A4a.1 Biodiversity, Habitats, Flora and Fauna

The purpose of this section is to provide an overview of the natural environment with respect to the various habitats and species present in each of the SEA areas. Each SEA area is summarised in section A4a.1.2, with attention paid to relevant conservation designations, their location and qualifying habitats and species in section A4a.1.3.

A4a.1.1 Regulatory Context

There is a wide range of international treaties and conventions, European and national legislation and other measures which have application in relation to the protection and conservation of species and habitats in the UK. These are summarised below as a context and introduction to the site listings which follow in section A4a.1.3.

Council Directive 79/409/EEC of 2nd April 1979 on the conservation of wild birds (Birds Directive), and *Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora* (Habitats Directive) have together formed a backbone to EU internal policy on the protection of biodiversity. The Habitats Directive requires the creation of a network of protected areas ("European Sites") known as "Natura 2000" sites. This network consists of Special Areas of Conservation (SACs) to protect habitats and species listed under the Habitats Directive and Special Protection Areas (SPAs) to protect wild birds as set out under the Birds Directive. The Directives also contain requirements for the protection of listed species ("European Protected Species").

The *Conservation (Natural Habitats &c.) Regulations 1994 (as amended)* transpose the Habitats Directive into legislation in England, Wales and Scotland. The *Wildlife and Countryside Act 1981 (as amended)* (WCA) is one of the principal pieces of legislation relating to nature conservation in Great Britain. The WCA is supplemented by various other pieces of legislation including the *Countryside and Rights of Way (CRoW) Act 2000* (in England and Wales), and the *Nature Conservation (Scotland) Act 2004* (in Scotland). This legislation provides for the protection of species and the designation of nationally important sites known as Sites of Special Scientific Interest (SSSI) in England, Wales and Scotland. Many SSSIs are also designated as European Sites.

A4a.1.2 Environmental Summaries of Relevant Regions of England, Wales and Scotland

A4a.1.2.1 Scotland (Natural Zones)

Scottish Natural Heritage identified a series of Natural Zones as part of their Natural Heritage Futures initiative, and used these areas to describe a vision for sustainable use of local natural heritage. Twenty one areas were identified in total, each having their own identity resulting from the interaction of geology, landforms, wildlife and land use.

For the purposes of this SEA, these Natural Zones provide a suitable level at which to describe relevant aspects of the Scottish Midlands environment. Relevant Natural Zones are highlighted in Figure A4a.1. Table A4a.1 below provides details of the general character of each zone and identifies key habitats and features.

Figure A4a.1 – SNH Futures Natural Zones in Relation to SEA Area 1

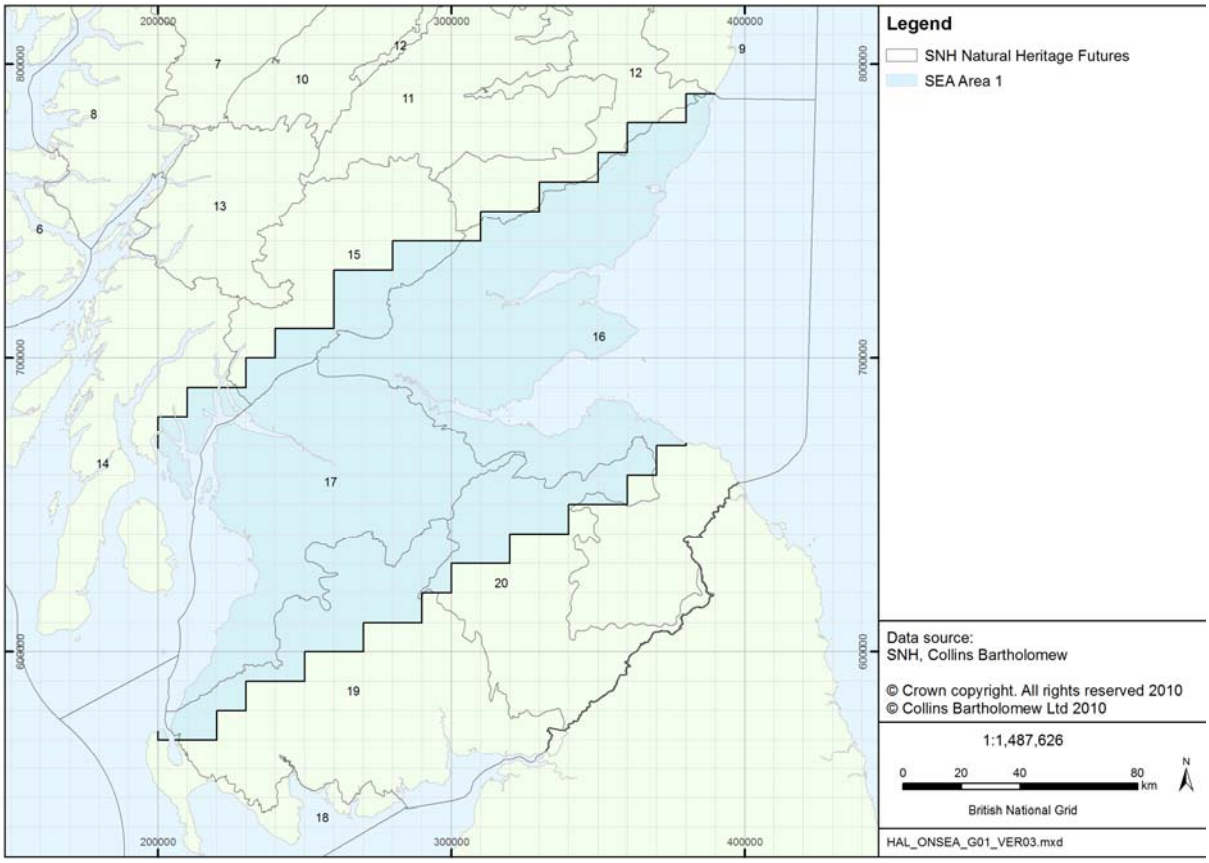


Table A4a.1 – Relevant SNH Futures Natural Zones in SEA Area 1

#	Natural Zone	Summary
		Scottish Midlands
16	Eastern Lowlands	The low coastline is backed by broad, flat farmed carseland, leading up to the sharply defined, steep sides of the major geological fault lines in the north and west. To the south, the boundary is softer with a more gradual transition to the rolling hills of the Borders. The east coast is deeply incised by the Firths of Tay and Forth. These rivers, along with the Tweed, are the largest in the region, running through wide flood plains to provide the area with rich arable land, allowing extensive areas of intensively managed farmland. The underlying geology and surface deposits in the region give great fertility to the soils of the Mearns and Strathmore, with rich coal and aggregate resources around Fife and the Firth of Forth. Plugs of volcanic rock form the isolated uplands characteristic of the Sidlaws, Ochils, Lomonds and Lothians. Coastal areas are characterised by a wide range of habitats including sandflats, mudflats, saltmarsh, brackish lagoons and reedbeds, offshore islands and cliffs. Other water resources include rivers, burns, lochs, small areas of standing water and mires. The largest areas of semi-natural habitat are found in upland areas with heather moorland and unimproved grassland. Woodland is absent from many areas where it would once have been extensive. The largest conurbations are Edinburgh and Dundee with industrial sites located along the coast and estuaries. Outside of these densely populated centred, the area is characterised by smaller towns and villages.
17	West	Beyond the Greater Glasgow conurbation, the dominant impression is that of a

	Central Belt	well-populated, intensively managed, working landscape. It is predominantly lowland, but with discrete upland areas of grassland, heath, mire, oak/birch woodland, and scrub. Geological features of the region include productive coal measures, ironstones, limestones and oil shales which have been extensively worked. The human influence on the landscape is very apparent with field boundaries, stone dykes, hedgerows, and boundary trees all abundant. Agriculture is typically based on mixture of improved pasture and rough grazing, with more intensive agriculture restricted to drier parts such as Ayrshire. The River Clyde along with its estuary and tributaries is a key feature with broadleaved woodland associated with the principal river systems. Freshwater lochs, many of which are used as reservoirs, are widespread and there are numerous and extensive canals in the area. The Inner Clyde Estuary is heavily urbanised and industrialised but opens out into extensive mudflats, sand and shingle, interspersed with coastal grassland and saltmarsh which are important for wintering wildfowl and waders. The area is the hub of the country's transport infrastructure. The industrial heritage of the region has resulted in a large number of closed mines, waste tips, coal and oil-shale bings, leaving contaminated, vacant and derelict land.
19	Western Southern Uplands and Inner Solway	The landscape is characterised by large, smooth, domed hills dissected by steep-sided valleys and broader glens. Undulating foothills have gently rounded summits in the east and craggier peaks to the west. Plateau moorland in the west is typically bleak, with waterlogged soil, nutrient poor lochs and numerous streams. Woodland is dominated by large-scale conifer plantations, with remnants of native oak, ash and elm woodland remaining in upland areas. The coal measures of southern Ayrshire and southern Lanarkshire support open-cast mining. Small settlements are mainly located along river valleys or in mining districts. Open ground is typically acid grassland or heather moorland with bracken and blanket bogs, important breeding habitats for birds of prey and waders, abundant. Mountain heath, with characteristic arctic/alpine flora, is found on the highest ground. Several important rivers including the Clyde and the Doon have sources in the uplands.
20	Border Hills	Narrow valleys with steep sides cut through rounded hills along with and areas of high level plateau are typical of the border region. Heather moorland, blanket bog, grass heath and modern conifer forests cover hilly ground, while more productive grasslands and native woodland are present in river valleys. Characteristic landscapes are of hill farms, valley, forests and the large houses of landed estates. The border region includes the largest area of montane plateau ground over 600m in southern Scotland and associated arctic-alpine flora is present. Blanket bog occurs above 500m on flatter hill slopes with occasional species rich calcareous flushes. At lower altitudes, more freely draining valley slopes support heather moorland. Below unenclosed uplands, most semi-natural habitats are fragmented by intensively farmed land. Most native woodland area has been lost although small pockets remain, restricted to steep slopes. In their place, extensive conifer plantations have developed. Rivers in the region include the Tweed, Annan, Esk and Liddel, which are important habitats for salmon and trout. Most areas of human habitation are concentrated along the valleys with the upland areas relatively undeveloped, except for a growing number of windfarms.

Source: Gordon et al. (2002), SNH (2002a-d)

A4a.1.2.2 England (Natural Areas)

Natural England (previously English Nature) has defined 120 (97 terrestrial, 23 marine) geographical areas of the English countryside, distinguished on the merit of their wildlife and other natural features, and also on historic land-use pattern. The boundaries of these zones should be considered as broad transition zones rather than hard, defined edges. The

purpose of these areas is to characterise areas of England for their natural features outside, but inclusive of, the network of protected, designated sites (e.g. SPAs, SACs, SSSIs). Natural Areas have been formally defined as "biogeographic zones which reflect the geological foundation, the natural systems and processes and the wildlife in different parts of England, and provide a framework for setting objectives for nature conservation" (UK Biodiversity Steering Group 1995).

Figure A4a.2 highlights those Natural Areas of relevance to the current SEA. Table A4a.2 below provides details of the general character of each area.

Figure A4a.2 – English Nature Natural Areas Relevant to SEA Areas

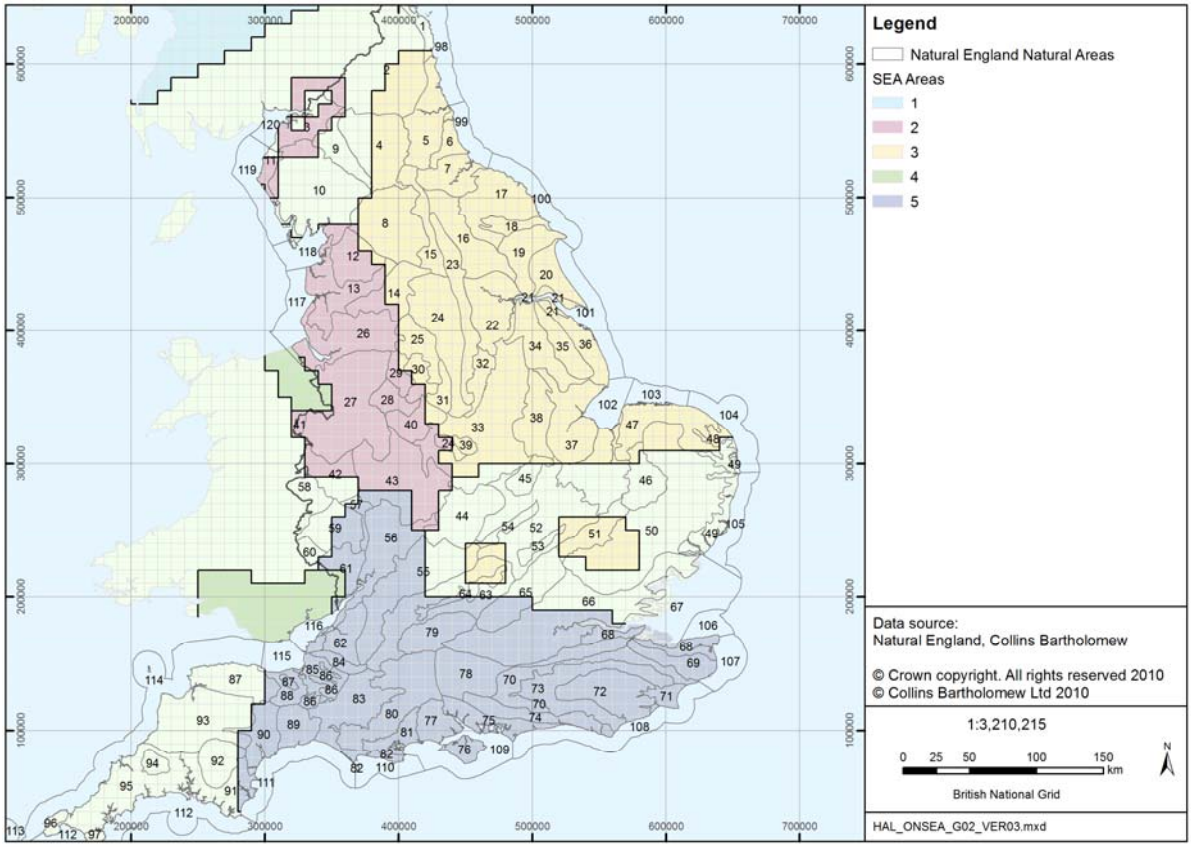


Table A4a.2 – English Nature Natural Areas Relevant to SEA Areas 2, 3 and 5

#	Natural Area	Summary
SEA area 2: West Midlands, North West England and Southern Scotland		
3	Solway Basin	Intensively cultivated area situated between the Cumbria High Fells and Dales, the Eden Valley and the Border Uplands to the south and east, and the Solway Firth. Most of the area is mixed dairy and livestock farming with some arable. Towards the coast there are large areas of lowland raised mire. There are extensive areas of estuarine lowland raised mires along the southern edge of the Solway Firth, other basin mires, fens and marshy grasslands that are scattered thinly across the area.
9	Eden Valley	A landscape of enclosed, agricultural land and woodland between the Lake District Fells to the west, the Pennines to the east and the limestone country of Orton, Asby and the Yorkshire Dales to the south. To the north it merges into the coastal plain around Carlisle and the Solway. Semi-natural woodland is mostly associated with the river valleys and stream sides. There are several large conifer plantations. The area has outstanding aquatic and wetland habitats associated with the River Eden and its tributaries; the river gorge and valley woods, the few remaining heaths and mires, and the remaining examples of species-rich meadow and pasture.
10	Cumbria Fells and Dales	The mountains of the Lake District rise into the montane zone and include examples of high-level heaths, grasslands and rock and scree communities. The submontane zone has heath, grassland and mire communities and locally extensive woodlands which are rich in Atlantic bryophytes. Lakes, tarns and rivers are a very important component of the area and associated habitats include swamps and marshy grasslands. In the lowlands, woodland forms significant cover both on acid rocks and on the extensive outcrops of limestone. Grasslands include a range of communities and those on limestone are of particular interest. Some of the most important areas of limestone pavement in Britain occur here.
11	West Cumbria Coastal Plain	The area the agriculture is rich dairy pasture land but to the north this gives way to rougher grazing for sheep and beef cattle. The wildlife interest of the area lies in the outstanding coastal habitats of saltmarsh, sand dune, shingle beaches and coastal cliffs, the mossland at the head of the Duddon Estuary, the coastal tarns, basin mires and wet grasslands, the rivers and lagoons, the valley woodlands, and the rougher wet grasslands to the north and east of Workington.
12	Forest of Bowland	High Millstone Grit-capped summits and expansive areas of wild, open rolling heather moorland and blanket bog managed principally for grouse and sheep. Provide habitat for important populations of red grouse, hen harrier, merlin, peregrine and golden plover. Moorland incised by steep, wooded river valleys and surrounded by a soft, undulating landscape with rush-filled pastures, herb-rich hay meadows and broadleaved woodland, separated by lush agricultural grassland, parkland and water bodies.
13	Lancashire Plain and Valleys	Intensively-farmed area with arable, horticulture and dairy farming. Fragmented remnants of habitats remain including peat bogs, meadows, ancient woodlands. Lakes, reservoirs and coastal grazing marshes support breeding and wintering waterfowl and waders. Numerous field ponds support great crested newt.
118	Morecambe Bay	At low water Morecambe Bay forms a vast expanse of intertidal sandflats with smaller areas of mudflat around Walney Island and the Lune Channel. Large area of saltmarsh fringes the Bay and is grazed by stock in most cases. Near-natural transitions between intertidal flats, saltmarsh, swamp and woodland are well displayed. Series of low limestone cliffs rising from the saltmarsh. Diverse fauna including internationally important wintering wildfowl.

#	Natural Area	Summary
14	Southern Pennines	See East Midlands and Eastern England for details.
24	Coal Measures	See East Midlands and Eastern England for details.
26	Urban Mersey Basin	Very densely populated area with the major cities and industries developing around the rivers Mersey and Irwell and associated network of canals, rivers and valleys. Most of the habitats have been modified and created by human activity. Important often fragmented habitats include raised bogs, ancient woodlands and heathland. Great crested newts occur in network of ponds.
117	Liverpool Bay	The hinterland of Liverpool Bay is heavily developed with both industrial and residential areas prominent along the coastline. Intervening stretches of relatively unprotected coast of great importance. Dee, Mersey and Ribble estuaries among the largest in Britain with extensive areas of mudflats, sandflats, saltmarsh and grazing marsh. Support very high numbers of wildfowl, waders, seaduck and divers during winter, and during the spring and autumn migration periods. Sand dunes dominate the Sefton Coast.
27	Meres and Mosses	Important wetland area extending from Shrewsbury in the south to the Knutsford area in the north, as far east as central Staffordshire and as far west as Wrexham. The rural landscape in which they occur is a gently undulating plain broken by sandstone ridges with agriculture the main land use. Wetland habitats include open water, swamp, fen, alder carr, marshy grassland and peat bog.
28	Potteries and Churnet Valley	The sprawling conurbation of the Potteries contrasts with the wild landscape of the uplands to the north; the sheltered, wooded valleys and pastures of the Churnet Valley to the south-east, and the rural landscape of the Staffordshire/Cheshire plain to the south and west. Industrial expansion of the Potteries towns powered by the underlying, mineral-rich geology of the Coal Measures. Despite the considerable impact of industry, substantial areas of semi-natural habitat remain, principally in the steep-sided valleys of the River Churnet and its tributaries. Also largely unmodified, ancient countryside of small fields and well-developed hedgerows.
29	South West Peak	Landscape characterised by Millstone Grits and Coal Measures formed during the Carboniferous period. Mosaic of closely related landform and vegetation patterns including extensive tracts of wild, heather-dominated moorland and blanket bog with wooded cloughs. Around the small-scale enclosed farmsteads there are meadows, rushy pastures and more productive farmland. The area is important for moorland breeding birds and ground nesting waders.
30	White Peak	See East Midlands and Eastern England for details.
40	Needwood and South Derbyshire Claylands	Woodlands are a distinctive feature with the remaining woodland consisting of fragments around the former forest of Needwood. Parklands are also a significant feature of the landscape. The principal river draining the area is the Dove, which has a broad floodplain of low-lying, wet meadows. Formerly these were much more widespread particularly along the floodplains of the rivers Trent and Dove. Small, isolated fragments of traditional hay meadows remain.
41	Oswestry Uplands	The character of the Oswestry Uplands Natural Area lies in the undulating landscape of Carboniferous Limestone hills with calcareous grasslands and occasional rocky outcrops together with steep wooded valleys with marsh and fen habitats on the valley floor. This has resulted in a diverse assemblage of rare and uncommon flora and fauna. Changes in land management practice however, have caused some decline in the nature conservation interest within the Natural Area.

#	Natural Area	Summary
43	Midlands Plateau	Mineral wealth of the area was a major factor in the development of the Midlands Plateau as an industrial area and the area has an outstanding variety of geological features. On the sandstone, heathlands predominate, e.g. Cannock Chase and Sutton Park. Unimproved grasslands, although relatively rare, also a feature of the area. Habitats in urban areas include remnants of semi-natural habitats such as valley mires and ancient woodlands, meadows and ponds.
SEA area 3: East Midlands and Eastern England		
1	North Northumberland Coastal Plain	Low-lying land running northwards from the Coquet valley to the River Tweed, and westwards to the Fell Sandstone moorland edge and low-lying land in Tweed valley. Characterised by an open agricultural landscape with Whin Sill outcrops and the river valleys of the Coquet, Aln, Tweed and Till. Broadleaved woodlands largely confined to these river valleys.
2	Border Uplands	Upland rolling moors of Northumberland and north-east Cumbria. Extensive open landscape of moorland and blanket bog. Farming dominated by sheep and cattle, with game management important at higher altitudes. Agricultural improvement, heavy grazing and drainage locally gives rise to acidic grasslands and extensive areas of purple moor grass-dominated moors, but the remaining moorlands are of high landscape and ecological value. Commercial forestry widespread.
4	North Pennines	Upland bogs blanket the open moorland with mosaics of heather, cotton-grass, bilberry, bracken and acid grassland and associated species. Geological features include exposures of Whin Sill, limestone caves and pavements and the area's rich mining heritage stems from veins of lead and zinc deposited in the limestone. Semi-improved pastures and hay meadows of the low-lying dales contain flower-rich meadows which attract snipe, redshank, curlew and lapwing. Alder, ash and oak woodland found in sheltered areas, gorges and valley sides.
5	Northumbria Coal Measures	Carboniferous Coal Measure rocks underlie this lowland area. The area has been worked for coal and associated minerals since Roman times and industrial developments and transport routes have developed to use the local products. River valleys provide important wildlife and habitat features within an intensively managed landscape. Heathlands, wetlands and flower-rich grasslands scattered through the area with ponds, often formed by mining subsidence of value for birds.
6	Durham Magnesian Limestone Plateau	Coincides with outcrop of Permian Magnesium-rich limestone escarpment. Predominantly agricultural in character. Urban areas include Sunderland, Peterlee and Newton Aycliff. Industrial character of the area shown by the many Limestone quarries and coal spoil heaps. Semi-natural habitats are concentrated on the limestone escarpment and the coast.
7	Tees Lowland	Considerable land-claim from the Tees Estuary but remnants exist including grazing marsh, open water and wetlands. Large areas of the Lower Tees are dense conurbation. In the south, there are internationally important rocks of Jurassic age and Pleistocene submerged forests. The land rises to the south to meet the North York Moors at an abrupt escarpment characterised by mixed woodland on the face and steep-sided gill woodlands. To the north and north-west the land rises gradually onto the Magnesian Limestone ridge. In places, the steep valleys of the Tees and the Leven retain characteristic ancient woodlands.
98	Northumberland Coast	Unusually high habitat diversity when compared with the majority of the North Sea coast. Varied nature derives from variety of rock and sediment types, including sandstone, limestone and hard volcanic rock. Extensive areas of intertidal sediment flats at Lindisfarne support extensive beds of eelgrass. Diverse hard rock reefs support rich benthic communities. Farne and Coquet Islands support important breeding and wintering colonies of seabirds and grey seals.

#	Natural Area	Summary
99	Tyne to Tees Coast	Varied coastline including limestone cliffs, rocky shore platforms, headlands and sandy bays, and sand dunes. Some mudflats survive on the tidal part of the Tyne and Wear, and Tees Estuary. Dumped coal waste forms a covering in the subtidal reaching up to the extreme high tide level.
8	Yorkshire Dales	Upland landscape of rounded hills and moors separated by broad valleys cut into Carboniferous rocks of limestone, millstone grit and shale. Geologically the area is considered to be outstanding for its 'karst' (limestone) landforms, cave systems and exposures of Carboniferous rocks. Habitats of international importance include limestone pavements and grasslands, blanket bog, upland heathland and upland hay meadow grasslands. Smaller areas of raised bog, fen and open water. Moorland supports important populations of grouse, merlin and golden plover.
12	Forest of Bowland	See West Midlands and North West England for details.
14	Southern Pennines	Upland areas of heather-dominated moorland, blanket bog and acid grassland. In places the effects of past enclosure, present-day overgrazing and past atmospheric pollution have reduced the once varied moorland vegetation to one dominated by purple moorgrass, cotton-grass and mat-grass. Many reservoirs are present providing valuable wintering and breeding habitat for wildfowl and waders. Fast-flowing streams drain the moorland plateau, cutting steeply inclined ravines into the surrounding hills with wet grasslands and varied woodlands present.
15	Pennine Dales Fringe	Rolling landscape forming the transition between the Pennines to the west and the lowlands to the east. Numerous small rivers drain the land and cut into the Carboniferous gritstone and limestone rocks before flowing into the five major rivers (Tees, Swale, Ure, Nidd and Wharfe) that cross the area. Characterised by pastoral agriculture with some mixed and arable farming on the main floodplains.
16	Vale of York and Mowbray	Predominantly flat, open land between the Pennines to the west and the North York Moors and Yorkshire Wolds to the east. Area's character influenced by widespread glacial deposits and the many rivers including the Derwent, Swale, Nidd, Ure, Wharfe and Ouse, which flow into the Humber Estuary. Riverine habitats, (e.g. the Lower Derwent Valley) are of nature conservation importance as are heathlands within the dominant arable land or improved grassland.
17	North York Moors and Hills	Underlying geology of uplands is sandstone and shale with a belt of limestone exposed along the southern edge. Large expanse of open heather moorland of considerable importance for its vegetation and breeding birds, especially golden plover and merlin. The area is dissected by numerous valleys supporting a mosaic of largely improved grasslands, semi-natural woodland, fast-running rivers and bracken on the slopes. Remnants of species-rich limestone grassland and calcareous fens in south. Some large tracts of conifer plantations.
18	Vale of Pickering	Low-lying, east-west plain bounded by the escarpment of the Yorkshire Wolds to the south, and the foothills of the North York Moors to the north. Rivers are a dominant influence in the landscape although most of the river habitats have been modified to some degree. The River Derwent is particularly important for its floodplain grasslands that support breeding and wintering bird populations.
19	Yorkshire Wolds	Undulating hills dissected by a large number of dry valleys, forming a characteristic chalk karst landscape. Intensively cultivated with crops but there are still numerous hillsides with floristically rich grasslands. Small number of ancient woods of nature conservation importance. Important chalk springs and streams support distinctive plants and insects. Jurassic and Cretaceous

#	Natural Area	Summary
		sediments of geological importance.
100	Saltburn to Bridlington	Coastline largely dominated by hard cliffs of chalk, limestone and sandstone with some soft cliffs of boulder clay. The high chalk cliffs of Flamborough Head support important seabird breeding populations. Wave-cut chalk platforms support a unique diversity of algal species.
20	Holderness	Low-lying plain of boulder clay, interspersed with areas of glacial gravel and sand. The hollows of the hummocky impervious clay once supported many pools and lakes, of which only Hornsea Mere (internationally important for birds) now remains. The River Hull fed by calcareous springs in the Yorkshire Wolds supports a variety of wildlife associated with the river and adjacent wetlands.
21	Humber Estuary	The Humber Estuary is 120km long, 14km at its widest point and drains one-fifth of the land mass of England. Supports a variety of coastal habitats including saltmarsh and mudflats. Ranks amongst the top five British estuaries for the size of the visiting waterfowl populations that overwinter and it is internationally recognised for its bird interest.
101	Bridlington to Skegness	The soft cliffs of Holderness which are subject to a high rate of erosion provide valuable material to sustain natural and man-made features within this maritime area. Diverse range of coastal habitats, including saline lagoons, saltmarsh, sandflats, mudflats, sand dunes and shingle bars, support an abundance of wildlife.
22	Humberhead Levels	Open, flat plain dominated by the major river systems of the Ouse and Trent which feed the western end of the Humber Estuary. Parts are now below sea-level and are maintained as agricultural land by pumping with fields bounded by dykes and hedgerows. Important peatlands of Thorne, Crowle, Goole and Hatfield Moors. Floodplain grasslands and localised areas of fen and reedbeds also important.
23	Southern Magnesian Limestone	Much of the light and dry soils have been cultivated leaving only small remnants of original vegetation. The unimproved grasslands and ancient woodlands harbour a rich flora, with associated scrub being important for insects. Base-rich flushes, rivers and streams form important wetland features. Quarries, cuttings, gorges and natural outcrops expose important geological sections in the limestone.
24	Coal Measures	Characterised by dense populations centred on a number of towns and cities that developed largely as a result of the underlying coal fields. Associated shales of geological importance as yield rich fossil floras. Gently undulating topography and the network of towns and cities is characterised by a matrix of acidic ancient and secondary woodlands, valley wetlands, neutral and acid grasslands, and mixed agriculture. Canals, mill-ponds and natural rivers are also important features.
25	Dark Peak	Upland heathland and blanket bog support nationally important breeding populations of golden plover, dunlin, merlin and short-eared owl. Rough grassland, hay meadow and pasture support lapwing, curlew and twite. Characteristic steep-sided valleys or cloughs with fast-flowing streams. Woodland largely confined to the cloughs and moorland fringes. Reservoirs are a characteristic feature. Geology dominated by Upper Carboniferous shales and sandstones.
29	South West Peak	See West Midlands and North West England for details.
30	White Peak	Distinctive area of pale Carboniferous limestone surrounded by dark gritstone moors. Gently rolling plateau dissected by steep-sided dales. The limestone or 'karst' scenery is dramatic with spectacular caves. Most important habitats are ancient ashwoods,

#	Natural Area	Summary
		calcareous grasslands and limestone rivers many of which hold populations of white-clawed crayfish. Plateau dominated by improved pasture but maintains characteristic drystone walls. Metal-rich grasslands, dewponds and hay meadows of nature conservation importance.
31	Derbyshire Peak Fringe and Lower Derwent	Small fast-flowing brooks run from the Dark Peak into the urban fringe of Chesterfield. Many of these were dammed in the past and these provide important habitats for pondweeds, great crested newts, migrating waders and breeding and wintering wildfowl. Mires and swamps are found along the river valleys. Woodland sparsely distributed, with concentrations in the narrow steep-sided valleys and isolated copses on higher ground. Mixed stock rearing with rough grazing and permanent pasture is the main land cover.
32	Sherwood	Land use dominated by agriculture and conifer plantations with only a small proportion of ancient or semi-natural woodland. Important wood pastures and heathland found in the parklands of the Dukeries. Wetlands are scarce with a few rivers, ornamental ponds, reedbeeds and marsh.
33	Trent Valley and Rises	Despite a large part of the area being under intensive agriculture, important habitats include neutral grassland and a number of acidic and calcareous grassland sites associated with local differences of geology. Wet floodplain grasslands along the Soar and Trent rivers support some of the richest wildlife and are important for birds. Important woodlands include ancient semi-natural stands, wet woodland and parkland. Standing water habitats of particular wildlife interest are restored gravel pits, reservoirs and canals; there are no natural large standing waters.
34	North Lincolnshire Coversands and Clay Vales	Comprises two broad lowland plains or clay vales separated by a watershed that stretch south from the Humber Estuary to the Wash. The majority of the area is either under intensive farming, conifer plantations or quarries, but important habitats include heathlands, inland sand dunes and ancient woods.
35	Lincolnshire Wolds	Rolling landscape that rises over 150m above sea level and is largely under arable cultivation. Important habitats include calcareous, acidic and neutral grasslands. River headwaters and chalk streams constitute the main aquatic and riparian habitats, with small areas of marsh and springline flushes in the steep river valleys. Little woodland remains in the Wolds.
36	Lincolnshire Coast and Marshes	Generally flat coastal plain that is largely under arable cultivation. Despite this, there are habitats rich in wildlife including meadow and pasture grasslands. Wet grasslands near the coast support large numbers of wildfowl and coastal birds but drainage has led to a loss of most of this habitat. Important freshwater habitats include streams, drainage ditches, blow wells and disused sea bank clay pit.
102	The Wash	Largest estuarine system in the UK where the Rivers Ouse, Nene, Welland and Witham drain into the North Sea. Despite large freshwater input, marine processes dominate its physical and biological character. Large area of intertidal mudflats and sandflats support the largest numbers of migrating waterfowl of any site in the UK. Largest colony of common seals in England and an important nursery ground for flatfish. Valuable fringing habitats of conservation significance include saline lagoons, shingle structures and dune complexes.
37	The Fens	Low-lying, level terrain which rarely reaches 10m above sea level. Land is predominantly cultivated with little natural or semi-natural habitat remaining. Rich soils and varied intensive agricultural use emphasise the scale and geometry of the land and produce strong seasonal colour changes within the landscape. Woodland cover is very sparse. Marshes, swamps and fens add

#	Natural Area	Summary
		a distinct character to the area with straight drainage channels exerting a strong influence in the landscape.
38	Lincolnshire and Rutland Limestone	Lot of woodland with broadleaved woodland, scrub and wood pasture all found. Small pockets of calcareous grassland. Freshwater habitats include rivers and streams and a few flooded sand and gravel pits important for breeding birds. Farming is the principal land use and the farms have some habitats important for wildlife including unimproved grasslands, hedges, streams, ponds and woodland copses. Quarrying of limestone has gone on since the Roman period.
39	Charnwood	The upper peaks formed from Precambrian rocks which contain internationally important fossils. Charnwood Forest has a variety of habitats including extensive woodlands, some of which are remnants of medieval parks, and acid grassland and lowland heath on the hills. Fast-flowing streams support rare animals such as the freshwater crayfish and brook lamprey, and three large reservoirs and their associated wetland habitats are important for breeding and wintering wildfowl.
40	Needwood and South Derbyshire Claylands	See West Midlands and North West England for details.
45	Rockingham Forest	Well-wooded area of higher ground between the Rivers Welland and Nene in Northamptonshire and the Soke of Peterborough. The land between the wooded areas is mainly arable with fragments of neutral grassland. Quarrying has been a feature of the area for many centuries for the extraction of limestone for building and ironstone for the local iron industry.
46	Breckland	Gently undulating plateau underlain by Cretaceous chalk. Important glacial features include patterned ground and ice depressions (pingos) of high geological and biological importance. The open landscape is important for its remaining heathland and acid/calcareous mosaics of grass-heath and associated species. Chalk rivers.
47	North Norfolk	The gravels, sands, chalk erratics and boulder clays left behind after the ice age determine natural vegetation patterns. Diverse habitats include heaths and mires in the north-west, a number of ancient woods and heaths with valley mires in the centre, and a disparate area of highly fertile soils ending in soft slumping coastal cliffs.
103	Old Hunstanton to Sheringham	Consists of the narrow strip of coastline along North Norfolk and the adjacent shallow seabed. Coastal habitats amongst the best in Britain with extensive sand dunes and saltmarshes and the biological and geomorphological interest of the barrier island of Scolt Head and the large shingle spit at Blakeney Point is outstanding. The mobile cliffs between Overstrand and Mundesley include some of the finest soft cliff habitat in Britain.
104	Sheringham to Lowestoft	Consists of a narrow strip of coastline and the adjacent North Sea. Cliffs between Sheringham and Happisburgh demonstrate the stratigraphy of the area and, through natural erosion, supply material to the dunes of nature conservation interest further south. West Runton possesses one of the few areas of intertidal rock in East Anglia, including the only well-developed chalk reef found between North Yorkshire and Kent.
48	The Broads	The low-lying land in the river valleys of the Bure, Yare and Waveney contains a number of habitats, both fresh and saline, including rivers and broads, floodplain fens, dykes and ronds (strips of land that lie between the river and flood embankment). Internationally important for a wide range of outstanding wildlife features including plant species, invertebrates and wintering waterfowl.

#	Natural Area	Summary
SEA area 5: Southern and South West England		
55	Cotswolds	Underlain by Jurassic Limestones of international importance for their fossils and stratigraphy. Area supports over 50% of the national resource of species-rich limestone grassland. Significant areas of ancient woodland.
56	Severn and Avon Vales	Low-lying, undulating plain through which the Rivers Severn and Avon, and their many tributaries, flow. Much of the land adjacent to the rivers still floods regularly in winter and there are relict wetland sites and features such as old pollards, wet pastures, ditches and tall hedges. Woodlands tend to be fairly small and are scattered throughout.
57	Malvern Hills and Teme Valley	Malvern Hills rise sharply from the Severn Valley floodplain to a height of about 400m. Hill tops covered by acid grassland and small areas of heathland, merging into bracken, scrub and woodland on the lower slopes. The River Teme, with its steep sides and wooded dingle valleys, has a narrow floodplain supporting arable and pasture land.
59	Central Herefordshire	Landscape predominantly lowland in character, with a few isolated flat-topped hills and a rolling plateau in the north-east. Large blocks of woodland occur on the more distinct hills and dingle woodlands occur where river sections run through a steep valley.
61	Dean Plateau and Wye Valley	Dominated by woodland with the largest areas of ancient semi-natural woodland in the Wye Valley and Woolhope Dome. Remnants of heathland found within some forested areas. Includes the middle and most of the lower sections of the River Wye, plus its many tributaries and numerous streams.
62	Bristol, Avon Valleys and Ridges	Characterised by alternating ridges and broad valleys with some steep wooded slopes and open rolling farmland. The large urban expanse of the city of Bristol dominates the central part. Important geological features include limestone caves and gorges. Important habitats include pockets of grassland, woodland and parkland and a number of reservoirs and rivers.
116	Severn Estuary	The immense tidal range (the second highest in the world) and classic funnel shape make the Severn Estuary unique in Britain and very rare worldwide. The intertidal zone of mudflats, sandbanks, rocky platforms and saltmarsh is one of the largest and most important in Britain. The estuarine fauna includes internationally important populations of waterfowl, important invertebrate populations and large populations of migratory fish.
63	Thames and Avon Vales	Gently rolling landscape with a mixture of arable and grass fields surrounded by thick hedgerows and interspersed with small woods. This is a very rural area with Oxford, Aylesbury and Swindon the only large built-up areas. Woodland is common on the slightly higher ground. Flooded gravel pits form a series of wetlands of high nature conservation value.
64	Midvale Ridge	Low band of limestone hills stretching east-west across the otherwise low-lying plain of the Thames and Avon clay vales. Soils are generally sandy and free-draining giving rise to a distinctive landscape of dry woodlands, sandy pastures and arable fields interspersed with many small settlements. Very important species rich habitats include calcareous fens and flushes and grassy heaths.
65	Chilterns	The chalk escarpment is a dominant geological and landscape feature which rises steeply from the Vale of Aylesbury. Habitats of importance for nature conservation comprise chalk downland and scrub, ancient semi-natural and secondary woodlands, and species-rich hedgerows with small areas of acid grassland.
66	London Basin	About one-third of the area is covered by London and the wildlife of the area is characterised by islands of semi-natural habitats. These habitats include large areas of woodland and heathland. Freshwater habitats include the River Thames and its tributaries, canals, flooded gravel pits reservoirs and associated wetlands.

#	Natural Area	Summary
67	Greater Thames Estuary	Coast and low-lying hinterland between the mouth of the Stour Estuary on the Essex/Suffolk border and the Swale Estuary in north Kent. Extensive saltmarshes and mudflats separated by man-made sea defences. Low lying areas were formerly subject to more frequent flooding, but are now mainly arable land, with much grassland and some substantial areas of grazing marsh. Urban development on the coast mainly confined to higher ground except in the inner Thames Estuary.
68	North Kent Plain	North of Canterbury, on the heavy clay soils and higher ground, is the heavily wooded area of the Blean. Further east on the gentle dip slope of the North Downs, the plain is rather poor in wildlife but is rich agricultural land. The chalk outlier that forms the Isle of Thanet characterised by an open, intensive arable landscape. Separating the above areas from each other are the floodplains of the Stour and Watsum, with low-lying marshes, reedbeds and wet grassland.
106	North Kent Coast	Much of the coast is of special conservation interest, comprising mainly unstable cliff and foreshore (shingle, sand and mudflats) with smaller areas of saltmarsh, coastal lagoons and cliff-top grassland. Internationally important numbers of sanderling and turnstone and nationally important populations of four more bird species. Supports about 10% of all the chalk coasts in northern European and is of international importance for its caves and reefs.
107	East Kent Coast	Important sand dune systems, chalk cliffs, cliff-top grassland, grazing marsh, saltmarsh, mudflats, sandflats and shingle foreshore. Nationally and internationally important populations of birds, including turnstone and little tern. The Natural Area is of international importance for its chalk marine cave and reef habitats.
69	North Downs	Extends across an outcrop of chalk from Farnham in the west to the white cliffs of Dover in the east. On the south-facing scarp slope, grazing has maintained a species rich grassland. North-facing dip slope has been agriculturally improved for arable farming and improved pasture. Many of the downland ridges are wooded with oak, ash, beech and yew. Patches of heathland on top of the Downs.
70	Wealden Greensand	Forms a conspicuous Greensand ridge running east to west across Surrey and Kent terminating in coastal cliffs at Folkestone Warren. Lowland heath is the most characteristic habitat. Many ancient woodlands have survived though often in fragmented patches and on steeper slopes. Several river valleys, notably the Arun, the Rother and the Wey support grazing meadows, marshy grassland, reedbeds and wet woodlands. Other habitats include dry acidic grassland and parkland.
71	Romney Marshes	Shingle beaches and flat marshland between Hythe in Kent and Pett in Sussex. Includes Dungeness, where the geomorphology, plants, invertebrates and birds are all of international importance. Human land use has been important in fashioning the present landscape, through the drainage of the marshes, military activity, gravel digging, and the construction of housing, roads and power stations.
108	Folkestone to Selsey Bill	Majority of coast very low-lying and heavily defended against flooding and erosion, although stretches of both chalk and clay cliffs exist. Apart from the cliffs much of the coastline is shingle. Muds and silts occur within Pagham Harbour and the estuaries of the Arun, Ouse, Cuckmere and Rother. Number of saline lagoons which support highly restricted lagoonal species. Wide range of birds such as wildfowl and waders in internationally important numbers. Chalk reefs occur below the chalk cliffs between Brighton and Eastbourne and continue some way into the sublittoral.
72	High Weald	Dominated by Lower Cretaceous sandstones and clays which form a landscape of high forested ridges and valleys. Numerous stream valleys and steep ravines and scattered outcrops of massive sandstone rocks. The Rivers Medway, Ouse and Rother flow through steep-sided valleys which are fundamental to the overall landscape character. Densely wooded with abundant

#	Natural Area	Summary
		semi-natural ancient woodland. Patchwork of small fields, hedges and sunken lanes. Important heathland in Ashdown Forest.
73	Low Weald and Pevensey	Predominantly low-lying region dominated by wet, heavy clay soils. Gently undulating topography, with steep-sided stream valleys, ridges and plateaux. Extensive ancient semi-natural woodland. Local areas of damp, neutral grassland support a rich meadow flora. Wetland habitats important component of the landscape and include rivers and streams, ponds and larger water bodies, and grazing marsh in the river floodplains, most notably Pevensey Levels.
74	South Downs	Underlain by chalk that extends from near Winchester to meet the sea at Beachy Head. Narrow, steep, mostly northerly-facing scarp of downland is broken only by the valleys of the Rivers Arun, Adur, Ouse and Cuckmere (and associated riverside habitats). Much of the south-facing slope has been cultivated for arable crops. Notable areas of chalk grassland, chalk heath and scrub on escarpment. Areas of ancient woodland concentrated in the west.
75	South Coast Plain and Hampshire Lowlands	Landscape split between the generally open, often featureless landscape of the coastal plain and the more varied landscape in the west. Although relatively small in extent, the south-facing slopes of Portsdown Hill support some high quality chalk grassland. The floodplains of the chalk rivers Test and Itchen contain some botanically rich neutral grassland and fen and fen-meadows occur.
76	Isle of Wight	The main habitats supported on the island include chalk grassland, neutral meadows, ancient semi-natural broad-leaved woodland and relict heathland and acid grassland. Important fossils from Lower Cretaceous to the Lower Tertiary sections and the cliffs and landslips support a number of rare plants.
109	Solent and Poole Bay	Despite its heavy industrial and recreational use, the area includes important natural and undisturbed lengths of coast. Extensive areas of intertidal mudflats, saltmarshes and shingle habitats support important numbers of migratory wildfowl and waders and resident seabird colonies. The area contains the highest density of brackish water lagoons in the country (15% of the national resource) which support a number of rare, specialist plants and animals. The coastline exposes a sequence of Cretaceous and Tertiary rocks of international importance.
77	New Forest	Open landscapes include the broad floodplain of the River Avon, the open marshes towards the coast and extensive tracts of heathland. More intimate enclosed landscapes are provided by the countryside of villages, hedged lanes, small fields, and coppice woodlands, grazed wood pastures and forestry plantations. The complex of heathland, mire and pasture woodland is unique and owes its character to the historic common grazing system.
78	Hampshire Downs	Part of the broad belt of chalk downland which runs through central southern England. Large scale landscape of open rolling country with broad, gently domed undulating plateaux dissected by both steep and shallow valleys, numerous distinct hilltops, ridges and scarps. The main habitats include extensive chalk grasslands, ancient woodlands, river valleys with chalk streams, and arable headlands.
79	Berkshire and Malborough Downs	Chalk downlands with important chalk grasslands and weathered sarsen stones. Key wildlife habitats are broadleaved woodland, wood pasture, grazing marsh and associated tall fen, the rich chalk rivers of the Kennet, Lambourne and Pang and the remaining fragments of biodiversity-rich arable land with its populations of rare plants and animals.
80	South Wessex Downs	Most notable habitats are chalk grassland including Salisbury Plain, chalk rivers, woodland and arable land, with smaller areas of meadow land and wetland habitats. The main geological features are chalk plateaux, scarp and dip slopes, clay with flints

#	Natural Area	Summary
		deposits and valleys, both dry and occupied by rivers and streams.
81	Dorset Heaths	Valley mires are a particular feature of the heathland and fen vegetation occurs in some of the river valley wetlands and on the edge of the heathland where the water is affected by the nearby chalk. Four significant rivers flow within floodplains through the area and these support important plant, insect and bird communities.
82	Isles of Portland and Purbeck	Calcareous grassland is the most extensive semi-natural habitat with fine examples on the chalk and limestone of Purbeck and Portland. Woods of various sizes scattered within the area with many of these ancient. Disused quarries and tunnels left behind by the stone quarrying industry provide valuable refuges for wildlife (e.g. bats).
110	South Dorset Coast	At Studland the sheltered chalk coastline supports important algal communities and beds of eelgrass. The southern Purbeck coastline is exposed and geologically varied and includes the Purbeck Marine Wildlife Reserve. Sea bed consists mainly of rocky reefs and ledges and coarse sand and gravel waves. Portland Harbour is a sheltered, enclosed bay and is of high scientific interest for its marine communities and species.
83	Wessex Vales	Characterised by abundance of small ancient woods linked by a network of species-rich hedges enclosing pastures and meadows. Deeply incised valleys contain streams and wet woodlands. Lowland wood pastures and parklands of international importance contain rare epiphytic lichens. The diverse range of habitats present including the mines and quarries of the Vale of Wardour are important for bats.
84	Mendip Hills	Underlain by limestone and supports characteristically species-rich grasslands and woodlands on thin soils. The geology of the area is important with fossil-rich exposures, caves and a spectacular limestone gorge. Large reservoirs in the area are important for their populations of wintering wildfowl. Caves and mines provide winter roosts for bats and the dormouse has one of its strongest British populations in the woods and hedgerows of the Mendip Hills.
85	Somerset Levels and Moors	Largest area of lowland wet grassland and associated wetland habitat remaining in Britain, covering about 35,000ha in the floodplains of the rivers Axe, Brue, Parrett and Tone. Used for summer cattle grazing often in conjunction with hay or silage production, with willow growing an important traditional activity. Supports internationally important numbers of waterfowl in winter and breeding waders.
115	Bridgwater Bay	A succession of limestones and shales of Triassic and Jurassic age form low cliffs from Blue Anchor to Hinkley Point. To the north the hard Carboniferous Limestone of Brean Down forms extensive sheer cliffs. Between Hinkley Point and Brean Down the estuaries of the Parrett and Brue cut through the low-lying alluvium of the Somerset Levels. Much of the grazing marsh below high tide mark and protected from tidal inundation by a combination of dune systems, shingle ridges and constructed earth banks.
86	Mid Somerset Hills	Steep hillsides rising above the Somerset Levels and Moors are the most characteristic feature of the area. Underlying geology is of Late Triassic and Early Jurassic sediments which contain many fossils. Habitats highly characteristic of the area include ash-maple woodlands, calcareous grasslands and neutral grasslands. These habitats are linked to a system of hedgerows of high conservation value.
87	Exmoor and the Quantocks	Exmoor is fringed by a ring of undulating hill slopes which, to the north, are truncated by the steep cliffs of the Bristol Channel Coast. Elsewhere the hills gradually fall away to merge with the surrounding rolling landscapes of the Culm Measures of Devon

#	Natural Area	Summary
		and Somerset. Numerous streams radiate from the central upland, many of them combining to form several major deep valleys, often wooded, cutting through hill slopes and creating the characteristic hog's-back ridges.
88	Vale of Taunton and Quantock Fringes	Comprises broad valley running between the Quantock and the Brendon Hills extending east to Bridgwater and the Somerset Levels. Underlying geology largely Permo-Triassic Mudstones. Woodland cover is low with most woods being small farm copses, however there are many trees and shrubs associated with ancient hedgerows. Semi-natural habitats are generally highly fragmented within a quite intensively farmed landscape. Linear features such as the hedgerows and the rivers and streams are critical in maintaining the wildlife interest of the area.
89	Blackdowns	Plateaux area which includes the catchments of the rivers Culm, Axe and Otter. Many of the valleys have a network of small, hedge-lined fields that are generally used for pasture, although other land uses include forestry and tourism. Underlain by Cretaceous Upper Greensand, although some of the westernmost outcrops of Chalk in England also occur. Important habitats include lowland heathland, wet heath and acid grassland, purple moor-grass and rush pastures and other mires. One of the most important Natural Areas for ancient and species-rich hedgerows.
111	Lyme Bay	Comprises over 150km of the most varied, spectacular and ecologically important coastline in England. The variety and interest relates to the complex geology, which is renowned for its layers of Jurassic rock with fossil remains. Important coastal habitats include shingle ridges, sand dunes, estuaries, brackish lagoons, soft and hard sea cliffs, and woodland. The Fleet, a large saline lagoon, supports several nationally rare and scarce species.
90	Devon Redlands	Characterised by the New Red Sandstone Rocks which underlie the area around Exeter, including the lower catchment of the River Exe and a significant part of the River Otter catchment. Lowland area dominated by mixed farmland with a scattering of towns and villages including Exeter City. The area is of international importance for its lowland heathland. Other notable habitats include ancient woodland, hedgerows, rivers, canals, lush fens and wildflower-rich grasslands.
91	South Devon	Undulating landscape of rolling hills dissected by numerous river valleys. Geology of the area is of considerable significance, particularly in quarry, mine and coastal exposures. Lowland heathland, species-rich neutral and calcareous grasslands, freshwater marsh and lagoons are of national importance. Other notable habitats include ancient woodlands, lowland farmland and hedgerows, ponds, rivers and streams and urban habitats, particularly in Plymouth and Torbay.
92	Dartmoor	Largest area of unglaciated moorland in Britain and also the largest granite massif in England. The moor is of international importance for its blanket bogs, upland heaths and valley mires and supports breeding populations of several upland birds at the extreme southern edge of their range in Europe. Other important wildlife habitats include upland oak woodland, Rhos pasture and fast-flowing rivers.
93	The Culm	The Culm Measures are named after the Carboniferous slates, shales and sandstones which underlie the area. Predominant land use is grass production for livestock. Contains one the greatest concentrations of species-rich grasslands remaining in the UK of Rhos pastures, known locally as Culm Grassland. Fields separated by a rich network of species-rich hedges and copses which support much biodiversity. Three major rivers cross the Culm Measures, the Taw, Torridge and Tamar, and together these support the greatest density of otters in England.

Source: Natural England Natural Areas Webpage (http://www.naturalareas.naturalengland.org.uk/)

A4a.1.2.3 Wales

The environmental information for North and South Wales described in Table A4a. 3 was mainly taken from relevant unitary development plans, as to date, environmental summaries similar to the SNH Natural Zones and EN Natural Areas described above are not readily available for Wales. Further information on these plans can be accessed through the UK Government Planning Portal website (http://www.planningportal.gov.uk/).

Table A4a. 3 – Summaries of North and South Wales

SEA region	Description
North Wales[1]	In general the region which includes Flintshire, most of Wrexham and eastern Denbighshire has close socio-economic links with the North west of England. Important landscape features include the River Dee, its floodplain and estuary and the Clwydian Hills. Coastal areas of the Dee estuary characterised by areas of traditional industrial development and large urban centres. The estuary also supports internationally important wintering and passage waterbird populations. Inland, the rural landscape of Flintshire varies through tracts of agricultural land, open common land, small wooded valleys to the slopes and upland habitats of the Clwydian Hills. The Clwydian Hills cover much of eastern Denbighshire with large tracts of high grade agricultural land located on the coastal plain and Vale of Clwyd. The coast also supports urban and traditional tourism centres such as Rhyl and Prestatyn with some areas suffering high levels of social deprivation. Bounded by the Clwydian Hills to the west, lowland areas of Wrexham characterised by hedgerows, river valleys, trees and woodland habitats with large tracts of agricultural land particularly along the River Dee flood plain. The area is rich in minerals with commercial extraction of limestone, sand and gravel extraction and small scale opencast coal extraction.
South Wales[2]	In general, characterised by a series of steep sided valleys radiating out behind a relatively flat coastal belt, on which stand the major population centres of Cardiff, Swansea, and Newport. The urban development of the valleys and coastal edge has a long association with coal extraction, oil, petrochemical and metal manufacturing industries. Many of these industries have now declined leaving a legacy of derelict and reclaimed land, as well as social deprivation and economic inactivity in some parts. Key habitats range from moorland and heathland habitats on higher ground, to localised areas of rich neutral and acid grassland and heathland known locally as 'rhos pastures', ancient and species rich hedgerows, pockets of ancient, ancient semi natural woodland and coniferous forest plantations in semi-upland and lowland areas. In the east, the valleys of the rivers Usk and Wye are important landscape features supporting internationally important riparian habitats and species. The low-lying Gwent Levels which extend from Chepstow to Cardiff contains important wetland habitats. The Severn Estuary represents an important landscape feature and supports internationally important coastal habitats and wintering and passage waterbird populations. Good quality agricultural land limited to the coastal plain including the Vale of Glamorgan, and parts of Bridgend, Swansea and Newport.

Source: [1]North Wales - Flintshire County Council Unitary Development Plan 2000-2015 Written Statement. Deposit Draft Plan September 2003. Denbighshire Unitary Development Plan. Wrexham Unitary Development Plan 1995-2011 (adopted Feb 2005). [2]South Wales - Revised Strategic Environmental Assessment of the Neath Port Talbot UDP March 2005. Gwent County Council Structure Plan 1991-2006, adopted March 1996. Caerphilly County Council Approved Unitary Development Plan (April 2003). The Vale of Glamorgan Council Adopted Unitary Development Plan 1996-2011. Merthyr Tydfil County Borough Council Local Plan, adopted May 1999. Monmouthshire County Council Local Plan, adopted May 1997. Newport County Borough Council Unitary Development Plan 1996-2011. Deposit plan November 1999. Blaenau Gwent Unitary Development Plan. Deposit written statement 2000.

A4a.1.3 Relevant Conservation Sites of National and International Importance

The suite of site designations implemented in the UK in order to conserve and manage certain key natural resources have already been described in section A4a.1.1 above. The following sections indicate the spatial distribution and status of SPA, SAC and Ramsar sites which reside within each of the SEA areas (Table A4a.4-Table A4a.18).

A4a.1.3.1 SEA Area 1

Figure A4a.3 – Sites of International Importance

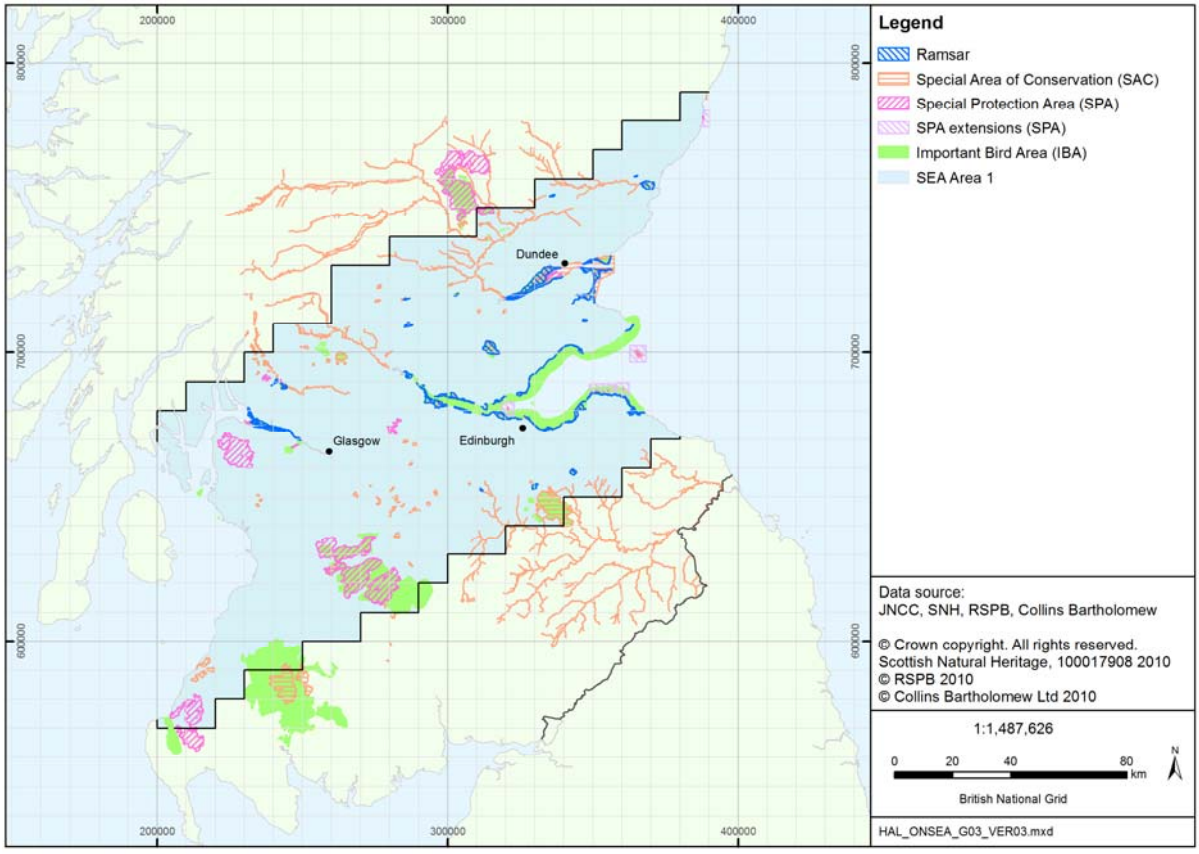


Figure A4a.4 – Sites of National and Local Importance

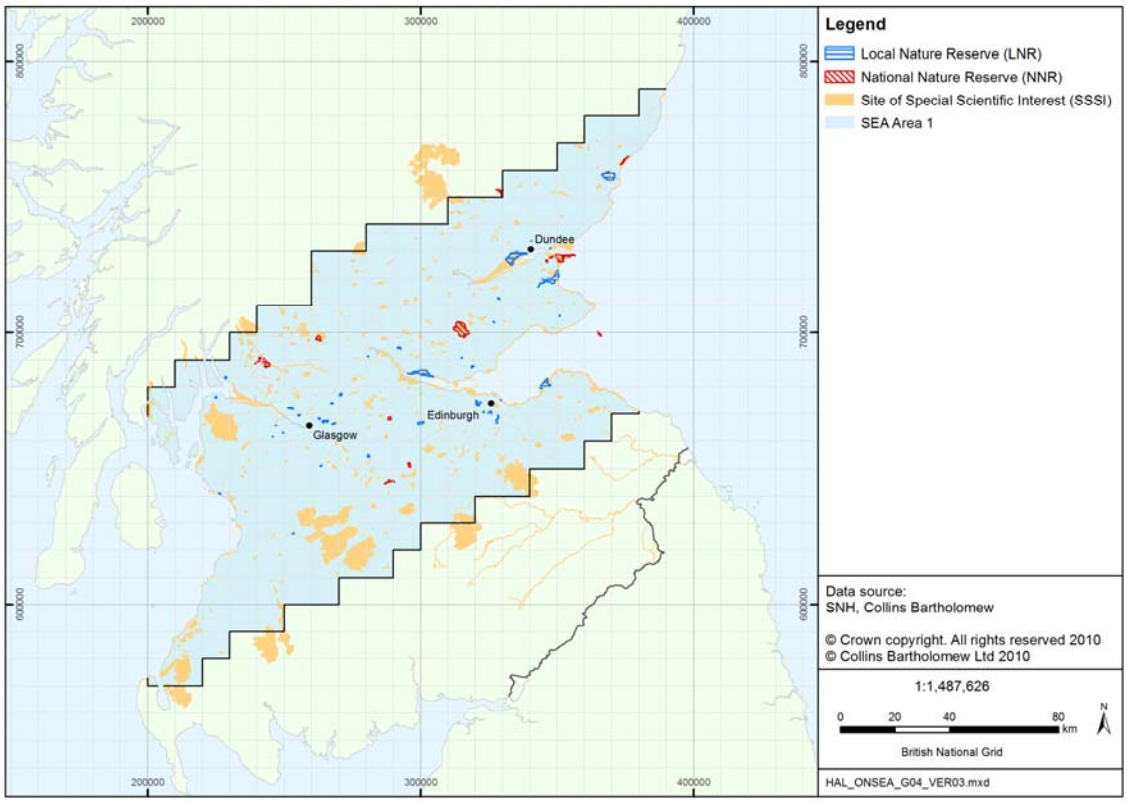


Table A4a.4 – Summary Details of Relevant Special Areas of Conservation (SACs)

SEA Area 1: Scottish Midlands					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
Garron Point UK0030356 02 10 08 W 56 59 00 N	15.58	**Primary:** N/A **Qualifying:** N/A	**Primary:** Narrow-mouthed whorl snail *Vertigo angustior* **Qualifying:** N/A	Use by the public; geologists, and people conducting information recreation. Changing pattern of grazing by rabbits and roe deer may be problematic. Parts of the site may be vulnerable to certain forms of marine oil pollution and rising sea-levels.	Signage informing users of snail colonies. The introduction of livestock may be advantageous provided erosion does not take place, which should be ensured through a management agreement.
Craigengar UK0012577 03 28 30 W 55 46 20 N	37.31	**Primary:** N/A **Qualifying:** European dry heaths, Species-rich *Nardus* grassland, on siliceous substrates in mountain areas (and submountain areas in continental Europe)	**Primary:** Marsh saxifrage *Saxifraga hirculus* **Qualifying:** N/A	Drainage operations.	Continuation of low-intensity grazing.
Dunkeld–Blairgowrie Lochs UK0012638 03 33 15 W 56 34 30 N	428.09	**Primary:** Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea* **Qualifying:** Transition mires and quaking bogs	**Primary:** Slender naiad *Najas flexilis* **Qualifying:** Otter *Lutra lutra*	Nutrient inputs. Quaking bogs and transition mire can sustain only low levels of physical disturbance and require high water table	Dependent on maintaining low levels of dissolved nutrients.
River Tweed UK0012691 02 47 30 W 55 36 00 N	3,797.41	**Primary:** Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation **Qualifying:** N/A	**Primary:** Atlantic salmon *Salmo salar, otter Lutra lutra* **Qualifying:** Sea lamprey *Petromyzon marinus*, brook lamprey	Pollution, acidification and eutrophication, river-works and bankside management, genetic pollution and disease, abstraction and impoundment	Water Framework Directive, River Tweed Catchment Management Plan, SEPA and EA management.

SEA Area 1: Scottish Midlands					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
			Lampetra planeri, river lamprey *Lampetra fluviatilis*	management.	
Flanders Mosses UK0012902 04 12 00 W 56 09 30 N	1,073.58	**Primary:** Active raised bogs **Priority feature*, degraded raised bogs still capable of natural regeneration **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Drainage.	Part of site is a National Nature Reserve (NNR). Management Agreement in place for programme of ditch-blocking and scrub removal.
Barry Links UK0013044 02 45 00 W 56 28 45 N	789.69	**Primary:** Embryonic shifting dunes, shifting dunes along the shoreline with Ammophila arenaria (`white dunes`), fixed dunes with herbaceous vegetation (`grey dunes`) **Priority feature*, Atlantic decalcified fixed dunes (Calluno-Ulicetea) **Priority feature*, humid dune slacks **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Overgrazing.	Joint MoD/SNH Concordat includes grazing management, an SSSI and scrub management plan. There is also an active Conservation Group.
Clyde Valley Woods UK0013089 03 47 50 W 55 43 00 N	434.66	**Primary:** *Tilio-Acerion* forests of slopes, screes and ravines **Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Non-native tree and shrub species invasion. Overgrazing, uncontrolled dumping of refuse.	NNR management plan to encourage native broad-leaved woodlands.
Loch Lomond Woods UK0013573 04 40 45 W	1,454.33	**Primary:** Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles **Qualifying:** N/A	**Primary:** N/A **Qualifying:** Otter *Lutra lutra*	Non-native tree and shrub species invasion. Overgrazing.	Woodland Grant Schemes, NNR management plan.

SEA Area 1: Scottish Midlands					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
56 12 00 N					
Lendalfoot Hills Complex UK0013592 04 53 15 W 55 11 29 N	1,309.71	**Primary:** Species-rich *Nardus* grassland, on siliceous substrates in mountain areas (and submountain areas in continental Europe) **Priority feature*, alkaline fens **Qualifying:** Northern Atlantic wet heaths with Erica tetralix, European dry heaths, calaminarian grasslands of the Violetalia calaminariae, transition mires and quaking bogs	**Primary:** N/A **Qualifying:** N/A	Changes in agricultural practices (e.g. artificial fertilisers).	Dependent on differing grazing and management regimes. Approximately 50% of site covered by management agreements.
Whitlaw and Branxholme UK0013594 02 47 38 W 55 33 00 N	40.71	**Primary:** Transition mires and quaking bogs **Qualifying:** Alkaline fens	**Primary:** Slender green feather-moss *Drepanocladus* (*Hamatocaulis*) *vernicosus* **Qualifying:** N/A	Agricultural activity accelerating rate of change in wetland sites from open water through fen to carr woodland.	Whitlaw is a NNR and Branxholme subject to a Management Agreement.
Bankhead Moss, Beith UK0019756 04 38 00 W 55 43 10 N	32.5	**Primary:** Active raised bogs **Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Overgrazing.	Owned by MOD and situated on a Royal Naval Armaments Depot, and is therefore well protected from any damage.
Black Loch Moss UK0019757 03 50 00 W	108.42	**Primary:** Active raised bogs **Priority feature* **Qualifying:** Degraded raised bogs still capable of natural regeneration	**Primary:** N/A **Qualifying:** N/A	Drainage, burning, overgrazing.	Management agreement to conserve and promote diversity of peatland plant communities. Restricts activities such as drainage and burning and controls grazing levels.

SEA Area 1: Scottish Midlands					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
55 54 20 N					
Blawhorn Moss UK0019758 03 47 00 W 55 53 40 N	109	**Primary:** Active raised bogs **Priority feature* **Qualifying:** Degraded raised bogs still capable of natural regeneration	**Primary:** N/A **Qualifying:** N/A	Drainage, fires.	NNR Management Plan addresses potential problems such as fires. Installation of dams and drain-blocks on all the manmade drains and erosion gullies.
Braehead Moss UK0019759 03 39 30 W 55 44 40 N	122.6	**Primary:** Active raised bogs **Priority feature* **Qualifying:** Degraded raised bogs still capable of natural regeneration	**Primary:** N/A **Qualifying:** N/A	Overgrazing.	NNR Management Plan.
Coalburn Moss UK0019760 03 51 50 W 55 36 15 N	224.32	**Primary:** Active raised bogs **Priority feature* **Qualifying:** Degraded raised bogs still capable of natural regeneration	**Primary:** N/A **Qualifying:** N/A	Drainage, non-native tree species and scrub encroachment.	Several Management Agreements are either in place or being negotiated which include the removal of coniferous woodland and invading scrub, and the blockage of drains.
Cockinhead Moss UK0019761 04 36 30 W 55 42 10 N	48.4	**Primary:** Active raised bogs **Priority feature* **Qualifying:** Degraded raised bogs still capable of natural regeneration	**Primary:** N/A **Qualifying:** N/A	Drainage, invasive tree scrub, fires, peat extraction.	Part of this raised bog covered by a Management Agreement to conserve and promote the development of the range of peatland habitats.
Cranley Moss UK0019762	101.27	**Primary:** Active raised bogs **Priority feature* **Qualifying:** Degraded raised bogs still capable of natural	**Primary:** N/A **Qualifying:** N/A	Drainage, invasive tree scrub, fires, peat extraction.	Management Agreements to conserve and promote the development of the diversity of peatland habitats.

SEA Area 1: Scottish Midlands					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
03 40 30 W 55 42 30 N		regeneration			
Dykeneuk Moss UK0019763 04 37 50 W 55 41 20 N	61.64	**Primary:** Active raised bogs **Priority feature* **Qualifying:** Degraded raised bogs still capable of natural regeneration	**Primary:** N/A **Qualifying:** N/A	Drainage, invasive tree scrub, over-grazing.	Management Agreement covers about 40% of site and makes provision for the maintenance of fences, the damming of drains and the removal of trees or scrub.
Waukenwae Moss UK0019765 04 05 54 W 55 44 00 N	155.49	**Primary:** Active raised bogs **Priority feature* **Qualifying:** Degraded raised bogs still capable of natural regeneration	**Primary:** N/A **Qualifying:** N/A	Drainage, invasive tree scrub, over-grazing, fires.	Management Agreements to restrict the use of fertilisers, pesticides and agricultural activities thought to have a damaging impact (e.g. drainage, burning, grazing).
North Shotts Moss UK0019768 03 47 54 W 55 49 50 N	53.36	**Primary:** Active raised bogs **Priority feature* **Qualifying:** Degraded raised bogs still capable of natural regeneration	**Primary:** N/A **Qualifying:** N/A	Drainage, invasive tree scrub, over-grazing, fires.	Present management compatible with the nature conservation interests. Monitoring is ongoing to ensure long-term favourable condition of the bog.
Kirkcowan Flow UK0019813 04 44 10 W 55 00 10 N	777.57	**Primary:** Active raised bogs **Priority feature* **Qualifying:** Degraded raised bogs still capable of natural regeneration	**Primary:** N/A **Qualifying:** N/A	Drainage, invasive tree scrub, over-grazing, fires.	Management Agreement to conserve the active blanket bog. Controls grazing, drainage and muirburn.
Endrick Water UK0019840	239.11	**Primary:** N/A **Qualifying:** N/A	**Primary:** Brook lamprey *Lampetra planeri,* river lamprey *Lampetra*	Point and diffuse sources of pollution not thought significant. Gravel	Development of a river conservation strategy during 2001/2002 under the

SEA Area 1: Scottish Midlands					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
04 24 00 W 56 03 20 N			*fluviatilis* **Qualifying:** Atlantic salmon *Salmo salar*	extraction.	'Safeguarding Natura Rivers in the UK' LIFE Project, which addressed all the management issues on the river including gravel extraction.
Merrick Kells UK0019841 04 26 45 W 55 08 00 N	8,698.3	**Primary:** Northern Atlantic wet heaths with *Erica tetralix*, siliceous alpine and boreal grasslands, blanket bogs **Priority feature* **Qualifying:** Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*, natural dystrophic lakes and ponds, European dry heaths, depressions on peat substrates of the *Rhynchosporion*, siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*), siliceous rocky slopes with chasmophytic vegetation	**Primary:** N/A **Qualifying:** Otter *Lutra lutra*	Overgrazing	Small part of site is a NNR but SNH has recommended expansion of this to cover a larger part of the SAC under Forest Enterprise ownership.
Borders woods UK0030094 02 39 45 W 55 34 50 N	53.23	**Primary:** *Tilio-Acerion* forests of slopes, screes and ravines **Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	No details.	Scottish Wildlife Trust and SNH with various management agreements with landowners for about 65% of the site. Integrity of the remaining 35% supported by connection with similar undesignated woodlands.
Craighall Gorge	53.59	**Primary:** *Tilio-Acerion* forests of slopes, screes and ravines	**Primary:** N/A **Qualifying:** N/A	Invasion of exotic tree and shrub species.	Uncontrolled spread of regenerating exotic trees and

SEA Area 1: Scottish Midlands					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
UK0030123 03 20 45 W 56 37 10 N		**Priority feature* **Qualifying:** N/A			rhododendron is being assessed. Management under a Woodland Grant Scheme.
Upper Strathearn Oakwoods UK0030125 03 51 54 W 56 20 38 N	152.47	**Primary:** Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Invasion of non-native species.	Comrie Woods subject to Management Agreement with SNH and Drummond Wood subject to a Woodland Grant Scheme contract with Forestry Commission.
Dogden Moss UK0030136 02 30 10 W 55 44 15 N	156.73	**Primary:** Active raised bogs **Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Drainage.	Aims to ensure water levels not reduced by any draining of the moss.
Dun Moss and Forest of Alyth Mires UK0030152 03 20 42 W 56 42 00 N	469.96	**Primary:** Active raised bogs **Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Drainage, grazing, muirburn.	Blocking of drains is being considered. Agri-environment schemes promote positive management over part of the site.
Galloway Oakwoods UK0030153 04 31 45 W 55 00 30 N	355.1	**Primary:** Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Invasion of exotic species, recreational pressure.	Removal of exotic species, underplanting and encouragement of regeneration. Work being carried out by private owners/occupiers, Forest Enterprise, RSPB and SWT.

SEA Area 1: Scottish Midlands					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
Glenartney Juniper Wood UK0030156 04 00 05 W 56 20 15 N	101.74	**Primary:** *Juniperus communis* formations on heaths or calcareous grasslands **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Overgrazing.	Very little regeneration of juniper is taking place due to grazing by sheep, cattle, rabbits and deer. Experimental management needs to be carried out to try and redress this.
Isle of May UK0030172 02 34 25 W 56 11 25 N	356.75	**Primary:** N/A **Qualifying:** Reefs	**Primary:** Grey seal *Halichoerus grypus* **Qualifying:** N/A	Recreational pressure and disturbance.	NNR owned and managed by SNH which ensures adequate protection for nature conservation. Visitor pressure concentrated out with seal-breeding season.
Kippenrait Glen UK0030177 03 56 50 W 56 10 30 N	61.56	**Primary:** *Tilio-Acerion* forests of slopes, screes and ravines **Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Overgrazing, invasion of non-native species, landslides.	Woodland Grant Scheme in operation over a part of the woodland that includes removal of sycamore and Rhododendron. Impacts of roe deer will be assessed.
Methven Moss UK0030204 03 36 10 W 56 23 30 N	83.7	**Primary:** Active raised bogs **Priority feature* **Qualifying:** Degraded raised bogs still capable of natural regeneration	**Primary:** N/A **Qualifying:** N/A	Drainage and scrub encroachment.	Restoration of site's hydrology is a priority to prevent further drying of the moss and invasion by birch scrub.
Moffat Hills UK0030208 03 20 00 W 55 24 30 N	2,891.92	**Primary:** Alpine and Boreal heaths, siliceous alpine and boreal grasslands **Qualifying:** European dry heaths, hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, blanket bogs **Priority*	**Primary:** N/A **Qualifying:** N/A	Overgrazing.	Agri-environment measures available and management of feral goat herds is being addressed.

SEA Area 1: Scottish Midlands					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
		feature, siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*), calcareous rocky slopes with chasmophytic vegetation, siliceous rocky slopes with chasmophytic vegetation			
Moorfoot Hills UK0030215 03 01 00 W 55 42 25 N	8,498.99	**Primary:** European dry heaths, blanket bogs **Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Grouse management, sheep grazing and muirburn.	Managed for both commercial and wildlife interests, with light to moderate grazing desired and appropriate muirburn.
Airds Moss UK0030218 04 11 50 W 55 30 10 N	1,359.33	**Primary:** Blanket bogs **Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Overgrazing.	Agreements being negotiated to reduce grazing pressure, and for phased removal of a conifer plantation.
Pitkeathly Mires UK0030239 03 26 40 W 56 18 45 N	61.49	**Primary:** N/A **Qualifying:** Transition mires and quaking bogs	**Primary:** Slender green feather-moss *Drepanocladus* (*Hamatocaulis*) *vernicosus* **Qualifying:** N/A	Overgrazing.	Grazing by cattle subject to monitoring.
Turflundie Wood UK0030240 03 18 00 W 56 18 50 N	86.36	**Primary:** N/A **Qualifying:** N/A	**Primary:** Great crested newt *Triturus cristatus* **Qualifying:** N/A	No details.	Maintaining great crested newt population may require creation and restoration of ponds, removal of trees shading ponds, and management of the woodlands.

SEA Area 1: Scottish Midlands					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
River South Esk UK0030262 02 55 00 W 56 42 10 N	478.62	**Primary:** N/A **Qualifying:** N/A	**Primary:** Freshwater pearl mussel *Margaritifera margaritifera*, Atlantic salmon *Salmo salar* **Qualifying:** N/A	Activities within catchment, water quality, river engineering.	Livestock exclusion and riparian habitat promotion will improve environmental conditions and assist population recovery of salmon and freshwater mussels.
River Teith UK0030263 04 17 15 W 56 17 00 N	1,312.4	**Primary:** N/A **Qualifying:** N/A	**Primary:** Sea lamprey *Petromyzon marinus*, brook lamprey *Lampetra planeri*, river lamprey *Lampetra fluviatilis* **Qualifying:** Atlantic salmon *Salmo salar*	Few significant threats. Water quality generally high.	Gravel extraction and river engineering will be addressed using practice and advice generated by SNH Research contracts on the Endrick Water SAC and by the 'Safeguarding Natura Rivers in the UK' LIFE Project.
Shelforkie UK0030272 03 50 30 W 56 16 00 N	111.37	**Primary:** Active raised bogs **Priority feature* **Qualifying:** Degraded raised bogs still capable of natural regeneration	**Primary:** N/A **Qualifying:** N/A	Inappropriate grazing.	Encroachment by birch and Scots pine will be monitored and removed if necessary.
Shingle Islands UK0030274 03 39 50 W 56 38 30 N	77.9	**Primary:** Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) **Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Under-grazing, invasion of non-native species.	Expansion of alluvial forest requires a balance with the conservation of nationally important, open-ground, botanical interests.
Threepwood Moss UK0030288 02 46 00 W	53.29	**Primary:** Active raised bogs **Priority feature* **Qualifying:** Degraded raised bogs still capable of natural regeneration	**Primary:** N/A **Qualifying:** N/A	Drainage, scrub encroachment.	Main aim to increase the water levels within the moss through damming of drains, removal of scrub and the introduction of low-intensity grazing.

SEA Area 1: Scottish Midlands					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
55 40 30 N					
Trossachs Woods UK0030290 04 25 15 W 56 14 10 N	374.94	Primary: Old sessile oak woods with Ilex and Blechnum in the British Isles Qualifying: N/A	Primary: N/A Qualifying: N/A	Invasive species, deer over-grazing.	50% covered by Woodland Grant Scheme for maintenance of Atlantic Oakwood. Forest Enterprise manage parts according to plan approved by SNH.
Tynron Juniper Wood UK0030294 03 50 35 W 55 12 50 N	6.67	**Primary:** *Juniperus communis* formations on heaths or calcareous grasslands **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Rabbit over-grazing, invasive species.	Rabbit control fencing and herbicide application to control bracken is being carried out to address potential threats.
Upper Nithsdale Woods UK0030297 03 52 00 W 55 21 25 N	98.38	**Primary:** *Tilio-Acerion* forests of slopes, screes and ravines **Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Overgrazing, invasive species.	Grazing controls and fencing. Control of bracken invasion using methods designed to protect associated water bodies.
Firth of Tay and Eden Estuary UK0030311 02 57 00 W 56 22 00 N	15,412.53	**Primary:** Estuaries **Qualifying:** Sandbanks which are slightly covered by sea water all the time, mudflats and sandflats not covered by seawater at low tide	**Primary:** Common seal *Phoca vitulina* **Qualifying:** N/A	Recreational pressure and disturbance.	Tentsmuir Point is a NNR and parts of the Eden Estuary and Inner Tay Estuary are Local Nature Reserves.

SEA Area 1: Scottish Midlands					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
River Tay UK0030312 04 05 00 W 56 34 00 N	9,497.72	**Primary:** N/A **Qualifying:** Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*	**Primary:** Atlantic salmon *Salmo salar* **Qualifying:** Sea lamprey *Petromyzon marinus*, brook lamprey *Lampetra planeri*, river lamprey *Lampetra fluviatilis*, otter *Lutra lutra*	Catchment management, water abstraction, hydro-schemes, fish farming.	Monitoring and survey will inform appropriate management of those activities which the site may be vulnerable to.
Peeswit Moss UK0030313 03 03 00 W 55 47 00 N	52.98	**Primary:** Active raised bogs **Priority feature* **Qualifying:** Degraded raised bogs still capable of natural regeneration	**Primary:** N/A **Qualifying:** N/A	Drainage, peat extraction and muirburn.	Current management unlikely to cause further damage to the site. Overall aim to stem the decline in extent and condition of the remaining viable raised bog resource.
Red Moss of Netherley 02 14 00 W 57 02 10 N	92.53	**Primary:** Active raised bogs **Priority feature* **Qualifying:** Degraded raised bogs still capable of natural regeneration	**Primary:** N/A **Qualifying:** N/A	Drainage, peat extraction, muirburn, over-grazing, prospecting for minerals.	Large part owned by the SWT which developing a management plan to include restorative management such as ditch-blocking.
West Fannyside Moss UK0030316 03 55 05 W 55 56 00 N	33.83	**Primary:** Blanket bogs **Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Drainage, peat digging and muirburn.	SNH currently developing management scheme entitled Natural Care. Overall purpose to stem the decline in extent and condition of remaining viable blanket bog resource.

Table A4a.5 – Summary Details of Relevant Special Protection Areas (SPAs)

SEA Area 1: Scottish Midlands					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
Renfrewshire Heights UK9020295 04 45 00 W 55 50 30 N	8,943.24	**During the breeding season:** Hen harrier *Circus cyaneus*	N/A	Breeding hen harriers are thus potentially vulnerable to disturbance from recreational activities, although these are largely confined to established tracks/paths. Hen harriers may face habitat loss through poor land/agricultural management, heather loss, peat erosion poor muirburn, overgrazing and the spread of bracken.	The Regional Park, with a dedicated countryside ranger service, presents opportunities to educate users and manage access in ways that minimise potential risks to hen harriers. The Renfrewshire Heights Moorland Management Scheme helps the control of any habitat damage. Harrier numbers are monitored by the South Strathclyde Raptor Study Group.
Slamannan Plateau UK9004441 04 01 10 W 55 59 48 N	591.32	**Over winter:** Bean Goose *Anser fabalis fabalis*	N/A	Subject to development pressure, including proposed housing, wind turbines and sewage sludge disposal. Forestry has reduced potential feeding areas. Peat milling has ceased though may recommence. Some recreational disturbance.	Damaging changes in part controlled by provisions of The Nature Conservation (Scotland) Act 2004, and through the 'Slamannan Plateau Bean Goose Management Scheme.' This scheme is closed though hoped that the prescriptions of the scheme will be incorporated in the Scotland Rural Development Programme.

SEA Area 1: Scottish Midlands					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
Fowlsheugh UK9002271 02 11 45 W 56 54 45 N	1,303.54	N/A	**During the breeding season:** Guillemot *Uria aalge* Kittiwake *Rissa tridactyla* Razorbill *Alca torda*	No significant threat at present.	Managed as nature reserve by RSPB.
Loch Lomond UK9003021 04 30 30 W 56 03 45 N	510.49	**During the breeding season:** Capercaillie *Tetrao urogallus* **Over winter:** Greenland white-fronted goose *Anser albifrons*	N/A	Disturbance from water sports/fishing monitored. Water abstraction. Removal of exotic species.	Managed under Nature Reserve Agreements with owners.
Inner Clyde Estuary UK9003061 04 38 00 W 55 56 50 N	1,826.02	N/A	**Over winter:** Redshank *Tringa totanus*	Industrial activity from container terminal and petroleum storage facility.	Contingency plan in place for oil spills. Water quality improving, may influence site productivity - strategy for monitoring future changes.
Black Cart UK9003221 04 26 20 W 55 52 45 N	56.3	**Over winter:** Whooper swan *Cygnus cygnus*	N/A	Water quality changes, bird strikes at airport.	Management plan for land north of the river is being drawn up. Airport abuts southern boundary – presence of birds noted in pilot flight information.
Muirkirk and North Lowther Uplands UK9003261 04 04 35 W 55 30 35 N	26,330.31	**During the breeding season:** Golden plover *Pluvialis apricaria*, hen harrier *Circus cyaneus*, merlin *Falco columbarius*, peregrine *Falco peregrinus*, short-eared owl *Asio flammeus*	N/A	Habitat degradation, loss of heather and peat erosion.	Moorland Management Scheme currently being developed.

SEA Area 1: Scottish Midlands					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
		Over winter: Hen harrier *Circus cyaneus*			
Glen App-Galloway Moors UK9003351 04 56 30 W 55 00 20 N	8,942.38	**During the breeding season:** Hen harrier *Circus cyaneus*	N/A	Heather habitat fragmentation, over-grazing.	ESA agri-environment scheme may result in more beneficial grazing patterns and SNH developing Moorland Management Scheme.
Montrose Basin UK9004031 02 30 20 W 56 42 40 N	986.6	N/A	**Over winter:** Greylag goose *Anser anser,* knot *Calidris canutus*, pink-footed goose *Anser brachyrhynchus*, redshank *Tringa totanus, oystercatcher Haematopus ostralegus* **Assemblage qualification:** Over winter, the area regularly supports 54,930 individual waterfowl including: pink-footed goose *Anser brachyrhynchus,* greylag goose *Anser anser,* oystercatcher *Haematopus ostralegus*, knot *Calidris canutus*, redshank *Tringa totanus*.	Wildfowling.	Management Agreements, SSSI procedures and management of the Local Nature Reserve.

SEA Area 1: Scottish Midlands					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
Loch of Kinnordy UK9004051 03 02 40 W 56 40 30 N	85.09	N/A	**Over winter:** Greylag goose *Anser anser,* pink-footed goose *Anser brachyrhynchus*	Recreation pressure – wildfowling, angling.	RSPB manages the site as a wildlife reserve.
Loch Leven UK9004111 03 22 30 W 56 11 48 N	1,611.81	**Over winter:** Whooper swan *Cygnus cygnus*	**Over winter:** Pink-footed goose *Anser brachyrhynchus*, shoveler *Anas clypeata* **Assemblage qualification:** Over winter, the area regularly supports 34,280 individual waterfowl including: whooper swan *Cygnus cygnus*, pink-footed goose *Anser brachyrhynchus*, shoveler *Anas clypeata*	Eutrophication, water quality issues, shoreline erosion, invasive aquatic plants. Recreation pressure – fishing, bird watching and wildfowling.	NNR managed by SNH through a Nature Reserve Agreement, bylaws, liaison with landowners and the presence of wardening staff.
Firth of Tay and Eden Estuary UK9004121 03 05 00 W 56 24 30 N	6,923.29	**During the breeding season:** Little tern *Sterna albifrons*, marsh harrier *Circus aeruginosus* **Over winter:** Bar-tailed godwit *Limosa lapponica*	**Over winter:** Greylag goose *Anser anser,* pink-footed goose *Anser brachyrhynchus*, redshank *Tringa totanus* **Assemblage qualification:** Over winter, the area regularly supports 48,000 individual waterfowl including: Velvet scoter	Recreation disturbance. Jet planes have crossed site for many years with no apparent effect.	NNR with management plan and resident warden.

SEA Area 1: Scottish Midlands					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
			Melanitta fusca, pink-footed goose *Anser brachyrhynchus*, greylag goose *Anser anser,* redshank *Tringa totanus*, cormorant *Phalacrocorax carbo*, shelduck *Tadorna tadorna*, eider *Somateria mollissima*, bar-tailed godwit *Limosa lapponica*, common scoter *Melanitta nigra*, black-tailed godwit *Limosa limosa*, goldeneye *Bucephala clangula*, red-breasted merganser *Mergus serrator*, goosander *Mergus merganser*, oystercatcher *Haematopus ostralegus*, grey plover *Pluvialis squatarola*, sanderling *Calidris alba*, dunlin *Calidris alpina*, long-tailed duck *Clangula hyemalis*.		
Cameron Reservoir UK9004131 02 51 12 W 56 17 32 N	68.76	N/A	**Over winter:** Pink-footed goose *Anser brachyrhynchus*	Proposed decommissioning of reservoir as public water supply.	No details.
Forth Islands UK9004171	9,796.98	**During the breeding season:** common tern *Sterna hirundo*,	**During the breeding season:** Razorbill *Alca torda*,	Recreation pressure.	Isle of May is a NNR managed by SNH. Fidra, The Lamb and

SEA Area 1: Scottish Midlands					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
02 33 20 W 56 11 10 N		roseate tern *Sterna dougallii*, sandwich tern *Sterna sandvicensis*	puffin *Fratercula arctica,* lesser black-backed gull *Larus fuscus, g*annet *Morus bassanus,* shag *Phalacrocorax aristotelis,* cormorant *Phalacrocorax carbo,* kittiwake *Rissa tridactyla,* guillemot *Uria aalge*.		Inchmickery are managed by RSPB while Long Craig Island is managed by the Fife Bird Club and the Scottish Wildlife Trust.
Gladhouse Reservoir UK9004231 03 06 00 W 55 47 10 N	186.41	N/A	**Over winter:** Pink-footed goose *Anser brachyrhynchus* **Assemblage qualification:** Over winter, the area regularly supports 3,124 individual waterfowl including: Pink-footed goose *Anser brachyrhynchus.*	Recreation pressure (shooting/angling), mink.	Site managed as public water supply but SNH inputs into advisory committee which manages water levels and levels of shooting/angling.
Fala Flow UK9004241 02 54 20 W 55 49 00 N	318.04	N/A	**Over winter:** Pink-footed goose *Anser brachyrhynchus*	Potential recreation disturbance.	Blanket bog habitat protected through SSSI mechanisms.
Westwater UK9004251 03 24 30 W 55 45 30 N	49.77	N/A	**Over winter:** Pink-footed goose *Anser brachyrhynchus* **Assemblage qualification:**	Water quality issues (eutrophication), recreation pressure, shooting.	Loch managed as a public water supply.

SEA Area 1: Scottish Midlands					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
			Over winter, the area regularly supports 31,465 individual waterfowl including: Pink-footed goose *Anser brachyrhynchus*.		
Forest of Clunie UK9004381 03 35 00 W 56 40 00 N	19,349.38	**During the breeding season:** Hen harrier *Circus cyaneus*, merlin *Falco columbarius*, osprey *Pandion haliaetus*, short-eared owl *Asio flammeus*	N/A	New afforestation proposals, egg collecting.	Moorland Management Incentive Scheme has been developed.
South Tayside Goose Roosts UK9004401 03 50 00 W 56 15 54 N	331.01	N/A	**During the breeding season:** Wigeon *Anas penelope* **Over winter:** Greylag goose *Anser anser,* pink-footed goose *Anser brachyrhynchus*	Water level changes, recreation disturbance.	Management agreement over water levels in Drummond Loch.
Firth of Forth UK9004411 02 53 00 W 56 01 00 N	6,313.72	**Over winter:** red-throated diver *Gavia stellata,* oystercatcher *Haematopus ostralegus, b*ar-tailed godwit *Limosa lapponica*, golden plover *Pluvialis apricaria*, Slavonian grebe *Podiceps auritus* **On passage:** Sandwich tern *Sterna sandvicensis*	**Over winter:** pink-footed goose *Anser brachyrhynchus*, turnstone *Arenaria interpres, k*not *Calidris canutus,* redshank *Tringa totanus*, shelduck *Tadorna tadorna*, **Assemblage qualification:** Over winter, the area	Oil and other industrial developments concentrated along the shore. Localised tipping.	Emergency contingency plans in place to minimise impact of any industrial incident. Potential for rising sea levels to remove important habitats with coastal realignment schemes planned.

SEA Area 1: Scottish Midlands					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
			regularly supports 95,000 individual waterfowl including: red-throated diver *Gavia stellata,* great crested grebe *Podiceps cristatus,* Slavonian grebe *Podiceps auritus,* cormorant *Phalacrocorax carbo, pink-footed goose Anser brachyrhynchus, shelduck Tadorna tadorna, wigeon Anas penelope, mallard Anas platyrhynchos,* scaup *Aythya marila,* eider *Somateria mollissima,* long-tailed duck *Clangula hyemalis,* common scoter *Melanitta nigra,* velvet scoter *Melanitta fusca,* goldeneye *Bucephala clangula,* red-breasted merganser *Mergus serrator,* oystercatcher *Haematopus ostralegus,* ringed plover *Charadrius hiaticula,* golden plover *Pluvialis apricaria,* grey plover *Pluvialis squatarola,* lapwing *Vanellus vanellus,* knot *Calidris canutus,* dunlin *Calidris alpina,* bar-tailed		

SEA Area 1: Scottish Midlands					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
			godwit *Limosa lapponica,* curlew *Numenius arquata,* redshank *Tringa totanus,* turnstone *Arenaria interpres.*		

Table A4a.6 – Summary Details of Relevant Ramsar Sites

Code/location	Name	Area (ha)	Description	Criteria*	Adverse factors
UK13005 02 51 12 W 56 17 32 N	Cameron Reservoir	68.76	Artificial mesotrophic loch with beds of aquatic and marginal vegetation. Open water used as a roost by an internationally important wintering population of pink-footed geese.	6	No factors reported
UK13015 02 54 20 W 55 49 00 N	Fala Flow	318.04	Blanket mire, with some pools, developed at a lower altitude than most blanket mires in Midlothian. Mire and pools support an internationally important goose roost.	6	No factors reported
UK13017 02 53 00 W 56 01 00 N	Firth of Forth	6,313.68	Complex of estuaries, mudflats, rocky shorelines, beaches and saltmarshes. Adjacent urban and industrial areas. Important for a large number of wintering waders and wildfowl.	5, 6	No factors reported
UK13018 03 05 00 W 56 24 30 E	Firth of Tay and Eden Estuary	6,918.42	Extensive invertebrate-rich intertidal mudflats and sandflats created by the massive sediment load deposited by the River Tay. Large areas of reedbed and sand-dune and a small amount of saltmarsh. Important assemblages of wintering and breeding waterfowl. Abertay Sands important as a major haul-out site for grey and common seals.	5, 6	Introduction/invasion flora

Code/location	Name	Area (ha)	Description	Criteria*	Adverse factors
UK13021 03 06 00 W 55 47 10 N	Gladhouse Reservoir	186.41	Reservoir built for public water supply, with limited aquatic and emergent vegetation. Largest freshwater body in the Lothians and surrounded by both coniferous and mixed woodland and grassland. Internationally important winter roost for pink-footed goose.	6	No factors reported
UK13024 04 38 00 W 55 56 50 N	Inner Clyde Estuary	1,824.92	Long, narrow, heavily industrialised estuary. Almost the entire site consists of tidal mudflat with a shoreline of unmanaged semi-natural coastal vegetation. Saltmarsh is also present.	6	No factors reported
UK13033 03 22 30 W 56 11 48 N	Loch Leven	1,611.81	Largest naturally eutrophic loch in the British Isles. Relatively shallow and is surrounded by farmland, with a diverse aquatic flora and shoreline vegetation. Supports internationally important wintering populations of pink-footed geese and shoveler.	5, 6, 1	No factors reported
UK13034 04 30 30 W 56 03 45 N	Loch Lomond	236.9	Marshy hinterland around the lower reaches of the River Endrick where it flows into Loch Lomond, and four islands in the loch. Supports several species of nationally scarce plants, and the slow-moving river and lagoons are especially rich in aquatic invertebrates. The area is noted for its wintering waterfowl and supports an internationally important population of Greenland white-fronted geese.	6, 3	No factors reported
UK13038 03 02 40 W 56 40 30 N	Loch of Kinnordy	85.09	Eutrophic loch with associated wetland communities, notably basin mire, swamp and fen. Formally drained. Carr woodlands include willow, alder and birch communities. Range of grassland types present. Roost for internationally important numbers of geese.	1, 6, 2	No factors reported
UK13046 02 30 20 W 56 42 40 N	Montrose Basin	984.62	Enclosed estuary of the South Esk containing areas of mudflat, marsh and agricultural land, and Dun's Dish, a small eutrophic freshwater loch. Site important internationally for wintering populations of pink-footed goose, greylag goose and common redshank.	5, 1, 6	No factors reported
UK13057 03 50 00 W 56 15 54 N	South Tayside Goose Roosts	331.01	Comprises seven lochs, a number of smaller water bodies and other wetland habitats. Internationally important as a roost for greylag geese and pink-footed geese.	6	No factors reported

Code/location	Name	Area (ha)	Description	Criteria*	Adverse factors
UK13060 03 24 30 W 55 45 30 N	Westwater	49.77	Artificial reservoir located 320m above sea level in the Pentland Hills. Regularly provides winter roost for large numbers of wildfowl. In winter large numbers pink-footed geese.	6, 5	No factors reported

*Note: Ramsar criteria:**

1. sites containing representative, rare or unique wetland types
2. supports vulnerable, endangered, or critically endangered species or threatened ecological communities
3. supports populations of plant/animal species important for maintaining regional biodiversity
4. supports plant/animal species at a critical stage in their life cycles, or provides refuge
5. regularly supports 20,000 or more waterbirds
6. regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
8. important source of food for fishes, spawning ground, nursery and/or migration path

A4a.1.3.2 SEA Area 2

Figure A4a.5 – Sites of International Importance

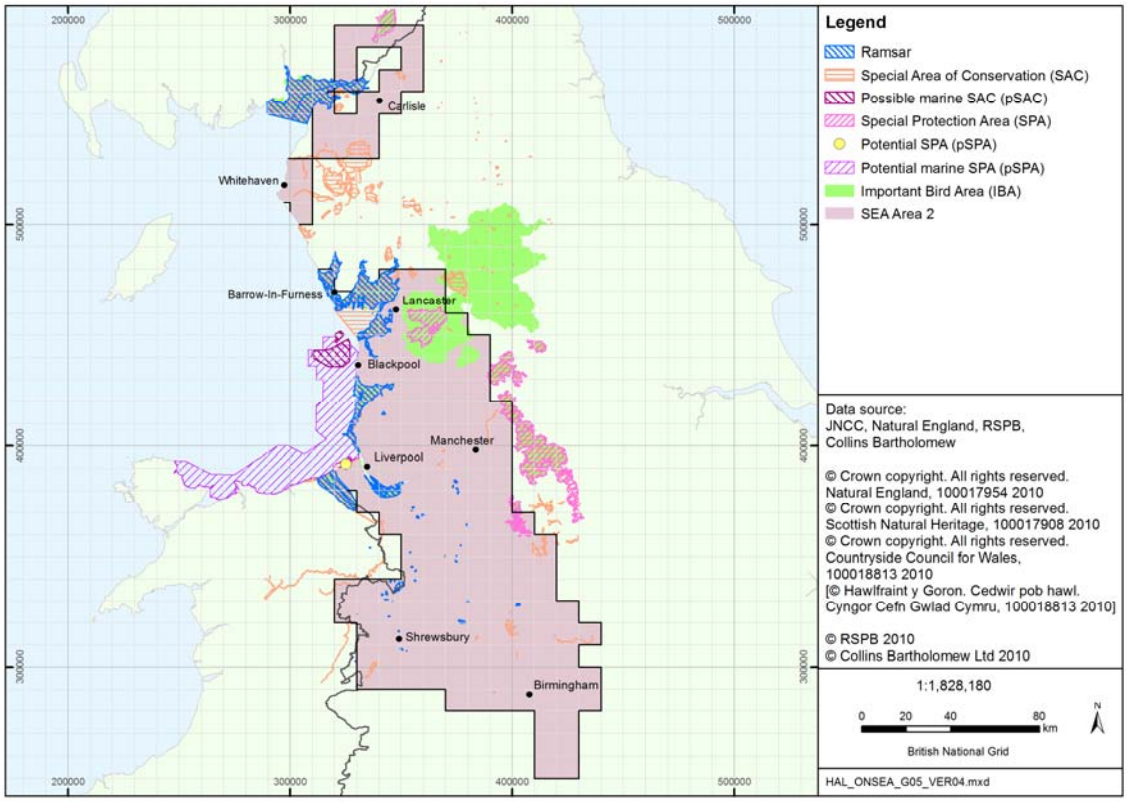


Figure A4a.6 – Sites of National and Local Importance

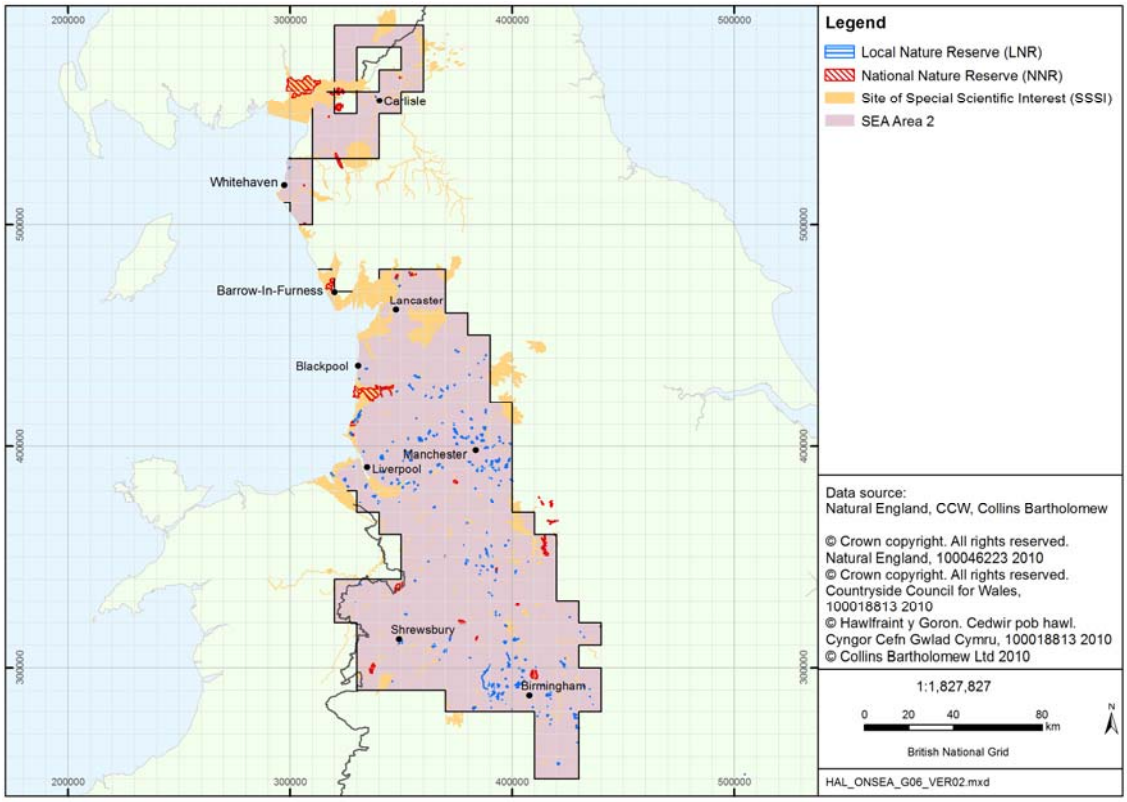


Table A4a.7 – Summary Details of Relevant Special Areas of Conservation (SACs)

SEA Area 2: West Midlands, North West England and Southern Scotland					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
The Stiperstones and The Hollies UK0012810 02 55 24 W 52 35 57 N	601.46	**Primary:** European dry heaths **Qualifying:** Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	**Primary:** N/A **Qualifying:** N/A	Lack of management, scrub encroachment, overgrazing and deterioration of the heathland interest. Neglect and grazing of the coppiced woods has led to deterioration in the woodland interest.	Traditional heather moorland management with rotational burning or cutting supplemented by light grazing. Part of the site is managed as a NNR and management agreements and ESA payments help maintain private areas. Traditional woodland management has been reinstated as part of the NNR management.
Ensor's Pool UK0012646 01 29 11 W 52 20 33 N	3.8	**Primary:** N/A **Qualifying:** N/A	**Primary:** White-clawed (or Atlantic stream) crayfish *Austropotamobius pallipes* **Qualifying:** N/A	Pollution and introduction of non-native crayfish, through uncontrolled access.	Managed as a Local Nature Reserve.
Cannock Extension Canal UK0012672 01 58 14 W 52 38 59 N	5.47	**Primary:** N/A **Qualifying:** N/A	**Primary:** Floating water-plantain *Luronium natans* **Qualifying:** N/A	Recreational pressure, surface water run-off from roads may cause reduction in water quality.	No details.
Ingleborough Complex UK0012782 02 22 25 W 54 09 36 N	5,769.28	**Primary:** *Juniperus communis* formations on heaths or calcareous grasslands, alkaline fens, calcareous rocky slopes with chasmophytic vegetation, limestone pavements * *Priority feature*	**Primary:** N/A **Qualifying:** N/A	Overgrazing, removal of limestone pavement, limestone quarrying.	Wildlife Enhancement Scheme and other forms of agri-environmental agreement being used to promote appropriate management. Limestone Pavement Orders.

SEA Area 2: West Midlands, North West England and Southern Scotland					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
		Qualifying: Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), blanket bogs **Priority feature*, petrifying springs with tufa formation (*Cratoneurion*) ** Priority feature*, *Tilio-Acerion* forests of slopes, screes and ravines **Priority feature*			
Pasturefields Salt Marsh UK0012789 02 00 45 W 52 49 17 N	7.7	**Primary:** Inland salt meadows **Priority feature* Qualifying: N/A	**Primary:** N/A Qualifying: N/A	Water abstraction.	Managed by Staffordshire Wildlife Trust with support from EN's Reserve Enhancement Scheme.
Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses UK0012912 02 45 44 W	949.2	**Primary:** Active raised bogs **Priority feature* Qualifying: Degraded raised bogs still capable of natural regeneration	**Primary:** N/A Qualifying: N/A	Large-scale commercial peat extraction. Lowering of water level.	Mire rehabilitation under guidance of a management plan.

SEA Area 2: West Midlands, North West England and Southern Scotland					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
52 55 21 N					
Oak Mere UK0012970 02 38 20 W 53 12 21 N	68.82	**Primary:** Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*), transition mires and quaking bogs **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Nutrient enrichment and chemical pollution. Water level issues. Accidents and spillages on busy road network.	Potential point source discharges investigated by EN and EA. Water-level changes are subject to monitoring.
Morecambe Bay UK0013027 02 57 42 W 54 07 09 N	61,506.22	**Primary:** Estuaries, mudflats and sandflats not covered by seawater at low tide, large shallow inlets and bays, perennial vegetation of stony banks, *Salicornia* and other annuals colonising mud and sand, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), Shifting dunes along the shoreline with *Ammophila arenaria* (`white dunes`), Fixed dunes with herbaceous vegetation (`grey dunes`) **Priority feature*, humid dune slacks **Qualifying:** Sandbanks which are slightly covered by sea water all the time, coastal lagoons **Priority feature*, reefs, embryonic shifting dunes, Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) ** Priority feature*, dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*)	**Primary:** Great crested newt *Triturus cristatus* **Qualifying:** N/A	Coastal processes. Potential threats include commercial fisheries, aggregate extraction, gas exploration, recreation.	NGO reserve management plans, EN's Site Management Statements and Coastal WES, the European Marine Site Management Schemes for the Duddon Estuary
Sefton Coast	4,563.97	**Primary:** Embryonic shifting	**Primary:** Petalwort	Recreation pressure, water	Co-ordinated management of

SEA Area 2: West Midlands, North West England and Southern Scotland					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
UK0013076 03 05 06 W 53 34 51 N		dunes, Shifting dunes along the shoreline with Ammophila arenaria (`white dunes`), fixed dunes with herbaceous vegetation (`grey dunes`)**Priority feature*, dunes with Salix repens ssp. argentea (Salicion arenariae), Humid dune slacks Qualifying: Atlantic decalcified fixed dunes (Calluno-Ulicetea) **Priority feature*	*Petalophyllum ralfsii* **Qualifying:** Great crested newt *Triturus cristatus*	abstraction.	the coast achieved through the long-standing Sefton Coast Management Scheme (now the Sefton Coast Partnership).
West Midlands Mosses UK0013595 01 57 40 W 52 51 04 N	184.18	**Primary:** Natural dystrophic lakes and ponds, Transition mires and quaking bogs **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Nutrient enrichment from atmospheric deposition. Recreational disturbance.	Management Agreement or by NNR management, and in liaison with the local wildlife trust at Abbots Moss.
North Pennine Dales Meadows UK0014775 02 06 24 W 54 37 31 N	497.09	**Primary:** Mountain hay meadows **Qualifying:** *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)	**Primary:** N/A **Qualifying:** N/A	Lack of traditional management.	Management agreements and ESA payments being used to promote continuation of traditional management.
Morecambe Bay Pavements UK0014777 02 51 36 W	2,609.69	**Primary:** Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp., *Juniperus communis* formations on heaths or calcareous grasslands, Semi-natural dry grasslands and	**Primary:** Narrow-mouthed whorl snail *Vertigo angustior* **Qualifying:** N/A	Inappropriate grazing, conifer plantations.	Large parts of the site are nature reserves and are sensitively managed. EN Wildlife Enhancement Schemes, ESA Agreements, and Woodlands Grant Schemes.

SEA Area 2: West Midlands, North West England and Southern Scotland					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
54 16 28 N		scrubland facies: on calcareous substrates (*Festuco-Brometalia*), Limestone pavements **Priority feature*, *Tilio-Acerion* forests of slopes, screes and ravines **Priority feature*, *Taxus baccata* woods of the British Isles **Priority feature* **Qualifying:** European dry heaths, calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* **Priority feature*, old sessile oak woods with *Ilex* and *Blechnum* in the British Isles			
Peak District Dales UK0019859 01 47 16 W 53 05 29 N	2,326.33	**Primary:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), *Tilio-Acerion* forests of slopes, screes and ravines **** Priority feature*** **Qualifying:** European dry heaths, *Calaminarian* grasslands of the *Violetalia calaminariae*, alkaline fens, calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*), calcareous rocky slopes with chasmophytic vegetation	**Primary:** White-clawed (or Atlantic stream) crayfish *Austropotamobius pallipes* **Qualifying:** Brook lamprey *Lampetra planeri*, bullhead *Cottus gobio*	Inappropriate grazing management. Drainage. Limestone or mineral extraction. Invasion of non-native tree species.	Some parts now managed under Countryside Stewardship. English Nature's White Peak Wildlife Enhancement Scheme to enhance conservation value of sites.
Mottey	43.87	**Primary:** Lowland hay	**Primary:** N/A	Agricultural run-off and	Owned and managed by EN with

SEA Area 2: West Midlands, North West England and Southern Scotland					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
Meadows UK0030051 02 14 13 W 52 43 03 N		meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*) **Qualifying:** N/A	**Qualifying:** N/A	lowering of water levels.	all the above issues addressed through the site's management plan.
Brown Moss UK0030100 02 39 12 W 52 56 59 N	32.03	**Primary:** N/A **Qualifying:** N/A	**Primary:** Floating water-plantain *Luronium natans* **Qualifying:** N/A	Colonisation by trees - shading, nutrient and hydrological effects on the open water and heathland.	No details.
Calf Hill and Cragg Woods UK0030106 02 41 53 W 54 02 48 N	34.43	**Primary:** Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles, **Qualifying:** Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae*, *Salicion albae*) **Priority feature*	**Primary:** N/A **Qualifying:** N/A	No immediate threats.	Limited intervention in land-use/management terms.
Cannock Chase UK0030107 02 01 36 W 52 45 59 N	1,236.96	**Primary:** European dry heaths **Qualifying:** Northern Atlantic wet heaths with *Erica tetralix*	**Primary:** N/A **Qualifying:** N/A	Recreational pressure, bracken invasion. Mining fissures continue to appear and thought to detrimentally affect site hydrology. Water abstraction.	Much of Cannock Chase falls within a popular and well-used Country Park.
Deeside and Buckley Newt Sites UK0030132	207.52	**Primary:** N/A **Qualifying:** Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	**Primary:** Great crested newt *Triturus cristatus* **Qualifying:** N/A	Works associated with mineral extraction. Recreational pressure.	Woodland habitats managed as a Country Park. Visitor management, footpath maintenance and woodland management are undertaken

SEA Area 2: West Midlands, North West England and Southern Scotland					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
03 03 42 W 53 12 09 N					through the Countryside Service and under a Forestry Commission WGS.
Fens Pools UK0030150 02 07 04 W 52 29 48 N	20.4	**Primary:** N/A **Qualifying:** N/A	**Primary:** Great crested newt *Triturus cristatus* **Qualifying:** N/A	Fish introductions, major ground disturbance to surrounding area, desiccation, poor water quality, human disturbance, land contamination.	Expand the number of breeding ponds.
Manchester Mosses UK0030200 02 27 56 W 53 28 16 N	172.81	**Primary:** Degraded raised bogs still capable of natural regeneration **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Drainage. Located close to heavy industry (Greater Manchester, Merseyside). Air quality. Groundwater issues.	Risley Moss owned and managed by Warrington Borough Council. Holcroft Moss owned and managed by Cheshire Wildlife Trust. Part of Astley and Bedford Mosses owned and managed by Lancashire Wildlife Trust.
River Dee and Bala Lake/ Afon Dyfrdwy a Llyn Tegid UK0030252 02 51 40 W 53 02 50 N	1,308.93	**Primary:** Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation **Qualifying:** N/A	**Primary:** Atlantic salmon *Salmo salar*, Floating water-plantain *Luronium natans* **Qualifying:** Sea lamprey *Petromyzon marinus*, brook lamprey *Lampetra planeri*, river lamprey *Lampetra fluviatilis*, bullhead *Cottus gobio*, otter *Lutra lutra*	Inappropriate water flow regulation; excessive abstraction; threats to water quality from direct and diffuse pollution; eutrophication and siltation. Degradation of riparian habitats due to engineering works, agricultural practices and invasive plant species. Fisheries.	Issues being addressed by a variety of statutory bodies that are in a position to overcome these threats through regulatory powers and partnerships with landowners, industry and other interested parties.
River Mease UK0030258	21.86	**Primary:** N/A **Qualifying:** Water courses of plain to montane levels with	**Primary:** Spined loach *Cobitis taenia*, Bullhead *Cottus gobio*	Water quality and quantity issues. Diffuse pollution and excessive	No details.

SEA Area 2: West Midlands, North West England and Southern Scotland					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
01 36 56 W 52 41 59 N		the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	**Qualifying:** White-clawed (or Atlantic stream) crayfish *Austropotamobius pallipes*, otter *Lutra lutra*	sedimentation have the potential to affect the site.	
Rixton Clay Pits UK0030265 02 28 31 W 53 24 23 N	13.99	**Primary:** N/A **Qualifying:** N/A	**Primary:** Great crested newt *Triturus cristatus* **Qualifying:** N/A	No details.	Warrington Borough Council owns and manages the site, and has a ranger based on-site.
Rochdale Canal UK0030266 02 09 40 W 53 31 50 N	25.55	**Primary:** N/A **Qualifying:** N/A	**Primary:** Floating water-plantain *Luronium natans* **Qualifying:** N/A	Boat movements.	Major restoration scheme to open canal for navigation from Manchester to Yorkshire. EN working together with partners to ensure restoration preserves site interest.
South Pennine Moors UK0030280 01 46 59 W 53 27 37 N	64,983.13	**Primary:** European dry heaths, blanket bogs **Priority feature*, old sessile oak woods with *Ilex* and *Blechnum* in the British Isles **Qualifying:** Northern Atlantic wet heaths with *Erica tetralix*, transition mires and quaking bogs	**Primary:** N/A **Qualifying:** N/A	Recreation pressure, accidental fires, over-grazing, muirburn. Atmospheric pollution depleting blanket bog, wet heath and transition mire. Loss of forest habitat.	Management strategy and conservation action programme produced as part of an EU-funded LIFE project for the area to the north of the National Park. Within Park, North Peak and South West Peak ESAs. Countryside Stewardship Scheme and Wildlife Enhancement Scheme (WES) also being used to achieve favourable management.
Bolton Fell Moss	374.74	**Primary:** Degraded raised bogs still capable of natural regeneration	**Primary:** N/A **Qualifying:** N/A	Site has been subject to commercial peat-extraction under an existing planning	Measures in hand to acquire permissions and cease peat extraction, thereafter

SEA Area 2: West Midlands, North West England and Southern Scotland					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
UK0030362 02 47 53 W 55 00 41 N		**Qualifying:** N/A		permission	hydrological restoration will be carried out.
Clints Quarry UK0030035 03 18 08 W 54 42 33 N	12.03	**Primary:** N/A **Qualifying:** N/A	**Primary:** Great crested newt *Triturus cristatus* **Qualifying:** N/A	Water levels in the ponds supporting newts are largely dependent on rainfall which has been low in recent years. The site has been relatively undisturbed since quarrying ceased.	Not provided.
Drigg Coast UK0013031 03 25 47 W 54 21 02 N	1,397.44	**Primary:** Estuaries, Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)*Priority feature, Dunes with *Salix repens* ssp. *Argentea* (*Salicion arenariae*) **Qualifying:** Mudflats and sandflats not covered by seawater at low tide, *Salicornia* and other annuals colonising mud and sand, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), embryonic shifting dunes, shifting dunes along the shoreline with *Ammophila arenaria* (`white dunes`), fixed dunes with herbaceous vegetation (`grey dunes`) *Priority feature, humid dune slacks	**Primary:** N/A **Qualifying:** N/A	There is no threat at present of any development that may affect estuarine processes.	Much of the sand dune area is under Countryside Stewardship Agreements or as a Cumbrian Wildlife Trust Reserve. The vulnerability of the marine site will be further identified by Natural England.
Lake District	26,996.36	**Primary:** Oligotrophic to	**Primary:** N/A	The European habitats on	Pressures have been

SEA Area 2: West Midlands, North West England and Southern Scotland					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
High Fells UK0012960 03 04 51 W 54 40 34 N		mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*, Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths, Alpine and Boreal heaths, *Juniperus communis* formations on heaths or calcareous grasslands, siliceous alpine and boreal grasslands, hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, blanket bogs * Priority feature, siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*), siliceous rocky slopes with chasmophytic vegetation, old sessile oak woods with *Ilex* and *Blechnum* in the British Isles **Qualifying:** Species-rich *Nardus* grassland, on siliceous substrates in mountain areas (and submountain areas in continental Europe) *Priority feature, alkaline fens, calcareous rocky slopes with chasmophytic vegetation	**Qualifying:** Slender green feather-moss *Drepanocladus* (*Hamatocaulis*) *vernicosus*	this site, other than acidic scree, are threatened by grazing and more locally grazing combined with visitor pressure. Siliceous scree is possibly the least-threatened habitat and is widespread, albeit in a modified state	significantly reduced over much of the site by entry into the Lake District ESA scheme, but this largely only slows or possibly arrests decline.
Montgomery Canal	55.89	**Primary:** N/A **Qualifying:** N/A	**Primary:** Floating water-plantain *Luronium natans*	Enrichment through agricultural or domestic nutrient inputs could affect	CCW will liaise with owners and occupiers to achieve appropriately scaled and timed

SEA Area 2: West Midlands, North West England and Southern Scotland					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
UK0030213 03 06 56 W 52 40 57 N			**Qualifying:** N/A	the populations of floating water-plantain. The effects of boat traffic on populations of floating water-plantain are uncertain and are being investigated. Floating water-plantain is vulnerable to colonisation by aggressive species which can have an impact on the canal's ecology. The introduction of certain fish species could also damage aquatic plant populations.	management. CCW will liaise with competent and relevant authorities to agree on appropriate methods and practices to ensure that bank protection and other engineering works are undertaken in a sensitive manner.
Raeburn Flow UK0030314 03 06 00 W 54 57 10 N	63.96	**Primary:** Active raised bogs*Priority feature **Qualifying:** Degraded raised bogs still capable of natural regeneration	**Primary:** N/A **Qualifying:** N/A	Historical peat-cutting and drainage.	Positive habitat works have been agreed with the owner/occupiers and are well underway, including tree and shrub removal, and limited grazing to prevent scrub regeneration. Ditches are being blocked to encourage *Sphagnum* growth.
River Derwent & Bassenthwaite Lake UK0030032 03 08 32 W 54 34 35 N	1,832.96	**Primary:** Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea* **Qualifying:** Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	**Primary:** Marsh fritillary butterfly *Euphydryas* (*Eurodryas*, *Hypodryas*) *aurinia*, sea lamprey *Petromyzon marinus*, brook lamprey *Lampetra planeri*, river lamprey *Lampetra fluviatilis*, Atlantic salmon *Salmo salar*, otter Lutra lutra, floating	There are problems with sewage, acidification (from rainfall) and pollution with synthetic pyrethroid sheep dips. Flow regimes and sedimentation are affected by flood defence works and abstraction. Much of the land is heavily drained for agriculture or forestry, which results in increased	Phosphorous stripping is being undertaken on part of the site, although it is expected that full recovery may take a decade or more. All issues are recognised in the joint English Nature/Environment Agency Conservation Strategy. All licensed activities which may be contributing to such problems will be addressed through the

SEA Area 2: West Midlands, North West England and Southern Scotland					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
			water-plantain *Luronium natans* **Qualifying:** N/A	run-off. Overgrazing has caused inputs of sediment and nutrients to the lakes which has affected plant communities.	review process under the Habitats Regulations.
River Ehen UK0030057 03 29 51 W 54 30 55 N	24.39	**Primary:** N/A **Qualifying:** N/A	**Primary:** Freshwater pearl mussel *Margaritifera margaritifera* **Qualifying:** Atlantic salmon *Salmo salar*	Mussels are likely to be adversely affected by the apparent decline in salmonid fish populations and by major eutrophication of the river from sewage works and agricultural run-off. Practices associated with sheep-dipping pose a potential threat at this site.	Water quality issues will be addressed through the review process under the Habitats Regulations and at a catchment level by local Environment Action Plans. Research is required to determine the extent of any problems arising from pearl fishing. Possible concerns over the flows within the river will also be addressed through reviews of abstraction licences where these are considered to be causing a problem.
Solway Firth UK0013025 03 20 12 W 54 58 15 N	43,636.72	**Primary:** Sandbanks which are slightly covered by sea water all the time, estuaries, mudflats and sandflats not covered by seawater at low tide, *Salicornia* and other annuals colonising mud and sand, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) **Qualifying:** Reefs, perennial vegetation of stony banks, fixed dunes with herbaceous vegetation (`grey dunes`) *Priority feature	**Primary:** Sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis* **Qualifying:** N/A	Flood defence and coastal erosion work, fishing and shellfisheries (including a cockle fishery which is currently closed to allow stocks to recover), saltmarsh/ merse grazing, oil and gas exploration (outwith the site), and industrial development.	A management strategy to consider and co-ordinate these activities is being produced by the Solway Firth Partnership. This will set out the means by which it is proposed to secure the sustainable use of the estuary.

SEA Area 2: West Midlands, North West England and Southern Scotland					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
South Solway Mosses UK0030310 03 14 36 W 54 55 33 N	1,962.36	**Primary:** Active raised bogs *Priority feature **Qualifying:** Degraded raised bogs still capable of natural regeneration	**Primary:** N/A **Qualifying:** N/A	Extensive drainage associated with agricultural reclamation and/or peat extraction. Parts of the site have suffered from uncontrolled fires	Management problems are being addressed through Site Management Statements, management agreements, acquisition, and through implementation of a National Nature Reserve Management Plan in part of the area.
Walton Moss UK0030093 02 46 30 W 54 59 26 N	285.89	**Primary:** Active raised bogs *Priority feature, degraded raised bogs still capable of natural regeneration **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Previous land-drainage operations and inappropriate grazing regimes.	Walton Moss includes land managed as a National Nature Reserve. A hydrological monitoring regime is in preparation to inform remedial measures. Grazing has been tackled by enclosure and by Countryside Stewardship agreements.
Shell Flat and Lune Deep pSAC 03 13 0.24 W 53 51 51.33 N	14,019.16	Interest features include Annex I Reefs and Sandbanks which are Slightly Covered by Sea Water all the Time		There is a low risk from a nearby dredge disposal site and physical damage and biological disturbance from trawling activities. Biological disturbance to sandbank features is considered to be moderate due to their exposure to commercial fishing. Coastal heavy metal and synthetic substance discharges pose a moderate threat of toxic contamination to reef features, though threats of non-toxic contamination are low.	No interactions with Licence areas foreseen.

Table A4a.8 – Summary Details of Relevant Special Protecion Areas (SPAs)

SEA Area 2: West Midlands, Northwest England and Southern Scotland					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
Morecambe Bay UK9005081 02 57 21 W 54 07 19 N	37,404.6	**During the breeding season:** Sandwich tern *Sterna sandvicensis*	**Over winter:** Pintail *Anas acuta*, pink-footed goose *Anser brachyrhynchus,* turnstone *Arenaria interpres,* dunlin *Calidris alpina,* knot *Calidris canutus,* oystercatcher *Haematopus ostralegus,* bar-tailed godwit *Limosa lapponica,* curlew *Numenius arquata,* grey plover *Pluvialis squatarola*, shelduck *Tadorna tadorna,* redshank *Tringa totanus*. **On passage:** Ringed plover *Charadrius hiaticula* **Assemblage qualification:** During the breeding season, the area regularly supports 61,858 individual seabirds including: sandwich tern *Sterna sandvicensis*. Over winter, the area regularly supports 210,668 individual waterfowl including: pink-footed goose *Anser brachyrhynchus*, shelduck *Tadorna tadorna,*	Land-claim for agriculture, over-grazing, dredging, over-fishing, industrial uses and pollution.	Management plans for non-governmental organisation reserves, EN Site Management Statements, European Marine Site Management Scheme, and the Morecambe Bay Partnership.

SEA Area 2: West Midlands, Northwest England and Southern Scotland					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
			pintail *Anas acuta,* oystercatcher *Haematopus ostralegus,* grey plover *Pluvialis squatarola,* knot *Calidris canutus,* dunlin *Calidris alpina,* bar-tailed godwit *Limosa lapponica,* curlew *Numenius arquata,* redshank *Tringa totanus,* turnstone *Arenaria interpres.*		
Leighton Moss UK9005091 02 47 31 W 54 10 03 N	128.61	**During the breeding season:** Bittern *Botaurus stellaris*, marsh harrier *Circus aeruginosus* **Over winter:** Bittern *Botaurus stellaris*	N/A	Changes in water quality and level. Agricultural run-off from adjacent land. Saline intrusion.	RSPB reserve managed to maintain and enhance fen and open water habitats to provide optimum conditions for important reedbed birds.
Ribble and Alt Estuaries UK9005103 02 59 14 W 53 42 20 N	12,412.31	**During the breeding season:** Common tern *Sterna hirundo*, ruff *Philomachus pugnax* **Over winter:** Bar-tailed godwit *Limosa lapponica*, Bewick's swan *Cygnus columbianus*, golden plover *Pluvialis apricaria*, whooper swan *Cygnus cygnus*	**During the breeding season:** Lesser black-backed gull *Larus fuscus,* black-headed gull *Larus ridibundus* **Over winter:** pintail *Anas acuta,* teal *Anas crecca*, wigeon *Anas penelope, Anser brachyrhynchus*, scaup *Aythya marila,* dunlin *Calidris alpina*, sanderling *Calidris alba,* knot *Calidris canutus,* oystercatcher *Haematopus ostralegus,* black-tailed	Recreation, built development (including coastal defence), wildfowling and industry. Overgrazing on saltmarsh. Accidental pollution from the nearby Mersey Estuary and Irish Sea oil and gas fields.	Agreed plans for three NNRs, two LNRs and other initiatives developed by the Sefton Coast Partnership. Wider land management issues being developed via the Ribble and Mersey Estuary Strategies. Sefton Shoreline Management Plan. Oil spill contingency plans maintained.

SEA Area 2: West Midlands, Northwest England and Southern Scotland					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
			godwit *Limosa limosa*, common scoter *Melanitta nigra,* Curlew *Numenius arquata*, Cormorant *Phalacrocorax carbo,* grey plover *Pluvialis squatarola,* shelduck *Tadorna tadorna,* redshank *Tringa totanus, Lapwing Vanellus vanellus.* **On passage:** Ringed plover *Charadrius hiaticula*, sanderling *Calidris alba,* redshank *Tringa totanus,* whimbrel *Numenius phaeopus* **Assemblage qualification:** During the breeding season, the area regularly supports 29,236 individual seabirds including: Black-headed gull *Larus ridibundus*, lesser black-backed gull *Larus fuscus*, common tern *Sterna hirundo*. Over winter, the area regularly supports 323,861 individual waterfowl including: cormorant *Phalacrocorax carbo,* Bewick's swan *Cygnus columbianus bewickii*,		

SEA Area 2: West Midlands, Northwest England and Southern Scotland					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
			whooper swan *Cygnus cygnus,* pink-footed goose *Anser brachyrhynchus,* shelduck *Tadorna tadorna,* wigeon *Anas penelope,* teal *Anas crecca,* Pintail *Anas acuta,* scaup *Aythya marila,* common scoter *Melanitta nigra,* common scoter *Melanitta nigra,* oystercatcher *Haematopus ostralegus,* ringed plover *Charadrius hiaticula,* grey plover *Pluvialis squatarola,* golden plover *Pluvialis apricaria,* lapwing *Vanellus vanellus,* knot *Calidris canutus,* sanderling *Calidris alba*, dunlin *Calidris alpina,* black-tailed godwit *Limosa limosa,* bar-tailed godwit *Limosa lapponica,* curlew *Numenius arquata,* redshank *Tringa totanus.*		
Martin Mere UK9005111 02 52 37 W 53 37 24 N	119.89	**Over winter:** Bewick's swan *Cygnus columbianus bewickii*, whooper swan *Cygnus cygnus*	**Over winter:** Pink-footed goose *Anser brachyrhynchus*, pintail *Anas acuta,* wigeon *Anas penelope.*	Water abstraction for agriculture. Changes in farming practice.	Areas of pasture positively managed under a Countryside Stewardship Scheme.
Mersey Estuary UK9005131	5,023.35	**Over winter:** Golden plover *Pluvialis apricaria*	**Over winter:** pintail *Anas acuta*, teal *Anas crecca,* wigeon *Anas penelope,* dunlin *Calidris*	Physical loss through land-claim and development, physical damage caused by	Estuary Management Plan.

SEA Area 2: West Midlands, Northwest England and Southern Scotland					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
02 49 25 W 53 18 51 N			*alpina alpina, b*lack-tailed godwit *Limosa limosa islandica,* curlew *Numenius arquata,* grey plover *Pluvialis squatarola, g*reat crested grebe *Podiceps cristatus,* shelduck *Tadorna tadorna*, redshank *Tringa totanus*, lapwing *Vanellus vanellus*. **On passage:** Redshank *Tringa totanus*, ringed plover *Charadrius hiaticula*	dredging, agricultural requirements, toxic and non-toxic contamination and recreation disturbance.	
Bowland Fells UK9005151 02 33 45 W 53 59 13 N	16,002.31	**During the breeding season:** Hen harrier *Circus cyaneus*, merlin *Falco columbarius*	**During the breeding season:** Lesser black-backed gull *Larus fuscus*	Inappropriate grazing, burning.	Overgrazing controlled through Management Agreements or Countryside Stewardship Scheme. Site Management Statements have agreed burning plans and stocking levels.
Peak District Moors (South Pennine Moors Phase 1) UK9007021 01 45 51 W 53 28 03 N	45,270.52	**During the breeding season:** Golden plover *Pluvialis apricaria*, merlin *Falco columbarius*, short-eared owl *Asio flammeus*	N/A	Significant visitor pressure and disturbance from major urban and industrial centres. Historic air pollution, high grazing pressure and wildfire burns.	Initiatives for sustainable recreation being developed. Two separate ESAs encourage and support habitat restoration.
South Pennine Moors Phase 2	20,936.53	**During the breeding season:** Golden plover *Pluvialis*	**Assemblage qualification:** During the breeding season the area regularly supports:	Heavy recreational pressure. Overgrazing. Adjacent intensive	Integrated management strategy and conservation action

SEA Area 2: West Midlands, Northwest England and Southern Scotland					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
UK9007022 02 04 16 W 53 48 38 N		*apricaria*, merlin *Falco columbarius*, short-eared owl *Asio flammeus*	dunlin *Calidris alpina alpina*, snipe *Gallinago gallinago,* curlew *Numenius arquata,* redshank *Tringa totanus,* lapwing *Vanellus vanellus,* common sandpiper *Actitis hypoleucos,* twite *Carduelis flavirostris,* northern wheatear *Oenanthe oenanthe,* whinchat *Saxicola rubetra,* ring ouzel *Turdus torquatus.*	agriculture.	programme as part of EU-funded LIFE project.
Dee Estuary UK9013011 03 11 02 W 53 18 39 N	13,084.85	**Over winter:** Bar-tailed godwit *Limosa lapponica*	**Over winter:** Pintail *Anas acuta*, knot *Calidris canutus*, oystercatcher *Haematopus ostralegus*, shelduck *Tadorna tadorna*, redshank *Tringa totanus*. **Assemblage qualification:** Over winter, the area regularly supports 90,518 individual waterfowl including: shelduck *Tadorna tadorna,* pintail *Anas acuta,* oystercatcher *Haematopus ostralegus,* knot *Calidris canutus,* bar-tailed godwit *Limosa lapponica,* redshank *Tringa totanus.*	Industrial and urban development. Water quality issues. Over-exploitation of cockle beds.	Sizeable parts of the estuary are in conservation management or are subject to Management Agreements. The Dee Estuary Strategy.
Mersey Narrows and North Wirral Foreshore pSPA	To be confirmed	N/A	**Over winter:** Redshank *Tringa totanus*, turnstone *Arenaria interpres*	No details.	No details.

SEA Area 2: West Midlands, Northwest England and Southern Scotland					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
UK9020287 03 07 43 W 53 25 09 N			**Assemblage qualification:** Over winter, the area regularly supports 20,269 individual waterfowl including: Dunlin *Calidris alpina*, knot *Calidris canutus*, grey plover *Pluvialis squatarola*, oystercatcher *Haematopus ostralegus*, cormorant *Phalacrocorax carbo*, turnstone *Arenaria interpres*, redshank *Tringa totanus*.		
Duddon Estuary UK9005031 03 15 24 W 54 10 39 N	6,806.3	**During the breeding season:** Sandwich Tern *Sterna sandvicensis*	**Over winter:** Knot *Calidris canutus,* pintail *Anas acuta,* redshank *Tringa totanus.* **Assemblage qualification:** Over winter, the area regularly supports 31,505 individual waterfowl including: Knot *Calidris canutus,* pintail *Anas acuta,* redshank *Tringa totanus.*	Intertidal zone being threatened by coastal squeeze due to land claim and coastal defence as well as sea level rise and storm surges. Saltmarshes are grazed by agricultural stock, sometimes at a high level. Waterfowl wintering vulnerable to loss of feeding areas through disturbance, land claim and development.	Issues are being addressed through the Shoreline Management Plan and more locally, Site Management Statements/Positive Management Schemes. Duddon Estuary partnership is addressing some of the threats arising from recreational pressure and bait digging.
Langholm - Newcastleton Hills UK9003271	TBC	**During the breeding season:** Hen Harrier *Circus cyaneus*	N/A	Threats to the moorland which supports the qualifying interest include degradation and	Being addressed through bracken control and management agreements for heather

SEA Area 2: West Midlands, Northwest England and Southern Scotland					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
02 53 14 W 55 12 53 N				loss of heather and peat erosion. Hen harriers potentially vulnerable to disturbance from agricultural practices, game management and recreational activities.	restoration, stocking levels and sensitive muirburn. Joint Raptor Study on the site is being continued and informs best management practice.
Upper Solway Flats and Marshes UK9005012 03 19 17 W 54 58 04 N	30,706.26	**Over winter:** barnacle goose *Branta leucopsis,* whooper swan *Cygnus cygnus,* bar-tailed godwit *Limosa lapponica,* golden plover *Pluvialis apricaria.*	**Over winter:** Pintail *Anas acuta,* shoveler *Anas clypeata,* teal *Anas crecca,* pink-footed goose *Anser brachyrhynchus*, turnstone *Arenaria interpres,* scaup *Aythya marila,* goldeneye *Bucephala clangula*, dunlin *Calidris alpina alpina,* sanderling *Calidris alba,* knot *Calidris canutu,s oystercatcher Haematopus ostralegus,* curlew *Numenius arquata,* redshank *Tringa totanus,* grey plover *Pluvialis squatarola,* shelduck *Tadorna tadorna.* **Assemblage qualification:** Over winter, the area regularly supports 133,440 individual waterfowl including: whooper swan *Cygnus cygnus,* pink-footed goose *Anser brachyrhynchus,* barnacle goose *Branta leucopsis,* shelduck *Tadorna tadorna,*	Some established and new flood defence and coastal erosion works may exacerbate erosion elsewhere within the site. Roosts and feeding areas are vulnerable to disturbance.	Cockle fishery has been closed for a number of years. Other commercial, traditional and shell fisheries are regulated by Government to ensure that they are carried out in a sustainable way and that their impact on bird feeding areas is not significant.

SEA Area 2: West Midlands, Northwest England and Southern Scotland					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
			teal *Anas crecca,* pintail *Anas acuta,* shoveler *Anas clypeata,* scaup *Aythya marila*, goldeneye *Bucephala clangula,* oystercatcher *Haematopus ostralegus,* golden plover *Pluvialis apricaria,* grey plover *Pluvialis squatarola,* knot *Calidris canutus,* dunlin *Calidris alpina alpina*, bar-tailed godwit *Limosa lapponica,* curlew *Numenius arquata,* redshank *Tringa totanus,* turnstone *Arenaria interpres.*		
Liverpool Bay pSPA UK9020294 53 36 30 N 03 13 16 W	197,504.24	**Over winter:** Red-throated diver	**Over winter:** Common scoter	-	-

Table A4a.9 – Summary Details of Relevant Ramsar Sites

Code/location	Name	Area (ha)	Description	Criteria*	Adverse factors
UK11035 02 47 31 W 54 10 03 N	Leighton Moss	128.61	Largest reedbed in north-west England situated on the eastern edge of Morecambe Bay. Large areas of open water surrounded by extensive reedbeds in which areas of willow scrub and mixed fen vegetation occur. A typical and varied fen flora has developed in part, whilst the reedbed shows all stages of transition from open water through to woodland.	1	Sedimentation/siltation, pollution – agriculture, salination of groundwater.
UK11039 02 52 37 W 53 37 24 N	Martin Mere	119.89	Areas of open water with associated muddy margins have been created, whilst maintaining seasonally flooded marsh and reed swamp habitats via water level control. In addition large areas of semi-improved damp grassland, unimproved species rich damp grassland and rush pasture have been maintained and enhanced via appropriate grazing management. Important as a refuge for large and diverse wintering, passage and breeding birds community.	5, 6	No factors reported.
UK11041 02 49 25 W 53 18 51 N	Mersey Estuary	5,023.35	Large, sheltered estuary comprising large areas of saltmarsh and extensive intertidal sand and mudflats, with limited areas of brackish marsh, rocky shoreline and boulder clay cliffs, within a rural and industrial environment. Intertidal flats and saltmarshes provide feeding and roosting sites for large and internationally important populations of waterfowl. During the winter, the site is of major importance for duck and waders. The site is also important during spring and autumn migration periods, particularly for wader populations.	5, 6	No factors reported.
UK11043 02 50 25 W 52 54 11 N	Midland Meres and Mosses – Phase 1	510.88	The 16 component sites include open water bodies (meres), the majority of which are nutrient-rich with associated fringing habitats; reed swamps, fen, carr and damp pasture. Peat accumulation has resulted in nutrient poor peat bogs (mosses) forming in some sites in the fringes of meres or completely infilling basins. In a few cases the result is a floating quaking bog or schwingmoor. Range of resulting habitats support nationally important flora and fauna.	1, 2	Introduction/invasion of flora, urban development, eutrophication.

Code/location	Name	Area (ha)	Description	Criteria*	Adverse factors
UK11045 02 57 21 W 54 07 19 N	Morecambe Bay	37,404.6	Represents largest continuous intertidal area in Britain. Comprises the estuaries of 5 rivers and the mudflats behind Walney Island. Area is of intertidal mud and sandflats, with associated saltmarshes, shingle beaches and other coastal habitats. Component in the chain of west coast estuaries of outstanding importance for passage and overwintering waterfowl, and breeding waterfowl, gulls and terns.	6, 5, 4	Overfishing
UK11057 02 58 44 W 53 42 41 N	Ribble and Alt Estuaries	13,464.1	Two estuaries which form part of the chain of west coast sites which fringe the Irish Sea. Formed by extensive sand and mudflats backed, in the north, by the saltmarsh of the Ribble Estuary and, to the south, the sand dunes of the Sefton Coast. Tidal flats and saltmarsh support internationally important populations of waterfowl in winter and the sand dunes support vegetation communities and amphibian populations of international importance.	2	Military activities, recreation disturbance, pollution – unspecified, mining, hunting or capture, over-grazing (livestock), general disturbance, erosion.
UK11060 02 23 05 W 53 21 14 N	Rostherne Mere	79.76	The deepest, and one of the largest and most northerly of the meres of the Cheshire Plain. It lies in a hollow surrounded by thick deposits of glacial drift overlying Triassic marls and salt-beds.	1	Introduction of exotic animals, eutrophication.
UK11080 02 45 43 W 52 55 20 N	Midland Meres and Mosses – Phase 2	1,588.24	The 18 component sites include open water bodies (meres), the majority of which are nutrient-rich with associated fringing habitats, reed swamp, fen, carr and damp pasture. Peat accumulation has resulted in the nutrient-poor peat bogs (mosses) forming in some sites on the fringes of the meres or completely infilling basins. In a few cases the result is a floating quaking bog or schwingmoor. Habitats support nationally important flora and fauna.	1, 2	Introduction of exotic animals, pollution – agriculture, introduction/ invasion of flora, eutrophication.
UK11082 03 11 02 W 53 18 39 N	The Dee Estuary (Wales)	13,084.85	One of the top five estuaries in the UK for wintering and passage waterfowl populations. Supports extensive areas of intertidal sand and mudflats as well as saltmarsh. Where land-claim has not occurred, the saltmarshes grade into transitional brackish and freshwater swamp vegetation, on the upper shore. The site includes the three sandstone islands of Hilbre with their important cliff vegetation and maritime heathland/grassland. Contrast between the industrialised usage of the coastal belt in Wales and residential and recreational usage in England.	5, 6, 1	Over-fishing, introduction/invasion of flora, transport infrastructure, industrial pollution, pollution – sewage, general disturbance.

Code/location	Name	Area (ha)	Description	Criteria*	Adverse factors
UK11022 03 15 24 W 54 10 39 N	Duddon Estuary	6,806.3	Duddon Estuary is formed by the River Duddon and the smaller Kirkby Pool opening into the Irish Sea in south-western Cumbria. Most of the site consists of intertidal sand and mudflats, important for large numbers of wintering and passage waterfowl. A range of grazed and ungrazed saltmarsh habitats occur around the edge of the estuary, especially the sheltered inner section. The site is the most important in Cumbria for sand-dune communities including large areas of calcareous dunes at Sandscale and Haverigg Haws and contrasting acid dunes on North Walney. Artificial habitats include slag banks and a flooded mine working known as Hodbarrow Lagoon, the largest coastal lagoon in north-west England.	2, 4, 5, 6	No factors reported.
UK11079 03 25 27 W 54 54 20 N	Upper Solway Flats and Marshes	43,636.73	The flats and marshes of the Upper Solway Firth form one of the largest continuous areas of intertidal habitat in Britain. The whole estuarine complex is a site of national and international importance for wintering wildfowl and wading birds and is a vital link in a chain of west coast estuaries used by migrating birds. The site is also noted for its populations of breeding birds, natterjack toad *Bufo calamita* and invertebrates. The geomorphology and vegetation of the estuarine saltmarshes or merses is also of international importance with broad transitions to mature 'upper-marsh' being particularly well represented. A number of rare plant species and geological exposures also occur within the site.	2, 5, 6	No factors reported.

*Note: Ramsar criteria:**

1. sites containing representative, rare or unique wetland types
2. supports vulnerable, endangered, or critically endangered species or threatened ecological communities
3. supports populations of plant/animal species important for maintaining regional biodiversity
4. supports plant/animal species at a critical stage in their life cycles, or provides refuge
5. regularly supports 20,000 or more waterbirds
6. regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
8. important source of food for fishes, spawning ground, nursery and/or migration path

A4a.1.3.3 SEA Area 3

Figure A4a.7 – Sites of International Importance

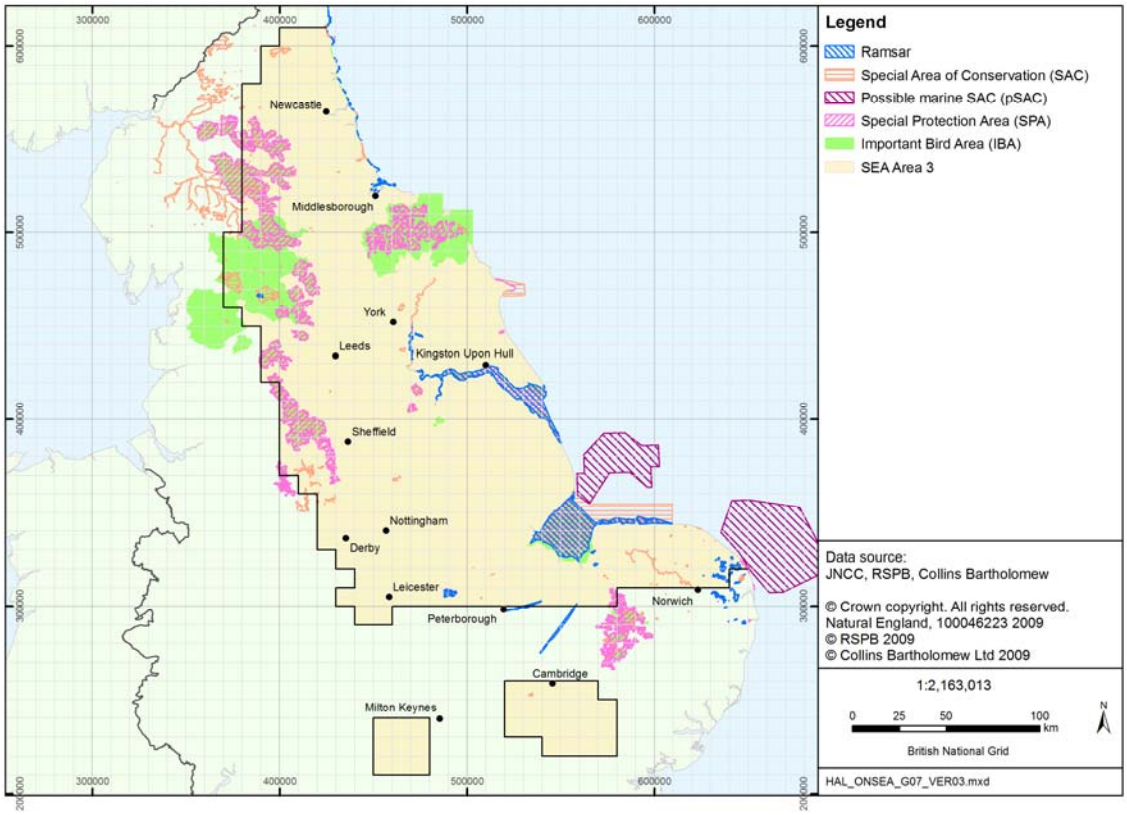


Figure A4a.8 – Sites of National and Local Importance

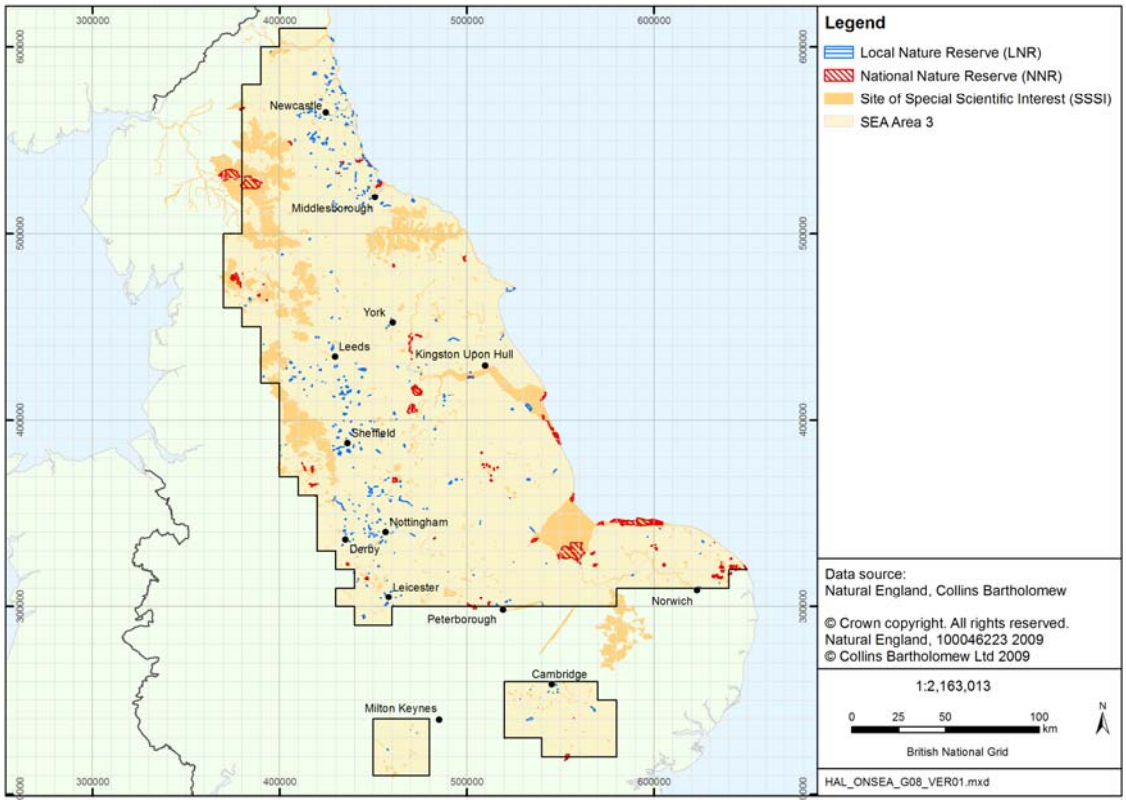


Table A4a.10 – Summary Details of Relevant Special Areas of Conservation (SACs)

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
Humber Estuary UK0030170 00 45 05W 53 35 21N	36,657.15	**Primary:** Estuaries, Mudflats and sandflats not covered by seawater at low tide **Qualifying:** Sandbanks which are slightly covered by sea water all the time, Coastal lagoons**Priority feature*, *Salicornia* and other annuals colonising mud and sand, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), Embryonic shifting dunes, Shifting dunes along the shoreline with *Ammophila arenaria* (`white dunes`), Fixed dunes with herbaceous vegetation (`grey dunes`) **Priority feature*, Dunes with *Hippophae rhamnoides*	**Primary:** N/A **Qualifying:** Sea lamprey *Petromyzon marinus*, River lamprey *Lampetra fluviatilis*, Grey seal *Halichoerus grypus*	Subject to past and ongoing human activity and sea-level change. Issues include coastal squeeze, impacts on sediment budget, geomorphological structure, and function of the estuary, changes in water quality, pressures from build development, disturbance from access and recreation.	Humber Flood Risk Management Strategy is addressing coastal squeeze. Proposed activities require consent from conservation bodies under the Habitats Regulations. Diffuse pollution controlled through Waste Water Framework Directive and Catchment Sensitive Farming Initiatives. The Humber Management scheme was developed by all statutory bodies to assist delivery of their duties under the habitats regulations.
Eversden and Wimpole Woods UK0030331 00 02 05 W 52 09 32 N	66.48	**Primary:** N/A **Qualifying:** N/A	**Primary:** Barbastelle *Barbastella barbastellus* **Qualifying:** N/A	Public access/disturbance.	Wimpole Woods is owned and managed by the National Trust. Management aimed at maintaining and enhancing barbastelle populations. Current use of both Eversden and Wimpole woods considered compatible with wood as a foraging/light path for barbastelle.
River Eden	2,463.23	**Primary:** Oligotrophic to mesotrophic standing waters	**Primary:** White-clawed (or Atlantic stream)	Overgrazing of riverbanks and nutrient run-off. Water	Maintenance of breeding and nursery areas for the species on

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
UK0012643 02 49 58 W 54 36 19 N		with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*, water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation, alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) **Priority feature* **Qualifying:** N/A	crayfish *Austropotamobius pallipes*, sea lamprey *Petromyzon marinus*, brook lamprey *Lampetra planeri*, river lamprey *Lampetra fluviatilis*, Atlantic salmon *Salmo salar*, bullhead *Cottus gobio*, otter *Lutra lutra* **Qualifying:** N/A	quality and eutrophication. Alluvial forest fragmentation.	this site (e.g. lampreys, salmon and otter) depends on the habitat quality of streams and their margins. Conservation strategy with actions to address river quality issues.
River Wensum UK0012647 00 59 38 E 52 43 04 N	381.74	**Primary:** Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation **Qualifying:** N/A	**Primary:** White-clawed (or Atlantic stream) crayfish *Austropotamobius pallipes* **Qualifying:** Desmoulin`s whorl snail *Vertigo moulinsiana*, brook lamprey *Lampetra planeri*, bullhead *Cottus gobio*	Invasive species, input of silt and agricultural chemicals, channel modification, development on floodplain, water abstraction.	No details.
Birklands and Bilhaugh UK0012740 01 04 31 W 53 12 17 N	271.84	**Primary:** Old acidophilous oak woods with *Quercus robur* on sandy plains **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Recreation pressure, subsidence from past coal mines, under-grazing, air pollution from industrial towns.	Visitor pressure and lack of grazing will be addressed by a management committee and in the management plan.
Castle Eden Dene	194.4	**Primary:** *Taxus baccata* woods of the British Isles *	**Primary:** N/A **Qualifying:** N/A	No details.	Managed as a NNR and Management Plan provides for

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
UK0012768 01 19 29 W 54 45 00 N		*Priority feature* **Qualifying:** N/A			regeneration of woodland.
Ingleborough Complex UK0012782 02 22 25 W 54 09 36 N	5,769.28	**Primary:** *Juniperus communis* formations on heaths or calcareous grasslands, alkaline fens, calcareous rocky slopes with chasmophytic vegetation, limestone pavements **Priority feature* **Qualifying:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), blanket bogs **Priority feature*, petrifying springs with tufa formation (*Cratoneurion*) **Priority feature*, *Tilio-Acerion* forests of slopes, screes and ravines ** Priority feature*	**Primary:** N/A **Qualifying:** N/A	Overgrazing, removal of limestone pavement, limestone quarrying.	Wildlife Enhancement Scheme and other forms of agri-environmental agreement being used to promote appropriate management. Limestone Pavement Orders.
Roydon Common and Dersingham Bog UK0012801	351.83	**Primary:** Northern Atlantic wet heaths with *Erica tetralix*, depressions on peat substrates of the *Rhynchosporion* **Qualifying:** European dry	**Primary:** N/A **Qualifying:** N/A	Agricultural pollution of catchment. Water abstraction, lack of traditional management.	EA's North West Norfolk River Catchment Plan and Review of Consents. Management agreements and Countryside Stewardship payments for reintroducing traditional

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
00 29 58 E 52 46 22 N		heaths			management and controlling scrub.
Tyne and Allen River Gravels UK0012816 02 29 08 W 54 57 20 N	36.84	**Primary:** Calaminarian grasslands of the *Violetalia calaminariae* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	River course change, succession to grassland and scrub.	Unknown whether management can restore areas where succession taken place, as may no longer be sufficient available metals even if the bare shingle re-exposed.
Gang Mine UK0012817 01 34 21 W 53 05 52 N	8.26	**Primary:** Calaminarian grasslands of the *Violetalia calaminariae* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Under-grazing, deposition of limestone dust from quarry.	Partly owned by Derbyshire Wildlife Trust. Other part managed under Countryside Stewardship Scheme and under no immediate threat.
Thrislington UK0012838 01 30 27 W 54 41 20 N	22.58	**Primary:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Fertiliser input.	Grasslands dependent upon continuous management by seasonally-adjusted grazing and no fertiliser input. NNR and traditional management reintroduced.
Lower Derwent Valley UK0012844 00 55 50 W 53 53 17 N	915.91	**Primary:** Lowland hay meadows (*Alopecurus pratensis, Sanguisorba officinalis*) **Qualifying:** Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) **Priority feature*	**Primary:** N/A **Qualifying:** Otter *Lutra lutra*	Subsidence from coal mines, water level.	Extant planning permission for deep coal mining has been reviewed and an appropriate compensation/mitigation package has been agreed.
Waveney and	93.18	**Primary:** *Molinia* meadows	**Primary:** Desmoulin`s	Water abstraction, over-	ESA funding to encourage

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
Little Ouse Valley Fens UK0012882 01 01 06 E 52 22 42 N		on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* **Priority feature* **Qualifying:** N/A	whorl snail *Vertigo moulinsiana* **Qualifying:** N/A	deepening of local rivers and land drainage.	reintroduction of grazing. EN and Suffolk Wildlife Trust NNR. Water level management plans.
Norfolk Valley Fens UK0012892 00 51 22 E 52 31 36 N	616.21	**Primary:** Alkaline fens **Qualifying:** Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths, semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*),calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* **Priority feature*, alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) **Priority feature*	**Primary:** Narrow-mouthed whorl snail *Vertigo angustior*, Desmoulin`s whorl snail *Vertigo moulinsiana* **Qualifying:** N/A	Reduction of water table and decrease in spring flows from groundwater abstraction.	Management Agreements, Countryside Stewardship and ESA payments help towards reintroduction or promotion of traditional management.
Thorne Moor UK0012915 00 53 51 W	1,909.38	**Primary:** Degraded raised bogs still capable of natural regeneration **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Peat cutting, water abstraction, agricultural drainage.	Much of site successfully restored to active bog through maintenance of water levels, though a large area is classed as degraded because

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
53 38 18 N					restoration in early stages.
Border Mires, Kielder – Butterburn UK0012923 02 29 52 W 55 18 17 N	11,851.77	**Primary:** Blanket bogs **Priority feature*, Transition mires and quaking bogs **Qualifying:** Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths, petrifying springs with tufa formation (*Cratoneurion*) **Priority feature*	**Primary:** N/A **Qualifying:** N/A	Forestry drainage, conifer planting, over-grazing, burning.	Programme of rehabilitation of bogs damaged by forestry underway, based on management plans.
Ouse Washes UK0013011 00 12 21 E 52 28 58 N	311.35	**Primary:** N/A **Qualifying:** N/A	**Primary:** Spined loach *Cobitis taenia* **Qualifying:** N/A	Water abstraction, water quality (agricultural and sewage pollutants), salinity, turbidity and sediment issues.	Water Level Management Plan agreed by EA and partner organisations. EA also involved in water quality management.
Flamborough Head UK0013036 00 04 37 W 54 06 41 N	6,311.96	**Primary:** Reefs, vegetated sea cliffs of the Atlantic and Baltic coasts, submerged or partially submerged sea caves **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Physical damage and toxic contamination.	Management Scheme will identify necessary monitoring systems and measures to maintain features.
Winterton-Horsey Dunes UK0013043 01 41 23 E 52 43 24 N	425.94	**Primary:** Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) **Priority feature*, humid dune slacks **Qualifying:** Embryonic shifting dunes, shifting dunes along the shoreline with *Ammophila arenaria* (`white dunes`)	**Primary:** N/A **Qualifying:** N/A	Coastal squeeze. Beach-feeding. Water abstraction. Recreation pressure.	Coastal Habitat Action Plan (ChaMP) will attempt to address these issues.

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
The Broads UK0013577 01 36 40 E 52 43 49 N	5,865.6	**Primary:** Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp., natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation, transition mires and quaking bogs, calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* * *Priority feature*, Alkaline fens, alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) **Priority feature* **Qualifying:** *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)	**Primary:** Desmoulin`s whorl snail *Vertigo moulinsiana*, fen orchid *Liparis loeselii* **Qualifying:** Otter *Lutra lutra*	Sea level rise and water abstraction. Saline intrusion. Eutrophication. Recreation pressure.	Partnership between EA, Broads Authority and EN. Broads Plan (Broads Authority), Water Level Management Plans and the ESA scheme are starting to raise water levels, revert arable areas back to grass and encourage sensitive management.
Moor House – Upper Teesdale UK0014774 02 18 44 W 54 42 59 N	38,795.99	**Primary:** Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp., Alpine and Boreal heaths, *Juniperus communis* formations on heaths or calcareous grasslands, *Calaminarian* grasslands of the *Violetalia calaminariae*, siliceous alpine and boreal grasslands, semi-natural dry grasslands and scrubland facies: on calcareous	**Primary:** Round-mouthed whorl snail *Vertigo genesii*, Marsh saxifrage *Saxifraga hirculus* **Qualifying:** N/A	Overgrazing, inappropriate burning, drainage, acid deposition.	Wildlife Enhancement Schemes geared at moorland and pasture, and ESA and Countryside Stewardship schemes.

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
		substrates (*Festuco-Brometalia*), *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), hydrophilous tall herb fringe communities of plains and of the montane to alpine levels, mountain hay meadows, blanket bogs **Priority feature*, petrifying springs with tufa formation (*Cratoneurion*) **Priority feature*, alkaline fens, Alpine pioneer formations of the *Caricion bicoloris-atrofuscae *Priority feature*, siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*), calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*), calcareous rocky slopes with chasmophytic vegetation, siliceous rocky slopes with chasmophytic vegetation **Qualifying:** European dry heaths, limestone pavements **Priority feature*			
North Pennine Dales Meadows UK0014775	497.09	**Primary:** Mountain hay meadows **Qualifying:** *Molinia* meadows on calcareous,	**Primary:** N/A **Qualifying:** N/A	Lack of traditional management.	Management agreements and ESA payments being used to promote continuation of traditional management.

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
02 06 24 W 54 37 31 N		peaty or clayey-silt-laden soils (*Molinion caeruleae*)			
Craven Limestone Complex UK0014776 02 06 59 W 54 06 04 N	5,328.25	**Primary:** Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp., semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), active raised bogs **Priority feature*, petrifying springs with tufa formation (*Cratoneurion*) **Priority feature*, alkaline fens, limestone pavements **Priority feature* **Qualifying:** Calaminarian grasslands of the *Violetalia calaminariae*, *Tilio-Acerion* forests of slopes, screes and ravines **Priority feature*	**Primary:** White-clawed (or Atlantic stream) crayfish *Austropotamobius pallipes*, bullhead *Cottus gobio*, lady`s-slipper orchid *Cypripedium calceolus* **Qualifying:** N/A	Overgrazing, removal of limestone pavement and limestone quarrying. Malham Tarn vulnerable to nutrient enrichment.	Wildlife Enhancement Scheme and other forms of agri-environmental agreement being used to promote appropriate management. Limestone Pavement Orders.
Asby Complex UK0014778 02 37 14 W 54 29 39 N	3,122.23	**Primary:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*),	**Primary:** Geyer`s whorl snail *Vertigo geyeri*, slender green feather-moss *Drepanocladus* (*Hamatocaulis*) *vernicosus* **Qualifying:** N/A	Overgrazing. Damage of limestone pavements.	Limestone Pavement Orders. Management Agreements are being sought but may be difficult to achieve on common land.

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
		petrifying springs with tufa formation (*Cratoneurion*) **Priority feature*, alkaline fens, limestone pavements **Priority feature* **Qualifying:** Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp., European dry heaths, calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* **Priority feature*			
Fenland UK0014782 00 16 44 E 52 18 23 N	618.64	**Primary:** *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* **Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** Spined loach *Cobitis taenia*, great crested newt *Triturus cristatus*	Lack of traditional management, water abstraction, high nutrients in flood water.	Constituent sites are all NNRs. English Nature, the EA and Anglian Water looking at water management issues.
The Wash and North Norfolk Coast UK0017075 00 19 05 E 52 56 13 N	10,7761.3	**Primary:** Sandbanks which are slightly covered by sea water all the time, mudflats and sandflats not covered by seawater at low tide, large shallow inlets and bays, reefs, *Salicornia* and other annuals colonising mud and sand, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*), Mediterranean and thermo-Atlantic	**Primary:** Common seal *Phoca vitulina* **Qualifying:** Otter *Lutra lutra*	Coastal squeeze. Dredging and coastal protection works. Disturbance.	Current management underway to address concerns over declines in shellfisheries. Disturbance of seals addressed through the Marine Scheme of Management.

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
		halophilous scrubs (*Sarcocornetea fruticosi*) **Qualifying:** Coastal lagoons **Priority feature*			
North Northumberland Dunes UK0017097 01 48 01 W 55 41 05 N	1,147.56	**Primary:** Embryonic shifting dunes, shifting dunes along the shoreline with *Ammophila arenaria* (`white dunes`), fixed dunes with herbaceous vegetation (`grey dunes`) **Priority feature*, dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*), humid dune slacks **Qualifying:** N/A	**Primary:** Petalwort *Petalophyllum ralfsii* **Qualifying:** N/A	Inappropriate grazing regimes. Invasion of non-native plant species. Recreation pressure.	Management Agreements, including Countryside Stewardship being pursued to address problems.
North Norfolk Coast UK0019838 00 36 38 E 52 58 08 N	3,207.37	**Primary:** Coastal lagoons **Priority feature*, perennial vegetation of stony banks, Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*), embryonic shifting dunes, shifting dunes along the shoreline with *Ammophila arenaria* (`white dunes`), fixed dunes with herbaceous vegetation (`grey dunes`) **Priority feature*, humid dune slacks **Qualifying:** N/A	**Primary:** N/A **Qualifying:** Otter *Lutra lutra*, petalwort *Petalophyllum ralfsii*	Sea-level rise, coastal retreat, water level management, habitat recreation and visitor pressure issues.	Shoreline Management Plan, local biodiversity action plans, water level management plans, Site Management Statements and Wildlife Enhancement Scheme Agreements. Number of NNRs managed by voluntary conservation organisations.
Peak District Dales	2,326.33	**Primary:** Semi-natural dry grasslands and scrubland facies: on calcareous	**Primary:** White-clawed (or Atlantic stream) crayfish	Inappropriate grazing management. Drainage. Limestone or mineral	Some parts now managed under Countryside Stewardship. English Nature's White Peak

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
UK0019859 01 47 16 W 53 05 29 N		substrates (*Festuco-Brometalia*), *Tilio-Acerion* forests of slopes, screes and ravines **Priority feature* **Qualifying:** European dry heaths, Calaminarian grasslands of the *Violetalia calaminariae*, alkaline fens, calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*), calcareous rocky slopes with chasmophytic vegetation	*Austropotamobius pallipes* **Qualifying:** Brook lamprey *Lampetra planeri*, bullhead *Cottus gobio*	extraction. Invasion of non-native tree species.	Wildlife Enhancement Scheme to enhance conservation value of sites.
Breckland UK0019865 00 44 42 E 52 31 08 N	7,548.06	**Primary:** Inland dunes with open *Corynephorus* and *Agrostis* grasslands, natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation, European dry heaths, semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) **Qualifying:** Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) **Priority feature*	**Primary:** N/A **Qualifying:** Great crested newt *Triturus cristatus*	Nutrient deposition from the atmosphere and adjacent land, tree/shrub invasion, recreational pressure. Water abstraction.	Managed grazing essential. Management agreements and ESA payments help to re-introduce largely uneconomic traditional management.
Rex Graham Reserve	2.67	**Primary:** Semi-natural dry grasslands and scrubland	**Primary:** N/A **Qualifying:** N/A	Scrub development, potential road development,	Site Management Statement agreed with Forest Enterprise

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
UK0019866 00 33 03 E 52 20 31 N		facies: on calcareous substrates (*Festuco-Brometalia*) (important orchid sites) **Priority feature* **Qualifying:** N/A		vandalism.	and Suffolk Wildlife Trust.
Barnack Hills and Holes UK0030031 00 24 41 W 52 37 40 N	23.27	**Primary:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (important orchid sites) **Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Recreation pressure.	Site leased to, and managed by, English Nature. Management plan in place.
North Pennine Moors UK0030033 01 47 24 W 54 10 10 N	10,3109.4	**Primary:** European dry heaths, *Juniperus communis* formations on heaths or calcareous grasslands, blanket bogs **Priority feature*, petrifying springs with tufa formation (*Cratoneurion*) **Priority feature*, siliceous rocky slopes with chasmophytic vegetation, old sessile oak woods with *Ilex* and *Blechnum* in the British Isles **Qualifying:** Northern Atlantic wet heaths with *Erica tetralix*, Calaminarian grasslands of the *Violetalia calaminariae*, siliceous alpine and boreal grasslands, semi-natural dry grasslands and scrubland facies: on calcareous	**Primary:** N/A **Qualifying:** Marsh saxifrage *Saxifraga hirculus*	Overgrazing. Drainage, excessive muirburn. Acid and nitrogen deposition.	Wildlife Enhancement and Countryside Stewardship schemes starting to overcome problems of overgrazing.

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
		substrates (*Festuco-Brometalia*), alkaline fens, siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*), calcareous rocky slopes with chasmophytic vegetation			
Denby Grange Colliery Ponds UK0030036 01 35 26 W 53 38 01 N	18.53	**Primary:** N/A **Qualifying:** N/A	**Primary:** Great crested newt *Triturus cristatus* **Qualifying:** N/A	No real problems currently exist.	English Nature concluded a management agreement with owners to address the loss of terrestrial hibernation habitat.
Devil's Dyke UK0030037 00 21 32 E 52 14 01 N	8.02	**Primary:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (important orchid sites) **Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Scrub encroachment of grassland.	Future management plans to address leaf-litter build up through a mowing regime being considered.
Eller's Wood and Sand Dale UK0030039 00 41 00 W 54 15 08 N	4.09	**Primary:** N/A **Qualifying:** Petrifying springs with tufa formation (*Cratoneurion*) **Priority feature*	**Primary:** Geyer`s whorl snail *Vertigo geyeri* **Qualifying:** N/A	Human and livestock pressure.	English Nature Management Agreement
Grimsthorpe UK0030043 00 28 09 W	0.35	**Primary:** N/A **Qualifying:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-*	**Primary:** Early gentian *Gentianella anglica* **Qualifying:** N/A	Overgrazing.	Managed under the terms of a Management Agreement with English Nature.

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
52 46 19 N		*Brometalia*)			
Orton Pit UK0030053 00 17 06 W 52 32 04 N	74.47	**Primary:** Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. **Qualifying:** N/A	**Primary:** Great crested newt *Triturus cristatus* **Qualifying:** N/A	Disturbance, development.	In the process of being converted into a dedicated nature reserve for which a management plan is being prepared.
Portholme UK0030054 00 11 03 W 52 19 15 N	91.93	**Primary:** Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*) **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Good condition, long history of favourable management.	Part of the site subject to Countryside Stewardship agreement aimed at maintaining alluvial flood meadow. EA produced a Water Level Management plan.
Baston Fen UK0030085 00 19 01 W 52 44 21 N	2.2	**Primary:** N/A **Qualifying:** N/A	**Primary:** Spined loach *Cobitis taenia* **Qualifying:** N/A	No details.	Effects of drain management presently unknown.
Beast Cliff – Whitby (Robin Hood's Bay) UK0030086 00 31 02 W 54 24 50 N	260.2	**Primary:** Vegetated sea cliffs of the Atlantic and Baltic coasts **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Coastal erosion.	Preferred coastal defence option as outlined in the Shoreline Management Plan is 'do nothing'.
Bee's Nest and Green Clay Pits UK0030087 01 38 29 W	14.76	**Primary:** N/A **Qualifying:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*)	**Primary: Great crested newt *Triturus cristatus*** **Qualifying:** N/A	Further mineral extraction of silica sands. Unauthorised excavation and tipping. Inappropriate grazing.	Ponds require maintenance and enhancement management for the newts.

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
53 05 12 N					
Durham Coast UK0030140 01 17 34 W 54 45 32 N	393.63	**Primary:** Vegetated sea cliffs of the Atlantic and Baltic coasts **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	No details	Parts of site managed as NNR. Majority of site in public ownership and management plan is being developed.
Arnecliff and Park Hole Woods UK0030142 00 47 16 W 54 26 00 N	52.49	**Primary:** N/A **Qualifying:** Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	**Primary:** Killarney fern *Trichomanes speciosum* **Qualifying:** N/A	Extensive disturbance for both iron workings and woodland management.	No details.
Hatfield Moor UK0030166 00 56 38 W 53 32 37 N	1,363.55	**Primary:** Degraded raised bogs still capable of natural regeneration **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Peat cutting and water abstraction, drainage, adjacent aggregate extraction affects groundwater levels.	Water Level Management Plans, Site Management Statements, NNR management and Wildlife Enhancement Scheme.
Helbeck and Swindale Woods UK0030167 02 20 02 W 54 32 32 N	136.38	**Primary:** *Tilio-Acerion* forests of slopes, screes and ravines ** Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Overgrazing.	Agri-environment schemes and management agreements.
Kirk Deighton UK0030178	4.03	**Primary:** N/A **Qualifying:** N/A	**Primary:** Great crested newt *Triturus cristatus* **Qualifying:** N/A	Water quantity issues. Overgrazing of pond edges.	Fencing of the pond and setting aside a small section of the pasture to improve the habitat

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
01 23 47 W 53 56 43 N					for newts.
Nene Washes UK0030222 00 04 42 W 52 34 22 N	88.19	**Primary:** N/A **Qualifying:** N/A	**Primary:** Spined loach *Cobitis taenia* **Qualifying:** N/A	Water quality, turbidity and sediment issues. Water abstraction. Sewage. Large-scale mineral extraction could affect the site by underground seepage, increased turbidity.	Water Level Management Plan.
North York Moors UK0030228 00 54 15 W 54 24 33 N	44,082.25	**Primary:** Northern Atlantic wet heaths with *Erica tetralix,* European dry heaths **Qualifying:** Blanket bogs **Priority feature*	**Primary:** N/A **Qualifying:** N/A	Drainage and overburning. Potential under-grazing.	Majority of the moorland managed for both sheep farming (by farmers) and for the sporting shooting of grouse (by estates).
Overstrand Cliffs UK0030232 01 19 30 E 52 55 23 N	30.02	**Primary:** Vegetated sea cliffs of the Atlantic and Baltic coasts **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Coastal protection measures and possible artificial drainage of seepages to reduce slippages.	Shoreline Management Plan allows for 'do nothing', i.e. retreat along all but the extreme eastern end of this section.
Ox Close UK0030234 02 01 28 W 54 18 29 N	141.25	**Primary:** Calaminarian grasslands of the *Violetalia calaminariae* **Qualifying:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), *Tilio-*	**Primary:** N/A **Qualifying:** N/A	Overgrazing by rabbits and livestock.	Rabbit control programme. Fencing to reduce livestock grazing of metalliferous grassland.

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
		Acerion forests of slopes, screes and ravines **Priority feature*			
Paston Great Barn UK0030235 01 26 58 E 52 51 26 N	0.95	**Primary:** N/A **Qualifying:** N/A	**Primary:** Barbastelle *Barbastella barbastellus* **Qualifying:** N/A	Disturbance. Recreation pressure.	Medieval building which is scheduled as an ancient monument. Proposals to develop part of the outbuildings.
River Derwent UK0030253 00 55 40 W 53 55 03 N	411.23	**Primary:** N/A **Qualifying:** Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	**Primary:** River lamprey *Lampetra fluviatilis* **Qualifying:** Sea lamprey *Petromyzon marinus*, bullhead *Cottus gobio*, otter *Lutra lutra*	Water level and quality issues and flooding.	Issues relating to water control levels being addressed through a collaborative project between EN, EA and Yorkshire Water.
Saltfleetby–Theddlethorpe Dunes and Gibraltar Point UK0030270 00 13 33 E 53 23 28 N	960.2	**Primary:** Shifting dunes along the shoreline with *Ammophila arenaria* (`white dunes`), fixed dunes with herbaceous vegetation (`grey dunes`) **Priority feature*, dunes with *Hippophae rhamnoides*, humid dune slacks **Qualifying:** Embryonic shifting dunes	**Primary:** N/A **Qualifying:** N/A	Changes in sedimentation rates along the coast caused by coastal protection schemes. Recreational disturbance.	Majority of sites are NNRs.
Skipwith Common UK0030276 00 59 51 W	295.2	**Primary:** Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Lack of management – scrub encroachment of heathland.	Management agreement is in place and a large-scale heathland regeneration project being pursued. Extant permission for deep coal mining.

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
53 49 40 N					
South Pennine Moors UK0030280 01 46 59 W 53 27 37 N	64,983.13	**Primary:** European dry heaths, Blanket bogs **Priority feature*, Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles **Qualifying:** Northern Atlantic wet heaths with Erica tetralix, transition mires and quaking bogs	**Primary:** N/A **Qualifying:** N/A	Recreation pressure, accidental fires, over-grazing, muirburn. Atmospheric pollution depleting blanket bog, wet heath and transition mire. Loss of forest habitat.	Management strategy and conservation action programme produced as part of an EU-funded LIFE project for the area to the north of the National Park. Within Park, North Peak and South West Peak ESAs. Countryside Stewardship Scheme and Wildlife Enhancement Scheme (WES) also being used to achieve favourable management.
Strensall Common UK0030284 01 00 21 W 54 01 47 N	569.63	**Primary:** Northern Atlantic wet heaths with *Erica tetralix,* European dry heaths **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Scrub encroachment.	English Nature pursuing the possibility of a large-scale heathland regeneration project for the site.
Eversden and Wimpole Woods UK0030331 00 02 05 W 52 09 32 N	66.48	**Primary:** N/A **Qualifying:** N/A	**Primary:** Barbastelle *Barbastella barbastellus* **Qualifying:** N/A	Current use, including public access considered compatible.	Owned and managed by the National Trust and their management is aimed at maintaining, and where possible, enhancing barbastelle bat population.
Fen Bog UK0030332 00 41 23 W 54 21 55 N	27.49	**Primary:** Transition mires and quaking bogs **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Lowering of the existing water table by drainage. Fires, bracken spraying chemicals.	No details.

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
Simonside Hills UK0030336 02 01 44 W 55 16 02 N	2,082.6	**Primary:** European dry heaths, **Qualifying:** Blanket bogs **Priority feature*	**Primary:** N/A **Qualifying:** N/A	Burning, drainage, recreational pressure, scrub invasion.	Various management plans - MOD, Forest Enterprise, National Park Authority. Wildlife Enhancement Scheme.
Inner Dowsing, Race Bank and North Ridge pSAC 0 41 7.69 E 53 15 28.32N	90,626.23	Interest features include Annex I Reefs and Sandbanks which are Slightly Covered by Sea Water all the Time.	**Sandbanks:** Moderately vulnerable to Removal, Physical disturbance or abrasion and selective extraction of species. Vulnerable at low levels to Obstruction, Introduction of synthetic compounds and non-synthetic compounds, Changes in suspended sediment and Changes in turbidity. **Reefs:** Highly vulnerable to Removal, Obstruction, Physical disturbance or abrasion. Moderately vulnerable to Selective extraction of species and Smothering. Vulnerable at low levels Introduction of synthetic and non-synthetic compounds, Changes in suspended sediment and Changes in turbidity.		Management practices to be developed to identify relevant threats.
Haisborough, Hammond and Winterton pSAC 1 54 58.05 E 52 50 08.29 N	184,808.77	Annex I Sandbanks which are Slightly Covered by Sea Water all the Time.	Moderately vulnerable to Physical disturbance or abrasion and Selective extraction of species. Vulnerable at low levels to Removal, Smothering, Obstruction, Introduction of synthetic compounds and Introduction of non-synthetic compounds, Changes in suspended sediment and Changes in turbidity.		Management practices to be developed to identify relevant threats.

Table A4a.11 – Summary Details of Relevant Special Protection Areas (SPAs)

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
Breckland	39,433.66	**During the breeding season:**	N/A	Stone-curlew, nightjar and woodlark are	A recovery project operates to find nests,

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
UK9009201 00 35 39 E 52 30 54 N		Nightjar *Caprimulgus europaeus,* stone curlew *Burhinus oedicnemus*, woodlark *Lullula arborea*		vulnerable to predation from corvids and foxes and to disturbance caused by human activity, including dog-walking. High nitrogen loads from air pollution, development pressure and egg collection are threats.	advise landowners on their operations which might affect stone-curlews, and to ring chicks. Management agreements are in place to provide nest plots and thus safeguard the population.
Thorne and Hatfield Moors UK9005171 00 53 53 W 53 38 16 N	2,449.2	**During the breeding season:** Nightjar *Caprimulgus europaeus*	N/A	Lack of management and re-wetting operations on areas outside of those currently worked for peat.	NNR management plans. Review of extant peat extraction permissions under the Habitats Regulations.
Coquet Island UK9006031 01 32 14 W 55 20 06 N	22.28	**During the breeding season:** Arctic tern *Sterna paradisaea*, common tern *Sterna hirundo*, roseate tern *Sterna dougallii*, Sandwich tern *Sterna sandvicensis*	N/A	Erosion and vegetation loss through burrowing rabbits and puffins.	Site managed by the RSPB as a nature reserve.
Teesmouth and Cleveland Coast UK9006061 01 07 07 W 54 37 50 N	1,247.31	**During the breeding season:** Little tern *Sterna albifrons* **On passage:** Sandwich tern *Sterna sandvicensis*	**Over winter:** Knot *Calidris canutus*, **On passage:** Redshank *Tringa totanus* **Assemblage qualification:** Over winter, the area regularly supports 21,312 individual waterfowl	Natural sedimentation and eutrophication of sheltered mudflats. Future port development. Recreation pressure.	Development addressed via planning system/Habitats Regs. Other issues by Site Management Statements, NNR bylaws and Tees Estuary Management Plan.

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
			including: knot *Calidris canutus*.		
Lower Derwent Valley UK9006092 00 55 34 W 53 53 04 N	915.45	**Over winter:** Bewick's swan *Cygnus columbianus*, golden plover *Pluvialis apricaria*, ruff *Philomachus pugnax*	**During the breeding season:** Shoveler *Anas clypeata* **Over winter:** Teal *Anas crecca,* wigeon *Anas penelope* **Assemblage qualification:** Over winter, the area regularly supports 40,616 individual waterfowl including: Bewick's swan *Cygnus columbianus,* wigeon *Anas penelope,* teal *Anas crecca,* golden plover *Pluvialis apricaria,* ruff *Philomachus pugnax*.	Eutrophication from agricultural run-off and domestic sewage. Water abstraction and water quality issues. Recreational disturbance.	Coal mining occurs adjacent to site and is monitored via a planning agreement.
Flamborough Head and Bempton Cliffs UK9006101 00 06 48 W 54 07 55 N	212.17	N/A	**During the breeding season:** Kittiwake *Rissa tridactyla*	No details.	Part of a European Marine Site. EN will set conservation objectives; identify key human activities which may affect the ornithological interest; identify survey and monitoring systems.
Humber Flats, Marshes and Coasts UK9006111	15,202.53	**During the breeding season:** Bittern *Botaurus stellaris,* marsh harrier *Circus*	**Over winter:** Dunlin *Calidris alpina*, knot *Calidris canutus*, redshank *Tringa totanus*, shelduck	Coastal squeeze, encroachment from flood defences, and changing levels of	Wider estuarine management issues co-ordinated through Humber Estuary

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
00 00 39 W 53 37 58 N		*aeruginosus,* avocet *Recurvirostra avosetta,* little tern *Sterna albifrons* **Over winter:** bittern *Botaurus stellaris,* hen harrier *Circus cyaneus,* Bar-tailed godwit *Limosa lapponica,* golden plover *Pluvialis apricaria*, avocet *Recurvirostra avosetta* **On passage:** Ruff *Philomachus pugnax*	*Tadorna tadorna,* black-tailed godwit *Limosa limosa islandica* **On passage:** Redshank *Tringa totanus*, Dunlin *Calidris alpina*, knot *Calidris canutus, black-tailed godwit Limosa limosa islandica* **Assemblage qualification:** Over winter, the area regularly supports 153,934 individual waterfowl including: teal *Anas crecca, wigeon Anas penelope,* mallard *Anas platyrhynchos,* turnstone *Arenaria interpres,* pochard *Aythya ferina,* scaup *Aythya marila,* bittern *Botaurus stellaris,* dark-bellied brent goose *Branta bernicla bernicla*, goldeneye *Bucephala clangula,* knot *Calidris canutus,* dunlin *Calidris alpina,* sanderling *Calidris alba,* ringed plover *Charadrius hiaticula,* oystercatcher *Haematopus ostralegus,* bar-tailed godwit *Limosa lapponica,* black-tailed godwit *Limosa limosa islandica*, curlew *Numenius arquata,* whimbrel *Numenius*	sewage and effluent discharge.	Management Strategy. Also Estuary Shoreline Management Plan (ESMP).

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
			phaeopus, ruff *Philomachus pugnax,* golden plover *Pluvialis apricaria,* grey plover *Pluvialis squatarola,* avocet *Recurvirostra avosetta,* shelduck *Tadorna tadorna,* greenshank *Tringa nebularia,* redshank *Tringa totanus,* lapwing *Vanellus vanellus.*		
Northumbria Coast UK9006131 01 35 18 W 55 27 58 N	1,107.98	**During the breeding season:** Little Tern *Sterna albifrons*	**Over winter:** Purple sandpiper *Calidris maritima*, turnstone *Arenaria interpres*	Disturbance by tourists in the summer causing reduced little tern breeding success.	National Trust employs wardens to protect little tern colony.
North York Moors UK9006161 00 53 01 W 54 23 43 N	44,087.68	**During the breeding season:** Golden plover *Pluvialis apricaria*, merlin *Falco columbarius*	N/A	Overgrazing, gripping and heather burning.	Majority of site being managed in a desirable way.
Hornsea Mere UK9006171 00 11 30 W 53 54 15 N	231.2	N/A	**During the breeding season:** mute swan *Cygnus olor* **Over winter:** Gadwall *Anas strepera*	Water level and quality issues.	Issues regarding water levels, water quality and habitat management addressed in the Heritage Management Plan.
North Pennine Moors UK9006272 02 14 49 W	147,246.41	**During the breeding season:** Golden plover *Pluvialis apricaria*, hen harrier *Circus cyaneus*, merlin *Falco*	N/A	Inappropriate grazing and burning regimes. Recreation pressure. Acidic and nitrogen deposition damage to	Site managed via management agreements and related incentives, Site Management

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
54 39 24 N		*columbarius*, peregrine *Falco peregrinus*		vegetation.	Statements and pollution control mechanisms.
South Pennine Moors Phase 2 UK9007022 02 04 16 W 53 48 38 N	20,936.53	**During the breeding season:** Golden plover *Pluvialis apricaria*, merlin *Falco columbarius*, short-eared owl *Asio flammeus*	**Assemblage qualification:** During the breeding season the area regularly supports: dunlin *Calidris alpina alpina*, snipe *Gallinago gallinago,* curlew *Numenius arquata,* redshank *Tringa totanus,* lapwing *Vanellus vanellus,* common sandpiper *Actitis hypoleucos,* twite *Carduelis flavirostris,* northern wheatear *Oenanthe oenanthe,* whinchat *Saxicola rubetra,* ring ouzel *Turdus torquatus.*	Heavy recreational pressure. Overgrazing. Adjacent intensive agriculture.	Integrated management strategy and conservation action programme as part of EU-funded LIFE project.
Peak District Moors (South Pennine Moors Phase 1) UK9007021 01 45 51 W 53 28 03 N	45,270.52	**During the breeding season:** Golden plover *Pluvialis apricaria*, merlin *Falco columbarius*, peregrine *Falco peregrinus*, short-eared owl *Asio flammeus*	**During the breeding season:** Dunlin *Calidris alpina*	Significant visitor pressure and disturbance from major urban and industrial centres. Historic air pollution, high grazing pressure and wildfire burns.	Initiatives for sustainable recreation being developed. Two separate ESAs encourage and support habitat restoration.
The Wash UK9008021 00 17 12 E 52 56 16 N	62,211.66	**During the breeding season:** Common tern *Sterna hirundo*, little tern *Sterna albifrons* **Over winter:** bar-tailed godwit *Limosa*	**Over winter:** pintail *Anas acuta,* wigeon *Anas penelope,* gadwall *Anas strepera,* pink-footed goose *Anser brachyrhynchus,* turnstone *Arenaria interpres,* dark-bellied brent goose *Branta*	Coastal squeeze, coastal defence works, sea-level rise, and storm surges. Changes in sediment budget caused by dredging and coastal protection, construction of river	Management scheme developed jointly for the SAC/SPA. Management agreements with MOD over weapon ranges. Wash Estuary Management Plan and

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
		lapponica, Bewick's swan *Cygnus columbianus bewickii*	*bernicla,* goldeneye *Bucephala clangula,* sanderling *Calidris alba,* dunlin *Calidris alpina,* knot *Calidris canutus,* oystercatcher *Haematopus ostralegus, Black-tailed godwit Limosa limosa islandica,* common scoter *Melanitta nigra,* curlew *Numenius arquata,* grey plover *Pluvialis squatarola,* shelduck *Tadorna tadorna,* redshank *Tringa totanus.* **Assemblage qualification:** Over winter, the area regularly supports 400,367 individual waterfowl including: Bewick's swan *Cygnus columbianus bewickii,* pink-footed goose *Anser brachyrhynchus,* dark-bellied brent goose *Branta bernicla,* shelduck *Tadorna tadorna,* wigeon *Anas penelope,* gadwall *Anas strepera,* pintail *Anas acuta,* common scoter *Melanitta nigra,* goldeneye *Bucephala clangula,* oystercatcher *Haematopus ostralegus,* grey plover *Pluvialis squatarola,* knot *Calidris canutus,* dunlin *Calidris*	training walls and flood defence works. Gas exploration. Water abstraction.	Local Environment Agency Plans.

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
			alpina, sanderling *Calidris alba,* black-tailed godwit *Limosa limosa islandica,* bar-tailed godwit *Limosa lapponica,* curlew *Numenius arquata,* redshank *Tringa totanus,* turnstone *Arenaria interpres.*		
Gibraltar Point UK9008022 00 20 16 E 53 06 00 N	414.09	**During the breeding season:** Little tern *Sterna albifrons* **Over winter:** Bar-tailed godwit *Limosa lapponica*	**Over winter:** Grey plover *Pluvialis squatarola*, knot *Calidris canutus*	High visitor pressure. Seaborne pollution, particularly accidental discharge from shipping or from inshore oil and gas drilling operations.	Contingency plans exist for dealing with oil spills. Broadly coincides with the area declared as a NNR and managed by local Wildlife Trust.
Nene Washes UK9008031 00 04 33 W 52 34 41 N	1,517.49	**Over winter:** Bewick's swan *Cygnus columbianus bewickii*	**During the breeding season:** Black-tailed godwit *Limosa limosa,* shoveler *Anas clypeata,* garganey *Anas querquedula,* gadwall *Anas strepera* **Over winter:** Pintail *Anas acuta*, shoveler *Anas clypeata,* teal *Anas crecca*, wigeon *Anas penelope*, gadwall *Anas strepera*	Water level issues.	Nene Washes Management Strategy Group - Management Plan agreed and a Water Level Management Plan currently being drafted.
Rutland Water UK9008051 00 39 54 W	1,556.87	N/A	**Over winter:** Gadwall *Anas strepera*, shoveler *Anas clypeata,* wigeon *Anas penelope, teal Anas crecca,* tufted duck	Recreation pressure, nutrient inputs, changes in water level. Eutrophication.	Management currently compatible with recreation uses except in periods of drawdown.

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
52 38 52 N			*Aythya fuligula,* mute swan *Cygnus olor,* coot *Fulica atra,* goosander *Mergus merganser,* great crested grebe *Podiceps cristatus* **Assemblage qualification:** Over winter, the area regularly supports 25,037 individual waterfowl including: great crested grebe *Podiceps cristatus, wigeon Anas penelope, Gadwall Anas strepera, teal Anas crecca, shoveler Anas clypeata, tufted duck Aythya fuligula,* goldeneye *Bucephala clangula, goosander Mergus merganser,* coot *Fulica atra*		
North Norfolk Coast UK9009031 00 35 55 E 52 58 13 N	7,886.79	**During the breeding season:** bittern *Botaurus stellaris,* marsh harrier *Circus aeruginosus, a*vocet *Recurvirostra avosetta,* little tern *Sterna albifrons,* common tern *Sterna hirundo,* sandwich tern *Sterna sandvicensis* **Over winter:** Avocet *Recurvirostra avosetta*	**During the breeding season:** Redshank *Tringa totanus*, ringed plover *Charadrius hiaticula* **Over winter:** wigeon *Anas penelope,* pink-footed goose *Anser brachyrhynchus,* dark-bellied brent goose *Branta bernicla,* knot *Calidris canutus,* **Assemblage qualification:** Over winter, the area	Sea level rise, storm surges and changes in erosion patterns affecting freshwater grazing marsh and reedbed habitats. Water abstraction. Visitor pressure.	Visitor management strategy developed through the Norfolk Coast Project. Shoreline management strategy will address many of the issues. Large parts of the site managed as nature reserves.

SEA Area 3: East Midlands and Eastern England					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
			regularly supports 91,536 individual waterfowl including: pink-footed goose *Anser brachyrhynchus,* dark-bellied brent goose *Branta bernicla,* wigeon *Anas penelope,* avocet *Recurvirostra avosetta,* knot *Calidris canutus.*		
Broadland UK9009253 01 36 00 E 52 43 56 N	5,462.4	**During the breeding season:** Bittern *Botaurus stellaris*, marsh harrier *Circus aeruginosus* **Over winter:** Bewick's swan *Cygnus columbianus*, hen harrier *Circus cyaneus*, whooper swan *Cygnus cygnus*	**Over winter:** Gadwall *Anas strepera*	Increased saline intrusion. Eutrophication. Recreational pressure. Drainage.	Broads Plan (Broads Authority). Water Level Management Plans and ESA scheme encouraging sensitive management. Flood defence works in accordance with EA Broads Strategy.
Great Yarmouth North Denes UK9009271 01 41 10 E 52 44 02 N	149.19	**During the breeding season:** Little Tern *Sterna albifrons*	N/A	Coast protection schemes disrupting or reducing sediment supply to the SPA. Recreation pressure.	Beach Management Plans required before works proceed. Wardening jointly undertaken by RSPB and EN.

Table A4a.12 – Summary Details of Relevant Ramsar Sites

Code/ location	Name	Area (ha)	Description	Criteria*	Adverse factors

Code/ location	Name	Area (ha)	Description	Criteria*	Adverse factors
UK11010 01 36 00 E 52 43 56 N	Broadland	5,488.61	Includes the river valley systems of the Bure, Yare and Waveney and their major tributaries. Open distinctive landscape comprises a complex and interlinked mosaic of wetland habitats including open water, reedbeds, carr woodland, grazing marsh and fen meadow. Important for recreation, tourism, agriculture and wildlife.	6, 2	Introduction of exotic animals, drainage/reclamation, water diversion, eutrophication, recreation disturbance.
UK11019 00 29 06 E 52 49 49 N	Dersingham Bog	157.75	East Anglia's largest remaining example of a pure acid valley mire, supports extensive bog, wet heath and transition communities over peat. Sustained by groundwater, fed via springs and seepage, from the underlying greensand. Internationally important plant communities, important assemblages of birds and invertebrates.	2	No factors reported
UK11027 00 20 16 E 53 06 00 N	Gibraltar Point	414.09	Consists of an actively accreting sand dune system, saltmarsh and extensive intertidal flats. All stages of dune development are represented, with the older dunes extensively colonised by scrub. Small areas of freshwater marsh and open water. Accommodates large numbers of overwintering birds.	6, 5, 1, 2	General disturbance
UK11031 00 00 39 W 53 37 58 N	Humber Flats, Marshes and Coast (Phase 1)	15,202.53	Inner estuary supports extensive areas of reedbed with areas of mature and developing saltmarsh backed by grazing marsh in the middle and outer estuary. On the north Lincolnshire coast the saltmarsh is backed by low sand dunes with marshy slacks and brackish pools. Supports internationally important numbers of waterfowl in winter and breeding populations in summer.	4, 6, 5, 3	No factors reported
UK11037 00 55 34 W 53 53 04 N	Lower Derwent Valley	915.45	One of the most important examples of traditionally managed species-rich alluvial flood meadow habitat remaining in the UK. The river and these flood lands play a substantial role in the hydrological and ecological functioning of the internationally important Humber basin.	5, 6, 2, 4, 1	Water diversion, reservoir/dam: flooding
UK11038 02 09 44 W 54 05 46 N	Malham Tarn	286.26	Comprises areas of open water, fen, soligenous fen and raised bog. These habitats hold important communities of rare plant species and wetland invertebrates, and are of types now highly restricted due to drainage and land use changes.	1, 2	No factors reported
UK11046 00 04 33 W 52 34 41 N	Nene Washes	1,517.49	Extensive area of seasonally-flooding wet grassland of importance for national and international populations of breeding and wintering waders and wildfowl. Also notable for the diversity of plant and associated animal life within its network of dykes.	6, 2	Vegetation succession

Code/ location	Name	Area (ha)	Description	Criteria*	Adverse factors
UK11048 00 35 55 E 52 58 13 N	North Norfolk Coast	7,862.39	Low-lying barrier coast site extends for 40km and includes intertidal sands and muds, saltmarshes, shingle and sand dunes, together with areas of land-claimed freshwater grazing marsh and reedbed. Both freshwater and marine habitats support internationally important numbers of wildfowl in winter and several nationally rare breeding birds. The sandflats, sand dune, saltmarsh, shingle and saline lagoons habitats are of international importance for their fauna, flora and geomorphology.	1, 2, 6, 5	No factors reported
UK11049 01 35 18 W 55 27 58 N	Northumbria Coast	1,107.98	Comprises several discrete sections of rocky foreshore which regularly support nationally important numbers of purple sandpiper and high concentrations of turnstone. Also includes an area of sandy beach at Low Newton, which supports an nationally important breeding colony of little tern, and parts of three artificial pier structures which form important roost sites for purple sandpiper.	6	No factors reported
UK11051 00 12 19E 52 28 34N	Ouse Washes	2,469.08	Seasonally-flooded washland habitat managed in a traditional agricultural manner. Support nationally and internationally important numbers of wintering waterfowl and nationally important numbers of breeding waterfowl. Large area of unimproved neutral grassland communities and rich aquatic flora.	2, 6, 1, 5	Eutrophication, reservoir/dam: flooding, vegetation succession
UK11061 00 30 02 E 52 46 24 N	Roydon Common	194.1	Lowland mixed valley mire surrounded by heathland. Dry heath of the upper slopes is hydrologically linked with wetter lower slopes, which experience seasonal waterlogging and are colonised by wet heath. Valley bottom permanently waterlogged, and comprises acid bog and nutrient-poor fen communities, blending into more base-rich fen and carr woodland in the valley bottom.	1, 3	No factors reported
UK11062 00 39 54 W 52 38 52 N	Rutland Water	1,360.34	Large eutrophic man-made reservoir. Supports internationally important numbers of gadwall and shoveler and nationally important numbers of eight other species of wildfowl.	6, 5	No factors reported
UK11068 01 07 07 W 54 37 50 N	Teesmouth and Cleveland Coast	1,247.31	Range of habitats (sand and mudflats, rocky shore, saltmarsh, freshwater marsh and sand dunes) on and around an estuary which has been much-modified by human activities. Together these habitats support internationally important numbers of waterbirds.	5, 6	Eutrophication

Code/ location	Name	Area (ha)	Description	Criteria*	Adverse factors
UK11072 00 17 12 E 52 56 16 N	The Wash	62,211.66	Extensive saltmarshes, intertidal banks of sand and mud, shallow waters and deep channels. Important staging post and over-wintering site for migrant wildfowl and wading birds. Supports valuable shellfish fishery and also an important nursery area for flatfish. Important for breeding common seal and some grey seals. Sublittoral area supports a number of different marine communities.	6, 5, 3, 1	Over-fishing

*Note: Ramsar criteria:**
1. sites containing representative, rare or unique wetland types
2. supports vulnerable, endangered, or critically endangered species or threatened ecological communities
3. supports populations of plant/animal species important for maintaining regional biodiversity
4. supports plant/animal species at a critical stage in their life cycles, or provides refuge
5. regularly supports 20,000 or more waterbirds
6. regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
8. important source of food for fishes, spawning ground, nursery and/or migration path

A4a.1.3.4 SEA Area 4

Figure A4a.9 – Sites of International Importance

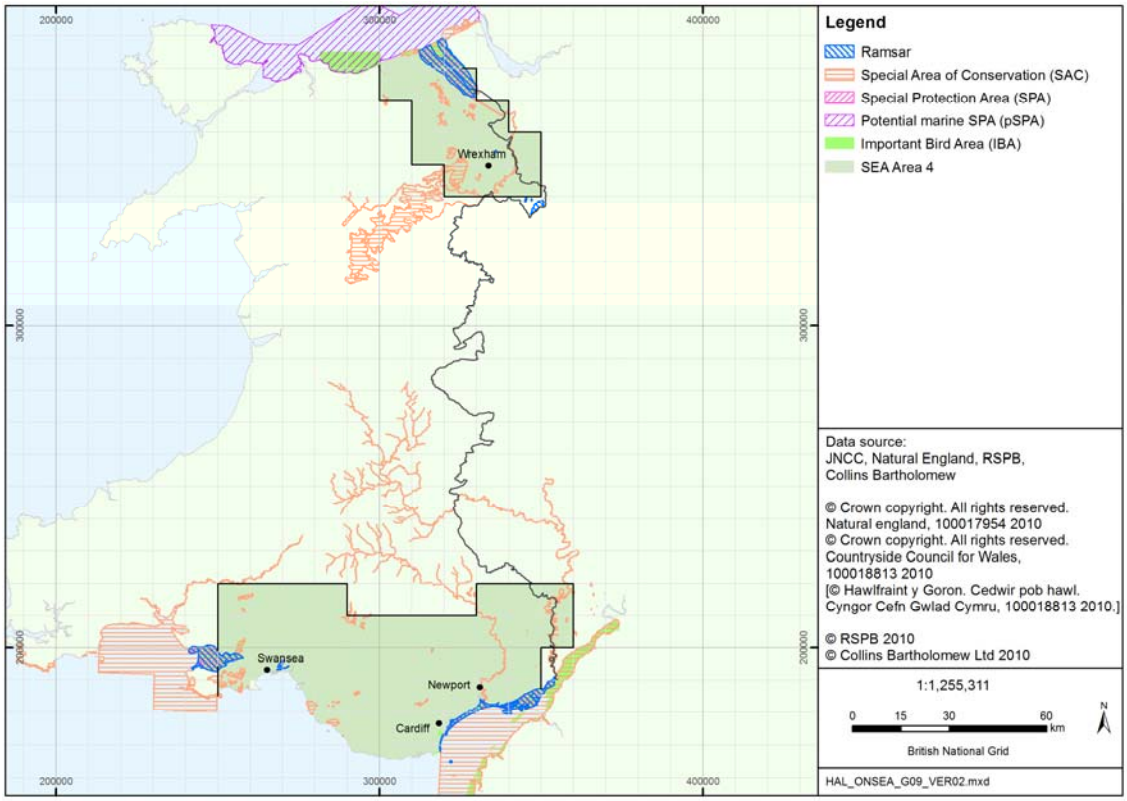


Figure A4a.10 – Sites of National Importance

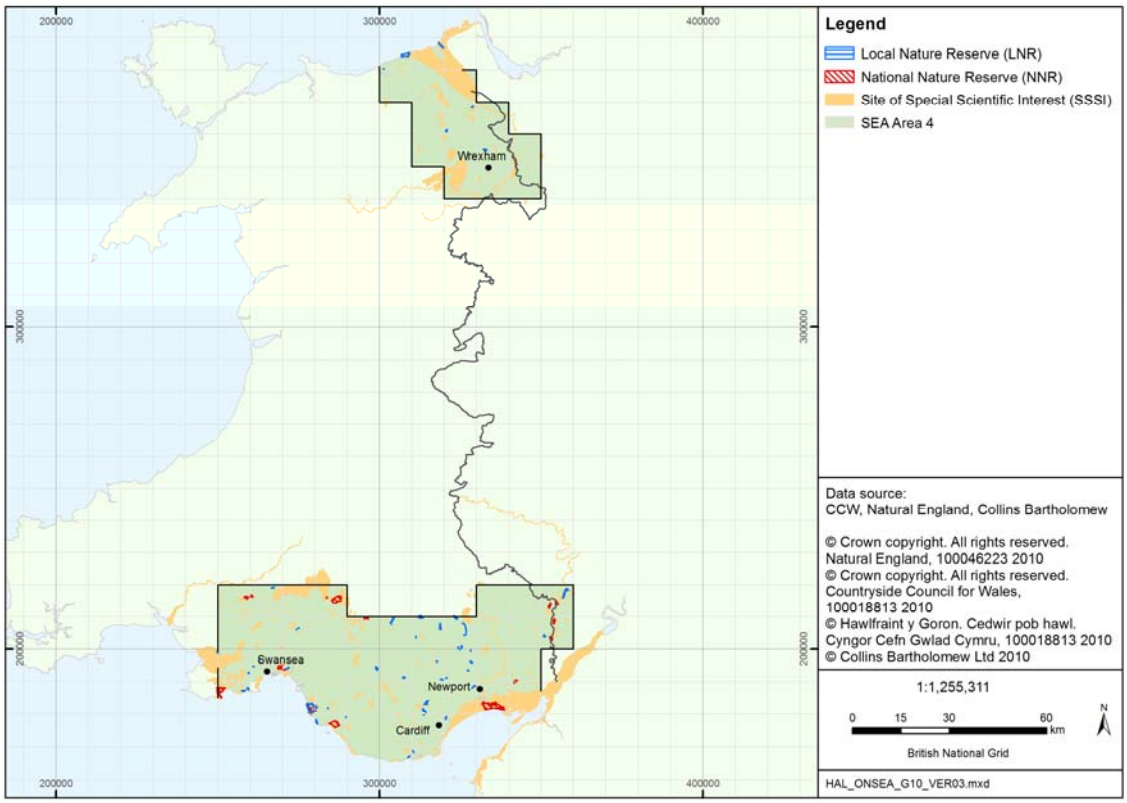


Table A4a.13 – Summary Details of Relevant Special Areas of Conservation (SACs)

SEA Area 4: North and South Wales					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
Severn Estuary/Môr Hafren UK0013030 02 58 41 W 51 28 07 N	73,715.4	**Primary:** Estuaries, Mudflats and sandflats not covered by seawater at low tide, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) **Qualifying:** Sandbanks which are slightly covered by sea water all the time, reefs	**Primary:** Sea lamprey *Petromyzon marinus, River lamprey Lampetra fluviatilis, Twaite shad Alosa fallax* **Qualifying:** N/A	The estuary is vulnerable to land-claim, aggregate extraction, physical developments such as barrage construction, flood defences, industrial pollution, oil spillage and tourism related disturbance.	A management scheme under Regulation 34 of the Habitats Regulations was established in 2004 in relation to the international bird interest. Mechanisms are in place to produce both Regulation 33 advice and a management scheme for the SAC once the site goes forward. The Severn Estuary Partnership seeks to deliver holistic management of the uses of the estuary. In Wales, Community Strategies and Local Biodiversity Action Plans also contribute to achieving the conservation aims for the Estuary.
Kenfig/Cynffig UK0012566 03 44 41 W 51 31 06 N	1,191.67	**Primary:** Fixed dunes with herbaceous vegetation (`grey dunes`) **Priority feature*, dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*), humid dune slacks, hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. **Qualifying:** Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	**Primary:** Petalwort *Petalophyllum ralfsii,* fen orchid *Liparis loeselii* **Qualifying:** N/A	Under-grazing. Introduced species.	Maintenance of hydrological regime of dune systems essential. NNRs at Kenfig and Merthyr Mawr.
River Wye/Afon Gwy	2,234.89	**Primary:** Water courses of plain to montane levels with	**Primary:** White-clawed (or Atlantic stream)	See Southern and South West England section for	

SEA Area 4: North and South Wales					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
UK0012642 03 17 59 W 52 01 24 N		the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation **Qualifying:** Transition mires and quaking bogs	crayfish *Austropotamobius pallipes*, sea lamprey *Petromyzon marinus*, brook lamprey *Lampetra planeri*, river lamprey *Lampetra fluviatilis*, Twaite shad *Alosa fallax*, Atlantic salmon *Salmo salar*, bullhead *Cottus gobio*, otter *Lutra lutra* **Qualifying:** Allis shad *Alosa alosa*	details.	
Wye Valley Woodlands/ Coetiroedd Dyffryn Gwy UK0012727 02 40 43 W 51 39 28 N	916.24	**Primary:** *Asperulo-Fagetum* beech forests, *Tilio-Acerion* forests of slopes, screes and ravines **Priority feature*, *Taxus baccata* woods of the British Isles **Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** Lesser horseshoe bat *Rhinolophus hipposideros*	See Southern and South West England section for details.	
Rodborough Common UK0012826 02 13 06 W 51 43 51 N	104.26	**Primary:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	See Southern and South West England section for details.	
Crymlyn Bog/ Cors Crymlyn UK0012885	299.45	**Primary:** Transition mires and quaking bogs, calcareous fens with *Cladium mariscus* and	**Primary:** N/A **Qualifying:** N/A	Scrub encroachment. Water quantity. Changes in water quality influenced by industrial effluent sources	NNR management plan. Since announcement in 1997 of closure of the BP Llandarcy Oil Refinery number of studies have

SEA Area 4: North and South Wales					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
03 53 18 W 51 38 11 N		species of the *Caricion davallianae* ***Priority feature*** **Qualifying:** Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) ****Priority feature***		such as oil, pulverised fuel ash and iron-rich mine adit discharge.	been completed to assess site's hydrology and the influence of historic hydrocarbon contamination.
Berwyn a Mynyddoedd de Clwyd/Berwyn and South Clwyd Mountains UK0012926 03 36 26 W 52 50 19 N	27,221.21	**Primary:** European dry heaths, blanket bogs ****Priority feature*** **Qualifying:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), transition mires and quaking bogs, calcareous and calcshist screes of the montane to alpine levels (*Thlaspietea rotundifolii*), calcareous rocky slopes with chasmophytic vegetation	**Primary:** N/A **Qualifying:** N/A	Inappropriate agricultural development (drainage, reseeding, application of fertilisers, burning, track construction, damaging grazing regimes). Recreation pressure.	Management Agreements with owners and occupiers and through joint agreements with the Tir Gofal scheme.
River Usk/Afon Wysg UK0013007 03 00 50 W 51 47 45 N	1,007.71	**Primary:** N/A **Qualifying:** Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation	**Primary:** Sea lamprey *Petromyzon marinus*, brook lamprey *Lampetra planeri*, river lamprey *Lampetra fluviatilis*, twaite shad *Alosa fallax*, Atlantic salmon *Salmo salar*, bullhead *Cottus gobio*, otter *Lutra lutra* **Qualifying:** Allis shad	Habitat degradation. Water abstraction.	Excellent habitat for six Annex II freshwater fish including salmon and shads. Usk Catchment Management Plan, the Conservation Strategy, the River SSSI Management Plan, and by the CCW and EA encouraging owners and occupiers to carry out positive habitat management through agreements and agri-environment schemes.

SEA Area 4: North and South Wales					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
			Alosa alosa		
Cwm Cadlan UK0013585 03 30 19 W 51 46 38 N	83.93	**Primary:** *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), alkaline fens **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Base enrichment (from rising groundwater) and moisture content. Operations influencing groundwater.	Grasslands dependent on continuance of low intensity agricultural management with minimal use of agro-chemicals.
Wye Valley and Forest of Dean Bat Sites/ Safleoedd Ystlumod Dyffryn Gwy a Fforest y Ddena UK0014794 02 34 21 W 51 44 15 N	142.7	**Primary:** N/A **Qualifying:** N/A	**Primary:** Lesser horseshoe bat *Rhinolophus hipposideros,* greater horseshoe bat *Rhinolophus ferrumequinum* **Qualifying:** N/A	Human disturbance, structural alteration and changes in ventilation conditions.	Planning regulation, management agreements and monitoring of individual roosts. Site Management Statements agreed with the owners of working mines to secure conservation of the populations alongside continued working. Preparation of Cave Conservation Plans.
Aberbargoed Grasslands UK0030071 03 12 35 W 51 41 06 N	39.78	**Primary:** N/A **Qualifying:** *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils *(Molinion caeruleae)*	**Primary:** Marsh fritillary butterfly *Euphydryas* (*Eurodryas*, *Hypodryas*) *aurinia* **Qualifying:** N/A	Under-grazing and lack of traditional management. Vandalism.	Management plan drawn up and discussions with owners towards securing a management agreement.
Sugar Loaf Woodlands UK0030072 03 01 23 W 51 50 36 N	173.84	**Primary:** Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Grazing, fires. Airborne acid and nutrient deposition may also be a problem.	Majority of woodland on common land grazed by sheep. Agri-environment schemes offer the best mechanism for securing favourable management in the longer term.

SEA Area 4: North and South Wales					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
Alyn Valley Woods/ Coedwigoedd Dyffryn Alun UK0030078 03 12 05 W 53 09 31 N	168.3	**Primary:** *Tilio-Acerion* forests of slopes, screes and ravines **Priority feature* **Qualifying:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicion albae*) **Priority feature*	**Primary:** N/A **Qualifying:** N/A	Previous mineral and limestone workings. Recreation pressure.	Part managed as a Country Park. Visitor management, footpath maintenance and woodland management undertaken through the Ranger Service and under a WGS.
Blackmill Woodlands UK0030090 03 32 39 W 51 33 41 N	71.01	**Primary:** Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	See Southern and South West England for details.	
Blaen Cynon UK0030092 03 31 41 W 51 44 54 N	66.83	**Primary:** N/A **Qualifying:** N/A	**Primary:** Marsh fritillary butterfly *Euphydryas* (*Eurodryas*, *Hypodryas*) *aurinia* **Qualifying:** N/A	Maintenance of the hydrological regime and continuation of traditional agricultural management. Burning, housing, opencast or other industrial development and pollution.	Agricultural management over the majority of the site through management agreements with owners and occupiers.
Cardiff Beech Woods UK0030109 03 16 14 W 51 32 02 N	115.62	**Primary:** *Asperulo-Fagetum* beech forests **Qualifying:** *Tilio-Acerion* forests of slopes, screes and ravines **Priority feature*	**Primary:** N/A **Qualifying:** N/A	Recreational pressure.	Extensively managed for timber production in the past and currently managed through Woodland Grant Scheme. Number of limestone quarries in the locality, and issues arising from these addressed through

SEA Area 4: North and South Wales					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
					the planning system.
Glaswelltiroedd Cefn Cribwr/ Cefn Cribwr Grasslands UK0030113 03 37 41 W 51 32 06 N	58.35	**Primary:** *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) **Qualifying:** N/A	**Primary:** N/A **Qualifying:** Marsh fritillary butterfly *Euphydryas* (*Eurodryas*, *Hypodryas*) *aurinia*	Quantity and base status of the groundwater.	Maintenance of grazing regime and water level. Management agreements will be used to secure appropriate management over the whole area.
Dunraven Bay UK0030139 03 36 09 W 51 26 32 N	6.47	**Primary:** N/A **Qualifying:** N/A	**Primary:** Shore dock *Rumex rupestris* **Qualifying:** N/A	Changes in hydrology.	Lies within Glamorgan Heritage Coast. Managed by agreement for the plant communities it supports.
Coedydd Nedd a Mellte UK0030141 03 34 02 W 51 46 20 N	378.18	**Primary:** Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles **Qualifying:** *Tilio-Acerion* forests of slopes, screes and ravines **Priority feature*	**Primary:** N/A **Qualifying:** N/A	Grazing. Recreational pressure. Airborne acid and nutrient deposition.	Majority of the woodland owned by Forestry Commission and is ungrazed.
Deeside and Buckley Newt sites UK0030132 03 03 42 W 53 12 11 N	207.52	**Primary:** N/A **Qualifying:** Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	**Primary:** Great crested newt *Triturus cristatus* **Qualifying:** N/A	See West Midlands and North West England for details.	
Coedwigoedd Dyffryn Elwy/	83.01	**Primary:** *Tilio-Acerion* forests of slopes, screes and	**Primary:** N/A **Qualifying:** N/A	Grazing, non-native species.	Management agreements in place. Parts of woods are

SEA Area 4: North and South Wales					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
Elwy Valley Woods UK0030146 03 27 59 W 53 12 35 N		ravines **Priority feature* **Qualifying:** N/A			managed under the terms of a Woodland Grant Scheme.
Halkyn Mountain/ Mynydd Helygain UK0030163 03 12 17 W 53 14 06 N	610.36	**Primary:** Calaminarian grasslands of the *Violetalia calaminariae* **Qualifying:** European dry heaths, semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)	**Primary:** Great crested newt *Triturus cristatus* **Qualifying:** N/A	Inappropriate agricultural practices (inappropriate grazing, livestock feeding and watering, burning and cutting). Reclamation schemes.	Much of the area is common land traditionally used for grazing of domestic livestock. However use of traditional common grazing rights has declined in recent years.
Johnstown Newt Sites UK0030173 03 01 42 W 53 00 44 N	69.61	**Primary:** N/A **Qualifying:** N/A	**Primary:** Great crested newt *Triturus cristatus* **Qualifying:** N/A	Post-industrial sites subject to threat from unregulated public access, fly-tipping and pollution, pressures for development.	Habitat management is underway on areas owned by the local authority.
River Dee and Bala Lake/Afon Dyfrdwy a Llyn Tegid UK0030252 02 51 40 W	1,308.93	**Primary:** Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation **Qualifying:** N/A	**Primary:** Atlantic salmon *Salmo salar*, floating water-plantain *Loronium natans* **Qualifying:** Sea lamprey *Petromyzon marinu*s, brook lamprey *Lampetra planeri*, river	Inappropriate water flow regulation; excessive abstraction; threats to water quality from direct and diffuse pollution; eutrophication and siltation. Degradation of riparian habitats due to engineering	Issues being addressed by a variety of statutory bodies that are in a position to overcome these threats through regulatory powers and partnerships with landowners, industry and other interested parties.

SEA Area 4: North and South Wales					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
53 02 50 N			lamprey *Lampetra fluviatilis*, bullhead *Cottus gobio*	works, agricultural practices and invasive plant species. Fisheries.	
Afon Tywi / River Tywi UK0013010 03 54 41 W 51 55 12 N	363.45	**Primary:** N/A **Qualifying:** N/A	**Primary:** Twaite shad *Alosa fallax, otter Lutra lutra* **Qualifying:** Sea lamprey *Petromyzon marinus*, brook lamprey *Lampetra planeri*, river lamprey *Lampetra fluviatilis*, Allis shad *Alosa alosa*, bullhead *Cottus gobio*	Direct and diffuse pollution, particularly nutrient run-off from agricultural land; eutrophication and increased siltation. Afforestation in the upper catchment contributes to low pH that can affect features further downstream. Features affected by flow conditions and extremes of water temperature. Anadromous fish are vulnerable to barriers to migration. All fish are vulnerable to inappropriate fishing activities and the introduction of non-indigenous species. Gravel extraction, intensive agricultural land-use, engineering works, invasive plant species and the loss of alder tree-cover through disease can lead to degradation of habitat and water quality. Disturbance relating to recreation and amenity access.	CCW and the Environment Agency encourage owners and occupiers to carry out positive habitat management through agreements and agri-environment schemes. A SSSI Site Management Plan and a Conservation Strategy has been produced by CCW and a Site Issue Briefing has been jointly produced by EA and CCW. The EA is investigating abstractions and discharges under the review of consents process under the Habitats Regulations and the river is included in their Asset Management Planning Process.
Caeau Mynydd Mawr	25.06	**Primary: N/A** **Qualifying:** *Molinia* meadows on calcareous,	**Primary:** Marsh fritillary butterfly *Euphydryas* (*Eurodryas*, *Hypodryas*)	Future industrial/residential development and increasing agricultural pressure.	Part of the site is owned by Butterfly Conservation, and Section 15 agreements cover

SEA Area 4: North and South Wales					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
UK0030105 04 03 57 W 51 47 21 N		peaty or clayey-silt-laden soils (*Molinion caeruleae*)	*aurinia* **Qualifying:** N/A		~66% of the site. CCW is in discussion with the owners of the unprotected parts of the site and hopes to conclude management agreements.
Carmarthen Bay and Estuaries / Bae Caerfyrddin ac Aberoedd UK0020020 04 22 35 W 51 40 00 N	66,101.16	**Primary:** Sandbanks which are slightly covered by sea water all the time, estuaries, mudflats and sandflats not covered by seawater at low tide, large shallow inlets and bays, *Salicornia* and other annuals colonising mud and sand, Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) **Qualifying:** N/A	**Primary:** Twaite shad *Alosa fallax* **Qualifying:** Sea lamprey *Petromyzon marinus*, river lamprey *Lampetra fluviatilis*, Allis shad *Alosa alosa*, otter *Lutra lutra*	Most of the potential threats come from fisheries and related activities such as shellfish management and access issues related to mussel and cockle gathering. CCW is consulted over applications to dredge aggregate from Helwick Bank. These works may have an effect locally on the biology of the Bank, and in conjunction with other coastal defence works may also affect sediment budgets and characteristics over a wider area.	CCW maintains close liaison in particular with the South Wales Sea Fisheries Committee. CCW has encouraged extensive monitoring and further research.
Cernydd Carmel UK0030070 04 02 36 W 51 49 32 N	361.14	**Primary:** Turloughs *Priority feature **Qualifying:** Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths, Active raised bogs *Priority feature, *Tilio-Acerion* forests of slopes, screes and ravines *Priority feature	**Primary:** N/A **Qualifying:** N/A	Proposals to intensify agricultural practices.	Issues are being addressed through management agreements and Tir Cymen/Tir Gofal agri-environment schemes.
Gower Ash Woods / Coedydd Ynn	233.15	**Primary:** *Tilio-Acerion* forests of slopes, screes and ravines *Priority feature	**Primary:** N/A **Qualifying:** N/A	Not indicated.	Management is predominantly by non-intervention and includes part of a National Nature

SEA Area 4: North and South Wales					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
Gwyr UK0030157 04 03 35 W 51 34 29 N		**Qualifying:** Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) * Priority feature			Reserve, a Wildlife Trust Reserve and Local Nature Reserve, and includes educational and visitor information. All areas are within the Gower Area of Outstanding Natural Beauty (AONB). Future management considerations would include selective removal of conifers as well as thinning of beech.
Gower Commons / Tiroedd Comin Gwyr UK0012685 04 10 11 W 51 35 20 N	1,776.72	**Primary:** Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths, *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) **Qualifying:** N/A	**Primary:** Southern damselfly *Coenagrion mercuriale*, marsh fritillary butterfly *Euphydryas* (*Eurodryas*, *Hypodryas*) *aurinia* **Qualifying:** N/A	Unauthorised burning. Off-road vehicles can cause localised damage.	Burning addressed on Cefn Bryn Common via a Tir Cymen agri-environment agreement. The cutting of fire-breaks together with control of bracken and *Rhododendron* helps to minimise the damaging effects of burning. The Gower Commons Initiative (2000) is aimed at developing the existing lowland heathland resource via management for countryside enhancement and nature conservation.
Limestone Coast of South West Wales / Arfordir Calchfaen De Orllewin Cymru UK0014787	1,594.53	**Primary:** Vegetated sea cliffs of the Atlantic and Baltic coasts, fixed dunes with herbaceous vegetation (`grey dunes`) *Priority feature **Qualifying:** European dry heaths, semi-natural dry	**Primary:** Greater horseshoe bat *Rhinolophus ferrumequinum*,early gentian *Gentianella anglica* **Qualifying:** Petalwort *Petalophyllum ralfsii*	Bats are vulnerable to disturbance from recreational users. Chemical/oil pollution from the sea, particularly in aerosol form is a threat.	Maintenance or re-introduction of a traditional grazing regime preceded by burning or cutting if required to reduce scrub. This is being addressed via agri-environment schemes and management agreements. Restoration plans are in place for areas of former sand

SEA Area 4: North and South Wales					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
05 03 21 W 51 37 50 N		grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), caves not open to the public, submerged or partially submerged sea caves			quarrying. An Integrated Land Management Plan exists for parts of the Pembrokeshire section which are MoD-owned. Close liaison with the British Mountaineering Council over the impact of rock climbing continues.

Table A4a.14 – Summary Details of Relevant Special Protection Areas (SPAs)

SEA Area 4: North and South Wales					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
Dee Estuary UK9013011 03 11 02 W 53 18 39 N	13,084.85	**Over winter:** Bar-tailed godwit *Limosa lapponica*	**Over winter:** Pintail *Anas acuta*, knot *Calidris canutus*, oystercatcher *Haematopus ostralegus*, shelduck *Tadorna tadorna*, redshank *Tringa totanus*. **Assemblage qualification:** Over winter, the area regularly supports 90,518 individual waterfowl including: shelduck *Tadorna tadorna,* pintail *Anas acuta,* oystercatcher *Haematopus ostralegus,* knot *Calidris canutus,* bar-tailed godwit *Limosa lapponica,* redshank *Tringa totanus.*	Industrial and urban development. Water quality issues. Over-exploitation of cockle beds.	Sizeable parts of the estuary are in conservation management or are subject to Management Agreements. The Dee Estuary Strategy.

SEA Area 4: North and South Wales					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
Severn Estuary UK9015022 03 02 57 W 51 13 29 N	24,662.98	**During the breeding season:** Bewick's swan *Cygnus columbianus bewickii*	**Over winter:** Gadwall *Anas strepera, Russian white-fronted goose Anser albifrons albifrons,* dunlin *Calidris alpina alpina,* shelduck *Tadorna tadorna,* redshank *Tringa totanus* **Assemblage qualification:** Over winter, the area regularly supports 84,317 individual waterfowl including: Bewick's swan *Cygnus columbianus bewickii,* Russian white-fronted goose *Anser albifrons albifrons,* shelduck *Tadorna tadorna,* gadwall *Anas strepera,* dunlin *Calidris alpina alpina,* redshank *Tringa totanus Numenius phaeopus*.	Land-claim, aggregate extraction/ dredging, physical developments such as barrage construction, flood defences, pollution (industrial, oil spillage), eutrophication and recreation.	Existing control measures and the Severn Estuary Strategy.
Burry Inlet UK9015011 04 10 40 W 51 38 56 N	6,628	N/A	**Over winter:** Pintail *Anas acuta,* shoveler *Anas clypeata,* teal *Anas crecca,* wigeon *Anas penelope,* dunlin *Calidris alpina alpina,* knot *Calidris canutus,* oystercatcher *Haematopus ostralegus,* curlew *Numenius arquata,* grey plover *Pluvialis squatarola,* shelduck *Tadorna tadorna,* redshank *Tringa totanus.*	Possible implications from shellfish activity, eutrophication, recreational activities and energy development.	CCW through a liaison group consults with the South Wales Sea Fisheries Committee over shellfish activities and the Environment Agency over eutrophication issues. RSPB and CCW are reviewing saltmarsh grazing levels on the south side of the estuary. There is close

SEA Area 4: North and South Wales					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
			Assemblage qualification: Over winter, the area regularly supports 34,962 individual waterfowl including: shelduck *Tadorna tadorna,* wigeon *Anas penelope,* teal *Anas crecca,* pintail *Anas acuta,* shoveler *Anas clypeata,* oystercatcher *Haematopus ostralegus,* grey plover *Pluvialis squatarola,* knot *Calidris canutus,* dunlin *Calidris alpina alpina,* curlew *Numenius arquata,* redshank *Tringa totanus.*		liaison with relevant authorities with regard to the proposed Millennium Coastal Park Project on the north shore in terms of tourism, amenity and recreation. Most recently, there has been a hydro-electric barrage scheme proposed across the mouth of the Burry Inlet.
Liverpool Bay pSPA UK9020294 53 36 30 N 03 13 16 W	197,504.24	**Over winter:** Red-throated diver	**Over winter:** Common scoter	-	-

Table A4a.15 – Summary of Relevant Ramsar Sites

Code/location	Name	Area (ha)	Description	Criteria*	Adverse factors
UK11080 02 45 43 W 52 55 20 N	Midland Meres and Mosses – Phase 2	1,588.24	The 18 component sites include open water bodies (meres), the majority of which are nutrient-rich with associated fringing habitats, reed swamp, fen, carr and damp pasture. Peat accumulation has resulted in the nutrient-poor peat bogs (mosses) forming in some sites on the fringes of the meres or completely infilling basins. In a few cases the result is a floating quaking bog or schwingmoor. Habitats support nationally important flora and fauna.	1, 2	Introduction of exotic animals, pollution – agriculture, introduction/ invasion of flora, eutrophication.

UK11081 03 02 57 W 51 13 29 N	Severn Estuary (Wales)	24,662.98	Tidal regime results in plant and animal communities typical of the extreme physical conditions of liquid mud and tide swept sand and rock. Species-poor invertebrate community includes high densities of ragworms, lugworms and other invertebrates forming an important food source for passage and wintering waders. Extensive intertidal zone comprising mudflats, sand banks, shingle, and rocky platforms. Heavily grazed saltmarsh fringes the estuary with a range of saltmarsh types present.	1, 8, 5, 4, 3, 6	Recreation disturbance, industrial pollution, pollution – oil, eutrophication, erosion, dredging, pollution – unspecified.
UK11082 03 11 02 W 53 18 39 N	The Dee Estuary (Wales)	13,084.85	One of the top five estuaries in the UK for wintering and passage waterfowl populations. Supports extensive areas of intertidal sand and mudflats as well as saltmarsh. Where land-claim has not occurred, the saltmarshes grade into transitional brackish and freshwater swamp vegetation, on the upper shore. The site includes the three sandstone islands of Hilbre with their important cliff vegetation and maritime heathland/grassland. Contrast between the industrialised usage of the coastal belt in Wales and residential and recreational usage in England.	5, 6, 1	Over-fishing, introduction/invasion of flora, transport infrastructure, industrial pollution, pollution – sewage, general disturbance.
UK14006 03 53 16 W 51 38 08 N	Crymlyn Bog	264.18	Floodplain-valley mire located within a lowland coastal context and is the most extensive wetland of its type in Wales. The mire features a complex mosaic of vegetation types, supporting examples of swamp, tall herb fen, fen meadow and carr communities.	1, 2, 3	Eutrophication
UK14001 04 10 37 W 51 38 55 N	Burry Inlet	6,627.99	Burry Inlet is a large estuarine complex located between the Gower Peninsula and Llanelli in South Wales. It includes extensive areas of intertidal sand and mud flats, together with large sand dune systems at the mouth of the estuary. The site contains the largest continuous area of saltmarsh in Wales (2,200 ha). The Burry Inlet regularly supports large numbers of wildfowl and waders.	5, 6	Erosion.

*Note: Ramsar criteria:**

1. sites containing representative, rare or unique wetland types
2. supports vulnerable, endangered, or critically endangered species or threatened ecological communities
3. supports populations of plant/animal species important for maintaining regional biodiversity
4. supports plant/animal species at a critical stage in their life cycles, or provides refuge
5. regularly supports 20,000 or more waterbirds
6. regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
8. important source of food for fishes, spawning ground, nursery and/or migration path

A4a.1.3.5 SEA Area 5

Figure A4a.11 – Sites of International Importance

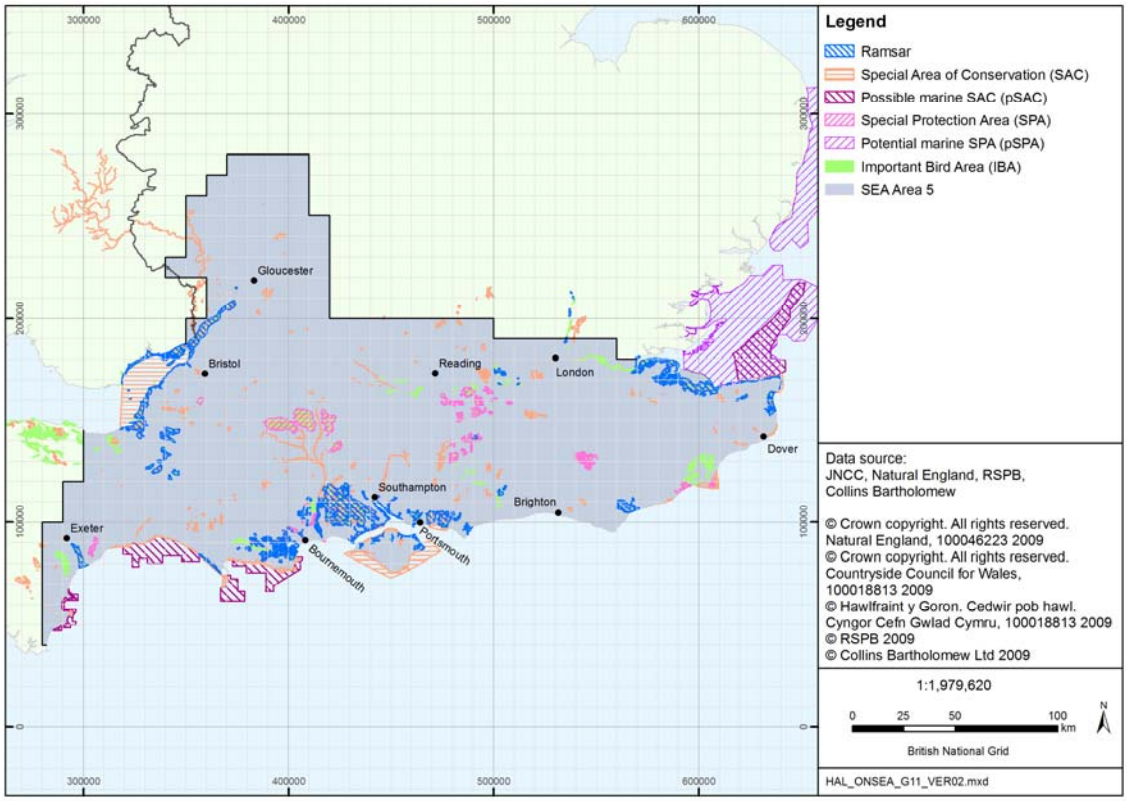


Figure A4a.12 – Sites of National and Local Importance

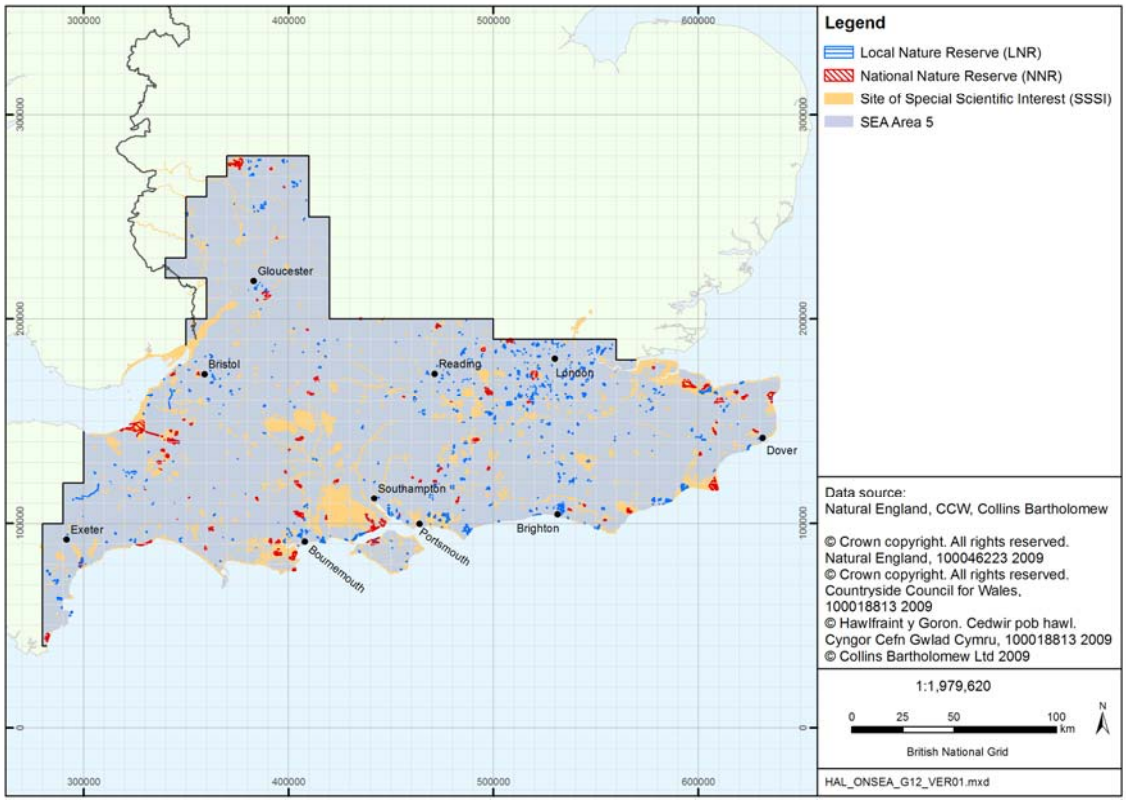


Table A4a.16 – Summary Details of Relevant Special Areas of Conservation (SACs)

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
Holnest UK0030350 02 28 29 W 50 53 40 N	54.94	**Primary:** N/A **Qualifying:** N/A	**Primary:** Great crested newt *Triturus cristatus* **Qualifying:** N/A	Agricultural diversification and alternative land uses could threaten breeding ponds, foraging areas and hibernation sites.	Agreements have been made with owners to prevent detrimental effects on newt populations.
Fontmell and Melbury Downs UK0012550 02 08 34 W 50 58 20 N	260.75	**Primary:** N/A **Qualifying:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*)	**Primary:** Early gentian *Gentianella anglica* **Qualifying:** N/A	Under-grazing, scrub encroachment, adjacent intensive agricultural practices.	Much of site managed by voluntary nature conservation organisations.
Pewsey Downs UK0012552 01 50 54 W 51 22 18 N	153.87	**Primary:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (important orchid sites) * *Priority feature* **Qualifying:** N/A	**Primary:** Early gentian *Gentianella anglica* **Qualifying:** N/A	Under-grazing by cattle and sheep.	Management of NNR takes into account requirements of the orchid-rich calcareous grassland and early gentian. May require increased support through agri-environment schemes/management agreements.
Prescombe Down UK0012553 02 01 14 W 51 01 39 N	76.14	**Primary:** N/A **Qualifying:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*)	**Primary:** Early gentian *Gentianella anglica* **Qualifying: M**arsh fritillary butterfly *Euphydryas* (*Eurodryas*, *Hypodryas*) *aurinia*	Under-grazing by cattle and sheep.	Management of NNR takes into account requirements of the orchid-rich calcareous grassland and early gentian. May require increased support through agri-environment schemes/management agreements.
The New Forest UK0012557	29,262.36	**Primary:** Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia*	**Primary:** Southern damselfly *Coenagrion mercuriale*, stag beetle	Drainage, afforestation of heathland habitats, under-grazing, recreational	Managed through SAC Management Plan, the National Park, and through

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
01 40 50 W 50 51 59 N		*uniflorae*), oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*, northern Atlantic wet heaths with *Erica tetralix*, European dry heaths, *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), depressions on peat substrates of the *Rhynchosporion*, Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrub layer (*Quercion robori-petraeae or Ilici-Fagenion*), *Asperulo-Fagetum* beech forests, old acidophilous oak woods with *Quercus robur* on sandy plains, bog woodland **Priority feature*, alluvial forests with *Alnus glutinosa* and *Fraxinus* excelsior (*Alno-Padion, Alnion incanae, Salicion albae*) **Priority feature* **Qualifying:** Transition mires and quaking bogs, alkaline fens	*Lucanus cervus* **Qualifying:** Great crested newt *Triturus cristatus*	pressures.	supplementary funding for restoration, e.g. LIFE funding.
Bath and Bradford-on-Avon Bats	107.16	**Primary:** N/A **Qualifying:** N/A	**Primary:** Greater horseshoe bat *Rhinolophus*	Change in environmental conditions, pollution, disturbance.	Efforts being made to fit grilles over most vulnerable mine entrances. If necessary,

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
UK0012584 02 14 19 W 51 25 03 N			*ferrumequinum,* Bechstein`s bat *Myotis bechsteinii* **Qualifying:** Lesser horseshoe bat *Rhinolophus hipposideros*		management agreements will be drawn up.
Beer Quarry and Caves UK0012585 03 06 43 W 50 41 49 N	31.1	**Primary:** N/A **Qualifying:** N/A	**Primary:** Bechstein`s bat *Myotis bechsteinii* **Qualifying:** Lesser horseshoe bat *Rhinolophus hipposideros,* Greater horseshoe bat *Rhinolophus ferrumequinum*	Disturbance.	Site management statement has been agreed with the quarrying company.
Windsor Forest and Great Park UK0012586 00 37 24 W 51 26 08 N	1,687.26	**Primary:** Old acidophilous oak woods with *Quercus robur* on sandy plains **Qualifying:** Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrub layer (*Quercion robori-petraeae* or *Ilici-Fagenion*)	**Primary:** Violet click beetle *Limoniscus violaceus* **Qualifying:** N/A	Changes in management practices.	Sympathetic management being undertaken through the Declaration of Intent signed between English Nature and the owners, the Crown Estate.
Bredon Hill UK0012587 02 03 02 W 52 03 49 N	359.86	**Primary:** N/A **Qualifying:** N/A	**Primary:** Violet click beetle *Limoniscus violaceus* **Qualifying:** N/A	Replacement of ancient trees.	Management agreements being used to preserve existing tree stocks and to provide replacement planting.
River Itchen UK0012599	309.26	**Primary:** Water courses of plain to montane levels with the *Ranunculion fluitantis*	**Primary: Southern damselfly *Coenagrion mercuriale*, bullhead**	Decrease in flow velocities and increase in siltation. Water abstraction.	EA initiating major study of the river's macrophytes from which a predictive model will be

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
01 20 05 W 50 57 14 N		and *Callitricho-Batrachion* vegetation **Qualifying:** N/A	***Cottus gobio*** **Qualifying:** White-clawed (or Atlantic stream) crayfish *Austropotamobius pallipes*, brook lamprey *Lampetra planeri*, Atlantic salmon *Salmo salar,* otter *Lutra lutra*		developed to aid decisions on water abstraction regime.
East Devon Pebblebed Heaths UK0012602 03 21 33 W 50 40 19 N	119.94	**Primary:** Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths **Qualifying:** N/A	**Primary:** Southern damselfly *Coenagrion mercuriale* **Qualifying:** N/A	Changes in agricultural management and quarrying (impact on water chemistry and water levels). Water abstraction.	Majority of site under positive conservation management.
River Wye/Afon Gwy UK0012642 03 17 59 W 52 01 24 N	2,234.89	**Primary:** Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation **Qualifying:** Transition mires and quaking bogs	**Primary:** White-clawed (or Atlantic stream) crayfish *Austropotamobius pallipes*, sea lamprey *Petromyzon marinus*, brook lamprey *Lampetra planeri*, river lamprey *Lampetra fluviatilis*, twaite shad *Alosa fallax*, Atlantic salmon *Salmo salar*, bullhead *Cottus gobio*, otter *Lutra lutra* **Qualifying:** Allis shad *Alosa alosa*	SAC interests particularly allis and twaite shad populations vulnerable to water quality impacts from changing agricultural land-use (nutrient run-off and increased siltation) and point-source discharges. Riverside development. Fishing activities (salmon). Water abstraction. Recreation.	Joint EN/EA/CCW conservation strategy for the river. River Wye formed part of the *Life in UK Rivers* project to develop methods for conserving the wildlife and habitats of rivers within the Natura 2000 network of protected European sites.
South Hams	129.53	**Primary:** European dry	**Primary:** Greater	Disturbance, through public	Quarry at Berry Head

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
UK0012650 03 29 21 W 50 23 54		heaths, semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia) **Qualifying:** Vegetated sea cliffs of the Atlantic and Baltic coasts, caves not open to the public, *Tilio-Acerion* forests of slopes, screes and ravines **Priority feature*	horseshoe bat *Rhinolophus ferrumequinum* **Qualifying:** N/A	access, recreational activities.	designated as a NNR and management plan prepared. Buckfastleigh Caves managed as a nature reserve.
Mells Valley UK0012658 02 29 30 W 51 13 33 N	28.22	**Primary:** N/A **Qualifying:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), caves not open to the public	**Primary:** Greater horseshoe bat *Rhinolophus ferrumequinum* **Qualifying:** N/A	Disturbance from public access.	None of the sites currently managed directly for bats. English Nature discussing access provisions with the owner.
Rooksmoor UK0012681 02 22 11 W 50 53 50 N	61.36	**Primary:** N/A **Qualifying:** *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)	**Primary:** Marsh fritillary butterfly *Euphydryas* (*Eurodryas*, *Hypodryas*) *aurinia* **Qualifying:** N/A	Scrub invasion due to neglect and lack of grazing animals.	EN Management Agreement.
Salisbury Plain UK0012683 01 53 22 W 51 14 45 N	21,438.1	**Primary:** *Juniperus communis* formations on heaths or calcareous grasslands, semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), semi-natural dry grasslands and scrubland facies: on calcareous	**Primary:** Marsh fritillary butterfly *Euphydryas* (*Eurodryas*, *Hypodryas*) *aurinia* **Qualifying:** N/A	Lack of management in some areas. Habitat damage.	MOD owned land as well as an NNR. Site interests require low intensity grazing. NNR management plan.

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
		substrates (*Festuco-Brometalia*) (important orchid sites) **Priority feature* **Qualifying:** N/A			
Ebernoe Common UK0012715 00 36 20 W 51 02 09 N	133.94	**Primary:** Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrub layer (*Quercion robori-petraeae* or *Ilici-Fagenion*) **Qualifying:** N/A	**Primary:** Barbastelle *Barbastella barbastellus*, Bechstein`s bat *Myotis bechsteinii* **Qualifying:** N/A	Not under any significant threat.	Ancient woodland dependent on traditional management. Sussex Wildlife Trust Management Plan.
The Mens UK0012716 00 32 27 W 51 00 04 N	203.28	**Primary:** Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrub layer (*Quercion robori-petraeae* or *Ilici-Fagenion*) **Qualifying:** N/A	**Primary:** N/A **Qualifying:** Barbastelle *Barbastella barbastellus*	Recreation pressure.	Ancient Wealden woodland managed as an area of minimum intervention.
Epping Forest UK0012720 00 01 21 E 51 38 39 N	1,604.95	**Primary:** Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrub layer (*Quercion robori-petraeae* or *Ilici-Fagenion*) **Qualifying:** Northern Atlantic wet heaths with Erica tetralix, European dry heaths	**Primary:** Stag beetle *Lucanus cervus* **Qualifying:** N/A	Neglect, atmospheric pollutants.	Comprehensive management plan completed and consented in 1998. Subject to provisions of Epping Forest Act (1878).
East Hampshire Hangers UK0012723 00 56 45 W 51 02 06 N	569.69	**Primary:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (important orchid sites) ** Priority feature*, *Asperulo-Fagetum* beech	**Primary:** N/A **Qualifying:** Early gentian *Gentianella anglica*	Nutrient run-off from agriculture leading to eutrophication.	EN exploring mechanisms to curtail damaging agricultural activities. Also liaising closely with Forestry Commission.

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
		forests, *Tilio-Acerion* forests of slopes, screes and ravines ** Priority feature* **Qualifying:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (Festuco-Brometalia), Taxus baccata woods of the British Isles **Priority feature*			
Chilterns Beechwoods UK0012724 00 35 07 W 51 48 39 N	1,276.48	**Primary:** *Asperulo-Fagetum* beech forests **Qualifying:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*)	**Primary:** N/A **Qualifying:** Stag beetle *Lucanus cervus*	Lack of appropriate management.	Significant changes to the structural and species diversity of these woods required in order to promote a more natural composition. Woodland Grant Scheme.
Wye Valley Woodlands/ Coetiroedd Dyffryn Gwy UK0012727 02 40 43 W 51 39 28 N	916.24	**Primary:** *Asperulo-Fagetum* beech forests, *Tilio-Acerion* forests of slopes, screes and ravines **Priority feature*, *Taxus baccata* woods of the British Isles **Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** Lesser horseshoe bat *Rhinolophus hipposideros*	Lack of traditional woodland management.	Positive management promoted through management plans (CCW), Site Management Statements (EN) and Management Agreements, and the Woodland Grant Scheme.
Avon Gorge Woodlands UK0012734 02 38 01 W 51 27 50 N	152.35	**Primary:** *Tilio-Acerion* forests of slopes, screes and ravines **Priority feature* **Qualifying:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*)	**Primary:** N/A **Qualifying:** N/A	No significant threats.	Part managed as a NNR and the management of the remainder addressed through a Site Management Statement.

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
South Dartmoor Woods UK0012749 03 49 09 W 50 31 00 N	2,157.15	**Primary:** Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles **Qualifying:** European dry heaths	**Primary:** N/A **Qualifying:** N/A	Heavy recreational pressure. Long-term decline of woodland lichens due to air pollution and/or climate change. Heavy grazing and uncontrolled fires (arson).	Within Dartmoor National Park. Parts managed as NNRs. Dartmoor ESA scheme to reduce grazing levels.
Kingley Vale UK0012767 00 49 40 W 50 53 30 N	208.05	**Primary:** *Taxus baccata* woods of the British Isles **Priority feature* **Qualifying:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*)	**Primary:** N/A **Qualifying:** N/A	Scrub encroachment of chalk grassland.	Conservation of yew forest requires the maintenance of nurse scrub habitat and regulation of numbers of resident deer.
Great Yews UK0012770 01 49 49 W 51 00 27 N	28.71	**Primary:** *Taxus baccata* woods of the British Isles **Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Woodland considered to be in good condition.	Little active management carried out except small-scale recreational activity.
Thursley, Ash, Pirbright and Chobham UK0012793 00 41 35 W 51 09 42 N	5,138	**Primary:** Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths, depressions on peat substrates of the *Rhynchosporion* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Insufficient grazing or other traditional practices. Water abstraction causing loss or damage to wet heath and mire. Neighbouring housing developments. Recreation pressure.	Largely dependent on active heathland management.
Mole Gap to Reigate Escarpment UK0012804	887.68	**Primary:** Stable xerothermophilous formations with *Buxus sempervirens* on rock slopes (*Berberidion* p.p.), semi-	**Primary:** N/A **Qualifying:** Great crested newt *Triturus cristatus*, Bechstein`s bat *Myotis bechsteinii*	Recreation pressure. Neglect and lack of appropriate grazing.	National Trust and Surrey County Council own and manage significant proportion of the site. Smaller areas owned by other local authorities and the

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
00 16 48 W 51 15 57 N		natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (important orchid sites) **Priority feature*, *Taxus baccata* woods of the British Isles ** Priority feature* **Qualifying:** European dry heaths, *Asperulo-Fagetum* beech forests			local wildlife trust.
Rodborough Common UK0012826 02 13 06 W 51 43 51 N	104.26	**Primary:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Lack of appropriate grazing, road traffic, recreation pressure.	Management issues addressed through continued liaison, joint working and a Site Management Statement between English Nature and the National Trust.
Wye and Crundale Downs UK0012831 00 58 52 E 51 09 36 N	112.24	**Primary:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (important orchid sites) **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Lack of appropriate grazing.	Continuous grazing management essential. Part of site managed as a NNR. On other parts, discussion with private land managers to encourage traditional management.
Lewes Downs UK0012832	146.86	**Primary:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-*	**Primary:** N/A **Qualifying:** N/A	Scrub encroachment. Leaching and spray drift of agricultural chemicals.	Continuous grazing management essential. NNR managed by the landowner under a management

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
00 02 51 E 50 51 53 N		*Brometalia*) (important orchid sites) **Qualifying:** N/A			agreement.
Queendown Warren UK0012833 00 37 24 E 51 20 07 N	14.28	**Primary:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (important orchid sites) **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Not under any current threat.	Continuous grazing management essential. Site managed as a nature reserve.
Lydden and Temple Ewell Downs UK0012834 01 15 23 E 51 09 43 N	61.7	**Primary:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (important orchid sites) **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	No details.	Continuous grazing management essential. EN's Reserves Enhancement Scheme and Countryside Stewardship schemes to encourage traditional management.
Folkestone to Etchinghill Escarpment UK0012835 01 07 06 E 51 06 22 N	81.94	**Primary:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (important orchid sites) **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Overgrazing.	Both English Nature and Countryside Stewardship agreements exist on the site.
Castle Hill UK0012836 00 03 04 W 50 50 31 N	114.68	**Primary:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (important orchid sites) **Qualifying:** N/A	**Primary:** N/A **Qualifying:** Early gentian *Gentianella anglica*	Leaching and spray-drift of agricultural chemicals. Inappropriate grazing.	Continuous grazing management essential. NNR leased to EN from the local authority.

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
Holme Moor and Clean Moor UK0012883 03 17 30 W 51 01 31 N	7.58	**Primary:** Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* *Priority feature*, alkaline fens **Qualifying:** *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)	**Primary:** N/A **Qualifying:** N/A	Neglect and lack of management.	EN reversed neglect and manages site with permission of owners.
Cothill Fen UK0012889 01 19 46 W 51 41 44 N	43.55	**Primary:** Alkaline fens **Qualifying:** Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) *Priority feature*	**Primary:** N/A **Qualifying:** N/A	Cessation of traditional management (grazing and peat-cutting).	Cutting of reed, cutting of areas of tall fen and removal of scrub to increase area and diversity of the short fen habitat.
River Avon UK0013016 01 49 24 W 51 06 14 N	498.24	**Primary:** Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation **Qualifying:** N/A	**Primary:** Desmoulin`s whorl snail *Vertigo moulinsiana*, sea lamprey *Petromyzon marinus*, brook lamprey *Lampetra planeri*, Atlantic salmon *Salmo salar*, bullhead *Cottus gobio* **Qualifying:** N/A	Land drainage; land use, water abstraction, disposal of sewage effluents and management of the water courses for fishery, agricultural and other uses.	Major land use activities addressed through Local Environment Action Plans, Catchment Abstraction Plans and Water Level Management Plans as well as through management agreements with landowners/occupiers.
Dungeness UK0013059 00 57 10 E 50 55 08 N	3,223.56	**Primary:** Annual vegetation of drift lines, perennial vegetation of stony banks **Qualifying:** N/A	**Primary:** Great crested newt *Triturus cristatus* **Qualifying:** N/A	Recreational disturbance, water abstraction, close to an active airport which carries a potential risk from air pollution.	Extensive areas managed as a Nature Reserve.
Sandwich Bay	1,137.87	**Primary:** Embryonic shifting dunes, shifting dunes along	**Primary:** N/A **Qualifying:** N/A	Scrub encroachment.	Most of the site unmanaged 'rough' on golf-courses. Control

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
UK0013077 01 22 39 E 51 18 19 N		the shoreline with *Ammophila arenaria* (`white dunes`), fixed dunes with herbaceous vegetation (`grey dunes`) **Priority feature*, dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*) **Qualifying:** Humid dune slacks			of scrub being undertaken through Management Agreements.
Thanet Coast UK0013107 01 22 33 E 51 23 24 N	2,803.84	**Primary:** Reefs, submerged or partially submerged sea caves **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Erosion and natural physical destruction. Recreational pressure.	In preparing management scheme, human activities have been evaluated with stakeholders, and management agreed.
Cotswold Beechwoods UK0013658 02 08 52 W 51 49 07 N	585.85	**Primary:** *Asperulo-Fagetum* beech forests **Qualifying:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*)	**Primary:** N/A **Qualifying:** N/A	No details.	Maintained by a variety of silvicultural practices. Sympathetic Woodland Grant Scheme.
Wormley Hoddesdonpark Woods UK0013696 00 05 19 W 51 44 08 N	335.53	**Primary:** Sub-Atlantic and medio-European oak or oak-hornbeam forests of the *Carpinion betuli* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Neglect. Recreation pressure.	Present management ranges from benign neglect to active forestry. Much of the site is a NNR.
Blean Complex UK0013697	520.62	**Primary:** Sub-Atlantic and medio-European oak or oak-hornbeam forests of the	**Primary:** N/A **Qualifying:** N/A	No details.	Coppice management in areas of the site maintained as nature reserves by EN, Kent Wildlife

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
01 01 43 E 51 18 07 N		*Carpinion betuli* **Qualifying:** N/A			Trust and RSPB.
Isle of Wight Downs UK0016254 01 28 18 W 50 40 08 N	461.8	**Primary:** Vegetated sea cliffs of the Atlantic and Baltic coasts, European dry heaths, semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) **Qualifying:** N/A	**Primary:** Early gentian *Gentianella anglica* **Qualifying:** N/A	Scrub encroachment. Recreation pressure. Sea cliffs vulnerable to cliff stabilisation schemes, inappropriate grazing.	Coastal strategies, management plans and Management Agreements.
North Meadow and Clattinger Farm UK0016372 01 58 45 W 51 38 20 N	104.88	**Primary:** Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*) **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Extraction and renovation of gravel workings potential threat to water levels.	NNR management plan and a site management statement stipulating an appropriate grazing regime.
Chilmark Quarries UK0016373 02 02 11 W 51 04 42 N	10.41	**Primary:** N/A **Qualifying:** N/A	**Primary:** Greater horseshoe bat *Rhinolophus ferrumequinum*, barbastelle *Barbastella barbastellus*, Bechstein`s bat *Myotis bechsteinii* **Qualifying:** Lesser horseshoe bat *Rhinolophus hipposideros*	Collapse of underground voids and unauthorised access.	Management plan and agreements in place.
Solent and Isle of Wight	36.24	**Primary:** Coastal lagoons **Priority feature*	**Primary:** N/A **Qualifying:** N/A	Water quality issues due to industrial waste	Mechanisms including Biodiversity Action Plans, other

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
Lagoons UK0017073 01 08 13 W 50 46 30 N		**Qualifying:** N/A		disposal/landfill/ discharges and diffuse pollution; the effects of sea-level rise; coastal defence; water level management.	coastal strategies, Water Level Management Plans and Management Agreements.
Chesil and the Fleet UK0017076 02 31 22 W 50 36 47 N	1,631.63	**Primary:** Coastal lagoons **Priority feature*, annual vegetation of drift lines, perennial vegetation of stony banks. Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*) **Qualifying:** Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	**Primary:** N/A **Qualifying:** N/A	Changes in natural coastal processes. Water quality issues. Close to busy shipping lanes, risk of accidental oil pollution. Licence given for offshore oil exploration nearby.	Much of the site privately-owned and managed as nature reserve.
Dorset Heaths UK0019857 02 09 36 W 50 39 03 N	5,730.73	**Primary:** Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths, depressions on peat substrates of the *Rhynchosporion* **Qualifying:** Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae * Priority feature*, alkaline fens, old acidophilous oak woods with *Quercus robur* on sandy	**Primary:** Southern damselfly *Coenagrion mercuriale* **Qualifying:** Great crested newt *Triturus cristatus*	Recreational pressure and high incidence of wildfires, disturbance by infrastructure works. Several mineral extraction permissions. Scrub encroachment.	Half the site is now held as NNRs, LNRs and non-statutory nature reserves.

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
		plains			
Isle of Portland to Studland Cliffs UK0019861 02 13 34 W 50 37 14 N	1,447.5	**Primary:** Vegetated sea cliffs of the Atlantic and Baltic coasts, semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) **Qualifying:** Annual vegetation of drift lines	**Primary:** Early gentian *Gentianella anglica* **Qualifying:** N/A	Coastal erosion and defence, recreational pressure.	Shoreline Management Plans. Establishment of suitable grazing regimes through site management statements. Heritage Coast which covers much of the coast.
St Albans Head to Durlston Head UK0019863 01 59 28 W 50 35 32 N	287.22	**Primary:** Vegetated sea cliffs of the Atlantic and Baltic coasts, semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (important orchid sites) **Priority feature* **Qualifying:** N/A	**Primary:** Early gentian *Gentianella anglica* **Qualifying:** Greater horseshoe bat *Rhinolophus ferrumequinum*	Under-grazing, recreation pressure.	Majority of site owned by a voluntary conservation organisation or by local Government and is being managed for nature conservation and amenity use.
Sidmouth to West Bay UK0019864 02 57 16 W 50 42 57 N	897.3	**Primary:** Vegetated sea cliffs of the Atlantic and Baltic coasts, *Tilio-Acerion* forests of slopes, screes and ravines **Priority feature* **Qualifying:** Annual vegetation of drift lines	**Primary:** N/A **Qualifying:** N/A	No immediate threats.	Management of the site assisted by Countryside Stewardship and English Nature's Reserve Enhancement Scheme.
Burnham Beeches UK0030034 00 37 51 W 51 33 36 N	382.76	**Primary:** Atlantic acidophilous beech forests with *Ilex* and sometimes also *Taxus* in the shrub layer (*Quercion robori-petraeae* or *Ilici-Fagenion*) **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Possible damage from adjacent mineral workings - dust and hydrological changes. Sulphur and nitrogen oxides levels may exceed criteria levels for sensitive vegetation.	Much of the site designated as a NNR and managed to restore grazed pasture woodland and heathland. The National Trust also owns part of the site.

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
Dorset Heaths (Purbeck and Wareham) and Studland Dunes UK0030038 01 57 57 W 50 39 16 N	2,221.94	**Primary:** Embryonic shifting dunes, shifting dunes along the shoreline with *Ammophila arenaria* (`white dunes`), Atlantic decalcified fixed dunes (*Calluno-Ulicetea*) **Priority feature*, humid dune slacks, oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*), Northern Atlantic wet heaths with *Erica tetralix*, temperate Atlantic wet heaths with *Erica ciliaris* and *Erica tetralix *Priority feature*, European dry heaths, depressions on peat substrates of the *Rhynchosporion*, bog woodland **Priority feature* **Qualifying:** *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae *Priority feature*, alkaline fens, old acidophilous oak woods with *Quercus robur* on sandy plains	**Primary:** Southern damselfly *Coenagrion mercuriale* **Qualifying:** Great crested newt *Triturus cristatus*	Extensive losses to agriculture, forestry and urban development. Recreation pressures. Wildfires. Disturbance from infrastructure works. Decline in traditional agriculture. Erosion of sand dunes.	About half of the site is now held as NNRs, LNRs and non-statutory nature reserves.
Kennet and Lambourn	114.47	**Primary:** N/A **Qualifying:** N/A	**Primary:** Desmoulin`s whorl snail *Vertigo*	Adequate supply of high quality water. Nearby	EA and EN ensuring appropriate water levels, through production

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
Floodplain UK0030044 01 32 59 W 51 25 53 N			*moulinsiana* **Qualifying:** N/A	Newbury Bypass.	of water level management plans and regular monitoring of water quality.
Mendip Woodlands UK0030048 02 25 18 W 51 12 25 N	253.92	**Primary:** *Tilio-Acerion* forests of slopes, screes and ravines **Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	No major threats.	Two parts of the site are NNRs. Cheddar Wood is a Somerset Wildlife Trust nature reserve.
North Somerset and Mendip Bats UK0030052 02 44 47 W 51 17 10 N	561.19	**Primary:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), *Tilio-Acerion* forests of slopes, screes and ravines **Priority feature* **Qualifying:** Caves not open to the public	**Primary:** Lesser horseshoe bat *Rhinolophus hipposideros*, greater horseshoe bat *Rhinolophus ferrumequinum* **Qualifying:** N/A	Human disturbance.	Low levels of grazing resulting in scrub invasion and the development of secondary woodland. Woodland requires a considerable amount of restoration.
Rook Clift UK0030058 00 49 58 W 50 57 25 N	10.82	**Primary:** *Tilio-Acerion* forests of slopes, screes and ravines **Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Overgrazing.	Site is in private ownership and managed under the Woodland Grant Scheme.
Solent Maritime UK0030059 00 55 40 W 50 47 47 N	11,309.25	**Primary:** Estuaries, *Spartina swards* (*Spartinion maritimae*), Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) **Qualifying:** Sandbanks	**Primary:** N/A **Qualifying:** Desmoulin`s whorl snail *Vertigo moulinsiana*	Flood defence and coast protection works; coastal squeeze; developments pressures. Accidental pollution from shipping, oil/chemical spills, heavy	Management Scheme for European Marine Sites, Biodiversity Action Plans, other coastal strategies, management plans and Management Agreements.

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
		which are slightly covered by sea water all the time, mudflats and sandflats not covered by seawater at low tide, coastal lagoons **Priority feature*, annual vegetation of drift lines, perennial vegetation of stony banks, *Salicornia* and other annuals colonising mud and sand, shifting dunes along the shoreline with *Ammophila arenaria* (`white dunes`)		industrial activities, former waste disposal sites and waste-water discharge; introduction of non-native species.	
South Wight Maritime UK0030061 01 20 51 W 50 35 29 N	19,862.71	**Primary:** Reefs, vegetates sea cliffs of the Atlantic and Baltic coasts, submerged or partially submerged sea caves **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Coast protection works, coastal squeeze, development or intensive agriculture in the hinterland, sewage disposal, accidental pollution from shipping activity, development in the intertidal/subtidal, dredging and dredged spoil disposal, fishing and boating, introduction of non-native species.	Management Scheme for European Marine Sites, Biodiversity Action Plans, other coastal strategies, management plans and Management Agreements.
Ashdown Forest UK0030080 00 04 14 E 51 03 21 N	2729	**Primary:** Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths **Qualifying:** N/A	**Primary:** N/A **Qualifying:** Great crested newt *Triturus cristatus*	Undergrazing, scrub encroachment. Possible long-term drying out of the site due to borehole extraction and transpiration from increase in vegetation cover.	Majority of site managed by Conservators of Ashdown Forest.
Aston Rowant	127.75	**Primary:** *Juniperus*	**Primary:** N/A	No details.	Approximately 95% of the site

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
UK0030082 00 56 55 W 51 40 06 N		*communis* formations on heaths or calcareous grasslands **Qualifying:** *Asperulo-Fagetum* beech forests	**Qualifying:** N/A		designated as NNR and is under the direct management control of English Nature.
Blackmill Woodlands UK0030090 03 32 39 W 51 33 41 N	71.01	**Primary:** Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Overgrazing.	Situated entirely on Common Land, and are subject to rights of common.
Bracket's Coppice UK0030095 02 41 15 W 50 51 38 N	53.66	**Primary:** N/A **Qualifying:** *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)	**Primary:** Bechstein`s bat *Myotis bechsteinii* **Qualifying:** N/A	No details.	Majority of the site owned by Dorset Wildlife Trust and Plantlife, and management plans for the two nature reserves take account of the bat's requirements. Land outside the nature reserves covered by Site Management Statements.
Butser Hill UK0030103 00 58 48 W 50 58 18 N	238.66	**Primary:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*), *Taxus baccata* woods of the British Isles **Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Spray-drift from intensively-managed arable land.	Within the South Downs ESA.
Cerne and Sydling Downs UK0030115	369.08	**Primary:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*)	**Primary:** Marsh fritillary butterfly *Euphydryas* (*Eurodryas*, *Hypodryas*) *aurinia* **Qualifying:** N/A	Inappropriate grazing level.	Scrub removal and grazing regimes undertaken under ESA management plans and English Nature management agreements.

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
02 28 06 W 50 49 00 N		**Qualifying:** N/A			
Dawlish Warren UK0030130 03 26 09 W 50 36 11 N	58.84	**Primary:** Humid dune slacks **Qualifying:** Shifting dunes along the shoreline with *Ammophila arenaria* (`white dunes`), fixed dunes with herbaceous vegetation (`grey dunes`) **Priority feature*	**Primary:** Petalwort *Petalophyllum ralfsii* **Qualifying:** N/A	Sand dune erosion, recreational pressure, spray-drift of chemicals.	A Site Management Statement being agreed on.
Dixton Wood UK0030135 02 01 50 W 51 58 47 N	13.14	**Primary:** N/A **Qualifying:** N/A	**Primary:** Violet click beetle *Limoniscus violaceus* **Qualifying:** N/A	Lack of future replacement pollards (age-class skewed to older generation) and game management practices.	Management Agreement for creation of new pollards and to prevent further loss.
Duncton to Bignor Escarpment UK0030138 00 37 37 W 50 54 50 N	214.47	**Primary:** *Asperulo-Fagetum* beech forests **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Expansion of pheasant shoots.	Plantations of non-native conifers targeted for complete or partial removal. Deer population controlled by deer stalkers.
Emer Bog UK0030147 01 26 18 W 50 59 24 N	37.5	**Primary:** Transition mires and quaking bogs **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Adjacent land-use affecting hydrological processes of the mire. Nutrient-enrichment and potential development.	Managed as nature reserve and site's importance raised through the Local Plan process to ensure that impacts of development proposals fully considered.
Exmoor and Quantock Oakwoods	1,895.17	**Primary:** Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	**Primary:** Barbastelle *Barbastella barbastellus* **Qualifying:** Bechstein`s	Overgrazing. Invasion of non-native species.	Minimum intervention but opportunities being taken to diversify age and species

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
UK0030148 03 34 57 W 51 11 02 N		**Qualifying:** Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) **Priority feature*	bat *Myotis bechsteinii*, otter *Lutra lutra*		composition to restore near-natural conditions where possible.
Hackpen Hill UK0030162 01 29 31 W 51 33 34 N	35.83	**Primary:** N/A **Qualifying:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*)	**Primary:** Early gentian *Gentianella anglica* **Qualifying:** N/A	Periodic damage by rapid fluctuations in rabbit numbers.	Grazing regime supported financially through an EN Management Agreement.
Hartslock Wood UK0030164 01 06 27 W 51 30 21 N	34.24	**Primary:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (important orchid sites) **Priority feature*, *Taxus baccata* woods of the British Isles **Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Not currently considered under significant threat.	Woodland Grant Scheme promotes retention of yew and removal of non-native tree species. Grassland area managed as a nature reserve by the local Wildlife Trust.
Hastings Cliffs UK0030165 00 39 08 E 50 52 07 N	183.72	**Primary:** Vegetated sea cliffs of the Atlantic and Baltic coasts **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Recreational pressure. Adjacent farming practices. Effect of surrounding coastal protection schemes and offshore activities unknown.	No details.
Hestercombe House UK0030168 03 05 03 W 51 03 07 N	0.08	**Primary:** N/A **Qualifying:** N/A	**Primary:** Lesser horseshoe bat *Rhinolophus hipposideros* **Qualifying:** N/A	Human disturbance, change of use, development.	Current knowledge of bat movements by site managers good so there is no immediate threat.

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
Kennet Valley Alderwoods UK0030175 01 25 39 W 51 24 16 N	56.77	**Primary:** Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) **Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Maintenance of constantly high groundwater.	No known threats to groundwater levels. Subject to low levels of intervention and natural processes are allowed to prevail to a large extent. A WGS scheme is in place.
Little Wittenham UK0030184 01 10 24 W 51 37 53 N	68.76	**Primary:** N/A **Qualifying:** N/A	**Primary:** Great crested newt *Triturus cristatus* **Qualifying:** N/A	Not considered to be under any known threat.	Provision of new ponds and the creation of hibernation sites for newts. Managed primarily for nature conservation and environmental education.
Lyppard Grange Ponds UK0030198 02 10 37 W 52 11 53 N	1.09	**Primary:** N/A **Qualifying:** N/A	**Primary:** Great crested newt *Triturus cristatus* **Qualifying:** N/A	Recreational pressure.	Development of a Management Plan. Action plan to remove stickleback, construct hibernacula and refugia, and water management systems being undertaken to secure conservation of the newt population.
Mendip Limestone Grasslands UK0030203 02 51 33 W 51 17 48 N	417.47	**Primary:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) **Qualifying:** European dry heaths, caves not open to the public, *Tilio-Acerion* forests of slopes, screes and ravines **Priority feature*	**Primary:** N/A **Qualifying:** Greater horseshoe bat *Rhinolophus ferrumequinum*	Recreational pressure. Inappropriate grazing.	Commoning system on which the management of the Crook Peak part of the site depends is breaking down and may cause serious problems in the future.
North Downs Woodlands	287.58	**Primary:** *Asperulo-Fagetum* beech forests, *Taxus baccata* woods of the British	**Primary:** N/A **Qualifying:** N/A	Under-grazing in parts.	Yew woodland managed as minimum intervention. Beech woodland as high forest with

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
UK0030225 00 24 13 E 51 20 24 N		Isles **Priority feature* **Qualifying:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*)			encouragement of beech regeneration. Chalk grassland needs continuous grazing.
Peter's Pit UK0030237 00 27 56 E 51 20 16 N	28.3	**Primary:** N/A **Qualifying:** N/A	**Primary:** Great crested newt *Triturus cristatus* **Qualifying:** N/A	Neglect and scrub invasion of newt breeding ponds. Urban development, water level potential threat.	EN working with the owners to make the site a secure nature reserve.
Quants UK0030242 03 09 32 W 50 57 11 N	20.29	**Primary:** N/A **Qualifying:** N/A	**Primary:** Marsh fritillary butterfly *Euphydryas* (*Eurodryas*, *Hypodryas*) *aurinia* **Qualifying:** N/A	Disruption of highly interventionist management.	Marsh fritillary population restricted to a comparatively small area (c. 2 ha) and is kept high by a considerable level of management directed at producing 'ideal' habitat.
Richmond Park UK0030246 00 16 28 W 51 26 27 N	846.68	**Primary:** N/A **Qualifying:** N/A	**Primary:** Stag beetle *Lucanus cervus* **Qualifying:** N/A	High levels of recreational pressure.	The whole site has been declared a NNR.
River Axe UK0030248 03 02 21 W 50 45 33 N	25.78	**Primary:** Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation **Qualifying:** N/A	**Primary:** N/A **Qualifying:** Sea lamprey *Petromyzon marinus*, brook lamprey *Lampetra planeri*, bullhead *Cottus gobio*	Potential eutrophication from surrounding land.	Programme of surveys investigating the sources of potential problems. On completion, management advice will be provided to the perpetrators to minimise impacts.
River Lambourn	27.27	**Primary:** Water courses of plain to montane levels with	**Primary:** Bullhead *Cottus gobio*	Localised higher water nutrient levels and siltation	EN and the EA have agreed protocol for dealing with issues

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
UK0030257 01 25 37 W 51 27 43 N		the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation **Qualifying:** N/A	**Qualifying:** Brook lamprey *Lampetra planeri*	problems associated with sewage treatment works.	affecting the river.
Shortheath Common UK0030275 00 53 38 W 51 07 25 N	58.94	**Primary:** Transition mires and quaking bogs **Qualifying:** European dry heaths, bog woodland **Priority feature*	**Primary:** N/A **Qualifying:** N/A	Encroachment of invasive scrub and trees.	Wildlife Enhancement Scheme agreement has been entered into in an attempt to address the ecological deterioration.
Stodmarsh UK0030283 01 10 21 E 51 18 23 N	564.64	**Primary:** N/A **Qualifying:** N/A	**Primary:** Desmoulin`s whorl snail *Vertigo moulinsiana* **Qualifying:** N/A	No details.	Approximately half of the site managed as a National Nature Reserve. Remainder managed in a way that is compatible with nature conservation.
West Dorset Alderwoods UK0030299 02 39 18 W 50 46 06 N	329.29	**Primary:** Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) **Priority feature* **Qualifying:** *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*), old acidophilous oak woods with *Quercus robur* on sandy plains	**Primary:** Marsh fritillary butterfly *Euphydryas* (*Eurodryas*, *Hypodryas*) *aurinia* **Qualifying:** Great crested newt *Triturus cristatus*	Surrounding land-use and management of water.	Agri-environment schemes, forestry management and planting grants, and Management Agreements are being examined with a view to addressing land-use concerns.
Wimbledon Common UK0030301	348.31	**Primary:** N/A **Qualifying:** Northern Atlantic wet heaths with *Erica tetralix*, European dry heaths	**Primary:** Stag beetle *Lucanus cervus* **Qualifying:** N/A	Heavy recreation pressure.	No details.

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
00 14 04 W 51 25 56 N					
Woolmer Forest UK0030304 00 51 01 W 51 05 08 N	666.68	**Primary:** Natural dystrophic lakes and ponds, European dry heaths, depressions on peat substrates of the *Rhynchosporion* **Qualifying:** Northern Atlantic wet heaths with *Erica tetralix*, transition mires and quaking bogs	**Primary:** N/A **Qualifying:** N/A	Neglect and encroachment of invasive scrub and trees. Military activities.	WES agreements being used to address ecological deterioration.
Briddlesford Copses UK0030328 01 13 15 W 50 42 38 N	167.22	**Primary:** N/A **Qualifying:** N/A	**Primary:** Bechstein`s bat *Myotis bechsteinii* **Qualifying:** N/A	Recreation pressure.	Majority of site owned and managed by the Peoples' Trust for Endangered Species and is subject to a Forestry Commission Woodland Grant Scheme.
Dover to Kingsdown Cliffs UK0030330 01 22 57 E 51 08 38 N	183.85	**Primary:** Vegetated sea cliffs of the Atlantic and Baltic coasts **Qualifying:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (important orchid sites) **Priority feature*	**Primary:** N/A **Qualifying:** N/A	Coastal squeeze.	Cliff-top grassland requires grazing, but where this is not feasible mowing is the preferred management. No immediate pressures on the vegetated sea cliff habitat.
Mottisfont Bats UK0030334 01 33 29 W 51 02 52 N	196.88	**Primary:** N/A **Qualifying:** N/A	**Primary:** Barbastelle *Barbastella barbastellus* **Qualifying:** N/A	No details.	70% of site owned by National Trust who have carried out woodland operations over recent years. 25% of the site is privately owned and not open to public access.

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
Singleton and Cocking Tunnels UK0030337 00 45 31 W 50 55 18 N	2.45	**Primary:** N/A **Qualifying:** N/A	**Primary:** Barbastelle *Barbastella barbastellus* **Qualifying:** Bechstein`s bat *Myotis bechsteinii*	Human disturbance, long term tunnel collapse.	No details.
Parkgate Down UK0030338 01 06 10 E 51 10 16 N	6.94	**Primary:** Semi-natural dry grasslands and scrubland facies: on calcareous substrates (*Festuco-Brometalia*) (important orchid sites) **Priority feature* **Qualifying:** N/A	**Primary:** N/A **Qualifying:** N/A	Not under any current threat.	Continuous grazing management essential. Site managed as a nature reserve.
Crookhill Brick Pit UK0030349 02 30 16 W 50 36 59 N	4.71	**Primary:** N/A **Qualifying:** N/A	**Primary:** Great crested newt *Triturus cristatus* **Qualifying:** N/A	Potential hazards (lighting, rats) from the adjacent waste transfer station. Lack of water body maintenance and introduction of invasive non-native plants.	Proposed designation of the land as a Local Nature Reserve.
Poole Bay to Lyme Bay Reefs (inshore pSAC) 02 52 47.08 W 50 39 59.38 N	60,750	Interest features include Annex I Reefs and Submerged or Partially Submerged Sea Caves		Fishing activity in the Lyme Bay Reefs, primarily scallop dredging, has degraded reef structure and biota. Physical damage from abrasion (e.g. anchoring).	Statutory closure on scallop dredging in the Lyme Bay area since July 2008.
Margate and Long Sands (pSAC)	55,878	Interest features include Annex I Sandbanks which are Slightly Covered by Sea Water all the Time		Dredging to maintain navigation channels (e.g. the Princes Channel, and aggregate extraction outside the site can lead to local	Management practices to be developed to identify relevant threats from sources of physical damage and biological disturbance.

SEA Area 5: Southern and South West England					
Name, code and location[1]	**Area (ha)**	**Annex I Habitat**	**Annex II Species**	**Vulnerability**	**Management**
02 21 16.16 E 51 32 11.34 N				hydrodynamic changes and impacts on benthic communities. A proposed offshore wind farm may generate physical changes to the structure of the banks through piling and cable laying.	

Table A4a.17 – Summary Details of Relevant Special Protection Areas (SPAs)

SEA Area 5: Southern and Southwest England					
Name, code and location[1]	**Area (ha)**	**Qualifying features under Article 4.1 of the Directive**	**Qualifying features under Article 4.2 of the Directive**	**Vulnerability**	**Management**
Walmore Common UK9007051 02 22 14 W 51 49 58 N	52.85	**Over winter:** Bewick's swan *Cygnus columbianus bewickii*	N/A	Water level issues, inappropriate grazing regime.	Water level management plan, currently in preparation, will ensure appropriate conditions retained for wintering bird interest.
Somerset Levels and Moors UK9010031 02 52 00 W 51 10 14 N	6,388.49	**Over winter:** Bewick's swan *Cygnus columbianus*, golden plover *Pluvialis apricaria*	**Over winter:** Teal *Anas crecca*, wigeon *Anas penelope,* lapwing *Vanellus vanellus* **Assemblage qualification:** Over winter, the area regularly supports 73,014 individual waterfowl including: Bewick's swan *Cygnus columbianus bewickii,* teal *Anas crecca,* golden plover *Pluvialis*	Agricultural improvement (e.g. conversion of grassland to arable, land drainage and fertilisers).	Water Level Management Plans, development of Raised Water Level Areas and ESA.

			apricaria, lapwing *Vanellus vanellus*		
Chew Valley Lake UK9010041 02 37 07 W 51 20 02 N	575.73	N/A	**Over winter:** Shoveler *Anas clypeata*	Recreational pressure.	Bristol Water implemented a nature conservation strategy for site.
Exe Estuary UK9010081 03 26 32 W 50 38 50 N	2,345.71	**Over winter:** Avocet *Recurvirostra avosetta*, Slavonian grebe *Podiceps auritus*	**Over winter:** Dark-bellied brent goose *Branta bernicla bernicla,* dunlin *Calidris alpina,* oystercatcher *Haematopus ostralegus,* Black-tailed godwit *Limosa limosa islandica,* grey plover *Pluvialis squatarola.* **Assemblage qualification:** Over winter, the area regularly supports 23,811 individual waterfowl including: Slavonian grebe *Podiceps auritus,* dark-bellied brent goose *Branta bernicla bernicla,* oystercatcher *Haematopus ostralegus,* avocet *Recurvirostra avosetta,* grey plover *Pluvialis squatarola,* dunlin *Calidris alpina,* Black-tailed godwit *Limosa limosa islandica*.	Recreational pressure. Dredging takes place in approach channel which could affect sediment movement patterns. Potential oil spill issues.	Exe Estuary Management Plan addresses the recreational, disturbance and potential oil spill issues. Substantial areas managed as nature reserves by RSPB, local wildlife Trust and local authorities.
Chesil Beach and The Fleet UK9010091	748.11	N/A	**Over winter:** Dark-bellied brent goose *Branta bernicla*	Recreational pressure. Agricultural run-off as potential source of eutrophication. Introduction of non-	Much privately owned and managed as nature reserve. Part of Chesil is Crown Common land. Contingency

02 31 10 W 50 36 40 N				native species. Port discharges. Close to one of the world's busiest shipping lanes and consequently risk of accidental oil pollution.	plans exist for dealing with oil spills.
Dorset Heathlands UK9010101 02 09 33W 50 39 00N	8,168.79	**During the breeding season:** Dartford warbler *Sylvia undata*, nightjar *Caprimulgus europaeus*, woodlark *Lullula arborea* **Over winter:** Hen harrier *Circus cyaneus*, merlin *Falco columbarius*	N/A	Fragmentation through agriculture, forestry and urban development. Recreational pressure. Several old mineral extraction permissions, some still active. Decline in traditional agriculture.	Support schemes and management initiatives encouraging the re-establishment of traditional management now cover much of the heath. About 43% of the site held as NNRs, LNRs and non-statutory nature reserves.
Poole Harbour UK9010111 02 01 34 W 50 40 52 N	2,271.99	**During the breeding season:** Common tern *Sterna hirundo*, Mediterranean gull *Larus melanocephalus* **Over winter:** Avocet *Recurvirostra avosetta*	**Over winter:** Black-tailed godwit *Limosa limosa islandica*, shelduck *Tadorna tadorna* **Assemblage qualification:** Over winter, the area regularly supports 25,091 individual waterfowl including: shelduck *Tadorna tadorna,* avocet *Recurvirostra avosetta,* black-tailed godwit *Limosa limosa islandica*.	Growth of urban conurbation, associated infrastructure, and development of commercial port. Recreation pressure.	Wytch Farm oilfield has facilities within site; their maintenance and any risks from oil spills are dealt with according to agreed method statements and oil spill contingency plans. Harbour management policies.
East Devon Heaths UK9010121 03 21 32 W 50 40 18 N	1,119.94	**During the breeding season:** Dartford warbler *Sylvia undata*, nightjar *Caprimulgus europaeus*	N/A	Changes in agricultural management, water abstraction and quarrying in immediate vicinity.	Majority of site under positive conservation management.
Chichester and	5,810.03	**During the breeding**	**Over winter:**	Recreational pressure.	Both harbours

Langstone Harbours UK9011011 00 55 12 W 50 48 23 N		**season:** Little tern *Sterna albifrons*, sandwich tern *Sterna sandvicensis,* common tern *Sterna hirundo* **Over winter:** Bar-tailed godwit *Limosa lapponica*	Pintail *Anas acuta*, shoveler *Anas clypeata*, teal *Anas crecca*, wigeon *Anas penelope*, turnstone *Arenaria interpres,* dark-bellied brent goose *Branta bernicla bernicla,* sanderling *Calidris alba,* dunlin *Calidris alpina alpina,* ringed plover *Charadrius hiaticula*, red-breasted merganser *Mergus serrator,* curlew *Numenius arquata,* grey plover *Pluvialis squatarola,* shelduck *Tadorna tadorna,* redshank *Tringa totanus* **Assemblage qualification:** Over winter, the area regularly supports 93,230 individual waterfowl including: dark-bellied brent goose *Branta bernicla,* shelduck *Tadorna tadorna, wigeon Anas penelope,* teal *Anas crecca,* pintail *Anas acuta*, shoveler *Anas clypeata*, red-breasted merganser *Mergus serrator,* ringed plover *Charadrius hiaticula,* grey plover *Pluvialis squatarola,* dunlin *Calidris alpina,* sanderling *Calidris alba,* bar-tailed godwit *Limosa lapponica,* curlew *Numenius arquata,* redshank *Tringa totanus, Turnstone Arenaria interpres*	Eutrophication. Sea-level rise and coastal squeeze. Water abstraction.	managed by statutory bodies whose remits include conservation of the natural environment. Numerous Local Authority and RSPB nature reserves around site. Management Scheme for the Solent Maritime SAC.

New Forest UK9011031 01 39 22 W 50 49 32 N	28,002.81	**During the breeding season:** Dartford warbler *Sylvia undata*, honey buzzard *Pernis apivorus*, nightjar *Caprimulgus europaeus*, woodlark *Lullula arborea* **Over winter:** Hen harrier *Circus cyaneus*	**During the breeding season:** Eurasian Hobby *Falco subbuteo,* wood warbler *Phylloscopus sibilatrix*	Recreation pressure. Water level issues (e.g. drainage).	New Forest now managed as a National Park.
Portsmouth Harbour UK9011051 01 07 32 W 50 49 41 N	1,248.77	N/A	**Over winter:** Dark-bellied brent goose *Branta bernicla bernicla,* dunlin *Calidris alpina alpina,* black-*tailed godwit Limosa limosa islandica,* red-breasted merganser *Mergus serrator*	Modification of physical processes through large-scale land-claim, capital and maintenance dredging, sea defences. Sea level rise and coastal squeeze. Accidental pollution from shipping and heavy industrial activities, former military and waste disposal sites, re-distribution of contaminated sediments. Recreational pressure.	Portsmouth Harbour Plan (non-statutory) aims to address many of these issues. Other strategic issues addressed through the Management Scheme covering European Marine Sites within the Solent complex of estuaries.
Solent and Southampton Water UK9011061 01 31 33 W 50 44 25N	5,505.86	**During the breeding season:** Mediterranean gull *Larus melanocephalus,* little tern *Sterna albifrons,* roseate tern *Sterna dougallii*, common tern *Sterna hirundo*, sandwich tern *Sterna sandvicensis*	**Over winter:** Black-tailed godwit *Limosa limosa islandica*, dark-bellied brent goose *Branta bernicla*, ringed plover *Charadrius hiaticula*, teal *Anas crecca* **Assemblage qualification:** Over winter, the area regularly supports 51,361 individual waterfowl including: dark-bellied brent	Modification of physical processes through large-scale land-claim, capital and maintenance dredging, sea defences. Sea level rise and coastal squeeze. Accidental pollution from shipping, heavy industrial activities and former waste disposal sites. Recreational and	Shoreline Management Plans, Estuarine Management Plans and through the Management Scheme which will cover the European Marine Sites including the Solent and Southampton Water SPA.

			goose *Branta bernicla,* teal *Anas crecca,* ringed plover *Charadrius hiaticula,* black-tailed godwit *Limosa limosa islandica*	commercial pressure.	
Avon Valley UK9011091 01 47 46 W 50 47 02 N	1,385.08	**Over winter:** Bewick's swan *Cygnus columbianus*	**Over winter:** Gadwall *Anas strepera*	Water level issues.	Management agreements, site management statements, water level management plans and ESA agreements.
Porton Down UK9011101 01 39 15 W 51 07 45 N	1,237.04	**During the breeding season:** Stone curlew *Burhinus oedicnemus*	N/A	No significant issues.	Integrated land management plan.
Salisbury Plain UK9011102 01 53 11 W 51 15 14 N	19,688.88	**During the breeding season:** Stone curlew *Burhinus oedicnemus*	N/A	Inappropriate management due to military interests.	Integrated Land Management Plan (ILMP).
The Swale UK9012011 00 50 21 E 51 21 39 N	6,514.71	N/A	**Over winter:** Dark-bellied brent goose *Branta bernicla bernicla,* dunlin *Calidris alpina alpina,* redshank *Tringa totanus* **Assemblage qualification:** During the breeding season the area regularly supports: reed warbler *Acrocephalus scirpaceus,* teal *Anas crecca*, mallard *Anas platyrhynchos,* gadwall *Anas strepera,* ringed plover	Rapid erosion of intertidal habitat due to natural processes and effects of sea defences and clay extraction. Water borne recreation disturbance.	Terrestrial part of site depends on appropriate grazing and management of water quality and quantity.

			Charadrius hiaticula, reed bunting *Emberiza schoeniclus,* coot *Fulica atra*, moorhen *Gallinula chloropus*, oystercatcher *Haematopus ostralegus*, curlew *Numenius arquata,* grey plover *Pluvialis squatarola,* shelduck *Tadorna tadorna,* redshank *Tringa totanus,* lapwing *Vanellus vanellus* Over winter, the area regularly supports 65,588 individual waterfowl including: dark-bellied brent goose *Branta bernicla,* gadwall *Anas strepera,* teal *Anas crecca,* oystercatcher *Haematopus ostralegus,* ringed plover *Charadrius hiaticula,* grey plover *Pluvialis squatarola,* dunlin *Calidris alpina,* curlew *Numenius arquata,* redshank *Tringa totanus.*		
Thames Estuary and Marshes UK9012021 00 35 47 E 51 29 08 N	4,838.94	**During the breeding season:** Avocet *Recurvirostra avosetta*, hen harrier *Circus cyaneus*	**Over winter:** Dunlin *Calidris alpina,* knot *Calidris canutus,* Black-tailed godwit *Limosa limosa islandica, grey plover Pluvialis squatarola,* redshank *Tringa totanus* **On passage:** Ringed plover *Charadrius*	Coastal squeeze and erosion of intertidal habitat. Water borne recreation disturbance. Direct land take and indirect disturbance and hydrological effects as a result of development.	Terrestrial part depends on appropriate grazing and management of water. Estuary Management Plan, Water Level Management Plan.

			hiaticula **Assemblage qualification:** Over winter, the area regularly supports 75,019 individual waterfowl including: avocet *Recurvirostra avosetta,* grey plover *Pluvialis squatarola, knot Calidris canutus,* dunlin *Calidris alpina,* Black-tailed godwit *Limosa limosa islandica,* redshank *Tringa totanus.*		
Medway Estuary and Marshes UK9012031 00 40 38 E 51 24 02 N	4,684.36	**During the breeding season:** Avocet *Recurvirostra avosetta*, little tern *Sterna albifrons, common tern Sterna hirundo* **Over winter:** Avocet *Recurvirostra avosetta, Bewick's swan Cygnus columbianus bewickii*	**Over winter:** pintail *Anas acuta, shoveler Anas clypeata,* teal *Anas crecca*, wigeon *Anas penelope,* turnstone *Arenaria interpres,* dark-bellied brent goose *Branta bernicla bernicla,* dunlin *Calidris alpina alpina, knot Calidris canutus,* ringed plover *Charadrius hiaticula,* oystercatcher *Haematopus ostralegus*, godwit *Limosa limosa islandica,* curlew *Numenius arquata,* grey plover *Pluvialis squatarola,* shelduck *Tadorna tadorna,* greenshank *Tringa nebularia,* redshank *Tringa totanus* **Assemblage qualification:** During the breeding season the area regularly supports:	Rapid erosion of intertidal habitat. Disturbance from water borne recreation. Pressures from proposed transport and industrial developments.	Terrestrial part depends on appropriate grazing and management of water.

			kingfisher *Alcedo atthis,* mallard *Anas platyrhynchos,* short-eared owl *Asio flammeus,* pochard *Aythya ferina*, hen harrier *Circus cyaneus,* merlin *Falco columbarius*, red-throated diver *Gavia stellata,* cormorant *Phalacrocorax carbo,* lapwing *Vanellus vanellus.* Over winter, the area regularly supports 65,496 individual waterfowl including: Red-throated diver *Gavia stellata,* great crested grebe *Podiceps cristatus,* cormorant *Phalacrocorax carbo,* Bewick's swan *Cygnus columbianus bewickii,* dark-bellied brent goose *Branta bernicla bernicla,* shelduck *Tadorna tadorna*, wigeon *Anas penelope*, teal *Anas crecca*, mallard *Anas platyrhynchos*, pintail *Anas acuta*, shoveler *Anas clypeata*, pochard *Aythya ferina*, oystercatcher *Haematopus ostralegus*, avocet *Recurvirostra avosetta*, ringed plover *Charadrius hiaticula*, grey plover *Pluvialis squatarola,* lapwing *Vanellus vanellus*, knot *Calidris canutus,* dunlin *Calidris alpina alpina*, black-		

			tailed godwit *Limosa limosa islandica,* curlew *Numenius arquata*, redshank *Tringa totanus*, greenshank *Tringa nebularia*, turnstone *Arenaria interpres*.		
Pagham Harbour UK9012041 00 45 38 W 50 45 48 N	636.68	**During the breeding season:** Little tern *Sterna albifrons,* common tern *Sterna hirundo* **Over winter:** Ruff *Philomachus pugnax*	**Over winter:** Dark-bellied brent goose *Branta bernicla*	Historic land drainage for agriculture. Pollution from sewage.	Majority of the site is a Local Nature Reserve managed by West Sussex County Council.
Thanet Coast and Sandwich Bay UK9012071 01 22 47 E 51 18 18 N	1,870.16	**During the breeding season:** Little tern *Sterna albifrons* **Over winter:** Golden plover *Pluvialis apricaria*	**Over winter:** Turnstone *Arenaria interpres*	Recreational pressures and disturbance. Port development. Potential for oil spills both from vessels and Port Ramsgate. Eutrophication.	Oil spill contingency plans need to be kept updated. Management scheme for European marine site.
Dungeness to Pett Level UK9012091 00 44 59 E 50 55 50 N	1,474.04	**During the breeding season:** Common tern *Sterna hirundo*, little tern *Sterna albifrons*, Mediterranean gull *Larus melanocephalus* **Over winter:** Bewick's swan *Cygnus columbianus*	**Over winter:** Shoveler *Anas clypeata*	Coastal erosion. Bird predation. Possible disturbance from aircraft. Recreational pressure. Changing agricultural practices. Overgrazing and lowering of water levels.	Management agreements and water level management plans.
Lee Valley UK9012111 00 02 58 W 51 34 51 N	447.87	**Over winter:** Bittern *Botaurus stellaris*	**Over winter:** Gadwall *Anas strepera*, shoveler *Anas clypeata*	Water quality issues. Recreational pressure. Over-extraction of surface water for public supply.	Majority of the site managed in accordance with agreed management plans in which nature conservation is a high or sole priority.

Stodmarsh UK9012121 01 10 19 E 51 18 18 N	481.33	**Over winter:** Bittern *Botaurus stellaris*, hen harrier *Circus cyaneus*	**During the breeding season:** Gadwall *Anas strepera* **Over winter:** Shoveler *Anas clypeata,* gadwall *Anas strepera* **Assemblage qualification:** During the breeding season, the area regularly supports: sedge warbler *Acrocephalus schoenobaenus, reed warbler Acrocephalus scirpaceus, wigeon Anas penelope,* mallard *Anas platyrhynchos*, little tern *Sterna albifrons,* pochard *Aythya ferina*, tufted duck *Aythya fuligula*, snipe *Gallinago gallinago, Savi's Warbler Locustella luscinioides,* common grasshopper warbler *Locustella naevia,* great crested grebe *Podiceps cristatus,* water rail *Rallus aquaticus,* redshank *Tringa totanus*, lapwing *Vanellus vanellus*.	Recreation pressure and disturbance. Water abstraction.	Much is a NNR and therefore relatively secure and well managed. Management of parts of the site owned by private land owners being addressed by production of Site Management Statements.
Thursley, Hankley and Frensham Commons (Wealden Heaths Phase 1) UK9012131 00 41 52 W	1,869.95	**During the breeding season:** Dartford warbler *Sylvia undata*, nightjar *Caprimulgus europaeus*, woodlark *Lullula arborea*	N/A	Neglect/lack of appropriate management. Lowering of water levels due to water abstraction.	Thursley Common is a NNR managed by EN. Frensham and Witley Commons managed by National Trust and a large part of the site owned by the MoD.

51 09 44 N					
Wealden Heaths Phase 2 UK9012132 00 51 02 W 51 05 11 N	2,053.83	**During the breeding season:** Dartford warbler *Sylvia undata*, nightjar *Caprimulgus europaeus*, woodlark *Lullula arborea*	N/A	Heathland fires and development associated with military training activities. Recreational pressure.	Consultation meetings with MoD and management plans on National Trust land.
Thames Basin Heaths UK9012141 00 44 18 W 51 22 18 N	8,274.72	**During the breeding season:** Dartford warbler *Sylvia undata*, nightjar *Caprimulgus europaeus*, woodlark *Lullula arborea*	N/A	Lack of grazing and other traditional management practices. Development pressure. Military use. Recreation pressure.	Countryside Stewardship and Wildlife Enhancement Schemes. Strategic approach to accommodating development being addressed through the Thames Basin Heaths Area Based Delivery Project.
South West London Waterbodies UK9012171 00 31 27 W 51 27 41 N	828.14	N/A	**Over winter:** Gadwall *Anas strepera*, shoveler *Anas clypeata*	Development pressures, vegetation succession, recreation. Potential future decommissioning of reservoirs and maintenance works, which may require winter draw-down of reservoirs.	Discussions with current owners and occupiers regarding future management, maintenance and decommissioning of the larger reservoirs, in order to maintain the site's interest.
Ashdown Forest UK9012181 00 04 12 E 51 03 44 N	3,207.08	**During the breeding season:** Dartford warbler *Sylvia undata*, nightjar *Caprimulgus europaeus*	N/A	Lack of management and grazing. Recreation pressure. Non-native species.	Integrated Management Plan of the Conservators of Ashdown Forest.
Severn Estuary UK9015022	24,662.98	**During the breeding season:** Bewick's swan *Cygnus*	**Over winter:** Gadwall *Anas strepera,* Russian white-fronted goose	Land-claim, aggregate extraction/ dredging, physical developments	Existing control measures and the Severn Estuary

03 02 57 W 51 13 29 N		*columbianus bewickii*	*Anser albifrons albifrons,* dunlin *Calidris alpina alpina,* shelduck *Tadorna tadorna,* redshank *Tringa totanus* **Assemblage qualification:** Over winter, the area regularly supports 84,317 individual waterfowl including: Bewick's swan *Cygnus columbianus bewickii,* Russian white-fronted goose *Anser albifrons albifrons,* shelduck *Tadorna tadorna,* gadwall *Anas strepera,* dunlin *Calidris alpina alpina,* redshank *Tringa totanus,* whimbrel *Numenius phaeopus*.	such as barrage construction, flood defences, pollution (industrial, oil spillage), eutrophication and recreation.	Strategy.
Arun Valley UK9020281 00 31 40 W 50 55 05 N	528.62	**Over winter:** Bewick's swan *Cygnus columbianus bewickii*	**Assemblage qualification:** Over winter, the area regularly supports 27,241 individual waterfowl including: Bewick's swan *Cygnus columbianus bewickii*	Inappropriate grazing regime, fertilisers, drainage, water abstraction, river maintenance.	Much of site currently under appropriate management through organisations such as the Sussex Wildlife Trust and the RSPB. Water Level Management Plans.
Outer Thames Estuary (pSPA) UK1452174 01 15 44.31 E 51 34 21.46 N	393,734	Qualifies as an SPA, supporting more than 1% (38%) of the UK population of the Annex I species, red-throated diver *Gavia stellata* Supported 6,486 wintering individuals (1989-2006/07)		Non-physical disturbance from shipping and recreational activity. Potential risk from entanglement in fishing gear.	Site management to be developed around operations which have been identified as generating vulnerabilities in order to maintain interest feature population and habitat extent.

Table A4a.18 – Summary of Relevant Ramsar Sites

Code/location	Name	Area (ha)	Description	Criteria*	Adverse factors
UK11004 00 31 40 W 50 55 05 N	Arun Valley	528.62	Area of wet meadows on the floodplain of the River Arun. The neutral wet grassland which is subject to winter, and occasional summer, flooding, is dissected by a network of ditches, several of which support rich aquatic flora and invertebrate fauna. Wintering wildfowl and breeding waders.	2, 5, 3	Water extraction, hunting or capture
UK11005 01 47 46 W 50 47 02 N	Avon Valley	1,385.08	River Avon displays wide fluctuations in water level and parts of the valley are regularly flooded in winter. The Avon valley has a greater range of habitats and a more diverse flora and fauna than any other chalk river in Britain. The valley includes one of the largest expanses of unimproved floodplain grassland in Britain, including extensive areas managed as hay meadow.	1, 6, 2	Agricultural drainage/reclamation, vegetation succession, sedimentation/ siltation, pollution – fertilisers and sewage, reservoir/dam: flow regime, recreation disturbance, cutting/ clearing of vegetation, introduction/invasion of flora.
UK11012 02 31 10 W 50 36 40 N	Chesil Beach and The Fleet	748.11	The Fleet is the largest and best example of a barrier-built saline lagoon in the UK and Chesil is one of the three major shingle structures in the UK. The salinity gradient, peculiar hydrographic regime and varied substrates, together with associated reedbed and intertidal habitats and the relative lack of pollution in comparison to most other lagoons, have resulted in the site becoming extraordinarily rich in wildlife. Outstanding communities of aquatic plants and animals are present, supporting large numbers of wildfowl, waders and seabirds.	6, 3, 1, 8, 2, 4	Sedimentation/ siltation, pollution – fertilisers and agriculture, eutrophication
UK11013 00 55 12 W 50 48 23 N	Chichester and Langstone Harbours	5,810.03	Large, sheltered estuarine basins comprising extensive mud and sand flats exposed at low tide. Of particular significance for over-wintering wildfowl and waders and also a wide range of coastal and transitional habitats supporting important plant and animal communities.	5, 1, 6	Erosion, eutrophication, water diversion, introduction of exotic species, introduction/ invasion of flora, pollution – sewage, recreation disturbance.

Code/location	Name	Area (ha)	Description	Criteria*	Adverse factors
UK11021 02 09 33W 50 39 00N	Dorset Heathlands	6,730.15	Extensive and fragmented heathland areas centred around the estuary of Poole Harbour and adjacent to the urban conurbation of Bournemouth and Poole. Numerous examples of wet heath and acid valley mire. Transitions to coastal wetland and fen habitat types. The wetland flora and fauna includes a large assemblage of nationally rare and scarce species, especially invertebrates.	3, 2, 1	Eutrophication, pollution – unspecified, recreation disturbance, habitat burning, acid rain.
UK11025 03 26 32 W 50 38 50 N	Exe Estuary	2,345.71	Encompasses the waters, foreshore, low-lying land, three marshes and an unusual double spit across the mouth of the estuary and sand dunes of Dawlish Warren. Complex of habitats supports internationally important numbers of wintering and passage waterfowl, as well as populations of breeding birds and nationally important rare plants and invertebrates.	5, 6	Intensive aquaculture
UK11034 00 02 58 W 51 34 51 N	Lee Valley	447.87	Series of embanked water supply reservoirs, sewage treatment lagoons and former gravel pits. Waterbodies support internationally important numbers of wintering gadwall and shoveler and nationally important numbers of several other bird species. Contains a range of wetland and valley bottom habitats, both man-made and semi-natural, which support a diverse range of wetland fauna and flora.	2, 6	No factors reported
UK11040 00 40 38 E 51 24 02 N	Medway Estuary and Marshes	4,696.74	Complex of rain-fed, brackish, floodplain grazing marsh with ditches, and intertidal saltmarsh and mudflat. Support internationally important numbers of wintering waterfowl. Rare wetland birds breed in important numbers. The saltmarsh and grazing marsh of international importance diverse assemblages of wetland plants and invertebrates.	2, 6, 5	Eutrophication, erosion, recreation disturbance, transport infrastructure, dredging, water diversion.
UK11047 01 39 22 W 50 49 32 N	The New Forest	28,002.81	Area of semi-natural vegetation including valley mires, fens and wet heath within catchments whose uncultivated and undeveloped state buffer the mires against adverse ecological change. Habitats present are of high ecological quality and diversity with undisturbed transition zones. Other wetland habitats include numerous ponds and a network of small streams mainly acidic in character.	3, 2, 1	Recreation disturbance, drainage/ reclamation, introduction/invasion of flora, commercial forestry.

Code/location	Name	Area (ha)	Description	Criteria*	Adverse factors
UK11052 00 45 38 W 50 45 48 N	Pagham Harbour	636.68	Central area of saltmarsh and tidal mudflats with surrounding habitats including lagoons, shingle, open water, reed swamp and wet permanent grassland. Intertidal mudflats rich in invertebrate and algae, and provide important feeding areas for birds. Supports internationally important numbers of wintering pintail and nationally important numbers of dark-bellied brent goose, grey plover and black-tailed godwit.	6	Pollution – sewage.
UK11053 00 20 32 E 50 50 30 N	Pevensey Levels	3,577.71	One of the largest and least-fragmented lowland wet grassland systems in south-east England. Low-lying grazing meadows intersected by a complex system of ditches which support a variety of important wetland communities, including nationally rare and scarce aquatic plants and invertebrates. Notable assemblage of breeding and wintering wildfowl.	2, 3	Introduction/invasion of flora, pollution – sewage.
UK11054 02 01 34 W 50 40 52 N	Poole Harbour	2,439.2	Extensive intertidal mudflats support internationally important numbers of waterfowl in winter. These are fringed on the landward side by saltmarshes or reedbeds. River valleys of the lower Frome and Piddle support grazing marsh which is also important for wintering waterfowl.	3, 2, 5, 6, 1	Introduction/invasion of flora, introduction of exotic animals, eutrophication.
UK11055 01 07 32 W 50 49 41 N	Portsmouth Harbour	1,248.77	Large industrialised estuary which includes one of the four largest expanses of mudflats and tidal creeks on the south coast of Britain. Mudflats support large beds of narrow-leaved and dwarf eelgrass, extensive green alga and sea lettuce. Site supports internationally important numbers of wintering dark-bellied brent geese and nationally important numbers of grey plover, dunlin and black-tailed godwit.	3, 6	Coastal engineering, eutrophication, urban development.
UK11063 01 31 33 W 50 44 25N	Solent and Southampton Water	5,346.44	Comprises estuaries and adjacent coastal habitats including intertidal flats, saline lagoons, shingle beaches, saltmarsh, reedbeds, damp woodland, and grazing marsh. Habitats support internationally important numbers of wintering waterfowl, important breeding gull and tern populations and an important assemblage of rare invertebrates and plants.	6, 5, 1, 2	Dredging, erosion, pollution – unspecified.

Code/location	Name	Area (ha)	Description	Criteria*	Adverse factors
UK11064 02 52 00 W 51 10 14 N	Somerset Levels and Moors	6,388.49	Contains the flood plains of the Rivers Axe, Brue, Parrett, Tone and their tributaries. Majority of site only a few metres above sea level and drains through a large network of ditches, rhynes, drains and rivers. Flooding may affect large areas in winter depending on rainfall and tidal conditions. Areas of open water, fen and reedbed. Internationally important numbers of wildfowl in winter and is one of the most important sites in southern Britain for breeding waders. The network of rhynes and ditches support an outstanding assemblage of aquatic invertebrates, particularly beetles.	6, 2, 5	Cutting/clearing of vegetation, erosion, pollution – unspecified, vegetation succession, eutrophication.
UK11065 00 31 27 W 51 27 41 N	South West London Waterbodies	828.14	Comprises a series of reservoirs and former gravel pits that support internationally important numbers of wintering *Anas strepera* and *Anas clypeata*.	6	No factors reported.
UK11066 01 10 19 E 51 18 18 N	Stodmarsh	481.33	Wetland site resulting in part from subsidence under the valley of the Great Stour and aggregate extraction but lies within the natural floodplain of the river. Range of wetland habitats including open water, reedbeds, grazing marsh and alder carr. Supports a number of uncommon wetland invertebrates and plants, and provides breeding and wintering habitats for important assemblages of wetland birds.	2	Flooding, water diversion, vegetation succession, eutrophication.
UK11069 00 35 47 E 51 29 08 N	Thames Estuary and Marshes	5,588.59	Complex of brackish, floodplain grazing marsh ditches, saline lagoons and intertidal saltmarsh and mudflat. Support internationally important numbers of wintering waterfowl. The saltmarsh and grazing marsh of international importance for diverse assemblages of wetland plants and invertebrates.	6, 5, 2	General disturbance, erosion, dredging, eutrophication.
UK11070 01 22 47 E 51 18 18 N	Thanet Coast and Sandwich Bay	2,169.23	Consists of long stretch of rocky shore, adjoining areas of estuary, sand dune, maritime grassland, saltmarsh and grazing marsh. The wetland habitats support 15 British Red Data Book invertebrates, as well as a large number of nationally scarce species. Internationally important numbers of turnstone and nationally important numbers of wintering waders. Used by large numbers of migratory birds.	6, 2	Water diversion, urban development, general disturbance, overgrazing (livestock), recreation disturbance, eutrophication, pollution – agriculture, vegetation succession.

Code/location	Name	Area (ha)	Description	Criteria*	Adverse factors
UK11071 00 50 21 E 51 21 39 N	The Swale	6,514.71	Complex of brackish and freshwater, floodplain grazing marsh with ditches, and intertidal saltmarsh and mudflat. Support internationally important numbers of wintering waterfowl. Rare wetland birds breed in important numbers. Saltmarsh and grazing marsh of international importance for diverse assemblages of wetland plants and invertebrates.	5, 6, 2	Erosion, recreation disturbance.
UK11074 00 42 01 W 51 09 52 N	Thursley and Ockley Bogs	265.24	Valley mire complex within a matrix of heathland, where drainage is impeded, and a deep layer of peat has built up. Several areas of open water contribute to the overall diversity of the site, ranging from acidic boggy pools and ditches to large ponds.	3, 2	Water extraction, flooding.
UK11076 02 22 14 W 51 49 58 N	Walmore Common	52.85	Low-lying area in the Severn Vale subject to winter flooding. Variety of habitats including improved neutral grassland, unimproved marshy grassland and open water ditches. The common is part of a series of sites within the Severn Vale which, in winter, form an important refuge and feeding area for wildfowl.	6	No factors reported.
UK11081 03 02 57 W 51 13 29 N	Severn Estuary (Wales)	2,4662.98	Tidal regime results in plant and animal communities typical of the extreme physical conditions of liquid mud and tide swept sand and rock. Species-poor invertebrate community includes high densities of ragworms, lugworms and other invertebrates forming an important food source for passage and wintering waders. Extensive intertidal zone comprising mudflats, sand banks, shingle, and rocky platforms. Heavily grazed saltmarsh fringes the estuary with a range of saltmarsh types present.	1, 8, 5, 4, 3, 6	Recreation disturbance, industrial pollution, pollution – oil, eutrophication, erosion, dredging, pollution – unspecified.

*Note: Ramsar criteria:**

1. sites containing representative, rare or unique wetland types
2. supports vulnerable, endangered, or critically endangered species or threatened ecological communities
3. supports populations of plant/animal species important for maintaining regional biodiversity
4. supports plant/animal species at a critical stage in their life cycles, or provides refuge
5. regularly supports 20,000 or more waterbirds
6. regularly supports 1% of the individuals in a population of one species/subspecies of waterbirds
8. important source of food for fishes, spawning ground, nursery and/or migration path

A4a.1.4 UK Biodiversity Action Plan (BAP) Priority Habitats

As part of the UK Biodiversity Action Plan, the UK Biodiversity Group has co-ordinated the preparation of action plans for the UK's most threatened species and wildlife habitats. Following a renewed survey taking place over 2 years, a new list of priority species and habitats was adopted containing 1150 species and 65 habitats, and a full list of these, their attributes and distribution may be found on the UK BAP website (http://www.ukbap.org.uk).

Table A4a.19 provides details of the status of a number of relevant priority habitats as well as current factors affecting them, with those of potential relevance to oil and gas activities highlighted in bold. Relevant UKBAP objectives and targets for each of the habitats are also included. The distribution of these habitats across the SEA regions was determined from their listing or otherwise on Local BAPs within each region thereby providing a very general overview of their distribution.

Table A4a.19 – Summary Details of Relevant BAP Habitats

Priority Habitat	Current Status	Current Factors Affecting the Habitat	Relevant Objectives and Targets	SEA Regions*				
				1	2	3	4	5
Coastal Habitats								
Coastal saltmarsh	Many saltmarshes have been reduced in extent by land claim. As a consequence, many saltmarshes now adjoin arable land, and the upper and transitional zones of saltmarshes have become comparatively scarce in England. Sites still displaying a full range of zonation are particularly valuable for nature conservation. In Scotland and Wales, transitions (e.g. to freshwater, grassland and dune communities) are still comparatively common. Most recent saltmarsh surveys of the UK estimate the total extent of saltmarsh (including transitional communities) to be approximately 45,500ha (England 32,500ha, Scotland 6,747ha and Wales 6,089ha). Concentrated in the major estuaries of low-lying land in eastern and north-west England and in Wales, with smaller areas in the estuaries of southern England and the firths of eastern and south-west Scotland. It is estimated that, at the mean high water line, 24% of the English coastline, 11% of the Welsh coastline and 3% of the Scottish coastline consists of saltmarsh vegetation.	Land claim Erosion and coastal squeeze Accretion Sediment dynamics Cord grass Grazing **Oil pollution can potentially destroy saltmarsh vegetation and whilst it usually recovers, sediment may be lost during the period of die-back.**	No further net loss (currently estimated at 100 ha/year) of coastal saltmarsh. Maintain quality of the existing resource in terms of community and species diversity.	✓	✓	✓	✓	✓
Coastal sand dunes	The Sand Dune Survey of Great Britain (1993-1995) gives the total area of sand dunes as 11,897ha in England and 8101ha in Wales. The ongoing Sand Dune Vegetation Survey of Scotland indicates that there may be as much as 48,000ha of dune and machair in Scotland. Major dune systems are widely distributed within the	Erosion and progradation Falling water tables Grazing Recreation Sea defence and stabilisation Beach management Forestry	Protect the existing sand dune resource from further losses to anthropogenic factors, whether caused directly or indirectly.	✓	✓	✓	✓	✓

Priority Habitat	Current Status	Current Factors Affecting the Habitat	Relevant Objectives and Targets	SEA Regions*				
				1	2	3	4	5
	UK, being found on all English coasts except the English Channel (other than Sandwich Bay) and the Thames Estuary, the north and south coasts of Wales and all Scottish coasts.	Military use						
Coastal vegetated shingle	Shingle structures sufficiently stable to support perennial vegetation comparatively rare. The major vegetated shingle structures surveyed in 1987-1991 totalled some 5,000 ha in England, 700ha in Scotland and 100ha in Wales. Dungeness, in southern England, is by far the largest site, with over 2,000ha of shingle. The main concentrations of vegetated shingle occur in East Anglia and on the English Channel coast, in north-east Scotland, and in north-west England and south-west Scotland. The Welsh coast has a number of small sites.	Sediment supply Natural mobility Exploitation Access Grazing	Prevent, where possible, further exploitation of, or damage to, existing vegetated shingle sites through human activities.	✓	✓	✓	✓	✓
Maritime cliff and slopes	Hard cliffs widely distributed around the more exposed coasts of the UK, occurring principally in south-west and south-east England (the latter area having the bulk of the 'hard' chalk cliffs), in north-west and south-west Wales, and in western and northern Scotland. Soft cliffs are more restricted, occurring mainly on the east and central south coasts of England and in north-west Wales. There are also examples on the Fife coast.	Erosion Coastal protection Built development Agriculture Recreational use Introduced species	Maintain existing maritime cliff resource of cliff-top and slope habitat, of about 4000 km. Retain or increase the amount of maritime cliff and slope habitats unaffected by coastal defence and other engineering works.	✓		✓	✓	✓
Freshwater Habitats								
Aquifer fed naturally fluctuating water bodies	Natural water bodies which have an intrinsic regime of extreme fluctuation in water level, with periods of complete or almost complete drying out as part of the natural cycle. Directly connected to the underlying groundwater system.	**Climate change** – rainfall patterns Water abstraction Heavy use of fertilisers Quarrying	Conserve the characteristic hydrological regimes, plant and animal communities of all known aquifer fed naturally fluctuating water			✓		✓

Priority Habitat	Current Status	Current Factors Affecting the Habitat	Relevant Objectives and Targets	SEA Regions*				
				1	2	3	4	5
	Very rare habitat. Single example of a turlough (Pant-y-llyn) in South Wales. Six fluctuating meres identified in the Norfolk Breckland, but some of the smaller pools nearby may also be fluctuating meres. Probably a number of aquifer fed water bodies which were once naturally fluctuating but have been deliberately modified. Total extent of aquifer fed naturally fluctuating water bodies approximately 1ha in Wales and 20ha in England.	Grazing Forestry	bodies in the UK.					
Chalk rivers	There are approximately 35 chalk rivers and major tributaries ranging from 20 to 90 kilometres in length located in south and east England - from the Frome in Dorset to the Hull in Humberside. All chalk rivers are fed from groundwater aquifers, producing clear waters and a generally stable flow and temperature regime. These conditions support a rich biodiversity.	Abstraction Physical modification Pollution – sewage, agriculture Fisheries management	Maintain characteristic plants and animals of chalk rivers.			✓		✓
Eutrophic standing waters	Highly productive as plant nutrients are plentiful, either naturally or as a result of artificial enrichment. Covers natural and manmade still waters such as lakes, reservoirs and gravel pits but excludes small pools, field ponds and brackish waters. No accurate estimates. Total area of still inland water estimated as 675km^2 in England, 125km^2 in Wales and 1,604km^2 in Scotland. Current work suggests over 80% of this resource in England, some 40% in Wales and approximately 15% in Scotland is eutrophic. On this assumption, area of eutrophic standing water in Great Britain would be about 845km^2.	**Climate change** **Point-source and diffuse pollution** **Land use changes releasing nutrients from soil** Water abstraction Fish management Recreational use Introduced species	Maintain condition of all important sites currently judged as in favourable condition. Ensure no further deterioration occurs in the water quality and wildlife of the remaining sites	✓	✓	✓	✓	✓

Priority Habitat	Current Status	Current Factors Affecting the Habitat	Relevant Objectives and Targets	SEA Regions*				
				1	2	3	4	5
Mesotrophic lakes	Mesotrophic lakes are relatively infrequent in the UK and largely confined to the margins of upland areas in the north and west. Characterised by having a narrow range of nutrients, the main indicative ones being inorganic nitrogen and phosphorus. Sensitive to artificially increased levels of nitrogen and phosphorus. Highest macrophyte diversity of any lake type, contain a higher proportion of nationally scarce and rare aquatic plants. Important invertebrates - dragonflies, water beetles, stoneflies and mayflies. Rare fish are well represented (e.g. vendace, powan). Few truly natural fish assemblages due to introduced species.	Pollution – nutrient enrichment from sewage, point and diffuse sources (agriculture and forestry), accidental spillages (e.g. slurry), fish farms, **industrial pollution** and pesticide losses. Water abstraction Water acidification Catchment land use Fisheries management Recreation	Maintain condition of all important sites currently judged as in favourable condition. Ensure no further deterioration occurs in the water quality and wildlife of the remaining sites.	✓		✓	✓	✓
Ponds	Ponds are widespread in the UK though only a few high-quality examples remain. This habitat category should be quite distinct from others which include standing water components, for instance small water bodies in blanket bog should be part of the blanket bog priority habitat, but ponds in heathland not dealt with elsewhere should be taken into account in the 'pond' habitat. For the purposes of UK BAP classification, ponds are classified as permanent and seasonal water bodies up to 2ha in extent which include one or more of: annex I habitats, species of conservation importance, exceptional assemblages of key biotic groups, are ponds of high ecological value or are otherwise regarded as important (e.g. pingos, machair ponds). Around 500 quality ponds are listed on the pond network database (www.pondnetwork.org.uk).	Long-term decline Subject to wider threats of UK freshwater ecosystems (e.g. eutrophication, acidification, pollutant deposition, introduction of non-native species, inappropriate modification – see Appendix 4d).	Maintain Priority pond sites Maintain quality of flagship sites Restore ponds to deliver on species targets Create new ponds of high quality potential (delivered through the million ponds project)	-	-	-	-	-

Priority Habitat	Current Status	Current Factors Affecting the Habitat	Relevant Objectives and Targets	SEA Regions*				
				1	2	3	4	5
	~20% of the 400,000 ponds in the UK are likely to meet one or more suitable BAP criteria.							
Lowland Habitats								
Lowland calcareous grassland	Developed on shallow lime-rich soils generally overlying limestone rocks, including chalk. Largely found on escarpments or dry valley slopes and sometimes on ancient earthworks in landscapes strongly influenced by the underlying limestone geology. More rarely, remnant examples occur on flatter topography such as in Breckland and on Salisbury Plain. Following the 2007 review, occurrences of this habitat on roadside verges are also covered by the definition. Current estimates put the amount of lowland calcareous grassland remaining in the United Kingdom around 33,000 to 41,000ha with less than 1,000ha of this in Wales. The bulk of the resource is found on chalk (25,000 to 32,000ha), with major concentrations in Wiltshire, Dorset and the South Downs.	Habitat fragmentation Intensive agriculture Overgrazing **Development activities such as mineral and rock extraction,** road building, housing and landfill Localised afforestation Recreational pressure Introduced species **Atmospheric pollution** and **climate change**	Arrest depletion of lowland calcareous grassland throughout UK		✓	✓	✓	✓
Lowland dry acid grassland	Typically occurs on nutrient-poor, generally free-draining soils (pH 4-5.5) overlying acid rocks or superficial deposits such as sands and gravels. Defined as both enclosed and unenclosed acid grassland throughout the UK lowlands (normally below c. 300m). Undergone substantial decline in the 20th century mostly due to agricultural intensification although locally, as in the Breckland, afforestation has been significant. Estimated that less than 30,000ha remains in UK. Important	Habitat fragmentation Intensive agriculture Management neglect leading to rank over-growth, and bracken and scrub encroachment. Overgrazing Afforestation **Development activities such as mineral and rock extraction**, road building, housing and landfill.	Arrest depletion of lowland acid grassland throughout UK	✓	✓	✓	✓	✓

Priority Habitat	Current Status	Current Factors Affecting the Habitat	Relevant Objectives and Targets	SEA Regions*				
				1	2	3	4	5
	concentrations occur in the Breckland, the New Forest, Dorset, Suffolk Sandlings, the Weald, Dungeness, the coasts of SW England and the Welsh and English border hills of Powys and Shropshire. Scotland estimated to have less than 5,000ha and much of this is likely to be on the upland fringe.	**Atmospheric pollution** and **climate change**, the influence of which is not fully assessed.						
Lowland meadows	Includes most forms of unimproved neutral grassland across enclosed lowland landscapes. In non-agricultural settings, such grasslands less frequent but additional examples found in recreational sites, church-yards, roadside verges and a variety of other localities. *Cynosurus-Centaurea* grassland, the mainstream community of unimproved hay meadows and pastures now highly localised and fragmented. Recent estimates indicate between 5,000-10,000ha of this community in England and Wales. Important concentrations in Worcestershire, south-west England (Somerset, Dorset and Wiltshire), the East Midlands and East Anglia (Leicestershire, Northamptonshire, Cambridgeshire and Suffolk), and in various parts of Wales. Scotland estimated to have 2,000-3,000ha of this community, with particular concentrations in the north west. Unimproved seasonally-flooded grasslands less widely distributed. *Alopecurus - Sanguisorba* flood-meadow has a total cover of <1,500ha and is found in scattered sites from the Thames valley through the Midlands and Welsh borders to the Ouse catchment in Yorkshire.	Habitat fragmentation Agricultural improvement Abandonment Application of herbicides and pesticides **Atmospheric pollution** and **climate change** Reduced inundation frequency and duration	Arrest depletion of unimproved lowland meadow throughout UK	✓	✓	✓	✓	✓

Priority Habitat	Current Status	Current Factors Affecting the Habitat	Relevant Objectives and Targets	SEA Regions*				
				1	2	3	4	5
Purple moor grass and rush pastures	Occur on poorly drained, usually acidic soils in lowland areas of high rainfall. Found in south-west England, particularly Devon, southern Wales, and south-west Scotland. Consists of various species-rich types of fen meadow and rush pasture and is highly susceptible to agricultural modification and reclamation. In Wales it is estimated that there is now about 24,000ha of lowland purple moor grass and rush pasture. In south west England 530 purple moor grass and rush pastures sites are known to survive on the Culm Measures, covering 3,981ha, 400 sites on Dartmoor covering 1,000ha with a further 90 sites covering about 300ha on the Blackdowns. Total extent in Scotland thought to be about 2,000ha. Total extent in UK about 56,000ha.	Agricultural improvement Inappropriate management Agricultural abandonment Fragmentation and disturbance for developments such as housing and road constructions. Afforestation	Arrest depletion of purple moor grass and rush pasture throughout UK	✓	✓	✓	✓	✓
Lowland heathland	Characterised by presence of plants such as heather, dwarf gorses, and cross-leaved heath and generally found below 300m, but this limit may be lower in high latitudes. Areas of good quality heathland should consist of an ericaceous layer of varying heights and structures, some areas of scattered trees and scrub, areas of bare ground, gorse, wet heaths, bogs and open water. The presence and numbers of characteristic birds, reptiles, invertebrates, vascular plants, bryophytes and lichens are important indicators of habitat quality. UK has some 58,000ha of lowland heathland of which the largest proportion (55%) found in England. The most significant areas for lowland heathland include the counties of Hampshire,	Lack of conservation management such as light grazing, controlled burning and cutting. Nutrient enrichment (e.g. from intensive livestock farming) Fragmentation and disturbance from developments such as housing and road constructions. Agricultural improvement	Maintain extent of all existing lowland heathland (58,000ha).	✓	✓	✓	✓	✓

Priority Habitat	Current Status	Current Factors Affecting the Habitat	Relevant Objectives and Targets	SEA Regions*				
				1	2	3	4	5
	Cornwall, Dorset, Surrey, Devon, Staffordshire, Suffolk, Norfolk, West Glamorgan and west Gwynedd.							
Lowland Wetland Habitats								
Coastal and floodplain grazing marsh	Periodically inundated pasture, or meadow with ditches which maintain the water levels, containing standing brackish or fresh water. The ditches are especially rich in plants and invertebrates. Almost all areas are grazed and some are cut for hay or silage. Exact extent of grazing marsh is not known but possible that there may be a total of 300,000ha. England holds the largest proportion with an estimate in 1994 of 200,000ha. However, only a small proportion of this grassland is semi-natural supporting a high diversity of native plant species. Grazing marshes are particularly important for the number of breeding waders and wintering wildfowl.	Widespread factors include: Ecologically insensitive flood defence works Agricultural intensification. Decline in traditional management. Eutrophication. Localised effects arise from: **Industrialisation** and urbanisation (particularly in the Greater Thames). Saltwater flooding due to sea level rise. Secondary threats include: Groundwater abstraction. **Pollution of groundwater or surface water.** Aggregate extraction.	Maintain quality and extent of existing habitat (300,000ha).	✓	✓	✓	✓	✓
Lowland Fens	Fens are peatlands which receive water and nutrients from the soil, rock and ground water as well as from rainfall. Fen habitats support a high diversity of plant and animal communities. In intensively farmed lowland areas fens occur less frequently, are smaller in size and more isolated than in other parts of the UK. The calcareous rich fen and swamp of Broadland covers an area of 3,000ha. In some lowland	Past loss of area by drainage and conversion to intensive agriculture. Water abstraction Small total area of habitat and critically small population sizes of several key species dependent on the habitat. Lack of or inappropriate management	Ensure appropriate water quality and water quantity for the continued existence of all SSSI/ASSI fens by 2005.	✓	✓	✓	✓	✓

Priority Habitat	Current Status	Current Factors Affecting the Habitat	Relevant Objectives and Targets	SEA Regions*				
				1	2	3	4	5
	areas such as the Scottish borders there are concentrations of small fens of particular importance.	Agricultural run-off and afforestation. Enrichment resulting in changing plant communities.						
Lowland raised bog	Peatland ecosystems which develop primarily, but not exclusively, in lowland areas such as the head of estuaries, along river flood-plains and in topographic depressions. In such locations drainage may be impeded by a high groundwater table, or by low permeability substrata such as estuarine, glacial or lacustrine clays. Particular feature of cool, rather humid regions such as the north-west lowlands of England, the central and north-east lowlands of Scotland and Wales, but remnants also occur in some southern and eastern localities, for example Somerset, South Yorkshire and Fenland.	Peat extraction Landfill development Forestry Regional drainage pressures **Pollution - contamination from adjacent** landfill, **opencast** or agricultural **drainage. Current deposition of atmospheric pollutants,** fertiliser drift during its application, or the legacy of past deposition Dereliction Livestock and game management Built development **Atmospheric nitrogen deposition and climate change**	Maintain the current distribution and extent (~6,000ha) of primary near-natural lowland raised peat bog.	✓	✓	✓	✓	✓

Priority Habitat	Current Status	Current Factors Affecting the Habitat	Relevant Objectives and Targets	SEA Regions*				
				1	2	3	4	5
Reedbeds	Wetlands dominated by stands of the common reed *Phragmites australis*, wherein the water table is at or above ground level for most of the year. Tend to incorporate areas of open water and ditches, and small areas of wet grassland and carr woodland. There are about 5000ha of reedbeds in the UK, but of the 900 or so sites contributing to this total, only about 50 are greater than 20ha. Support a distinctive breeding bird assemblage, provide roosting and feeding sites for migratory species and are used as roost sites for several raptor species in winter.	Small total area of habitat and critically small population sizes of several key species dependent on the habitat. Loss of area by excessive water extraction and, in the past, land drainage and conversion to intensive agriculture. Lack of or inappropriate management Most of the important reedbeds found on coast of eastern England, where relative sea-level rise is predicted to lead to the loss of significant areas of habitat. **Pollution of freshwater supplies to the reedbed**	Maintain priority areas of existing reedbed by active management.	✓	✓	✓	✓	✓
Upland habitats								
Blanket bog	Peatland habitat confined to cool, wet, typically oceanic climates. One of the most extensive semi-natural habitats in the UK and ranges from Devon in the south to Shetland in the north. Although most widespread in the wetter west and north, blanket bog also occurs in eastern upland areas. Total extent of blanket peat in the UK amounts to just under 1.5 million ha. England supports some 215,000ha, Scotland approximately 1,060,000ha, and Wales has around 70,000ha. Significant proportions of peat	**Climate change** **Pollution, from sulphate** and nitrate **deposition**, **may be significant in certain areas, such as the Southern Pennines.** Drainage Heavy grazing Burning Forestry Peat extraction Agricultural improvement	Maintain current extent and overall distribution of blanket mire currently in favourable condition.	✓	✓	✓	✓	✓

Priority Habitat	Current Status	Current Factors Affecting the Habitat	Relevant Objectives and Targets	SEA Regions*				
				1	2	3	4	5
	soil, probably in excess of 10%, no longer support blanket bog vegetation.	Recreation Planning developments - wind farms and communication masts, increasingly being proposed on areas of blanket bog, especially those at high altitude. There are also threats from hydro-electric schemes in Scotland Erosion Water course liming						
Limestone pavements	Widely scattered in Britain, on Carboniferous limestone in Wales and Northern England, and Durness limestone in Scotland. Total UK area less than 3,000ha with the largest areas occurring in North Yorkshire and Cumbria, and smaller areas in Lancashire, Wales and Scotland. Limestone pavements are of both geological and biological importance. The vegetation is rich in vascular plants, bryophytes and lichens and varies according to geographical location, altitude, rock type and the presence or absence of grazing animals.	Illegal or incidental removal of pavements. Legal removal of pavements under extant planning permissions. Overgrazing of some upland pavements and abandonment of lowland pavements.	Ensure no further loss to the extent of limestone pavement areas. Ensure no further deterioration in the quality of existing limestone pavement areas. Maintain features of geological importance.		✓	✓		✓
Upland calcareous grasslands	Generally restricted to shallow soils derived from a variety of lime-rich bedrocks. The most widely distributed and locally extensive calcareous rock in the uplands is Carboniferous Limestone, which forms major exposures in north and south Wales, the North Pennines. Other limestones support calcareous grassland in Scotland and northern England, while certain shales and sandstones are locally important.	Agricultural intensification Heavy or too light grazing Quarrying **Acidification and nitrogen enrichment caused by atmospheric deposition,** and **climate change**	Maintain the current distribution and extent (ca 22,000- 25,000ha) of upland calcareous grassland in the UK.	✓	✓	✓	✓	

Priority Habitat	Current Status	Current Factors Affecting the Habitat	Relevant Objectives and Targets	SEA Regions*				
				1	2	3	4	5
	Estimated 10,000ha of upland calcareous grassland in England, 10,000-13,000ha in Scotland, 800ha in Wales. Particularly important areas for the habitat include the North Pennines and Cumbria in England and Breadalbane in Scotland.							
Upland hay meadows	Main concentrations in the northern Pennines of North Yorkshire, Durham and east Cumbria but there are scattered locations in west Cumbria, Lancashire, Northumberland, Perthshire and as far north as Aberdeenshire. There are no known examples in Wales or southern England. Meadows have become much reduced through agricultural intensification. Recent estimates indicate that there are less than 1,000ha in northern England and 100ha in Scotland.	Habitat fragmentation Agricultural improvement, practices and management Grazing Application of herbicides and other pesticides. **Atmospheric pollution** and **climate change**	Arrest depletion of unimproved upland hay meadow throughout UK .	✓	✓	✓		✓
Upland heathland	Occurs widely on mineral soils and thin peats throughout uplands and moorlands. Characterised by the presence of dwarf shrubs. Defined as lying below the alpine or montane zone (at about 600-750m) and usually above the upper edge of enclosed agricultural land (generally at around 250-400m). Present on an estimated 270,000ha in England, 80,000ha in Wales, and between 1,700,000 and 2,500,000ha in Scotland.	Heavy grazing Agricultural practices Afforestation Poorly managed burning **Quarries, windfarms, communication masts, access tracks and certain other planning developments can impact directly on wildlife interest.** **Acidification, ozone and nitrogen enrichment caused by atmospheric deposition** **Climate change** Localised damage and threats from other forms of land use such as military use and	Maintain the current extent and overall distribution of the upland heathland which is currently in favourable condition.	✓	✓	✓	✓	✓

Priority Habitat	Current Status	Current Factors Affecting the Habitat	Relevant Objectives and Targets	SEA Regions*				
				1	2	3	4	5
		recreation. Interaction of two or more of the factors often greatly increases the overall impact on upland heathland vegetation.						
Inland Rock Outcrop and Scree†	The habitat covers a range of rock types from acidic to calcareous, and is largely restricted to upland areas, particularly in Scotland. Screes support numerous ferns, lichens and bryophytes, and on cliff ledges, tall herbs may be abundant (e.g. *Sedum rosea, Angelica sylvestris*). Due to the inaccessible nature of some of these areas, grazing is restricted and so the flora of these areas is generally unhindered and provides a refuge for some plants. Beetles, Diptera, spiders and several key species of bird use inland cliffs for nesting, notably raptors (peregrine, golden eagle)	Grazing Muirburn may affect heather-rich faces	Not stated at present.	-	-	-	-	-
Calaminarian Grasslands†	These areas range from semi-natural to anthropogenic, and consist of sparse vegetation on a substrate characterised by high heavy metal concentrations, including lead, chromium and copper. These metals may be from sources of serpentine, river gravels rich in heavy metals, or artificial mine workings and spoil heaps. The toxicity generated by the presence of these metals arrests seral succession which develops into the sparse Calaminarian grasslands. Ruderal/metallophyte species of lichens, bryophytes and vascular plants tend to dominate plant assemblages. There are few natural	Land reclamation and rehabilitation (e.g. reworking of old mineral areas for landfill) Agricultural improvement Successional change Open cast mining **Air pollution** Fragmentation	Not stated at present.	✓	✓	✓	✓	✓

Priority Habitat	Current Status	Current Factors Affecting the Habitat	Relevant Objectives and Targets	SEA Regions*				
				1	2	3	4	5
	examples left, most are on artificial sites.							
Upland flushes, fens and swamps†	Defined as peat or mineral-based terrestrial wetlands in upland situations, which receive water and nutrients from surface and/or groundwater sources as well as rainfall. The soil (peaty or mineral) is waterlogged, with the water table at, close to, or above the surface for much of the year. Includes soligenous, topogenous and certain *Molina* grasslands and rush pastures, but not ombrotrophic bogs (blanket bog). This widespread (but not comprehensively surveyed) upland habitat is usually grazed by deer and/or sheep, sometimes cattle, in conjunction with surrounding grassland/heath. And is generally too wet to be burned.	Grazing	Not stated at present.	-	-	-	-	-
Woodland Habitats								
Lowland beech and yew woodland	Spans a variety of distinctive vegetation types reflecting differences in soil and topographical conditions. Beech can grow on both acidic and calcareous soils, although its association with yew tends to be most abundant on the calcareous sites. Beech considered native only in southern England and southern Wales. No precise data on total extent of native lowland beech and yew. Estimated total about 30,000ha. It has declined in area by clearance and replanting with non-native species over the last 50 years.	Animal damage Introduced species Lack of proper management **Air pollution** Fragmentation of habitat by development **Climate change**	Maintain the total current extent (~30,000ha) of lowland beech and yew woodland.				✓	✓
Wood pasture and parkland	Products of historic land management systems, and represent a vegetation structure rather than	Lack of proper management Disease	Maintain the current extent and distribution of the total	✓	✓	✓	✓	✓

Priority Habitat	Current Status	Current Factors Affecting the Habitat	Relevant Objectives and Targets	SEA Regions*				
				1	2	3	4	5
	being a particular plant community. Typically consists of large, open-grown or high forest trees (often pollards) at various densities, in a matrix of grazed grassland, heathland and/or woodland floras. Most common in southern Britain, but scattered examples occur throughout the country. Sites are frequently of national historic, cultural and landscape importance.	Damage Changes to ground-water levels leading to water stress and tree death, resulting from abstraction, drainage, neighbouring development, roads, prolonged drought and climate change. Habitat fragmentation Pasture loss and improvement Grazing **Pollution derived either remotely from industry** and traffic, or locally from agro-chemical application and nitrogen enrichment from pasture overstocking, causing damage to epiphyte communities and changes to soils.	resource of wood-pasture and parkland.					
Native pine woodlands	Relict indigenous forests dominated by self-sown *Scots Pinus sylvestris* which occur throughout the central and north-eastern Grampians and in the northern and western Highlands of Scotland. Native mixed forests dominated by pine may have covered over 1.5 million ha in the Scottish Highlands about 4,000 years ago. Now they occupy around 1% of this former range, some 16,000 hectares, which is spread over 77 separate areas across the Highlands.	Poor natural regeneration and reduced diversity due to browsing by deer and sheep. Fragmentation and isolation of individual woods. Limited diversity of structure in many woods related to historical exploitation and over-grazing.	Maintain the current wooded area in the 'core areas' of the pinewoods listed in the Caledonian Pinewood Inventory.	✓				
Upland mixed ashwoods	Woods on base-rich soils, in most of which ash is a major species, although locally oak, birch, elm, small-leaved lime and even hazel may be the	Overgrazing Invasion by non-native species Disease	Maintain the total extent (approx. 67,000ha) and distribution of upland mixed	✓	✓	✓	✓	

Priority Habitat	Current Status	Current Factors Affecting the Habitat	Relevant Objectives and Targets	SEA Regions*				
				1	2	3	4	5
	most abundant species. Most upland mixed ashwoods are probably ancient, but some important areas such as Derbyshire Dales are mosaics of ancient and recent ash woodland. Found throughout upland Britain, though they are limited in the north-west Highlands. Estimated total extent of ancient semi-natural woodland of this type to be 40,000-50,000ha. Declined in area by clearance, overgrazing and replanting with non-native species, by about 30-40% over the last 50 years.	Quarrying Agricultural practices Lack of proper management **Climate change**	ashwood. Maintain the current extent (40,000-50,000ha) and distribution of ancient semi-natural upland mixed ashwood.					
Upland oakwood	Characterised by a predominance of oak and birch in the canopy, with varying amounts of holly, rowan and hazel as the main understorey species. Total extent believed to be about 70,000-100,000ha. It is found throughout the north and west of the UK with major concentrations in Argyll and Lochaber, Cumbria, Gwynedd, Devon and Cornwall.	Overgrazing Invasion by non-native species Development pressures such as new roads and quarrying. **Effects of air pollution on lichen and bryophyte communities.** Unsympathetic forest management.	Maintain the current extent (70,000 to 100,000ha) and distribution of the upland oakwood system.	✓	✓	✓	✓	✓
Wet woodland	Occurs on poorly drained or seasonally wet soils, usually with alder, birch and willows as the predominant tree species, but sometimes including ash, oak, pine and beech on the drier riparian areas. Found on floodplains, as successional habitat on fens, mires and bogs, along streams and hill-side flushes, and in peaty hollows. Notable concentrations of wet woodland on fens occur in East Anglia, Shropshire and Cheshire, while hill-side and plateau alder woods are more	Clearance and conversion to other land uses. Cessation of management. Water abstraction and drainage. Inappropriate grazing levels. Flood prevention measures. **Poor water quality arising from** eutrophication, **industrial effluents** or rubbish dumping. Invasion by non-native species.	Maintain the total extent (50,000-70,000ha) and distribution of wet woodlands.	✓	✓	✓	✓	✓

Priority Habitat	Current Status	Current Factors Affecting the Habitat	Relevant Objectives and Targets	SEA Regions*				
				1	2	3	4	5
	restricted to Wales, Cumbria and western Scotland. Fragments of ancient floodplain forest are rare, and the best examples are probably in the New Forest and northern Scotland. Bog woodlands of pine on bog are confined to Scotland, but fragments of birch bog woodland occur more widely. Crude estimate of the total wet woodland area about 50,000 - 70,000ha.	**Climate change.**						
Traditional Orchards (non-intensive)	Similar to wood-pasture and parkland, though dominated by Rosaceae which are densely packed and tend to be on a smaller scale. Includes planting for nuts including hazel and walnut. Historical management defines this habitat, which consisted of grafting and pruning to aim fruit and nut production rather than the pollarding common to wood-pasture. Orchards support a number of nationally scarce and rare species which depends on a mosaic of fruit trees, scrub, hedgerows and orchard floor habitats. These sites also contain numerous fruit cultivars, for instance the parishes of Gloucestershire contain 101 varieties of perry pear. The total estimated area of traditional orchards in the UK is 28,750ha; 28,000 in England, 250ha in Scotland and 440ha in Wales.	Weather events Commercial redundancy Neglect Development	Not stated at present.	✓	✓	✓	✓	✓
Open Mosaic Habitats on Previously Developed	Consists of mosaics of bare ground with, typically, very early pioneer communities on skeletal substrates, more established open grasslands, usually dominated by fine leaved grasses with	Not stated at present.	Not stated at present.	-	-	-	-	-

Priority Habitat	Current Status	Current Factors Affecting the Habitat	Relevant Objectives and Targets	SEA Regions*				
				1	2	3	4	5
Land	many herbs, areas of bare ground, scrub and patches of other habitats such as heathland, swamp, ephemeral pools and inundation grasslands. These areas are important for plant, invertebrate and bird species, some of which are nationally or internationally rare. Site heterogeneity is partly controlled by the variety of chemical and physical modification of some sites. The habitat is concentrated in urban, urban fringe and large-scale former industrial landscapes, especially in the lowlands, though more isolated examples can be found on previously developed land in more remote rural areas.							

Source: UK BAP website (http://www.ukbap.org.uk/), JNCC (2007), Maddock (2008), Widdicombe (2008)
*Note * SEA Regions: 1=Scottish Midlands, 2=West Midlands and North West England, 3=East Midlands and North East England, 4=North and South Wales, 5=Southern and South West England.*
†Indicates a new priority habitat (Maddock 2008).

A4a.1.5 Biodiversity, Habitats, Flora and Fauna Indicators

The following indicators and related information have been principally gathered from the UK Sustainable Development website and accompanying publications unless otherwise stated.

Table A4a.20 – Biodiversity, Habitats, Flora and Fauna Indicators

#	Indicator	Region[1]
1	**Bird Populations***	
	Farmland	UK, E, W
	Woodland	UK, E, W
	Coastal	UK, E, S
	Wintering and waders	UK, E, S
2	**Butterfly populations**	
	Semi-natural habitat specialists	UK
	Generalist species of the wider countryside	UK
3	**Bat populations**	UK
4	**Biodiversity**	UK
	BAP priority species	UK, S, W
	BAP priority habitats	UK, S, W
5	**Condition of species and habitats†**	UK

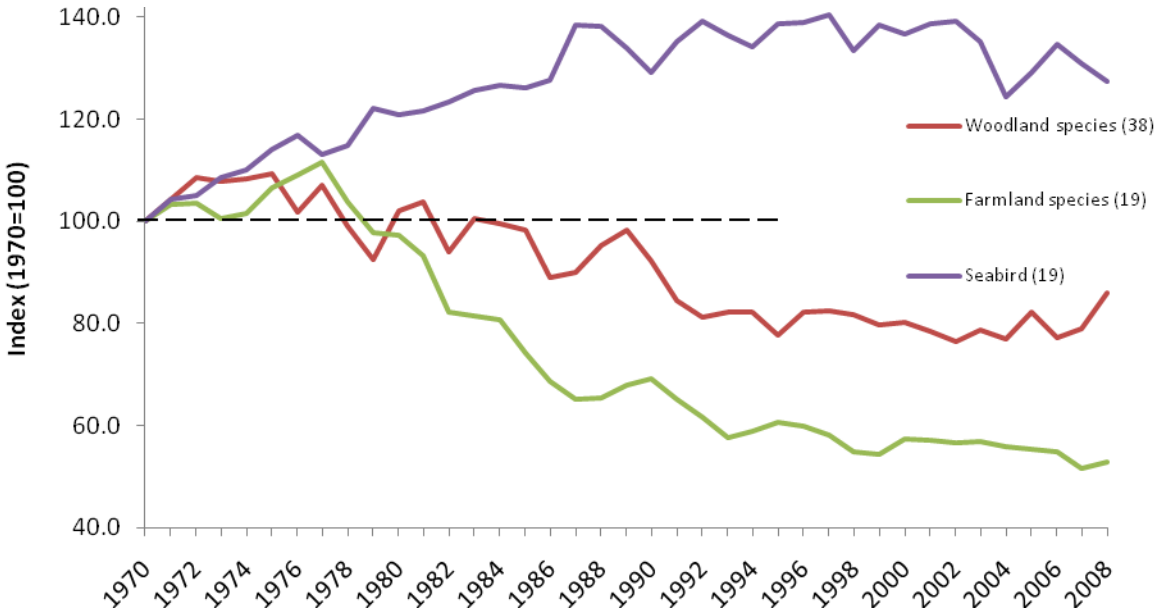
*Note: *signifies a framework indicator – those shared by the UK Government and the devolved administrations. †additional indicator not included in the UK government sustainable development strategy. [1]Region refers to that for which data is available: E=England, W=Wales, S=Scotland, UK=Whole of United Kingdom.*

A4a.1.5.1 Bird Populations

Bird populations are considered to be good indicators of the state of the environment and the countryside. Species typical of farmland, woodland and coastal areas have been used as indicators of the health of their particular habitat (Figure A4a.13).

Breeding farmland bird populations fell by 53% between 1970 and 2008. Most of this decline took place between the mid-1970s and mid-1990s, but the indices have fallen to their lowest recorded levels over the last four years, albeit with a small increase for 2008. Some generalist species such as wood pigeon (*Columba palumbus*) and jackdaw (*Corvus monedula*) have increased in the last five years whilst some of the more specialised species such as tree sparrow (*Passer montanus*), corn bunting (*Miliaria calandra*), grey partridge (*Perdix perdix*) and turtle dove (*Streptopelia turtur*) have continued to decline. Between 1994 and 2007, the index of farmland wild birds in England fell by 13%. In the North East, Yorkshire and the Humber, farmland birds increased by 2% and 1% respectively, whereas decreases were recorded for West Midlands (18%), East Midlands (17%), South West (14%) and East of England (13%). The largest regional fall was in the South West (27%).

Figure A4a.13 – Bird Population Indices, 1970-2008



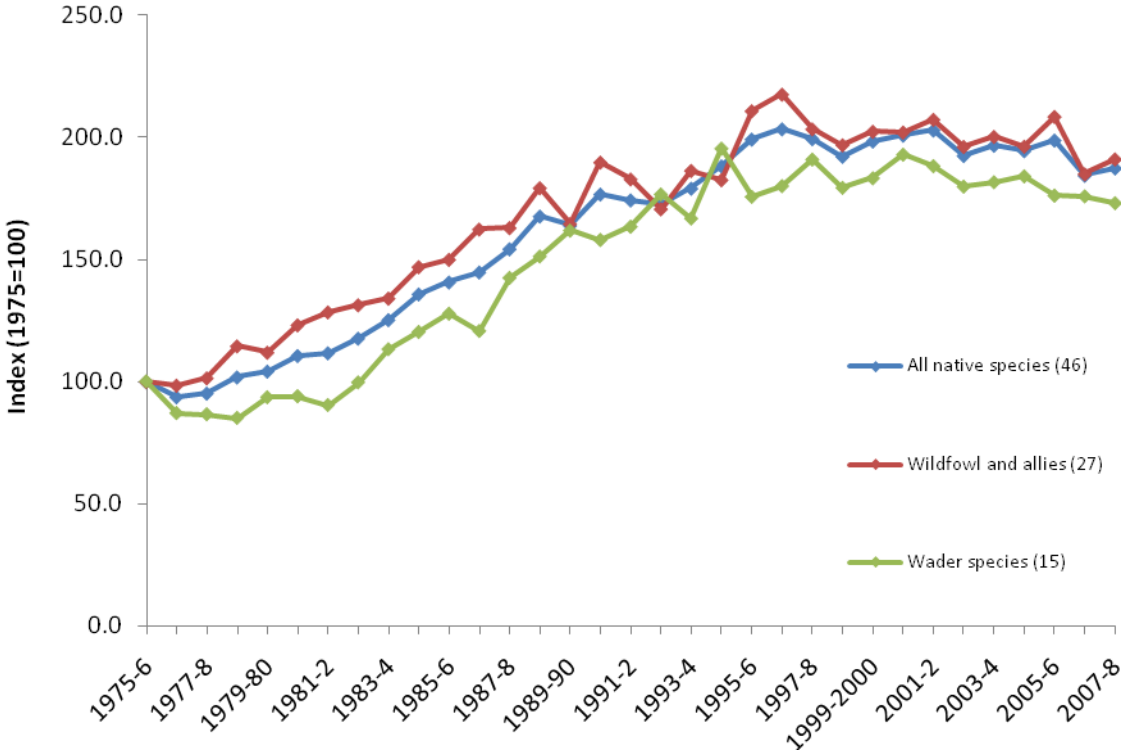
Source: JNCC BIYP Webpages (http://www.jncc.gov.uk/page-4235), after Defra, RSPB, BTO, JNCC.
Note: Figures in brackets give the number of species included in each category. See section A4a.1.5.6 at the end of this appendix for a list of specific species.

Between 1970 and 2008, there was a 25% decrease in UK abundances of woodland birds. The most severe decline occurred in the late 1980s and early 1990s, but the index has been broadly stable in recent years. More species of woodland birds increased than declined between 1994-2007 in 6 of the 8 English regions, with the largest increase (42%) occurring in the North West of England. There was also an increase of 30% in the Yorkshire and the Humber region. There was a decrease of 16% in the South East and 7% in the South West of England, but little change in the remaining regions. This compares with an overall decline in England of 6% over the same period.

Seabird populations have increased by 27% between 1970 and 2008. Populations peaked in the late 1980s, with a small decline occurring since then. The seabird measure increased steadily throughout the 1970s and 1980s to a high point in 1988 before falling back slightly by 2006. Despite a sustained rise in the measure, kittiwake (*Rissa tridactyla*), shag (*Phalacrocorax aristotelis*) and fulmar (*Fulmarus glacialis*) have all suffered significant declines in recent years, contributing to the dip in the indicator between 2003 and 2004.

Across the UK, the wintering wetland bird index was 88% higher in 2007-8 than in 1975-6, with populations peaking in 1996-7 (see Figure A4a.14). The UK wildfowl and wader population indices increased by 91% and 73% on the 1975-76 level respectively, for the winter of 2007-08. Some species showed a marked increase in populations (>400%), and include the whooper swan, North West Scotland greylag goose, Svalbard barnacle goose, black-tailed godwit, Svalbard light-bellied brent goose, gadwall and avocet. Species which declined compared to the 1975-6 baseline were Bewick's swan, European white-fronted goose, mallard, pochard, ringed plover, dunlin and bar-tailed godwit (Defra 2010).

Figure A4a.14 – Population Index of UK Wintering Waterbirds, 1975-2008



Source: JNCC BIYP Webpages (http://www.jncc.gov.uk/page-4235), after DEFRA, RSPB, BTO, JNCC, WWT.
Note: Figures in brackets give the number of species included in each category. See section A4a.1.5.6 at the end of this appendix for a list of specific species.

In Scotland, waterbird numbers peaked in 1996-7 (120% of 1975-6 baseline), and remained relatively stable until recent years, declining to 107% of the 1975-6 baseline in 2006-7. Geese showed the largest increase, being 294% of the baseline figure in 2006-7. Wildfowl and waders are at 99% and 78% of the baseline their baseline figures respectively in 2006-7.

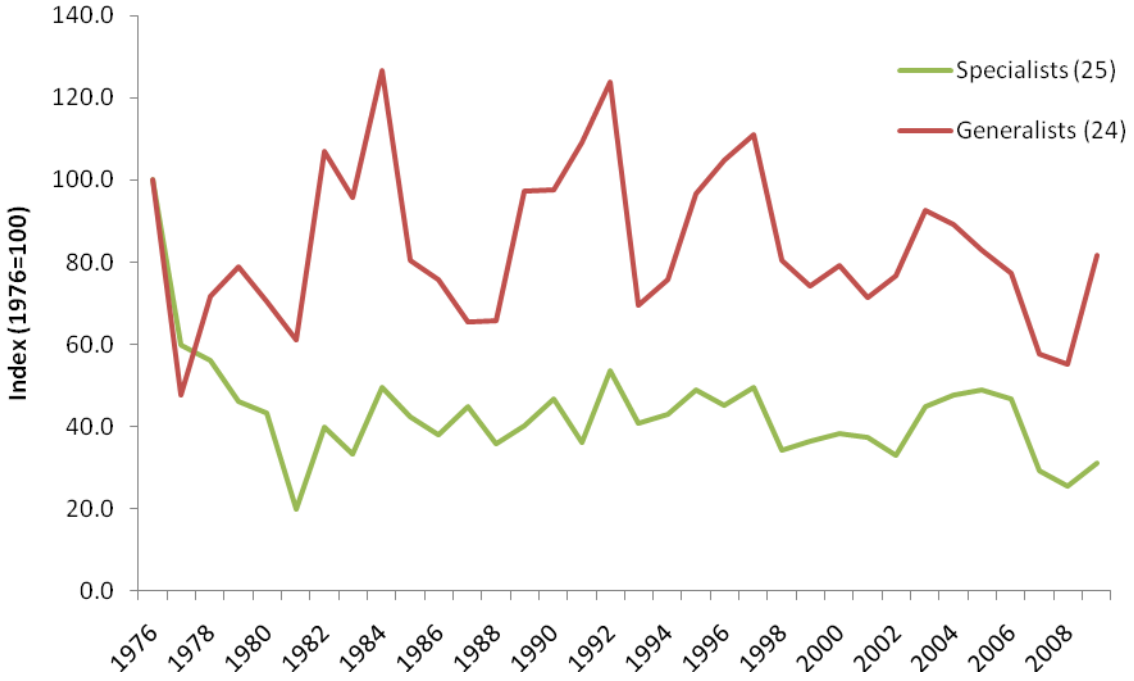
In Wales, the change in populations of widespread breeding birds is used as a sustainable development indicator, with populations in 1994 taken as the baseline. In 2007, farmland birds showed a net decrease of 7%, woodland birds had risen by 5%, and all other birds (including urban species) had risen by 15%. The net rise across all species from 1994 to 2007 represented in the index was 3%. In Scotland, 50 out of 65 terrestrial breeding bird species surveyed between 1994 and 2008 showed a statistically significant increase in numbers (31% overall). Woodland bird abundance increased by 64% overall, with farmland birds increasing by 26%.

A4a.1.5.2 Butterfly Populations

This indicator presents a measure of annual populations of specialist butterfly populations (those strongly associated with particular habitats, such as unimproved grassland) and generalist butterflies of the wider countryside (JNCC website). The data shows a high degree of annual variation (Figure A4a.15), and an assessment of the underlying trends has been undertaken by CEH and Butterfly Conservation. A technical paper (Brereton and Roy 2009) is available via the JNCC website which provides a comprehensive explanation of the analysis carried out.

Though the generalist measure can be seen to have fallen 18% since 1976, further analysis of the data reveals no marked change in the long term, the data merely reflecting natural/random fluctuations which are typical of butterfly populations. The specialist measure is different however, and the 69% decline in population since 1976 is considered to reflect a long-term deterioration. The analysis of data since 2000 shows no statistically significant change in the butterfly population trend.

Figure A4a.15 - Trends in Butterfly Populations for Habitat Specialists and Generalist Species, 1976-2009

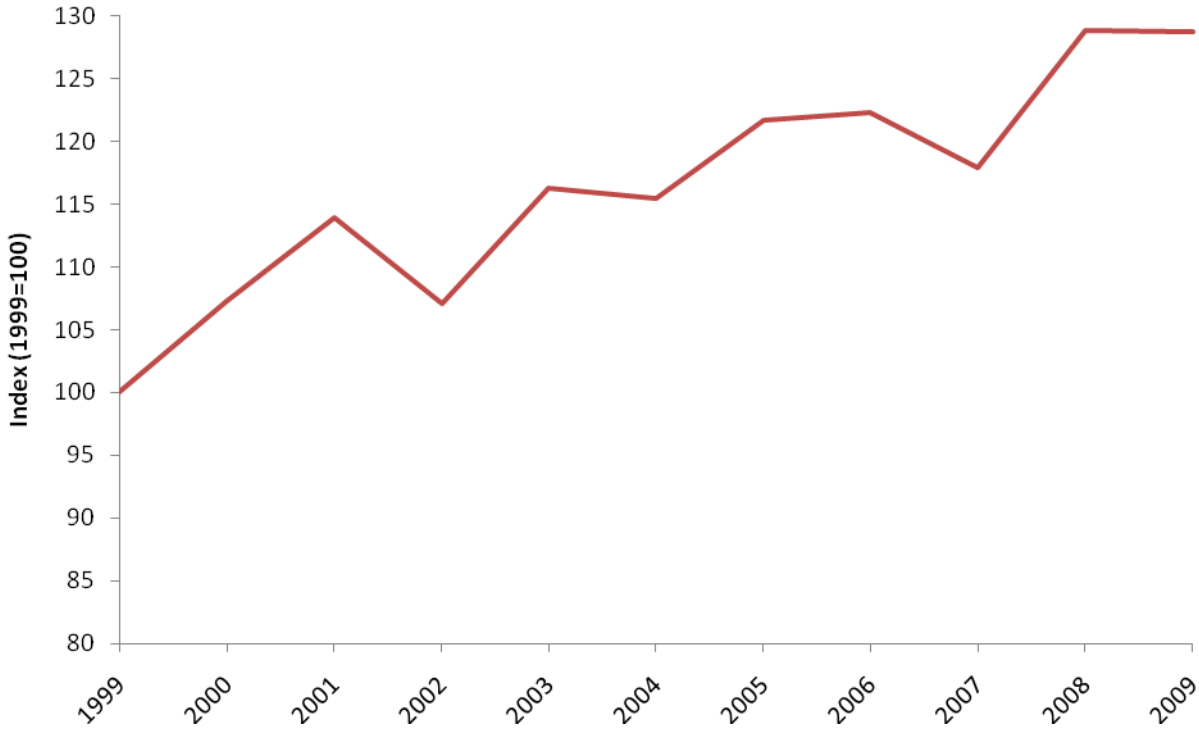


Source: JNCC BIYP Webpages (http://www.jncc.gov.uk/page-4236) after Butterfly Conservation, CEH, Defra. Note: numbers in brackets indicate number of species included in each category. See section A4a.1.5.6 at the end of this appendix for a list of specific species.

A4a.1.5.3 Bat Populations

Since 2000, bat populations have increased by a collective total of 20% (Figure A4a.16). A significant increase in the lesser horseshoe bat (*Rhinolophus hipposideros*) is responsible for the positive trend. Prior to this, bats had experienced a major population decline, recently stabilised (and now increasing) due to protection and direct conservation action, though they remain under threat from landscape change and development pressure (JNCC website).

Figure A4a.16 – Trends in Widespread Bat Populations, 1999-2009



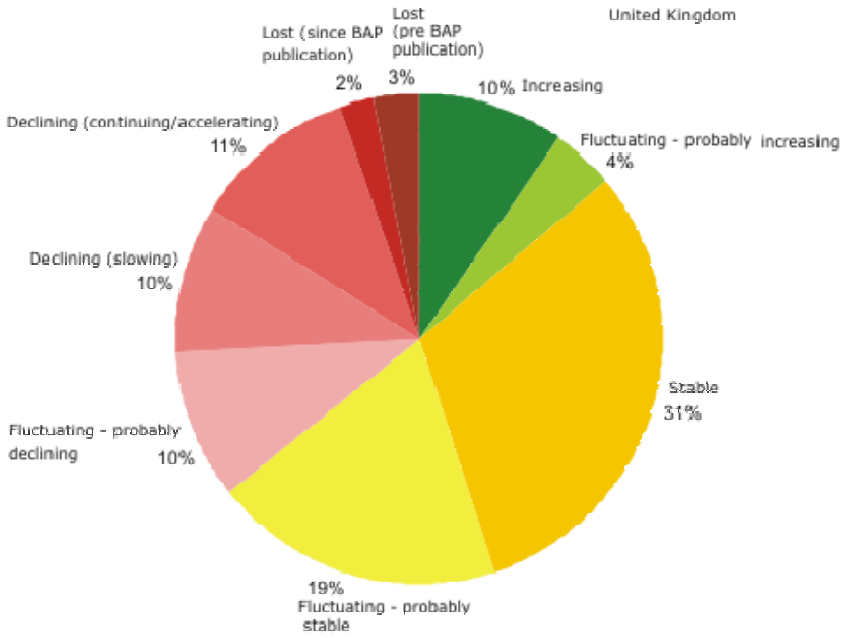
Source: JNCC BIYP Webpage (http://www.jncc.gov.uk/page-4239)
Note: The headline measure is a composite index of six species; Daubenton's, noctule, serotine, lesser horseshoe, common pipistrelle and soprano pipistrelle.

A4a.1.5.4 Biodiversity

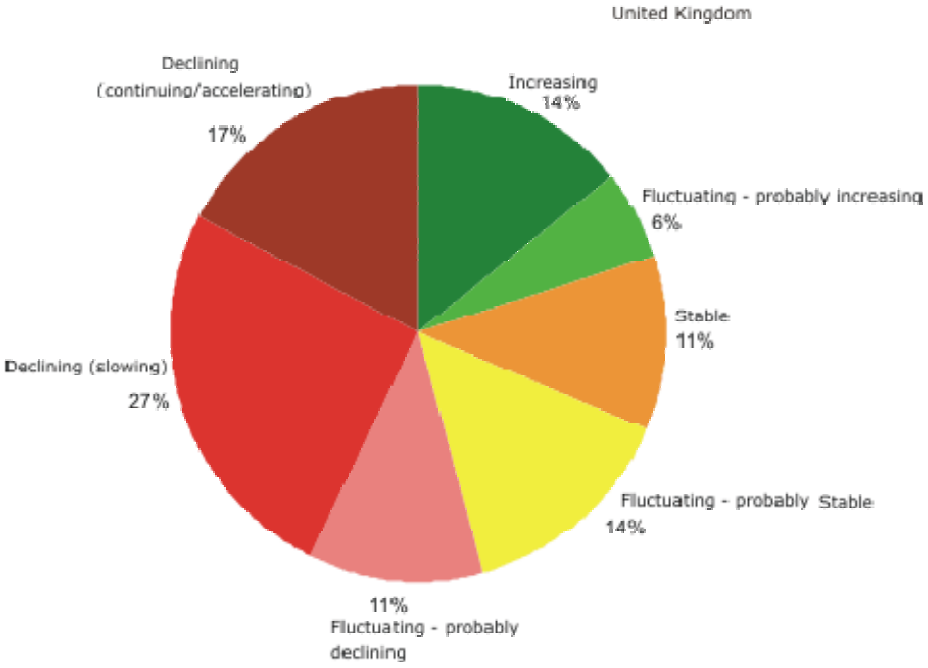
The UK Biodiversity Action Plan is the UK's national biodiversity strategy produced in response to the Convention on Biological Diversity. The Plan was revised in 2007 and the number of priority species and habitats increased but the indicator is based on the 371 species and 45 habitats which were assessed between 1999 and 2008. Between these years, the number of species assessed as stable or increasing in number or extent has risen from 202 to 214 (an increase of 3.5%), while the number recorded as declining or lost fell from 137 to 125. However, despite this modest improvement, the number of species assessed as 'increasing' has fallen from 48 to 45, 89 are still declining and 6 have been lost from the UK since the Plan was published in 1994. Even those that are stable may have populations well below target levels. Based on a comparison of the earliest available and most recent assessment for each habitat, the number either 'stable' or 'increasing' in area has fallen from 21 to 20 (2.5**%** of the known habitats). Despite this position of little or no overall change, 15 priority habitats (44%) are still declining in extent.

Figure A4a.17 – Status of UK Priority Species (A) and Habitats (B) in 2008

A



B



Source: JNCC BIYP Webpages (http://www.jncc.gov.uk/page-4239)
Note: based on the 287 species and 35 habitats assessed in 2008 respectively.

The number of species that have moved from the decreasing category to "stable" or "increasing" outweighs those moving in the other direction, but there are no obvious patterns in these changes. Sixty six of the species that were declining in 2008 were also declining in 2005, while 6 species changed from "declining" in 2005 to "lost" in 2008. This turnover between categories means that while there is an increase in the number of species stable or increasing, it is not necessarily the same species which are improving. Species that have moved from "decreasing" in 2002 to either "increasing" or "stable" in 2008 include the shrill carder bee (*Bombus syvarum*), great yellow bumblebee (*Bombus distinguendus*), reed

bunting (*Emberiza schoeniclus*) and the heath tiger beetle (*Cicindela sylvatica*). Very few species have moved from "increasing" to "declining" although examples include: Newman's lady fern (*Athyrium flexile*) and fen orchid (*Liparis loeselii*). The ongoing increase in number of species reported as lost, which came from the declining and unknown categories in 2005 is an additional cause for concern.

The indicator shows a very small net decrease in the number of habitats that are stable or increasing and there has been a limited amount of turnover of habitats over the period 1999-2008. Lowland beech and yew woodland habitats were recorded as decreasing in 2002 and increasing in 2008. Lowland calcareous grassland and upland calcareous grassland were both stable in 2002 but decreasing in 2008. There has also been a change in the number of habitats reported as "unknown" from 11 in 2005 to 6 in 2008. The number of habitats reported as "increasing" fell from 10 in 2005 to 7 in 2008.

In Scotland, 23% of BAP species and 20% of BAP habitats were identified as "stable", with an additional 4% of species and 13% of habitats recorded as "increasing" in 2008. In Wales, biodiversity is regarded as a high level summary indicator. In 2005, 34% of Welsh Biodiversity Action Plan (BAP) species were stable or increasing (compared with 22% in 2002) and 18% (2002 and 2005) declining. In 2005, 36% of priority habitats were stable or increasing compared with 20% in 2002. The number of habitats with a 'declining' status has increased from 46% in 2002 to 59% in 2005 (WAG 2008). The increase in the number of habitats in decline is partly due to a change in the number of habitats considered (5 more than in 2002) in addition to an increase in the number of BAP habitats as a whole (by 2, both of which were in decline).

A4a.1.5.5 Condition of Species and Habitat Features (SSSI, SAC, SPA and Ramsar)

A report describing the first 6 years of common standards monitoring of UK designated sites (SSSI, SAC, SPA and Ramsar) was produced by the JNCC (Williams 2006), involving an assessment of the conditions of those features for which the sites were designated. In total, 12,937 feature assessments were carried out between April 1998 and March 2005, representing about 57% of all UK designated features.

In general, taking in all features assessed, the condition of Ramsar and SPA features were found to be the most favourable - 86% and 78% favourable respectively. SSSI features were 57% favourable as opposed to SAC features which were only 37% favourable. The favourable state of Ramsar and SPA sites is largely a reflection of the condition of bird features in general (see Table A4a.21).

Table A4a.21 – Condition of Species Features by % Favourable and Recovering

Reporting Category	No. of Assessments	% Favourable and Recovering
Dragonflies and damselflies	41	85.4
Aggregations of non-breeding birds	732	81.3
Amphibians	49	79.6
Assemblages of breeding birds	180	78.9
Mammals	144	77.8
Aggregations of breeding birds	760	75.9
Other invertebrates	298	75.2
Butterflies	91	68.1
Flowering plants and ferns	324	67.3
Non-flowering plants and fungi	131	59.5
Fish	86	37.2
Species total	**2,840**	**74.6**

Bird features were found to be faring well, with between 75% and 81% in a favourable and recovering condition. Mammal, invertebrate and plant features formed an intermediate group, while fish (37.2%) had a low proportion of favourable and recovering assessments.

Williams (2006) presented assessments under a range of broad feature categories for species and habitats (see Table A4a.22).

Table A4a.22 – Condition of Habitat Features by % Favourable and Recovering

Reporting category	No. of assessments	% favourable and recovering
Upland assemblages	55	89.1
Lagoons	47	83
Rocky shores, reefs and caves	46	82.6
Sea cliffs	180	76.1
Intertidal sands and muds	148	75.7
Limestone pavement, inland cliffs and screes	272	73.9
Acid grassland – lowland	174	70.1
Calcareous grassland – lowland	625	70.1
Blanket bogs	222	68.9
Neutral grassland	1,074	68.2
Subtidal sandbanks	9	66.7
Broadleaved and mixed woodland	1842	66.3
Heathlands – lowland	374	64.4
Fens and marshes – upland	114	64
Dunes, shingle and machair	342	63.7
Standing water	513	63.5
Saltmarsh	146	63
Lowland raised bogs	199	62.3

Fens and marshes – lowland	789	61.2
Coniferous woodland	56	57.1
Calcareous grassland – upland	84	53.6
Acid grassland – upland	56	51.8
Heathlands - upland	195	46.2
Montane grasslands and heaths	69	43.5
Rivers and streams	89	37.1
Habitats total	**7,720**	**65.6**

Many of the features in best condition were ones less easily damaged by human activities; this may be because they are relatively robust or because they are relatively difficult to access (e.g. cliffs). The features which were least favourable were often impacted by factors which operated outside the sites on which they were designated (e.g. drainage conditions for some isolated wetlands, fires on heaths adjacent to housing developments), or which require concerted effort by many agencies (e.g. water quality affecting fish).

Lack of remedial management and grazing were mentioned most often as the activities leading to an unfavourable condition. Of particular relevance was that the effects of air pollution on SSSIs were often very difficult to determine given the complex interactions between pollution impacts, management and abiotic influences. This resulted in the impacts of air pollution being substantially under-reported in the assessment.

A4a.1.5.6 Species Used to Calculate Population Indices

Table A4a.23 – Bird Species Used to Calculate Wild Bird Population Indices

Woodland Birds	Waterbirds	Seabirds	Farmland Birds
Accipiter nisus (Sparrowhawk)	*Actitis hypoleucos* (Common sandpiper)	*Stercorarius parasiticus* (Arctic skua)	*Alauda arvensis* (Skylark)
Aegithalos caudatus (Long-tailed tit)	*Mergus merganser* (Goosander)	*Alca torda* (Razorbill)	*Carduelis cannabina* (Linnet)
Anthus trivialis (Tree pipit)	*Motacilla cinerea* (Grey wagtail)	*Catharacta skua* (Great skua)	*Carduelis carduelis* (Goldfinch)
Carduelis cabaret (Lesser redpoll)	*Cinclus cinclus* (Dipper)	*Aria aalge* (Common guillemot)	*Carduelis chloris* (Greenfinch)
Carduelis spinus (Siskin)	*Tachybaptus ruficollis* (Little grebe)	*Fratercula arctica* (Puffin)	*Columba oena*s (Stock dove)
Certhia familiaris (Treecreeper)	*Podiceps cristatus* (Great crested grebe)	*Fulmarus glacialis* (Fulmar)	*Columba palumbus* (Woodpigeon)
Coccothraustes coccothraustes (Hawfinch)	*Anas platyrhynchos* (Mallard)	*Larus argentatus* (Herring gull)	*Corvus frugilegus* (Rook)
Cyanistes caeruleus (Blue tit)	*Aythya fuligula* (Tufted duck)	*Larus canus (Common gull)*	*Corvus monedula* (Jackdaw)
Dendrocopos major (Great spotted woodpecker)	*Gallinula chloropus* (Moorhen)	*Larus fuscus* (Lesser black-backed gull)	*Emberiza citrinella* (Yellowhammer)
Dendrocopos minor (Lesser spotted woodpecker)	*Fulica atra* (Coot)	*Larus marinus* (Great black-backed gull)	*Emberiza schoeniclus* (Reed bunting)
Erithacus rubecula (Robin)	*Acrocephalus scirpaceus*	*Larus ridibundus* (Black-headed gull)	*Falco tinnunculus* (Kestrel)

Woodland Birds	Waterbirds	Seabirds	Farmland Birds
	(Reed warbler)		
Ficedula hypoleuca (Pied flycatcher)	*Acrocephalus schoenobaenus* (Sedge warbler)	*Morus bassanus* (Gannet)	*Miliaria calandra* (Corn bunting)
Fringilla coelebs (Chaffinch)	*Cettia cetti* (Cetti's warbler)	*Phalacrocorax aristotelis* (Shag)	*Motacilla flava* (Yellow wagtail)
Garrulus glandarius (Jay)	*Emberiza schoeniclus* (Reed bunting)	*Phalacrocorax carbo* (Cormorant)	*Passer montanus* (Tree sparrow)
Loxia curvirostra (Crossbill)	*Cygnus olor* (Mute swan)	*Rissa tridactyla* (Kittiwake)	*Perdix perdix* (Grey partridge)
Luscinia megarhynchos (Nightingale)	*Anas crecca* (Teal)	*Sternula albifrons* (Little tern)	*Streptopelia turtur* (Turtle dove)
Muscicapa striata (Spotted flycatcher)	*Numenius arquata* (Curlew)	*Sterna hirundo* (Common tern)	*Sturnus vulgaris* (Starling)
Parus major (Great tit)	*Vanellus vanellus* (Lapwing)	*Sterna paradisaea* (Arctic tern)	*Sylvia communis* (Whitethroat)
Periparus ater (Coal tit)	*Gallinago gallinago* (Snipe)	*Sterna sandvicensis* (Sandwich tern)	*Vanellus vanellus* (Lapwing)
Phoenicurus phoenicurus (Redstart)	*Tringa totanus* (Redshank)		
Phylloscopus collybita (Chiffchaff)	*Motacilla flava* (Yellow wagtail)		
Phylloscopus sibilatrix (Wood warbler)	*Ardea cinerea* (Grey heron)		
Phylloscopus trochilus (Willow warbler)	*Alcedo atthis* (Kingfisher)		
Picus viridis (Green woodpecker)	*Haematopus ostralegus* (Oystercatcher)		
Poecile montanus (Willow tit)	*Riparia riparia* (Sand martin)		
Poecile palustris (Marsh tit)			
Prunella modularis (Dunnock)			
Pyrrhula pyrrhula (Bullfinch)			
Regulus regulus (Goldcrest)			
Sitta europaea (Nuthatch)			
Strix aluco (Tawny owl)			
Sylvia atricapilla (Blackcap)			
Sylvia borin (Garden warbler)			
Sylvia curruca (Lesser whitethroat)			

Woodland Birds	Waterbirds	Seabirds	Farmland Birds
Tetrao urogallus (Capercaillie)			
Troglodytes troglodytes (Wren)			
Turdus merula (Blackbird)			
Turdus philomelos (Song thrush)			

Table A4a.24 - Species Used to Calculate the Wintering Waterbird Measure

Anas acuta (Pintail)	*Branta bernicla hrota* (Light-bellied brent goose - east Canadian population)	*Limosa limosa* (Black-tailed godwit)
Anas clypeata (Shoveler)	*Branta bernicla hrota* (Light-bellied brent goose - Svalbard population)	*Mergus merganser* (Goosander)
Anas crecca (Teal)	*Branta leucopsis* (Barnacle goose - Greenland population)	*Mergus serrator* (Red-breasted merganser)
Anas penelope (Wigeon)	*Branta leucopsis* (Barnacle goose - Svalbard population)	*Numenius arquata* (Curlew)
Anas platyrhynchos (Mallard)	*Bucephala clangula* (Goldeneye)	*Phalacrocorax carbo* (Cormorant)
Anas strepera (Gadwall)	*Calidris alba* (Sanderling)	*Pluvialis apricaria* (Golden plover)
Anser albifrons albifrons (European white-fronted goose)	*Calidris alpina* (Dunlin)	*Pluvialis squatarola* (Grey plover)
Anser albifrons flavirostris (Greenland white-fronted goose)	*Calidris canuta* (Knot)	*Podiceps cristatus* (Great crested grebe)
Anser anser (Greylag goose - Icelandic population)	*Calidris maritima* (Purple sandpiper)	*Recurvirostra avosetta* (Avocet)
Anser anser (Greylag goose - northwest Scottish population)	*Charadrius hiaticula* (Ringed plover)	*Somateria mollissima* (Eider)
Anser brachyrhynchus (Pink-footed goose)	*Cygnus columbianus* (Bewick's swan)	Tac*hybaptus ruficollis* (Little grebe)
Arenaria interpres (Turnstone)	*Cygnus cygnus* (Whooper swan)	*Tadorna tadorna* (Shelduck)
Aythya ferina (Pochard)	*Cygnus olor* (Mute swan)	*Tringa totanus* (Redshank)
Aythya fuligula (Tufted duck)	*Fulica atra* (Coot)	*Vanellus vanellus* (Lapwing)
Aythya marila (Scaup)	*Haematopus ostralegus* (Oystercatcher)	
Branta bernicla bernicla (Dark-bellied brent goose)	*Limosa lapponica* (Bar-tailed godwit)	

Table A4a.25 – Species Used to Calcluate Butterfly Population Indices

Generalist butterflies	Habitat specialist butterflies
Aglais urticae (Small tortoiseshell)	*Apatura iris* (Purple emperor)
Anthocharis cardamines (Orange-tip)	*Argynnis adippe* (High brown fritillary)
Aphantopus hyperantus (Ringlet)	*Argynnis aglaja* (Dark green fritillary)
Aricia agestis (Brown argus)	*Argynnis paphia* (Silver-washed fritillary)
Celastrina argiolus (Holly blue)	*Aricia artaxerxes (*Northern brown argus)
Coenonympha pamphilus (Small heath)	*Boloria euphrosyne* (Pearl-bordered fritillary)
Erebia aethiops (Scotch argus)	*Boloria selene* (Small pearl-bordered fritillary)
Gonepteryx rhamni (Brimstone)	*Callophrys rubi* (Green hairstreak)
Inachis io (Peacock)	*Cupido minimus* (Small blue)
Lasiommata megera (Wall)	*Erynnis tages* (Dingy skipper)
Lycaena phlaeas (Small copper)	*Euphydryas aurinia* (Marsh fritillary)
Maniola jurtina (Meadow brown)	*Hamearis lucina* (Duke of Burgundy)
Melannargia galathea (Marbled white)	*Hesperia comma* (Silver-spotted skipper)
Neozephyrus quercus (Purple hairstreak)	*Hipparchia semele* (Grayling)
Ochlodes venata (Large skipper)	*Leptidea sinapis* (Wood white)
Pararge aegeria (Speckled wood)	*Limenitis camilla* (White admiral)
*Pieris brassica*e (Large white)	*Lysandra bellargus* (Adonis blue)
Pieris napi (Green-veined white)	*Lysandra coridon* (Chalkhill blue)
Pieris rapae (Small white)	*Melitaea athalia* (Heath fritillary)
Polygonia c-album (Comma)	*Papilio glaucas* (Swallowtail)
Polyommatus icarus (Common blue)	*Plebeius argus* (Silver-studded blue)
Pyronia tithonus (Gatekeeper)	*Pteridium aquilinum* (Large heath)
Satyrium w-album (White-letter hairstreak)	*Pyrgus malvae* (Grizzled skipper)
Thymelicus sylvestris (Small skipper)	*Thecla betulae* (Brown hairstreak)
	Thymelicus acteon (Lulworth skipper)

A4b.1 Geology and Soils

The geology and soils of the UK provide numerous resources (e.g. minerals, fertile agricultural land) and habitats for fauna and flora, some of which are recognised in national and international designations or as priority Biodiversity Action Plan habitats. The following section presents the environmental baseline and associated indicators for UK geology and soils.

A4b.1.1 Regulatory Context

A4b.1.1.1 Sites Designated for their Geological or Geomorphological Attributes

Geological sites in the UK are principally protected as part of the Sites of Special Scientific Interest notification, carried out under the National Parks and Access to the Countryside Act 1949 and subsequently under the Wildlife and Countryside Act 1981. Improved provisions for the protection and management of SSSIs were introduced by the Countryside and Rights of Way Act 2000 (in England and Wales) and the Nature Conservation (Scotland) Act 2004 (JNCC website).

Sites of Special Scientific Interest

Sites with distinct geological of physiographical features may be designated as Sites of Special Scientific Interest (SSSI).

World Heritage Sites

The Jurassic Coast of Dorset and East Devon is the only World Heritage Site (WHS) in the UK which has gained its designation for outstanding geological features. This area, which is also a National Park, covers 95 miles of coastline from East Devon to Dorset, with rocks recording 185 million years of geological history.

Geological Conservation Review Sites

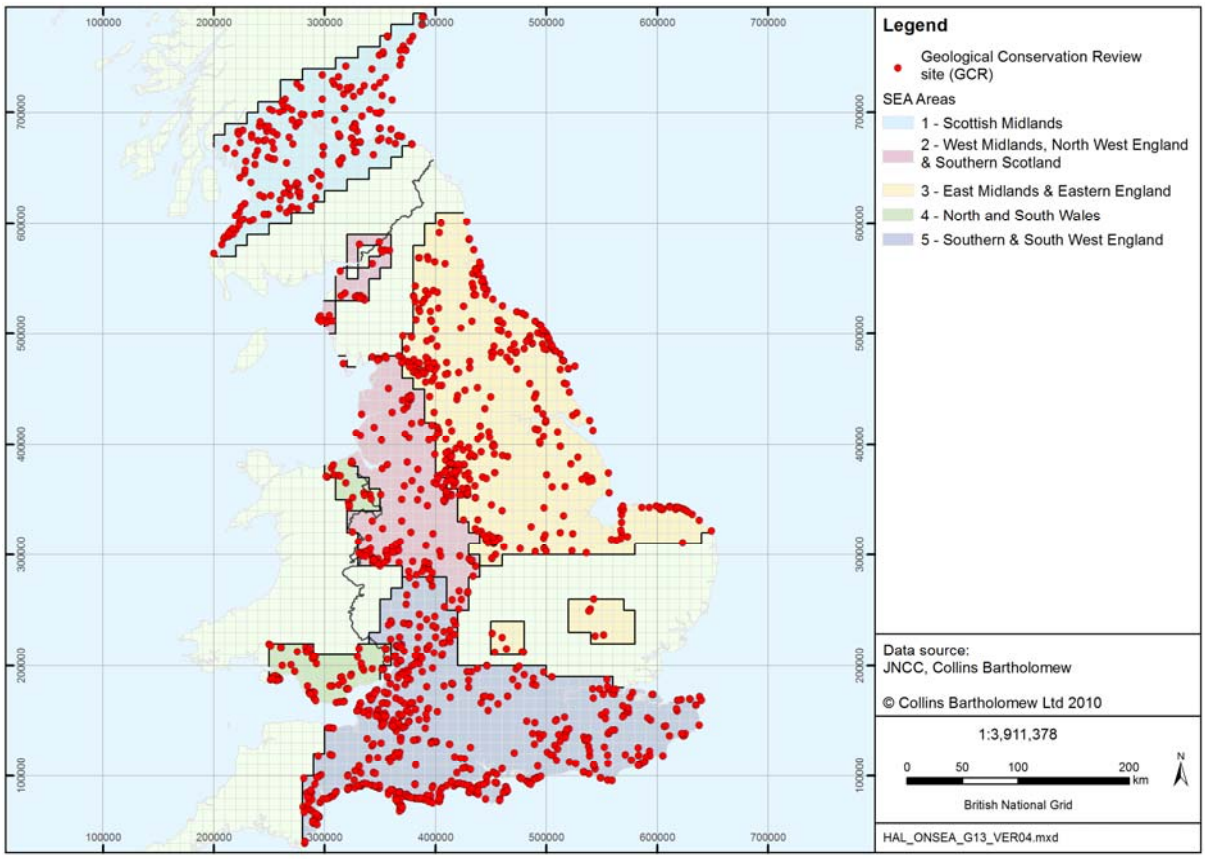
The Geological Conservation Review (GCR) was launched in 1977 in order to identify and describe the most important (nationally and internationally) geological sites in Britain, and to create a suite of descriptions which collectively catalogue and display the full range of the UK's earth heritage features. The GCR series of sites are chosen such that they satisfy the legal requirements of SSSI designations for geology and physiography. The full geological chronology from the Cambrian period to the Quaternary is covered in 3,000 sites spanning 100 categories (or "blocks"). The results of the GCR programme are being published in a series of 45 volumes so that there is a public record of features of interest and their location. A database of GCR sites is also available via the JNCC website (http://www.jncc.gov.uk/page-2949). The UK coverage of GCR sites which are of relevance to this SEA are indicated in Figure A4b.1. Whilst individual sites are indicated as points on this figure, in reality they may range from a single rock exposure to a stretch of cliff.

Regionally Important Geological and Geomorphological Sites (RIGS) and Local Geodiversity Action Plans (LGAPs)

RIGS was a concept initiated by the Nature Conservancy Councils (NCC) publication *Earth Science Conservation in Great Britain – A Strategy* (1990). These sites do not have any

statutory protection, but are instead designated by 56 local groups following locally developed criteria. Local Geodiversity Action Plans (LGAPs), 23 of which were in practice (with 14 in development and 4 proposed – Haffey 2008) in 2008, set out to conserve, enhance and raise awareness about local geology. Company Geodiversity Action Plans (cGAPs) are also being developed for company land-holdings, with an initial focus on the aggregates industry.

Figure A4b.1 – Geological Conservation Review Sites in Relation to SEA Areas



A4b.1.2 Soil Protection

A number of different legal instruments have, in the past, indirectly protected soils, for instance those limiting emissions of certain pollutants to air and water bodies (discussed elsewhere in appendices A4e and A4d respectively), contaminated land, agricultural and forestry practice; but no policy tool had the specific aim of protecting soils (Black *et al.* 2008, Scottish Executive 2008b). This situation has undergone recent review in the form of the EU Thematic Strategy for Soil Protection, which was adopted in September 2006, and the proposal for a Soil Framework Directive. The main principles of the Thematic Strategy were to prevent further soil degradation while restoring degraded soils to a level at least consistent with current and intended use.

At a national level, England's 2009 Soil Strategy: Safeguarding our Soils, presents a framework through which it is hoped that all soils in England should be managed sustainably and degradation threats tackled successfully by 2030. The strategy identifies many of the key problems currently affecting soils in England (though which are more generally soil

problems for the UK as a whole) including loss of organic matter, compaction, erosion, contamination (new and those of historic legacy) and soil sealing (see section A4b.1.5.2). Scotland similarly has its own strategy, The Scottish Soil Framework, published in 2009 which outlines the broad properties, pressures and policies in this area. Wales has also consulted on a renewed soil framework programme for the coming years.

In addition to these initiatives, the UK Soil Indicators Consortium (UKSIC) has been developing a set of indicators with which to monitor the condition of the UK's soils which are needed to address ongoing policy issues, while being flexible enough to take into account possible future policy requirements of the data (Black *et al.* 2008).

Some element of soil protection is provided in the Town and Country Planning Act 1990, Environmental Protection Act 1990, Waste Management Licensing Regulations 1994, Sludge (Use in Agriculture) Regulations 1989, and Environment Act 1995 (section 57).

A4b.1.3 Geological Summary

A4b.1.3.1 The Scottish Midlands

The Midland Valley is fault-bounded by the Highland Boundary Fault to the north and the Southern Upland Fault to the south. Although well known for coal-bearing Carboniferous strata, older Silurian and Devonian sequences include terrestrial sandstone and volcanic lava and younger Permian and Triassic rocks include lava and desert dune sandstone. Volcanic intrusions have created small areas of hilly land such as the Bathgate Hills and the Campsie Fells. The conservation importance of the region's geology is reflected in the large number of GCR sites (200).

A4b.1.3.2 West Midlands, North West England and Southern Scotland

Much of the West Midlands are underlain by predominantly soft reddish sandstone and clays. Jurassic Lias are found as an outlier to the west of Carlisle, and towards the south and east, Carboniferous limestones and shales are found. Carboniferous rocks underlie the region from Wolverhampton to Coventry, and around the Potteries and Telford. These include coal seams and other economically valuable deposits which have been responsible for much of the earlier industrial growth of the large urban centres (Silcock *et al.* 2003). To the north, Quaternary superficial deposits cover much of the region including the Carboniferous rocks of the Lancashire Coalfield and the sandstones that make up the surrounding Permo-Triassic basin. In contrast, moorland areas are dominated by Millstone Grit. The area of Walney Island is underlain by Triassic sandstones, and backed by Carboniferous limestones similar to the Solway and Borders area, though these are largely covered in glacial drift material. The area of Walney Island is noted for its coastal geomorphology which has been greatly influenced by glacial sedimentation, and is a designated GCR site.

The conservation importance of the region's geology is reflected in the large number of GCR sites (171).

A4b.1.3.3 East Midlands and Eastern England

The main geological features include the Carboniferous Limestones, sandstones and Millstone Grit of the Pennines, Northumberland moors and Yorkshire Dales, as well as the

coal measures of the Northumberland, Durham and West Yorkshire coalfields. Sherwood Sandstone and mudstones occupy much of the Vale of York. Cretaceous Chalk extends through Humberside to the Wolds and Flamborough Head, and into north-east Norfolk. The conservation importance of the region's geology is reflected in the large number of GCR sites (399).

A4b.1.3.4 North and South Wales

The region has a complex geology being underlain by rocks of Ordovician, Silurian, Devonian and Carboniferous age, in places covered by glacial and post-glacial deposits. These comprise shales, sandstones, limestone, coal, sands, gravels, boulder clay and peat, most of which have been exploited at some time. Carboniferous limestone and Coal Measures represent the most economically important mineral resources and the extensive coal fields of South Wales provided the stimulus for much of the region's industrial development. The conservation importance of the region's geology is reflected in the large number of GCR sites (80).

A4b.1.3.5 Southern and South West England

The open rolling downs and heaths which characterise much of the region are underlain largely by chalk. Wealden Greensand forms a conspicuous ridge running east to west across Surrey and Kent terminating in coastal cliffs at Folkestone Warren. Further west, chalk downlands are intersected by Greensand hills and clay vales in Dorset and Wiltshire. Granite underlies much of Devon with sedimentary rocks, especially sandstone, limestone, shale and chalk occurring to the east. Past geological history has created conditions for oil and gas generation and entrapment for example at the Wytch Farm oil field in Dorset which in 1993 had an estimated 41.1 million tonnes of recoverable oil reserves, including an offshore extension (Crumpton *et al.* 1996). The conservation importance of the region's geology is reflected in the large number of GCR sites (640). The Dorset and East Devon Coast World Heritage Site has been designated for its important fossil sites and coastal geomorphologic features.

A4b.1.4 Soils

Soils have many functions both as a habitat for fauna and flora, and as a natural resource used by people in agriculture and in construction. Table A4b.1 indicates the six principle functions of soils (Environment Agency 2004) and their relevance to other appendices

Table A4b.1 – Soil Functions

Function	Summary	Relevance to other Appendix
Support of ecological habitat and biodiversity	Soil is an important habitat and gene reserve for an enormous variety of micro-organisms and larger soil-dwelling animals.	A4a
Food and fibre production	Soil is the growing medium for food, fibre, timber and energy crops, and forage crops that are the basis for livestock production. It stores nutrients and water, and supports root growth.	A4h
Environmental interaction	Soil is a crucial link between the atmosphere, geology, water resources and land use. It acts as a filter, attenuates and immobilises substances, and takes up, stores and releases	A4d, A4e

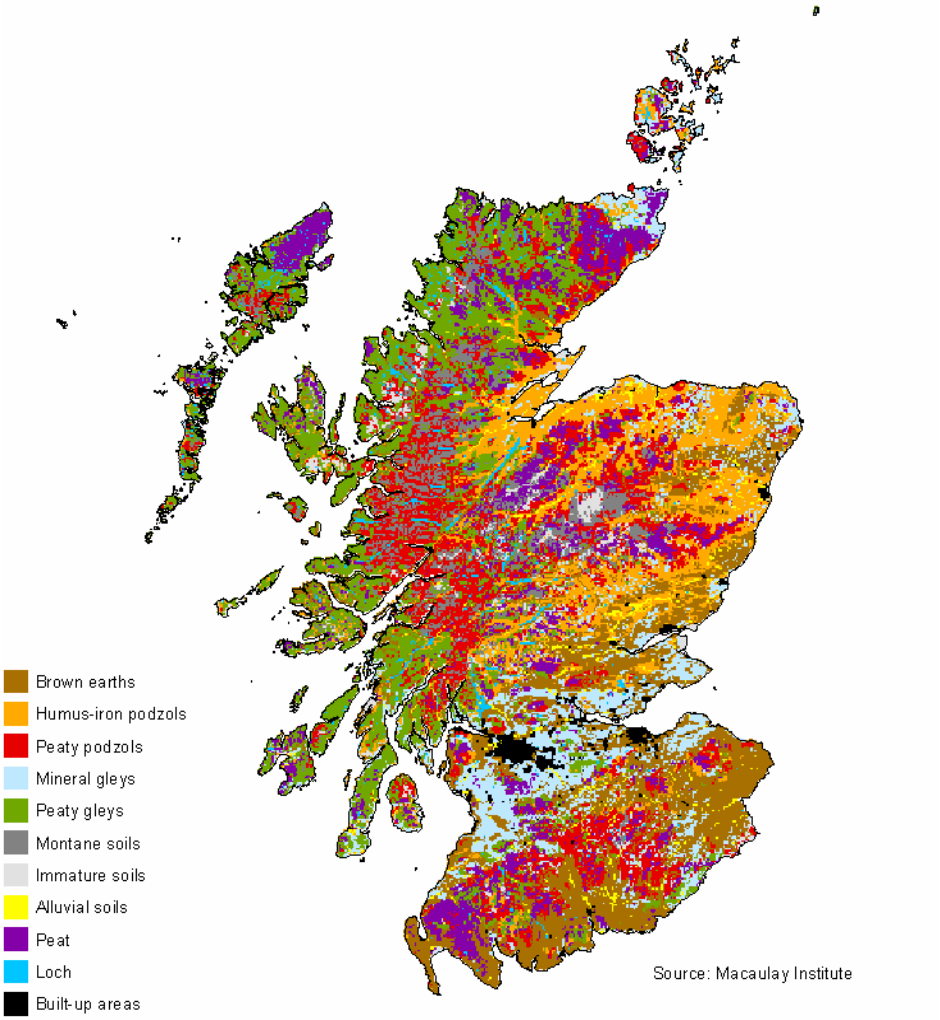
	atmospheric gases. Soil regulates water flow from rainfall to vegetation and groundwater, and influences river flows and flooding.	
Providing a platform	Soil provides the foundation for building and other development. Natural landscapes reflect the different soil systems that they contain.	A4h
Providing raw materials	Soil holds billions of cubic metres of water and is a direct source of minerals and resources, such as brickearth, peat and topsoil.	A4h
Protecting cultural heritage	Soil stores and protects much of our cultural heritage, including archaeological remains.	A4i

Source: Blum (1993) cited in EA (2004)

A4b.1.4.1 The Scottish Midlands

The cool, maritime climate of Scotland and resistant rock have led to the development of soils which are generally higher in organic content, more leached and wetter than those in most other European countries (Towers *et al.* 2006). Podzols (infertile, non-productive soils), peat and gley soils (poorly draining, frequently anaerobic soils) cover a substantial proportion of the land area (23.7%, 22.5% and 20.6% respectively), and are found mostly in the north and west, contrasting markedly with the Midlands which contain a higher percentage of mineral soils. Twenty five percent of Scotland's land area is used for arable agriculture and this is mostly restricted to the east, with improved grassland having its greatest abundance in the south west. With the exception of forest (17% cover) much of Scotland is under moorland, blanket bog and montane habitat (Towers *et al.* 2006). The Scottish Midlands has a cover of brown earths and humus-iron podzols in eastern parts with localised alluvial soil cover. In the west, surface water gleys cover much of the region with peaty podzols and peat soils present over upland areas. Broad soil categories and their distribution in Scotland are indicated in Figure A4b.2.

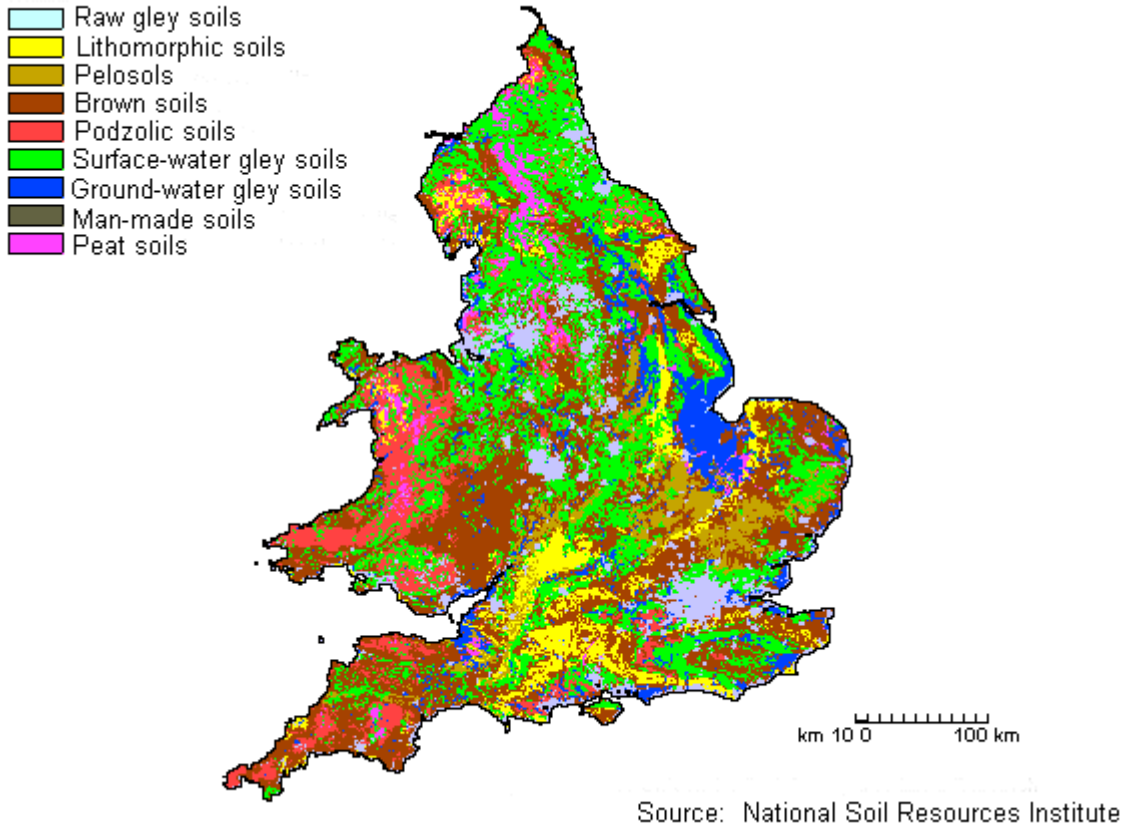
Figure A4b.2 – Broad Soil Types and their Distribution in Scotland



Source: Macaulay Institute, as cited in Towers et al. (2006)

For England, the National Soils Research Institute (NSRI), based at Cranfield University, has produced a simplified soils map for England and Wales at a scale of 1:250,000, created by merging some of the 300 soil associations generated for the National Soils Map (NATMAPVector) to just 27 categories. Figure A4b.3 shows a further simplified broad soil distribution map for England and Wales.

Figure A4b.3 – Broad Soil Types and their Distribution in England and Wales



Source: National Soil Resources Institute, as cited on the Environment Agency website

A4b.1.4.2 West Midlands, North West England and Southern Scotland

Urban areas including Birmingham, Manchester and Liverpool cover extensive tracts of land. Brown soils, surface-water gleys and localised podzolic soils cover much of the southern part of the region. To the north, upland areas are characterised by peat soils. Surface-water gleys cover much of the lowlands and groundwater gleys, lithomorphic and brown soils are also present.

A4b.1.4.3 East Midlands and Eastern England

Surface-water gley soils cover much of the northern part of the region with peat soils over upland areas. Brown and lithomorphic (lime-rich soils over chalk or limestone) soils cover large tracts of land from Yorkshire through the East Midlands and Lincolnshire. Groundwater gley soils are extensive around the Humber, the Lincolnshire coast and the Wash. Brown, lithomorphic and surface water gley soils are prominent in Norfolk.

A4b.1.4.4 North and South Wales

Brown soils cover much of the Brecon Beacons and towards the English border. Podzolic soils and surface-water gleys cover much of south Wales, with brown soils and extensive urban areas near the coast. North Wales has a mixed cover of podzolic, brown, surface-

water and groundwater gley soils. A legacy of past metal and coal mining activities has left some soils and river systems contaminated.

A4b.1.4.5 Southern and South West England

Brown soils, lithomorphic, surface-water and groundwater gley soils cover much of Kent and Sussex. Lithomorphic soils dominate in central and western parts with brown, surface-water gley and podzolic soils also present. In Devon, brown and podzolic soils dominate, with groundwater gley soils along the coastal fringe of the Severn Estuary.

A4b.1.5 Geology and Soils Indicators

Table A4b.2 below presents the relevant indicators used to describe and assess the evolution of the baseline for this section.

Table A4b.2 – Geology and Soils Indicators

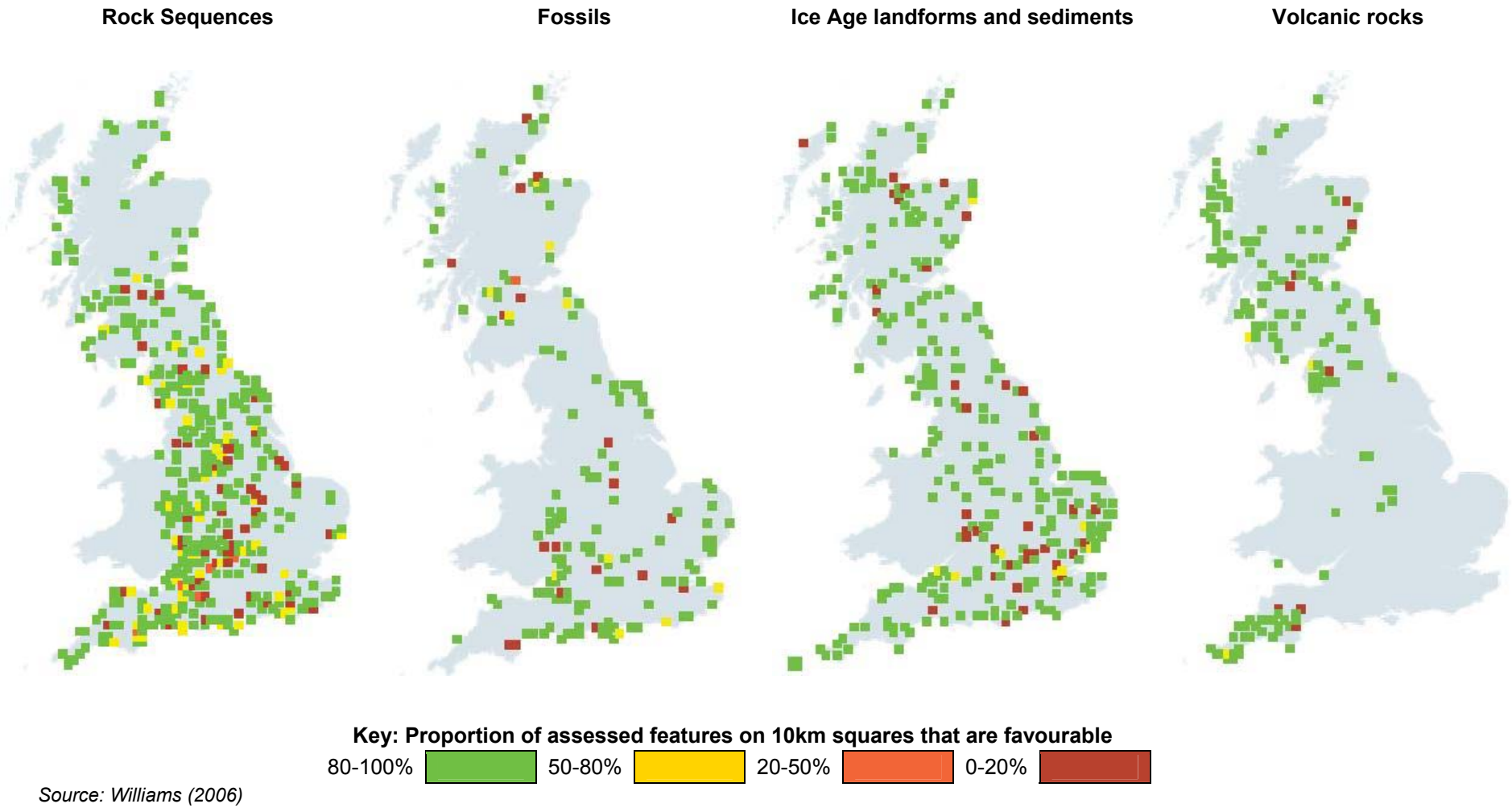
#	Indicator	Region[1]
6	**Condition of earth science features†**	UK
7	**Soil condition and threats†**	
	Loss of soil organic matter (also see Appendix 4h)†	E, W
	Loss of agricultural land to development (Scotland)†	S
	Loss of soil to development (England and Wales)†	E, W

Note: [1]Indicates the spatial coverage of the data; E=England, W=Wales, S=Scotland, UK=United Kingdom, †additional indicator not included in the UK government sustainable development strategy.

A4b.1.5.1 Condition of Earth Science Features

The information given here is principally derived from Williams (2006) and associated JNCC webpages unless otherwise stated. As part of the JNCC Common Standards Monitoring for designated sites, the features for which certain sites are designated were assessed to determine site condition. For geological sites, the principle designations are GCRs and SSSIs, many of which occupy the same or part of the same area of land. Site attribute condition was compared with its target value, the outcome of which resulted in a site being classified as favourable, unfavourable, unfavourable-recovering, or destroyed (in whole or in part). The overall results of the survey for broad geological features are indicated in Table A4b.3, and the spatial distribution of sites and their condition in shown in Figure A4b.4 and Figure A4b.5.

Figure A4b.4 – Current Condition of SSSI Features (Where Unfavourable-Recovering is Counted as Unfavourable)



Source: Williams (2006)

Figure A4b.5 – Current Condition of SSSI Features (Where Unfavourable-Recovering is Counted as Unfavourable)

Folds, faults and rock movements

Minerals

Active landforms

Source: Williams (2006)
Note: Key as per Figure A4b.4

Table A4b.3 – Condition of Geological Features

Category	No. of assessments	% favourable and unfavourable-recovering	% destroyed (whole or part)
Rock sequences	859	84.5	1
Fossils	274	87.6	1
Ice Age landforms & sediments	410	90.2	1
Volcanic rocks	215	95.3	-
Folds, faults & rock movements	139	93.5	1
Minerals	120	85.8	8
Active landforms	225	89.3	1
Total	**2242**	**88.1**	**1.3**

Source: Williams (2006)

Rock Sequences

The rock sequences category has the largest number of sites in any of the broad categories studied, with stratigraphic sequences representing the most abundant feature in this assessment (*ca.* 80%*).* A high number of sites (*ca.* 83%) are in favourable condition, and those which are not are principally so due to the feature being obscured. Management agreements are in place for many sites, which include measures to keep features exposed.

Fossils

Williams (2006) accounts for *ca.* 75% of sites which have fossils indicated as a notified feature, 87% of which are in a favourable condition. Like many geological sites, many are considered unfavourable because features are obscured rather than damage inflicted as a result of fossil collectors.

Ice Age Landforms and Sediments

About 75% of Quaternary features, which includes glacial landforms and sediments, have been accounted for in the JNCC Common Standard Monitoring assessment, 88% of which are reported as being in favourable condition. 1% of features are reporting as having being destroyed in whole or in part, with the remainder being unfavourable or recovering, mostly where sites are obscured.

Volcanic Rocks

Of the 70% coverage of volcanic (igneous) rock sites assessed, 95% were regarded as favourable. Most igneous areas are robust and less likely to be affected by activities which may be damaging to soft rock or sedimentary landscapes. The unfavourable condition of most sites results from being obscured, probably by vegetation cover or scree.

Folds, Faults and Rock Movements

Only 40% of sites in this category were accounted for, and 94% were in favourable condition. Like volcanic rock areas, the robust nature of the rocks and features in this category makes them less susceptible to damage than soft-rock, sedimentary and more dynamic landscapes.

Minerals

Just of 60% of sites are accounted for in the assessment, of which 86% are regarded as in favourable condition. There is a relatively large amount of partially or wholly destroyed sites (7.5%) compared with the other broad geological categories. Apart from being obscured, minerals have been the subject of anthropogenic exploitation and at some sites most or all of the features have been removed.

Active Landforms

Just over 60% of active landforms (including caves, karst features, fluvial and coastal geomorphology) have been accounted for in the assessment, 86% of which are in favourable condition. The data collected for this category is too sparse to detect any trends in the reasons for the condition of sites. Active landforms are often large and their dynamic, complex nature makes them particularly difficult to monitor.

A4b.1.5.2 Soil Condition and Threats

The distribution and type of soils found in the UK have already been discussed in section A4b.1.4 above, and the agricultural productivity of key soils is discussed separately in Appendix 4h.

A number of threats to the UK soil resource have been recognised in England, Scotland and Wales including (Environment Agency 2004, Towers *et al.* 2006, Defra 2009g):

- Loss of soil organic matter and erosion
- Climate change
- Loss of soil biodiversity
- Structural degradation and compaction
- Contamination
- Loss of soil to development (e.g. soil sealing), including urbanisation and agriculture
- Threat to soil as a cultural resource (e.g. archaeological protection and UK environmental records)

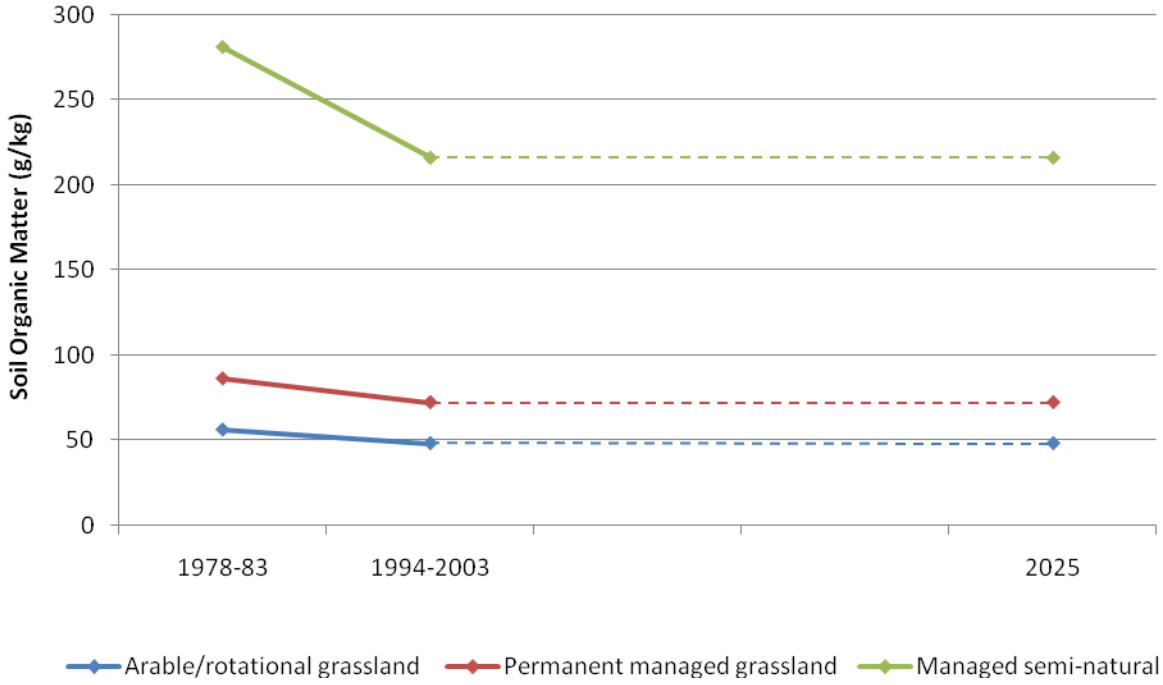
Loss of Soil Organic Matter

The loss of organic matter from soils influences its structure and is linked to erosion and soil compaction, reduced agricultural productivity and soil biota diversity. There is limited data for Scotland, but recent surveys in England and Wales as part of a programme for the National Soils Inventory reveal that the loss of organic matter is a series issue (Towers *et al.* 2006). Since 1980 there has been an estimated average loss in organic matter of (Defra 2006a):

- 15% in arable soils and rotational grass soils
- 16% in soils under permanently managed grassland
- 23% in agriculturally managed soils and semi-natural land

There is a target to halt the decline of organic matter in vulnerable soils by 2025 (Figure A4b.6) whilst maintaining the organic matter of other agricultural soils.

Figure A4b.6 – Levels of SOM in Agricultural Soil (England and Wales)



Source: Defra Sustainable Farming and Food Strategy Indicators Webpage (http://www.defra.gov.uk/evidence/statistics/foodfarm/general/indicators/)

UK soils store around 10 billion tonnes of carbon *(*Environment Agency 2004). A study by the National Soil Inventory (NSI) found that between 1978 and 2003 there had been a loss in soil organic carbon of 0.6% per year for all soil types, though with higher losses (2% per year) in those which are particularly organic rich (Bellamy *et al.* 2005). The loss of this carbon may also have climate change implications (see: section 0, Appendix 4f).

Structural Degradation, Compaction and Soil Erosion

Compaction may result from a number of activities including intensive mechanised agriculture, poor timing of cultivation, over-stocking and overworking of land (Environment Agency 2004). The result is a reduced plant yield, habitat loss for larger fauna, N_2O losses, reduced water holding and soil infiltration capacity and an increased risk of flooding and erosion (Towers *et al.* 2006).

17% of soils in England and Wales show signs of erosion which leads to a reduction in water retention and filtering, and the mobilisation of sediment (which may contain pesticides, nutrients and metals) to watercourses or floodplains (Environment Agency 2004) – see Appendix A4d. The principle causes of accelerated erosion (i.e. that which exceeds background levels) in England, Wales and Scotland are:

- Intensive cultivation – particularly where compacted by machinery and left open to rain
- Trampling by animals
- Poor forestry practice (e.g. during road construction and harvesting)
- Runoff from urban land surfaces

Other causes include wind erosion, tillage losses and soil co-extracted with root vegetables (Quine *et al.* 2006). In the 2006 Farm Practices Survey for England (Defra 2006b), 53% of farmers stated that they had experienced some indicator of soil erosion on their land (Defra

2007b), with at least 11% of farms experiencing erosion at a frequency of every year, with frequency of occurrence tending to increase with the size of farm (Defra 2007c). For the 12 months leading up to August 2008, the Farm Practices Survey 2008 (Defra 2008a) indicated that the most common actions taken to reduce run-off, water and wind erosion were working across rather than down slopes (71%), loosened tramlines (66%) and fenced watercourses to prevent stock eroding banks (50%).

Studies in Scotland indicate that land-use practices which leave bare soil during the winter months are particularly damaging, especially in lowland sandy/cultivated mineral soils, though single events may be confined to small areas (Towers *et al.* 2006). In the uplands, peat has been shown to be susceptible to erosion which has implications for carbon storage (Towers *et al.* 2006), and erosion of any soil has implications for most soil 'functions' (referred to in Table A4b.1).

Climate Change

There is still some uncertainty about the intensity and nature of any threats posed by climate change with regard to soil, though the following possibilities may be suggested (Environment Agency 2004, Towers *et al.* 2006):

- A probable reduction in soil organic matter. Change is most critical in peat and organic-rich soils which are a major carbon store
- A requirement for new management techniques – soils may become more susceptible to compaction
- Biomass production may fall due to higher drought duration
- Soil erosion may increase, particularly in peaty soils, if winters are to become wetter
- Acidification and nutrient mobility will change with rainfall and temperature
- There may be more demand for irrigation, particularly in the south of England

As indicated above, UK soils store a substantial amount of carbon (~10 billion tonnes), and land use which allows the release of carbon accounts for ~5% of UK annual greenhouse gas emissions, offset by up to 2% by forestry and farming uptake (Environment Agency 2004).

Loss of Soil Biodiversity

Soil biodiversity is an emerging field of soil science and there is a low level of understanding and few relevant datasets (Towers *et al.* 2006), and it is not known what effects pollutants including metals and pesticides have on soil organisms important for maintaining soil quality (Environment Agency 2004). Organisms include bacteria, fungi and invertebrates, 100 of which are regarded as BAP species, and like many other facets of the UK's natural environment, soil habitats are host to introduced species such as the predatory New Zealand flatworm (Environment Agency 2004).

Contamination

Contaminated land may be the result of a legacy of old industrial practices or more recent incidents and is regarded as 'contaminated' in legislation (Part 2A of the Environmental Protection Act 1990) where there is a threat to the natural environment or public health (see: Defra 2008b). The area of contaminated land in the UK cannot be reliably estimated, though the Environment Agency estimates that ~325,000 sites covering 300,000ha (~2% of the area of England and Wales) are affected. The most common pollutants at sites identified by the Environment Agency were heavy metals and inorganic/organic compounds (Environment Agency website).

Other contamination results from pollutant deposition and direct application, leading to acidification and nutrient enrichment. These topics are dealt with in Appendix A4d, Water Environment and A4e, Air Pollution.

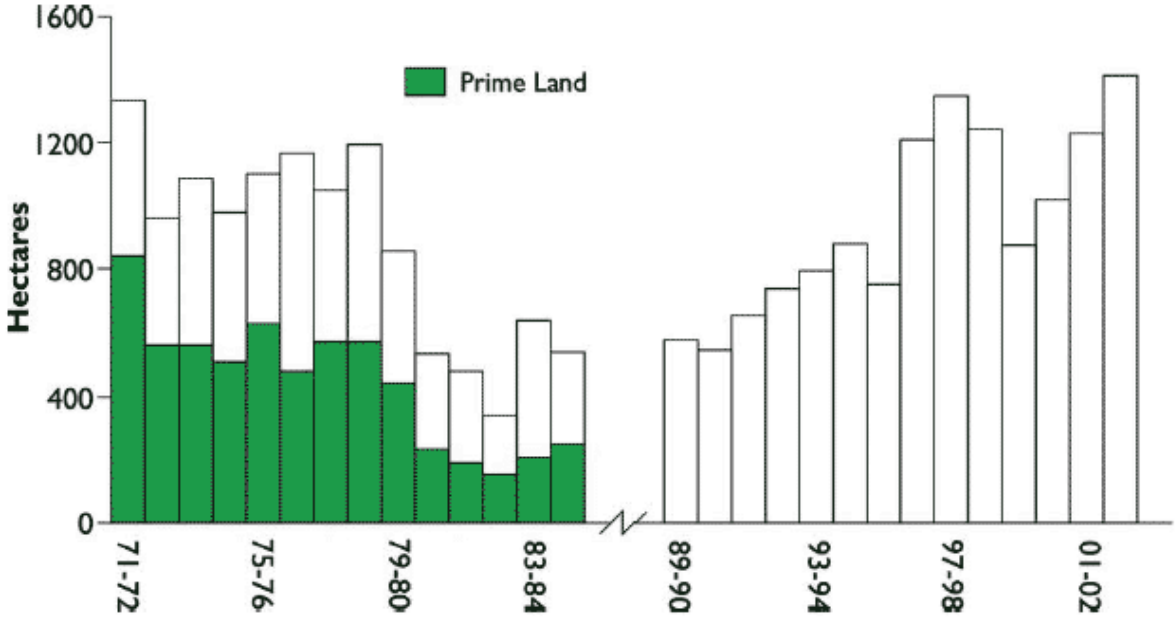
Soil Loss to Development

In Scotland, most land is currently being lost to development in the central belt, with development in this area having doubled since the early 1980s and 1990s, though soil sealing in urban areas has not been accurately calculated as gardens, parks and other open spaces have not been accounted for (Towers *et al.* 2006). Scotland's land cover has been studied in both the Countryside Survey and by the National Countryside Monitoring Scheme (NCMS). The latter study is arguably outdated, being based on aerial photography interpretation with the last dataset dating to 1988. The principle findings with regard to this section include:

- Built land increased by 46% mainly on grassland and farmland
- Recreational land increased by 138%
- Bare ground increased four-fold due to peat extraction and urban road development
- Transport corridors increased by 22%
- Upland surfaced tracks increased by 29%

Figure A4b.7 indicates the area of agricultural land in Scotland lost to development over the last 30 years, which unlike England and Wales, has been recently increasing.

Figure A4b.7 – Conversion of Agricultural Land (Scotland)

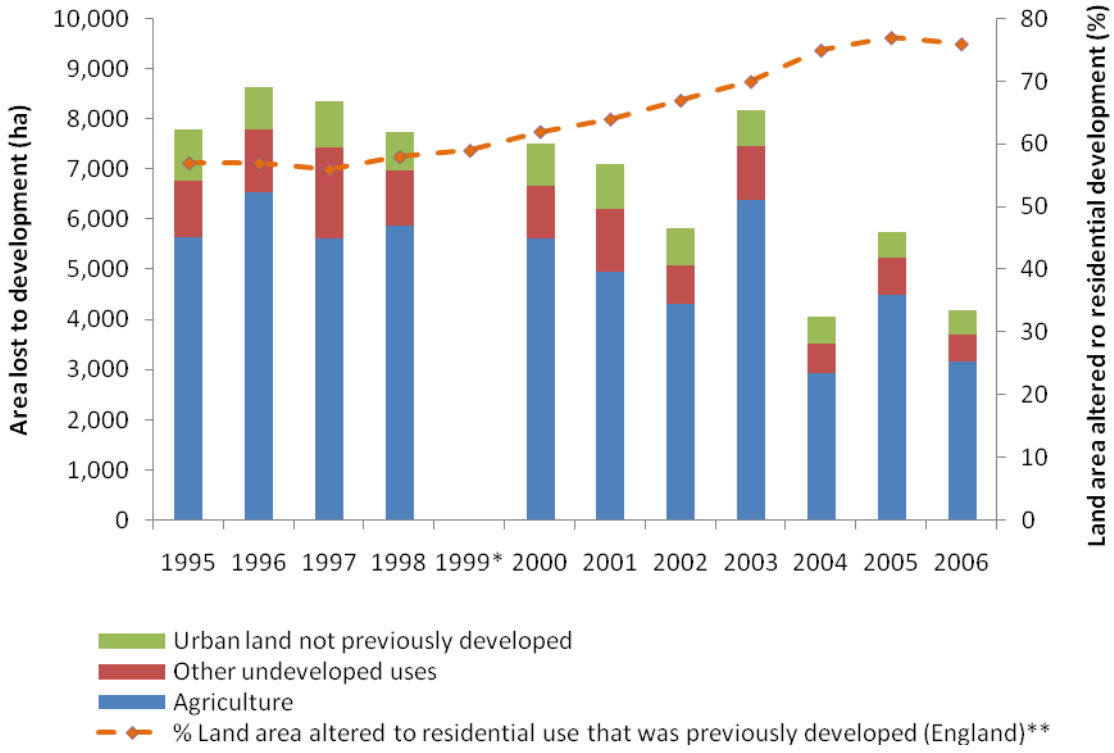


Source: Towers et al. (2006)

Figure A4b.8 shows the origin and amount of soil lost to development for each year from 1995 to 2006 for England and Wales. Overall, the amount of soil lost to development has gradually decreased from nearly 8,000ha in 1995 to 4,200ha in 2006. There was a noticeable increase in 2003 to over 8,000ha. In 2000, 10% of England and Wales was categorised as urban or suburban, predicted to rise to 12% by 2016. The government has set a target of 60% of new homes to be built on brown-field sites, which includes building

conversions (ODPM 2004). In 2007, 77% of new homes were developed on brown-field sites, an increase of 21 percentage points on 1997 figures (Communities and Local Government 2009a), increasing to 79% in 2008 (Communities and Local Government 2009b).

Figure A4b.8 – Soils Lost to Development (England and Wales)



Source: Department for Communities and Local Government Land Use Change Statistics Webpage (http://www.communities.gov.uk/planningandbuilding/planningbuilding/planningstatistics/landusechange/)
*Note: *data incomplete for some variables, **Includes building conversions (constituting ~3% up to 2002). Note that the calculation for housing conversions altered for 2003, see ODPM (2004), section 3.5 for details.*

Threat to Soil as a Cultural Resource

The soil of the UK has gradually built up since the end of the last ice age ~10,000 years ago during the current Holocene warm period, and even before in the case of palaeosols. Soils provide protection for a great deal of the UK's archaeological resource which remains covered, protecting it from redistribution, erosion, and in the case of peat, may provide exceptional preservational contexts. Undisturbed peatlands also preserve the environmental record of areas all over the UK pertaining to the Holocene which can be reconstructed using palaeo-archaeological methods (e.g. plant macrofossil, microfossil, entomological and sedimentary analyses). In many cases the soils themselves are a cultural construct such as the thickened soils of St Kilda (Meharg *et al.* 2006, Donaldson *et al.* 2009), and the rig-and-furrow formations which are the most abundant archaeological feature in Scotland (Halliday 2003).

Land use including agriculture and building work have the potential to disturb archaeological contexts, which if not appropriately studied, could be damaged. Since the middle of the last century in England, 23,500 ancient monuments have been destroyed, with a total 10% destroyed and 30% damaged by agricultural practices (Environment Agency 2004). Around

3,000 scheduled monuments are actively ploughed, and a third of all sites are on ploughed land, with 2% at high risk (Environment Agency 2004). In Wales, 15% of scheduled ancient monuments have deteriorated due to natural, agricultural and other causes. In Scotland there is a lack of monitoring with regard to issues relating to the preservation of archaeological features, and indeed the extent and distribution of cultural soils (Towers *et al.* 2006). In addition, there is a general lack of data on changes in soil condition which may influence preservation conditions (Towers *et al.* 2006) – see below.

The report by Davidson & Wilson (2006) presents a comprehensive study of potential headline soil indicators for the preservation of cultural heritage. These are presented briefly here, but are not discussed further (those indicated in bold are presently not considered practicable due to lack of suitable technologies, background data, and studies into the response of cultural resources to changes in this soil property):

- Soil pH
- Soil organic carbon content
- Area and volume/depth of superficial deposits lost annually to mineral extraction and peat cutting (including peat depth)
- **Erosion and sediment redistribution**
- **Water table depth and fluctuations, and/or soil redox potential**
- **Plough depth**
- **Area of new cultivation**

A number of other practicable, site-level, indicators are also suggested, though are beyond the scope of this study (see: Davidson & Wilson 2006 for more details).

A4c.1 Landscape

A4c.1.1 Introduction

Onshore oil and has developments are typically small in size, generally with minimal visual intrusion, and planning regulations make provisions for site reinstatement following the secession of production activities. The character of any given landscape is defined by both its natural/semi-natural (e.g. topographic, faunal, floral) and cultural associations (including historic land-use). The relevant authorities in England, Wales and Scotland have in recent years sought to define boundaries around certain areas which are deemed to have a distinctive character. In England, these have been subject to review through the Countryside Quality Counts project, which has distinguished changes to landscape character in these areas.

A4c.1.2 Protected Landscapes

The sensitivity of the landscape to visual influences of onshore oil and gas developments may be gauged partly on the presence of designated (statutory and non-statutory) sites protected for their natural/semi-natural and cultural aesthetics. Landscape characterisation is not restricted to designations however. Natural England has described 159 National Character Areas (formerly Joint Character Areas) which are relevant to three of the five SEA areas. Historic Landscape Characterisation (HLC) is being carried out as part of a country-wide initiative in Wales, administered by each Welsh archaeological trust (see section A4i.1.2.3). Similarly, English Heritage has prepared HLC reports in association with local authorities and councils for almost two thirds of England. These are presented either in themed report form (e.g. Woodland, Industry) or interactive online GIS environments.

Scheduled monuments and listed buildings may also be considered as individual landscape elements which also rely on their setting to characterise them. Though not listed here, scheduled monuments are mapped and discussed in Appendix 4i.

Areas of Outstanding Natural Beauty (AONB)

AONB designations are made by Natural England (NE) and the Countryside Council for Wales (CCW), and these bodies also advise on policies for their protection. Provision is made to preserve not only the natural environment but traditional agriculture, forestry and industry. AONB designations are made under the National Parks and Access to the Countryside Act 1949 amended in the Environment Act 1995 in England and Wales. The Countryside and Rights of Way Act 2000 clarifies the procedure and purpose of AONB designations, including a statutory duty placed on local authorities to create a management plan for AONBs.

Heritage Coasts

Heritage coasts comprise areas of coast more than 1 mile in length which are of exceptional scenic value and which are largely undeveloped. Their purpose is to protect and enhance the coast and their heritage features including architecture and archaeology. These are a non-statutory landscape definition which is agreed between the Maritime Agency and Natural England, and the Countryside Council for Wales. Though these sites are not

afforded the same protection as National Parks or AONB, most are located within areas with such designations.

National Parks

The primary objective of National Parks is to preserve and enhance the landscape, while promoting public enjoyment, particularly of those residing within the park. The National Parks and Access to the Countryside Act 1949 established the National Park designation in England and Wales. In addition, the Environment Act 1995 requires relevant authorities to have regard for nature conservation and includes provisions for a statutory National Park Management Plan with a review period of 5 years. In Scotland, provisions for National Parks are made under the National Parks (Scotland) Act 2000.

Country Parks

Statutorily declared under the Countryside Act 1968, Country Parks are intended for recreation and leisure close to population centres and need not have any nature conservation importance, though some form semi-natural environments. Non-statutory historic parks and gardens are located throughout England and Wales, as are gardens and designed landscapes in Scotland (see section A4i.1.4.4).

World Heritage Sites

These sites are designated by UNESCO according to their natural (physical, biological, geological) or cultural (historic, aesthetic, archaeological monuments and structures) attributes considered to be of outstanding value to humanity. Though these sites are not strictly landscape designations, their setting is important in maintaining their integrity.

National Scenic Areas (Scotland)

National Scenic Areas (NSAs) are Scotland's only national landscape designation. They are those areas of land considered of national significance on the basis of their outstanding scenic interest which must be conserved as part of the country's natural heritage. They have been selected for their characteristic features of scenery comprising a mixture of richly diverse landscapes including prominent landforms, coastline, sea and freshwater lochs, rivers, woodlands and moorlands.

Special (Local) Landscape Areas (Scotland)

Special (Local) Landscape Areas (LLAs), formerly Areas of Great Landscape Value or Local Landscape Designations, are defined by local authorities with the aim of protecting the aesthetic appeal of an area while helping guide change in the planning process. Nearly a third of the Scottish landscape is covered by such designations (Figure A3c.1), though spatial data held by some local authorities is at present only partial and these areas are often spatially variable and have differing focus and nomenclature (Scott & Shannon 2007). SNH and Historic Scotland jointly published guidance to create a more systematic designation process which developed from a review of sites started in 2003, and this is the only national guidance on LLDs in the UK and Europe (Scott & Shannon 2007).

Environmentally Sensitive Areas and Environmental Stewardship

These agri-environment schemes join the promotion of good agricultural practice with meeting environmental objectives. The ESA scheme (applicable to England, Wales and Scotland) aimed to maintain and enhance the conservation, landscape and historical value of the key environmental features of an area, and where possible, improve public access to these areas. The scheme provided particular support to agricultural practices which take account of environmental sensitivity and attempt to reduce impacts. This scheme was closed in 2000, though 10 year agreements signed before its closure are still valid up to 2014. The area of covered by ESAs continues to fall as agreements expire (653,000ha in 2004 to 503,000ha in 2008), and has been replaced with the Environmental Stewardship Scheme (ESS) in England and Wales. Outside of ESAs, the Countryside Stewardship Scheme (CSS) piloted in England in 1991 aimed to, "improve the natural beauty and diversity of the countryside, enhance, restore and re-create targeted landscapes, their wildlife habitats and historical features, and to improve opportunities for public access" (Natural England website). CSS has now also closed and the area covered by agreements set out in this scheme is now in decline.

The Environmental Stewardship Scheme, introduced in 2005, has similar aims and objectives to the previous ESA scheme, which include:

- The conservation of wildlife (biodiversity)
- The maintenance and enhancement of landscape quality and character
- The protection of the historic environment and natural resources
- The promotion of public access and understanding of the countryside
- The protection of natural resources

Secondary objectives include genetic conservation and flood management.

Though all these objectives are broadly relevant to the SEA, those specifically relating to landscape quality and character, and the protection of the historic environment are particularly pertinent to this section. Any change in the characteristics of factors mentioned in the other objectives may also have indirect landscape impacts, for instance loss of certain species.

In Scotland, Rural Stewardship Schemes (RSS) followed the cessation of new applications for ESAs up to 2006 when RSS also came to an end. Like the former ESA scheme, farmers (including crofters and common grazing committees) were encouraged to adopt environmentally friendly practices with the aim of maintaining or enhancing particular habitats and landscape features (Scottish Executive 2006).

Figure A4c.1 below indicates the distribution of ongoing ESAs – though now closed, a number of these schemes are valid until 2014. ESSs are geographically smaller and more numerous than ESAs and so cannot be meaningfully represented at a scale suitable for this SEA. Spatial data for ESSs is available from Natural England.

Register of Historic Landscapes and Historic Landscape Characterisation

The Register of historic landscapes of Wales describes 58 landscapes which are of particular historic interest and are regarded as a material consideration in planning decisions. 18 of these occur within SEA area 4, North and South Wales, and further reference is made to these in section A4i.1.2.3.

Historic Landscape Characterisation (HLC) is being carried out as part of a country-wide initiative in Wales, administered by each Welsh archaeological trust. Similarly, English Heritage has prepared HLC reports in association with local authorities and councils for almost two thirds of England. These are presented either in themed report form (e.g. Woodland, Industry) or interactive online GIS environments.

The European Landscape Convention

The European Landscape Convention (ELC) seeks to "promote landscape protection, management and planning, and to organise European co-operation on landscape issues" (Ch. 1 Art. 2), and encompasses "the entire territory of the Parties and covers natural, rural, urban and peri-urban areas. It includes land, inland water and marine areas. It concerns landscapes that might be considered outstanding as well as everyday or degraded landscapes" (Ch. 1 Art. 1). The convention came into force in the UK on 1st March 2007. Many of the current landscape designations for the UK satisfy the articles set out in the convention (Defra 2007a, Scottish Executive 2008), though it can be generally accepted that the treatment of landscape in countryside environments is better than that in urban areas (Defra 2005).

A number of draft policies have been proposed by English Nature partly as a result of the content of this recent convention, such as the Protected Landscapes, Future Landscapes and 'All Landscapes Matter' policies. These and other recent changes to landscape policy or related initiatives are listed and described in Appendix 3.

A4c.1.3 Overview of Designations

There are a number of statutory (AONBs and National Parks) and non-statutory (Heritage Coasts, World Heritage Sites) sites within the geographical scope of this SEA (Figure A4c.1). These areas are listed in Table A4c.1 which includes a summary of their main characteristics.

Figure A4c.1 – National Distribution of Landscape Designations

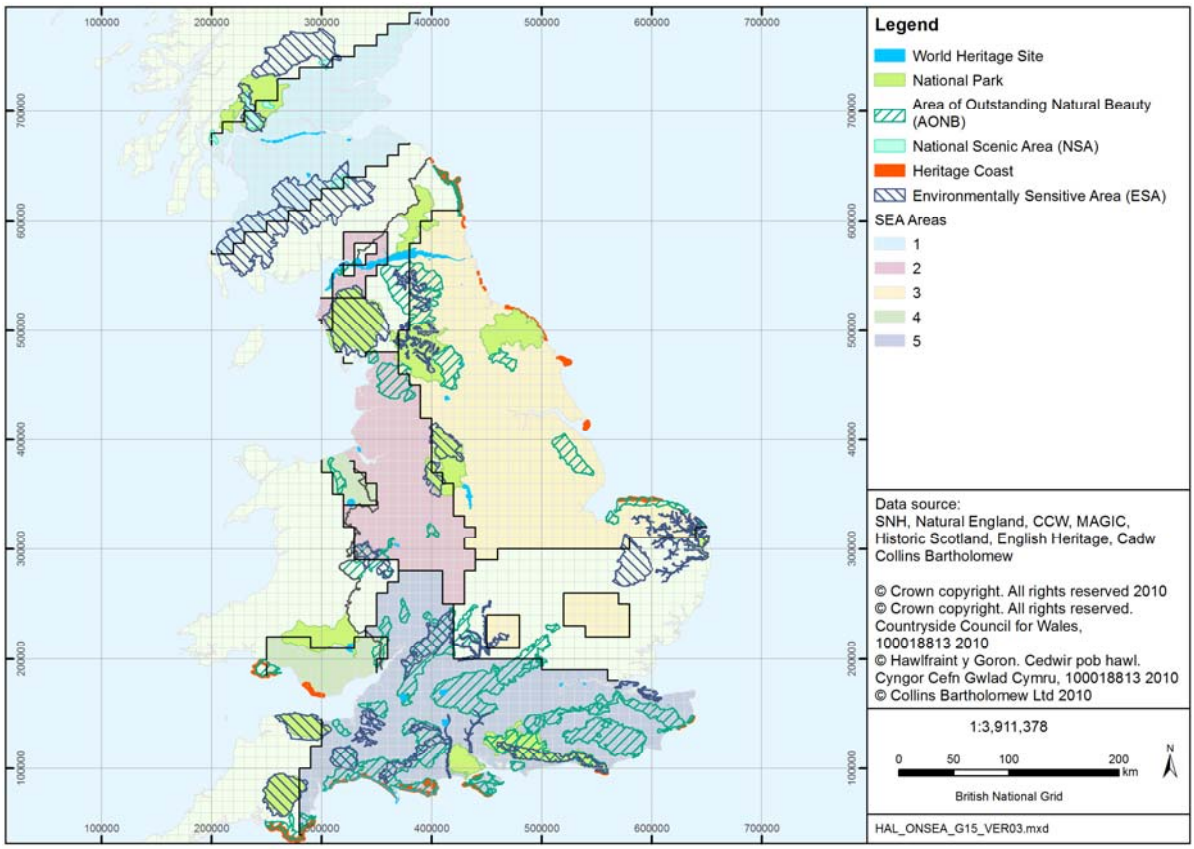


Table A4c.1 – Relevant Landscape Designations in each Regional Area

Site name	Designation	Summary
SEA Area 1: Scottish Midlands		
Lomond	ESA	See Loch Lomond NSA for landscape description.
Breadalbane	ESA	Supports significant and important areas of species-rich calcareous grasslands. Agricultural activity dominated by livestock production. Broadleaved woodlands present with commercial coniferous plantations in upland areas.
Central Southern Uplands	ESA	Much of the region characterised by smooth slopes and, subdued, rolling landforms. Hills dominated by heather moor and rough acid grassland, and there are extensive coniferous plantations, particularly in the upper Tweed valley. Ribbons of improved grassland penetrate into the hills following the major valleys of the Tweed, Yarrow, Ettrick and Teviot. Evidence of ancient settlement on the fringes of the upland valleys, together with Roman military features, medieval bastle houses and tower houses.
Western Southern Uplands	ESA	Characteristically smooth, conical peaks with extensive foothills and plateaux. Forestry and upland sheep farming are principal land uses, except in the dales where more cattle are grazed, arable crops and grass silage grown within walled and hedged enclosures. Main settlements and lines of communications are in the dales.

Site name	Designation	Summary
		The dales also contain major country seats and many features representative of a rich cultural history.
Loch Lomond and the Trossachs	NP	Rolling lowland landscapes in the south to high mountains in the north, with many lochs and rivers, forests and woodlands. Given proximity of much of Scotland's population, the Park is of high recreational value.
Kyle of Bute	NSA	NSA made up of a number of Landscape Character Types. Key ones are craggy upland, steep ridgeland and mountains but the island of Bute opposite creates the distinctive passage of the sea that counterbalances the landform.
Loch Lomond	NSA	Loch Lomond is fjord-like and narrow at the northern end and largely wooded along its entire length. Rich variety of deciduous woodland on loch shores and semi-natural woods on islands.
Trossachs	NSA	Extends from Ben Venue to the summit ridge of the Menteith Hills and centres upon Loch Achray and the eastern part of Loch Katrine. Complex landscape with knolls, craggy hills and rugged peaks which stand in contrast to the character of the adjacent lowland containing coniferous, deciduous and broadleaved woodland.
River Tay (Dunkeld)	NSA	Lies across the zone of transition of the River Tay as it joins with the River Braan and changes from a Highland to a Lowland river as it crosses the Highland Boundary Fault. The rivers flow between rugged hills and through richly-wooded designed landscapes. A landscape of waterfalls and rapids.
Upper Tweeddale	NSA	Covers part of the Tweed Valley between Broughton and Peebles. The course of the river is contained in a narrow steep-sided valley, flanked by high rounded hills. Diverse area containing woodlands, contrasting topography and historical landscape features, such as castles.
Edinburgh Old and New Towns	WHS	Recognised for its unique juxtaposition of Medieval Old Town and neoclassical Georgian planned New Town. A Cultural heritage site containing 4,500 buildings, over 75% of which are listed.
Antonine Wall (Frontiers of the Roman Empire)	WHS	The wall was the north-western frontier of the Roman Empire for a generation, constructed in the AD140s by the order of Emperor Antoninus Pius. The wall runs for 60km from modern Old Kilpatrick to Bo'ness.
SEA Area 2: West Midlands, North West England and Southern Scotland		
Arnside and Silverdale	AONB	Consists of small scale limestone hills and agricultural land sheltered by deciduous woodlands and valleys. A diverse landscape juxtaposing salt marsh, limestone cliffs and reclaimed mosses, with limestone pasture, rock outcrop and limestone pavements at higher altitudes.
Forest of Bowland	AONB	Geologically part of the Pennines, this area has a central core of incised gritstone fells and large areas of heather moorland. The fell's fringe of foothills is dissected by

Site name	Designation	Summary
		'cloughs', steep-sided valleys which open out into the rich green lowlands of the Ribble, Hodder, Wyre and Lune Valleys.
Cannock Chase	AONB	A remote area of high sandstone heather and bracken heathland with birch woodland and extensive pine plantations. The AONB encloses the last oak remnant of the ancient Cannock forest and provides semi-natural contrast to the regular agricultural landscapes of the Midlands. The heaths are the largest surviving heathland in the Midlands, transitional between high altitude moorlands and lowland heaths.
Shropshire Hills	AONB	The hills and valleys of the AONB run south-west, north-east with the line of rocks forming the Long Mynd and Stiperstones, Clun Forest, the Clee Hills, Stretton Hills and The Wrekin. The area ranges from fertile, lowland, pastoral landscape, to upland heath and moorland. The area has no large towns, though the towns of Shrewsbury and Telford have major leisure developments, and tourism is likely to become more important in the local economy.
Nith Estuary	NSA	The River Nith and the Lochar Water flow into the Solway Firth to form a wide tidal estuary comprising the Carse Sands, Blackshaw Bank and Priestside Bank. The NSA has an openness and horizontal scale unusual in Scotland, complemented by the granite cone of Criffel and the well-wooded ridge extending to Marthrown hill. The eastern flank of the hill has steep convex slopes with a mixture of woodland and moorland descending into the sylvan and pastoral landscape around New Abbey. To the east of the tidal channel of the Nith relief is low. The river at this point is broad and bordered by open fields, marshes and riverside trees in some places.
East Stewartry Coast	NSA	The wide tidal flats of Mersehead Sands occur at a point where the saltings of Preston Merse meet the fossil cliffs and raised beaches of the rocky Sandyhills coast. Sandyhills Bay is separated from Mersehead Sands by the intertidal stretch of the Southwick Water which adds interest to the wide expanse of sand. Inland the containing hills are part wooded and part moorland, and at Caulkerbush there is a diverse pattern of hedgerow trees, parkland and wooded hillside. Westwards the hills become progressively more wooded in a way which strengthens the feeling of enclosure to the inshore waters of Rough Firth, Orchardton Bay and Auchencairn Bay. Within the bays lie Heston Island and Rough Island. Around their shores the land use pattern of mixed farming and forestry and undulating relief contrasts well with the open character of the sand flats. The villages of Rockcliffe and Kippford add to the diversity of the scene, and elsewhere buildings tend to be of a traditional character.
Solway Coast	AONB	The coast has a characteristic 7.6m raised beach, and silting along the estuary has left considerable marine deposits. Openness is generated particularly at low tide

Site name	Designation	Summary
		which exposes mud-flats and salt-marsh. The area has a large number of wildfowl and seals, dolphins and porpoises may be spotted offshore. Cultural associations include Hadrian's Wall, an Elizabethan sea dyke and salt pans; and the remains of the redundant Carlisle Canal and railway line. This is a traditional agricultural area remote from large towns.
North Pennines	AONB	Also partly in SEA Area 3 – see below for details.
South West Peak	ESA	Mosaic of vegetation, small fields, traditional farm buildings, historical features, individual trees and woodlands combine to create an area rich in landscape, ecological and historic interest. The farming is based on sheep in the upland plateau and on dairying, with some beef and sheep on grassland in the surrounding hills and valleys. Environmental value lies in the mosaic of core moorland, moorland fringe and farmed upland.
North Peak	ESA	See East Midlands and Eastern England for details.
Lake District	ESA	Covers the central, western and southern parts of Cumbria, and mostly lies within the national park boundary (see below). The contrast between open fells, rugged mountains, rolling farmland, sheltered valleys and man-made influences (drystone walls, hedgerows) makes for spectacular scenery. Cairns, hillforts and earthworks including ancient field systems also make this area of archaeological importance. Agriculture is based around traditional hill sheep farming.
Shropshire Hills	ESA	The area contains a number of semi-natural habitats including grasslands, broadleaved woodlands, rivers and streams. Hillforts, earthworks and field systems attest to the continuous use of the area since prehistoric times, including more recent mining activity. Traditional land-use has consisted of beef cattle and sheep grazing.
Lake District	NP	Much of the Lake District consists of moorland and fell. The 16 lakes, the largest of which is Windemere, were formed by glacial meltwater. Around Skiddaw and in the south of the Park there are angular and rounded hills. Neolithic stone circles, like Castlerigg and Roman forts, like Hardknott, reflect Lakeland's long history. Townend at Troutbeck is an example of a local yeoman farmer's house. Former iron workings and more modern slate quarrying have also left their marks. Note that there is a current proposal to extend this designation.
St Bees Head	HC	A headland of red sandstone rising to 140m, this is the only stretch of Heritage Coast between Wales and Scotland. The area contains an RSPB reserve and a cliff edge path forms part of the Cumbria Coastal Way and Wainwright's Coast to Coast Walk.
Hadrian's Wall (Frontiers of the Roman Empire)	WHS	Also partly in SEA Area 3 – see below for details.
SEA Area 3: East Midlands and North East England		
North Pennines	AONB	This area covers the upland plateau at the northern end

Site name	Designation	Summary
		of the Pennine chain, which is characterised by expansive undulating heather moorland and blanket peat. The Tyne, Tees, Wear, Derwent and Allen rivers drain from the plateau forming valleys that each have their own distinct character. The area includes herb-rich hay meadows, juniper, alpine limestone flora and a diversity of moorland and wading birds. Parts are protected as a NP, SSSI, ESA and was Britain's first biosphere reserve. The area is also characterised by upland grazing (mainly sheep), limestone quarrying, mineral working and a legacy of extensive lead mining.
Nidderdale	AONB	The area spans from the east of the Yorkshire Pennines, south and east to the edge of the Vale of York. The area is crossed by deep pastoral, often wooded dales of the Washburn, Laver, Burn and the long dale of the Nidd itself. Millstone grit and an accompanying cover of heather moorland further characterise the area and contrast with the pastoral landscape elsewhere.
Howardian Hills	AONB	The irregular 180m ridges of the Howardian Hills are effectively an extension of the limestone rocks of the North York Moors. The area combines arable land, pasture and managed woodland.
Lincolnshire Wolds	AONB	The chalk hills of the wolds run northwest to southeast between the Humber and the Wash. The area is traditionally open grassland and hedged fields, much of which has been lost to ploughing for arable farming. The chalk geology characterises much of the topography of the area. Traditional oak, oak, ash and hazel coppice are managed in order to preserve their character. The economy is largely arable, with intensive cereal cultivation, though mineral extraction also takes place.
Norfolk Coast	AONB	Consists of sand and mud flats, dunes, shingle, saltmarsh, reedbeds and grazing marsh in addition to soft, eroding cliffs of glacial sands and gravels east of Weybourne and the farmland, estates and woodland of the coastal hinterland, with important areas of heathland.
Pennine Dales	ESA	Predominately upland pastoral character. Although each dale has its own landscape character, there is a strong unifying pattern of enclosure created by the traditional drystone walls and numerous stone built field barns. Contains greatest concentration of traditionally managed meadows and pastures in England containing a wide diversity of flora and providing an important habitat for ground-nesting birds
North Peak	ESA	Landscape value of the area lies in the remote and extensive nature of the moorland and the contrasting enclosed patterns which are limited to the valleys around the moorland fringe. Historic interest includes Mesolithic settlements, medieval tracks and field patterns, peat cutting, traditional stone farm buildings and old quarrying and mineral extraction sites.
South West Peak	ESA	See West Midlands and North West England for details.

Site name	Designation	Summary
Breckland	ESA	Central plateau characterised by intensively cropped arable land, interspersed with a fragmented network of internationally important lowland heaths which provide valuable habitats for a diversity of flora and fauna. Line and belts of Scots pines are an important landscape feature, whilst the large-scale conifer plantations dominate the background. In the west, the rich, organic, black soil and the lower lying, flat landform creates fenland landscapes which are typically in arable production. Wealth of historical and archaeological features ranging from prehistoric earthworks to buildings and structures.
Broads	ESA	One of the few remaining large areas of lowland river grassland in Britain. The 'Broads' are shallow lakes, probably the result of medieval peat workings, concentrated in the Ant, Bure, Thurne and Yare River valleys often fringed by fen and reedbeds with associated areas of carr woodland. Long history of settlement has left a legacy of historical and archaeological features. Supports many rare and interesting species of plant, invertebrate and bird life.
North Northumberland	HC	Stretches from Berwick-upon-Tweed to Amble. A low-lying coast with long views. Coastal dunes are broken by low rocky headlands and coves of Whin Sill basalt. The dunes marshes and mud-flats are important for their waterfowl and are recognised in conservation designations (e.g. Northumbria Coast SPA). The coast is largely undeveloped and a lack of coastal infrastructure contributes to its remoteness, though tourist pressure is rising.
Durham	HC	Stretches between Tyne and Wear and Teesside, characterised by Magnesian limestone grasslands cliffs, pebble and sandy beaches. Designated in 2001 after a substantial transformation of the coastline following a legacy of colliery waste dumping. The area has renewed tourist potential.
North Yorkshire and Cleveland	HC	The seaward edge of the North York Moors National Park. High cliffs cut by bays characterise the coast. The area is a SSSI and is of special geological interest.
Flamborough Head	HC	Probably the finest line of chalk cliffs in the country, rising at Bempton to 130 metres. Clay and chalk geology home to a distinct flora and a mainland gannet colony.
Spurn	HC	This area comprises the curving hook of shingle and sand which makes up the tip of the eastern part of the mouth of the Humber and is home to many migratory bird species in spring and autumn.
North Norfolk	HC	Consists of sand and mud flats, dunes, shingle, saltmarsh, reedbeds and grazing marsh in addition to soft, eroding cliffs of glacial sands and gravels east of Weybourne and the farmland, estates and woodland of the coastal hinterland, with important areas of heathland.
Northumberland	NP	The National Park stretches from Hadrian's Wall through

Site name	Designation	Summary
		the valleys of Tyne and Rede to the Cheviot Hills on Scotland's border.
North York Moors	NP	Holds the largest expanse of heather moorland in England. Red pantile roofs and sandstone give the cottages of the park a distinctive character.
Yorkshire Dales	NP	The area is largely characterised by limestone, which includes landscape features such as cliffs, gorges and pavements, and has also leant character to the cultural landscape of drystone walls, barns, stone-built villages surrounded by an otherwise largely pastoral landscape. Millstone grit often overlies the limestone, over which heather is often present. Both prehistoric field systems and Scandinavian place names allude to the past, as has lead mining which peaked in the 19th century. Note that there is a current proposal to extend this designation.
Peak District	NP	Deep dales and undulating fields characteristic of limestone areas extensively feature, with the White Peak at the centre of the park. Millstone grit covered in heather moorland almost surrounds the Dark Peak, which has precipitous edges. The largest town in the park id Bakewell. Great houses, such as Chatsworth and Haddon Hall, are among the Park's notable attractions, and Magpie Mine near Sheldon is evidence of former lead working.
Broads	NP	This area was designated under its own Act of Parliament in 1989. The broads consist of peat-pits dug in the medieval period, connected to interior lakes by dykes, allowing lock-free navigation. Fen and carr woodland and drained marshland are characteristic of the area.
Hadrian's Wall (Frontiers of the Roman Empire)	WHS	The site consists of sections of the border line of the Roman Empire at its greatest extent in the 2nd century A.D., part of what is known as the "Roman Limes". The Limes stretched over 5,000km from the Atlantic coast of northern Britain, through Europe to the Black Sea, and from there to the Red Sea and across North Africa to the Atlantic coast. Vestiges in this site include remains of the ramparts, walls and ditches, watchtowers, forts, and civilian settlements. "Hadrian's Wall" previously inscribed on the World Heritage List, is part of the transnational property "Frontiers of the Roman Empire".
Derwent Valley Mills	WHS	The Derwent Valley contains a series of 18th and 19th century cotton mills and an industrial landscape of high historical and technological interest. The modern factory owes its origins to the mills at Cromford, where Richard Arkwright's inventions were first put into industrial-scale production. The workers' housing associated with this and the other mills remains intact and illustrate the socio-economic development of the area.
Saltaire	WHS	A complete and well-preserved industrial village of the second half of the 19th century. Its textile mills, public buildings and workers' housing are built in a harmonious style of high architectural standards and the urban plan

Site name	Designation	Summary
		survives intact, giving a vivid impression of Victorian philanthropic paternalism.
Studley Royal Park and Fountain Abbey Ruins	WHS	A striking landscape was created around the ruins of the Cistercian Fountains Abbey and Fountains Hall Castle, in Yorkshire. The 18th century landscaping, gardens and canal, the 19th century plantations and vistas, and the neo-Gothic castle of Studley Royal Park, make this an outstanding site.
SEA Area 4: North and South Wales		
Clwydian Range	AONB	Geological variation (Silurian rocks to carboniferous limestone) is responsible for the distinct landscape of the range. Upland areas are dominated by heather moorland, with hedged fields and coppice woodlands on the lower slopes. Iron-age hillforts form one of the principle archaeological elements of interest in the landscape. Land use in the area ranges from hill sheep to mixed dairy, cattle and arable farming.
Wye Valley	AONB	This AONB reaches substantially inland from the coast. Riparian limestone scenery is made up of sheer wooded cliffs as the river has cut down into the rock. Open valley reaches with rounded hills and bluffs make up much of the intervening countryside.
Gower	AONB	Scenery ranges from the south coast's carboniferous limestone scenery at Worms Head and Oxwich Bay to salt-marshes and dune systems in the north. Inland, the most prominent features are the large areas of common, dominated by sandstone heath ridges. Secluded valleys have rich deciduous woodland and the traditional agricultural landscape is a patchwork of fields characterised by walls, stone-faced banks and hedgerows.
Glamorgan	HC	Extends between Aberthaw and Porthcawl, the area has a diversity of coastal landscape features including low cliffs, coves and extensive sand dunes (e.g. at Merthyr Mawr). Dunraven Bay is notable for its sandstone cliffs which back the beach. There are several Blue Flag beaches including Dunraven Bay, Trecco Bay and rest Bay.
Gower	HC	Includes the coastal elements of the Gower AONB described above.
Brecon Beacons	NP	The Brecon Beacons is a remote part of Wales with contrasting woodlands, reservoirs, waterfalls, caves and windswept uplands. The area supports a diverse array of natural and cultural heritage features and provides recreational access. A section of the park is part of the European Geopark network, which aims to preserve geological heritage.
Pontcysyllte Aqueduct and Canal	WHS	Pontcysyllte Canal is a feat of civil engineering of the Industrial Revolution, completed in the early years of the 19th century. The building of the canal required substantial, bold civil engineering solutions, especially as it was built without using locks. The aqueduct is a

Site name	Designation	Summary
		pioneering masterpiece of engineering and metal architecture, conceived by the civil engineer Thomas Telford. The use of both cast and wrought iron in the aqueduct enabled the construction of arches that were light and strong, producing an overall effect that is both monumental and elegant.
Blaenavon Industrial Landscape	WHS	The area around Blaenavon is evidence of the pre-eminence of South Wales as the world's major producer of iron and coal in the 19th century. All the necessary elements can still be seen - coal and ore mines, quarries, a primitive railway system, furnaces, workers' homes, and the social infrastructure of their community.
SEA Area 5: Southern and South West England		
Wye Valley	AONB	The area has Britain's most southerly example of Carboniferous limestone scenery, with gorges, dry valleys and sink holes being prominent features - Cheddar Gorge and Wookey Hole Caves being excellent examples of such features.
Malvern Hills	AONB	Notably varied geology gives the AONB a series of differing landscapes. The ridge, with its high open stretches of semi-natural grassland, owes its hogsback skyline to heavily folded and faulted pre-Cambrian rocks. Sandstones and marls underlie the fertile arable plain to the south-east. To the west, alternate limestone and sandstone beds undulate in pastoral scarps and vales with a pattern of meadows, fields and orchards and a maze of narrow lanes. The ridge is crowned by three ancient hill forts.
Cotswolds	AONB	The Cotswold Hills rise gently west from the broad, green meadows of the upper Thames to crest in a dramatic escarpment above the Severn valley and Evesham Vale. Jurassic limestone gives the Cotswolds their distinctive character. Steep scarp slope in the west drained by short streams in deep cut wooded valleys, and a gentle dip slope which forms the headwaters of the Thames. This gentle slope has a maze of lanes connecting picturesque streamside villages built predominantly from local stone.
Mendip Hills	AONB	The Mendips' most dramatic landscape is the famous Cheddar Gorge and Wookey Hole Caves. The Mendips rise to a high, bare plateau, criss-crossed by drystone walls and rich in archaeological remains. Other areas of the AONB are well-wooded with a prosperous farmland fringe. Distinctive landscape features include dew ponds and drystone walls and the 'gruffy ground' of old mine workings.
Quantock Hills	AONB	The area runs north-west from the Vale of Taunton Deane to the Bristol Channel coast. The ridge which makes up this area is surrounded by an agricultural plain, and has elements of heathland and sessile oak which are diminished in southern England.
Blackdown Hills	AONB	High, elevated plateau of improved enclosed grassland

Site name	Designation	Summary
		and cultivated land, deeply dissected by narrow valleys where land use is dominated by enclosed permanent grassland with a strong pattern of hedgebanks and frequent hedgerow trees. Between the plateau and the lower farmland is a discontinuous belt of greensand often dominated by woodland and semi-natural vegetation, in particular springline mires. Northern part comprises a long north facing escarpment with extensive areas of woodland, and improved and semi-improved grassland. Rich historic heritage includes extensive remains of small-scale industry, such as lime kilns, marl pits and mills.
East Devon	AONB	East Devon, from Lyme Regis to Exmouth, is characterised at the coast by red sandstone cliffs, broken by chalk at Beer Head. Inland the area rises to a high flat plateau incised by the rivers Axe, Sid and Otter.
South Devon	AONB	The South Devon AONB stretches from Torbay to the outskirts of Plymouth. The coast ranges from cliffs (Bolt Head), sandy beaches (Slapton Sands) and wooded estuaries (Dart, Kingsbridge) and some of Britain's best ria coastline.
Dorset	AONB	The Dorset AONB is underpinned by a curving chalk ridge which runs from the upland Axe, east to the Stour Valley and a southern section circles Dorchester and reaches the Isle of Purbeck. The area has downland and heath the likes of which are now diminished in southern England.
Cranborne Chase and West Wiltshire Downs	AONB	To the south, the smooth rounded downs, steeply cut combes and dry valleys of Cranborne Chase display a typical chalk landscape. To the north, the Wiltshire Downs are more varied and broken, with shapely knolls and whaleback ridges. Traditional downland pasture now largely confined to steeper slopes but large rectangular fields emphasise the chalkland's open character. The AONB's sandstone fringe of wooded ridges and valleys includes rich parklands such as Longleat and Stourhead.
North Wessex Downs	AONB	One of the largest and least affected by development, tracts of chalk downland in southern England. The AONB's richly farmed valley landscapes contrast with the chalk uplands. The downs are dotted with barrows and other prehistoric features. In places, distinctive white horses have been cut into the chalk. The Neolithic stone circle at Avebury and surrounding monuments are included in a World Heritage Site.
Isle of Wight	AONB	There are five separate areas of land across the island constituting the AONB, representing different attributes of the island. These include: chalk and sandstone cliffs, salt-marsh and mud-flats, chalk farmland, wooded dairy pasture, heathland, hay meadows and distinctive 'chines'.
Chichester Harbour	AONB	Features range from tidal inlets and creeks, salt-marsh, intertidal mudflats, orchards and historic harbour settlements with a distinctive vernacular. The tidal flats

Site name	Designation	Summary
		and saltings in the area are extensive, and host wildfowl, waders and a rich plant and invertebrate diversity.
East Hampshire	AONB	Two very different landscapes typify this richly farmed and deeply rural AONB. In the south and west, the rolling chalk downland characterised by dry valleys and dotted woodland is a natural extension of the Sussex Downs. In contrast, a series of steep, heavily wooded scarp slopes form the northern and eastern third of the AONB, meeting the Surrey and Sussex borders in heaths and woodland. The downs, with their flora-rich remnants of unimproved pasture, are also an important archaeological area. East Hampshire's superb broadleaved woodlands of hanger beech, ash, wych elm and lime form one of the most important of such areas in Britain.
Sussex Downs	AONB	This designation meets the sea with significant cliffs including Beachy Head and the Seven Sisters. Lowland heath and chalk grassland are important habitats in the area, as are the ancient downland turfs which are now quite depleted.
Surrey Hills	AONB	Chalk landscape of hills and beech-wooded combes with a steep scarp crest looking south to the Weald. The downs are paralleled to the south by an undulating wooded greensand ridge. In the west, sandy open heathland, typified by Frensham Common, stretches to the Hampshire border.
Kent Downs	AONB	This area includes the southeast's outcrop of chalk. Dip slopes and dry valleys of the chalk ridge are of wildlife importance and include unimproved grassland, scrub communities and broadleaved woodland. Kentish hop gardens, orchards and historic parklands are also important features.
High Weald	AONB	Much of this AONB is located inland and consists of a hilly area of ridges and valleys with the highest proportion of ancient woodland in the country. The area meets the sea at Hastings. The built environment is characterised by brick, tile and weatherboard houses, oasthouses, and traces of the Wealden iron industry.
North Kent Marshes	ESA	Distinctive, exposed, flat landscape of pasture and arable land. Agricultural land predominates, with over half being in grassland. Most have been enclosed by sea walls since medieval times to prevent flooding. Beyond the sea wall, mudflats and saltings are common. The ESA is bounded by a belt of higher 'upland' which forms a pronounced landscape feature defining the southern boundary. There is considerable archaeological interest in the ESA, ranging from prehistoric sites to medieval salt-working mounds and more recent armament production and defensive sites. Much of the archaeological interest is believed to be buried under the alluvium.
South Downs	ESA	Recognised as one of the most important chalk landscapes in England and most of the area has been

Site name	Designation	Summary
		designated as an AONB. Inhabited since ancient times and very rich in historical features, including defensive sites, burial mounds and field boundaries. The traditional sheep grazing on the Downs has given rise to the characteristic closely grazed chalk downland turf.
Test Valley	ESA	River Test meanders through chalk downland and divides into many channels and streams which flow through pasture interspersed with trees. The distinct linear form of the landscape is emphasised by the drifts of tree cover at the water's edge. Past management and the retention of high water levels have led to the occurrence of extremely diverse plant communities. Most notable historical features are the remains of old water meadow systems from the 17th and 18th Century.
Avon Valley	ESA	River Avon is one of the finest chalk rivers in England, with a pastoral landscape that has evolved over centuries through farming of the naturally fertile flood plain. Combinations of grassland, streams, small woods, scrub and willow car create a varied landscape of high value. The middle reaches of the river have the highest concentration of traditional water meadows in England and there are archaeological remains dating from prehistoric times to more recent industrial monuments.
South Wessex Downs	ESA	Indented sweeping scarp slopes, cultivated rolling dip slopes and sheltered stream valleys combine to produce a landscape of great quality. Contains a large proportion of the remaining semi-natural chalk grassland. Diverse range of features of historical and archaeological importance ranging from single earthworks to complex sites.
Blackdown Hills	ESA	High, elevated plateau of improved enclosed grassland and cultivated land, deeply dissected by narrow valleys where land use is dominated by enclosed permanent grassland with a strong pattern of hedgebanks and frequent hedgerow trees. Between the plateau and the lower farmland is a discontinuous belt of greensand often dominated by woodland and semi-natural vegetation, in particular springline mires. Northern part comprises a long north facing escarpment with extensive areas of woodland, and improved and semi-improved grassland. Rich historic heritage includes extensive remains of small-scale industry, such as lime kilns, marl pits and mills.
Dartmoor	ESA	Highest and most extensive upland area in southern England. Centred on, and underlain by, a granite massif rising out of the sedimentary rocks which underlie most of the rest of Devon. The upland supports a central moorland core of semi-natural heath, bog and grassland habitats which is surrounded by lower enclosed farmland. The range of wildlife habitats and archaeological features, as well as other landscape elements, such as the network of walls, banks and hedges enclosing the lower farmland, combine to produce the unique landscape of Dartmoor.

Site name	Designation	Summary
Exmoor	ESA	Diverse landscape is centred on a smoothly moulded upland core and includes coastal cliff, high moorland, fringe hill slopes of enclosed land, incised wooded valleys, and a scattering of villages and isolated farmsteads. The area is rich in archaeological sites dating from the stone age to nineteenth century industrial remains.
Cotswold Hills	ESA	Diverse landscape characterised by limestone upland where the dramatic scarp and secluded, steep grassland valleys contrast with the open, expansive cultivated wold tops. Large open arable fields, bounded by dry stone walls characterise the wold tops whilst in the valleys hedges bound the smaller grass fields. Unimproved and semi-improved limestone grassland located on the steeper slopes of the valleys and escarpment. Wealth of archaeological interest ranging from Neolithic Long Barrows and Iron Age Hill Forts to extensive Roman and Romano British Settlements.
The Upper Thames Tributaries	ESA	The river valleys incorporate elements of lowland river landscape, such as pasture and meadow hedgerows, pollarded riverside willows, parkland and copses, as well as stone river bridges. The Thames and the Ray contain the wide, flat and open areas, such as Otmoor, whilst the upper reaches of the Windrush and Evenlode valleys form part of the Cotswolds Area of Outstanding Natural Beauty and are characterised by complex meandering rivers that are contained by gently rising land. Wealth of archaeological remains, ranging from those which date from prehistoric times to more recent industrial structures, used particularly for milling and communication.
Avon Valley	ESA	River Avon is one of the finest chalk rivers in England, with a pastoral landscape that has evolved over centuries through farming of the naturally fertile flood plain. Combinations of grassland, streams, small woods, scrub and willow car create a varied landscape of high value. The middle reaches of the river have the highest concentration of traditional water meadows in England and there are archaeological remains dating from prehistoric times to more recent industrial monuments.
South Foreland	HC	Includes a section of the white cliffs of Dover and the Saxon Shore Way along St Margaret's Bay. Covers 6.9km from Dover to Kingsdown near Deal.
Dover-Folkstone	HC	7.2km in length, the area encompasses a section of the white chalk cliffs at Dover and part of the Saxon Shore Way.
Sussex	HC	Comprises the eastern end of the South Downs, terminating at the coast in the chalk cliffs of Beachy Head and the Seven Sisters.
Hamstead	HC	Contains the drowned estuary of Newtown River. The area includes saltmarsh and mudflats which harbour overwintering birds. The clay and limestone cliffs are rich in fossils unique to this area of Britain.

Site name	Designation	Summary
Tennyson	HC	This area includes 'The Needles', high chalk cliffs and 'chines' (steep chalk gullies) unique to the Isle of Wight.
Purbeck	HC	The area ranges between Poole Harbour and Studland. The area includes excellent examples of chalk and limestone cliffs.
West Dorset	HC	This area includes the vast shingle beach at Chesil, which forms a tombolo at its eastern end, joining the island of Portland to the mainland.
East Devon	HC	Red sandstone cliffs with pebble beaches contrast markedly with the white chalk cliffs which outcrop at Beer. The coast forms part of Britain's longest national trail, the 'South West Coast Path'. Tourist pressures have made screening and landscaping of facilities an important management issue.
Exmoor	NP	The moorland plateau terminates with the tallest cliffs in England, overlooking the Bristol Channel coast. Inland, the grass moorland of the former Royal Forest is surrounded by heather-covered moors, intersected by roundsided combes. Lynton and Lynmouth form the largest settlement, and have traditional stone and slate buildings which contrast with more ornate Victorian structures. The Vale of Porlock villages have colour-washed cob, stone and thatched cottages. Bronze Age burial mounds and stone circles, Iron Age hillforts, Roman fortlets, medieval castles, bridges, farmsteads, and unique rural industrial sites are preserved within the agricultural and moorland landscape.
New Forest	NP	Ancient woodland, bog, heathland and unspoilt coastline with views of the Solent and Isle of Wight. It uniquely supports a medieval forest and pastoral system. The National Park is of nature conservation interest in addition to being a working and recreational landscape.
South Downs	NP	This area has been proposed for national park designation. A public enquiry closed on 4th July 2008 and a decision is expected in early 2009. The area reaches the coast only in its eastern extent in East Sussex between Seaford and Eastbourne.
Dartmoor	NP	Dartmoor consists of two, high, boggy plateaux divided by the River Dart. Surrounding them is rocky land which has dramatic stone outcrops (tors). The softer river valleys, with their ancient clapper bridges, provide a contrast to the stark magnificence of the moors. There are many standing stones, Bronze and Iron Age hut circles and hillforts as well as tin mining remains. The last mine closed in 1939.
Downs	Somerset Levels and ESA	Forms the largest lowland grazing marsh system in Britain and is, consequently, of outstanding environmental interest. The landscape value lies within the rectilinear pattern of traditionally managed fields and drainage channels within a low-lying, generally wet and open grassland landscape, containing scattered trees and scrub. The archaeology and history of the area is

Site name	Designation	Summary
		internationally famous, with many prehistoric wooden trackways, preserved by the waterlogged ground conditions.
Dorset and East Devon Coast	WHS	Known as The Jurassic Coast, this National Park covers 95 miles of coastline from East Devon to Dorset, with rocks recording 185 million years of the Earth's history.
Stonehenge Avebury	WHS	Stonehenge and Avebury are among the most famous groups of megaliths in the world. The two sanctuaries consist of circles of menhirs arranged in a pattern whose astronomical significance is still being explored. These holy places and the nearby Neolithic sites are an incomparable testimony to prehistoric times.
City of Bath	WHS	Founded by the Romans as a thermal spa, Bath became an important centre of the wool industry in the Middle Ages. In the 18th century, under George III, it developed into an elegant town with neoclassical Palladian buildings, which blend harmoniously with the Roman baths.
Canterbury Cathedral, St Augstine's Abbey and St. Martin's Church	WHS	Canterbury has been the seat of the spiritual head of the Church of England for nearly five centuries. Canterbury's other important monuments are the modest Church of St Martin, the oldest church in England; the ruins of the Abbey of St Augustine, a reminder of the saint's evangelizing role in the Heptarchy from 597; and Christ Church Cathedral where Archbishop Thomas Becket was murdered in 1170.
Royal Botanic Gardens of Kew	WHS	This historic landscape garden features elements that illustrate significant periods of the art of gardens from the 18th to the 20th centuries. The gardens house botanic collections that have been considerably enriched through the centuries. Since their creation in 1759, the gardens have made a significant and uninterrupted contribution to the study of plant diversity and economic botany.
Westminster Palace, Westminster Abbey and Saint Margaret's Church	WHS	Westminster Palace, rebuilt from the year 1840 on the site of important medieval remains, is a fine example of neo-Gothic architecture. The site – which also comprises the small medieval Church of Saint Margaret, built in Perpendicular Gothic style, and Westminster Abbey, where all the sovereigns since the 11th century have been crowned – is of great historic and symbolic significance.
Tower of London	WHS	The massive White Tower is a typical example of Norman military architecture, whose influence was felt throughout the kingdom. It was built on the Thames by William the Conqueror to protect London and assert his power. The Tower of London – an imposing fortress with many layers of history which has become one of the symbols of royalty – was built around the White Tower.

Source: English Heritage website, Natural England website, Scottish Natural Heritage Website, Antonine Wall WHS website (http://www.antoninewall.org/), DCMS UK World Heritage Site Portal (http://www.ukworldheritage.org.uk/), NAAONB website (http://www.aonb.org.uk/), Southern Wales website (http://www.southernwales.com/downloads/189.pdf)

A4c.1.4 Landscape Indicators

The range of indicators used to assess the evolution of the baseline for landscape is presented in Table A4c.2 and these are discussed in the sections which follow.

Table A4c.2 – Landscape Indicators

#	Indicator	Region[1]
8	**Changes to landscape character†**	E
9	**Tranquil areas†**	E, W
10	**Light Pollution†**	UK

*Note: *signifies a framework indicator – those shared by the UK Government and the devolved administrations. †additional indicator not included in the UK government sustainable development strategy.*
[1]Region refers to that for which data is available: E=England, W=Wales, S=Scotland, UK=United Kingdom

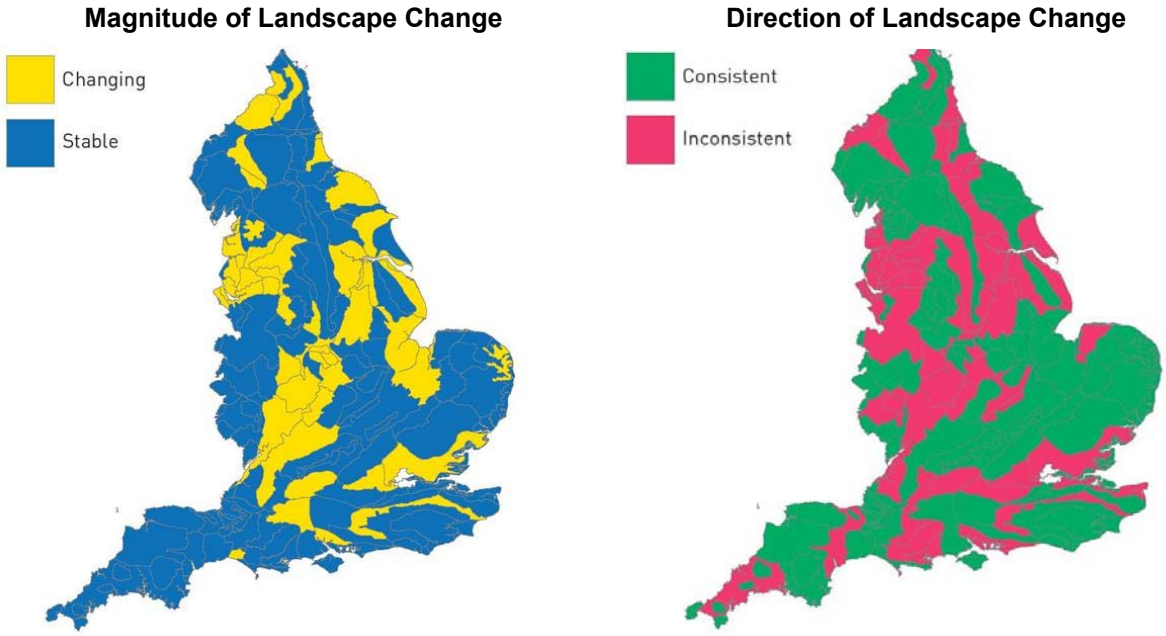
A4c.1.4.1 Changes to Landscape Character

English National Character Areas (NCAs), defined by Natural England, have been adopted as the spatial framework in which to assess the change in landscape character between 1999 and 2003 as part of the Countryside Quality Counts (CQC) project (Haines-Young 2007). Haines-Young (2007) considered change over this period using seven themes and each area was assigned one of four categories based on observed magnitude and direction of change.

- Woodland and trees
- Boundary features
- Agricultural land cover
- Settlement and development plans
- Semi-natural habitats
- Historic features
- River and coastal features

The results of the study indicated that 71% of England's landscapes were 'stable' between 1999 and 2003, with 62% of the country experiencing landscape changes consistent with local character. As might be expected, much of the 'stable' areas are also those which have a consistent character (Figure A4c.2).

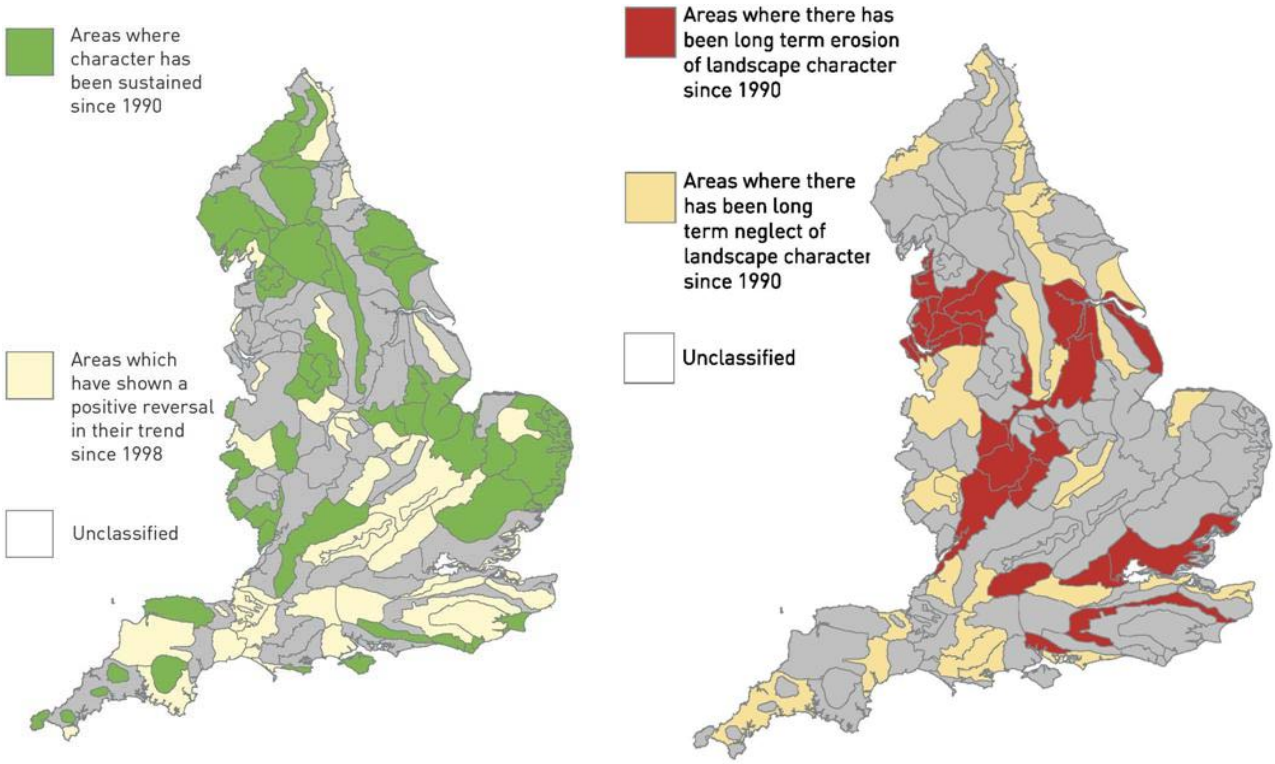
Figure A4c.2 – Magnitude and Direction of Landscape Change in each National Character Area, 1999-2003



Source: Haines-Young (2007)

A comparison of results from the previous (1990-1998) and most recent (1999-2003) CQC studies reveal that the number of NCAs which have a pattern of change which has a maintained or enhanced character has increased from 36% to 61%, while the number experiencing neglect or loss of character appears to have decreased (Figure A4c.3). Some of these changes may be related to a refinement in the assessment methodology between the studies, but this will not be the case in all regions. 42 out of 100 NCAs which displayed changes inconsistent with landscape character between 1990 and 1998 showed a slowing or reversal of this degradation in the years leading up to 2003 – these areas were mainly in central and southern England (Haines-Young 2007). Those areas which did not show a recovery are mainly to be found in the West-Midlands, Yorkshire, the Humberside Region and North West.

Figure A4c.3 – Comparison between the First and Second CQC assessments



Source: Haines-Young (2007)

A4c.1.4.2 Tranquil Areas

Tranquillity is a measure of the degree of naturalness, remoteness, or indeed intrusion by manmade structures and noise. The ease with which individuals are able to experience tranquil areas of the countryside away from major roads and urban or industrial environments may be declining. The Campaign to Protect Rural England (CPRE) has created a measure of tranquillity which utilises not only natural or anthropogenic aspects which are likely to contribute or detract from a sense of tranquillity, but people's own perceptions of tranquillity derived from a national survey. The result is a 500x500m^2 tranquillity map of England, each square having being given a tranquillity score.

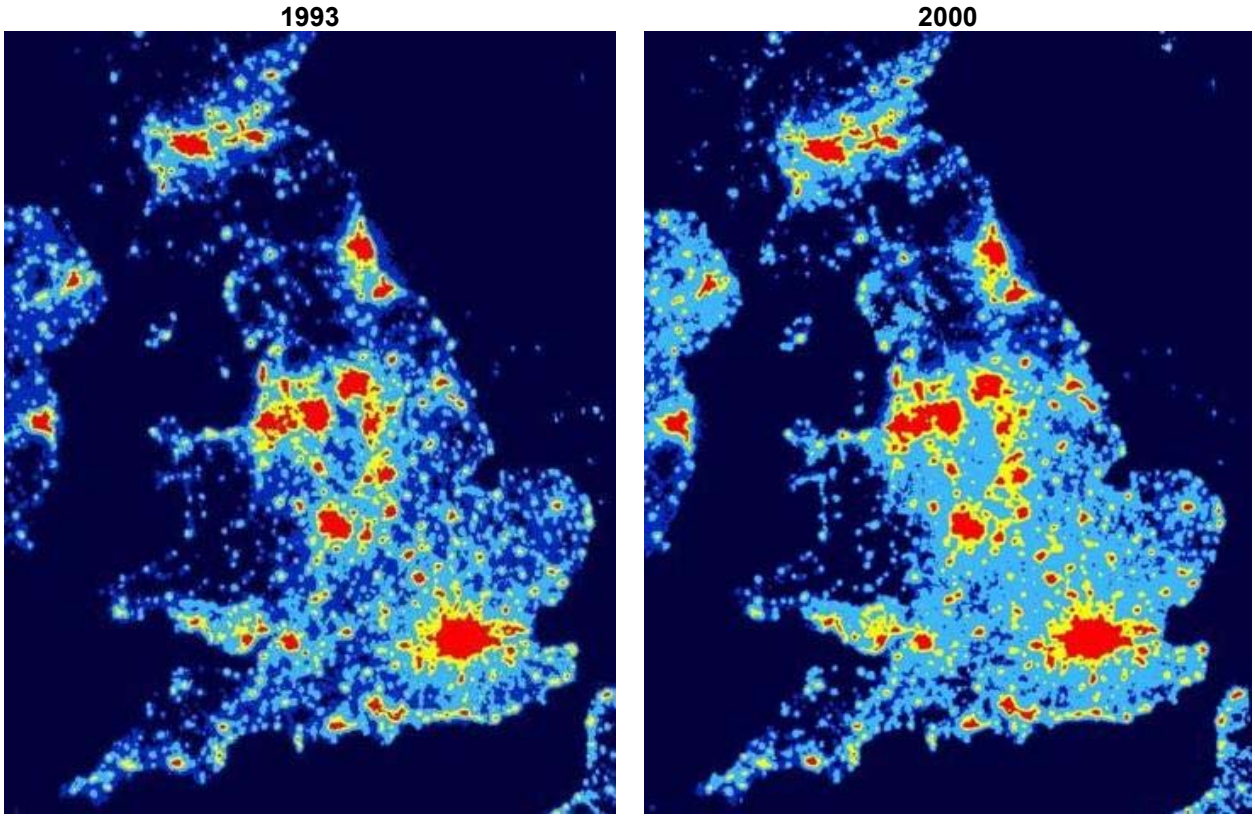
The least tranquil areas tend to be urban centres and those near major route ways. Previous studies of tranquillity conducted by CPRE indicated a total loss of tranquillity amounting to 21% between the 1960s and 1990s, with the south-east faring worst, with less than 40% of land remaining tranquil in the early 1990s.

The Tranquillity map for Wales was updated in 2009, following on from that produced in 1997. The three zones identified in the map apply to areas subject to significant disturbance (Zone B), that somewhat disturbed (Zone C), and those areas undisturbed. A comparison of the resulting maps indicates a reduction of 1,500km^2 undisturbed areas, equivalent to 6% of the land area of Wales. There was also a ~7% rise in areas falling within Zone B and C categories.

A4c.1.4.3 Light Pollution

Light pollution is generated from artificial light used to illuminate towns, cities and roadways, and is worsened by inefficient lighting which allows light to escape upwards limiting the ability to observe the night sky. Figure A4c.4 indicates how the level of light pollution altered over a seven year period from 1993 to 2000. Data was collected from US weather satellites which typically track cloud cover at night (CPRE website). The resulting figure indicates the intensity and distribution of light pollution in the UK at a spatial resolution of 1km^2. The key indicates the level of light pollution, the figures attached to each band representing arbitrary numbers with 0 indicating that the sensor of the satellite detected no light, and 255 indicating light sensor saturation.

Figure A4c.4 – National Light Pollution Levels



Light pollution is centred on major urban areas, with a noticeable increase in the light levels of suburban areas between 1993 and 2000.
Table A4c.3 indicates the percentage area of England, Wales and Scotland in each of the light bands indicated above, and the percentage of the area of each country moving up or down a light band between 1993 and 2000. Guidance on lighting which avoids pollution of the night sky or other local disturbance of communities is available (ODPM 1997) via the Communities and Local Government website, and inappropriate lighting which is deemed to constitute a nuisance is now regulated under the Environmental Protection Act 1990.

Table A4c.3 – Percentage Change in Light Pollution for England, Wales and Scotland, 1993-2000

						% of area moving up or down a band between 1993 and 2000	
Band						**Increased light**	**Decreased Light**
England	11	16	51	14	7	26	2
Wales	62	17	17	3	2	17	1
Scotland	46	16	28	8	1	19	4
Total	31	17	38	10	4	24	2

Source: CPRE website

A4d.1 Water Environment

The availability of water resources in the UK are spatially controlled not only by the amount and distribution of precipitation, but the nature of watercourses and the underlying geological controls on aquifer capacity and efficiency – the distribution of water supply and demand is also often spatially disparate. The demand for water and its availability have to be controlled in a manner which not only prevents a shortfall in supply for economic and social reasons, but also for pollution and flood control purposes, and so that ecological habitats dependent on good water quality and quantity are not disturbed. This section describes the character, existing pressures and trajectory of key water resource indicators for areas relevant to this SEA.

A4d.1.1 Regulatory Context

A4d.1.1.1 The Water Framework Directive (WFD)

In the UK, the principles of the Water Framework Directive (2000/60/EC) have been implemented through the Water Environment and Water Services (Scotland) Act 2003 and the Water Environment (Water Framework Directive) (England and Wales) Regulations 2003. The Water Framework Directive covers all surface waters (rivers, lakes, estuarine and other transitional waters and coastal waters), groundwater and terrestrial ecosystems which are dependent on groundwaters. The directive aims to take a holistic approach to water management, preventing deterioration of aquatic ecosystems and restoring surface waters and groundwater to "good status" in terms of ecological and chemical objectives for surface waters and quantitative and chemical objectives for groundwater. The Directive also aims to ensure that protected areas such as bathing waters and drinking waters also achieve their objectives.

Two "daughter" directives accompany the WFD; the Groundwater Directive (2006/118/EC) and the Priority Substances Directive (2008/105/EC). This legislation underpins the requirements of the WFD with regard to groundwater and surface water pollution respectively.

A4d.1.1.2 The Groundwater Directive (GwD)

The GwD, as required under Article 17 of the WFD, will work alongside the current 1980 legislation (Groundwater Regulations 1998) until 2013. Under the current legislation, Source Protection Zones (SPZs) are designated in areas where groundwater is at high risk of pollution. Groundwater protection issues are addressed in other legislation including the IPPC Directive (99/31/EC), Biocidal Products Directive (98/8/EC), Plant Protection Products Directive (91/414/EEC) and Nitrates Directive (91/676/EEC) – section 0.

A4d.1.1.3 Priority Substances Directive

This directive indicates acceptable levels of contamination in surface waters for certain priority substances and other pollutants (so called Environmental Quality Standards). A list of priority substances which pose a threat to the water environment was earlier established in accordance with Article 16 of the WFD in decision 2455/2001/EC. 33 substances were agreed upon, reiterated in Annex I of the latest directive.

A4d.1.1.4 The WFD and Protected Areas

The WFD requires that a register of "protected areas" be kept and the status of sites within each category monitored and maintained. Many of these areas are already protected through current UK law and these are discussed below. In addition to these, Natura 2000 sites protected under either the habitats or wild bird directives must also be regarded where water is an important factor in their protection (see section A4d.1.2.3). The standards set by the WFD will achieve levels of protection for sites already afforded protection by a number of existing pieces of legislation including the freshwater fish and shellfish waters directives, which are set to be repealed under the WFD in 2013.

A4d.1.1.5 Economically Important Aquatic Species

The freshwater fish directive (2006/44/EC) seeks to protect salmonid and cyprinid species through setting physical and chemical standards on freshwater bodies. At present the directive is transposed into UK law under the Surface Waters (Fishlife) (Classification) Regulations 1997 (amended 2003) in England and Wales, and the Surface Waters (Fishlife) (Classification) (Scotland) Regulations 1997 (amended 2003 and 2007).

The shellfish waters directive (2006/113/EC) sets physical, chemical and microbiological water quality requirements in order to protect and improve shellfish waters so that high quality individuals are available as food. Note that the directive and subsequent UK legislation (The Surface Waters (Shellfish) Classifications Regulations 1997) does not cover shellfish crustaceans such as crabs, crayfish and lobsters.

A4d.1.1.6 Nutrient-Sensitive Areas and Nitrate Vulnerable Zones

The Nitrates Directive (91/676/EC) has the aim of reducing pollution from agricultural sources while also preventing future pollution. Nitrate Vulnerable Zones (NVZs) can be designated where appropriate and these must be reviewed every four years. The directive also stipulates that a code of good agricultural practice should be established, as well as an action programme which can be applied within a specific NVZ or to the country as a whole (Defra website).

The Urban Wastewater Treatment Directive (91/217/EC), implemented into UK law in the Urban Waste Water Treatment (England and Wales) Regulations 1994 (and amendments) and the Urban Waste Water Treatment (Scotland) Regulations 1994 (and amendments) seeks to protect the environment from the adverse effects of sewage discharges (Defra website). Sensitive Areas may be designated where waters are, or have the potential to become, eutrophic if no protective action is taken, drinking water sources contain or could contain more than 50mg/l of nitrate if no protective action is taken, and/or waters are in need of protective action to meet the requirements of other Directives (Defra 2002). Sensitive areas in the UK are listed and mapped on the Defra Urban Waste Water Treatment webpages:
(http://www.defra.gov.uk/environment/quality/water/waterquality/sewage/sensarea/).

A4d.1.1.7 The Floods Directive and Flooding

The Floods Directive (2007/60/EC) came into force on the 26th November 2007, with member states having 2 years from this date to implement its contents. The Flood and Water Management Act 2010 has transposed this Directive into UK (England and Wales) law. In Scotland, Royal Assent of the Flood Risk Management (Scotland) Act 2009 took

place in June 2009. At present, planning policy in relation to developments and flooding is covered by PPS25 and TAN15, both called, Development and Flood Risk, and also by Scottish Planning Policy.

The Floods Directive seeks to manage the risks posed to human health, the environment, cultural heritage and economic activity by flooding. The programme includes the production of a Preliminary Flood Risk Assessment showing the impact of historic flooding by 2011, and the generation of flood risk maps showing a range of hazard variables (water depth, extent and probability) by 2013. By 2015, management plans should have been produced which should be coordinated with river basin management plans (see section A4d.1.1.1 above). At the time of writing, the Environment Agency had completed consulting on Catchment Flood Management Plans (CFMPs) in England and Wales, and is in the process of formulating an output from this work. The CFMPs aim to understand the causes of flooding and recommend ways of managing flooding over the next 50 to 100 years for 68 catchments in England and 10 in Wales. The Environment Agency (2009b) and Environment Agency Wales (2009a) have published National Flood Risk Assessments, which indicate the way in which flood risk should be reduced and mitigated, through physical or policy measures.

Shoreline Management Plans (SMPs), currently under revision by Coastal Groups and the Environment Agency, assess the risks to people, development, and the natural and historic environment from coastal processes. These plans (SPM2) will provide a route map for local authorities for the time period of the next 20 years, and leading up to the next 50-100 years. They will include an action plan of what is required to manage coastal processes and where, and will form the basis of decision making for such works. As a supplement to PPS25 (see above), PPS25: Development and Coastal Change, provides planning guidance for development at the coast.

A4d.1.1.8 Bathing (Recreational) Waters

The renewed EC bathing waters directive (2006/7/EC) sets higher standards than those enacted under previous legislation (76/160/EEC), transposed into UK law by the Bathing Waters (Scotland) Regulations 2008 and The Bathing Water Regulations (England and Wales) 2008. Standards will continue to be monitored under the old regulations until 2013, at which point standards under the renewed regulations will have to be achieved by 2015 (see section A4d.1.3.6). Two standards may be met with regard to the current regulations; mandatory or guideline. Mandatory standards are those minimum requirements to be met for 10 parameters (total and faecal coliforms, salmonella, pH, mineral oils, detergents, phenols, colour, transparency and enteroviruses), enhanced guideline standards are met where concentrations of total coliforms, faecal coliforms and streptococci are suitably low enough in a sufficient quantity of samples.

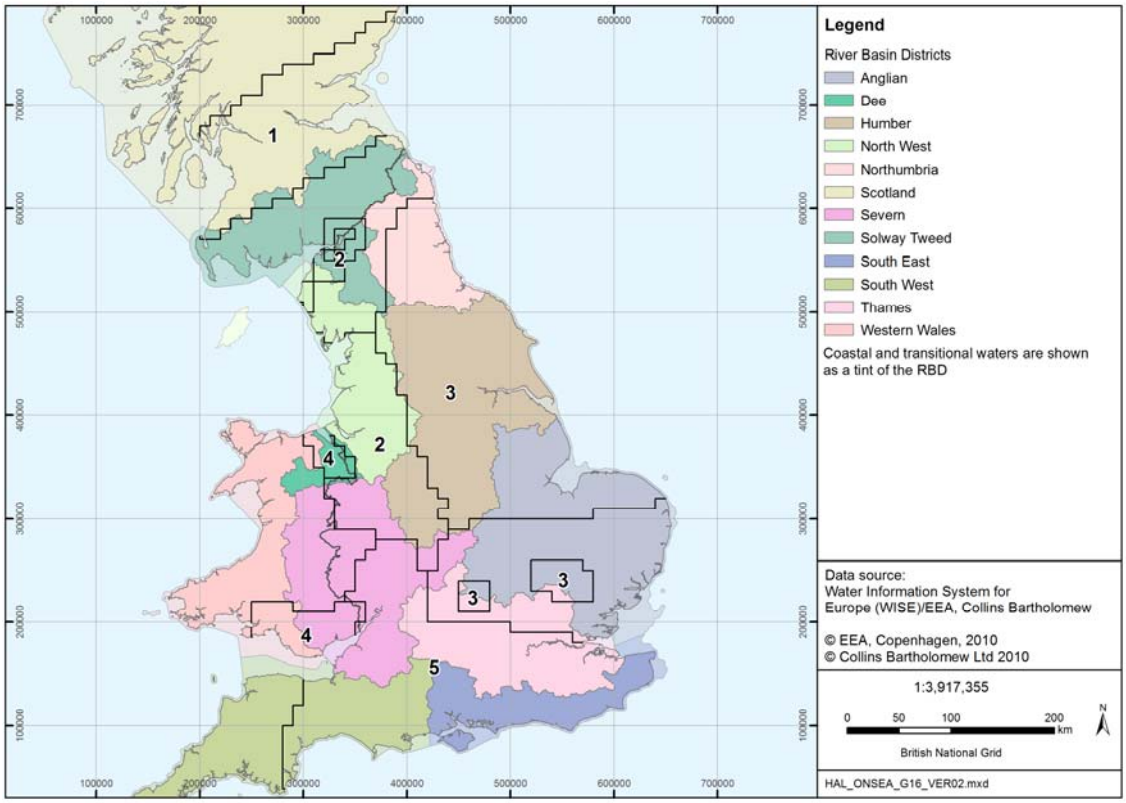
A4d.1.2 River Basin Districts

As a result of the holistic management approach underpinning the philosophy of the WFD, water resources are managed regionally through the use of River Basin Districts (RBDs), which may comprise a single large catchment or a grouping of numerous catchments, as in the Scotland RBD. These districts include transitional waters, coastal waters, surface waters and groundwaters, and are geographically limited by the inherent natural (hydrological/topographic) features of an area rather than by any administrative boundary.

There are 12 RBDs in the UK (Figure A4d.1), some of which cross national borders into Scotland and Wales (e.g. Severn, Solway Tweed). Table A4d.3-Table A4d.7 on the following pages summarises the characteristics, water resources, and principal

environmental pressures found in each RBD. The Scotland RBD was split into 8 Draft Management Plan Areas (DMPAs) now administered by 8 regional Area Advisory Groups, three of which are relevant to the area considered by this SEA (Clyde, Forth and Tay), and these are also summarised in the sections which follow.

Figure A4d.1 – Relevant River Basin Districts in the UK



A4d.1.2.1 Current Pressures in the Water Environment

The water resources of the UK are currently experiencing pressures from a number of key sources, all of which might be considered anthropogenically led (Table A4d.1), and these are being addressed under the new river basin management plans proposed for the 12 River Basin Districts (and associated management plan areas) indicated in Figure A4d.1 above. The pressures indicated in Table A4d.1 have been gathered from the river basin management plans (Environment Agency 2009d-w) and the Water Resources Strategy for England and Wales (Environment Agency 2009c, Environment Agency Wales 2009b).

Table A4d.1 – Pressures Affecting the Water Environment

Topic	Source of Environmental Pressure
Point Source Pollution	Organic pollution: including ammonia and biochemical oxygen demand
	Chemicals: including priority hazardous substances, priority substances, specific pollutants
	Other Pollutants: Faecal Indicator Organisms
	Acidification
	Nutrients: nitrates, phosphorus

	Mines and mine waters
Diffuse Source Pollution	Chemicals: including priority hazardous substances, priority substances, specific pollutants (including oil and hydrocarbons)
	Pesticides
	Sediments
	Organic pollution: including ammonia and biochemical oxygen demand
	Other Pollutants: Faecal Indicator Organisms
	Acidification
	Nutrients: nitrates, phosphorus
	Mines and mine waters
Pressures on the quantitative status of water	Abstraction and other artificial flow pressures
	Physical modification: morphology
Other impacts on the status of water	Invasive, non-native species (e.g. mink, zebra mussel, signal crayfish)
	Biological pressures: including fish stocking, biota removal
	Endocrine disrupters
	Urban and transport pressures (development and growth)
	Recreation (e.g. boating, fishing)
	Fisheries management (e.g. direct fish/shellfish removal, impact of competition/predation from managed fisheries on native biology, impact of supplied feeds on nutrient conditions and impacts of removing migratory fish)

Source: Environment Agency (2008a-j)

Those environmental impacts indicated above (and also any mitigation measures) may well be influenced by future climate change (Environment Agency 2008a-j) and are discussed with reference to recent and potential future climate change in Environment Agency River Basin Management Plans. Future climate change scenarios are based on those in the UK Climate Impacts Programme (UKCP09) projections (Jenkins *et al.* 2009, Murphy *et al.* 2009). These assessments at present do not consider the severity or timescale over which changes may occur, but do provide a prioritisation for areas of water resources that require adaptation or mitigation to change (Environment Agency 2008a-j). Table A4d.2 indicates the high level output of this assessment for each RBD in England and Wales.

Table A4d.2 – Qualitative Description of the Potential Increased Risk of Certain Hydrological Pressures due to Future Climate Change

Pressure source	D	NW	A	H	N	Se	SE	SW	T	W
Abstraction and other artificial flow										
Biological (fisheries management)										
Biological (invasive non-native species)										
Microbiological (including faecal indicator organisms)										
Organic pollution (sanitary										

Pressure source		D	NW	A	H	N	Se	SE	SW	T	W
determinands)											
Nutrients (nitrogen and phosphorus)											
Hazardous/priority substances											
Acidification	*Freshwater*										
	Marine										
Salinity											
Temperature											
Physical modification											
Sediment											

Source: Environment Agency (2008a-j)
Note: A=Anglian, D=Dee, H=Humber, NW=North West, N=Northumbria, Se=Severn, SE=South East, SW=South West, T=Thames, W=West Wales
Key:

Very High
High
Medium/High
Medium
Medium/Low
Low

A4d.1.2.2 Summary of River Basin District Character for the SEA areas

The following section provides a high level summary of the main hydrological characteristics of each RBD or DMPA relevant to the SEA areas and any impact and pressures faced by these areas.

A4d.1.2.2.1 Scottish Midlands

Table A4d.3 – Relevant River Basin Characteristics, Water Resources and Impacts/Pressures

RBD or DMPA	Environmental Characteristics	Water Resources	Principal Impacts and Pressures
Scotland: Clyde	There are 11 river catchments with just over 2,200km of river length which are recognised as supporting salmon and trout, in addition to a number of other small burns. The River Endrick also supports two rare species of lamprey. Sea lochs are home to both international and national wildlife designations and busy port operations. The Firth of Clyde has an expanse of intertidal mudflats, sand and shingle interspersed with saltmarsh. Wintering wildfowl and waders of national and international importance are present around the Firth, and Ailsa Craig supports important numbers of gannet. Most of the Loch Lomond and the Trossachs National Park is within the management area, and the loch itself is of recreational, scientific and economic importance, with ~2 million visitors per year. The area has a strong industrial heritage which has spanned the last 200 years and has had a	**Surface waters:** 263 rivers and canals (2,846km), 27 lochs (107km^2), 22 coastal waters (3,153km^2), 9 estuaries (91km^2). **Ground water bodies:** 44 **Freshwater fisheries:** 14 salmonid and 1 cyprinid catchment designated under the Freshwater Fish Directive. **Shellfish waters:** 6 shellfish growing waters. **Designated bathing areas:** 15 **Nutrient sensitive areas:** 20 **Protected drinking waters:** 108 **Natura 2000 sites:** 3 SACs and 4 SPAs dependent upon water resources.	**Physical modification: morphology:** Almost all river catchments have modified sections. Changes to physical character affect 826km (38% of river length) and 561km can be regarded as being heavily modified. Structures prevent fish migration into 334km of river. Most lochs are of less than good status due to morphological changes. **Abstraction and artificial flow:** Changes to flow affect 232km (11%) of river length. Impacts on groundwater from abstraction are minimal, with 5% recorded as poor, and 95% recorded as good status. **Chemical pollutants:** 156km (7%) of river length is at less than good status due to chemical pollution. **Nitrate in surface/groundwater:** 20 nutrient sensitive areas are listed for this area, though no NVZs have been designated. Increased nutrients in the area come from a variety of sources, including sewerage network discharges, agriculture, industry and run-off from

RBD or DMPA	Environmental Characteristics	Water Resources	Principal Impacts and Pressures
	significant influence on the water environment. In addition to manufacturing, mining, quarrying, tourism and recreation, the rural lowlands support large areas of arable, livestock and mixed farming land. Continuing growth within the towns and cities means that developments have the potential to increase pressure on resources of the water environment.		roads and urban areas. They can encourage attached algae and rooted plants, which in turn can affect habitat structure and DO levels. These particularly affect the estuaries of the Clyde and Gareloch and Garnock/Irvine Estuaries.
Scotland: Forth	The Forth RBMA covers over 4,900km^2 and contains 11 major river catchments in addition to estuarine and coastal waters. Extensive industrialisation around the Forth has occurred over the last 200 years including mining, quarrying, glass container manufacture, oil production from oil shale, chemical manufacturing, paper manufacturing and distilling. Population increases in the past and in the future have generated demands for greater levels of infrastructure which have, *inter alia*, effects for the water environment. The economy of Edinburgh is largely based on the financial and business services sector, public administration, higher education, culture and tourism, though also supports the busiest port in Scotland as well as arable, livestock and mixed farming in more rural areas. As a consequence of pollution from industrial development, many of the rivers, lochs, estuaries and coastal waters were severely affected. Significant improvements to the quality of these waters have been made over the last 40 years.	**Surface waters:** 160 rivers and canals (1,569km), 11 lochs (27km^2), 11 coastal waters (1,404km^2), 3 estuaries (40km^2) **Ground water bodies:** 29 **Freshwater fisheries:** 14 salmonid and 1 cyprinid watercourse designations. **Shellfish waters:** 3 areas are designated as shellfish growing waters. **Designated bathing waters:** 22 **Nutrient sensitive areas:** 27 **Protected drinking water:** 59 **Natura 2000 sites:** 7 SPAs and 4 SACs dependent on water resources.	**Nitrate in surface/groundwater:** 2 NVZs are present; Edinburgh, East Lothian and Borders, and Strathmore and Fife. A total of 27 nutrient sensitive areas are present in the RBD management area. 775km (~50%) of rivers are of less than good status due to water chemistry and species composition, much of which is due to excess nutrients. However DO levels were found to be affected on only 63km of river. **Physical modification: morphology:** 619km (39%) of river are of less than good quality due to morphological changes. 12 lochs (29km^2) have been heavily modified. 1 coastal and 2 estuarine water bodies have been designated as heavily modified. **Abstraction and artificial flow:** 319km of river length is regarded as less than good due to poor flow conditions as a result of inappropriate abstraction levels. Changes to water flow are the main reason for lochs failing to meet good ecological potential. Impacts on groundwater from abstraction are minimal, with 5% recorded as poor, and 95% recorded as good. **Chemical pollutants:**

RBD or DMPA	Environmental Characteristics	Water Resources	Principal Impacts and Pressures
	The significance of the water environment in the Forth is recognised internationally and nationally for many rare and significant habitats and species (e.g. sea, brook and river lamprey in the River Teith). 16 rivers are presently recognised for their importance in supporting migratory freshwater fish populations, and the Firth of Forth is a recognised Ramsar site due to its waterfowl community.		175km (21%) of river length is of less than good status due to elevated iron levels from point or diffuse mine water discharges. Other metals and toxic substances affect 126km of river length.
Scotland: Tay	The Tay covers ~9,000km^2 and includes the eastern expanses of the Loch Lomond and the Trossachs National park, and the south eastern extremes of the Cairngorms National Park around Glen Clova and Glen Prosen. There are 7 major river catchments within the Tay DMPA, most of which are of high quality, supporting salmon populations. Conservation sites including SACs and SPAs recognise the importance of flora and fauna such as the Tay and South Esk SACs for their salmon and freshwater pearl mussel populations respectively. The quality of the coast and estuaries of the area promotes tourism, and many of these waters are designated as SPAs. The Tay supports a high level of agricultural activity including arable farming, potato and soft fruit growing and upland sheep farming. The uplands also support forestry, deer stalking, grouse shooting, angling and other outdoor pursuits.	**Surface waters:** 215 rivers and canals (2,556km), 10 lochs (39km^2), 6 coastal waters (640km^2), 5 estuaries (117km^2) **Ground water bodies:** 46 **Designated bathing areas:** 7 **Freshwater fisheries:** 14 salmonid watercourse designations. **Shellfish waters:** 3 areas designated as shellfish growing waters. **Protected drinking waters:** 74 **Nutrient sensitive areas:** 16 **Natura 2000 sites:** 9 SPAs and 9 SACs dependent on water resources.	**Phosphorous/nitrate in surface/groundwater:** Almost 30km^2 (77%) of lochs and around 600km (>20%) of rivers have high levels of phosphorus, located predominantly in the east of the area. Nitrogen levels exceed the standard required by the WFD in 12% of estuaries, though there is no evidence to suggest that this has lead to enhanced plant (algal) growth. Those groundwaters not achieving good chemical status are primarily failing due to nitrate levels. **Physical modification: morphology:** The condition of 30% of the river habitat (800km) is less than good status due to morphological alterations. Barriers to fish affect around 300km of river length. **Abstraction and artificial flow:** Around 700km (>25%) of river length if affected by alterations to flow. A further 100km (15%) of heavily modified rivers fail potential ecological standards due to poor hydrological regime. 1,601km^2 (18%) do not meet good status due to reduced levels.

RBD or DMPA	Environmental Characteristics	Water Resources	Principal Impacts and Pressures
	The Tay and Earn catchments support large scale hydro power schemes managed by Scottish and Southern Energy, with a smaller scale scheme on the River Lyon.		
Solway Tweed (also partly in SEA area 2)	The Solway Tweed RBD crosses the border between Scotland and England, covering an area of ~17,500 km^2 (3,800 km^2 of which is in England). The landscape varies from rolling hills in the Southern Uplands to rocky shorelines and sandy beaches along the west coast. The Southern Uplands are drained by rivers in the west (the Nith, Annan and Esk) which discharge to the Solway Firth. The River Eden rises in the northern Pennines and eastern Lake District fells, and flows north to the Solway estuary. The River Tweed drains the eastern part of the District into the Tweed estuary. Land use in the district is mainly agriculture, forestry and woodland. Both the Tweed and Eden are also excellent salmon rivers in the district. The rural nature of the District means that it supports important habitats and wildlife, including water-dependent SACs and SPAs, notably the River Eden and tributaries, and the Solway estuary. The District has a moderately high rainfall relative to the rest of the UK, being higher in the west than in the east. Around 90% of the water supply for the District comes from surface waters, the remainder from groundwaters.	**Surface waters:** 526 rivers and canals, 35 lakes/lochs, 8 coastal waters (1913km^2), 11 estuaries (390km^2). **Ground water bodies:** 73 **Designated bathing waters:** 8 **Designated drinking waters:** 74 **Freshwater fisheries:** 252 salmonid and 4 cyprinid watercourse designations. **Shellfish waters:** 4 areas are designated as shellfish growing waters. **Natura 2000 sites:** 13 SPAs and 33 SACs dependent on water resources	**Water quality:** 32% of all water bodies are less than good due to water quality issues, including 28% of rivers and 40% of lakes. Though only 9% of estuaries are regarded as being of less than good status, by area these account for 78% of estuarine waters. 11% of groundwaters are less than good, mainly due to nitrate inputs from agriculture and mining impacts. **Alterations to water flows and levels:** 13% of water bodies fail to achieve good status due to changes to water flows and levels, including 13% of rivers and 23% of lakes. **Modification of bed, banks and shores:** 31% of lakes/lochs and 19% of rivers are modified sufficiently that they fail to achieve good status. **Barriers to fish migration (Scotland only):** 20% of lakes/lochs and 9% of rivers pose barriers to fish that inhibit these water bodies achieving good status. **Invasive non-native species (Scotland only):** only 1% of rivers and 3% of lakes/lochs fail to achieve good status due to the impact of these introduced species.

Source: Environment Agency & SEPA (2008, 2009a, b), SEPA (2008a-e, 2009)

A4d.1.2.2.2 West Midlands, North-West England and Southern Scotland

Table A4d.4 – Relevant River Basin Characteristics, Water Resources and Impacts/Pressures

RBD	Environmental Characteristics	Water Resources	Principal Impacts and Pressures
North West	The North West RBD covers an area of 13,140km^2 from Cheshire in the south to the Lake District in the North. The area contains the key cities of Manchester and Liverpool and many other major settlements. Agricultural land covers 80% of the area. A number of small settlements sit alongside protected areas including SACs and SPAs with water dependent features. The area has a third of the poorest quality rivers in England and Wales. The reservoirs of the Pennine Fells and Lake District supply water for highly populated areas. There are a number of excellent salmon rivers, and coarse rivers to the south. Canals are important for tourism, transport and coarse fishing. The RBD contains 38% of England's swamp and reed beds, extensive dune systems, shingle and coastal reef and mudflats. The area is the second most important site for wintering birds in the Western Palaearctic. Coastal habitats are affected by dredging, recreational pressures and pollution run off from land. Drainage and intensive farming have resulted in a 98% reduction in peat over 100 years, and what is left is fragmented and small in size. While there is restoration this is small in scale.	**Surface waters:** 547 rivers and canals (including surface water transfers), 164 lakes and reservoirs, 8 coastal waters, 12 estuaries. 41% of surface waters may be regarded as having been heavily modified. **Ground water bodies:** 18 **Bathing waters:** 34 **Freshwater fisheries:** 830 **Shellfish waters:** 9 **Nitrate vulnerable zones:** 59 **Protected drinking waters:** 156 **Natura 2000 sites:** 7 SPAs and 20 SACs dependent on water resources.	**Phosphorous in rivers and standing waters:** 2,468km (41%) of river length is/probably at risk from point and diffuse pressures. 26 lakes at/probably at risk from diffuse or point phosphorous inputs. 57% of river length at/probably at risk from diffuse agricultural pollutants. **Organic pollution (ammonia and BOD):** 1,446km (24%) of river length at/probably at risk of failing ammonia standards. 779km (13%) of river length at/probably at risk of failing BOD standards. **Nitrate in surface and groundwaters:** 44% of groundwater bodies are at risk of failing environmental objectives as a result of nitrate **Sediment:** 1,111km (18%) of river length is/probably at risk from direct effects of sediment. **Pesticides:** 1,000km at/probably at risk from diffuse pesticides. 762km at/probably at risk from sheep dip. 1 groundwater body is probably at risk from pesticides. **Faecal indicator organisms** **Urban and transport pressures:** 158 rivers at/probably at risk from ammonia, 120 at/probably at risk from BOD levels.

RBD	Environmental Characteristics	Water Resources	Principal Impacts and Pressures
			Chemicals including priority hazardous substances, priority substances and specific pollutants (excl. pesticides): 16 rivers and 4 transitional water bodies either at/probably at risk of failing WFD dangerous substance objectives. **Mines and mine waters:** 37 water bodies at risk from mines or mine waters. **Physical modification: morphology:** 2,662km (44%) of river length, all coastal and 11 (92%) estuarine water bodies at risk from failing WFD 2015 objectives. 133 (81%) of lakes at/probably at risk from morphological pressures. **Abstraction and other artificial flow pressures:** 609km (12%) of river length at/probably at risk from abstraction/flow regulation.

Source: Environment Agency (2008d, 2009j, k)

A4d.1.2.2.3 East Midlands and North-East England

Table A4d.5 – Relevant River Basin Characteristics, Water Resources and Impacts/Pressures

RBD	Environmental Characteristics	Water Resources	Principal Impacts and Pressures
Northumbria	The Northumbria RBD covers an area of 9,029km^2 from the Scottish Borders to just south of Guisborough, and from the Pennines, east to the North Sea. The landscape is highly variable, ranging from industrial urban areas to moors, hills and valleys of the Northumberland National Park and Pennine Area of	**Surface waters:** 380 rivers and canals, 73 lakes or reservoirs, 7 coastal waters, 7 estuaries. 27% of surface waters may be regarded as having been heavily modified. **Ground water bodies:** 9	**Mines and mine waters:** 40 (12%) rivers at risk and 6 (67%) groundwater bodies at risk. **Nitrate in surface and groundwater:** 404km (11%) of river length is at/probably at risk from oxidised nitrogen loading and 15% are

RBD	Environmental Characteristics	Water Resources	Principal Impacts and Pressures
	Outstanding Natural Beauty. Outside of urban areas, the rural landscape supports a range of agricultural activities including hill farming, arable production and forestry. Around 67% of the area is farmed, managed for moorland grouse or used for forestry. Blanket peat in the north Pennines and Cheviots form the headwaters of rivers which flow west to east. Drainage has reduced the size of wetland isolating habitats and associated species even with schemes in the North Pennines to restore peatland. Eutrophication, alterations to catchment hydrology, reduced water quality and abstraction affected freshwater habitats. The North East Region has the only site in Britain with Baltic bog-moss, only one of two sites in Britain for water rock-bristle; and is home to one of the largest breeding colonies of grey seals. Industrial neglect is found next to major rivers such as the Tees which are close to large centres of population and have the potential for environmental improvement. The river basin district contains internationally important river shingle habitat which is associated with previous metal ore mining along the Rivers Tyne and Allen, which support unique metal tolerant flora Healthy populations of salmon and sea trout present in several rivers, including the River Tyne, which has the highest salmon rod catch in England and Wales.	**Bathing waters:** 33 **Freshwater fisheries:** 312 **Shellfish waters:** 1 **Nitrate vulnerable zones:** 48 (20% of RBD area) **Protected drinking waters:** 34 **Natura 2000 sites:** 6 SPAs and 9 SACs dependent on water resources.	at/probably at risk from phosphorous. 4 groundwater bodies are at risk of failing their nitrate objectives and a further 1 has failed its test with a significant and sustained increase in nitrate concentration. **Physical modification: morphology:** 1,790km (51%) of river length is probably at risk of failing WFD 2015 objectives. 2 (29%) estuarine water bodies are at risk and 7 (100%) coastal waters at risk from failing WFD 2015 targets. Pressures include land reclamation, shoreline reinforcement, dredging and aggregate extraction. **Urban and transport pressures:** 34 rivers at risk/probably at risk from urban diffuse pollution. **Invasive non-native species:** 20 (5%) rivers probably at risk of failing WFD 2015 targets, and 2 out of 7 estuarine water bodies are probably at risk. **Organic pollution (ammonia and BOD):** 423km (12%) of river length at/probably at risk from ammonia. 139km (3%) at/probably at risk from failing proposed BOD standards. 29% of the estuarine water bodies and no coastal water bodies have been assessed as at risk or probably at risk from point sources of organic pollution. **Pesticides:** 1,243km of river at/probably at risk from pesticides. 46km at/probably at risk from sheep dip. No groundwaters at risk.

RBD	Environmental Characteristics	Water Resources	Principal Impacts and Pressures
			Phosphorous in rivers and standing waters; 52% of total river length is/probably is at risk from diffuse phosphorous pollution. There is no risk assessment for lakes at present. **Sediment:** 1,332km (38%) of river length is/probably at risk from sediment effects.
Humber (also partly in SEA area 2)	The Humber RBD covers 26,109km^2 ranging from the North York Moors to Birmingham, the Pennines to the North Sea and Stoke-on-Trent to Rutland. The key economic sectors include business services, health, wholesale and distribution and manufacturing (particularly metals). Mining for coal and other minerals has been historically important, but is now less so – a few deep coal mines still survive. Outside of urban centres, land use is centred on arable floodplain agriculture and upland livestock grazing. The North Yorkshire Moors, Yorkshire Dales and High Peak are within the RBD and are an important component of the tourist economy. Salmon and trout numbers are increasing across the district's rivers due to improved estuary water quality. Land has been drained and reclaimed for agricultural production. As a result there has been a loss of wetland which has become both reduced in size and fragmented. Schemes seek to restore wetland but this is small in scale.	**Surface waters:** 960 rivers and canals, 136 lakes or reservoirs, 1 coastal water, 8 estuaries. 36% of all surface waters may be regarded as modified. **Ground water bodies:** 50 **Bathing waters:** 22 **Freshwater fisheries:** 1,273 **Shellfish waters:** 1 **Nitrate vulnerable zones:** 197 (81% of RBD) **Protected drinking waters:** 167 **Natura 2000 sites:** 7 SPAs and 26 SACs dependent on water resources.	**Abstraction and other artificial flow pressures:** 1,901km (17%) of river length and 11km^2 lake is/probably at risk from abstraction and flow regulation. 9,922km2 (38%) of groundwaters at/probably at risk from abstraction and flow regulation. **Mines and mine water:** 43 water bodies are at risk from mines and mine waters. **Nitrate in surface and ground water:** 3,158km (28)% of river length is at risk of failing the 50mg/l threshold for nitrate. 14 (30%) groundwater bodies are at risk of failing objectives due to nitrate. In addition, 13 groundwater bodies in the Humber River Basin District (26%) had a significant and sustained increase in nitrate concentration in groundwater. **Physical modification: morphology:** 5,246km (46.93%) of river length and 7 (88%) estuarine water bodies are at/probably at risk of failing WFD 2015 objectives. 1 (100%) coastal water body and 97% of lakes are probably at risk from morphological pressures. **Urban and transport pollution pressures:**

RBD	Environmental Characteristics	Water Resources	Principal Impacts and Pressures
	The area contains very important wetland habitats including intertidal mudflats and 11% of the nation's saline lagoon, which is located around the Humber Estuary and supports internationally important migratory birds and rare mammals.		211 rivers at/probably at risk from urban and transport pressures. **Organic pollution** 2,399km (21.47%) of river length at/probably at risk of failing the ammonia standards. 1,431km (12%) of river length are at risk of failing the biochemical oxygen demand (BOD) standards. **Invasive non-native species:** 123 (12.7%) rivers are/probably at risk of failing WFD 2015 targets. 6 (4.4 %) lake, 1 coastal water body and 8 (37.5%) estuarine waters are at risk. **Pesticides:** 5,869km of river is/probably at risk from diffuse pollutants. 83km is/probably at risk from sheep dip. 32 groundwater bodies in the Humber River Basin District are at risk from pesticides. **Phosphorous in rivers and standing waters:** 53% of river length is/probably at risk of failing to meet standards for good ecological status. Over 61% of river length is/probably at risk from diffuse phosphorous from agriculture. **Sediment:** 4,567km (40%) are/probably at risk from direct effects of sediment.
Anglian	The River Basin District covers 27,890 km^2 from Lincolnshire in the north to Essex in the south, and Northamptonshire in the west to the East Anglian coast. The landscape ranges from gentle chalk and limestone ridges to the extensive lowlands of the Fens and East	**Surface waters:** 758 rivers and canals, 49 lakes or reservoirs, 11 coastal waters and 18 estuaries. Note that 71% of these surface waters are regarded as having been modified or are man-made.	**Abstraction and artificial flow:** 1,593km (21%) of river length is/probably at risk from abstraction and flow regulation. 24km^2 (18%) of lakes are/probably at risk from abstraction and flow regulation. 14,577km^2 (87%) of groundwaters are at/probably at risk from

RBD	Environmental Characteristics	Water Resources	Principal Impacts and Pressures
	Anglian coastal estuaries and marshes. Over half of the landmass of the catchment is used for agriculture and horticulture, producing more than a quarter of the wheat and barley in England in addition to a diverse horticultural crop including peas, beans, potatoes, carrots, apples and salad crops. The artificial landscape of the fens is a major arable region in the UK for grains and vegetables, with low water levels maintained by drainage banks and pumps which also provide flood alleviation for homes and infrastructure. The Broads are ecologically important, supporting a number of rare plants and animals, and freshwater habitats in the RBD as a whole are important for wintering waterfowl and fisheries. Approximately 80% of England's lowland fen is located in the Anglian RBD, in addition to swamp, reedbed and carr woodland habitats. The district has some of the finest coarse fishing and some of the most famous river-trout fisheries. Many of the chalk-fed rivers that flow into the Breckland, River Great Ouse and some Lincolnshire and Norfolk rivers support natural brown trout populations. There are a number of internationally designated intertidal areas along the coast, representing 33% of the UK's saltmarsh. Water bodies and wetland areas within the	**Ground water bodies:** 31 **Bathing waters:** 38 **Protected drinking water areas:** 50 **Freshwater fisheries:** 426 **Shellfish waters:** 22 **Nitrate vulnerable zones:** 229 **Natura 2000 sites:** 23 SPAs and 24 SACs dependent on water resources.	abstraction and flow regulation. 9 km^2 (3%) of estuaries are probably at risk from industrial abstraction and artificial flow pressures. 6,758 km^2 (40%) of groundwaters are at/probably at risk from Saline Intrusion. **Invasive non-native species:** 248 rivers (33%) are probably at risk of failing WFD objectives by 2015 due to the effect of alien species. 8 (17%) lakes, 4 (36%) coastal water bodies and 8 (44%) estuarine waters are also probably at risk. **Nitrate in surface/ground water:** 10 ground waters are at risk of failing objectives due to nitrate. 61% of river length is at risk of failing the 50mg/l threshold for nitrate. 6% of estuarine water bodies and 36% of coastal water bodies are potentially at risk from diffuse source nutrient nitrogen. **Phosphorous in rivers/standing water:** More than 72% of the total lengths of Anglian river water bodies are at risk from diffuse agricultural pollution. **Physical modification: morphology:** 32 (65%) of lakes probably at risk. 6,013km (81%) rivers at risk of failing WFD 2015 targets, as are 18 (100%) estuarine water bodies. 8 (72%) coastal water bodies are at risk. **Sediment (rivers and lakes):** 2,472km (33%) are/probably at risk from the direct effects of sediment.

RBD	Environmental Characteristics	Water Resources	Principal Impacts and Pressures
	Anglian RBD support a number of priority species listed in the UK Biodiversity Action Plan, such as freshwater white-clawed crayfish (*Austropotamobius pallipes*) and bittern (*Botaurus stellaris).*		

Source: Environment Agency (2008a, c, e, 2009d, e, h, i, l, m)

A4d.1.2.2.4 North and South Wales

Table A4d.6 – Relevant River Basin Characteristics, Water Resources and Impacts/Pressures

RBD	Environmental Characteristics	Water Resources	Principal Impacts and Pressures
Dee	The Dee RBD covers an area of 2,251km^2 of North East Wales, Cheshire, Shropshire and the Wirral, and encompasses the River Dee basin, tributaries and estuary. The area varies from the mountains of the Snowdonia National Park, through the Vale of Llangollen to the open Cheshire plains and the Dee estuary mudflats. The dominant land uses, particularly in the upper reaches, are agriculture and forestry. Several major lakes and storage reservoirs are present in the upper reaches including Llyn Tegid, the largest natural lake in Wales. The Dee is one of the most regulated rivers in Europe, and supplies ~3 million people with water in North West England in addition to those in the Dee catchment. The strategic importance of the catchment for flood alleviation and water supply led to the lower Dee being categorised as the only Water Protection Zone in the UK in 1999.	**Surface waters:** 87 rivers and canals, 21 lakes or reservoirs, 1 estuary. 34% of all surface waters are designated as heavily modified. **Ground water bodies:** 6 **Bathing waters:** 1 **Protected drinking water areas:** 25 **Freshwater fisheries:** 83 **Shellfish waters:** 2 **Nitrate vulnerable zones:** 3 (23% of RBD) **Natura 2000 sites:** 3 SPAs and 7 SACs dependent on water resources.	**Pesticides:** 114km of river is at/probably at risk from diffuse pesticides. 407km at/probably at risk from sheep dip. 3.7% of river length at risk of pesticide point sources. **Invasive non-native species:** 8 (9%) of rivers probably at risk of failing WFD 2015 objectives. The only estuarine area is also probably at risk. **Phosphorous in rivers and standing waters** 51% of the river length at/probably at risk from phosphorous enrichment from diffuse agricultural sources. **Nitrate in surface and ground water:** 49 km (6.5%) of total river length or 5% of the total number of river water bodies are at risk of failing the 50mg/l threshold for nitrate. **Urban and transport pressures:** 6 (7%) rivers are at/probably at risk from urban

RBD	Environmental Characteristics	Water Resources	Principal Impacts and Pressures
	The principal abstractions in the Dee are for water supply, manufacturing and agriculture, amounting to 700 Ml/d. In the Dee River Basin District, land reclamation and commercial fishing are significant sources of morphological alteration in transitional waters. Game fish, including salmon and sea trout, can be found throughout the catchment. Coarse fish, including grayling, for which the River Dee is well-known, are present in the middle and lower reaches. Some salmon net-fishing takes place in the estuary under licence. The estuary is also home to important cockle beds, which provide a local industry.		diffuse pollution and organic pollution. **Sediment:** 249km (33%) of total river length are/probably at risk from effect of sediment.
Severn (also partly in SEA areas 2 and 5)	The Severn RBD covers an area of 21,590km^2, with one third in Wales and two thirds in England. In addition to the river Severn, the district covers the rivers Wye, Usk and Taff, and those of the counties of Avon and Somerset that drain into the Severn. Much of the area is rural, with 80% being used for agriculture and forestry, though there are several large urban centres including Bristol, Cardiff and Coventry. The key economic sectors in the area include business services, wholesale and distribution, public administration and health. Transport equipment and metals are also important sectors. The basin contains 29 SACs and 5 SPAs with features which are dependent on water resources. Past and present activities have	**Surface waters:** 791 rivers and canals, 75 lakes and reservoirs, 6 estuaries. 17% of surface waters may be regarded as having been heavily modified. **Ground water bodies:** 40 **Bathing waters:** 4 **Freshwater fisheries:** 906 **Nitrate vulnerable zones:** 147 (44% of RBD) **Protected drinking water:** 124 **Natura 2000 sites:** 5 SPAs and 28 SACs dependent on water resources.	**Abstraction and other artificial flow pressures:** 918km (11%) of river length is/probably at risk from abstraction/regulation. 3 (4%) of lakes and 8,179km^2 (40%) of groundwater are at risk or probably at risk from abstraction and flow regulation. **Invasive non-native species:** 138 (17%) rivers are probably at risk of failing WFD 2015 objectives, and 1 (1%) lake is also probably at risk. **Nitrate in surface and groundwaters:** 10 (25%) groundwater bodies are at risk of failing their environmental objectives. 1,995km (24%) of total river length are/probably at risk of failing the 50mg/l threshold for nitrate. **Pesticides:** 2,940km (39%) of river is/probably at risk of

RBD	Environmental Characteristics	Water Resources	Principal Impacts and Pressures
	put water resources under pressure from a number of sources, including diffuse pollutants from rural land management issues, sewerage discharges, urban runoff and the legacy of mining. Otters are numerous in the upper Severn catchment and lamprey, salmon, allis and twaite shad spawn in the mid Severn. Freshwater pearl mussels are also present in the River Clun. Floating water plantain and grass-wrack pond weed occur in Montgomery canal which crosses the basin, and *Ranunculus* is a feature of the Wye and Usk catchments. The lower catchment is important for elvers. Associated wetlands include the Mosses and Meres of the upper catchment and the floodplain grassland hams of the lower Severn/Avon. The River Severn and its tributaries, (e.g. the Wye and Usk), have in the past been important salmon fisheries however over the past decade fish populations have been decreasing. In addition there were concerns that mixed stock salmon fishing was reducing the numbers of rare shad as by-catch.		diffuse pollution and 1,888 (25.3%) is/probably at risk from sheep dip. 18 groundwater bodies are probably at risk from diffuse pesticides. **Phosphorous in rivers and standing waters:** An estimated 56% of the length of river water bodies are/probably at risk from diffuse phosphorous pollution. **Physical modification: morphology:** 6 (100%) of estuarine water bodies are at risk of failing WFD 2015 targets. 3,226km (39%) of rivers are at risk or probably at risk of failing WFD 2015 targets. 63 (84%) of lakes are probably at risk from morphological pressure. **Sediment:** 3,231 (39%) of rivers are/probably at risk. **Urban and transport pressures:** 107 river water bodies are at/probably at risk for urban diffuse pollution.
West Wales	The West Wales RBD covers an area of 16,653km^2, extending from Vale of Glamorgan in the south to Denbighshire in the north and includes Anglesey off the north-west coast. Lakes and rivers are excellent for game and coarse fishing, with many rivers supporting salmon, brown and sea trout, which bring significant revenue to the area. Welsh rivers	**Surface waters:** 676 rivers, 62 lakes or reservoirs, 27 estuaries, 24 coastal water bodies. **Groundwater bodies:** 25 **Protected drinking waters:** 86 **Freshwater fisheries:** 498	**Phosphorus in rivers and standing waters:** Over 46% of river length is/probably at risk from diffuse agricultural phosphorous pollution. **Mines and mine waters:** 87 water bodies are at risk from mines and mine waters. **Organic pollution (ammonia and BOD):**

RBD	Environmental Characteristics	Water Resources	Principal Impacts and Pressures
	account for more than half the sea trout caught in England and Wales, and in 2005 the Tywi and Teifi had the highest declared rod catch of sea trout in England and Wales. Valuable cockle and mussel beds are present in the north and south, with mussel farming taking place in the Menai Strait. Coastal fisheries are dominated by lobster and crab potting, and dredging for scallops and other species. The rural uplands are used for livestock (particularly sheep) farming, with the lower, milder Pembrokeshire area being used for significant arable agriculture. The principal urban centres are Swansea, Bridgend and Neath in the south, Aberystwyth in the centre on the coast, and Bangor in the north. In the summer time, coastal tourism accounts for a significant increase in population in an otherwise sparsely populated area.	**Shellfish waters:** 25 **Bathing waters:** 81 **Nitrate vulnerable zones:** 39 (2% of RBD) **Natura 2000 sites:** 12 SPAs and 60 SACs dependent on water resources.	236km (4%) of river length is/probably at risk from failing ammonia standards. 151km (4%) of river length are at risk of failing proposed BOD standards. **Pesticides:** 155km of river is/probably at risk from diffuse pesticides. 1,897km is/probably at risk from sheep dip. **Sediment:** 1,231km (29%) of river length is/probably at risk from the direct effect of sediment. **Other pollutants: faecal indicator organisms** **Acidification:** 114 (17%) of river water bodies are/probably at risk of failing 2015 WFD objectives. **Invasive, non-native species:** 38 (6%) of river water bodies are at risk of failing 2015 WFD objectives. 2 (3%) lakes, 12 (50%) coastal water bodies and 7 (26%) transitional waters are also probably at risk.

Source: Environment Agency (2008b, f, j, 2009f, g, n, o, v, w)

A4d.1.2.2.5 Southern and South West England

Table A4d.7 – Relevant River Basin Characteristics, Water Resources and Impacts/Pressures

RBD	Environmental Characteristics	Water Resources	Principal Impacts and Pressures
South East	The South East RBD covers over 10,000km^2, with a large proportion being dominated by the rural landscape of the South Downs. Major	**Surface waters:** 340 rivers and canals, 34 lakes or reservoirs, 17 coastal waters, 20 estuaries.	**Abstraction and other artificial flow regulation:** 601km (24%) of total river length and 9 (9%) of

RBD	Environmental Characteristics	Water Resources	Principal Impacts and Pressures
	urban centres include Brighton and Hove, Southampton and Portsmouth. SPA and SAC designations with wetland features cover around 9% of the area. The coastal region supports a variety of habitats including exposed chalk, reed-beds, natural harbours, mudflats, salt-marshes and lagoons. Migratory species of commercial and recreational interest (salmon, sea trout and eels) and of conservation importance (shad species) are present. Many urban and rural rivers have been modified for flood defences or navigation, and there is a great amount of pressure on groundwater for public water supply. 72% of public water supply is from groundwater, which is also required to maintain river flows and wetlands which support a range of water dependent habitats. It is envisaged that around 200,000 new homes and associated infrastructure is to be built in the area by 2026 which will increase pressures on the water resources of this area.	**Ground water bodies:** 81 **Protected drinking waters:** 46 **Freshwater fisheries:** 222 **Shellfish waters:** 26 **Bathing waters:** 81 **Nitrate vulnerable zones:** 112 (70% of RBD) **Natura 2000 sites:** 8 SPAs and 13 SACs dependent on water resources.	lakes is/probably at risk. 5,180km^2 (82%) of groundwater area is/probably at risk. **Nitrate in surface and groundwater:** 493 kilometres (20%) of total river length at risk of failing the 50mg/l threshold for nitrate. 22 groundwater bodies are at/probably at risk of failing their objectives as a result of nitrate. **Organic pollution (ammonia and BOD):** 282km (11%) of river length are/probably at risk for failing ammonia standards. 300km (12%) is at risk of failing BOD standards. **Pesticides:** 673km (29%) of river length is/probably at risk from diffuse pesticides. 197km (8%) of river length is/probably at risk from sheep dip. **Phosphorus:** 55% of the rivers by length in the South East River Basin District are at risk from phosphorus enrichment. **Physical modification morphology:** 1,470 (59%) of river length, 29 (85%) lakes, 15 (94%) coastal water bodies, and 18 (90%) estuarine water bodies are/probably at risk from being degraded due to changes to their morphology. **Sediment:** 1,176km (47%) of river length is/probably at risk from the effects of sediment. **Urban and transport pressures:** 52 river water bodies are at/probably at risk, from

RBD	Environmental Characteristics	Water Resources	Principal Impacts and Pressures
			urban diffuse pollution.
South West	The South West RBD covers an area of 21,000km^2, and is predominantly rural while including the urban centres of Exeter, Plymouth, Torquay, Bournemouth and Poole. This RBD also covers the Isles of Scilly and Lundy. The area encompasses two National Parks and 12 Areas of Outstanding Natural Beauty and England's only Marine Nature Reserve (Lundy). SACs and SPAs which are dependent on water resources are located in the RBD, as is England's only natural World Heritage Site, the Jurassic Coast of Devon and Dorset. The district supports nearly half of England's fishing operations and a half of all shellfish waters in England and Wales. However, because of the geology and historic mining activities some sediments in the Gannel, Hayle, Fal and Looe continue to suffer from significant metal pollution. The economy is dominated by the service sector and tourism is also a significant contributor to the local economy. Public administration and defence are the largest economic sectors, followed by construction, wholesale and distribution, retail and health. Agriculture is less significant, though important to the rural environment, and a potential source of pressure on the water environment. 38,000 hectares of SSSI are considered to be in unfavourable condition, and many of these are rivers and streams. Salmon are an	**Surface waters:** 938 rivers and canals, 63 lakes or reservoirs, 25 coastal waters, 23 estuaries. **Ground water bodies:** 44 **Protected drinking waters:** 130 **Freshwater fisheries:** 954 **Shellfish waters:** 33 **Bathing waters:** 187 **Nitrate vulnerable zones:** 97 (41% of RBD) **Natura 2000 sites:** 9 SPAs and 40 SACs dependent on water resources.	**Sediment:** 3,550km (47%) of river length at/probably at risk from the direct effects of sediment. **Physical modification: morphology:** 2,485km (33%) of river and 14 (61%) estuarine areas are at/probably at risk of failing to meet WFD 2015 objectives. 55 (87%) lakes and 16 (64%) coastal water bodies are at risk from morphological pressures. **Nitrate in surface and groundwater:** 3 groundwater bodies at risk. In addition, nine groundwater bodies in the South West River Basin District (20.5%) had a significant and sustained increase in nitrate concentration in groundwater. **Phosphorous in rivers and standing waters:** 61% of total river length at/probably at risk of diffuse phosphorous pollution. **Invasive non-native species:** 213 (23%) river water bodies are probably at risk of failing WFD objectives in 2015. 6 (10%) of lakes are probably at risk, 15 out of 25 coastal water bodies (60%) and 13 out of 23 estuarine waters (57%) are also probably at risk. **Phosphorus in rivers and standing waters:** 59% of the total length of river water bodies is at risk or probably at risk from diffuse phosphorus from agricultural pollution. **Abstraction and other artificial flow pressures:**

RBD	Environmental Characteristics	Water Resources	Principal Impacts and Pressures
	important indicator species, and only 3 rivers were expected to reach the Environment Agency's management objectives for Salmon by 2008.		880km (12%) of river length is at/probably at risk from abstraction and flow regulation. 12 (19%) of lakes and 3,885km^2 (24%) of groundwater bodies are at/probably at risk. **Mines and mine water:** 106 rivers and 6 groundwater bodies are at/probably at risk from mines/mine water. **Pesticides:** 1,563km (21%) of river length is at/probably at risk from diffuse pesticides. 345km (5%) of river length at/probably at risk from sheep dip. 2% of river length at risk from pollution point sources. **Urban and transport pressures:** 49 (5%) of our river water bodies are at risk, or probably at risk from urban diffuse pollution. **Organic pollution:** 425km (6% of total length) of river water bodies are at/probably at risk of failing the ammonia standards. 340 km (5% of total length) of river water bodies are at risk of failing the biochemical oxygen demand standards. 4% of estuarine water bodies at risk or probably at risk from point sources of organic pollution. **Chemicals including priority hazardous substances, priority substances and specific pollutants (excl. pesticides):** 40 (4%) of rivers and 10 (43%) estuarine water bodies are at/probably at risk from failing WFD objectives due to dangerous substance directive compliance. **Other issues include:**

RBD	Environmental Characteristics	Water Resources	Principal Impacts and Pressures
			Endocrine Disrupters Faecal Indicator Organisms Commercial fisheries (estuaries and coastal waters)
Thames (also partly in SEA area 3)	The Thames Estuary RBD covers an area of 16,133km^2 from the river's source in Gloucestershire, through London to the North Sea. The eastern and northern parts of the basin are heavily urbanised, though considerable areas of rural land remain. Rainfall levels are low, and the area is one of the driest in the UK. The Thames provides two thirds of London's drinking water, with most other abstraction in the RBD coming from groundwater sources, principally from chalk aquifers. Business services account for about one fifth of the Thames economy. Transport, and the London and Medway ports are also of economic importance. Agriculture is minimal, but where it exists, animal husbandry and vegetable growing make up the greatest proportion of activities. The Thames and its tributaries support a number of water related priority species listed on the UK Biodiversity Action Plan such as cod, freshwater white-clawed crayfish and depressed river mussels. Populations of water vole and salmon are falling below conservation limits in the RBD, and they could become extinct in some areas without intervention. The status and condition of SSSIs are	**Surface waters:** 483 rivers and canals, 76 lakes or reservoirs, 1 coastal water, 11 estuaries. **Ground water bodies:** 46 **Protected drinking waters:** 116 **Freshwater fisheries:** 433 **Shellfish waters:** 3 **Bathing waters:** 15 **Nitrate vulnerable zones:** 114 (78% of RBD) **Natura 2000 sites:** 5 SPAs and 11 SACs dependent on water resources.	**Abstraction and other artificial flow pressures:** 1,121km (21%) of river length and 2km^2 (5%) is/probably at risk from abstraction and flow regulation. 8,660km^2 (85%) of groundwater are at risk or probably at risk. **Invasive non-native species:** 246 (51%) of rivers are at risk of failing WFD objectives by 2015. 5 (7%) of lakes (though 46% are not assessed), and 3 transitional waters are also probably at risk. **Nitrate in surface and ground waters:** 2,171km (40%) of total river length is at/probably at risk of failing the 50mg/l threshold for nitrate 14 groundwater bodies are at risk of failing environmental objectives due to nitrate. **Pesticides:** 1,901km of river is/probably at risk from diffuse pesticides. No rivers are at risk from sheep dip. **Phosphorous in rivers and standing waters:** Over 71% of river length is/probably at risk from diffuse agricultural phosphorous pollution. **Physical modification: morphology:** 2,371km (44%) of river length and 21 (28%) of transitional water bodies are at risk of failing 2015 WFD objectives for morphological pressures. 11 (100%) of estuarine waters and 1 (100%) coastal water is also at risk from similar pressures.

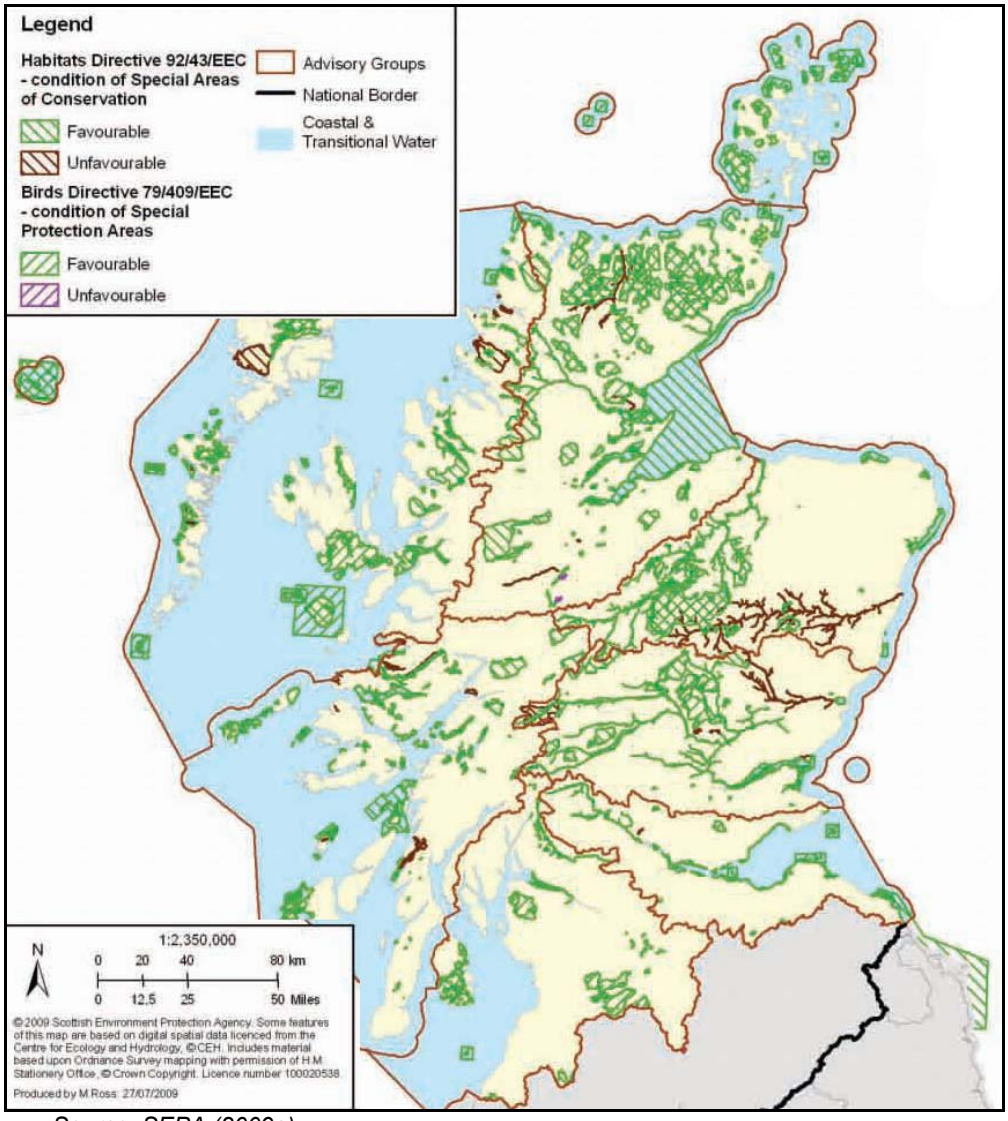
RBD	Environmental Characteristics	Water Resources	Principal Impacts and Pressures
	influenced by habitat fragmentation, poor agricultural management, spread of non-native species, increasing water abstraction pressures and impacts of drought – which also have wider reaching impacts.		**Sediment:** 1,569km (29%) of river length is/probably at risk from the direct effects of sediment. **Urban and transport pressures:** 120 river water bodies are at risk, or probably at risk for urban diffuse pollution **Organic pollution:** 685km (13%) of total river length is at/probably at risk of failing the ammonia standards. 658km (12%) of total river is at risk or probably at risk of failing the biochemical oxygen demand standards. **Faecal indicator organisms**

Source: Environment Agency (2008g, h, i, 2009p-u)

A4d.1.2.3 Condition of Water Dependent Natura 2000 Sites

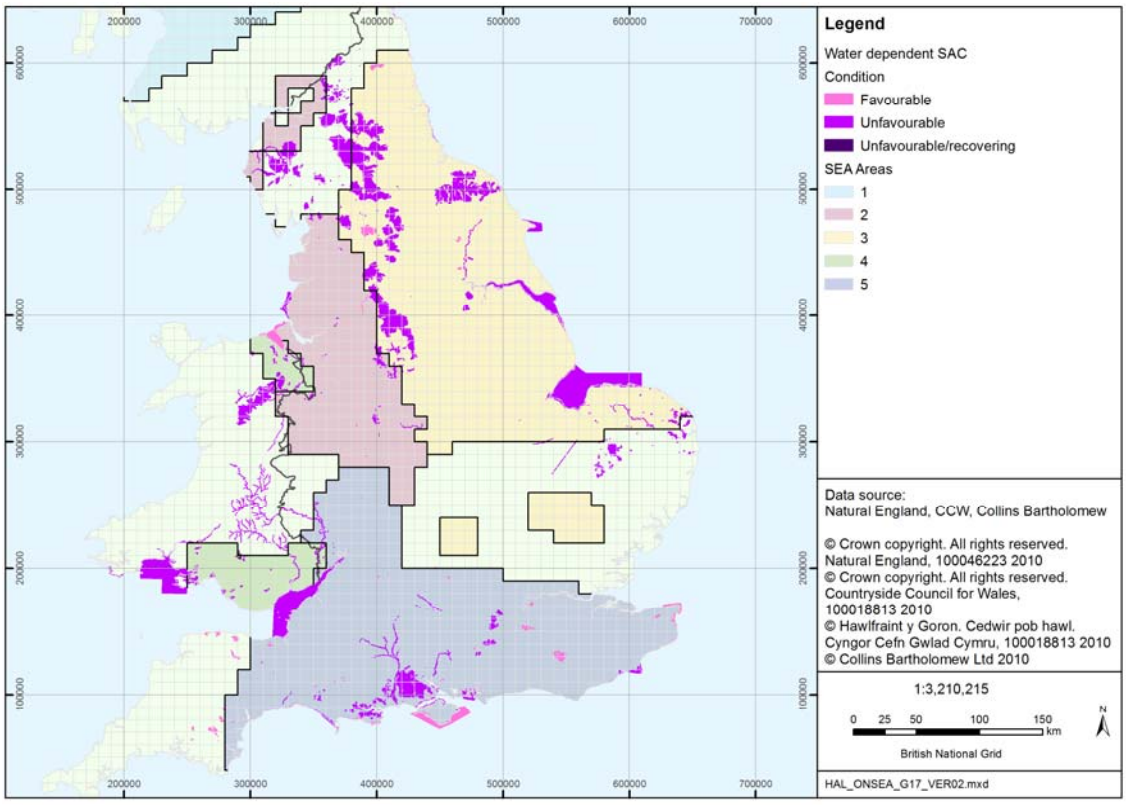
The pressures experienced in each RBD often coincide with areas designated under the EC habitats (92/43/EC) and birds (79/409/EC) directives. Figure A4d.2, Figure A4d.3 and Figure A4d.4 indicate the location of associated Natura 2000 SAC and SPA sites which are water dependent. The figure indicates whether each of the sites is meeting the environmental objectives of Article 4.1(c) of the WFD. Unfavourable site condition may result from any of the pressures indicated above, but more specifically may relate to inappropriate abstraction, weirs and other structures, and the presence of invasive, non-native species. Article 4.1(c) of the WFD sets a deadline of December 22nd 2015 for the achievement of objectives (i.e. favourable status) relating to Natura sites which are also water bodies, and this is the target set for achieving favourable status in these areas. A full illustration and list of Natura 2000 sites located in each SEA area is given in appendix 4a.

Figure A4d.2 – Location of Water Dependent SACs and SPAs and Results of Site Condition Monitoring



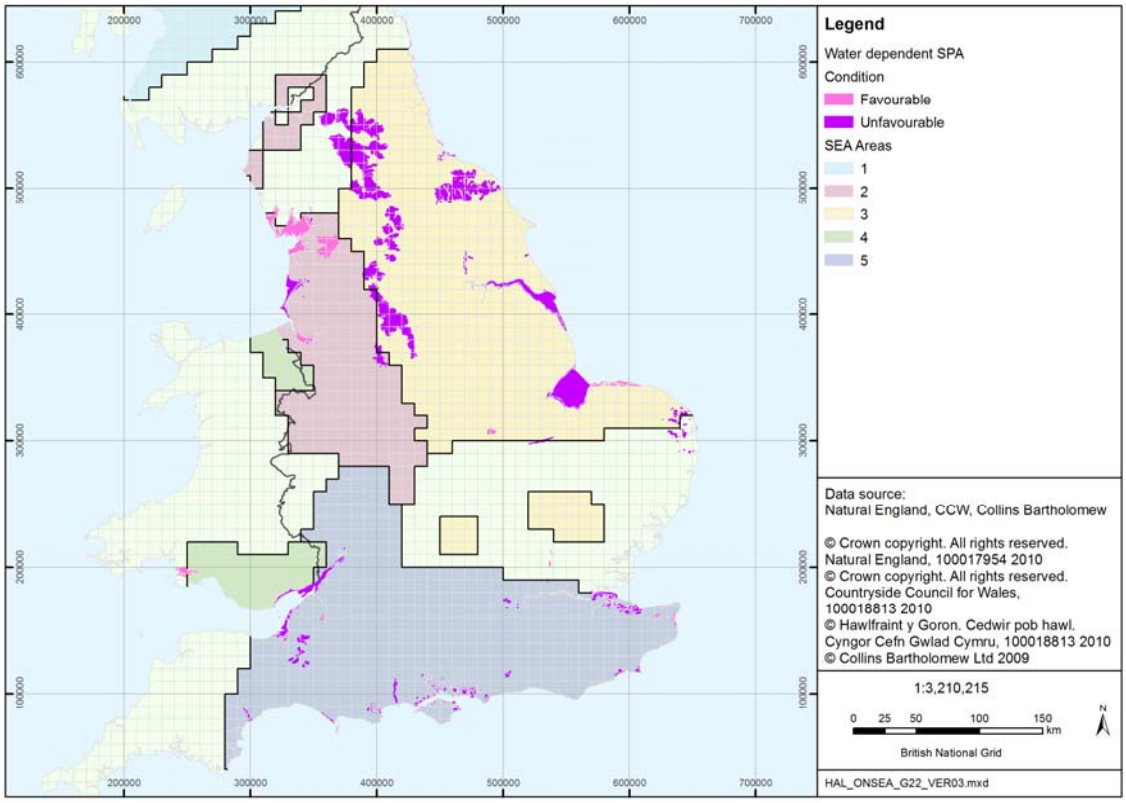
Source: SEPA (2009a)

Figure A4d.3 – Condition of Water Dependent SACs



Additional source: Environment Agency (2009d-w)

Figure A4d.4 – Condition of Water Dependent SPAs



Additional source: Environment Agency (2009d-w)

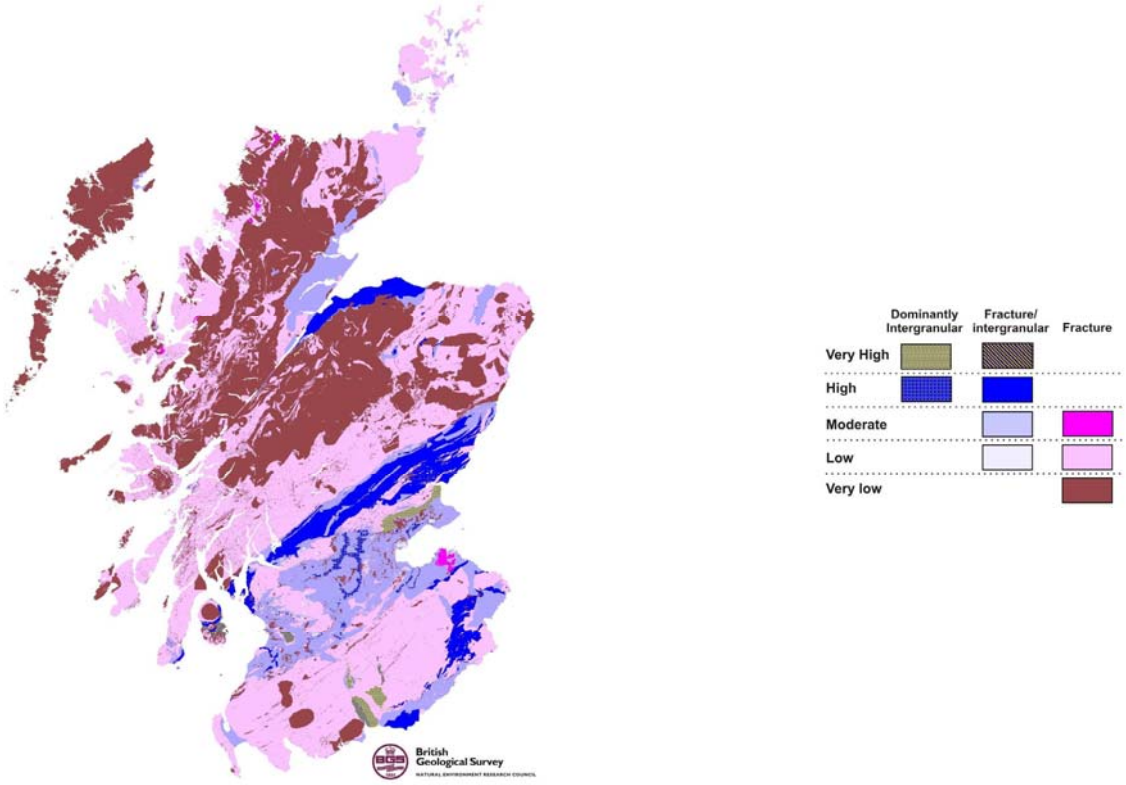
A4d.1.2.4 Groundwater and Groundwater Vulnerability

Groundwater may be defined either as water in surficial sediment (drift) or more commonly, in base rock aquifers. Groundwater effluent flow to surface waters and its use as potable water (constituting ~74% of drinking water supplies in south-east England, and 30% in England and Wales as a whole) requires that abstraction levels and contamination are monitored and managed appropriately in the long-term.

The efficiency of aquifers depends on the porosity (space in which to store water) and permeability (how well water is transmitted) of the rock. Pollution of groundwaters is of concern as a high number of water soluble chemicals are available as by-products of industry and agriculture which can infiltrate into groundwater (e.g. nitrogen and industrial non-aqueous phase liquids), may have long residence times (UK Groundwater Forum Website, also see Downing 1998), and affect the quality of abstracted water and natural effluent flow. Increasing urbanisation has also led to reduced recharge, higher demands, and an increase in potential pollution sources (Environment Agency 2006). The residence time of a given pollutant in groundwater varies depending on the input of water through precipitation sources (greater rainfall helps to dilute incoming pollutants and vice versa) and the transmission time. The latter is a function of geology (e.g. the depth/nature of the unsaturated zone, fractured rock versus more consolidated permeable rock) and the viscosity/density of the pollutant (UK Groundwater Forum Website). Potentially long residence times and the lack of microbiological activity to break down pollutants (Jones 1997) make groundwater cleanup a difficult process. As part of the current groundwater regulation in the UK, and the impending adoption of the WFD groundwater daughter directive (see section A4d.1.1.2 above), 2,000 groundwater sources have been identified as Source Protection Zones (SPZs). In addition to direct pollution, future climate and sea-level change may influence the recharge rates to aquifers and the level of saline intrusion (Environment Agency 2006).

The most productive aquifers of the UK are found in southern England and consist of chalk, Permo-Triassic sandstones, Jurassic limestones and Lower Greensand which range in age from Permian to Quaternary (UK Groundwater Forum Website). Older Devonian and Carboniferous strata are of secondary importance due to low productivity and make up the principal aquifers of Scotland (UK Groundwater Forum Website). Aquifer productivity is described for Scotland in the BGS report, MacDonald *et al.* (2004), and a resulting map of modelled productivity is indicated in Figure A4d.5.

Figure A4d.5 – Bedrock Aquifer Productivity in Scotland

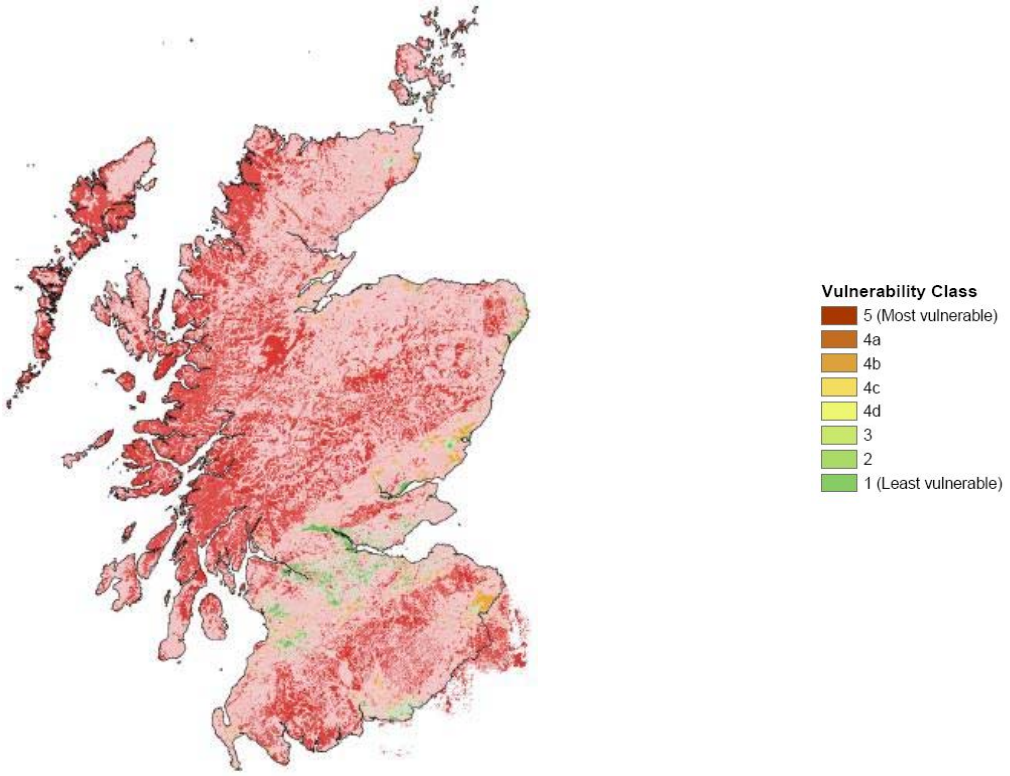


Source: MacDonald et al. (2004)

SNIFFER (2004) describes groundwater vulnerability as, "the tendency and likelihood for general contaminants to reach the water table after introduction at the ground surface". As a requirement under the WFD an assessment of the risk to groundwater contamination is required. A regional scale (1:100,000) groundwater vulnerability map (Figure A4d.6) was generated by SNIFFER (2004), using criteria including the thickness and permeability of superficial deposits (e.g. clay versus sandy sediment), the permeability of intergranular or intergranular-dominant bedrock aquifers, the groundwater flow in type in bedrock and the depth to the water table in order to generate different potential vulnerability scenarios.

Vulnerability maps are available for the entirety of the UK from the BGS, though more up to date information may be available from the Environment Agency.

Figure A4d.6 – Groundwater Vulnerability



Source: SNIFFER (2004)

A4d.1.3 Water Resources Indicators

Indicators which form part of the UK Governments' Sustainable Development Strategy, amongst others, and are of relevance to the water resources of the UK are indicated in Table A4d.8. The following information has been principally gathered from the UK Sustainable Development website and accompanying publications unless otherwise stated.

Table A4d.8 –Water Resources Indicators

#	Indicator	Region[1]
11	**River Quality*** (biological and chemical quality)	E, W, S
12	**Water Resource Use**	
	Total abstractions from surface and groundwater	E, W
	Leakage losses	E, W
13	**Public water yield and demand (Scotland)†**	S
14	**Water stress†**	E, W
15	**Bathing waters†**	E, W, S

*Note: *signifies a framework indicator – those shared by the UK Government and the devolved administrations. †additional indicator not included in the UK government sustainable development strategy.*
[1]Region refers to that for which data is available: E=England, W=Wales, S=Scotland.

A4d.1.3.1 River Quality

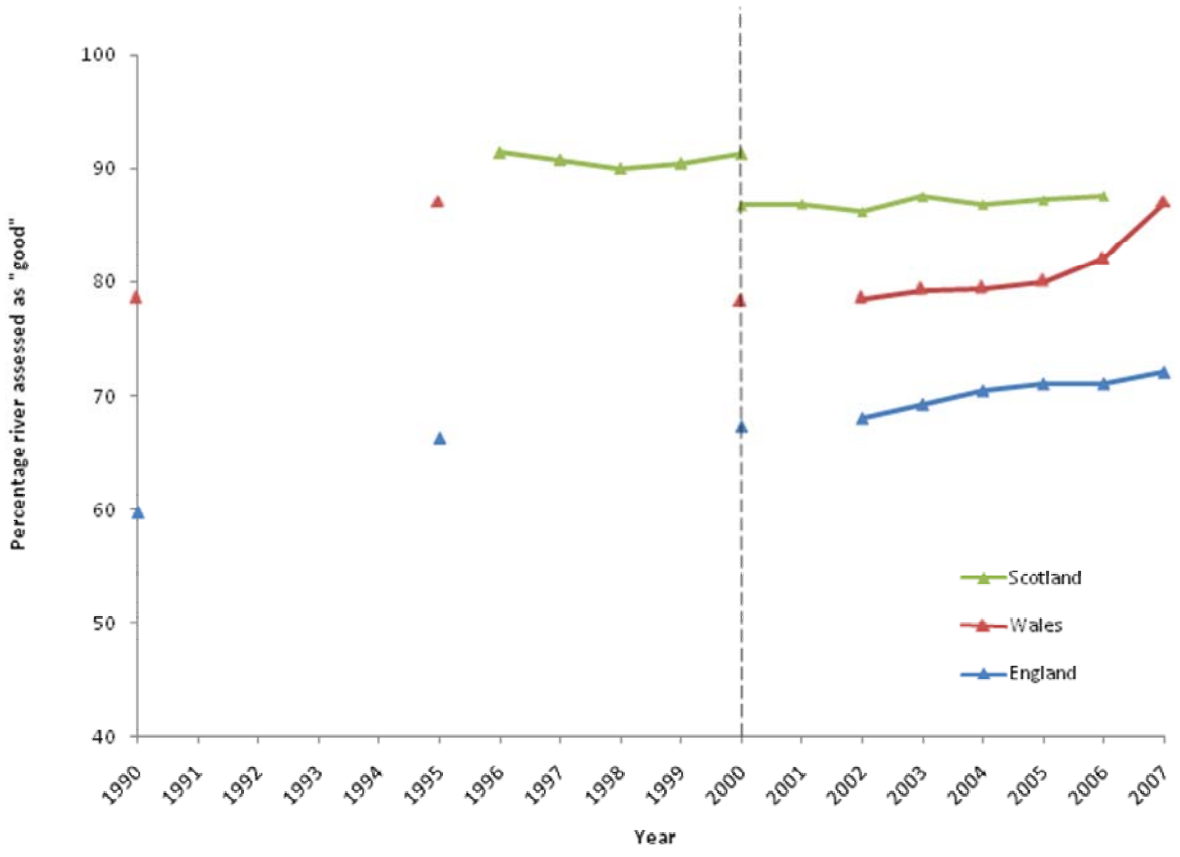
Biological grading is based on the monitoring of small animals (invertebrates) which live in, or on the bed of rivers and canals. Monitoring involves the comparison of the actual

observed and expected species composition in the absence of pollution. Surveys to determine biological quality have been carried out on an annual basis since 2002. Between 1990 and 2007 the percentage of rivers of good biological quality in England rose from 60% to 72% (excluding London office region). In 2007, 87% of rivers in Wales were of good biological quality (Figure A4d.7 and Figure A4d.8; Table A4d.9).

The chemical quality of rivers is measured differently in Scotland than in England and Wales and so results between these areas are not directly comparable. In England and Wales the General Quality Assessment (GQA) measures dissolved oxygen (DO), biological oxygen demand (BOD) and ammoniacal nitrogen in order to make an assessment of chemical quality. In 2007, 76% of English rivers (excluding London office region) were of good chemical quality, compared with 43% in 1990. In all years since 1993, over 90% of rivers in Wales have been of good chemical quality.

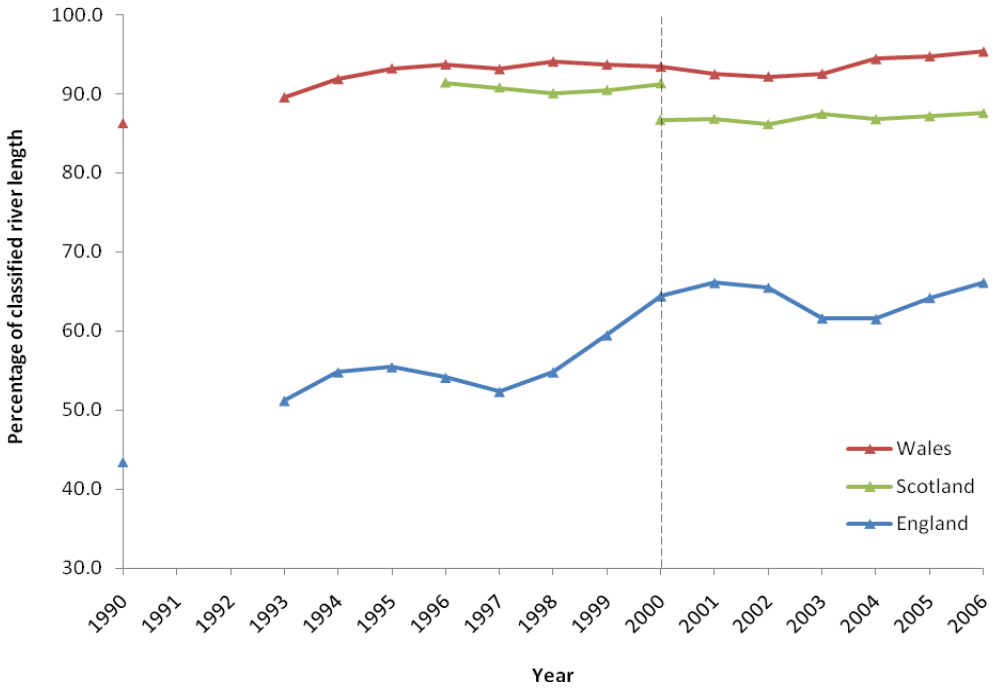
In Scotland, the percentage of rivers of good quality has remained stable at around 87% between 2000 and 2006, based on a combined chemical, biological and aesthetic assessment.

Figure A4d.7 – Rivers of Good Biological Quality, 1990-2007



Source: Environment Agency and SEPA, from data provided in the Defra e-Digest of Environmental Statistics (http://www.defra.gov.uk/environment/statistics/)
Note: Scottish river classification is based on a combined chemical, biological and aesthetic assessment and is not directly comparable with other countries. The Scottish classification network changed in 2000.

Figure A4d.8 – Rivers of Good Chemical Quality, 1990-2006



Source: Environment Agency and SEPA, from data provided in the Defra e-Digest of Environmental Statistics (http://www.defra.gov.uk/environment/statistics/), Defra (2009e)
Note: Scottish river classification is based on a combined chemical, biological and aesthetic assessment and is not directly comparable with other countries. The Scottish classification network changed in 2000.

Table A4d.9 – River Lengths of 'Good' Biological and Chemical Quality by Government Office Region, 1990 and 2006

River Quality	EM	EE	L	NE	NW	SE	SW	W	WM	YH
% of total river lengths of good biological quality	66	74	21	79	56	77	89	83	59	64
% change, 1990-2006	25	17	10	11	12	11	8	4	11	8
% of total river lengths of good chemical quality	63	44	37	82	63	65	81	95	64	65
% change, 1990-2006	43	23	24	12	22	25	19	8	25	13
England Average: Good biological quality	65% (71% excluding London)									
England Average: Good chemical quality	63% (66% excluding London)									

Source: Environment Agency, from data provided on the Defra sustainable development in government webpages (http://www.defra.gov.uk/sustainable/government/)
Note: EM=East Midlands, EE=East of England, L=London, NE=North East, NW=North West, SE=South East, SW=South West, W=Wales, WM=West Midlands, YH=Yorkshire and the Humber

A4d.1.3.2 River Quality and the WFD

This indicator will in due course be changed to reflect assessments of ecological status as required by the Water Framework Directive which take into account a wider suite of environmental pressures. Results presented in the current RBD Management Plans indicating the biological status of surface waters are given in Table A4d.10 along with 2015 projections (for more details see the Environment Agency and SEPA WFD websites).

Table A4d.10 –Biological Status of Rivers (as a Percentage of Assessed River Length)

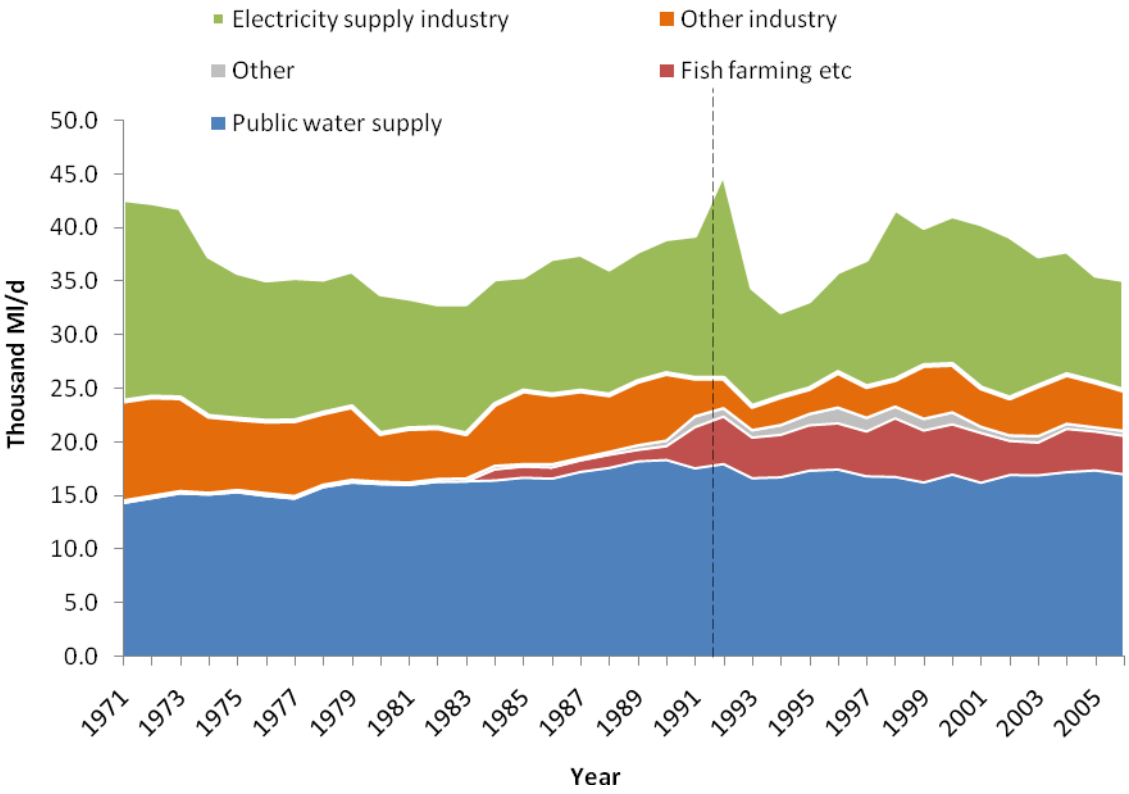
River Quality	A	D	H	NW	N	Se	S*	ST*	SE	SW	T	W
% High	6	16	5	6	10	13	6	1	7	19	7	10
% Good	26	35	22	31	27	24	45	40	33	32	21	41
% Moderate	34	31	36	28	33	32	22	42	32	27	30	37
% Poor	29	17	29	25	26	27	15	13	25	20	36	11
% Bad	5	1	8	11	4	4	10	5	3	2	6	1
2015 projections												
% High	6	16	5	6	10	13	8	1	7	19	8	10
% Good	30	35	27	38	33	30	53	50	40	46	26	49
% Moderate	37	32	36	29	33	33	22	39	30	23	37	31
% Poor	23	15	26	20	20	21	11	8	20	10	26	9
% Bad	4	1	5	7	4	3	6	2	3	2	4	1

Source: SEPA (2008a-d, 2009), Environment Agency & SEPA (2008, 2009), Environment Agency (2009d-w)
Note: A=Anglian, D=Dee, H=Humber, NW=North West, N=Northumbria, S=Scotland, Se=Severn, ST=Solway-Tweed, SE=South East, SW=South West, T=Thames, W=West Wales
** Figures for Scotland and Solway Tweed are for the overall ecological status/potential of rivers, including chemical and morphological factors.*

A4d.1.3.3 Water Resource Use

In 2006, 35,000Ml/d of water was abstracted from non-tidal surface and ground water sources in England and Wales (Figure A4d.9), though abstraction had been lower during the early and mid-1990s. In 2006, public water supply accounted for an estimated ~48% of abstracted water in England and Wales, electricity generation accounted for ~30%, fish farming ~10%, with the rest being used by other industries, e.g. mineral washing. More generally, the quantity of water being abstracted since 2000 has fallen. The most significant increase in abstracted water use in the last 20 years has been for the fish farming industry, increasing from just ~3% of total water abstracted in 1984 to ~10% in 2006 (non-tidal).

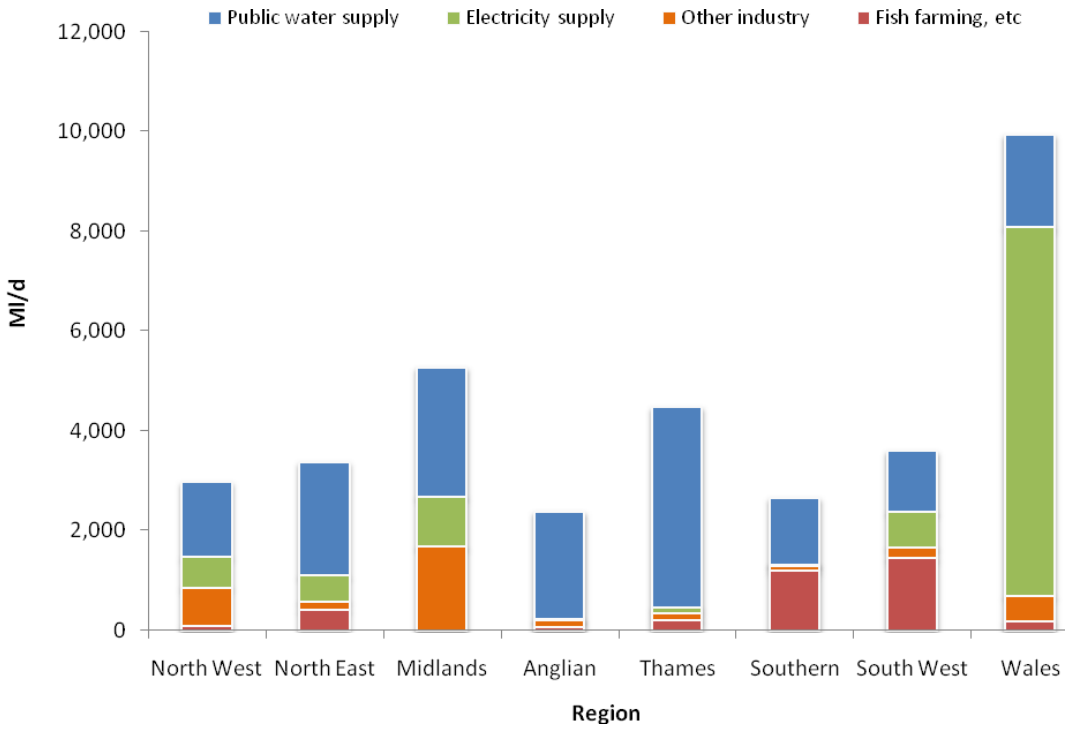
Figure A4d.9 – Estimated Water Abstracted from non-Tidal Surface Water and Ground Water (England and Wales) by Purpose, 1971-2006



Source: Environment Agency, from data provided in the Defra e-Digest of Environmental Statistics, April 2009 (http://www.defra.gov.uk/environment/statistics/)
Note: data collected prior to 1991 is not directly comparable with later years

Figure A4d.10 indicates the regional distribution of water abstracted from non-tidal surface water and groundwater by purpose for England and Wales in 2006. With the exception of Wales and the North East, public water supply accounts for the highest percentage use of abstracted water. Water used in power generation exceeds public water use in Wales and the North East, and accounts for the third highest proportion of water use in the North West, Midlands and South West. Water abstracted in the Southern and South West regions make a significant contribution to the fish farming industry, almost equalling public water demands.

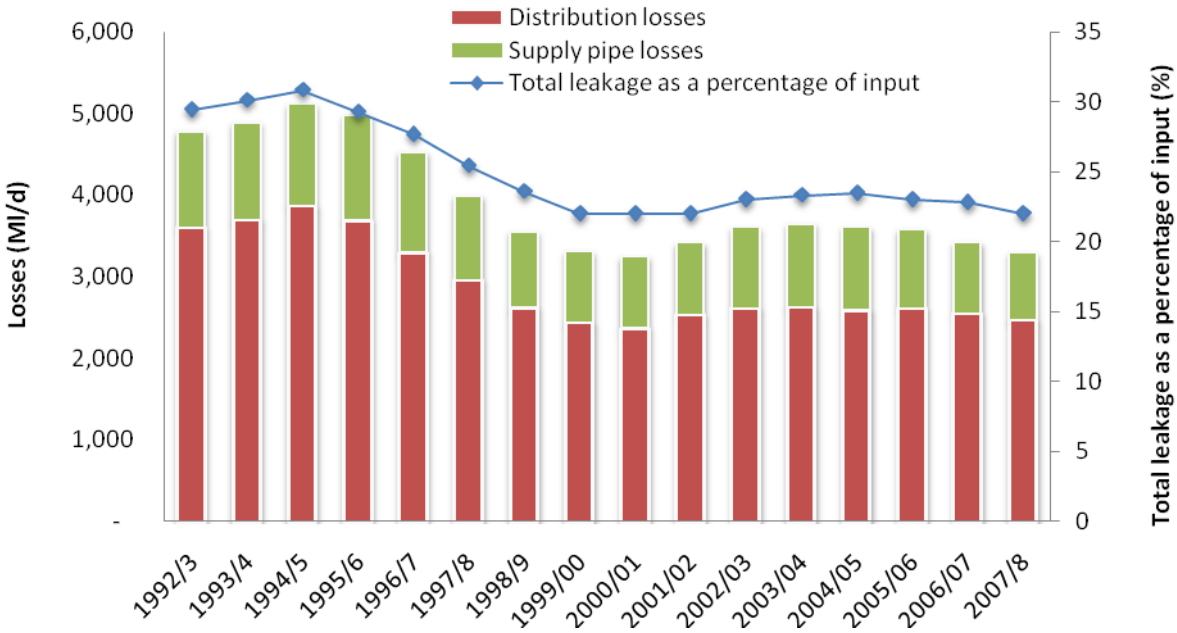
Figure A4d.10 – Estimated Water Abstraction by Purpose and by Region (England and Wales), 2006 (non-tidal surface and groundwaters)



Source: Environment Agency, from data provided in the Defra e-Digest of Environmental Statistics, April 2009 (http://www.defra.gov.uk/environment/statistics/)

In 2007/08, 3,291 Ml/d of water put into the supply in England and Wales (out of a distribution input of 14,755 Ml/d) was lost through leakage (Figure A4d.11), which as a percentage of total input, is 7% less loss (22 vs. 29%) than in the peak year of 1994/5 (Environment Agency website). "Distribution losses" include leakage from water companies' distribution systems; "Supply pipe losses" are those from customers' underground supply pipes.

Figure A4d.11 – Estimated Leakage Losses and Distribution Input (England and Wales), 1992-2008



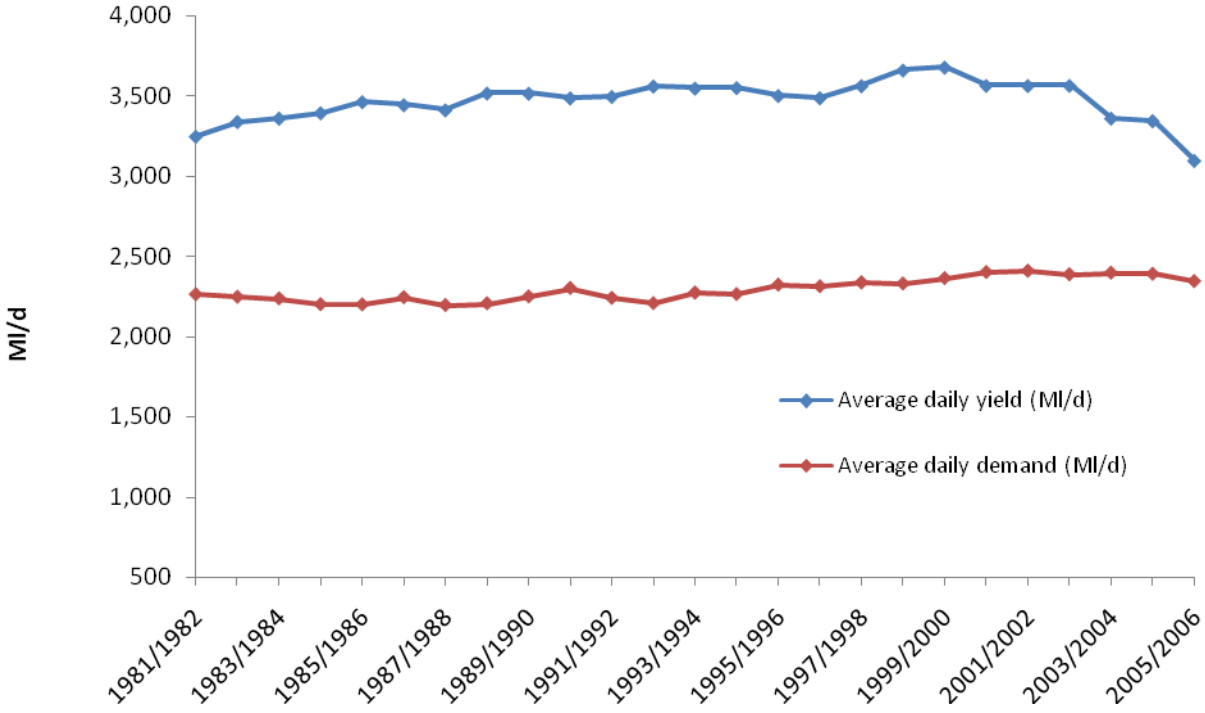
Source: Ofwat, from data provided in the Defra e-Digest of Environmental Statistics, April 2009 (http://www.defra.gov.uk/environment/statistics/)

A4d.1.3.4 Public Water Yield and Demand (Scotland)

Demand for water in Scotland has increased by 4% since 1981, although yield from developed resources (representing the potential water available) is still greater than demand (Figure A4d.12). Reductions in yield in recent years are due to the rationalisation of treatment works with some being closed as a result. For 2005/2006, daily demand includes an estimated 47% lost through leakage (Scottish Executive 2007).

Water demand comes from unmetered and metered potable water, and small amounts of non-potable water. Unmetered demand (domestic use, small industries, public use, leakage, etc.) accounted for 80% of daily demand in 2005/2006, compared with 70% in 1981/1982 (Scottish Executive 2007).

Figure A4d.12 – Public Water Supplies, Yield and Demand (Scotland), 1981-2006



Source: Scottish Environment Statistics Online (http://www.scotland.gov.uk/Topics/Statistics/Browse/Environment/seso)

A4d.1.3.5 Water Stress

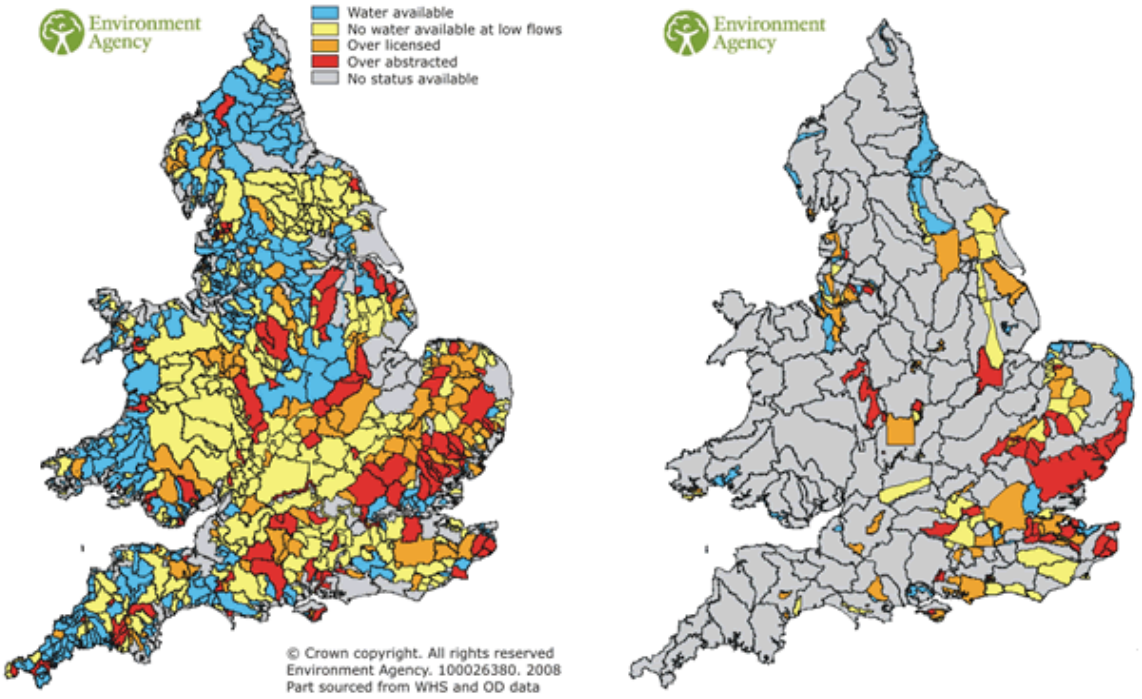
The UK is commonly perceived as wet, but the population density is high, and rainfall varies across the country, tending to be highest in the north and west, and lowest to the south and east. Therefore there is relatively little water available per person, especially in the south east and some urban areas.

Figure A4d.13 illustrates Environment Agency Catchment Abstraction Management Strategy (CAMS) areas as of March 2008, where map A shows surface water (or where surface water interacts significantly with groundwater). Map B shows where groundwater was assessed separately from surface water. Catchment Abstraction Management Strategies enable water resource management at the catchment scale and at the individual surface and groundwater scale. These will in future be linked to those waterbodies considered in the RBMPs under the WFD. In addition, water companies are statutorily required to produce Water Resource Management Plans (WRMPs) for their respective areas, the latest of which (2010-2035) are nearing completion. These set out how companies plan to meet demand in the wider context of, for instance, climate change and changing demographics.

Figure A4d.13 – Resource Availability Status by Catchment Abstraction Management Strategy Areas, 2008

A: Surface water and/or surface water combined with groundwater

B: Groundwater

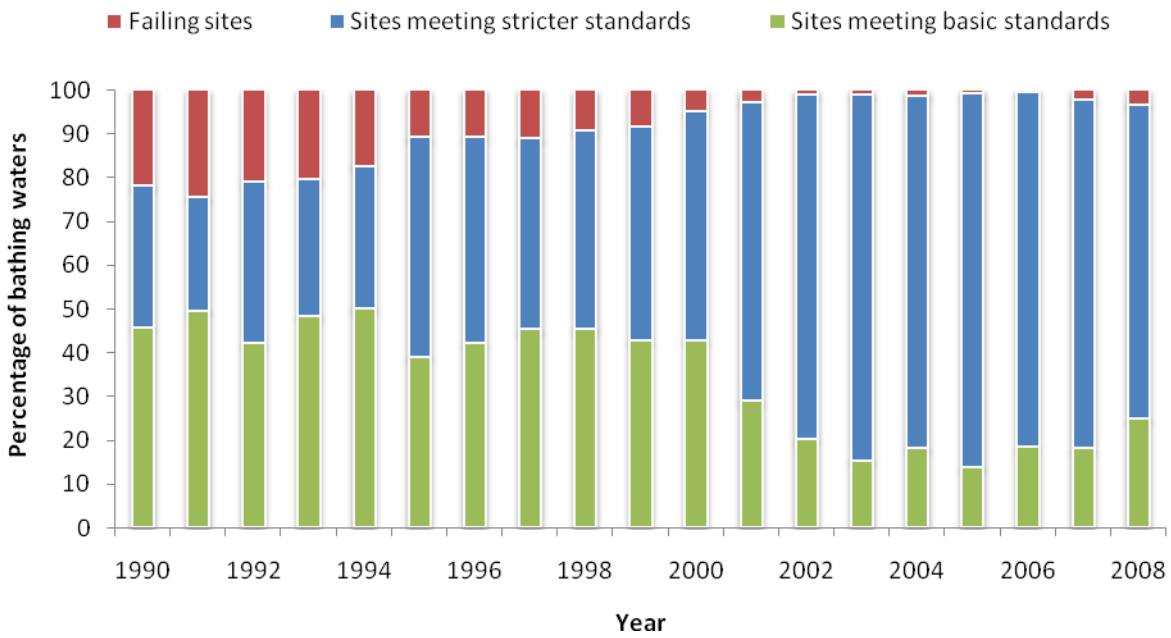


Source: Environment Agency, as cited in Defra (2008d, 2009e)
*Note: **Water available**: Water is likely to be available at all flows including low flows. Restrictions may apply; **No water available**: No water is available for further licensing at low flows. Water may be available at higher flows with appropriate restrictions; **Over licensed**: Current actual abstraction is such that no water is available at low flows. If existing licences were used to their full allocation they could cause unacceptable environmental damage at low flows. Water may be available at high flows, with appropriate restrictions; **Over abstracted**: Existing abstraction is causing unacceptable damage to the environment at low flows. Water may still be available at high flows, with appropriate restrictions.*

A4d.1.3.6 Bathing Waters

The quality of bathing water in the UK has been steadily increasing and fewer sites now fail to meet basic standards. In England and Wales, the lowest number of recorded failures was in 2006 (0.6%), with a small percentage increase in 2007 (2.2%) and 2008 (3.4%). 2008 figures indicate that there was a decrease in the number of waters reaching mandatory standards by 1.7% on 2007 (Figure A4d.14). 15 waters failed which include: Staithes in the North East; Aldingham, Allonby and Bardsea in the North West; Coombe Martin, East Looe, Exmouth, Instow, Plymouth Hoe East, Plymouth Hoe West, Porthluney, Readymoney, Rock and Seaton (Cornwall) in the South West, and Sandgate in the Southern region (Defra 2009). Only 3 (Staithes, Exmouth and Sandgate) occur within the areas considered in this SEA.

Figure A4d.14 – Bathing Water Compliance in England and Wales, 1990-2008

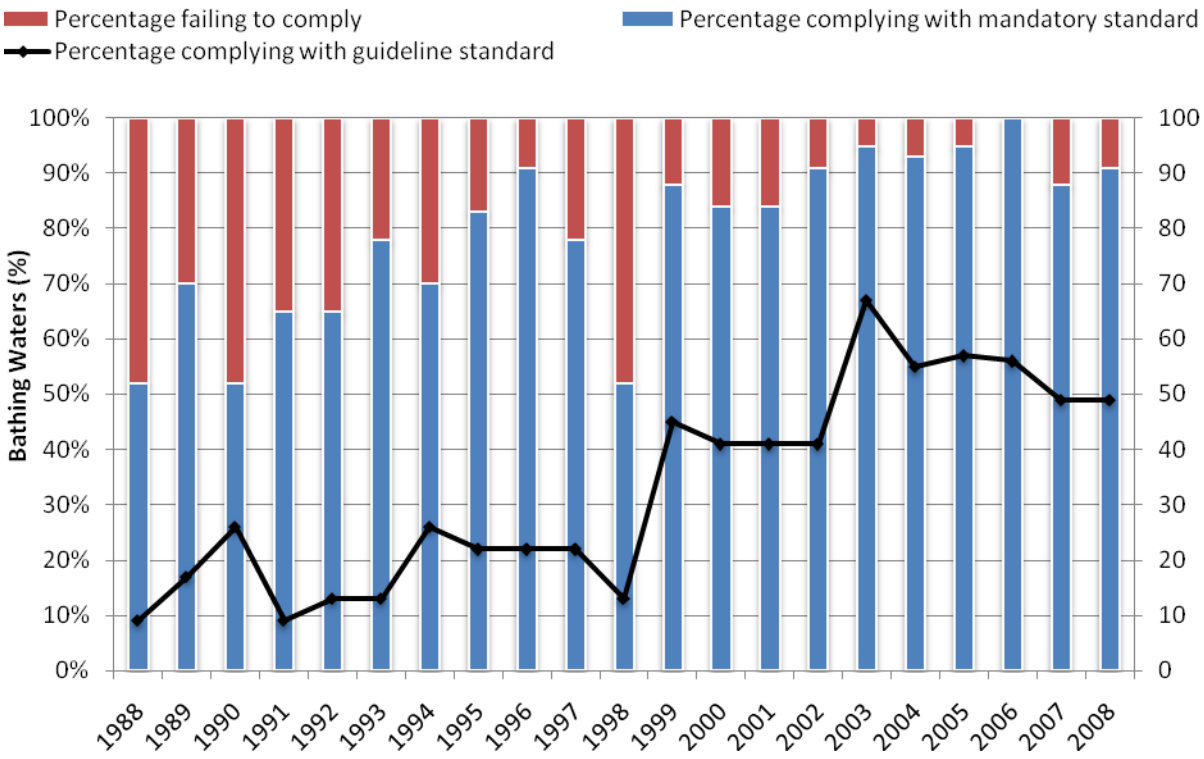


Source: Environment Agency website
Note: In 2008 495 designated bathing waters were used to assess compliance

Overall, there were fewer mandatory (95.8%) and stricter guideline (63.9%) passes in the UK in 2008 than in 2007. In Scotland (Figure A4d.15), 7 bathing waters failed to meet basic standards, as did 1 in Wales. Those which failed in Scotland were Aberdeen, Cruden Bay, Ettrick Bay, Portobello (Central), Rosehearty, Saltcoasts/Ardrossan and Sandyhills. Of these, 3 (Ettrick Bay, Portbello (Central), Saltcoasts) occur within the current SEA area.

A potential reason for the increase in bathing water failures in 2008 was the exceptionally high rainfall experienced in the year. Diffuse pollution from agricultural and other sources would have been more readily transported into water courses, and combined sewer overflows would have had a higher frequency of use (Defra 2009).

Figure A4d.15 – Bathing Water Compliance in Scotland, 1990-2008



Source: SEPA, from data provided in the Scottish Environment Statistics Online, May 2009 (http://www.scotland.gov.uk/Topics/Statistics/Browse/Environment/seso)
Note: Bathing waters complying with a guideline pass did so in addition to achieving mandatory status. Note: In 2008 80 designated bathing waters were used to assess compliance

A4e.1 Air Quality

Poor air quality has been an environmental and human health issue since at least the industrial revolution. There is now a growing body of evidence to suggest that climate change (see: appendix A4f) may be influenced from the emission of certain gases (CO_2, CH_4), while others (SO_2, NO_x, NO, NO_2 and NH_3) are known to be involved in acid deposition, which leads to acidification, eutrophication, crop and building damage and human health issues (Bell and Walker 2005). Airborne particulate matter is of concern in urban areas; this is generated by vehicles (accounting for 22% of PM emissions) and industrial processes. There may be significant health implications (see: appendix A4g) to humans from particulate emissions which are not yet fully understood, though levels have been generally declining since the 1980s due to stricter regulation and the adoption of improved technology (Maggs *et al.* 2008).

The change in indicators of air pollution connected with these environmental problems is presented in section A4e.1.3 below, and is further discussed in Appendix A4g in relation to population and human health.

A4e.1.1 Regulatory Context

The air quality of all local authority areas is generally within national standards set by the UK government's air quality strategy (Defra 2007d), though several Air Quality Management Areas (AQMAs) have been declared to deal with problem areas.

The Government's revised *Air Quality Strategy for England, Scotland, Wales and Northern Ireland* has set national air quality standards with the objective of protecting human health, vegetation and ecosystems. In the longer term, these standards along with other strategies connected with climate change could significantly improve air quality and achieve meaningful reductions in CO_2 by 2050 (Defra 2007d). Many of the standards set in the strategy are derived from EU obligations for the reduction or non-exceedance of a particular pollutant. The pollutant concentration levels have their origin in the 1996 Air Quality Framework Directive (1996/62/EC) and "daughter" directives, subsequently replaced by the Ambient AQ and Cleaner Air for Europe Directive (2008/50/EC) released upon adoption in May 2008 and required to be transposed to UK law by June 2010, which have the following key elements:

- For clarity, existing legislation should be merged into a single directive with no changes to air quality objectives
- New objective for $PM_{2.5}$ including a limit value and exposure related objectives – there is no minimum concentration identifiable for $PM_{2.5}$ where risks to human health are reduced
- The possibility to exclude natural sources of pollution in assessing compliance values where they can be reliably measured and where exceedances are due in whole or part to natural contributions
- Possible time extensions under Article 22 until 11th June 2011 for PM_{10}, or five years for NO_2 and benzene for compliance with limit values, based on conditions and assessment by the EC[1]

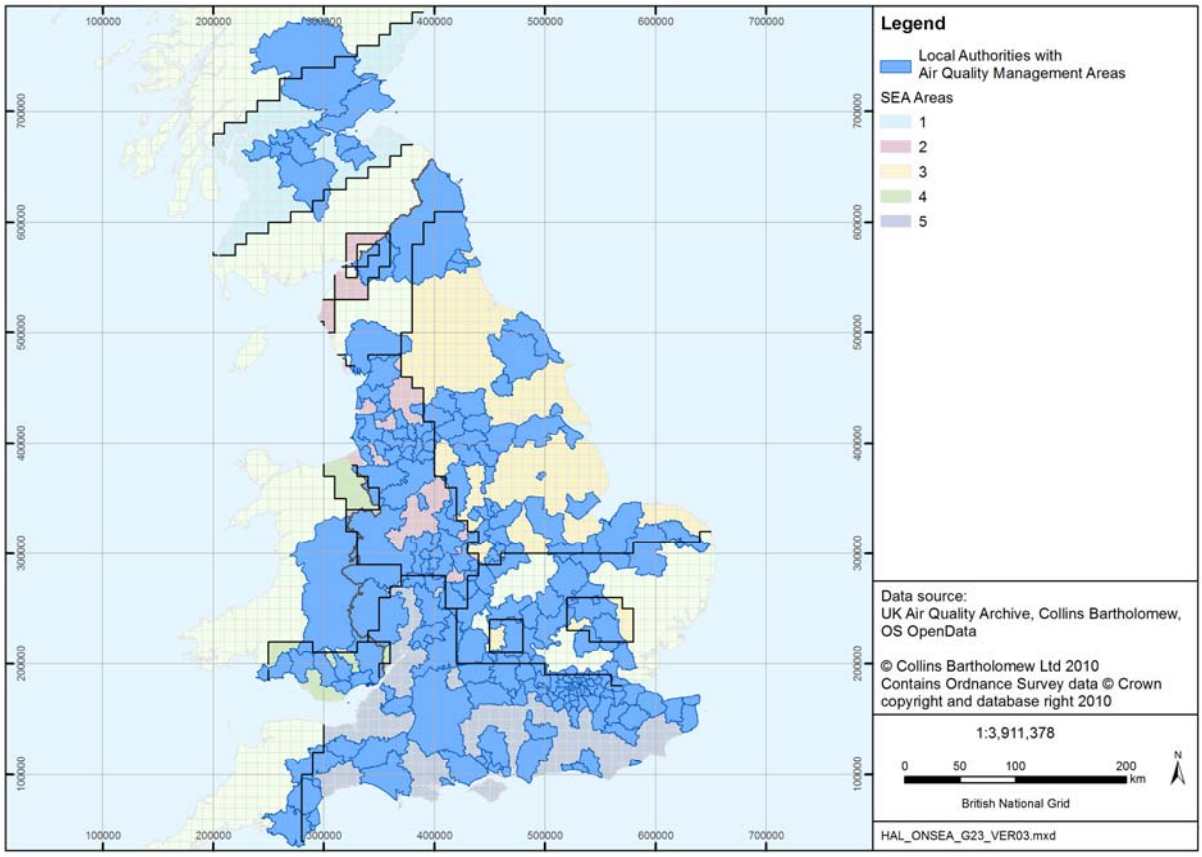
The current objectives set by the EU were transposed into UK law in the Air Quality Standards Regulations (2007), which came into force on the 15th January 2007. Limit values for pollutants can be found via the UK Air Quality Archive website, or the Air Quality

[1] *In April 2009, the UK sent a notification to the EC to secure additional time to meet the limit values for particulate matter for eight areas across the UK in accordance with Article 22. Details can be found in Defra (2009f), Technical report to accompany UK PM_{10} Time Extensions Notification forms.*

Standards Regulations (2007) document located on the Office of Public Sector Information website. The Ambient AQ and Cleaner Air for Europe Directive (2008/50/EC) must be transposed into UK legislation by June 2010.

Part 5 of the Environment Act 1995 requires local authorities to review and assess the present air quality in their areas and its probable future trajectory. Since 1997 each local authority in the UK has been assessing their air quality and making projections on how it might change in years to come, with the aim of meeting the national air quality objectives by the relevant deadlines. An Air Quality Management Area (AQMA) must be declared where the local authority finds that it is unlikely to meet the objective of reducing pollution by the specified amount, and in accordance with the Air Quality Framework Directive, a Local Air Quality Action Plan must be used to coordinate and improve air quality, for which a set of guidance documents has been released by Defra (2009a-d). There are a number of AQMAs in the UK and these are indicated in Figure A4e.1. AQMAs are as large as is required to meet air quality objectives, and in many cases may consist of an area surrounding just a few streets or a major route way.

Figure A4e.1 – Local Air Quality Management Areas



In addition to AQMAs, smoke control areas are also declared for a number of regions in the UK. These areas relate to legislation described in the Clean Air Act 1993, where local authorities may prohibit the emission of smoke from chimneys and boilers within designated areas, and impose fines on those who pollute without authorisation. Some fuels (e.g. gas, electricity) are inherently smokeless and so exempt, and some appliances (e.g. wood burners) are exempt as these can burn smoky fuels with no smoke emissions. No smoke control areas are present north of Fife, indicative of a reduced level of urban development as one moves north.

The *Automatic Urban and Rural Network* (AURN) monitors certain pollutants at hourly intervals for a range of locations across the UK. The location of these stations can be viewed at the AURN website, and data are made available via the UK Air Quality Archive website.

A4e.1.2 Atmospheric Emission of Pollutants

The National Atmospheric Emissions Inventory contains a database listing the emissions of a range of pollutants across the UK. Emission inventories are estimates of the amount and type of pollutants that are emitted to the air each year from all sources (e.g. industrial point sources, shipping, rail, road traffic). The details of a number of pollutants are described below and their emissions are graphically represented in Figure A4e.2-Figure A4e.5.

Sulphur Dioxide

UK emissions are dominated by combustion of fuels containing sulphur, such as coal and heavy oils by power stations and refineries. In some parts of the UK, coal for domestic use is a significant source (Defra 2007d).

Particulate Matter (PM_{10}, $PM_{2.5}$)

Particulate Matter is generally categorised on the basis of the size of the particles (for example $PM_{2.5}$ consists of particles with a diameter of less than 2.5µm). Concentrations of PM comprise primary particles emitted directly into the atmosphere from combustion sources and secondary particles formed by chemical reactions in the air. In the UK the biggest human-made sources are stationary fuel combustion and transport (Defra 2007d). Most monitoring is associated with PM_{10} concentrations, though smaller fractions ($PM_{2.5}$ and PM_1) are becoming of increasing interest in relation to any possible health side-effects. Recent research has indicated some problems in measuring particulate mass reliably, which may have led to the over-estimation of PM_{10} and $PM_{2.5}$ levels (Maggs *et al.* 2008).

Nitrogen Oxides (NO_x)

All combustion processes in air produce oxides of nitrogen (NO_X). Nitrogen dioxide (NO_2) and nitric oxide (NO) are both oxides of nitrogen and together are referred to as NO_X. Road transport is the main source, followed by the electricity supply industry and other industrial and commercial sectors (Defra 2007d).

Carbon Monoxide (CO)

Carbon Monoxide (CO) is formed from incomplete combustion of fuels containing carbon. The largest source is road transport, with residential and industrial combustion making significant contributions (Defra 2007d).

Figure A4e.2 – Emissions of NOx (2007)

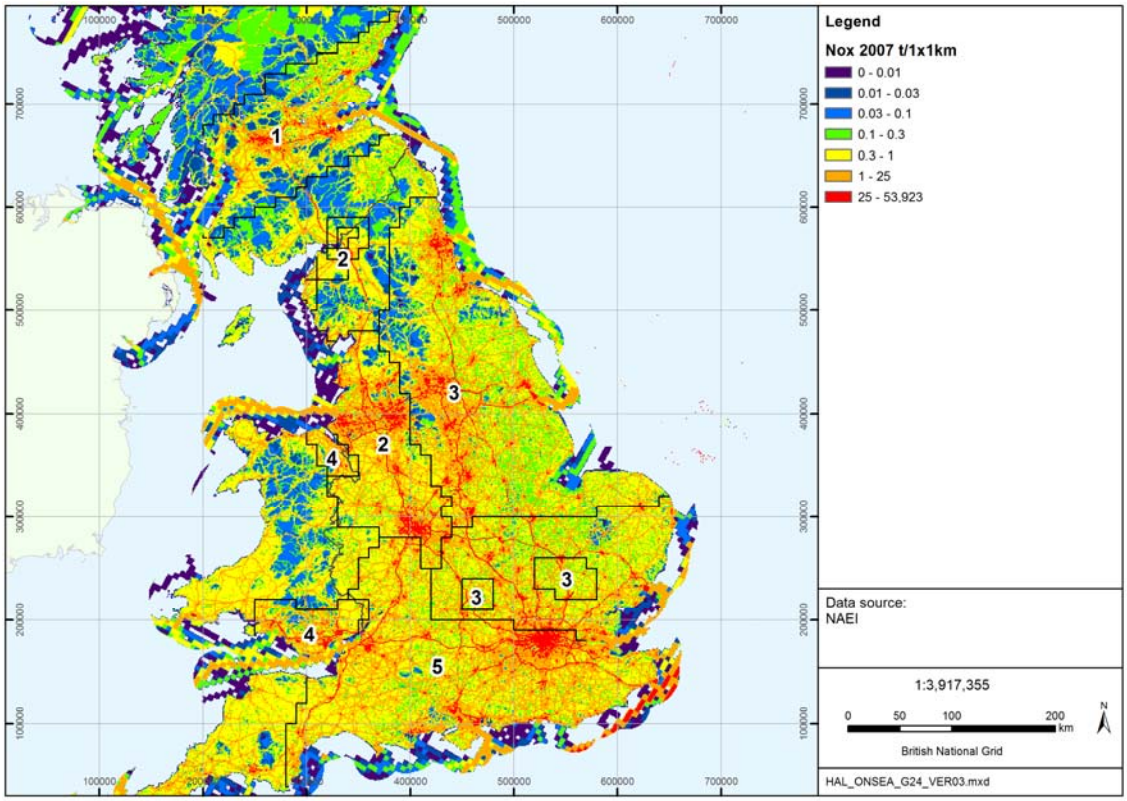


Figure A4e.3 – Emissions of CO (2007)

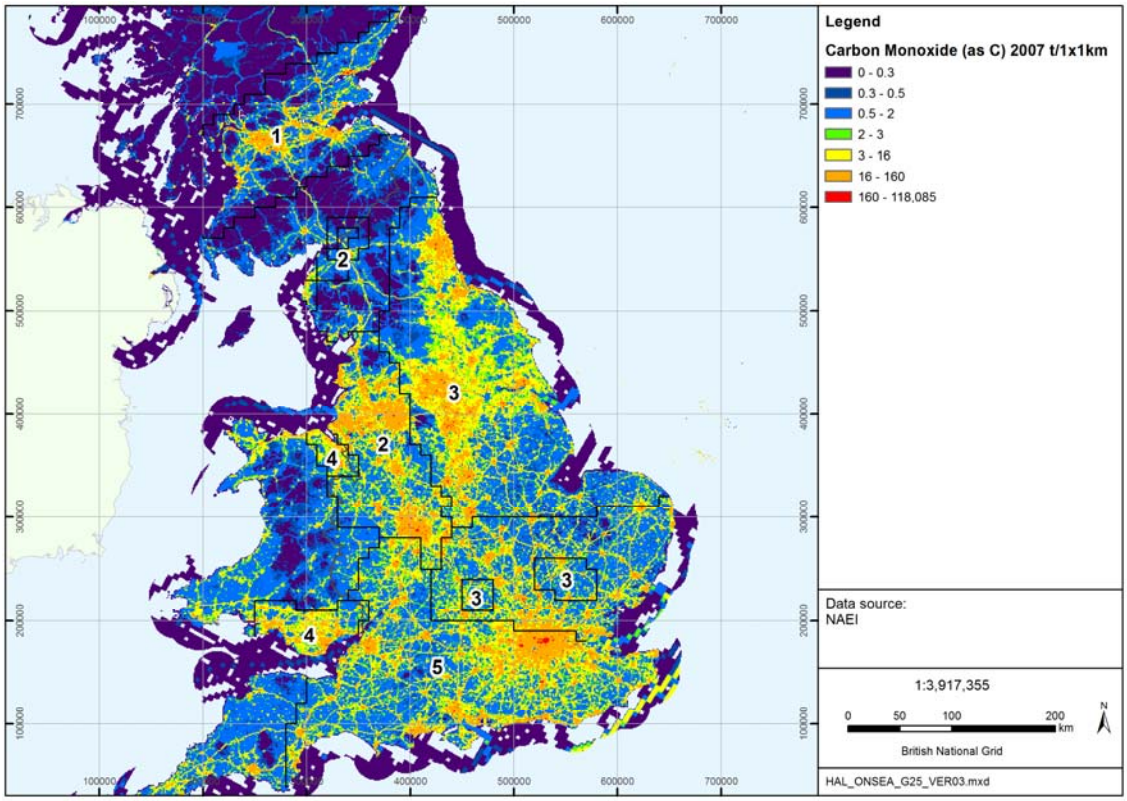


Figure A4e.4 – Emissions of SO_2 (2007)

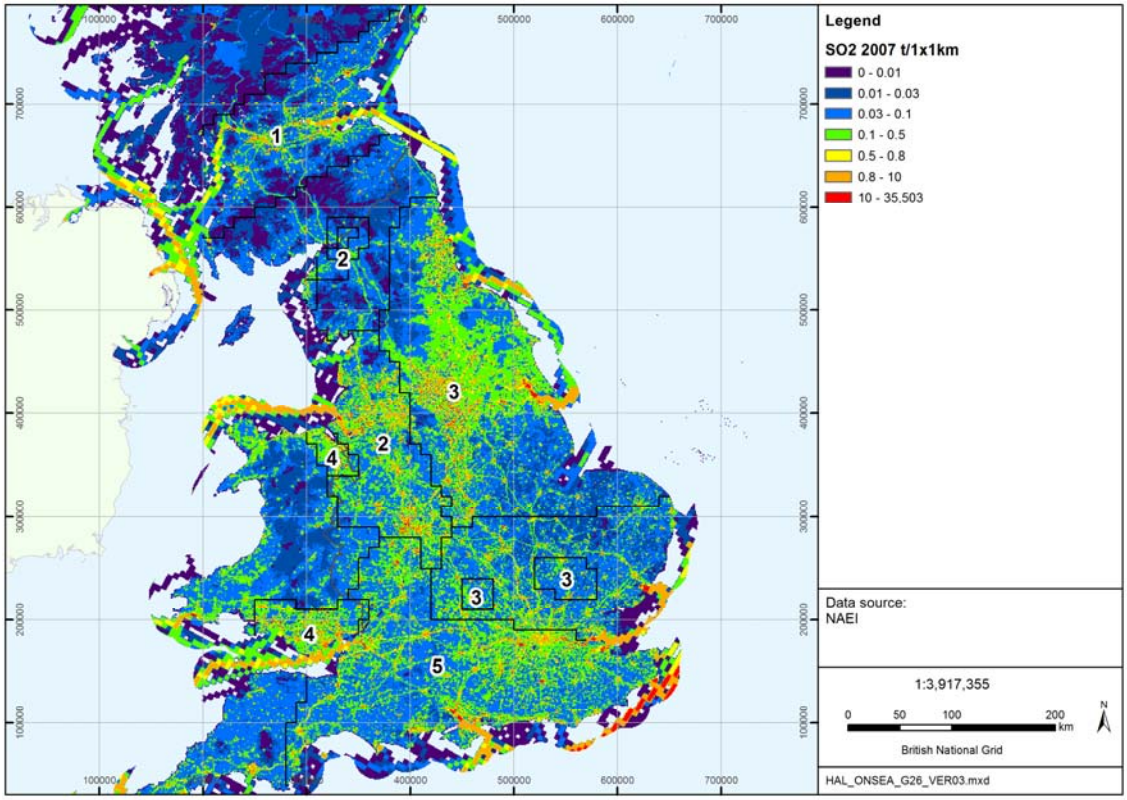
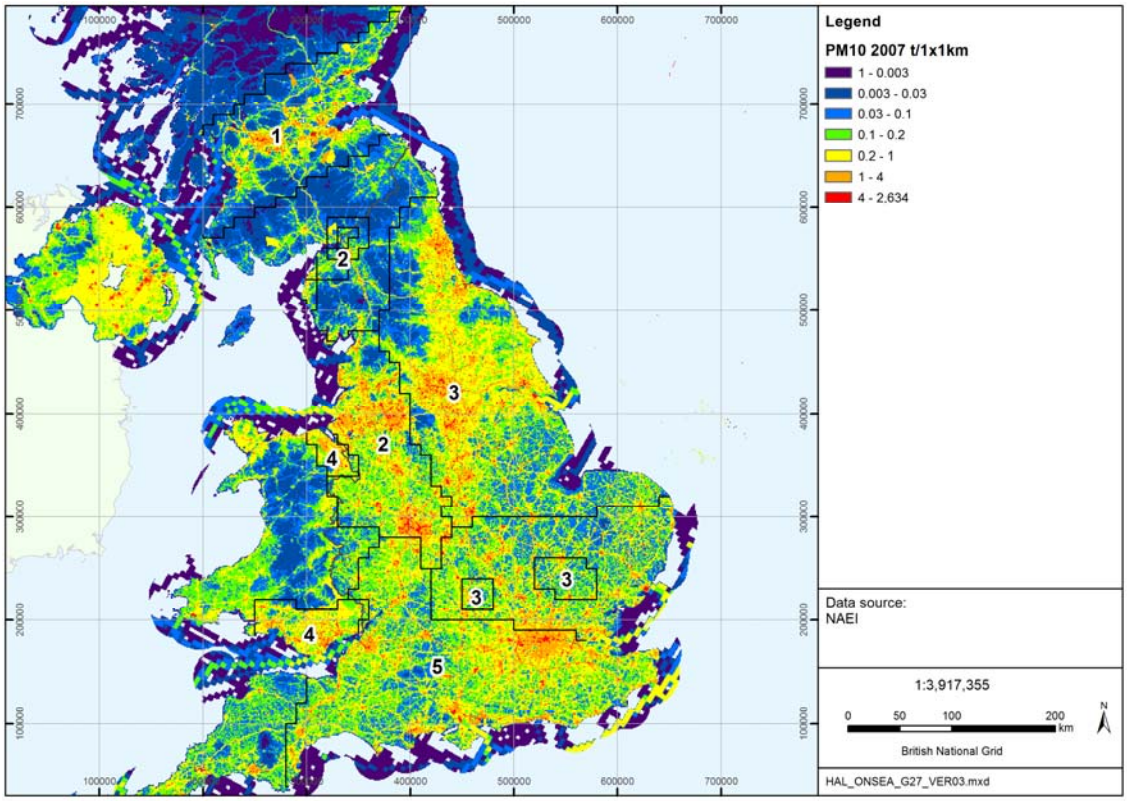


Figure A4e.5 – Emissions of PM_{10} (2007)



A4e.1.3 Air Quality Indicators

Relevant sustainable development indicators used to present the evolution of the baseline for this section are shown in Table A4e.1 below, and the sections which follow present information relevant to each indicator.

Table A4e.1 – Air Quality Indicators

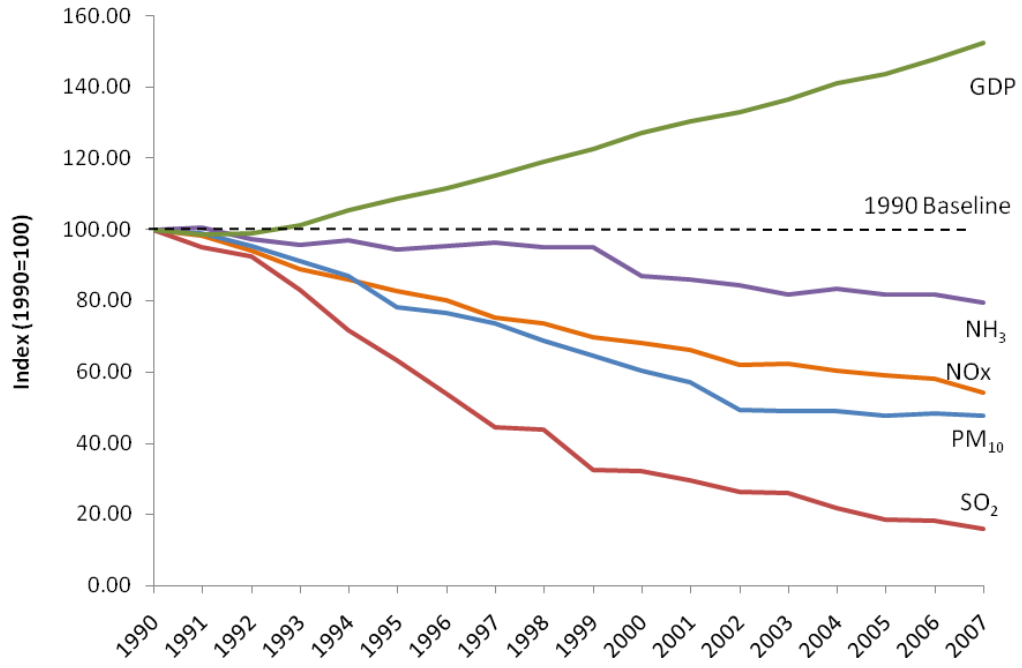
#	Indicator	Region1
16	**Emissions of air pollutants**	UK
17	**Ecological impacts of air pollutants**	
	*Area affected by acidity**	UK
	*Area affected by nitrogen**	UK
18	**Air quality and health – see population and human health for details (appendix 4g)**	

*Note: *signifies a framework indicator – those shared by the UK Government and the devolved administrations. †additional indicator not included in the UK government sustainable development strategy. 1Indicates the spatial coverage of the presented data; E=England, W=Wales, S=Scotland, UK=Entire United Kingdom*

A4e.1.3.1 Emissions of Air Pollutants

The national emission of all air pollutants (NH_3, SO_2, NO_x, PM_{10}) reduced between 1990 and 2007. Ammonia (NH_3) reduced by ~20%, nitrogen oxides (NO_x) by ~45%, particulates (PM_{10}) by more than 50% and sulphur dioxide (SO_2) by more than 80% (Figure A4e.6). GDP (Gross Domestic Product) increased by 48% over the same period.

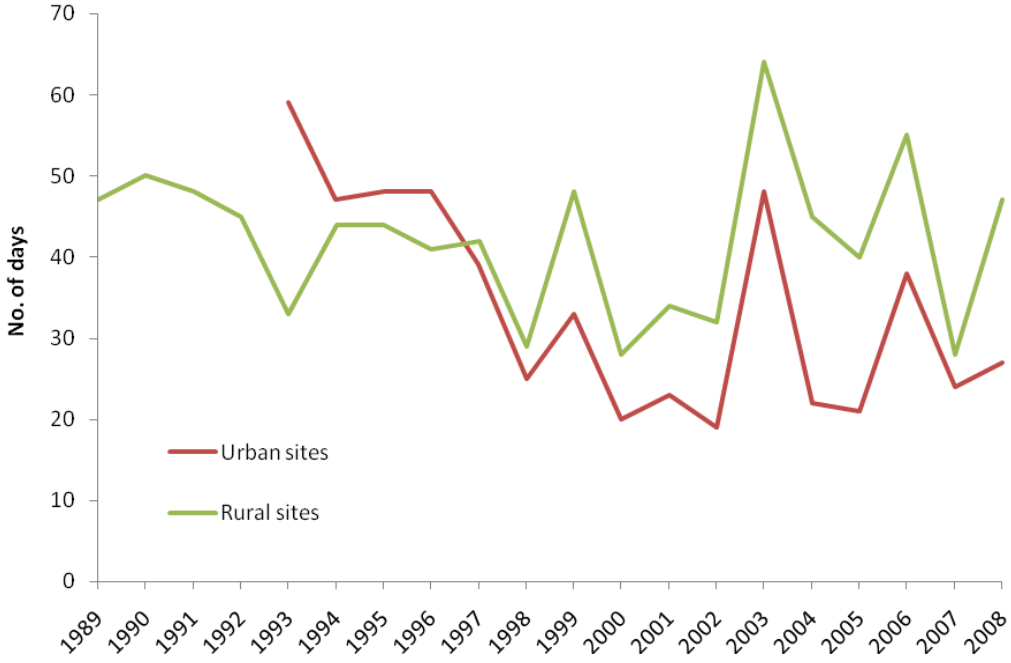
Figure A4e.6 – UK Emissions and GDP, 1990-2007



Source: AEA Energy and Environment, Environment Agency and the Office for National Statistics, from data provided on the Defra Sustainable Development in Government webpages, (http://www.defra.gov.uk/sustainable/government/)

Figure A4e.7 displays the number of days when air pollution was moderate or higher based on levels of five pollutants (O_3, NO_x, CO, SO_2, PM_{10}) between the years of 1990 and 2008. The figures show a high degree of inter-annual variability and no particular trend in the data can be seen. The weather can cause significant variation from year to year in the number of days of moderate or higher air pollution. The hot summers of 2003 and 2006, coupled with certain pollution episodes that occurred in these years, led to an unusually high number of pollution days (Defra 2009e). In urban areas in 2008, air pollution was recorded as moderate or higher on 27 days on average per site, compared with 24 days in 2006, and 59 days in 1993, reflecting a high degree of variability. In rural areas, air pollution in 2008 was moderate or higher for 47 days on average per site, compared with 24 in 2006.

Figure A4e.7 – Days when Air Pollution was Moderate or Higher, 1989-2008



Source: AEA Energy and Environment and Defra, from data provided in the Defra e-Digest of Environmental Statistics, April 2009 (http://www.defra.gov.uk/environment/statistics/)

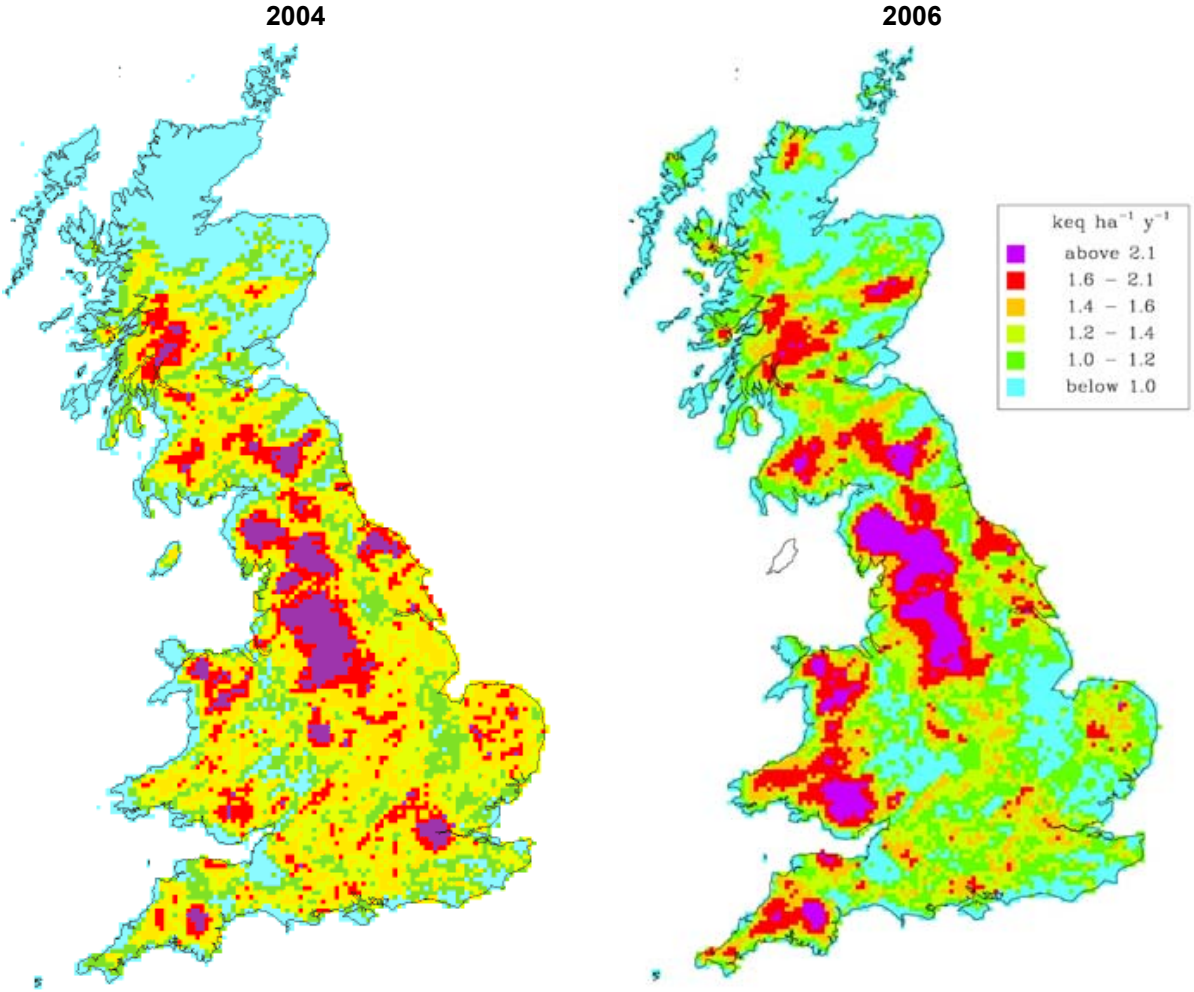
A4e.1.3.2 Ecological Impacts of Air Pollution: Areas Affected by Acidity and Nitrogen

Acidification and eutrophication may be attributed to the deposition of pollutants including SO_2, NO_x, and NH_3 (both ongoing and historic), the emissions for some of which have already been discussed in sections A4e.1.2 and A4e.1.3.1. Deposition of pollutants is controlled by the location of a given area in relation to the source of pollution, airflow trajectories, precipitation and vegetation type (e.g. tree scavenging of acid aerosols). Elevation is a major indirect control on acid loading – in upland areas (many of which are rural or remote; e.g. western Scotland, upland Wales) acid loading tends to be higher due to enhanced rainfall caused by the orographic effect of mountains (Jones 1997). This effect is displayed in Figure A4e.8, which shows the total acidifying inputs to the UK, modelled by CEH for 2004 and 2006 (see: Fowler *et al.* 2004).

The impact of acid deposition is in part locally dependant on the acid neutralising capacity (ANC) of the local geology and the residence time of pollutants which is determined by local hydrological pathways (Jones 1997). Chalk and limestone will neutralise acid inputs (e.g.

The Pennines, North Norfolk) whereas acid igneous or metamorphic base geology like that in Cumbria and Snowdonia tends to have a lower neutralising capacity, and be more sensitive to acid deposition (Environment Agency website). Where water bodies and soils become more acidic, there is a general increase in the concentration of dissolved metals such as aluminium, which may have ecological effects on fish, algae, higher plants and invertebrates (Jones 1997). With regard to freshwater bodies, attention is drawn to the Defra funded UK Acid Waters Monitoring Network (AWMN), which has been assessing trends in the ecology of acid-sensitive habitats for over 20 years (http://www.ukawmn.ucl.ac.uk/).

Figure A4e.8 – Total Acidifying Inputs: Deposition of Potential Acidity

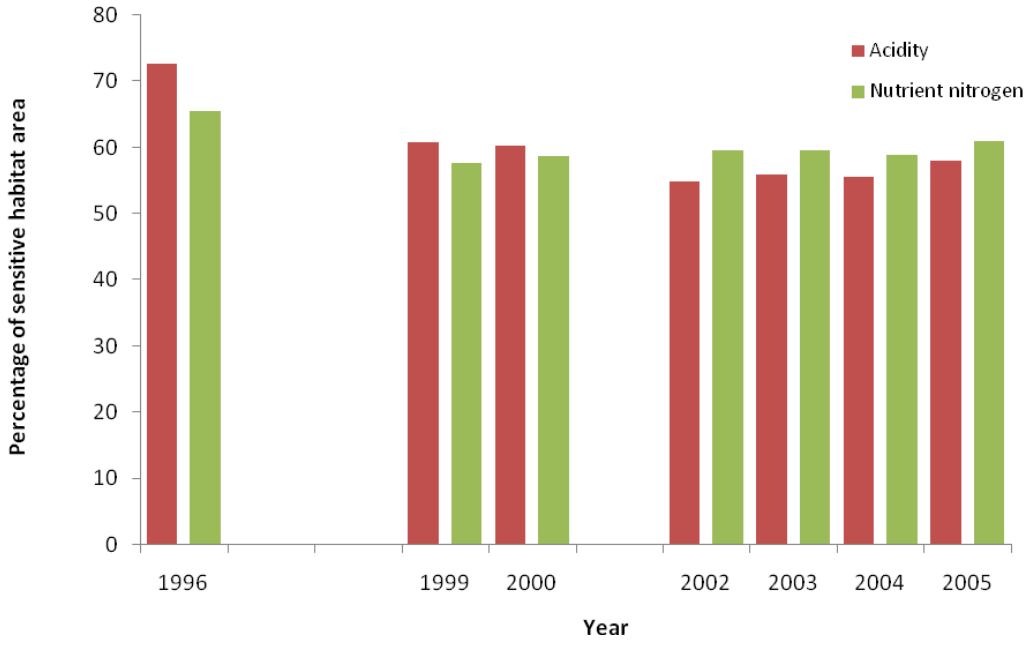


Source: CEH UK Pollutant Deposition website (also see: Fowler et al. 2004)
Note: Maps are 5km^2 resolution

Around a third of UK land area is sensitive to acid deposition (~78,000km^2) and a third to eutrophication (~74,000km^2), with some sensitive to both. The Centre for Hydrology and Ecology (CEH) has calculated and modelled estimates for acid and nutrient nitrogen critical loads for the UK. CEH define critical loads after Nilsson and Grennfelt (1988) as, "*a quantitative estimate of an exposure to one or more pollutants below which significant harmful effects on specified sensitive elements of the environment do not occur according to present knowledge"* (CEH 2004), and it is only in their exceedance that there is risk of harmful effects.

In 1996, the percentage of sensitive habitat area[2] where acid deposited exceeded critical loads was 73% (Figure A4e.9). Between 2000 and 2005 this declined from 60 to 58%. The percentage of sensitive habitat area subject to critical loads of nitrogen pollution remained at 59% between 2000 and 2004, down from 65% in 1996, though showed an increase to 61% in 2005. Between 1999, there is no significant overall change, though in the longer-term, there is evidence for improvement. Deposition predictions for 2020 (CEH 2007) reduce the expected exceeded areas to 41% for acidity and 48% for nutrients, though under scenario analyses for the Air Quality Strategy, further reductions were considered possible. Across a time series spanning 1970-2020, the reduction equates to a 50% fall in the area of sensitive habitat exceeded for acid and 21% for nutrients (CEH 2007).

Figure A4e.9 – Area of Sensitive UK Habitats Exceeding Critical Loads for Acidification and Eutrophication, 1996 to 2005



Source: JNCC BIYP Webpage (http://www.jncc.gov.uk/page-4245)
Note: Since 2000, inclusion of nitric acid deposition increases the area of critical load exceedance compared to earlier periods. Each bar represents a 3 year average to reduce year to year variability.

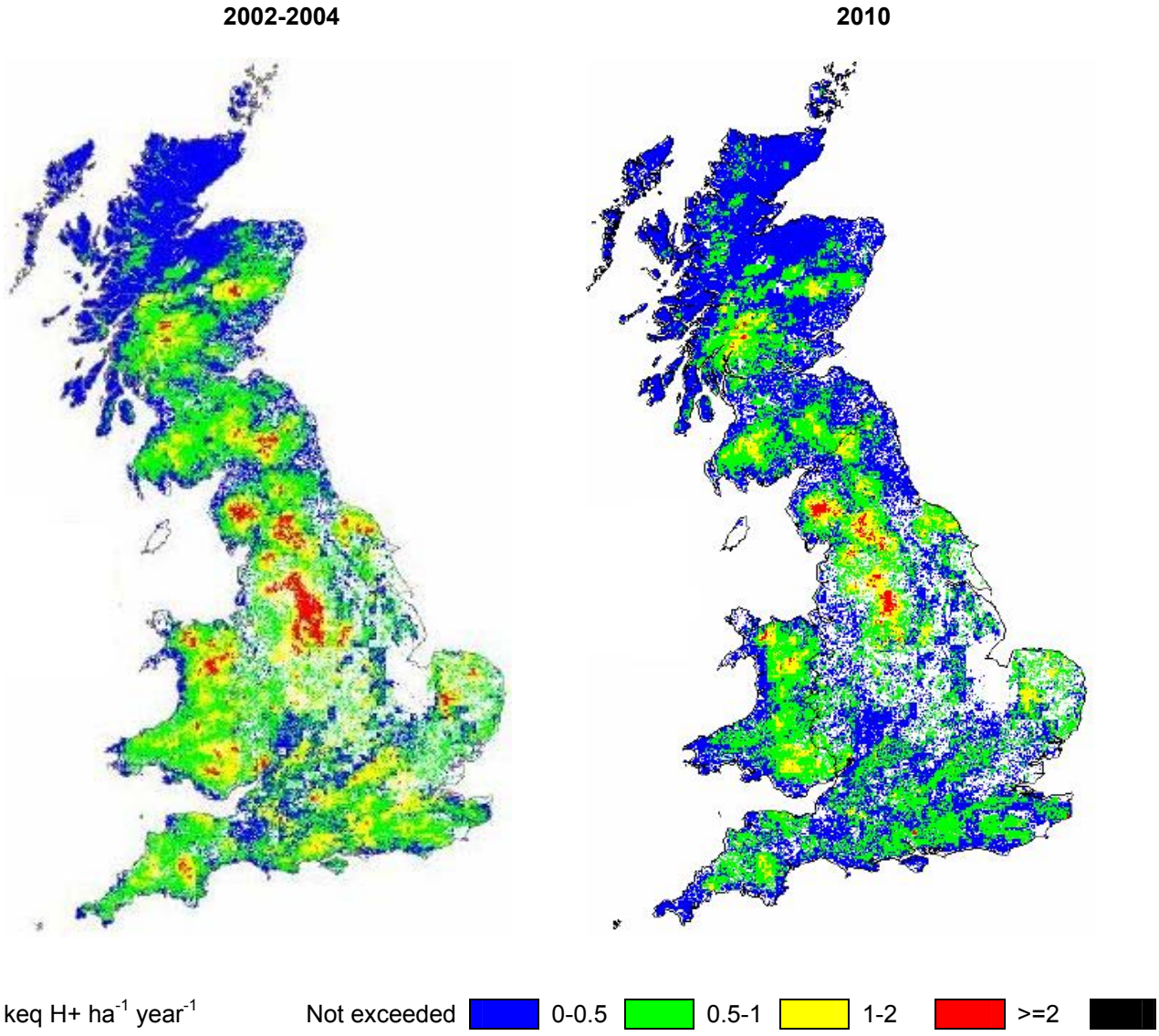
Carey *et al.* (2008) present findings as part of the UK Countryside Survey which suggests that soil acidity has decreased in line with declining emissions and sulphur deposition between 1978 and 2007, and that there is some evidence of soil recovery. Increased levels of nutrients were associated with an increase in soil fertility between 1978 and 1990. The 1998 survey indicated that plant species preferring nutrient enriched conditions were becoming more prolific, though some improvement was seen in the 2007 survey. In addition to nitrogen deposition, soil fertility can also be affected by the use of agricultural fertilisers and animal husbandry, and improved management practices in recent years may have resulted in the reduced fertility seen in the most recent survey.

Figure A4e.10 and Figure A4e.11 below present the exceedance of critical loads for acidity and nutrient nitrogen for 2002-2004, along with expected exceedance in 2010 under current legislated emissions reduction conditions. Note that the exceedance of a critical load does

[2] Based on 11 broad habitats considered to be sensitive to acid and N deposition. Includes woodland, semi-natural grassland, heathland, freshwater and coastal habitats.

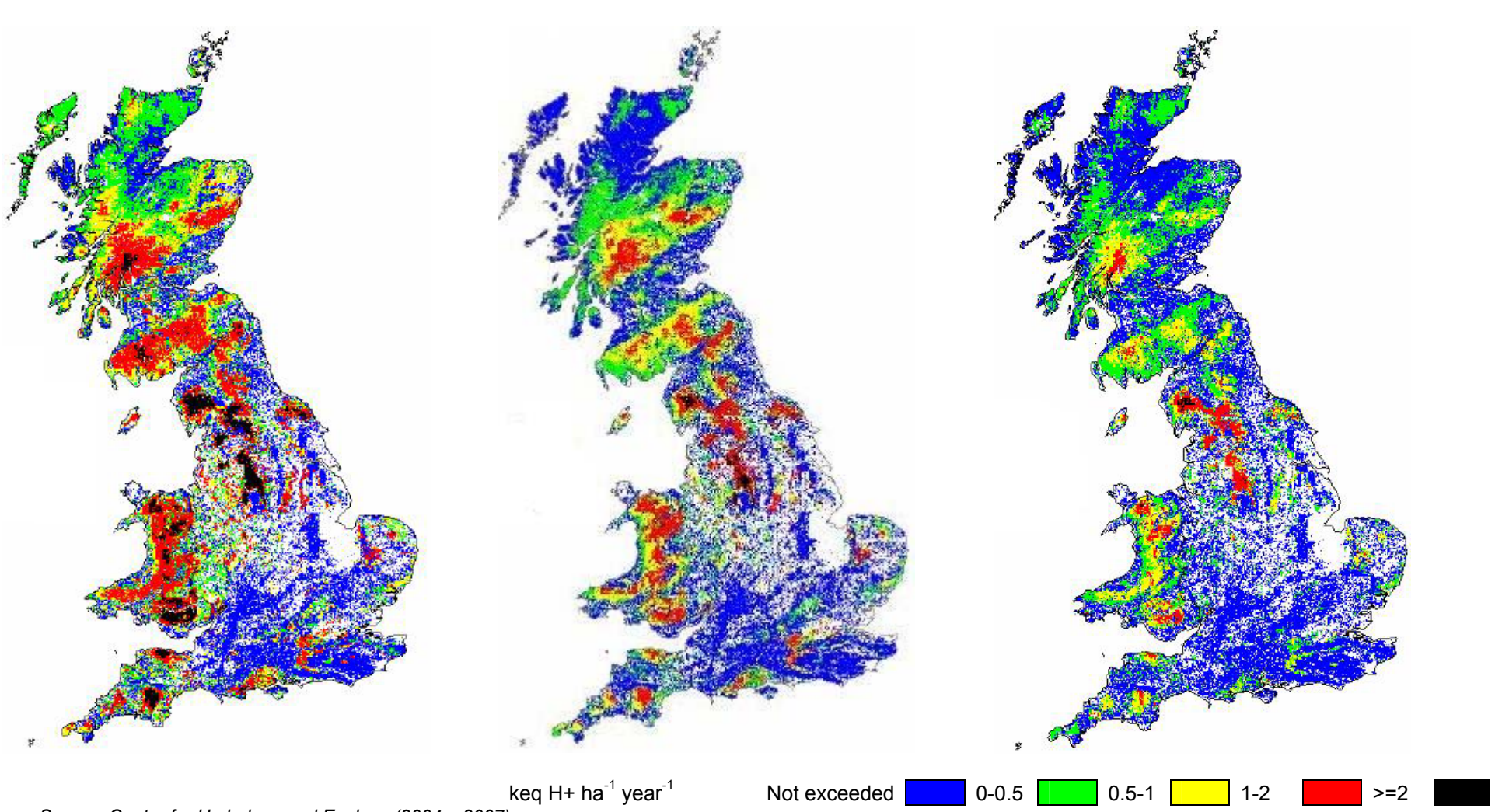
not place any quantitative estimate on habitat damage, but rather indicates the potential for damage to occur (CEH 2007). Recovery of soils and surface waters is generally predicted up to 2010, with an expected reduction in recovery thereafter in the absence of greater emissions reduction targets (CEH 2007). For some environments (bogs and forested areas), even with stricter emission controls (see CEH 2007 for a definition of their Maximum Feasible Reduction (MFR) scenario), recovery by 2030 may not occur (CEH 2007).

Figure A4e.10 – Exceedance of 5th percentile Nutrient Nitrogen Critical Loads using Deposition Data



Source: Centre for Hydrology and Ecology (2004a, 2007)
Note: Maps are 1km^2 resolution

Figure A4e.11 – Exceedance of 5th percentile Acidity Critical Loads using Acid Deposition Data



Source: Centre for Hydrology and Ecology (2004a, 2007)
Note: Maps are 1km² resolution

A4f.1 Climate and Meteorology

The UK is influenced by predominantly westerly tracking storm systems throughout the year. Depressions are often interspersed by small mobile anticyclones bringing milder weather, though the sequence of these air masses has a tendency to generate rather changeable weather (Met Office 2007, also see: Met Office 2009). There is a general trend of decreasing rainfall and wind speeds from the North West to the South East, and a similar increase in temperature from north to south. Variations may be accounted for by exposure, latitude and altitude. The surrounding seas also have a significant effect on the national and local weather conditions. The temperatures of air masses reaching the UK have been modified by the ocean such that the UK tends to experience lower summer temperatures than mainland Europe, but milder winters. Coastal areas likewise tend to experience ameliorated temperatures compared with areas inland due to the influence of the sea.

A4f.1.1 Regulatory Context

Scientific understanding of the interconnections of radiative heating with anthropogenically enhanced levels of greenhouse gases (e.g. CO_2, CH_4, N_2O) and ozone is high (IPCC 2007), with less known about other potentially important factors including aerosols and solar irradiance (for instance see: Blaauw *et al.* 2004). It is the view of *inter alia* the IPCC and UK Government that an intrinsic connection exists between the anthropogenic emission of greenhouse gasses (most notably CO_2) and a positive change in global temperature, amounting to 0.6°C (range 0.4-0.8°C) between 1901-2000 (or since the start of the industrial revolution). The continued emission of greenhouse gases at their current levels have been projected to eventually lead to a 6°C rise in temperature by the end of this century (see: IEA 2008). In order to avoid the most dangerous impacts indicated in the IPPC (2007) 4th assessment report, average global temperatures (relative to pre-industrial levels) must not rise more than 2°C (see section A4f.1.3.2 for further details).

The 2009 UK Government White Paper, 'The UK Low Carbon Transition Plan', notes that this cannot be achieved without cooperation from developing nations. It is considered that the costs of not confronting climate change are greater than those of implementing plans to try and curb greenhouse gas emissions, which are considered the principal drivers of anthropogenic climate change (The Stern Review (2006) concluded that, unabated, the cost of climate change could be in the range of 5-20% of global GDP, per year, averaged over time, reducing to 1 or 2% of GDP by 2050 if action is taken).

There has been a substantial move forward in European and UK legislation (and global agreements e.g. The Kyoto Protocol) in recent years regarding energy and climate change, which principally seek to reduce carbon (and other GHG) emissions through regulation and incentive. The UK Government 2007 Energy White Paper, 'Meeting the Energy Challenge', outlined targets and plans relating to CO_2 emissions and energy production to 2050. The legislative aspects of this paper passed into law in the Energy Act 2008, which makes provisions for areas including (and which are applicable to this SEA):

- Gas importation and storage (including Carbon Capture and Storage)
- Electricity from Renewable Sources (strengthens the existing renewables obligation in order to generate enhanced speed of delivery and diversity of supply technologies)
- Feed-in Tariffs which allow Government to introduce a tailor-made scheme to financially support low carbon generation of electricity in projects up to 5MW
- Miscellaneous energy issues (e.g. provision of smart meters, renewables heat incentives, transmission access powers and costs relating to network connections, gives effect in legislation to earlier administrative transfer of responsibilities for

certain aspects of energy regulation, and contains provisions relating to nuclear security)

The Energy Act aims to not only help maintain the reliability of energy supply, promote competitive markets and ensure affordable heating, but also contribute to the reduction in CO_2 emissions which may be linked to climate change.

The Climate Change Act 2008 makes provisions for the reduction of CO_2 equivalent emissions (i.e. includes other notable greenhouse gases such as CH_4 and N_2O) through a number of measures, including the setting of a "carbon budget". The carbon budget set out in the Act in its original form targeted an 80% reduction in emissions on 1990 levels by 2050, with an interim reduction in emissions of 26% by 2020. The 2020 carbon budget has been subsequently altered under The Climate Change Act 2008 (2020 Target, Credit Limit and Definitions) Order 2009 to 34% below 1990 levels. The Act aims to meet this target through a range of measures, but principally the Committee on Climate Change[1], to provide a system of carbon budgeting and trading (e.g. the EU Emissions Trading System), to encourage activities that reduce or remove greenhouse gases from the atmosphere and to promote through financial incentive the production of less waste and more recycling. Similarly, in Scotland the Climate Change (Scotland) Act 2009 sets an interim 42% reduction target for greenhouse gases by 2020, increasing to 80% by 2050 on 1990 levels.

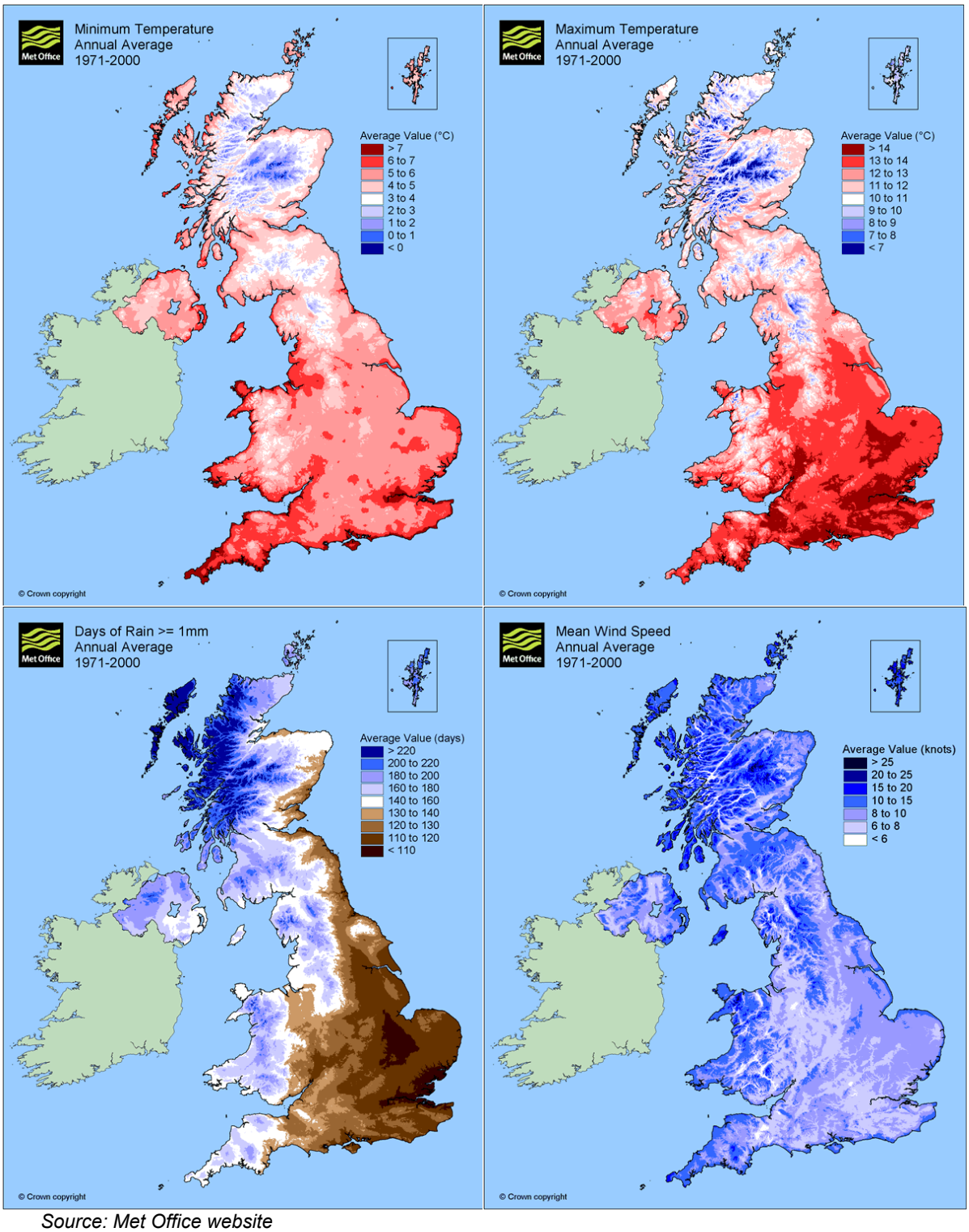
The 2009 Energy White Paper, 'The UK Low Carbon Transition Plan' sets out the demands which will have to be placed on all sectors (domestic, commercial, industrial, transport) to reduce carbon emissions through increased energy efficiency measures and the deployment of 'clean' technology (e.g. CCS [specifically in relation to coal], offshore wind) in order to realise the required emissions reductions targets.

[1] *see: http://www.theccc.org.uk/*

A4f.1.2 Mapped Averages of UK Meteorological Conditions

Figure A4f.1, below, indicates the annual average range of certain climatic variables recorded in the UK over the period 1971-2000. These maps, produced by the Met Office, indicate modelled estimates across a 1x1km grid.

Figure A4f.1 – Annual Average Temperature and Rainfall



Source: Met Office website

The methods used to construct the modelled averages of meteorological conditions for the UK shown above can be found in Perry and Hillis (2005), and a greater range of mapped and raw data can be obtained directly from the Met Office.

A4f.1.3 Climate Change

A4f.1.3.1 UK Climate Change in the Recent Past

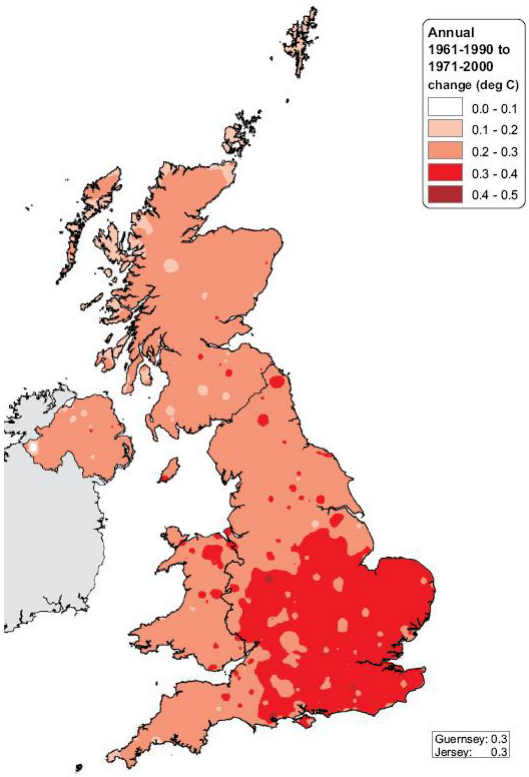
The UK Climate Impacts Programme (UKCIP) has published an updated report (Jenkins *et al.* 2009) detailing recent trends in climatic variables (e.g. precipitation, air temperature). Met Office data spanning the periods 1961-1990 and 1971-2000 have been used to calculate the annual and seasonal arithmetic difference for each variable between the two datasets and are presented as a series of maps. A longer term dataset (1915-2006) has also been utilised to display the change in each variable based on a linear trend. The principal findings of this research have been:

- Central England Temperature (CET) has risen by ~1°C since the 1970s, likely influenced by anthropogenic activity
- Scottish and Northern Irish temperatures have risen by ~0.8°C since 1980. These changes cannot necessarily be attributed to anthropogenic activity
- Overall, change in annual precipitation has been negligible in the east, with a 2-10% increase in the west, particularly in Scotland, Wales and the south-west peninsula. Seasonally, summer precipitation has decreased by up to 10% in north and east Scotland and northern England, whereas in winter, values have increased by up to 10% in Wales and the south west and by up to 30% in north-west Scotland, the Hebrides and Northern Isles.

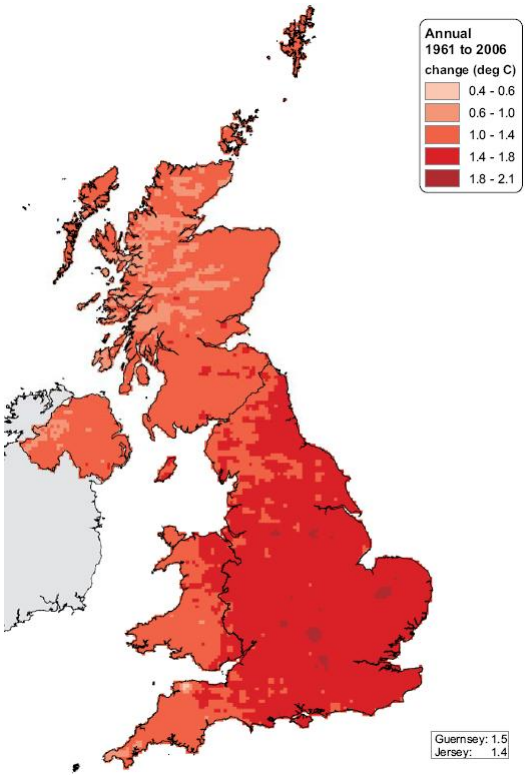
Figure A4f.2 below is the result of calculations performed during the production of the first document in the UKCP09 series, The Climate of the UK and Recent Trends (Jenkins *et al.* 2009). These figures indicate the degree of change in average annual temperature between 1961 and 1990, and 1971 and 2000, mapped on a 1x1km grid. The figures indicate a general increase in average annual temperature, being greatest in the south-east.

Figure A4f.2 – Change in Average Annual Temperate and Rainfall

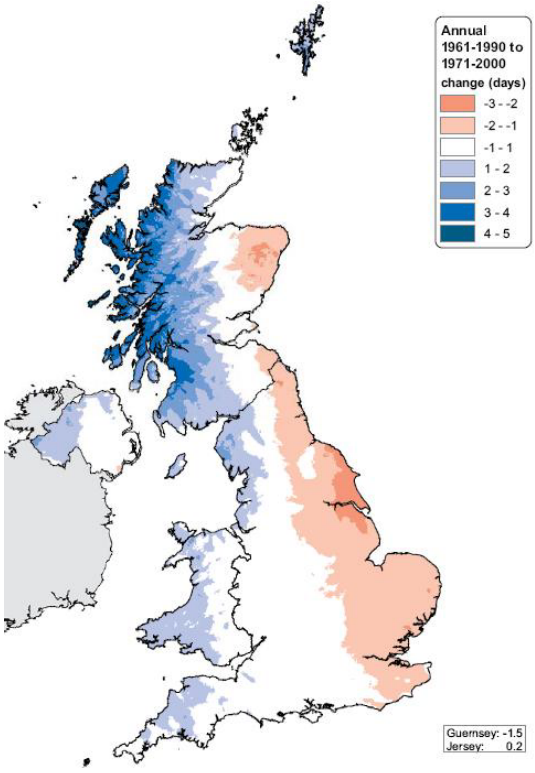
Change Annual Temperature (°C), 1961-1990; 1971-2000



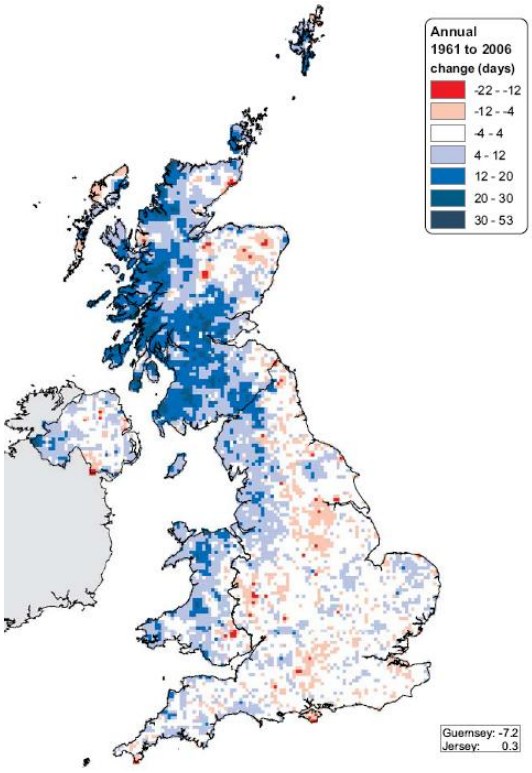
Change Annual Temperature (°C), 1961-2006



Change in Annual Days Rainfall ≥1mm, 1961-1990; 1971-2000



Change in Annual Days Rainfall ≥1mm, 1961-2006



Source: Jenkins et al. (2009)

A4f.1.3.2 Climate Change Projections

Climate change, particularly that which may be anthropogenically augmented, is the motivation for the UK government CO_2 reduction targets. In recent years, anthropogenic and natural drivers of climatic change have become an increasing focus of study due to concern over the potential impacts of any undesirable climatic deterioration. The input of greenhouse gasses (e.g. CO_2, CH_4, N_2O, O_3) resulting from fossil fuel usage, agriculture and other land use, is of particular concern as these have been linked with atmospheric warming. Ice core records indicate that industrial increases in CO_2 (the major contributor to the 'greenhouse effect') and CH_4 have resulted in atmospheric concentrations not surpassed in at least the last 650 ka (IPCC 2007a). Conversely, negative radiative forcing (i.e. cooling) is associated with aerosols (small particles/droplets) which may be produced naturally (e.g. volcanic eruptions, dust storms), or anthropogenically (e.g. sulphate aerosols, soot, biomass-burning aerosols), and these may have offset some greenhouse related warming (Bell and Walker 2005), though some of the processes associated with atmospheric aerosols are still not well understood (IPCC 2007b).

The IPCC Fourth Assessment Report, Working Group I, entitled, 'The Physical Science Basis' (IPCC 2007a) presents current scientific knowledge on climatic change, associated processes and the potential future climatic trajectory. The principal findings of the report are:

- Global atmospheric CO_2, CH_4 and N_2O has increased since 1750. CO_2 has primarily increased as a result of anthropogenic fossil fuel usage, and current levels have not been surpassed for c. 650,000 years. It is very likely[2] (>90%) that CH_4 and N_20 concentrations have increased from agriculture and fossil fuel use.
- The combined increased concentrations of these 'greenhouse gases' has led to a positive radiative forcing of $2Wm^{-2}$ – forcing for CO_2 increased by 20% from 1995 to 2005. Ozone-forming chemicals (nitrogen oxides, carbon monoxide, hydrocarbons), changes in surface albedo due to land cover change and deposition of black aerosol on snow have also attributed to a net positive radiative forcing. Aerosol concentrations have produced a cooling effect.
- Direct observation of recent climate change indicates an increase in global average air and ocean temperatures, widespread melting of snow and ice and rising global sea-levels. The average temperature of the ocean has increased down to 3,000m since 1961, generating seawater expansion associated with rising sea-levels. Global average sea-levels have increased by c. 1.8mm per year (1961-2003), though figures for 1993-2003 show an increased rate of 3.1mm per year. There is high confidence that sea-level rise increased from the 19^{th} to 20^{th} Centuries.
- At continental, regional, and ocean basin scales, numerous long-term changes in climate have been observed. These include changes in Arctic temperatures and a corresponding reduction in ice cover, widespread changes in precipitation amounts, ocean salinity, wind patterns and aspects of extreme weather including droughts, heavy precipitation, heat waves and the intensity of tropical cyclones.
- Some climatic features do not show any statistically significant change. Antarctic sea ice extent remains within an acceptable range of interannual variability. Diurnal temperature range has not changed from 1979 to 2004. There is presently insufficient evidence to suggest that there has been any change in meridional overturning circulation of the global ocean, or small-scale phenomenon such as tornadoes, hail, lightning and dust storms.

2 From the Summary for Policymakers, the following terms have been used to indicate the assessed likelihood, using expert judgement, of an outcome or a result: Virtually certain >99% probability of occurrence, Extremely likely >95%, Very likely >90%, Likely >66%, More likely than not >50%, Unlikely <33%, Very unlikely <10%, Extremely unlikely <5% (IPCC 2007a).

- Most of the observed increase in globally averaged temperatures since the mid-20th century is very likely due to the observed increase in anthropogenic greenhouse gas concentrations. This is an advance since the Third Assessment Report (TAR) conclusion that "most of the observed warming over the last 50 years is likely to have been due to the increase in greenhouse gas concentrations". Discernible human influences now extend to other aspects of climate, including ocean warming, continental-average temperatures, temperature extremes and wind patterns.
- For the next two decades a warming of about 0.2°C per decade is projected for a range of SRES (Special Report on Emissions Scenarios) emission scenarios. Even if the concentrations of all greenhouse gases and aerosols had been kept constant at year 2000 levels, a further warming of about 0.1°C per decade would be expected.
- Continued greenhouse gas emissions at or above current rates would cause further warming and induce many changes in the global climate system during the 21st century that would very likely be larger than those observed during the 20th century.

Resulting impacts of enhanced atmospheric greenhouse gas concentrations include increased warming and drought, rising sea-levels due to net polar ice cap and terrestrial glacier retreat and the thermal expansion of the ocean. More changeable and extreme weather is also a possible outcome, though, for instance, future changes in Northern European windiness cannot be projected with confidence, though it is surmised it might increase (IPCC 2007a). Indeed, other stochastic influences such as volcanic eruptions may have a significant influence on deviations from average climatic conditions including windiness (Dawson *et al.* 1997).

A4f.1.3.3 UK Climate Change Projections

Climate change scenarios have been developed to show the possible changes in UK climate over the next ~100 years. Following on from the UKCIP02 (Hulme *et al.* 2002) initiative, UKCP09 (already mentioned in relation to section A4f.1.3.1 above) updates UK climate projections and presents results at resolutions of 25km grid squares, by administrative region, by river basin district (see section A4d.1.2) and across 9 marine regions.

The scenarios are based on three of the four 'storylines' (see: Nakićenović *et al.* 2000) developed by the IPCC Special Report on Emissions Scenarios and reflect four alternative views of the future. UKCP09 describes changes in the UK as a result of three of these scenarios; (SRES B1), medium (SRES A1b) and high (SRES A1FI). The UKCP09 document includes:

- **Probabilistic climate projections**: modelled future climate change at a 25x25km grid resolution using a range of probabilities and emission scenarios
- **Weather generator projections**: modelled statistics of future daily weather at a 5x5km grid resolution
- **Marine projections**: modelled future climate changes including mean air temperature, sea level pressure and precipitation rate
- **Historical climate information**: information on present and recent UK climate trends (see section A4f.1.3.1, above)

Key differences (resulting from changes in methodologies) between UKCIP02 and UKCP09 based purely on comparisons of central probability estimates include:

- Projected mean temperatures are greater than in UKCIP02
- Projected summer rainfall reduction is less in UKCP09 than UKCIP02
- There is some geographical variation in the projected changes in winter rainfall
- There is some change in the projected winter cloud cover.

Despite changes to/improved methodologies, some factors that may affect the long-term climate scenarios cannot be reliably accounted for. These include:

- Natural climatic variability – e.g. solar irradiance, volcanic activity
- Modelling uncertainty – due to uncertainty about certain processes and how they are represented in models
- Uncertainty about the future level of anthropogenic GHG emissions

The mean seasonal mapped output of two of these scenarios (low and high) are presented here for three of the probability estimates (10, 50 and 90%) for temperature and precipitation.

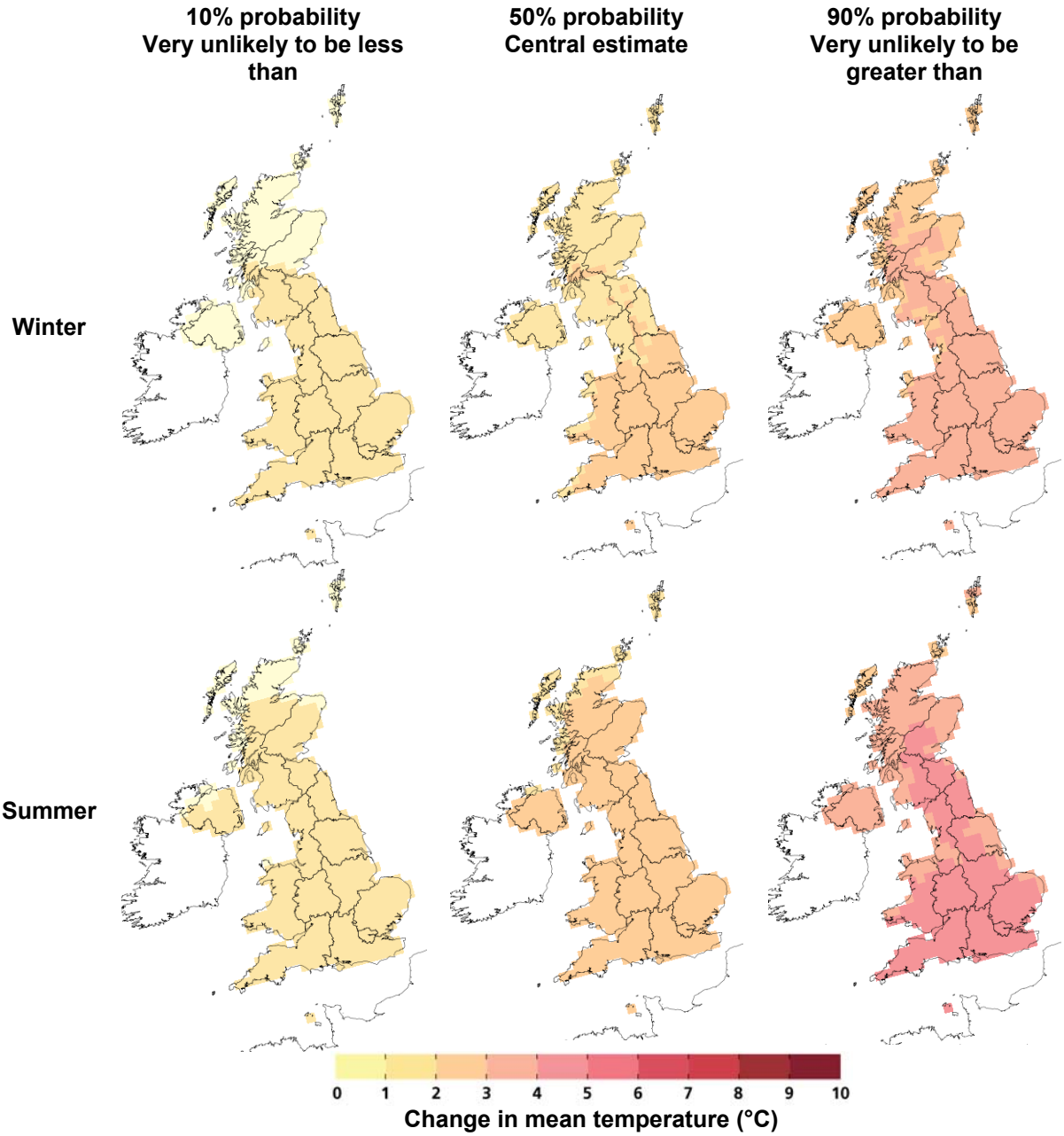
The high emissions scenario has the highest global total emissions of carbon (summed over the 21st century at 2,189 billion tonnes of carbon), more than twice the mass of the low emissions scenario (983 billion tonnes). At present, about 7 billion tonnes of CO_2 is emitted globally into the atmosphere each year, with an additional 1.6 billion tonnes emitted by land use change (Wicks 2009).

Figures A4f.3 & 4 present the modelled climate changes (mean temperature change and mean precipitation change) on a 25x25km grid under the medium emissions scenarios for different seasons and for two time periods: 2040-2069 (2050s) and 2070-2099 (2080s). The changes in climate for each of these periods reflect the deviation in average meteorological statistics relative to the baseline period, 1961-1990 (see section A4f.1.3.1 above). It was noted in UKCP09 (Murphy et al. 2009) that this baseline period, identical to that used in UKCIP02, was chosen following support for retaining it through consultation.

Modelling results suggest that by the 2080s (2070-2099) UK wide mean winter temperatures could increase by between 1.8 and 3.1°C for the 50% probability projection, for a 'medium' emissions scenario. Depending on the emission scenario, the extremes of the modelled temperature range form an increase of 1.7 to 3.8°C, relative to the 1961-1990 baseline (i.e. temperature changes are unlikely to be lower than 1.7°C, but are unlikely to exceed 3.8°C). For summer, the extremes are 1.9-5.3°C, with a medium emissions range of 2.5-4.2°C, again at the 50% probability. These figures cannot be interpreted usefully without the wider range of probability projections modelled in UKCP09, and for a greater number of variables.

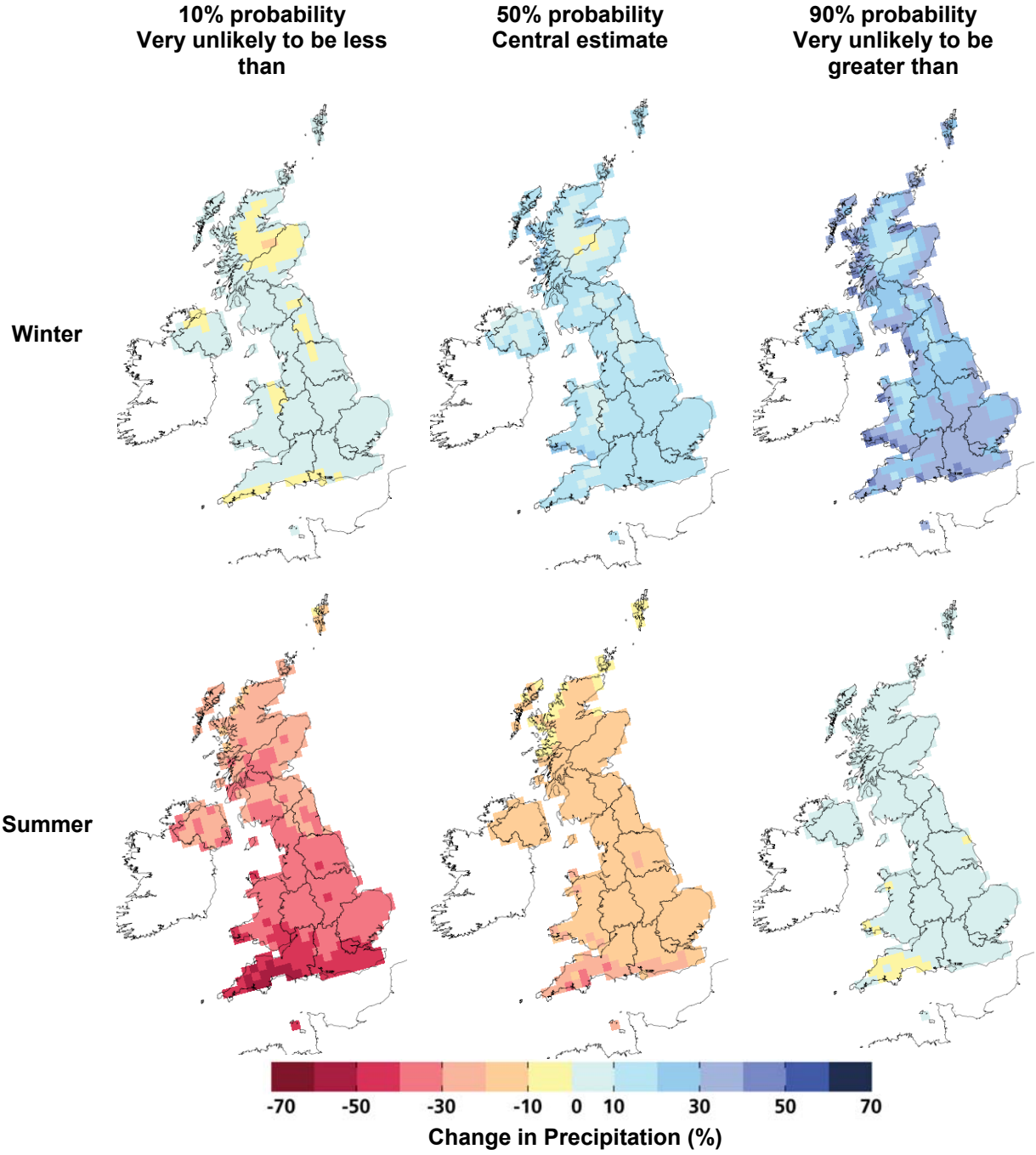
Figures A4f.3 and 4 and Table A4f.1 present projections for summer and winter temperature and precipitation for the 2050s (2040-2069) by administrative region, as defined in Murphy *et al.* (2009). Though impractical to reproduce all the relevant figures here, the UKCP09 technical website (http://ukclimateprojections.defra.gov.uk/) provides the full range of graphics (including graphics subdivided by administrative area and river basin district) and published information and data. Relevant UKCP09 projections for the administrative regions relative to each SEA area are presented in the Environmental Report.

Figure A4f.3 – Mean Seasonal Probabilistic Temperature Projections for the 2050s, based on the Medium Emissions Scenario



Source: UKCP user interface (http://ukclimateprojections-ui.defra.gov.uk/ui/)
Note: grid size 25x25km, figures are relative to the 1961-1990 baseline dataset

Figure A4f.4 – Mean Seasonal Probabilistic Precipitation Projections for the 2050s, based on the Medium Emissions Scenario



Source: UKCP user interface (http://ukclimateprojections-ui.defra.gov.uk/ui/)
Note: grid size 25x25km, figures are relative to the 1961-1990 baseline dataset

Table A4f.1 – Highest and Lowest Changes in Mean Summer and Winter Temperature (°C) and Precipitation (%) by the 2050s, Relative to 1961-1990 for the Medium Emissions Scenario

Variable	Mean winter temperature			Mean summer temperature			Mean winter precipitation			Mean summer precipitation		
Probability level (%)	10	50	90	10	50	90	10	50	90	10	50	90
North Scotland	0.6	1.7	2.8	0.9	2	3.4	3	13	24	–23	–10	2
East Scotland	0.7	1.7	2.9	1.1	2.3	3.9	2	10	20	–26	–12	1
West Scotland	1	1.9	3	1.1	2.4	3.8	5	15	28	–26	–12	1
NE England	1	2	3.1	1.2	2.5	4.1	1	11	24	–29	–14	1
NW England	1	2	3	1.2	2.6	4.1	3	13	26	–34	–17	1
Yorkshire & Humber	1.1	2.1	3.3	1.1	2.3	3.9	2	11	24	–35	–17	1
East Midlands	1.1	2.2	3.4	1.2	2.5	4.2	2	14	29	–35	–15	6
West Midlands	1.2	2.1	3.2	1.2	2.6	4.4	2	13	28	–36	–16	6
Wales	1.1	2	3.1	1.2	2.5	4.1	2	14	30	–36	–16	6
East England	1.1	2.2	3.4	1.2	2.5	4.3	3	14	31	–37	–16	6
London	1.2	2.2	3.5	1.3	2.7	4.6	2	15	33	–39	–18	7
SE England	1.1	2.2	3.4	1.3	2.7	4.6	2	16	36	–40	–18	7
SW England	1.1	2.1	3.2	1.3	2.7	4.6	4	17	38	–41	–19	7

Source: Murphy et al. *(2009)*

A4f.1.4 Climate and Meteorology Indicators

Indicators which form part of the UK Governments' Sustainable Development Strategy and are of relevance to the Climate and Meteorology of the UK are indicated in Table A4f.2. The following information has been principally gathered from the UK Sustainable Development website and accompanying publications unless otherwise stated.

Table A4f.2 – Climate and Meteorology Indicators

#	Indicator	Region[1]
19	**Greenhouse gas emissions**	
	CO_2 emissions	UK, S, W
20	**CO_2 emissions by end user***	
	Industry	UK
	Domestic	UK
	Transport	UK
21	**Electricity generation**	
	Electricity consumption, fossil fuels used	UK
	CO_2 and NO_x emissions	UK
	SO_2 emissions	UK
22	**Renewable energy**	UK

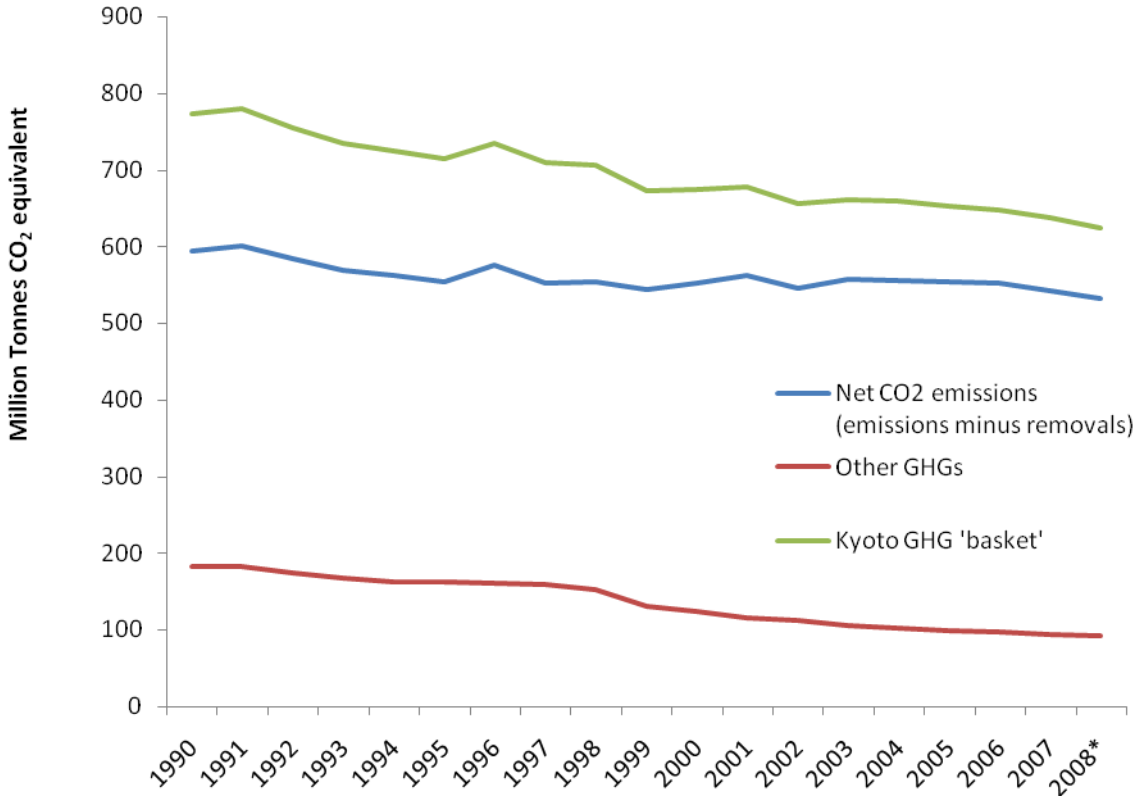
*Note: *signifies a framework indicator – those shared by the UK Government and the devolved administrations. [1]Region refers to that for which data is available: E=England, W=Wales, S=Scotland, UK=UK wide*

A4f.1.4.1 Greenhouse Gas Emissions

Collective emissions of the six primary greenhouse gases (the so called 'basket': CO_2, CH_4, N_2O, HFCs, PFCs and SF_6) that the UK is committed to reduce under the Kyoto Protocol were estimated to be 639 million tonnes in 2007, 17% below 1990 levels (Figure A4f.5). Provisional 2008 estimates indicate that these GHGs reduced a further 2% from 2007 to 623.8 million tonnes. The primary greenhouse gas of concern, CO_2, was estimated to be 544 million tonnes in 2007, just over 8% lower than 1990 levels, with provisional estimates also suggesting a 2% decrease on 2007 figures to 531.8 million tonnes. Emissions decreased by 3% between 2006 and 2007 due to a switch from coal to gas powered electricity generation in some areas (Defra 2009e).

Net greenhouse gas emissions in Scotland have reduced by 15.4% between 1990 and 2005, equalling 54.6 million tonnes in 2005. The Scottish Government set interim targets in its 2007 Government Economic Strategy for 2011 and also committed to reducing greenhouse gas emissions by 80%, by 2050 (Scottish Executive 2007). CO_2 was the largest contributor to greenhouse gasses in Scotland, accounting for 80% of emissions (43.8 million tonnes). The remaining emissions were of methane (9.3%), nitrous oxide (8.9%), hydrofluorocarbons (1.3%), pefluorocarbons (0.1%) and sulphur hexafluoride (0.1%). See Appendix A4e for details on the contribution of some of these substances to changes in air quality.

Figure A4f.5 – UK Greenhouse Gas and Carbon Dioxide Emissions, 1990-2008



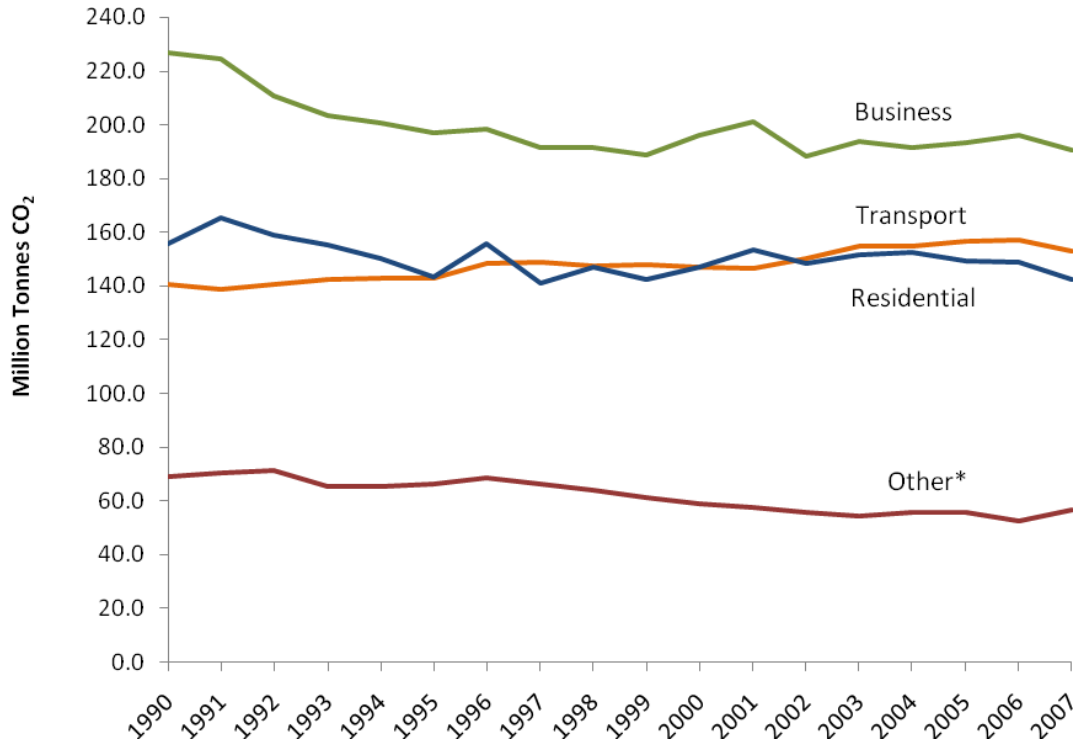
Source: Defra e-Digest Statistics about: Climate Change (http://www.defra.gov.uk/environment/statistics/globatmos/index.htm)
*Note: *2008 figures are provisional*
Figures for previous years may be subject to change due to methodological refinements.
Figures shown do not include any adjustment for the effect of the EU Emissions Trading Scheme (EU ETS), which was introduced in 2005.

A4f.1.4.2 CO_2 Emissions by End User

End user emissions include those from electricity generation and fuel processing. In 2006, the percentage total carbon dioxide emissions accounted for by business, residential and transport were 35%, 26% and 28% respectively (Figure A4f.6). Total CO_2 emissions declined by ~8% between 1990 and 2007. This may largely be attributable to a decline in the business sector, accounting for a relative decline of 16%. Over the same period, residential emissions have shown a decline of 9%, while emissions from transport have increased by 9%.

In Scotland, energy generation was the largest contributor of CO_2 emissions (19.5 million tonnes, down ~5% on 1990 figures) in 2005. Agriculture, business, industrial and waste management accounted for 8.3 million tonnes of CO_2 emissions in 2005, down by 31% on 1990 figures; and public and residential emissions account for 8.7 million tonnes, down 3.5% since 1990. The second highest CO_2 emitter in Scotland is transport, which in 2005 emitted 11.89 million tonnes of CO_2, an increase of ~8% since 1990. A net carbon sink was recorded through land use and forestry, estimated to be ~4.5 million tonnes, though such an estimate is uncertain as it depends on assumptions made about the rate of loss and gain of carbon in Scotland's soils (Scottish Executive 2007).

Figure A4f.6 – CO_2 Emissions from Business, Residential and Transport (excluding aviation and shipping) sectors, 1990-2007



Source: Sustainable Development in Government webpages (http://www.defra.gov.uk/sustainable/government/)
*Note: *Mostly of public, industrial and agricultural sectors*

Table A4f.3, below, indicates the percentage CO_2 emissions for each region of England, Scotland and Wales, as estimated by AEA technology on behalf of Defra. The calculation of emissions from each sector (Industry and Commerce, Domestic, Road Transport) includes (Defra 2008c):

Industry and Commerce

- Electricity use
- Gas use
- Oil and solid fuel use
- Waste
- Agricultural processes and fuel use
- Off road machinery

Domestic

- Electricity use
- Gas use
- Oil and solid fuel use
- Home and garden machinery

Transport

- Road transport and railways

Table A4f.3 – Percentage Regional CO_2 Emissions by End User, 2006

Region	Industry and Commerce	Domestic	Road Transport
North East	65	20	15
North West	45	29	25
Yorkshire and Humber	53	25	22
East Midlands	45	27	28
West Midlands	42	29	29
East of England	38	31	31
Greater London	44	34	22
South East	38	32	31
South West	40	31	28
England average	46	29	26
Wales	57	23	19
Scotland	47	30	24

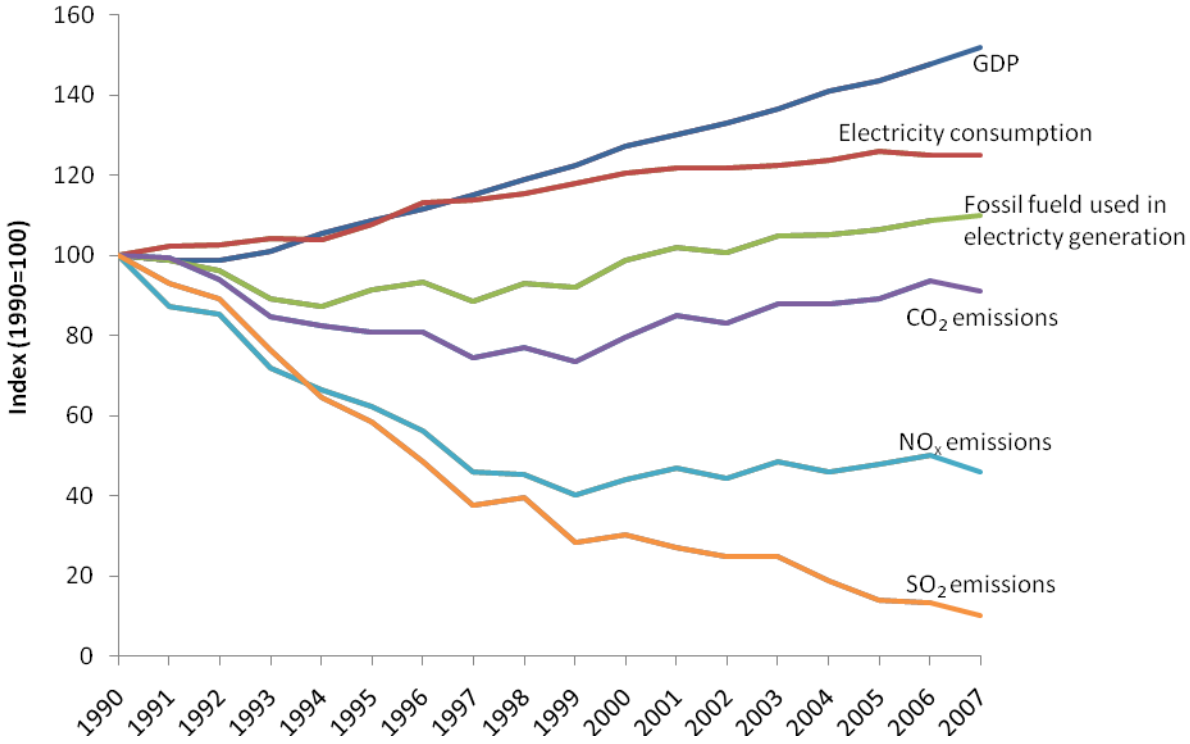
Source: Defra e-Digest of Environmental Statistics (http://www.defra.gov.uk/environment/statistics/)

A4f.1.4.3 Electricity Generation

Electricity consumption increased by 24% between 1990 and 2007, with an accompanying increase in fossil fuel use of 12%. During the 1990s, the emission of CO_2, NO_x and SO_2 declined by 27%, 60% and 72% respectively, however since 1999, both NO_x and CO_2 have shown an increase of 4% and 28% on 1999 figures respectively to 2006 – 6% and 50% lower than 1990 figures (Figure A4f.7). Increases in these gases reflect a greater use of fossil fuels.

In Scotland in 2006, electricity generation increased by 6% on 2000 figures to 53,509 GWh, with 44% and 22% more generation being sought from coal, and gas and oil, respectively than in the previous year. One of the reasons for this increase was due to unplanned outages at Scotland's nuclear power stations, which led to a 24% fall in electricity output compared to 2005 (Scottish Executive 2007).

Figure A4f.7 – Electricity Generated, CO_2, NO_x, SO_2 Emissions by Electricity Generators and GDP, 1990-2007



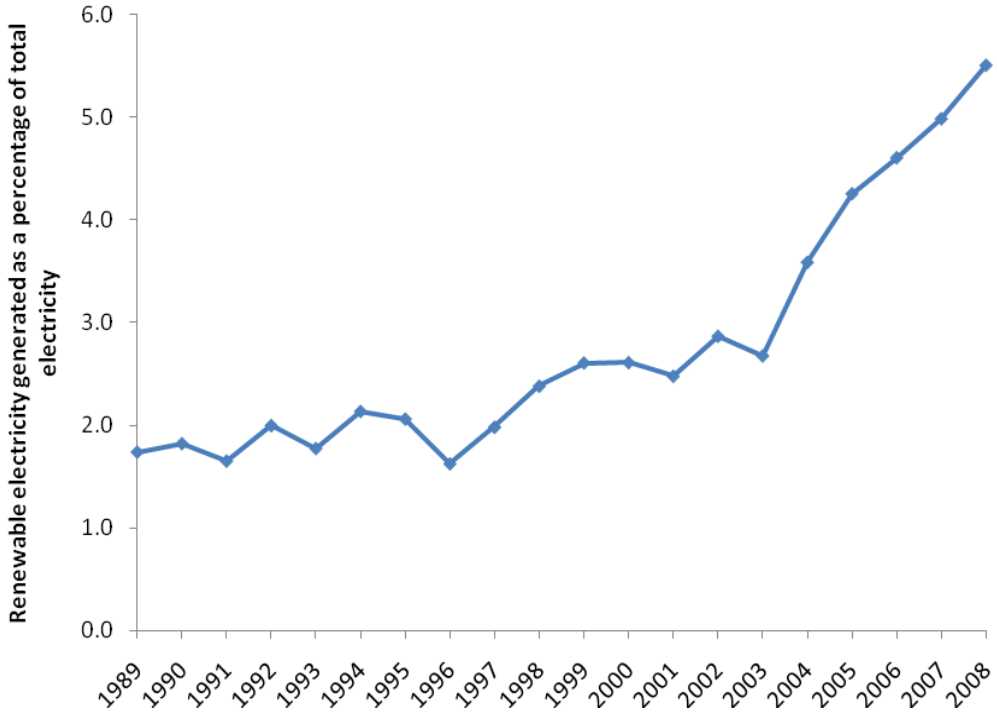
Source: Sustainable Development in Government webpages (http://www.defra.gov.uk/sustainable/government/)

A4f.1.4.4 Renewable Energy

In 2008, renewable sources of electricity represented 5.5% of the total energy mix, increasing from 1.8% in 1990 (Figure A4f.8, Figure A4f.9). Over the same period, the percentage of renewable energy generated by non-hydro electric renewables rose from 10% to 75%. The government set a target of generating 10% of the UK's energy from renewables by 2010 in 2000, doubling that figure to 20% by 2020 in 2006 (or 30% of electricity generated as indicated in the 2009 White Paper, *The UK Low Carbon Transition Plan*). Details of how it is proposed that this is to be achieved can be found in the UK Renewable Energy Strategy. The relative energy generation of each renewable source in the UK between 1996 and 2008 is indicated in Figure A4f.8. It can be seen that the increase in renewable energy generation has principally been from biomass and wind sources.

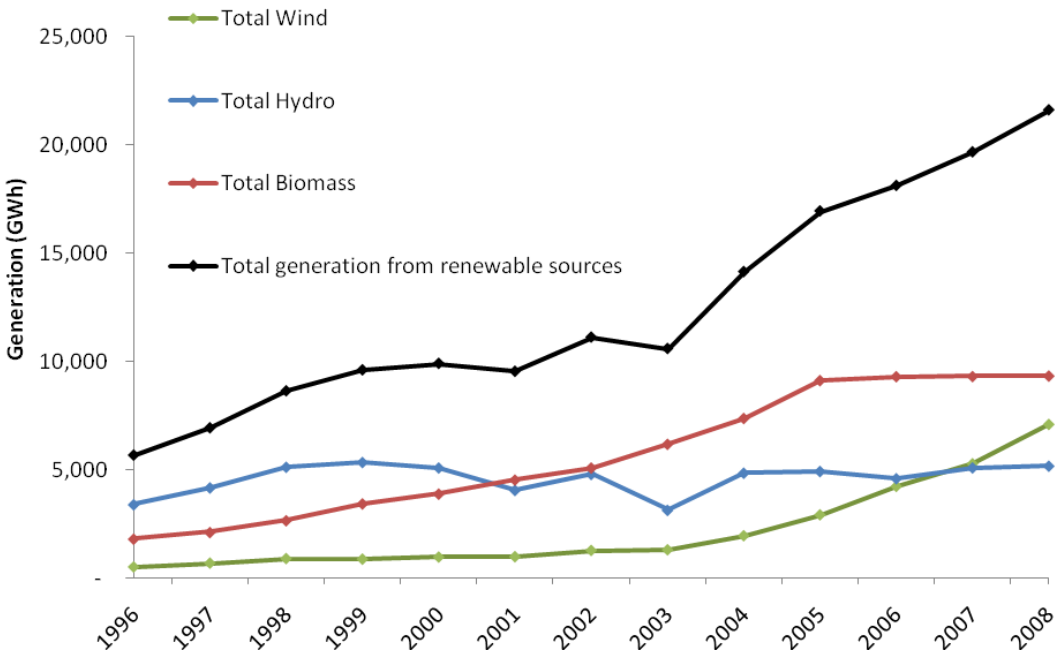
In 2006, Scotland produced 6,962GWh of electricity from renewable sources, amounting to 16.3% of the total electricity demand – this compares with 12.2% in 2000. Scotland has committed to a target of 50% for electricity generated from renewable sources by 2020, with an interim target of 31% by 2011.

Figure A4f.8 – Renewable Electricity Generated as a Percentage of Total Electricity, 1990-2008



Source: DECC digest of UK Energy Statistics Webpages (http://www.decc.gov.uk/en/content/cms/statistics/source/renewables/)

Figure A4f.9 – Renewable Generation by Technology, 1996-2008



Source: DECC digest of UK Energy Statistics Webpages (http://www.decc.gov.uk/en/content/cms/statistics/source/renewables/)
Note: Total Wind includes offshore (excluding the 10MW capacity Beatrice demonstrator) and onshore wind; hydro includes both small- and large scale-projects.

A4g.1 Population and human health

A4g.1.1 Introduction

The following sections provide a summary of the population, demography and human health statistics for each of the SEA areas. Information is drawn from a variety of sources produced by the Office for National Statistics. Where available, information is presented at an appropriate administrative area level (e.g. Local Authority District and Unitary Authority in England and Wales, Council areas in Scotland). The most recently available population data at such a scale are estimates for mid-2008, while statistics on the employment structure of the population are given in the 2001 Census.

Information on the general health and wellbeing of the population is drawn from several Community Health Indicators obtained in the 2001 Census. One of these indicators uses the percentage of household residents who reported their health over the previous 12 months as having been "not good". Evidence suggests that this self-reported measure of health has good predictive validity of mortality and health care utilisation. Life expectancy over the period 1998-2000 is also included. The next UK-wide census is due to be carried out in 2011.

A4g.1.2 Population Density

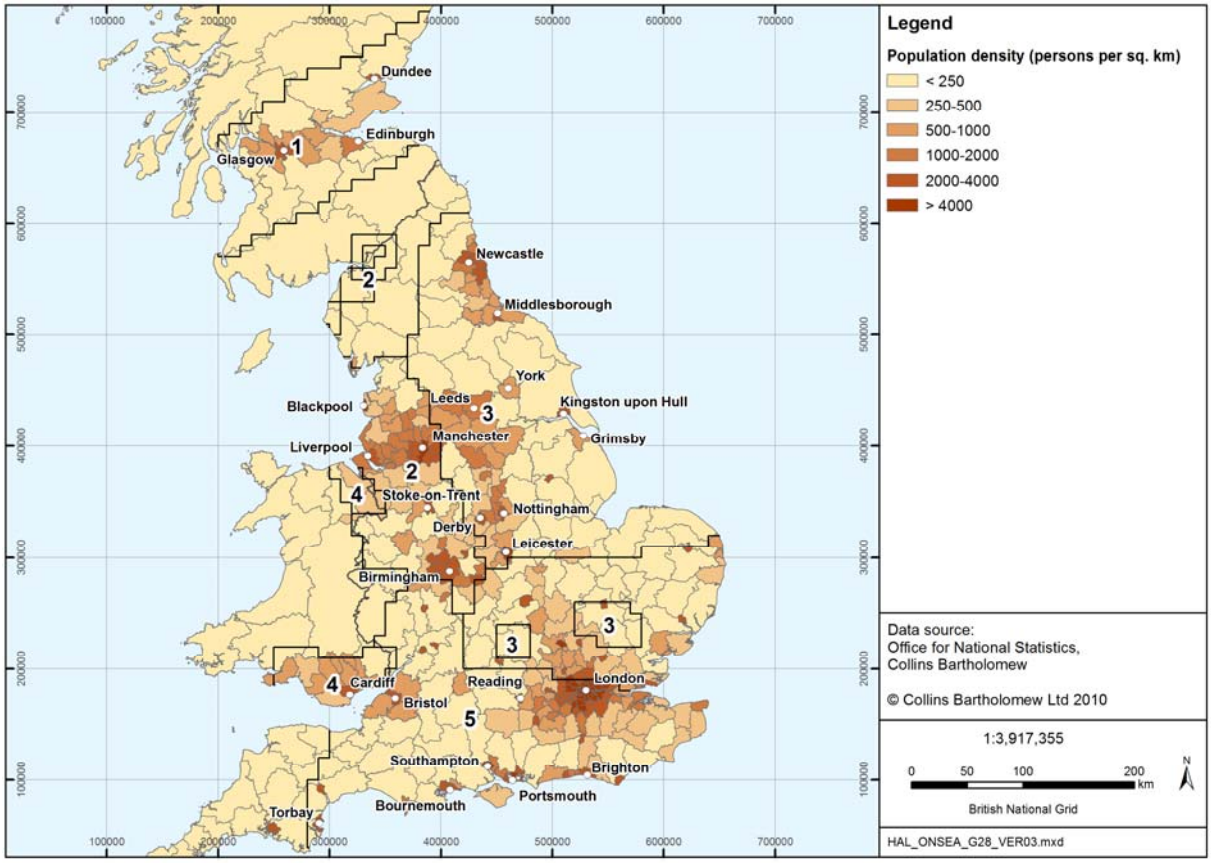
The following provides a brief summary of relative population density of each SEA area. The most recent national population estimates (mid-2008) are shown in Table A4g.1 and the population density for the relevant English, Welsh and Scottish regional authorities are shown in Figure A4g.1. Population density is highest in England; over 80% of the UK population reside there. The population density in Wales is comparably lower than that of the UK as a whole; the density in Scotland is the lowest by a considerable margin.

Table A4g.1 – Mid-2008 Population Estimates

Area	Population ('000s)	Area (km^2)	Density (persons km^{-2})
England	51,446.2	130,281	394.89
Wales	2,993.4	20,732	144.39
Scotland	5,168.5	77,925	66.33
United Kingdom	**61,383,000**	**242,514**	**253.11**

Source: Office for National Statistics mid-2008 population estimates, Office for National Statistics website.

Figure A4g.1 – Mid-2008 Population Density estimates in the SEA Areas



A4g.1.2.1 Scottish Midlands

Within the Scottish Midlands, the Central Belt supports the highest population densities, being greatest in the cities of Glasgow, Edinburgh and also to the north east in Dundee. The population density in the areas intervening these centres (Fife, North Lanarkshire, West Lothian) still contain relatively high densities compared with more rural areas to the north and south of the central belt (e.g. Stirling, Perth and Kinross, South Lanarkshire, Scottish Borders). The population and population density of each relevant administrative area is shown in Table A4g.2.

Table A4g.2 – Mid-2008 Population Estimates for Administrative Areas in the Scottish Midlands SEA Area

Area	Area (km^2)	Population ('000s)	Density (persons km^{-2})
Aberdeenshire*	6,313	241.50	38.25
Angus	2,182	110.30	50.55
Clackmannanshire	159	50.50	317.61
Dumfries and Galloway*	6,426	148.60	23.12
Dundee City	60	142.50	2,375
East Dunbartonshire	175	104.70	598.29
East Lothian	679	96.10	141.53
East Renfrewshire	174	89.20	512.64

Area	Area (km^2)	Population ('000s)	Density (persons km^{-2})
Edinburgh	264	471.70	1,786.74
Falkirk	297	151.60	510.44
Fife	1,325	361.90	273.13
Glasgow	175	584.20	3,338.29
Inverclyde	160	80.80	505
Midlothian	354	80.60	227.68
North Lanarkshire	470	325.50	692.55
Perth and Kinross*	5,286	144.20	27.28
Renfrewshire	261	169.80	650.57
Scottish Borders*	4,732	112.40	23.75
West Dunbartonshire	159	90.90	571.70
West Lothian	427	169.50	396.96
Stirling*	2,187	88.40	40.42
Scottish Midlands Total	**32,265**	**3,814.90**	**118.24**
Scotland	**77,925**	**5,168.50**	**66.33**
United Kingdom	**242,514**	**61,383.20**	**253.11**

Source: Office for National Statistics
*Note: *only part of this administrative area resides within the SEA area*

A4g.1.2.2 West Midlands, North West England and Southern Scotland

The West Midlands and North West England SEA area has a high population density in most administrative areas (particularly the West Midlands, Merseyside and Greater Manchester), with concentrations of population centred on the urban areas of Liverpool, Blackpool, Manchester and Birmingham. The high collective population density for all the administrative areas in the SEA area is around 2.5 times that of the national figure, and over 1.5 times that of England.

Table A4g.3 – Mid-2008 Population Estimates for Administrative Areas in the West Midlands and North West England SEA Area

Area	Area (km^2)	Population ('000s)	Density (persons km^{-2})
Lancashire	2,903	1,169.00	402.69
Blackburn with Darwen	137	140.7	1,027.01
Merseyside	645	1,347.90	2,089.77
Warrington	181	196.2	1,083.98
Greater Manchester	1,276	2,573.5	2,016.85
Cheshire	2,083	328.6	157.75
Cumbria	6,768	496.6	73.37
Blackpool	35	141.9	4,054.29
Halton	79	119.8	1,516.46
Shropshire	3,197	292.8	91.59
Telford and Wrekin	290	162.1	558.97

Area	Area (km^2)	Population ('000s)	Density (persons km^{-2})
Worcestershire*	1,741	557.6	320.28
Staffordshire	2,620	828.9	316.37
Stoke-on-Trent	93	240.1	2,581.72
West Midlands	902	2,619.6	2,904.21
Warwickshire	1,975	530.7	268.71
Dumfries & Galloway	6,426	148.6	23.12
Scottish Borders	4,732	112.4	23.75
West Midlands/England, Southern Scotland Total	**18,157**	**11,249.40**	**619.56**
England Total	**130,281**	**51,446.2**	**394.89**
National Total	**242,514**	**61,383.2**	**253.11**

Source: Office for National Statistics
*Note: *only part of this administrative area resides within the SEA area*

A4g.1.2.3 East Midlands and Eastern England

Northumberland, Durham, North Yorkshire, Lincolnshire and Norfolk have a relatively low population density compared to administrative areas in the East Midlands, including South Yorkshire, West Yorkshire, Nottinghamshire, Leicestershire and Derbyshire. The principal population centres in this SEA are the urban areas of Newcastle, Leeds, York and Hull in the north, and Nottingham, Leicester and Derby in the south.

Table A4g.4 – Mid-2008 Population Estimates for Administrative Areas in the East Midlands and Eastern England SEA Area

Area	Area (km^2)	Population ('000s)	Density (persons km^{-2})
Northumberland	5,013	311.0	62.04
Tyne and Wear	540	1,093.5	2,025
Durham	2,226	508.5	228.44
Darlington	197	100.5	510.15
Hartlepool	94	91.7	975.53
Middlesbrough	54	139.0	2,574.07
Redcar and Cleveland	245	139.5	569.39
Stockton-on-Tees	204	191.9	940.69
North Yorkshire	8,038	599.2	74.55
South Yorkshire	1,552	1,305.9	841.43
West Yorkshire	2,029	2,200.6	1,084.57
York UA	272	195.4	718.38
East Riding of Yorkshire	2,409	335.0	139.06
North Lincolnshire	846	160.3	189.48
Derby	78	239.2	3,066.67
Derbyshire	2,547	762.1	299.21
North East Lincolnshire	192	158.2	823.96
Kingston upon Hull	71	258.7	3,643.66
Nottinghamshire	2,085	776.5	372.42

Area	Area (km^2)	Population ('000s)	Density (persons km^{-2})
Nottingham	75	292.4	3,898.67
Lincolnshire	5,921	698.0	117.89
Leicestershire	2,083	645.8	310.03
Leicester	73	294.7	4,036.99
Rutland	382	39.2	102.62
Peterborough	343	164.0	478.13
Cambridgeshire*	3,046	605.0	198.62
Norfolk*	5,371	850.8	158.41
East Midlands and Eastern England Total	**45,986**	**13,156.6**	**286.10**
England Total	**130,281**	**51,446.2**	**394.89**
National Total	**242,514**	**61,383.2**	**253.11**

Source: Office for National Statistics
*Note: *only part of this administrative area resides within the SEA area*

A4g.1.2.4 North and South Wales

The North and South Wales SEA area takes in those areas of Wales which are most heavily populated, namely Cardiff, Swansea and the Valleys in the south. The relatively high population density in these areas (Table A4g.5) can be seen by comparison with the national (Wales) total.

Table A4g.5 – Mid-2008 Population Estimates for Administrative Areas in the North and South Wales SEA Area

Area	Area (km^2)	Population ('000s)	Density (persons km^{-2})
Flintshire	438	151	344.75
Wrexham	498	132.9	266.87
Denbighshire	844	97.6	115.64
Monmouthshire	850	88.4	104.00
Blaenau Gwent	109	69.1	633.94
Torfaen	126	91.1	723.02
Newport	73	140.7	1,927.40
Caerphilly	278	172.4	620.14
Cardiff	140	324.8	2,320.00
Merthyr Tydfil	111	55.7	501.80
Rhondda, Cynon, Taff	424	234.1	552.12
Neath Port Talbot	442	137.6	311.31
Bridgend	246	134.8	547.97
The Vale of Glamorgan	335	124.9	372.84
Carmarthenshire	2,394	180.5	75.40
Neath Port Talbot	441	137.6	312.02
Powys	5,181	132.6	25.59
Swansea	378	229.1	606.08
North and South Wales Total	**13,308**	**2,634.90**	**197.99**
Wales Total	**20,732**	**2,993.40**	**144.39**

Area	Area (km^2)	Population ('000s)	Density (persons km^{-2})
National Total	**242,514**	**61,383.2**	**253.11**

Source: Office for National Statistics
*Note: *only part of this administrative area resides within the SEA area*

A4g.1.2.5 Southern and South West England

The collective population density for all the administrative areas in this SEA area is significantly larger than the national and English averages. The area of Greater London has the largest population density of any administrative area in the UK. Southampton and Bristol also have very high population densities, having the second and sixth highest density of any administrative area in the UK. The other principal population centres in the South and South West are Reading, Bournemouth, Portsmouth, Brighton and Torbay.

Table A4g.6 – Mid-2008 Population Estimates for Administrative Areas in the Southern and South West England SEA Area

Area	Area (km^2)	Population ('000s)	Density (persons km^{-2})
Devon*	6,564	754.7	114.98
Somerset	3,451	525.8	152.36
Dorset	2,542	407.8	160.42
Wiltshire	3,255	455.5	139.94
North Somerset	375	206.8	551.47
Bath and North East Somerset	351	180.3	513.68
South Gloucestershire	497	257.7	518.51
Bristol	110	421.3	3,830.00
Gloucestershire	2,653	582.6	219.60
Worcestershire	1741	557.6	320.28
Herefordshire*	2,180	179.3	82.25
Swindon	230	192.9	838.70
West Berkshire	704	152.8	217.05
Oxfordshire*	2,605	639.8	245.60
Hampshire	3,679	1,285.9	349.52
Poole	65	138.8	2,135.38
Bournemouth	46	163.9	3,563.04
Southampton	50	234.6	4,692.00
Isle of Wight	380	140.2	368.95
Wokingham	179	159.1	888.83
Windsor and Maidenhead	198	142.8	721.21
Slough	33	121.2	3,672.73
Surrey	1,663	1,109.70	667.29
West Sussex	1,991	781.5	392.52
East Sussex	1,709	509.9	298.36
Brighton and Hove	83	256.6	3,091.57
Kent	3,544	1,406.6	396.90
Greater London	1,580	7,619.8	4,822.66

Area	Area (km^2)	Population ('000s)	Density (persons km^{-2})
Medway	192	253.5	1,320.31
Thurrock	163	151.6	930.06
Reading	40	145.7	3,642.50
Southern and South West England	**43,191**	**20,136.30**	**466.22**
England Total	**130,281**	**51,446.2**	**394.89**
National Total	**242,514**	**61,383.2**	**253.11**

Source: Office for National Statistics
*Note: *only part of this administrative area resides within the SEA area*

A4g.1.3 Population and human health indicators

The indicators chosen to present an evolution of the baseline for population and human health are shown in Table A4g.7, and are described with reference to appropriate data in the sections which follow.

Table A4g.7 – Population and Human Health Indicators

#	Indicator	Region[1]
23	**Demography**	UK, E, W, S
24	**Life expectancy at birth***	
	Men	UK, E, W, S
	Women	UK, E, W, S
25	**General health**	E, W,S
26	**Environmental Equality***	E
27	**Air quality and health**	
	Annual levels of particles and ozone	UK
	Days when air pollution is moderate or higher (rural)	UK, W
	Days when air pollution is moderate or higher (urban)	UK, W
	Noise pollution†	E, W, S

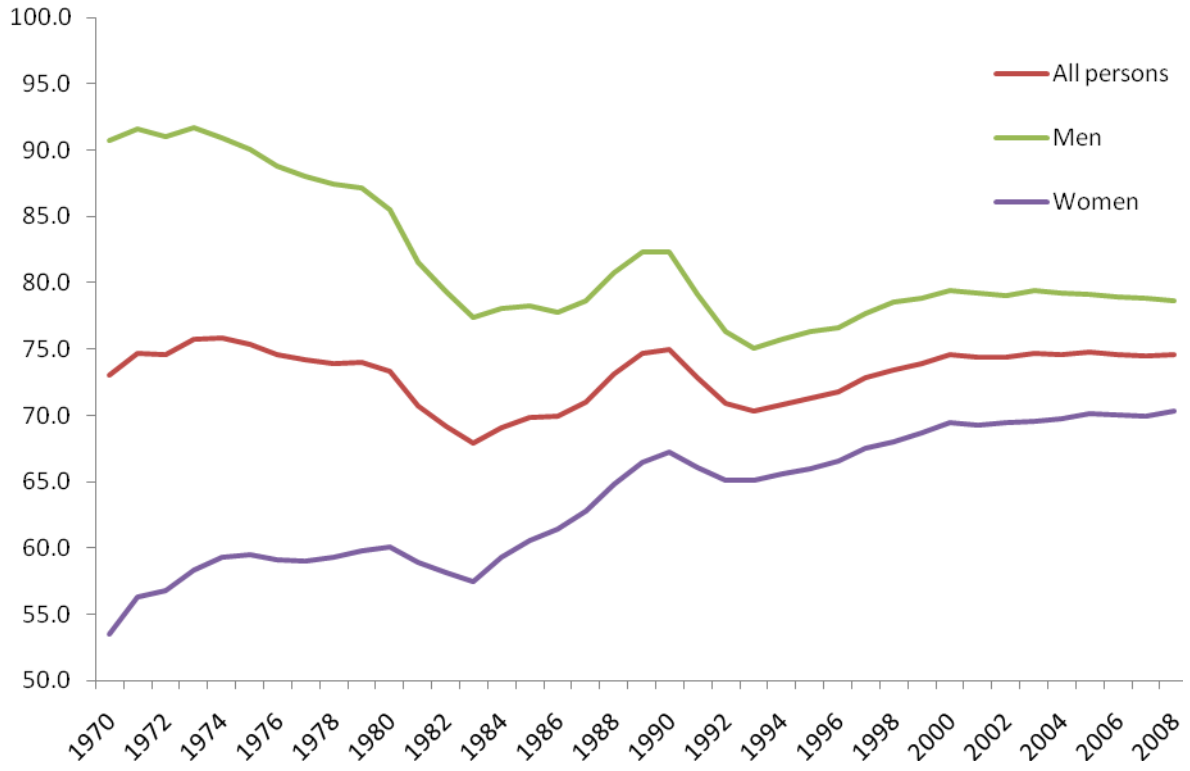
*Note: *signifies a framework indicator – those shared by the UK Government and the devolved administrations; †additional indicator not included in the UK government sustainable development strategy.*
[1]Indicates the spatial coverage of the data; E=England, W=Wales, S=Scotland, UK=Entire United Kingdom.

A4g.1.3.1 Demography

The overall UK population was estimated to be 60.5 million in 2006, up from 58.8 million in 2001, 57.2 million in 1990 and 55.6 million in 1970. The working age population was estimated to be 37.6 million (62% of the total population) in 2006, up from 35.1 million (61%) in 1990 and 32.5 million (58%) in 1972. The UK population in 2009 has been projected to 61.9 million (51.9 million in England, 5.2 million in Scotland, 3.0 million in Wales, and 1.8 million in Northern Ireland), with 38.3 million of working age. The projected trend is of an increasing UK population up to 66.8 million in 2020.

In 2009 the number of people of working age (i.e. 16-59/64) in employment was 74.5%, reducing to 73.6% in quarter 1 of 2009. The number of men in employment has reduced from 91.4% in 1971 to 75.1% of 2008, with an increase of women in employment over the same period from 56.3% to 70.2% (Figure A4g.1).

Figure A4g.2 – People of Working Age in Employment, 1970-2008



Source: Sustainable Development in Government webpages (http://www.defra.gov.uk/sustainable/government/)

Estimates from the 2001 Census show a population increase between 1991 and 2001 of 4.3% in England, 1.3% in Scotland and 2.4% in Wales. Projected increases between 2001 and 2009 (based on the figures given above) are of a further 5.7% in England, 1.9% in Scotland and 3.4% in Wales.

Within the English Government Office Regions, lowest populations in 2001 were in the North East (2.5 million, 2.9 people per hectare) and the highest in the South East (8 million, 4.2 people per hectare). The South West (4.9 million) had the lowest population density (2.1 people per hectare) and London (7.2 million) the highest (45.6 people per hectare).

In the Scottish Midland regions, the cities of Glasgow (0.58 million, 32.9 people per hectare) and Edinburgh (0.45 million, 17 people per hectare) had the highest populations in 2001 with Clackmannanshire (0.05 million, 3 people per hectare) one of the lowest. Whilst Glasgow had the highest population density, Perth and Kinross (0.13 million, 0.26 people per hectare) and the Scottish Borders (0.11 million, 0.23 people per hectare) had amongst the lowest.

In North Wales, Flintshire (0.15 million, 3.4 people per hectare) had the highest population with Denbighshire the lowest (0.09 million, 1.11 people per hectare). The population of South Wales was much higher and in general, population density over much of the area was greater than in the north. Cardiff (0.31 million, 22 people per hectare) had the highest with Merthyr Tydfil, the lowest (0.06 million, 5.1 people per hectare).

Table A4g.8 – Population Change and Projections to 2016

Area[1]	Population (000s)[2]			% change	
	1996	2006	2016	96-06	06-16
England	48,402.1	50,762.9	54,724.2	4.9	7.8
Wales	2,891.3	2,965.9	3,138.8	2.6	5.8
Scotland	5,092.2	5,116.9	5,270.2	0.5	3.0
United Kingdom	58,047.3	60,587.3	65,001.5	4.4	7.3

Notes: [1] Regional Sea values are totals for coastal administrative areas within each Regional Sea; [2] Mid-year estimates, 2016 forecast based on mid-2006 estimates. Sources: Office for National Statistics website; GROS website; NISRA website; StatsWales website.

Table A4g.9 – Population Projections (in 000's) to 2031

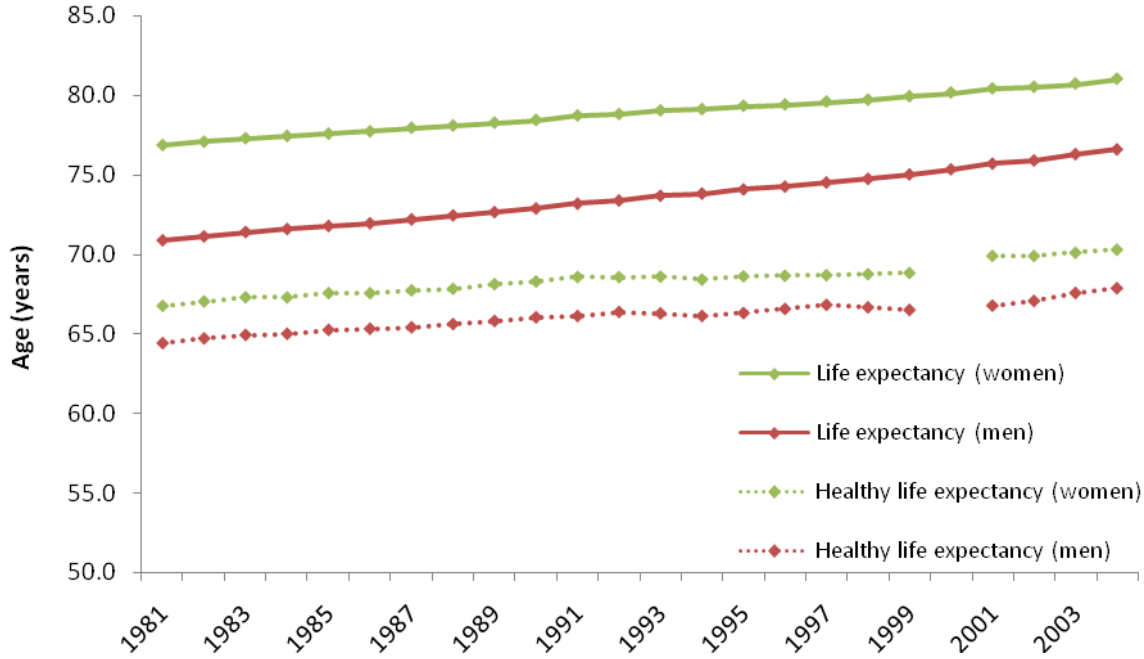
Area	2006	2011	2016	% change 06-16	2021	2026	2031
North East	2,556	2,594	2,638	**3.21**	2,685	2,730	2,769
North West	6,853	7,014	7,193	**4.96**	7,377	7,546	7,696
Yorkshire and Humber	5,142	5,377	5,621	**9.32**	5,866	6,101	6,319
East Midlands	4,364	4,591	4,825	**10.56**	5,060	5,286	5,491
West Midlands	5,367	5,506	5,662	**5.50**	5,824	5,977	6,114
East of England	5,607	5,890	6,179	**10.20**	6,471	6,747	6,997
London	7,512	7,817	8,114	**8.01**	8,390	8,633	8,858
South East	8,238	8,550	8,871	**7.68**	9,202	9,523	9,814
South West	5,124	5,368	5,620	**9.68**	5,882	6,139	6,374
Wales	2,966	3,038	3,113	**4.96**	3,186	3,248	3,296
Scotland	5,117	5,206	5,270	**2.99**	5,326	5,363	5,374

Source: Office for National Statistics (2009)

A4g.1.3.2 Life Expectancy at Birth

In 2004, UK average life expectancy was 76.6 years for men and 81 years for, while the average healthy life expectancies were 67.9 and 70.3 respectively. Since 1981 average life expectancy has increased by 5.7 years for men and by 4.2 years for women. Comparing across local authority areas based on figures from the 2001 Census, overall average life expectancies in England (men 76 years, women 80.6 years) and Wales (men 75.4 years, women 80.1 years) are broadly similar, but Scotland average is lower (73.3 years for men and 78.8 years for women).

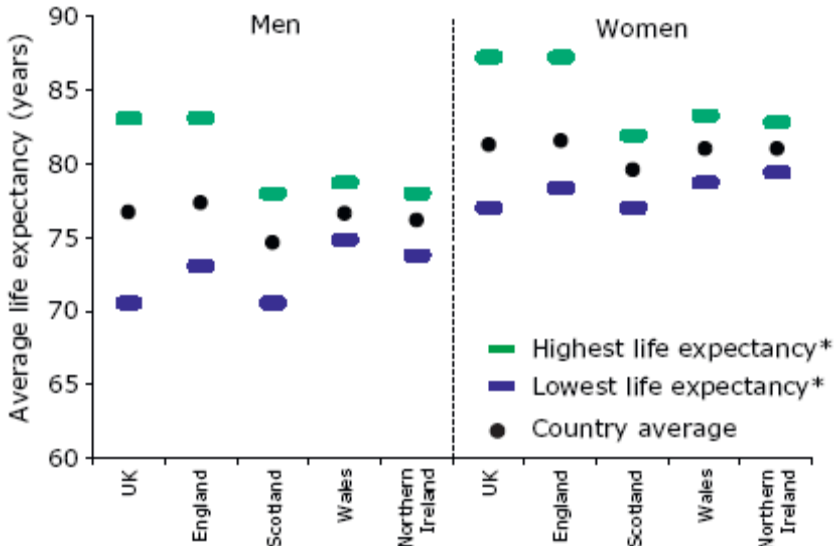
Figure A4g.3 – UK Life Expectancy and Healthy Life Expectancy at Birth, 1981-2004



Source: Sustainable Development in Government webpages (http://www.defra.gov.uk/sustainable/government/)
Note: data for healthy life expectancy for 2000 is not available.

Differences in average life expectancy between local authority areas forms part of the UK Framework Indicator *Health Inequality*. Life expectancy at birth is also one of the recently identified Community Health Profile Indicators. The range of influences on life expectancy is vast and includes all those influences on health at each age. Average life expectancy is therefore a good summary indicator of the health status of the population (Association of Public Health Observatories 2006).

Figure A4g.4 – Differences in Average Life Expectancy between Local Authority Areas, 2004-2006



*Note: *Highest and lowest averages amongst regional Local Authority Districts*
Source: Defra (2008)

A4g.1.3.3 General Health

The age standardised percentage of household residents who reported their health over the previous 12 months as having been "not good" is classified in the Community Health Indicator as *Feeling* “in poor health”. Evidence suggests that this self-reported measure of health has good predictive validity of mortality and health care utilisation. Overall in the UK, 9.3% of people described their health for the 12 months prior to Census day (29 April 2001) as “not good”. This compared with 9.0% (England), 10.2% (Scotland) and 12.5% (Wales).

At a regional level there was considerable variation in the percentage of people describing their health as “not good” (Figure A4g.5). For the English Government Office Regions, the figures ranged from 7.1% in the South East to 12% in the North East (Office for National Statistics, Census 2001). In the Scottish Midlands, the figures varied from 7.7% in the Scottish Borders to 15.6% in Glasgow City (Scotland’s Census 2001). In North Wales, the figures ranged from 9.8% in Flintshire to 11.5% in Denbighshire whilst South Wales varied between 9.5% in Monmouthshire and 18.1% in Merthyr Tydfil (Office for National Statistics, Census 2001).

Figure A4g.5 – Self Assessed General Health “Not Good”, 2001

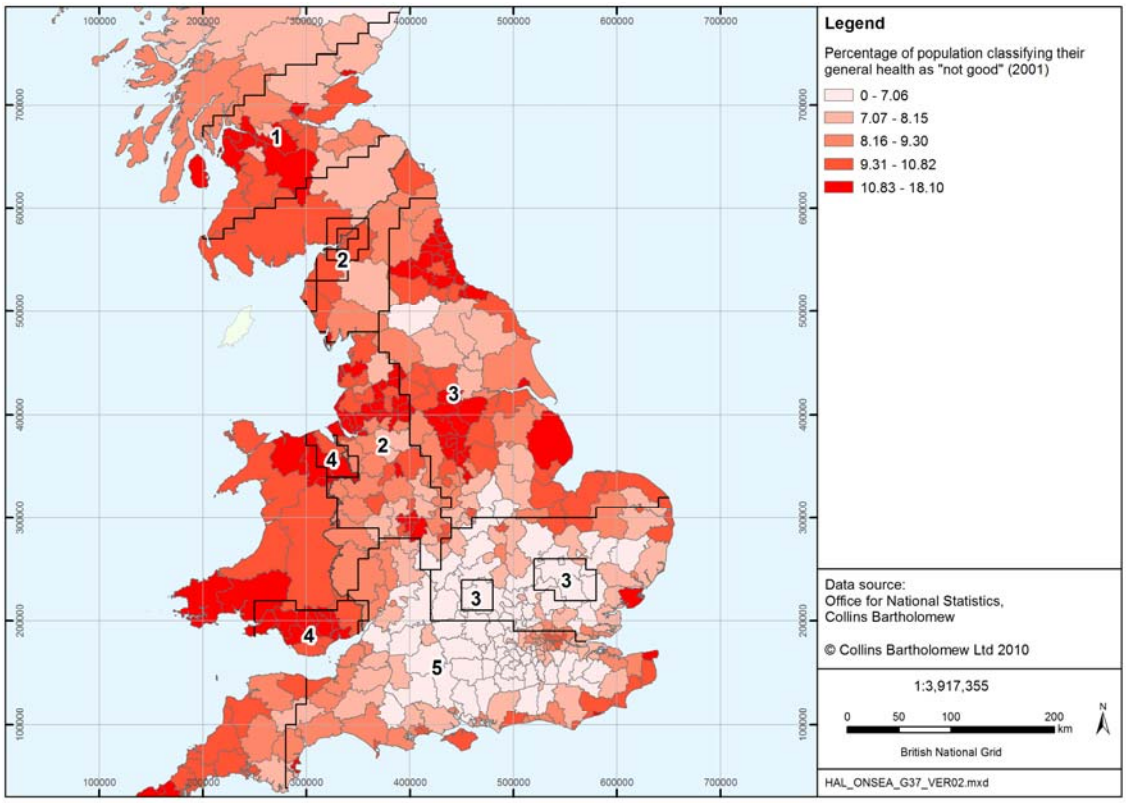


Table A4g.10 – Self-Assessed General Health and Life Expectancy at Birth for each of the English Regions, Scotland and Wales

Region	Not good health (%)[1]	Limiting long-term illness (%)	Life expectancy[2]	
			Male	Female
North East	10.36	19.4	73.9	78.8
Yorkshire and the Humber	8.91	16.6	74.9	79.8
East Midlands	7.79	15.4	75.4	80.2
East	6.37	13.3	76.6	81
South East	5.93	12.6	76.7	81.2
South West	6.76	14.0	76.7	81.5
West Midlands	8.42	16.0	74.9	79.9
North West	9.58	17.8	74.0	79.0
England	**7.82**	**15.2**	**75.5**	**80.3**
Wales	**10.55**	**19.4**	**74.8**	**79.7**
Scotland	**8.88**	**17.3**	**72.9**	**78.2**
United Kingdom	**8.12**	**15.7**	**75.2**	**80.1**

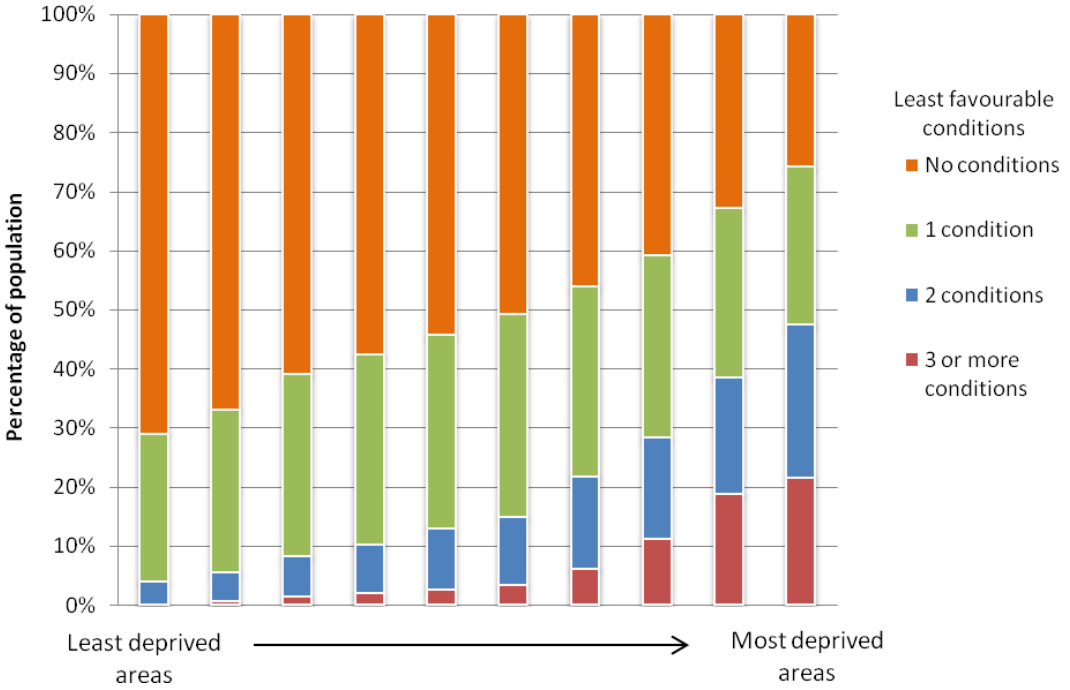
Notes: [1] self-assessed, for 12 months prior to census date; [2] at birth, 1998-2000; [3] health indicator totals consider population size of each administrative area, life expectancy average is an un-weighted mean of all areas. Source: Census 2001, Office for National Statistics website.

A4g.1.3.4 Environmental Equality

Preliminary analysis of selected environmental conditions provides evidence that those most deprived areas in England may also experience one or more environmental conditions which are in relative terms 'least favourable' compared to less deprived areas (Defra 2008). More work is required to develop this indicator to reflect the condition of each country of the UK. Wales has developed a similar but not directly comparable index of Index of Multiple Depravation. Note that the index does not reflect affluence, but exposure to certain environmental variables.

Figure A4g.6 illustrates the relative number of least favourable conditions experienced for a percentage of the population in relation to the scale of deprivation. Less than 0.5% of the population in the least deprived areas experience 3 or more environmental conditions that are 'least favourable', rising to ~22% in the most deprived areas.

Figure A4g.6 – Environmental Equality in England, 2000-2007



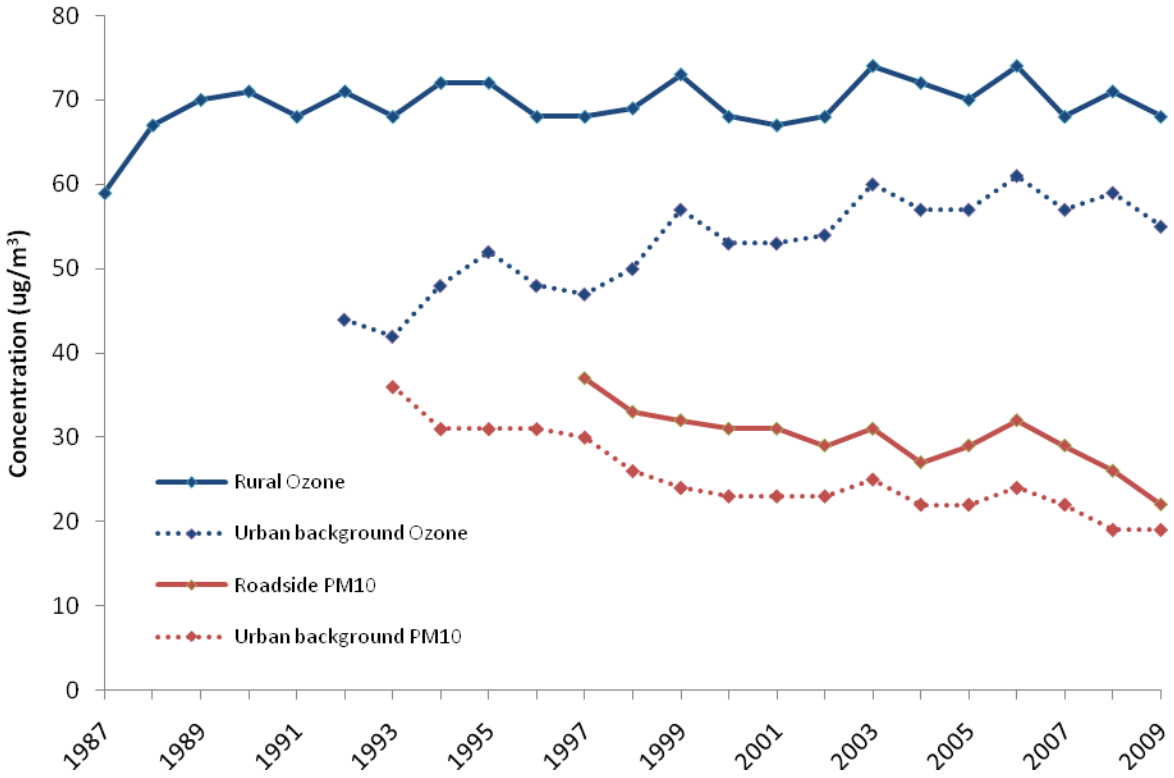
Source: Defra, Environment Agency and DCLG, from data provided on the Sustainable Development in Government webpages (http://www.defra.gov.uk/sustainable/government/)
Note: Eleven environmental conditions or characteristics have been included, derived from the Index of Multiple Deprivation: river water quality, air quality, green space, habitat favourable to biodiversity, flood risk, litter, detritus, housing conditions, road accidents, and presence of 'regulated sites' (e.g. waste management, industrial, or landfill sites, or sewage treatment works). For each of these conditions the population living in areas with, in relative terms, the 10% least favourable conditions have been determined.
This data is mainly derived from that collected between 2005 and 2007/08.

A4g.1.3.5 Air Quality and Health

The two types of air pollution believed to have the most significant impacts on public health are long-term exposure to particulate matter (PM_{10}) and daily peak ozone levels (Figure A4g.7). Annual average particulate levels have been decreasing, although the trend may be levelling off. There is a very slight upward trend in background ozone levels, and a more marked increase in urban areas, due to the reduction in urban emissions of nitrogen oxides, which destroy ozone close to their emission source.

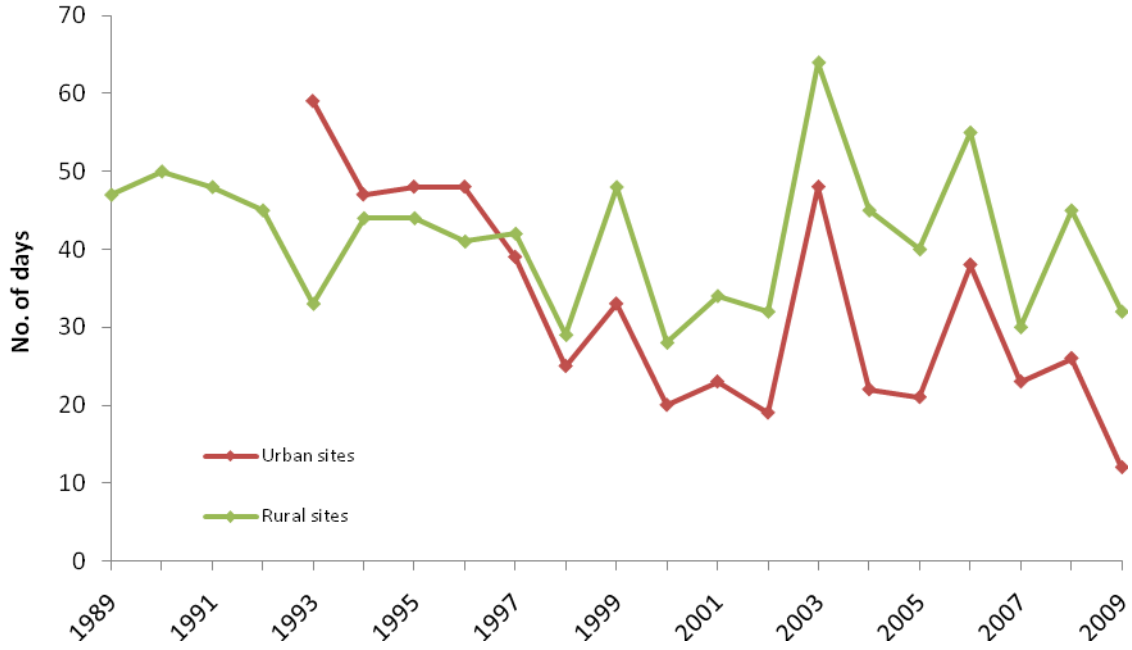
The number of days when air pollution was assessed as being moderate or higher at urban sites has reduced significantly since 1993 (with the exception of a peak in 2003) while the number of days affected in rural areas, caused largely by ozone, has shown no overall trend (Figure A4g.8). The weather can cause significant variation from year to year in the number of days of moderate or higher air pollution. The hot summer and other pollution episodes in 2003 led to an unusually high number of pollution days.

Figure A4g.7 – Annual Levels of Particulates and Ozone, 1987-2009



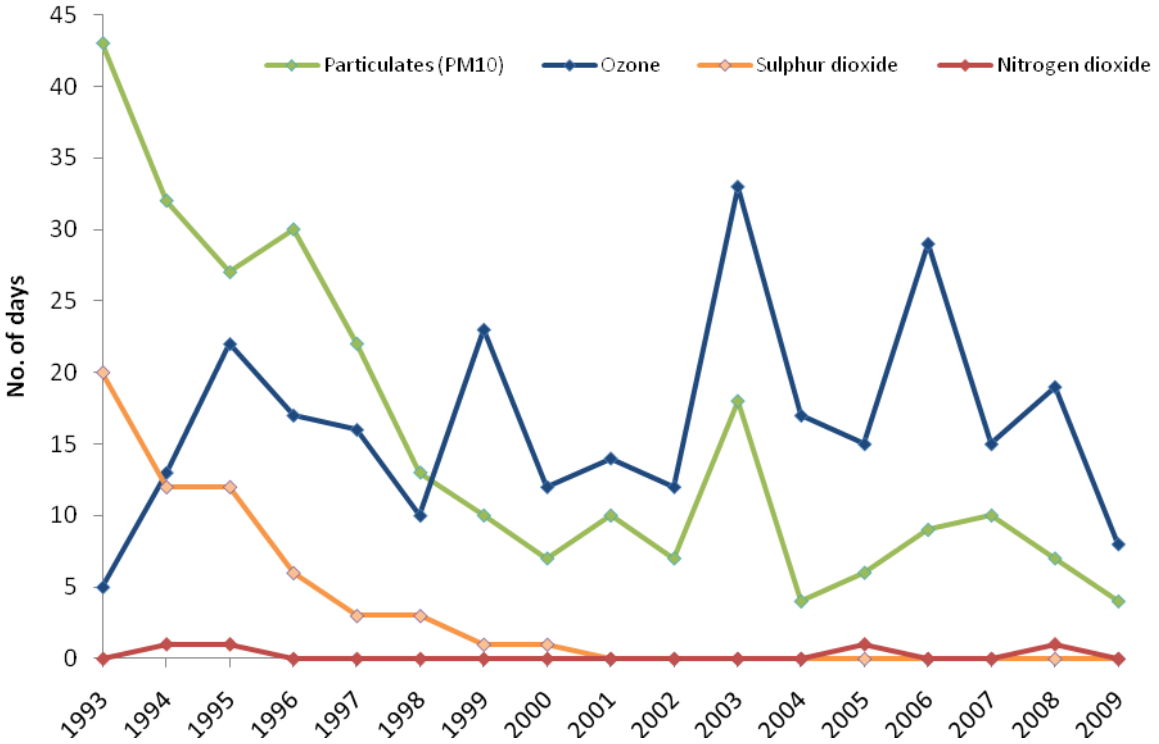
Note: PM_{10} annual mean is the average across all included sites. Ozone annual mean is of the daily maximum eight hour running mean.
Source: Defra and AEA Energy, from data provided in the Defra e-Digest of Environmental Statistics (http://www.defra.gov.uk/evidence/statistics/)

Figure A4g.8 – Number of Days when Air Pollution is Moderate or Higher, 1989-2009



Source: Defra and AEA Energy, from data provided in the Defra e-Digest of Environmental Statistics (http://www.defra.gov.uk/evidence/statistics/)

Figure A4g.9 – Average Number of Days of Moderate or Higher Air Pollution at Urban Sites, 1993-2009



Source: Defra e-Digest of Environmental Statistics (http://www.defra.gov.uk/evidence/statistics/)

The Effects of Short-Term Changes in Levels of Air Pollution

For the most part, healthy individuals will not notice or suffer from any serious or lasting ill effects from levels of pollution commonly experienced in the UK, even when levels are described as "high" or "very high". However, knowledge of the effects of air pollutants on individuals is incomplete (Department of Health website).

Evidence shows that some people with diseases of the airways (such as Chronic Obstructive Pulmonary Disease and asthma) are more likely to be may be adversely affected by day-to-day changes in the levels of air pollutants. Air pollution should be regarded as one of a number of factors that may affect people with breathing disorders (Department of Health website).

The number of deaths and hospital admissions that occur each day varies and both seem to go up when air pollution levels are high, particularly for those with cardiovascular and lung disorders and especially amongst the elderly. It is not possible, at the moment, to say by how much the deaths of those affected are advanced but it may be a matter of weeks or months rather than years. These deaths seem to affect people who already have a serious pre-existing condition which has made them extremely susceptible to a variety of external factors of which high levels of air pollution may be one amongst many (Department of Health website).

The Effects of Long-Term Exposure to Air Pollution

Perhaps surprisingly, long term exposure to air pollution is unlikely to be a cause of the increased number of people now suffering from asthma in the UK.

Scientific evidence suggests that exposure to air pollution has a long-term effect on health, though the effects will vary depending on location (whether urban or rural, for example) and the type of pollutant to which a person is predominantly exposed. The full extent of this is hard to quantify but, if life-long exposure to fine particles was cut by half, life expectancy from birth could be increased, on average, by between 1 and 11 months (Department of Health website). The mechanism for this effect of long term exposure to particles is not understood but appears to mainly affect the number of deaths from heart disease.

A number of pollutants present in the air (benzene, 1,3-butadiene and some polycyclic aromatic hydrocarbons (PAHs)) are potentially carcinogenic. Available evidence strongly suggests that the risks associated with the levels found in the air in the UK are exceedingly small (Department of Health website).

A4g.1.3.6 Noise Pollution

The Environmental Noise Directive (END) 2002/49/EC, transposed into UK law in the Environmental Noise Regulations 2006, is concerned with noise from roads, rail, air traffic and industry. The directive requires that member states determine the exposure of the public to noise and its potential effects through the use of noise mapping. Using these maps, action plans are required to manage any noise issues and reduce them if necessary; the directive also requires the maintenance of good noise quality where it exists. Noise maps have now been produced for England, Scotland and Wales and are available online as interactive maps which may be browsed, or standalone files which may be downloaded. Map layers for major road, rail, air and industrial noise are available, with noise units usually in decibels (dB). Maps are available via the Defra, Scottish Noise Mapping and Welsh Assembly websites, and Defra has recently published a noise policy statement for England (2010).

Environmental noise is also linked with tranquillity. See section A4c.1.4.2 for details on this indicator.

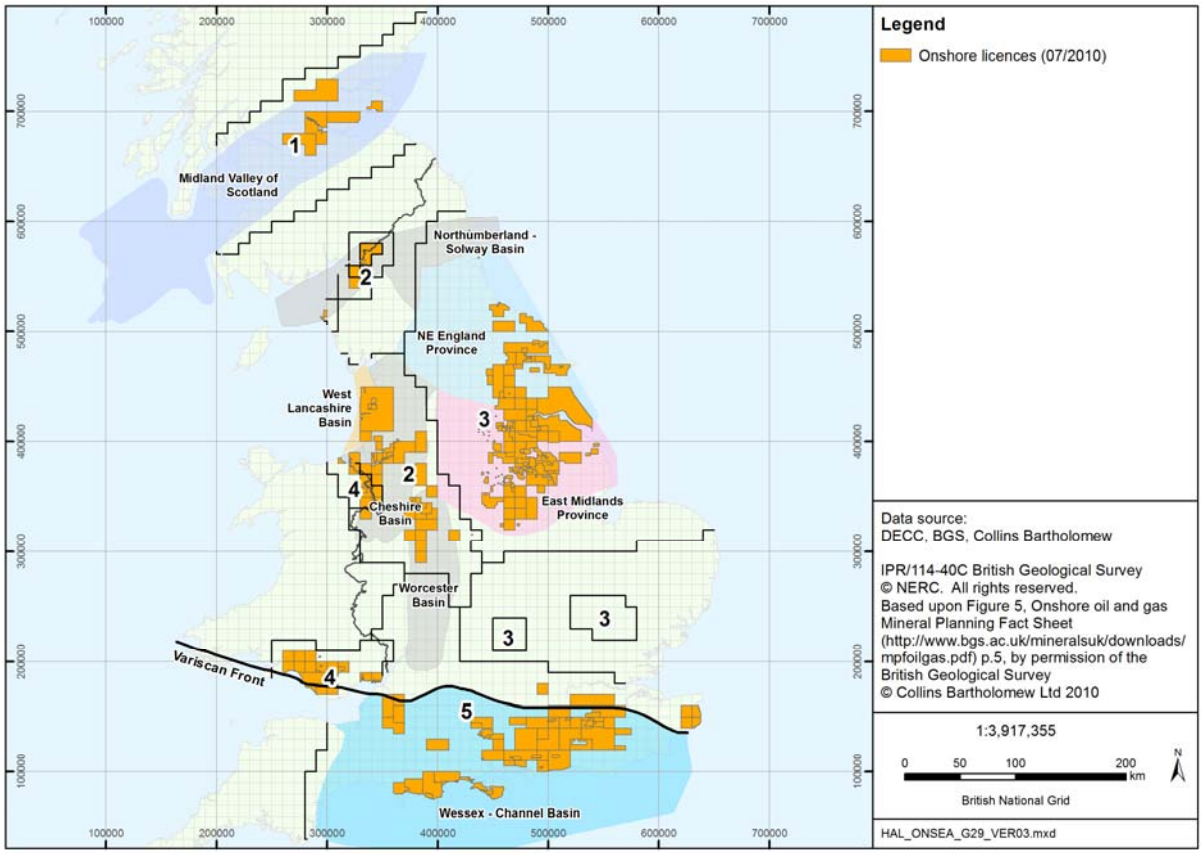
A4h.1 Material Assets

A4h.1.1 Summaries of Relevant Regions of England, Wales and Scotland

The East Midlands oil province comprises Carboniferous source and reservoir rocks deposited in a series of major fault-bounded basins. The Midland Valley of Scotland is also prospective, with Carboniferous source and reservoir rocks. The Wessex-Channel (including the Weald) Basin arises from the presence of both Triassic and Jurassic (Mesozoic) source and reservoir rocks. Other oil and gas fields in North West and North East England arise from the presence of older (Carboniferous-Silesian) source rocks and younger Permian and Mesozoic reservoir rocks. They include the West Lancashire Basin and North East England Province (including the Cleveland Basin). Although they have not so far yielded commercial quantities of hydrocarbons, the presence of Carboniferous and Permo-Triassic reservoirs lead to other potentially productive basins/provinces including the Cheshire Basin and Northumberland-Solway Basin.

A4h.1.1.1 Oil and Gas Prospectivity

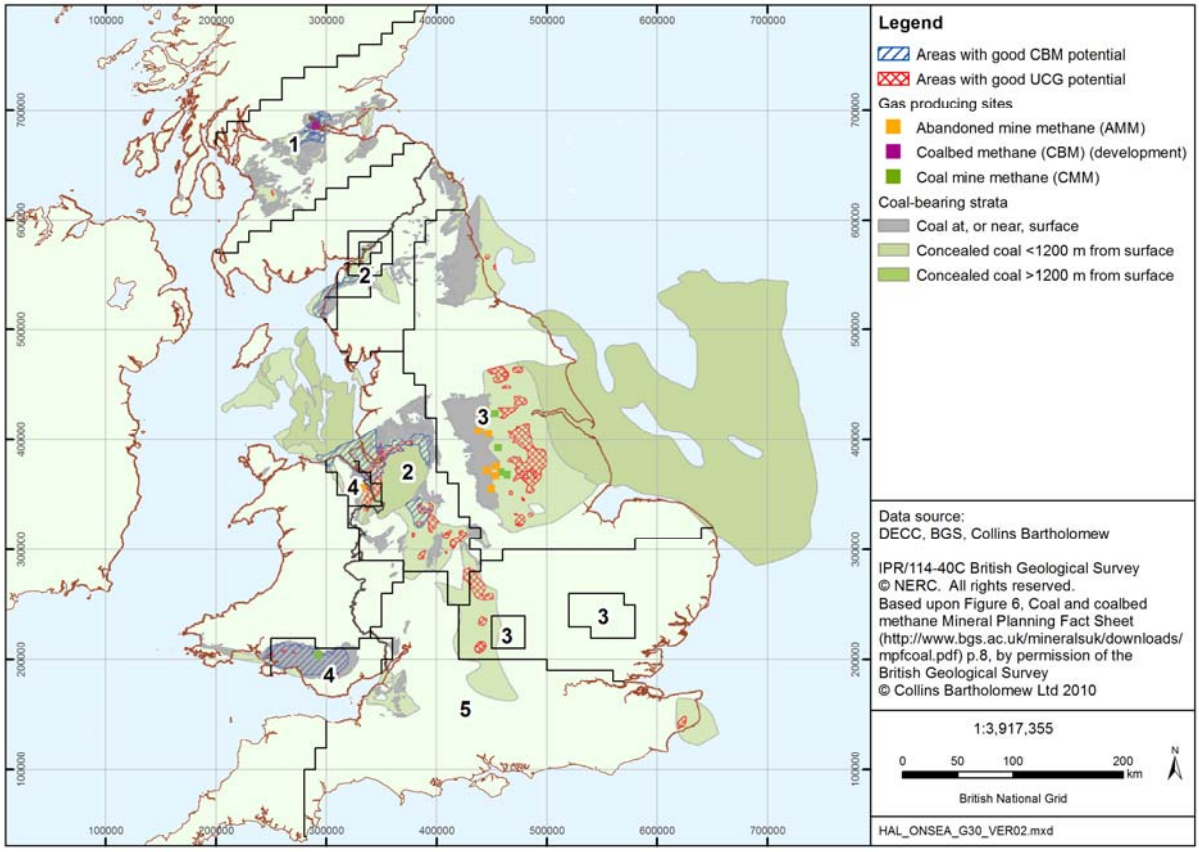
Figure A4h.1 – Oil and Gas Licensing and Prospectivity



Many of these provinces are not entirely onshore, with the Wessex and Weald basins extending offshore into the English Channel. Similarly, the West Lancashire Basin is the eastern, onshore margin of the more extensive East Irish Sea Basin, and the East Midlands

and Cleveland Basin link to the Southern North Sea Gas Basin (source as for Figure A4h.1 above).

Figure A4h.2 – Coal Resources



Almost all onshore coal resources in Britain occur in rocks of Carboniferous age (300-330 million years old). In England and Wales coal-bearing rocks are almost entirely confined to the Coal Measures Group of Upper Carboniferous age. However in parts of northern England and the Midland Valley of Scotland coals also occur in strata beneath the Coal Measures Group.

Coal-bearing strata occur at the surface in a number of discrete 'exposed coalfields' but also dip beneath younger rocks to form 'concealed coalfields' (see Figure A4h.2).

Significant coal resources amenable to surface extraction remain but the method is severely constrained by environmental and land-use planning considerations. Very large resources of Carboniferous coal remain at depths below 1,200m (the normal limit of conventional mining), particularly in the eastward extension of the East Pennine Coalfield, however much is lignite rather than bituminous coal.

Potential Virgin Coal Bed Methane (VCBM) resources include unworked coal seams thicker than 0.4m at depths between 200 and 1,200m. Low permeability and high drilling costs currently make deeper targets unattractive. In general, UK coals exhibit low permeability, which limits their potential for VCBM.

The potential underground coal gasification (UCG) resource includes coal seams >2m thick at depths between 600-1,200m. Areas with potential are extensive and occur in a number of

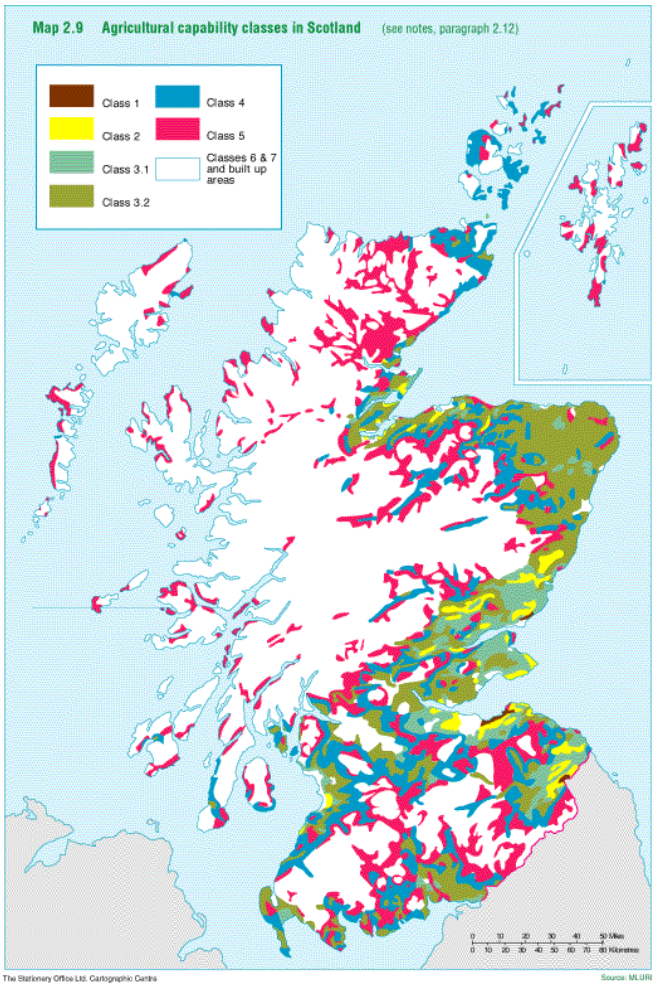
concealed coalfields. The largest areas are in Yorkshire, Lincolnshire and Warwickshire, with smaller areas in Central Scotland and South Wales. Potential also exists in the Firth of Forth, the Dee estuary and around the River Humber.

The UK has abundant shales at depth though their location is poorly understood. Should these rocks contain sufficient Total Organic Content (TOC) to contain methane, they pose a prospective source of natural gas. Shales typically have a low permeability, and therefore gas does not tend to migrate to a reservoir rock. The use of hydrofracturing techniques to release the gas from shales now makes shale gas extraction commercially viable.

A4h.1.2 Agricultural Land Classification in Scotland, England and Wales

In Scotland, the production capability of the land ranges from land capable of producing a very wide range of crops (Class 1) to that of very limited agricultural value (Class 7). Class 3 represents the separation between prime and non-prime agricultural land (Figure A4h.3). In England and Wales, the Agricultural Land Classification (ALC) developed by Defra aids the identification of different agricultural soil classes. There are 5 grades, 1 being the best land and 5 the poorest (Figure A4h.4).

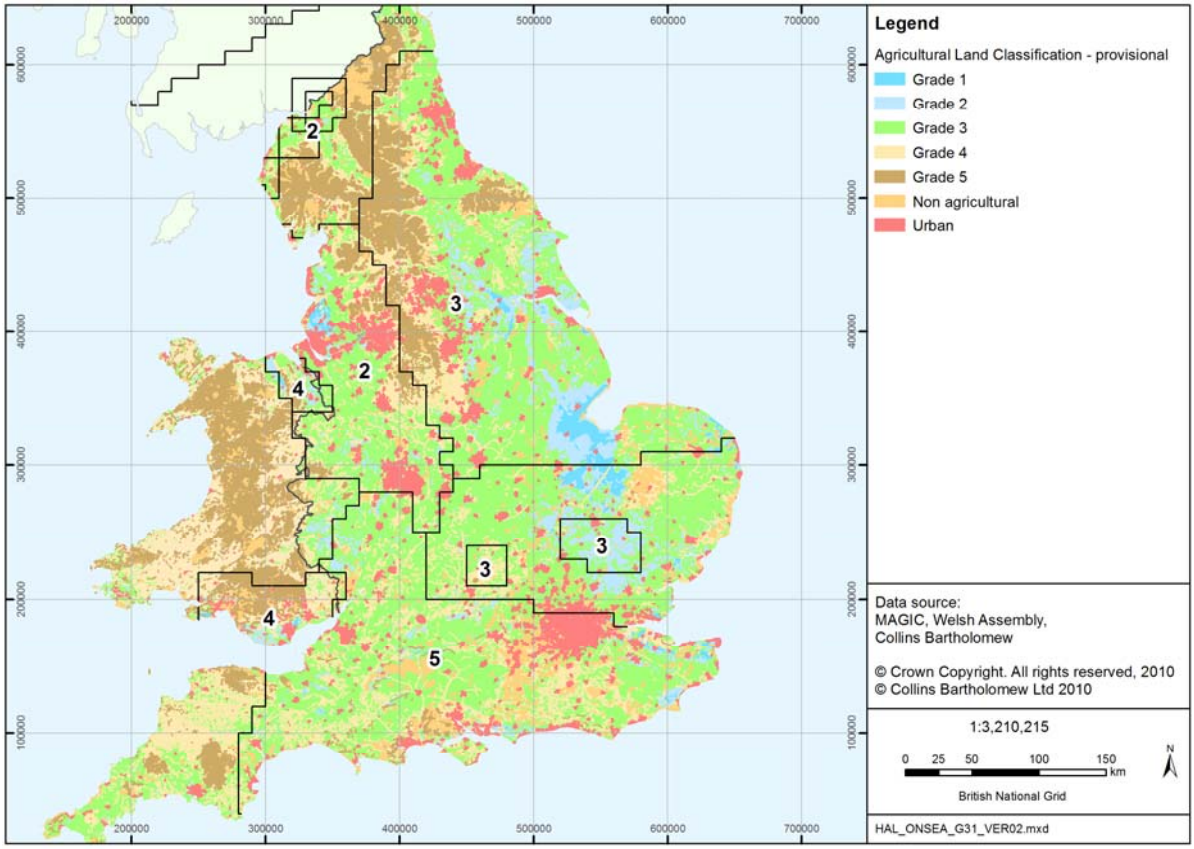
Figure A4h.3 – Agricultural Land Classification (Scotland)



Source: Scottish Office website – (http://www.scotland.gov.uk/library/stat-ses/sesm2-9.htm)

These areas are of national and strategic importance, being a non-renewable resource, and substantial weight is given to the protection of Best and Most Versatile (BMV) land (i.e. classes 1, 2 and 3a) in Planning Policy Statement (PPS) 7: Sustainable Development in Rural Areas (Formerly PPG note 7, ODPM 2004b) (Steadman *et al.* 2004). It is stated in PPS 7 (ODPM 2004b) that 'Where significant development of agricultural land is unavoidable, local planning authorities should seek to use areas of poorer quality land (grades 3b, 4 and 5) in preference to that of a higher quality, except where this would be inconsistent with other sustainability considerations'.

Figure A4h.4 – Agricultural Land Classification (England and Wales)



A4h.1.3 Material Assets Indicators

Table A4h.1 lists the relevant indicators for this section of the SEA which are detailed in the sections which follow. Information in this section is primarily from Defra (2009e) unless otherwise stated.

Table A4h.1 – Material Assets Indicators

#	Indicator	Region[1]
28	**Onshore crude oil production†**	UK
29	**Onshore gas production†**	UK
30	**Coal production†**	UK
31	**Fossil fuel dependency**	UK
32	**Energy supply**	UK

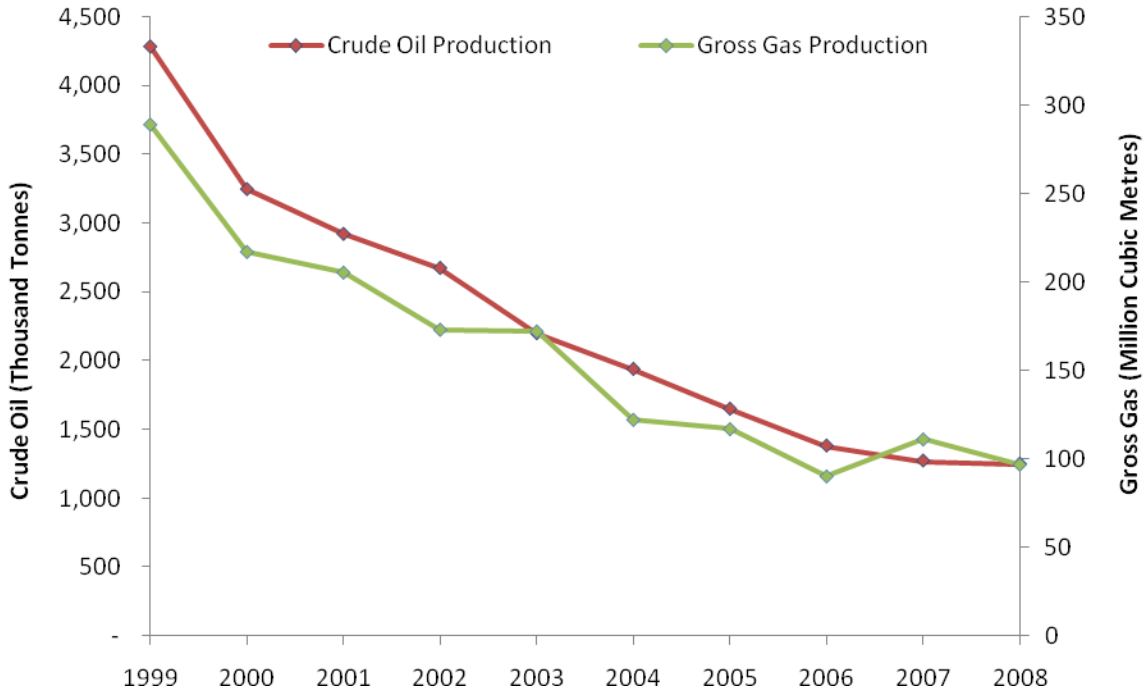
#	Indicator	Region[1]
33	**Land use**	
	Agricultural land use†	UK, S
	Land recycling†	UK

Note: †additional indicator not included in the UK government sustainable development strategy. [1]Indicates the spatial coverage of the data; E=England, W=Wales, S=Scotland, UK=Entire United Kingdom.

A4h.1.3.1 Onshore Crude Oil and Gross Gas Production

UK onshore crude oil production (Figure A4h.5) from the Hamble and Holybourne terminals (plus other onshore oil fields) has decreased steadily from ~5.2 million tonnes in 1998 to ~1.25 million tonnes in 2008.

Figure A4h.5 – UK Onshore Crude Oil and Gross Gas Production, 1998-2008



Source: DECC digest of UK Energy Statistics Webpages (Tables F.1 and F.2) (http://www.decc.gov.uk/en/content/cms/statistics/source/oil/), see also BERR (2008), DECC (2009b, c)

UK onshore gas production is dominated by Wytch Farm, which accounted for over 50% of the total gas production between 1994 and 2006. Total onshore gas gross production has fallen steadily from 289 million cubic metres in 1999 to 97 million cubic metres in 2008.

A4h.1.3.2 Coal Production

UK total coal production has fallen from 147.2 million tonnes in 1970 to 17.9 million tonnes in 2009 (Figure A4h.6) and there has been a decline in deep-mined production of around 94% since 1970. Opencast mine production was between 8.5 and 9 million tonnes in 2006 and 2007, the lowest value since 1970, though increased slightly to 9.9 million tonnes in 2009. Imports, initially of coal types in short supply in this country, started in 1970 and grew steadily to reach 20 million tonnes a year by the late 1990s. The very rapid expansion of imports in 2001 meant that imports exceeded the level of UK production for the first time. In

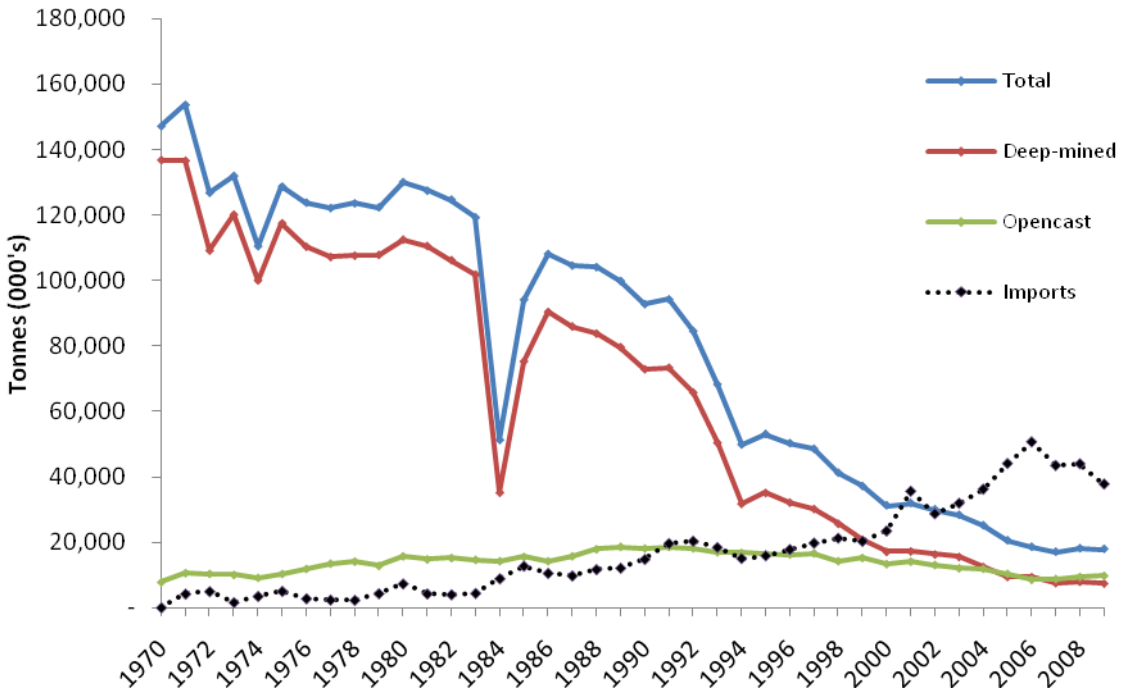
2006 imports were at a new record of 50.5 million tonnes, accounting for about 73% of coal supplied. This figure fell to 43.4 million tonnes (72%) at the end of 2007 and fell a further 12.9% of 2008 figures to 38.2 million tonnes in 2009 (DECC 2008, 2009c), still a figure much higher than at any time prior to 2005, ~70% of which was used as steam coal in power stations.

A number of mines have closed since 2003 (Selby Complex, Ellington, Rossington and Tower), though Hatfield restarted commercial production in 2007, two further mines are due to start production in 2009, and the previously mothballed Harworth is under appraisal (DECC 2008).

The UK is estimated to have (as at 31st March 2007) 243 million tonnes of economically recoverable coal in the 'reserves' category (i.e. proved and probably mineable coal), of which 170 million tonnes is at continuing deep mines and 73 million tonnes is at existing surface mines. The UK is estimated to have further coal resources amounting to (DECC 2008):

- 80 million tonnes in potential surface mines
- 183 million tonnes in previously proven reserves in mines closed within the last 15 years
- 474 million tonnes of shallow coal for possible surface working
- 1,295 million tonnes of deep coal mine prospects

Figure A4h.6 – UK Coal Production and Imports, 1970-2009

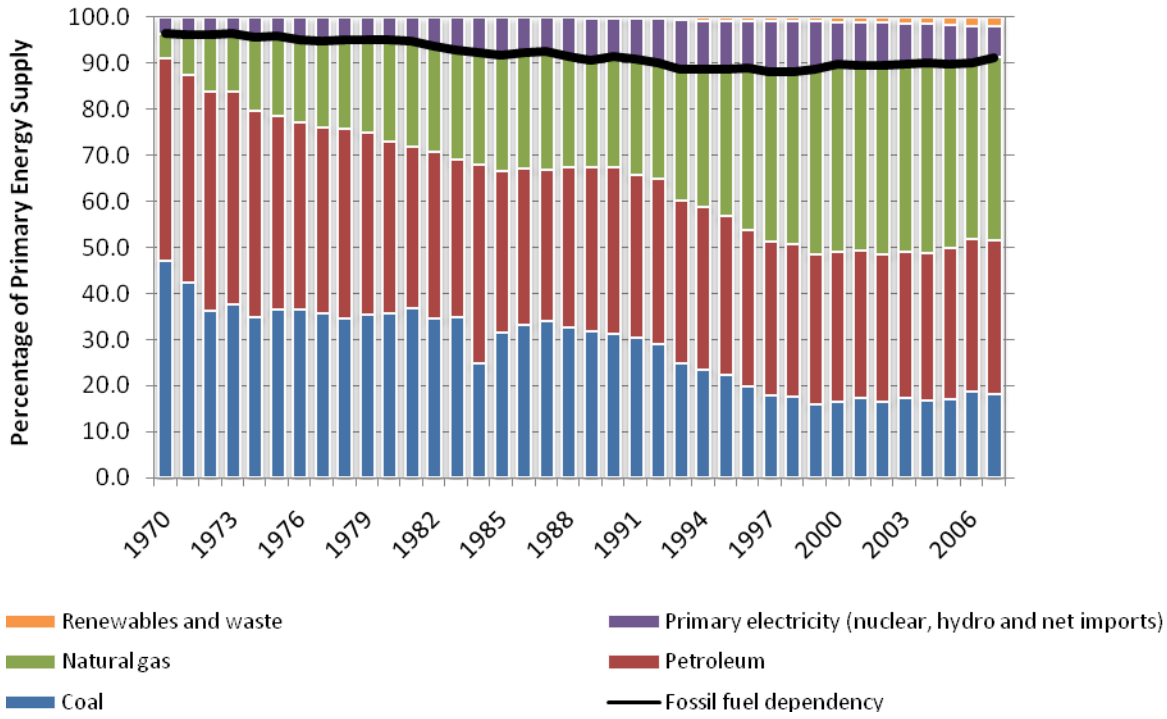


Note: The low level of production in 1984 is because of the miners' strike. The 1993 import figure includes an additional estimate for unrecorded trade. 2008 is 4 days longer than the standard 52 week statistical reporting period (SRP) for January to December 2008. This is to enable a smooth transition to publishing data on a calendar month basis from January 2009 rather than 4 and 5 week SRPs used for previous years.
Source: DECC digest of UK Energy Statistics Webpages (http://www.decc.gov.uk/en/content/cms/statistics/source/coal/), see also BERR (2008), DECC (2009b, c)

A4h.1.3.3 Fossil Fuel Dependency

The mix of primary fuels consumed for energy purposes in the UK has become increasingly diverse since 1970, when it was heavily dominated by coal and petroleum. In the 1990s coal consumption rapidly fell (~40% 1992-1995 and 25% 1996-1999 compared with 1970 figures) as the amount of natural gas consumed increased (Figure A4h.7). Fossil fuel dependency can be measured as the proportion of primary energy supply met by coal, oil or gas. The overall trend has been that fossil fuel dependency has been falling gradually since 1970, though has risen slightly since 1997 due to a decrease in nuclear electricity generation (DECC 2008).

Figure A4h.7 – Shares of Fossil Fuels Contributing to UK Energy Supply: Fossil Fuel Dependency, 1970-2007



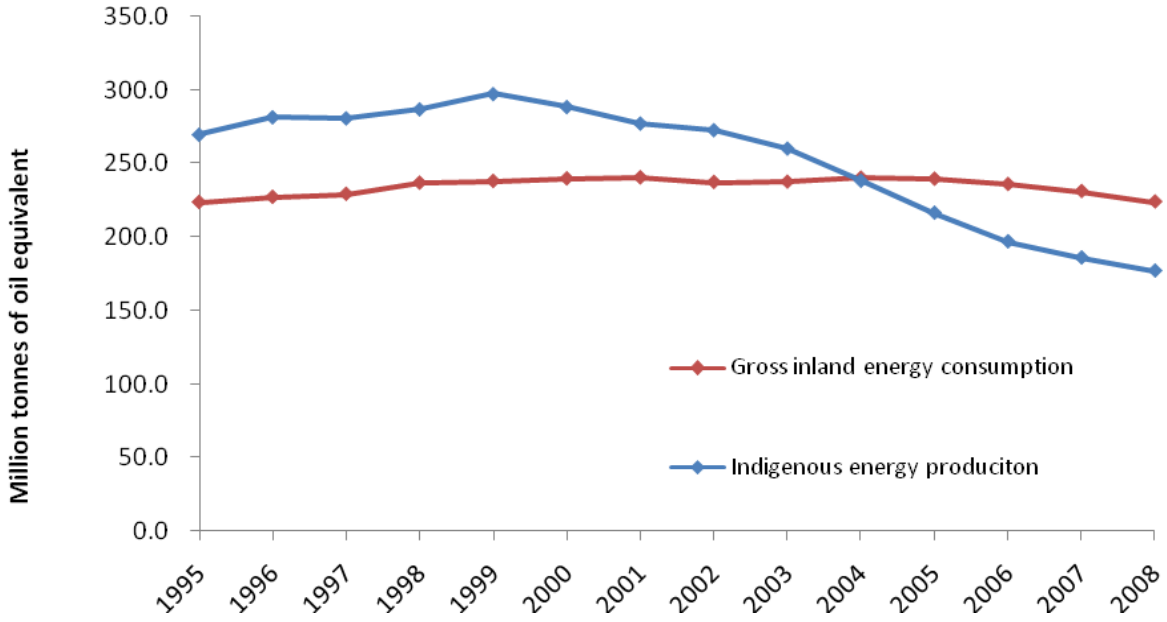
Source: DECC digest of UK Energy Statistics Webpages (http://www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx), see also BERR (2008)

A4h.1.3.4 Energy Supply

The UK's indigenous energy production broadly met or exceeded gross inland energy consumption during the 1990s (Figure A4h.8). Since 1999 indigenous energy production has fallen from being 22% above consumption to 19% less than consumption in 2006, with the UK a net importer of energy.

In the early 1970s energy imports accounted for over 50% of United Kingdom consumption, but by 1983 the UK was a net exporter at a level equivalent to 18% of inland consumption. After 1986 net exports declined. Following temporary production losses in the North Sea, the UK became a small net importer of energy between 1989 and 1992. Between 1993 and 2003 the UK became a net exporter again with a new peak of 21% in 1999. However, in 2004 the UK became a net importer at a level of 4.9% of inland consumption.

Figure A4h.8 – UK Indigenous Energy Production and Gross Inland Energy Consumption, 1990-2008

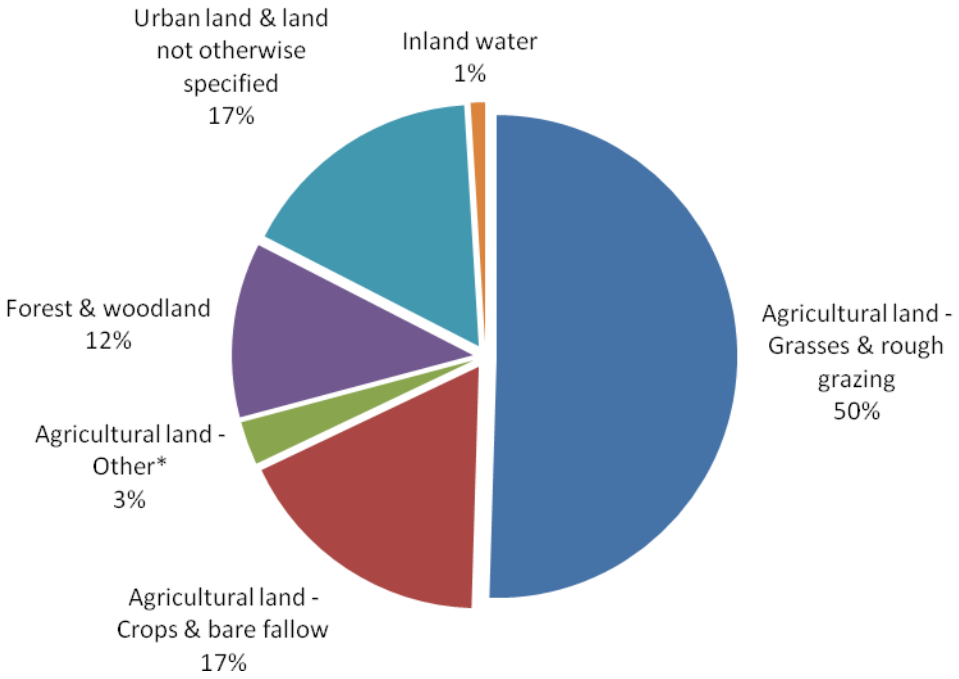


Source: DECC digest of UK Energy Statistics Webpages (http://www.decc.gov.uk/en/content/cms/statistics/publications/dukes/dukes.aspx), see also BERR (2008)
Note: Coal, petroleum and natural gas are seasonally adjusted and temperature corrected.

A4h.1.3.5 Land Use

In 2006, 52% of land in the UK was either grass or rough grazing land, and 18% of land was covered by crops or left bare fallow (Figure A4h.9). Other forms of agriculture accounted for 3% of UK land. 12% of UK land area was forest and woodland whilst 14% of land area was urban land or 'land not otherwise specified'. Inland water covered 1% of UK land area.

Figure A4h.9 – Area Covered by Agriculture, Woodland, Water and Urban Land in the UK in 2006



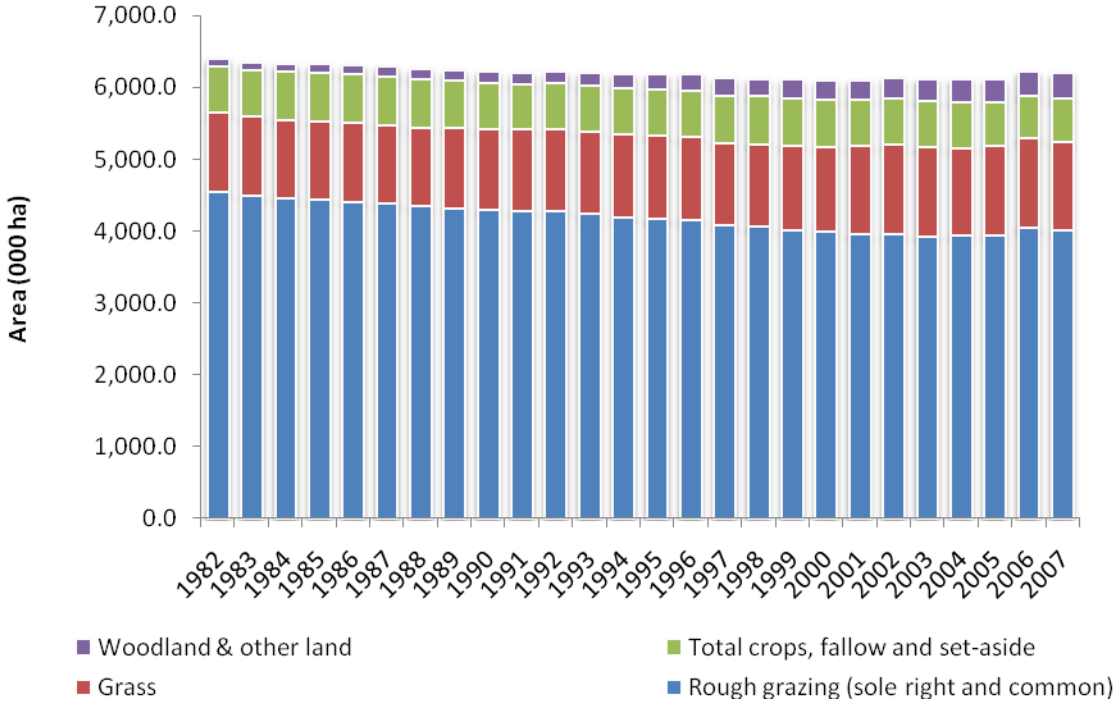
Source: Sustainable Development in Government webpages (http://www.defra.gov.uk/sustainable/government/)
*Note: *includes set aside and other land on agricultural holdings. Excludes woodland.*

A4h.1.3.6 Agricultural Land Use (Scotland)

Agricultural land use has a strong influence on the landscape and environment of Scotland. In particular, changes in agricultural land use have an impact on wildlife habitats, water pollution, and emissions of the greenhouse gas carbon dioxide.

Between 1982 and 2000, the total land used for agriculture in Scotland decreased by 5% to 6.08Mha, followed by a slight rise to 6.2Mha in 2007 (Figure A4h.10). The area of rough grazing decreased by 0.63mha (14%) between 1982 and 2003, rising slightly by 2007. In 2007, the area of woodland and other land was more than three times greater than in 1982.

Figure A4h.10 – Breakdown of Agricultural Land Use in Scotland, 1982-2007



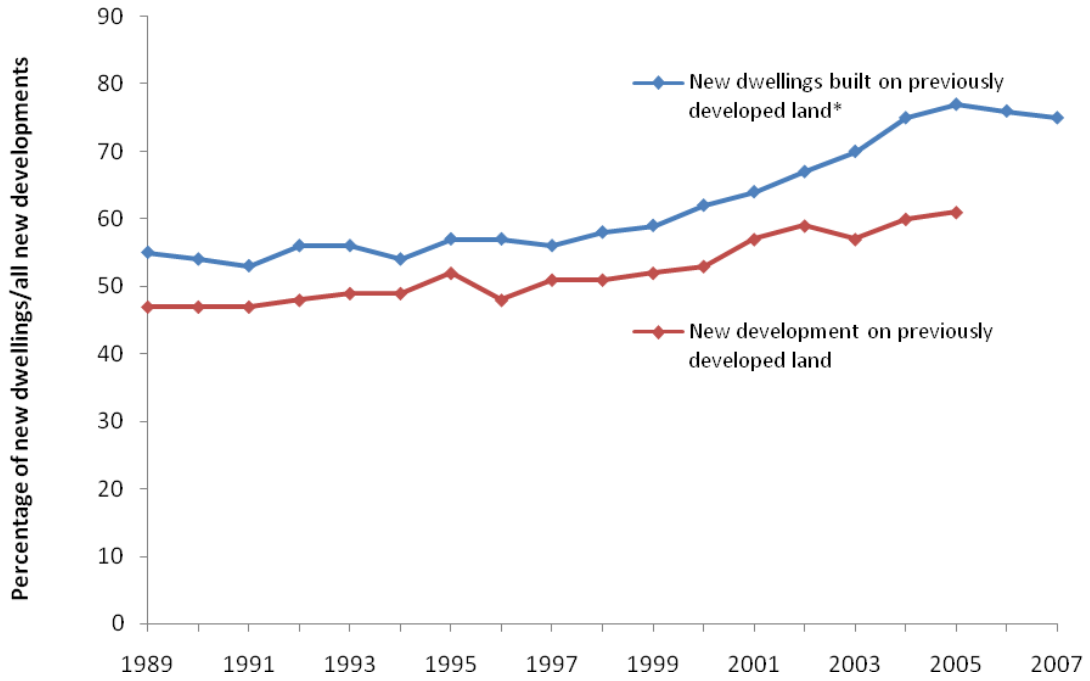
Note: Woodland excludes woodland managed by the Forestry Commission. Other Land includes roads, yards and buildings.
Source: Scottish Environment Statistics Online Webpages (http://www.scotland.gov.uk/Topics/Statistics/Browse/Environment/seso), see also: Scottish Executive (2008a)

A4h.1.3.7 Land Recycling

The percentage of new dwellings arising from building on previously developed land or through the conversion of existing buildings increased from 54% in 1990 to 75% in 2007 (provisional estimate) (Figure A4h.11).

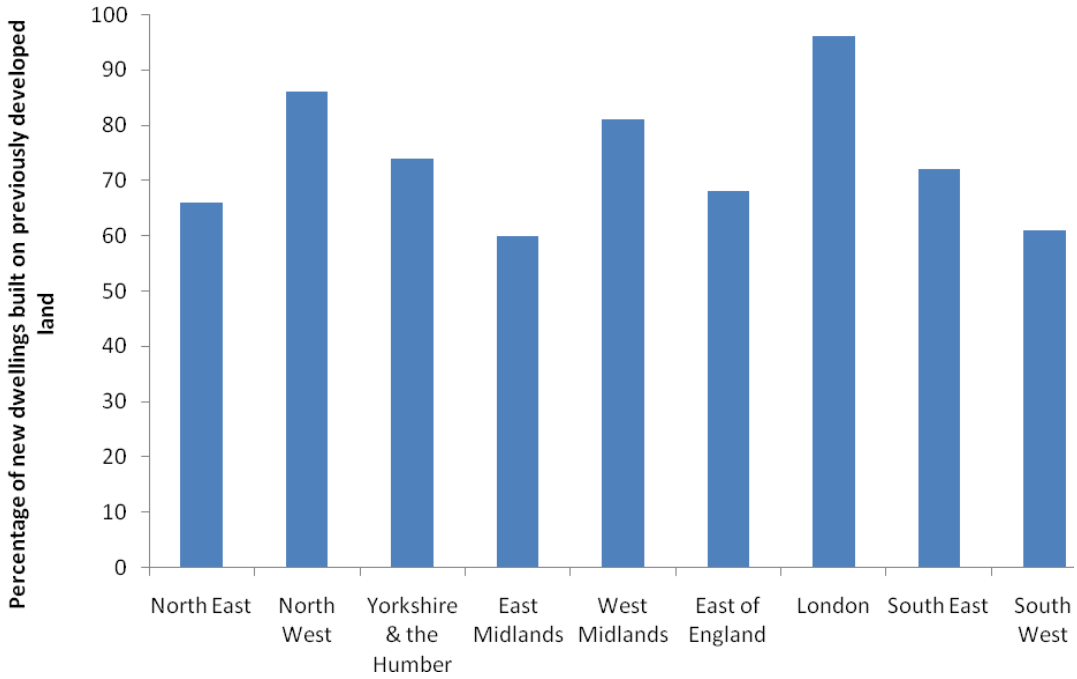
The percentage of all new development (not just residential) occurring on previously developed land (measured by land area) also increased: from 47% in 1990 to 61% in 2005 (Figure A4h.12).

Figure A4h.11 – New Developments on Previously Developed Land in England, 1990-2007



Source: Source: Sustainable Development in Government webpages (http://www.defra.gov.uk/sustainable/government/), see also: DCLG (2009)
*Note: * Includes conversions. Until 2002, the conversion of existing buildings was estimated to add three percentage points, while since 2003 the process of estimation has been elaborated.*

Figure A4h.12 – New Dwellings on Previously Developed Land by Region



Source: Source: Sustainable Development in Government webpages (http://www.defra.gov.uk/sustainable/government/), see also: DCLG (2009)

A4i.1 Cultural Heritage

A4i.1.1 Introduction

The cultural heritage of England, Wales and Scotland, which includes archaeological and architectural heritage, principally spans the time covering Holocene period (*ca.* 10,000 BP to present) and the cultural periods therein (e.g. Mesolithic, Neolithic, Roman, Iron Age). In reality, the archaeological heritage of Britain extends back certainly as far as 500,000 years BP (e.g. research by Roberts and Parfitt (1999) found ovate hand axes at Boxgrove dating to *c.* 500kya), and perhaps as far as 700,000 years BP based on current knowledge (Parfitt *et al.* 2005), termed the Palaeolithic period. The following section outlines how these heritage features are protected through statutory and non-statutory designations and provides regional summaries of each SEA area.

A4i.1.2 Regulatory Context

A4i.1.2.1 Statutory Designations

”Scheduling” is the main process through which nationally important sites and monuments are given legal protection by being placed on a list, or ”schedule”. Scheduled monuments are protected by the Ancient Monuments and Archaeological Areas Act 1979, and scheduling is the only legal protection specifically for archaeological sites. The current scheduling legislation affords protection for deliberately created structures (e.g. buildings), features and remains.

In addition to scheduling, the “listing” of certain buildings (which include structures such as walls and bridges) is also used to protect the integrity of structures either from a certain historic period or which are considered to fulfil the criteria required for protection. There are three grades of listing which are:

- Grade I buildings are of exceptional interest, sometimes considered to be internationally important. 2.5% of listed buildings are Grade I.
- Grade II* buildings are particularly important buildings of more than special interest. 5.5% of listed buildings are Grade II*.
- Grade II buildings are nationally important and of special interest. 92% of all listed buildings are in this class and it is the most likely grade of listing for a home owner.

All pre-1700 buildings which have been maintained in a condition not significantly different from the original structure are automatically listed, as are those up to 1840. Thereafter criteria for listing becomes tighter so that only those building of exceptional value built in the post-war period can be listed, and these would still usually be in excess of 30 years old (English Heritage website).

The condition of listed buildings in the UK is discussed with reference to the Cultural Heritage indicators in section A4i.1.5.

A4i.1.2.2 Non-Statutory Designations

Non-statutory designations which have the potential to be impacted by developments include gardens and designed landscapes, and World Heritage Sites, discussed further in section A4i.1.4.2. These areas may be designated due to their cultural and archaeological features and are mentioned within relevant planning policy statements and guidelines (see below). Though these are not statutorily protected through their designation, they are a material consideration in planning and would have to be taken into account in planning applications (see: Planning Policy Guidance Note 15: Planning and the Historic Environment – due to be renewed in 2009, see below – and Welsh Office Circular 61/96).

A4i.1.2.3 Historic Environment Records

In England, Wales and Scotland, recorded heritage assets are more numerous than that indicated on the maps of scheduled ancient monuments (Figure A4i.1 and Figure A4i.2) below. Those sites which are not designated are held on the Historic Environment Records (or Sites and Monuments Records), which are maintained in each UK country by the relevant authority. In Wales, this is the Welsh Archaeological Trusts, in England it is each of the County Councils, District Councils or Unitary Authorities. In Scotland, these records are also maintained regionally.

A4i.1.2.4 Heritage Protection Reform

England and Wales

In 2007, the white paper, "Heritage Protection for the 21st Century", and associated consultation responses provided the impetus for the draft Heritage Protection Bill. Due to be implemented in the parliamentary programme of 2009, the Bill has at present been dropped, though English Heritage and DCMS remain committed to legislative reform in this area (English Heritage website). The aims of the Bill were to reform the designation and consent procedure for terrestrial heritage assets in England and Wales. Though a number of elements of heritage reform in England can be taken forward without this new primary legislation (e.g. Planning Policy Statement 5, the World Heritage Site Planning Circular 07/2009), a number of reforms cannot (English Heritage Website):

- The full transfer of responsibility for designation from the Department for Culture, Media and Sport (DCMS) to English Heritage
- To bring together in one simple list, the separate regimes for listing, scheduling, registration of parks, gardens, battlefields and protected wreck sites
- To introduce interim legal protection for heritage assets being considered for designation
- To give better protection for sites of early human activity which cannot currently be scheduled
- For owners to have a formal right to appeal against a designation decision.
- The unification of Listed Building and Scheduled Monument Consent into a single Historic Asset Consent
- Local authorities to grant Historic Asset Consent including archaeological cases currently handled by the DCMS
- For the pre-determination of Historic Asset Consent via Heritage Partnership Agreements
- To give Historic Environment Records statutory force
- For the merger of Conservation Area Consent with Planning Permission

In addition, the consideration of heritage features including archaeological heritage is indicated in Minerals Policy Statement (MPS) 2: *Controlling and Mitigating the Environmental Effects of Minerals Extraction in England,* under the aims of Mineral Planning Authorities (MPAs).

Cadw and the Welsh Assembly Government began a consultation in July 2009 which outlines their main conservation principles, policies and guidance in relation to the historic environment (Cadw 2009b), largely based around the English Heritage (2008a) document released in 2008 after extensive consultation. The documents outline a number of principles which Cadw (or English Heritage) intend to apply to sites in their care, and in cases where applications come before them for consideration. The long-term priorities for this area in England are outlined in the Government's Statement on the Historic Environment. This document sets out a number of strategic aims which broadly look to ensure that relevant policy and guidance is in place to protect England's heritage, to encourage skills in this sector so that there is capacity to execute suitable alterations to heritage assets, to promote public use the local historic environment, provide standards of care for those assets in private ownership and promote the role of heritage of in UK Government's response to climate change.

Scotland

Under the recent reform of heritage protection, the Scottish Government released a policy document in 2008 which consolidates the Scottish Heritage Protection Policy (SHEP) series of reports. The new SHEP document covers both statutory and non-statutory designations, and includes a number of annexes providing criteria and guidance on scheduling, listing and conservation areas, as well as information on listed building consent and associated planning permission process. In coordination with the SHEP document, Scottish Planning Policy (SPP) 23: *Planning and the Historic Environment* (2008) consolidated earlier national planning guidelines for this area, and has now itself been superseded by Scottish Planning Policy (2010).

A4i.1.3 Summaries of Heritage Features of each SEA Area

The summaries of cultural heritage presented below are taken from a variety of different sources including Scottish Natural Heritage landscape character assessment reports for relevant areas of Scotland, relevant historic and cultural information provided for the English Government Office Regions as part of the England Rural Development Programme 2000-2006 and for Wales, relevant descriptions from the Register of Welsh Historic Landscapes, shown in Figure A4i.4, above.

Table A4i.1 – Cultural Heritage Summaries of each SEA area

Description
SEA Area 1: Scottish Midlands
The Scottish Midlands region contains a wealth of cultural heritage dating back to prehistoric times. Prehistoric features including cairns, standing stones and inscribed stones are found throughout the region generally in less cultivated areas. Fortified settlements dating from Iron Age times may be prominent features in upland areas such as the Scottish Borders where they are generally sited on hill promontories commanding wide views over the river valleys. South Lanarkshire has a particularly fine concentration of Iron Age sites including settlements and defensive structures. The legacy of Roman occupation is visible primarily in the form of the Antonine Wall and its associated forts which stretch across the region.

Description
The remains of earthwork castles of Norman origin are numerous and occasionally prominent features of lowland areas. Unlike the prehistoric forts, many of these were located in lowland situations amongst productive farmland and with ready access to watercourses, roads and associated settlements. Lowland areas support a wealth of designed landscapes which are predominantly a legacy of the period of agricultural improvement and the growth of estates in the 18th and 19th centuries, reflecting both the commercial and agricultural prosperity of much of the area, and favourable soils and climate. The extensive and varied industrial activities of the 18th and 19th centuries have left a legacy of industrial landscapes, buildings and engineering structures which have a significant influence on the character of the landscape, particularly in the Lothians, Fife, Ayrshire, Lanarkshire and around Glasgow. Exploitation of the rich resources of coal and oil-shale led to increased demand for housing and a rapidly spreading network of railways, roads and canals. Although the Forth and Clyde and Union canals are no longer used for industrial transport, they have become important water features within an increasingly urbanised area, both for recreation and as wildlife habitats. Recreation has also saved many of the disused railway lines from disuse, as a number are long-distance footpaths and cycle paths, and the embankments and bridges associated with the railways are distinctive and often attractive features.

Area	Description
	SEA Area 2: West Midlands, North West England and Southern Scotland
North West	Human activity has shaped the rural landscape and has overlaid the basic landform with farms, villages, towns and has created the agricultural landscape. Evidence of the chronological depth of this process is provided by the few surviving henges, such as Mayburgh in Cumbria dating from up to 5,000 years ago, the stone circles such as Castle Rigg, and funerary monuments from 4,500 to 3,500 years ago, and the hill forts and unenclosed settlements of the first millennium BC. The Roman period is marked firstly by the military presence of the late 1st Century AD and, subsequently, by increasing 'Romanisation' of the local population which is particularly marked in the richer agricultural areas of Cheshire, but less so in the uplands of the north. The area contains many exceptionally fine monuments of medieval secular and religious authority, such as Beeston Castle in Cheshire and it is from this period that the origins of the many present day characteristics of the rural landscapes can first be clearly traced: the historic market towns and villages; the patterns of agricultural land usage; and the establishment of major estates together with their historic houses, associated parklands and gardens. The importance of the Industrial Revolution to the historic character of the North West cannot be overstated. The textile industry of Lancashire and Greater Manchester created the mill towns and a transport infrastructure, much of which survives today. Extractive industries such as lead (in the North Pennines and Northern Lakes), iron (the Furness Peninsula in particular) and coal (on the west coast of Cumbria) have all left their mark. There is need for improved conservation and management of archaeologically rich landscapes in marginal areas such as the lower southern fells of the Lake District, the limestones of East Cumbria, the Pennine fringes of Lancashire and Greater Manchester and, in particular, the wetland areas of the region, both coastal and inland.
West Midlands	The western area known as "the Marches" runs down the border between England and Wales, an upland zone subject to raiding and warfare until well after the final conquest of Wales in the later 13th Century. Testaments to this violent past are the large numbers of prehistoric hill forts, the Anglo-Saxon Offa's Dyke and medieval earth and stone castles. East of this are several discrete blocks of countryside. Some of these, such as the Arden and Felden districts of Warwickshire or the north Shropshire Plain, are extensive. Others, like Herefordshire's Golden Valley or Staffordshire's Weaver Hills, are smaller, yet equally distinct. In each, their archaeological sites and vernacular buildings help give character

	Description
	and identity. Much of the region is connected by the River Severn, and this, together with the ready availability of minerals and fuel, is among the factors which made possible the early development of large scale, innovative industry. This was especially so in the Ironbridge Gorge, the designation of which as a Word Heritage Site is recognition of its role as "The Birthplace of Industry". Also within the West Midlands are two other major industrial areas, the Potteries and the Black Country, as well as many lesser ones, such as the north Herefordshire ironworks and the Clee Hills mining and quarrying area of south-east Shropshire.
SEA Area 3: East Midlands and Eastern England	
North East	North East characterised by sparsely populated uplands and dense river valley and coastal populations, the latter concentrated since the Industrial Revolution in the large conurbations of Teesside, Tyneside and Wearside. Other towns had important historic roles in defence, trade, or as political centres. Durham was recognised as the site of St Cuthbert's burial since the Dark Ages and the headquarters of the Prince-bishops thereafter. Berwick upon Tweed has commanded the mouth of the River Tweed since the medieval period, while the crossing of the River Tyne between Gateshead and Newcastle has been defended since Roman times and Hadrian's Wall is a Roman frontier system of international significance. The building type with the highest representation in the North East well above the national average is defence. Many of these are dwellings originally built as defensive fortifications such as pele towers and bastles. This reflects the disturbed borderland history of the North East in relation to the Scots. They are often in isolated positions and represent the earliest surviving vernacular architecture in the region and many are at risk from neglect and decay. Relatively large number of industrial buildings, reflecting the primary and secondary manufacturing heritage of the region, now in many instances abandoned, with the associated buildings left without any beneficial use. Examples include the remains of the lead industry in the North Pennines, where there are many recently scheduled monuments in urgent need of conservation. These are significant as it has shaped the lives of the people of the North Pennines and given rise to the typical landscape of areas such as upper Weardale and Rookhope.
Yorkshire and the Humber	The region contains a rich heritage of historic buildings, ancient monuments boundary features and settlement patterns, reflecting the region's varied economic and social history. The greatest densities of known sites and monuments are in the North York Moors, parts of the Pennines, the Vale of York and Yorkshire Wolds. Many boundaries of the region are of historic importance and range from a few ancient banks and ditches (e.g. Roman ridges in South Yorkshire) to complex field systems and dykes (e.g. dyke field systems in East Yorkshire, stretching over many miles). Ancient parish boundaries dating from the medieval period to the 19th century make up the most prominent feature of large areas of the landscape. There are also nationally and internationally significant areas of surviving medieval open field strip cultivation on the Isle of Axholme, within the Humberhead levels. These constitute the most extensive and varied of the handful of surviving field systems in Britain. The majority of prehistoric, Roman and medieval sites surviving as earthworks are designated as SAMs or are registered by English Heritage as parks and gardens, whilst related buildings are often listed. The vast majority of archaeological sites, of all periods, beneath farmland or present -day settlements are not protected by designations.
East Midlands	Historic and archaeological sites range from Stone Age burial sites, to field lynchets, medieval ridge and furrow and deserted villages, lime kilns, lead mines and rakes etc. Intensification of agriculture and development is putting many of these sites at risk.

	Description
	Many of the Region's natural assets contribute to recreation and access resources, whether by green corridors along river valleys through cities: country parks, such as Clumber, Bradgate and Barnwell: woodland areas: such as Sherwood Forest: or the Lincolnshire Coast. Long distance footpaths, cycleway (Viking Way, Sustrans National Cycle Network, North Peak Trail, etc.) and bridleways cross the Region. The Region's historic sites are subjected to high recreational use and also form part of the cultural assets, such as the historic parks of Clumber, Rufford, Chatsworth and Althorp. There are also important archaeological remains such as Creswell Crags, battlefields such as Bosworth Fields, castles including Tattershall and Fotheringay, mansions such as Chatsworth and smaller historic buildings spread across the Region.
East of England	The region is particularly rich in vernacular buildings and archaeological remains. The combination of good soils, favourable climate and adequate supplies of water made it a favoured area for settlement from the end of the last ice age around 10,000 years ago. Protection of the unique pre-historic remains of the fens and in the Brecklands is a priority for the region. The quality of historic remains, preserved due to waterlogging, is of international importance. The remains of medieval settlements, prehistoric and later burial mounds need protection. Earthwork sites of these types are rare in the region. They are, in part, protected by grassland but often suffer from a lack of grazing management. Also of note in the region are complexes of crop mark remains visible in aerial photographs. Medieval moated sites are a particular feature of the historic landscape of Norfolk, Suffolk and Essex. Greens and Commons are important grassland features on the claylands of Norfolk, Suffolk and Essex. There are many high quality historic parks and gardens across the region. There is also a rich heritage of top fruit orchards in the region which are now in decline.
	SEA Area 4: North and South Wales
North Wales	The cultural heritage in North Wales evidences an extensive occupation, extending from Palaeolithic finds at Cae Gwyn and Ffynnon Beuno caves, to medieval settlements and field systems, Iron Age fortifications as well as the remains of the lead and slate mining industries and notable transport routes such as the Llangollen branch of the Shropshire Union Canal. The generally flat, fertile lowland area forming the western fringes of the North Shropshire and South Cheshire plain contains a range of medieval settlements which comprise small towns, villages, hamlets and moated sites, most of which are surrounded by medieval open field systems with characteristic ridge-and-furrow cultivation patterns. The Dee valley, in particular the Vale of Llangollen supports fortified sites of the prehistoric and medieval periods, the remains of later mineral extraction and industrial sites including significant communications and transport systems. The upland limestone plateau of Holywell Common and Halkyn Mountain bears distinctive evidence of lead mining remains, associated features and settlements from the 18th and 19th centuries, and possibly earlier.
South Wales	South Wales contains a diverse evidence of settlement, defence and industry from the prehistoric period to the recent past. Bronze Age ritual and funerary monuments; large Iron Age hillforts, settlements, enclosures and trackways are found throughout the region as is extensive evidence of Roman occupation including Roman roads, forts and associated features. The Gwent Levels is an extensive area of alluvial wetlands and intertidal mudflats situated on the north side of the Severn Estuary, representing the largest and most significant example of a "hand-crafted" landscape in Wales. They have been recurrently inundated and reclaimed from the sea from the Roman period onwards and have a proven and possibly quite vast potential for extensive, well-preserved, buried, waterlogged, archaeological and palaeoenvironmental deposits surviving from earlier landscapes. Similarly, extensive areas of littoral, windblown sand dunes situated on the west

	Description
	Glamorgan coast contain buried remains of immense archaeological and historic potential from the prehistoric, Roman and medieval periods. The South Wales valleys contain extensive remains of early mineral workings and processing followed by the later commercial production of coal, iron and steel in the 18th and 19th centuries. Areas such as Blaenavon, Merthyr Tydfil and the Rhondda valleys contain opencasts, mines, quarries, spoil tips, transport systems, preserved colliery and ironworks; and related settlements.
SEA Area 5: Southern and South West England	
South East	Historic features cover a wide range of sites from archaeological remains to orchard and parkland landscapes. The South East region has a rich archaeological and built heritage. As the closest region to Europe it has been a gateway to the rest of the country for millennia and has a range and diversity of archaeological and historical sites to match. In the last millennium, its settlement and transport patterns have been influenced by both its geographical position and its proximity to London, and by the need to defend the country's coastline, as well as by geology and climate. Important elements of the historic landscape survive but are under threat, such as the great number of parks and gardens, often associated with important historic houses, and the orchards of Kent. The wealth of archaeological sites on the gravel terraces of the Thames catchment area largely now only survive as buried remains under ploughed soil; the remaining earthwork monuments and surviving areas of historic landscape are a priority for preservation. The light, well-drained soils of the South and North Downs and the Cotswolds were similarly attractive for settlement from earliest times but are now extensively ploughed, with both the retention of surviving grassland and reversion to grassland being priorities in terms of the historic environment. Other areas are also under threat from the expansion of arable farming, such as the Romney Marshes.
South West	There is good survival of medieval and later material within the region, but also excellent preservation of internationally important prehistoric landscapes in the uplands of, for example, Dartmoor, West Penwith, and the Cotswolds. Prehistoric patterns of land use determined the present pattern of land use in certain areas. Much of the area displays Roman influence in the landscape particularly in the location of towns and the roads that connect them. Large stretches of the region are medieval and Anglo-Saxon in origin. Medieval landscapes include abandoned strip linchet systems at Mere, Glastonbury and Worth Matravers, preserved open fields at Forrabury Strips and Braunton Great Field, former open fields now defined by strip fields, associated networks of contemporary footpaths green lanes and roads and associated rural settlement pattern often with deserted medieval settlements. Many examples of archaeological features, including hut circles, courtyard villages, quoits, standing stones, iron age hill forts, tumuli, long barrows and field systems are found within the South West. In addition, the region contains farming and industrial remains such as water meadow systems, drainage systems, wildfowl and decoy remains, millponds and mill buildings.

Source: Scotland: Relevant landscape character assessments published on the Scottish Natural Heritage website – http://www.snh.org.uk, MAFF (2000). England Rural Development Programme 2000-2006. Appendix 6: Overview of historic and cultural aspects provided for each of the English Government Regions. Wales: Register of Welsh Historic Landscapes. Countryside Council for Wales website, CPAT website, GGAT website.

A4i.1.4 Distribution of Protected Heritage Sites

A4i.1.4.1 Scheduled Ancient Monuments

Scheduled monuments are widely distributed throughout the UK, and are too numerous to be described here. Figure A4i.1 and Figure A4i.2 display the distribution of scheduled monuments in relation to the geographical area being considered in this SEA – each dot marks the centroid of each part of a site (i.e. each site can have many parts). These sites have an extremely high density, and qualifying the features of each is beyond the scope of this assessment. Further information for each country can be found in their respective heritage service websites: Scotland (http://www.historic-scotland.gov.uk/), England (http://www.english-heritage.org.uk/), Wales (http://www.cadw.wales.gov.uk/).

Figure A4i.1 – Scheduled Monuments in the Scottish Midlands

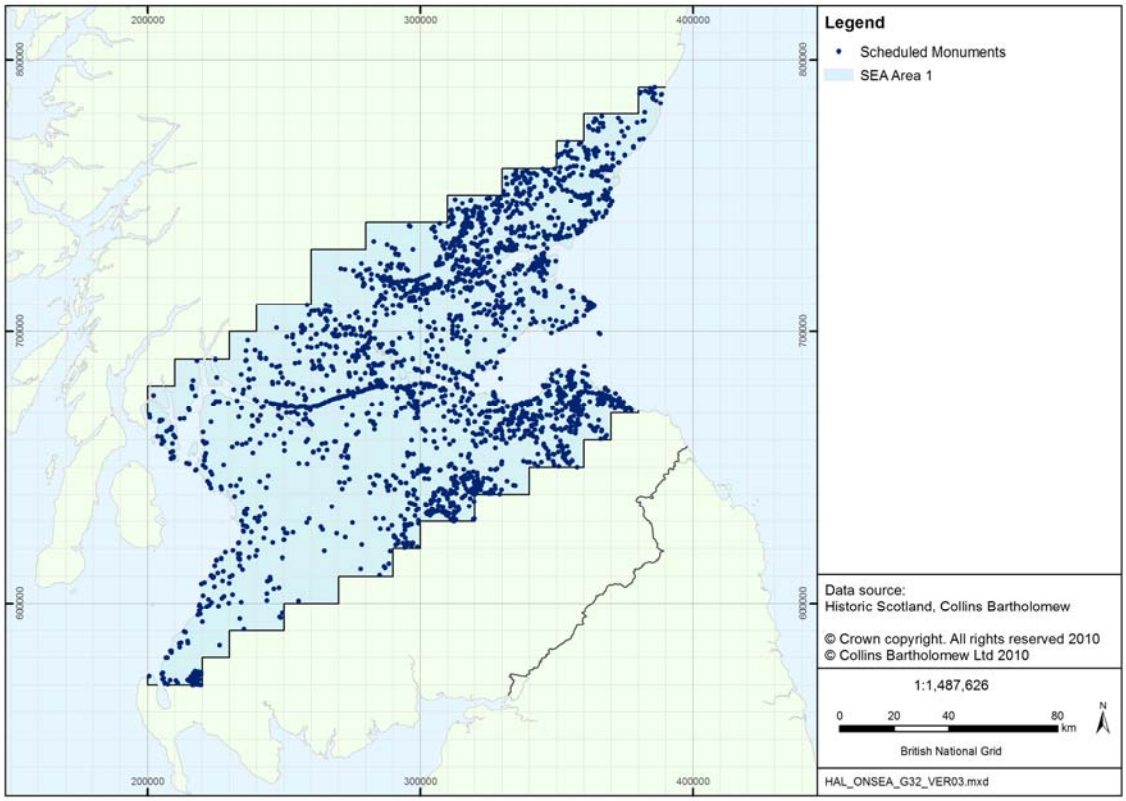
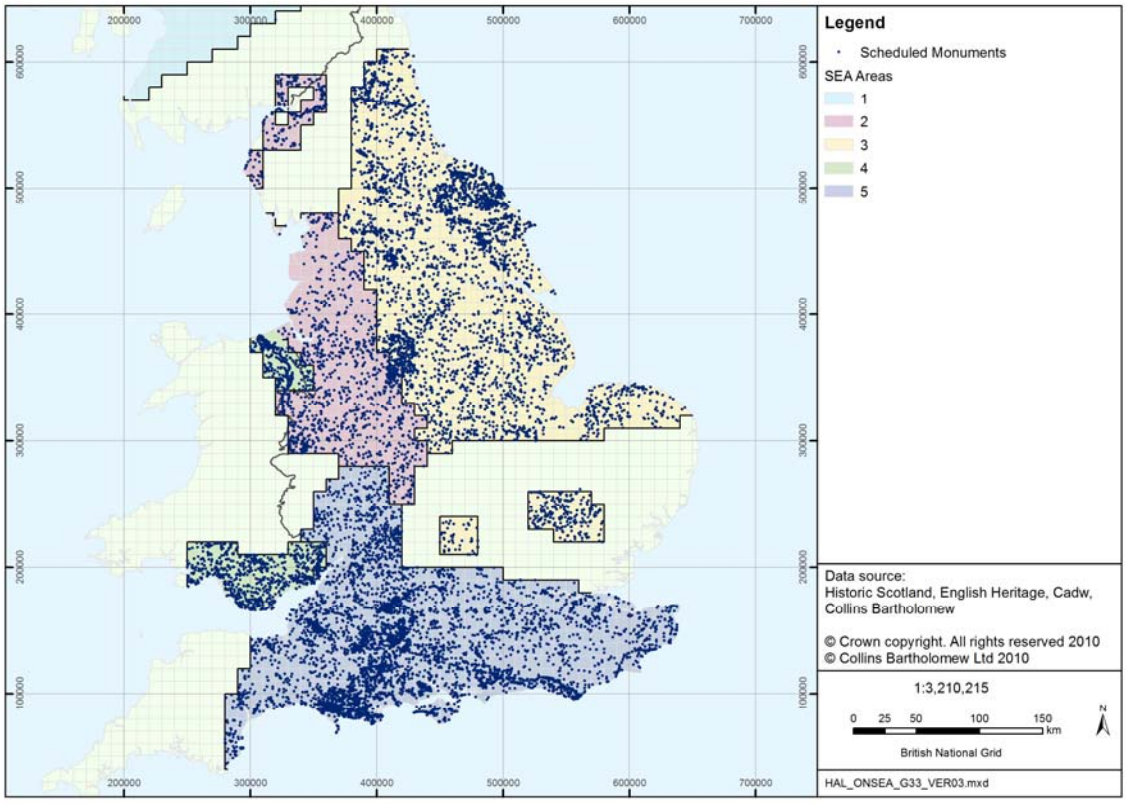


Figure A4i.2 – Scheduled Monuments in SEA Areas in England and Wales



A4i.1.4.2 World Heritage Sites

There are 18 World Heritage Sites (WHS) in the SEA areas which are designated due to their historic cultural attributes (
Table A4i.2). These sites are described in Table A4i.3 below, and their location is shown in relation to each SEA area in Figure A4i.3.

Table A4i.2 – Cultural Criteria for Selection of World Heritage Sites

Criteria	Summary
C (i)	to represent a masterpiece of human creative genius
C (ii)	to exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design
C (iii)	to bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared
C (iv)	to be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history
C (v)	to be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change
C (vi)	to be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance. (The Committee considers that this criterion should preferably be used in conjunction with other criteria)

Source: UNESCO (2008)

Figure A4i.3 – World Heritage Sites in Relation to SEA areas

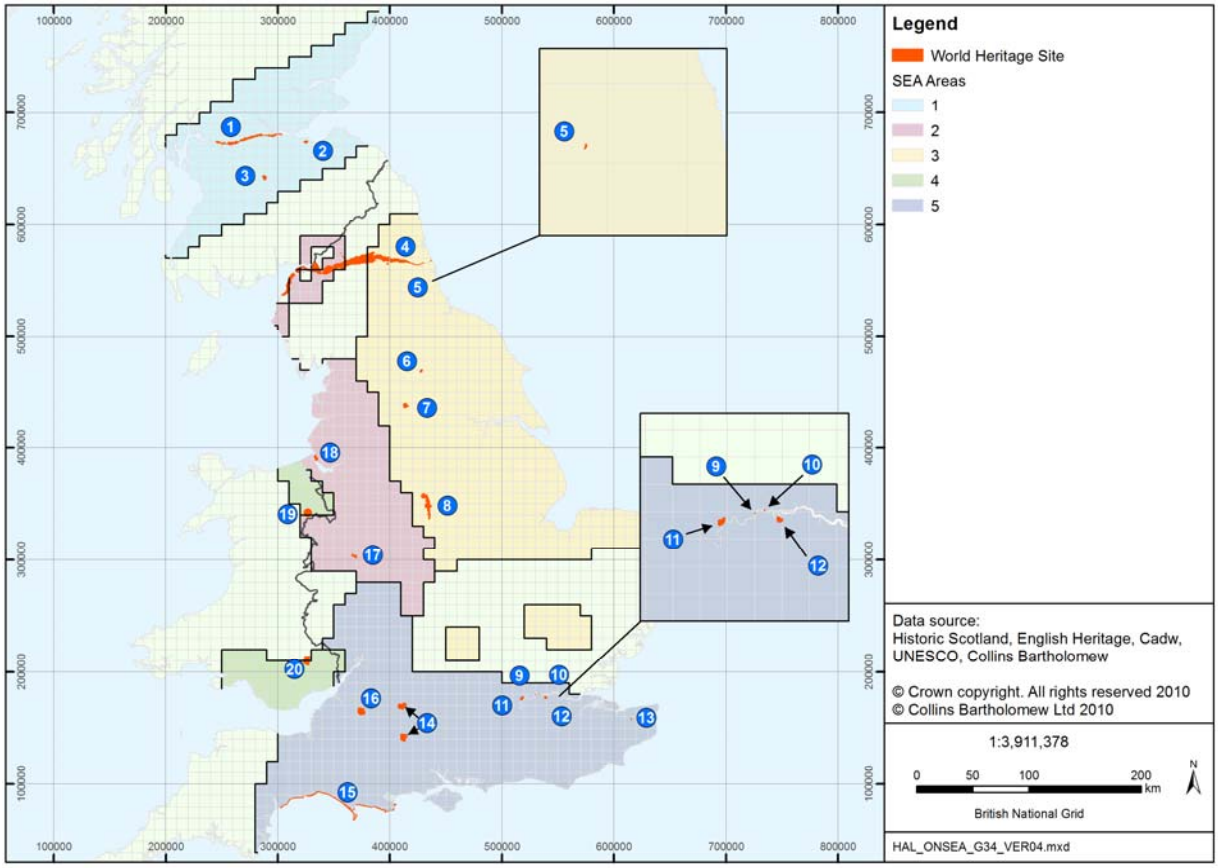


Table A4i.3 – World Heritage Sites

Map ref	Site	Criteria	Description
SEA Area 1: Scottish Midlands			
1	Frontiers of the Roman Empire (The Antonine Wall)	C (ii), (iii), (iv)	The former (and most northerly) frontier of the Roman army in the years following AD 140. The wall was built between the modern areas of Bo'ness, Firth of Forth to Old Kilpatrick on the River Clyde, covering 40 Roman miles (60km). Forts and fortlets were built along its length to provide accommodation and crossing points. The frontier was abandoned in the 160s.
2	Old and New Towns of Edinburgh	C (ii), (iv)	Scottish capital since the 15th century. Edinburgh has two distinct areas: the Old Town, dominated by a medieval fortress and the neoclassical New Town, whose development from the 18th century onwards had a far-reaching influence on European urban planning. The harmonious juxtaposition of these two contrasting historic areas, each with many important buildings, is what gives the city its unique character.

Map ref	Site	Criteria	Description
3	New Lanark	C (ii), (iv), (vi)	Small 18th century village where the philanthropist and Utopian idealist Robert Owen moulded a model industrial community in the early 19th century. The imposing cotton mill buildings, the spacious and well-designed workers' housing, and the dignified educational institute and school still testify to Owen's humanism.
SEA Area 2: West Midlands, North West England and Southern Scotland			
17	Ironbridge Gorge	C (i), (ii), (iv), (vi)	Ironbridge is known throughout the world as the symbol of the Industrial Revolution. It contains all the elements of progress that contributed to the rapid development of this industrial region in the 18th century, from the mines themselves to the railway lines. Nearby, the blast furnace of Coalbrookdale, built in 1708, is a reminder of the discovery of coke. The bridge at Ironbridge, the world's first bridge constructed of iron, had a considerable influence on developments in the fields of technology and architecture.
18	Liverpool – Maritime Mercantile City	C (ii), (iii), (iv)	Six areas in the historic centre and docklands of the maritime mercantile City of Liverpool bear witness to the development of one of the world's major trading centres in the 18th and 19th centuries. Liverpool played an important role in the growth of the British Empire and became the major port for the mass movement of people, e.g. slaves and emigrants from northern Europe to America. Liverpool was a pioneer in the development of modern dock technology, transport systems, and port management. The listed sites feature a great number of significant commercial, civic and public buildings.
SEA Area 3: East Midlands and Eastern England			
4	Frontiers of the Roman Empire (Hadrian's Wall)	C (ii), (iii), (vi)	Site consists of sections of the border line of the Roman Empire at its greatest extent in the 2nd century A.D., part of what is known as the "Roman Limes". The Limes stretched over 5,000km from the Atlantic coast of northern Britain, through Europe to the Black Sea, and from there to the Red Sea and across North Africa to the Atlantic coast. Vestiges in this site include remains of the ramparts, walls and ditches, watchtowers, forts, and civilian settlements. "Hadrian's Wall" previously inscribed on the World Heritage List, is part of the transnational property "Frontiers of the Roman Empire".
5	Durham Castle and Cathedral	C (ii), (iv), (vi)	Durham Cathedral was built in the late 11th and early 12th centuries to house the relics of St Cuthbert (evangelizer of Northumbria) and the Venerable Bede. It attests to the importance of the early Benedictine monastic community and is the largest and finest example of Norman architecture in England. Behind the cathedral stands the castle, an ancient Norman fortress which was the residence of the prince-bishops of Durham.

Map ref	Site	Criteria	Description
6	Studley Royal Park including the Ruins of Fountains Abbey	C (i), (iv)	A striking landscape was created around the ruins of the Cistercian Fountains Abbey and Fountains Hall Castle, in Yorkshire. The 18th century landscaping, gardens and canal, the 19th century plantations and vistas, and the neo-Gothic castle of Studley Royal Park, make this an outstanding site.
7	Saltaire	C (ii), (iv)	A complete and well-preserved industrial village of the second half of the 19th century. Its textile mills, public buildings and workers' housing are built in a harmonious style of high architectural standards and the urban plan survives intact, giving a vivid impression of Victorian philanthropic paternalism.
8	Derwent Valley Mills	C (ii), (iv)	The Derwent Valley contains a series of 18th and 19th century cotton mills and an industrial landscape of high historical and technological interest. The modern factory owes its origins to the mills at Cromford, where Richard Arkwright's inventions were first put into industrial-scale production. The workers' housing associated with this and the other mills remains intact and illustrate the socio-economic development of the area.
SEA Area 4: North and South Wales			
19	Pontcysyllte Aqueduct and Canal	C (i), (ii), (iv)	Pontcysyllte Canal is a feat of civil engineering of the Industrial Revolution, completed in the early years of the 19th century. The building of the canal required substantial, bold civil engineering solutions, especially as it was built without using locks. The aqueduct is a pioneering masterpiece of engineering and metal architecture, conceived by the civil engineer Thomas Telford. The use of both cast and wrought iron in the aqueduct enabled the construction of arches that were light and strong, producing an overall effect that is both monumental and elegant.
20	Blaenavon Industrial Landscape	C (iii), (iv)	The area around Blaenavon is evidence of the pre-eminence of South Wales as the world's major producer of iron and coal in the 19th century. All the necessary elements can still be seen - coal and ore mines, quarries, a primitive railway system, furnaces, workers' homes, and the social infrastructure of their community.
SEA Area 5: Southern and South West England			
9	Westminster Palace, Westminster Abbey and Saint Margaret's Church	C (i), (ii), (iv)	Westminster Palace, rebuilt from the year 1840 on the site of important medieval remains, is a fine example of neo-Gothic architecture. The site – which also comprises the small medieval Church of Saint Margaret, built in Perpendicular Gothic style, and Westminster Abbey, where all the sovereigns since the 11th century have been crowned – is of great historic and symbolic significance.

Map ref	Site	Criteria	Description
10	Tower of London	C (ii), (iv)	The massive White Tower is a typical example of Norman military architecture, whose influence was felt throughout the kingdom. It was built on the Thames by William the Conqueror to protect London and assert his power. The Tower of London – an imposing fortress with many layers of history which has become one of the symbols of royalty – was built around the White Tower.
11	Royal Botanic Gardens, Kew	C (ii), (iii), (iv)	This historic landscape garden features elements that illustrate significant periods of the art of gardens from the 18th to the 20th centuries. The gardens house botanic collections that have been considerably enriched through the centuries. Since their creation in 1759, the gardens have made a significant and uninterrupted contribution to the study of plant diversity and economic botany.
12	Maritime Greenwich	C (i), (ii), (iv), (vi)	The ensemble of buildings at Greenwich, and the park in which they are set, symbolise English artistic and scientific endeavour in the 17th and 18th centuries. The Queen's House (by Inigo Jones) was the first Palladian building in England, while the complex that was until recently the Royal Naval College was designed by Christopher Wren. The park, laid out on the basis of an original design by André Le Nôtre, contains the Old Royal Observatory, the work of Wren and the scientist Robert Hooke.
13	Canterbury Cathedral, St Augustine's Abbey, and St Martin's Church	C (i), (ii), (iv)	Canterbury has been the seat of the spiritual head of the Church of England for nearly five centuries. Canterbury's other important monuments are the modest Church of St Martin, the oldest church in England; the ruins of the Abbey of St Augustine, a reminder of the saint's evangelizing role in the Heptarchy from 597; and Christ Church Cathedral where Archbishop Thomas Becket was murdered in 1170.
14	Stonehenge, Avebury and Associated Sites	C (i), (ii), (iii)	Stonehenge and Avebury are among the most famous groups of megaliths in the world. The two sanctuaries consist of circles of menhirs arranged in a pattern whose astronomical significance is still being explored. These holy places and the nearby Neolithic sites are an incomparable testimony to prehistoric times.
15	Dorset and East Devon Coast (Jurassic Coast)	C (viii)	This site is designated for its geological features rather than any cultural aspect and so is not described here. See appendix 4c for details.
16	City of Bath	C (i), (ii), (iv)	Founded by the Romans as a thermal spa, Bath became an important centre of the wool industry in the Middle Ages. In the 18th century, under George III, it developed into an elegant town with neoclassical Palladian buildings, which blend harmoniously with the Roman baths.

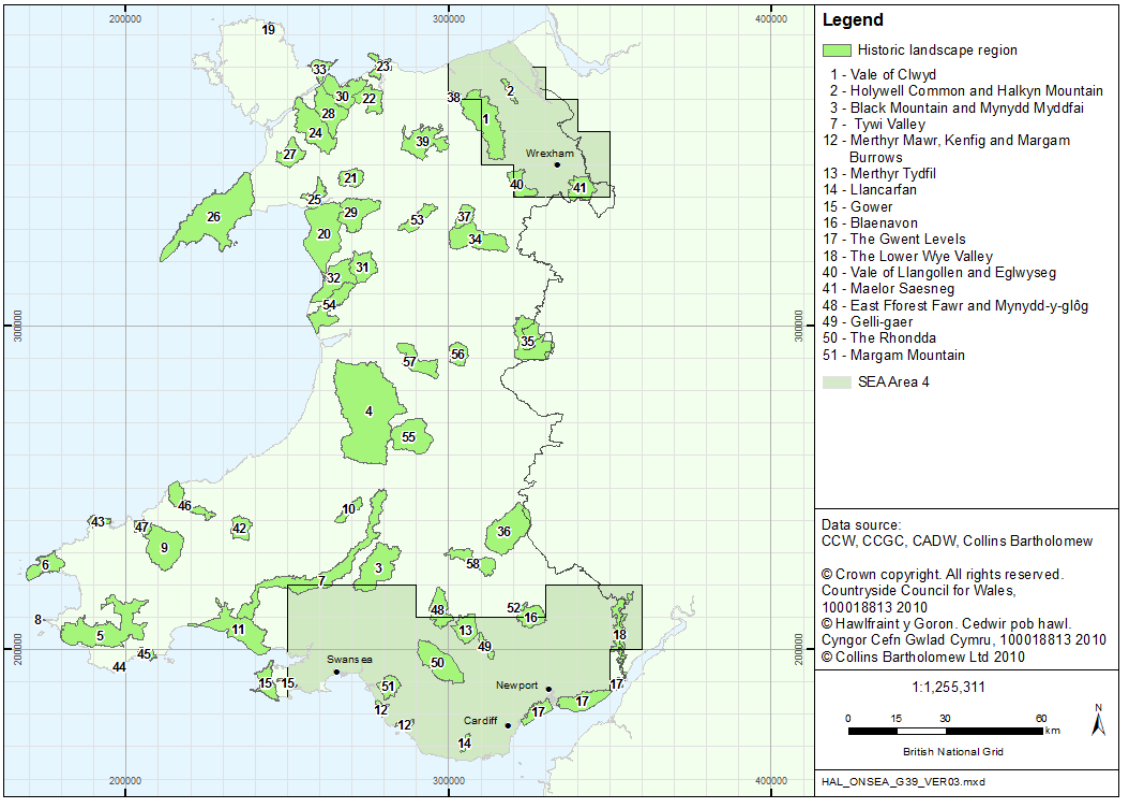
Source: UNESCO World Heritage website, Historic Scotland website, English Heritage website, DCMS UK World Heritage Portal (http://www.ukworldheritage.org.uk/)

A4i.1.4.3 Historic Landscapes

The Historic Landscape Characterisation (HLC) of Wales began with the publication in 1998 and 2001 of a two-volume Register of Historic Landscapes (see: Cadw 1998a, b, 2007a), which identified 58 areas which are regarded as representing the best examples of the variety of historic landscapes in Wales. Since then, these areas have been studied and categorised into numerous sub-areas by each of the four Welsh Archaeological Trusts, and on completion, it is expected that 'unregistered' areas will start to be characterised. The register was updated in Cadw (2007a), and in the same year, a guidance document on the best use of the register in the planning process was also released (Cadw 2007b).

Those landscapes on the Register are a material consideration in planning decisions, and are therefore also included in landscape considerations outlined in appendix 4c. Of the 58 landscapes identified on the Register, 13 are located in SEA area 4, North and South Wales (Figure A4i.4). Similarly, English Heritage has prepared HLC reports in association with local authorities and councils for England, with 81% of England having been mapped under HLC in 2009 (English Heritage 2009). Scotland is also presently carrying out a historic land use assessment, conducted by Historic Scotland and RCAHMS. To date (March 2009), 68% of Scotland has been covered by Historic Land use Assessment, and an interactive map displaying results is available at the RCAHMS HLA website (http://jura.rcahms.gov.uk/HLA/start.jsp).

Figure A4i.4 – Landscapes on the Register of Landscapes of Outstanding Historic Interest, or Special Historic Interest in Wales

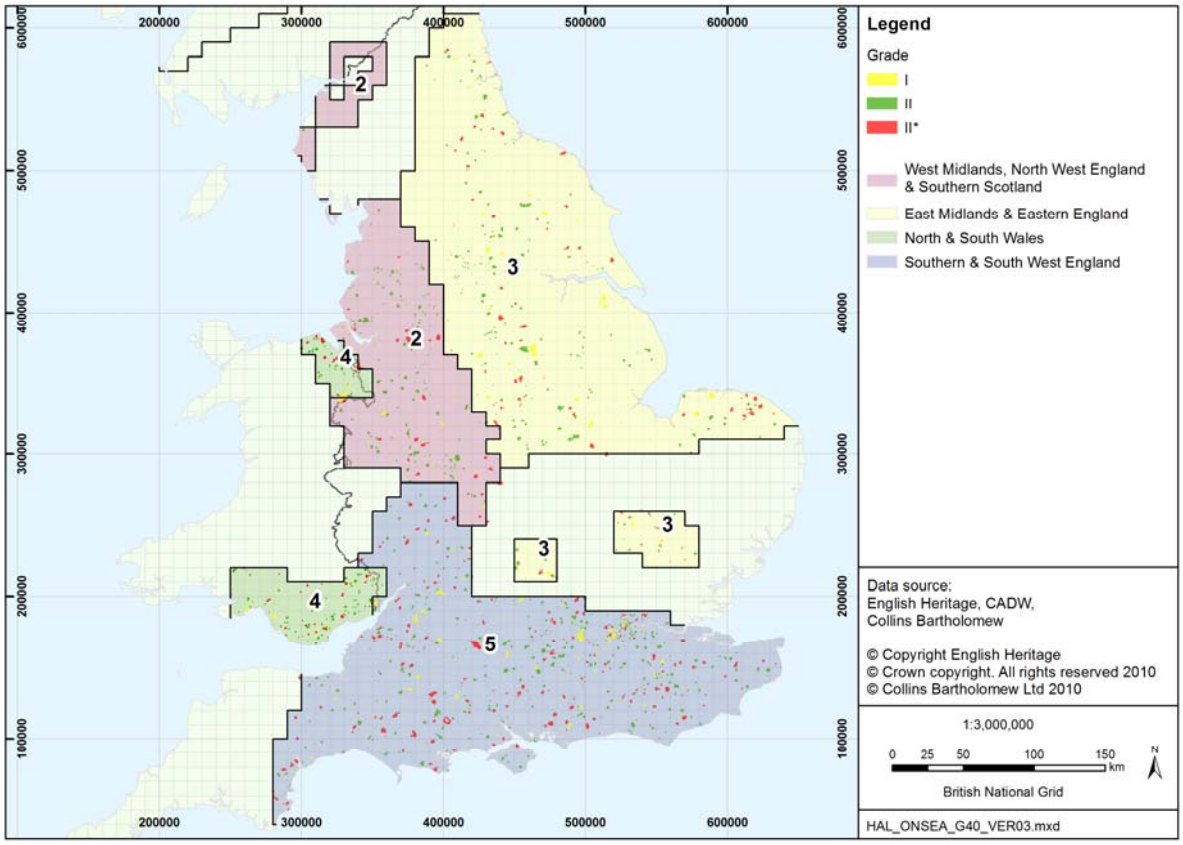


A4i.1.4.4 Historic Parks and Gardens

Initiated in 1992, and completed in 2002 (though still accepting additions/amendments), Cadw undertook a comprehensive study of historic parks and gardens in Wales, which are included on the Cadw/ICOMOS Register of Parks and Gardens of Special Historic Interest. There are presently 372 sites on the register in Wales, 184 of which are located in SEA area 4, North and South Wales. Sites are listed in the same way as buildings, attaining a grade of I, II or II* – approximately 10% of sites are grade I, and 23% are grade II*. In addition, sites in Wales also have an area out with the designated park called an 'essential setting', which comprises the visual area outside of the garden which is essential to the maintenance of its character. In England there are 1,590 sites included on the Register of Parks and Gardens of special historic interest in England, and as with Wales, these are given similar grades to listed buildings, 10% achieving a grade I and 30% achieving a grade II*. Approximately 1,250 parks and gardens are located in the three SEA regions in England.

One of the key aims of this non-statutory protection is the preservation of the historic (e.g. historic layout, structure, built features and planted elements) and visual character of the parks and gardens, and should also be considered a landscape concern. Figure A4i.5 below indicates the distribution of historic parks and gardens in England and Wales. Scotland also has an Inventory of Gardens and Designed Landscapes which records details on a number of nationally important gardens and designed landscapes. These are not graded like those in England and Wales.

Figure A4i.5 – Historic Parks and Gardens in England and Wales



A4i.1.5 Cultural Heritage Indicators

Relevant sustainable development indicators used to present the evolution of the baseline for this section are shown in Table A4i.4 below, and the sections which follow present information relevant to each indicator.

Table A4i.4 – Cultural Heritage Indicators

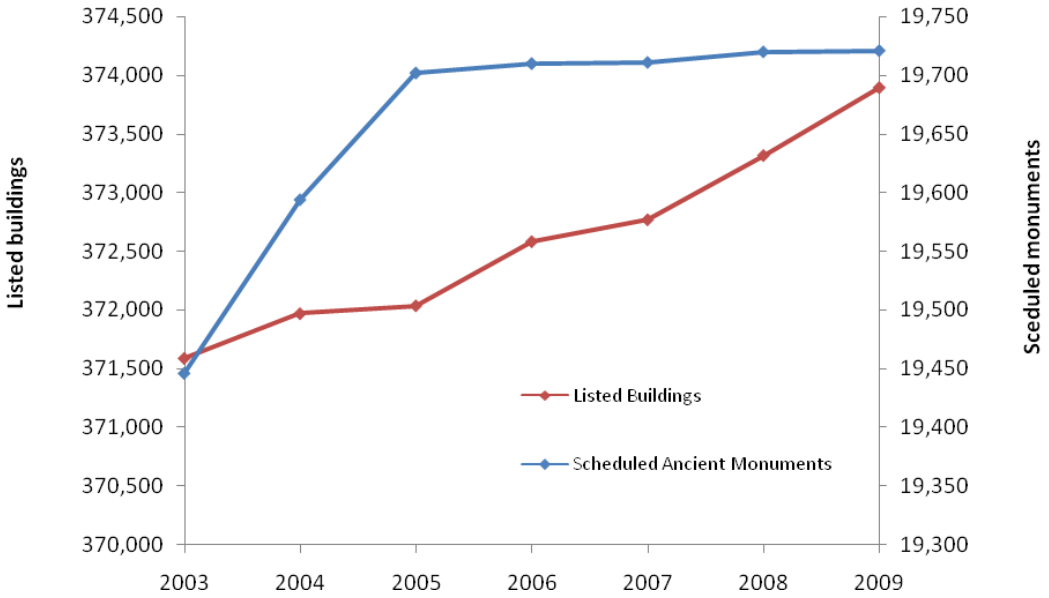
#	Indicator	Region[1]
34	**Number of designated heritage assets†**	E, W, S
	Number of scheduled ancient monuments	E
	Number of listed buildings	E
35	**Historic Environment at Risk†**	E, W, S
	Percentage of listed buildings at risk	E
	Monuments at high risk	E, W, S

Note: †additional indicator not included in the UK government sustainable development strategy. 1Indicates the spatial coverage of the data; E=England, W=Wales, S=Scotland, UK=Entire United Kingdom.

A4i.1.5.1 Number of Designated Heritage Assets

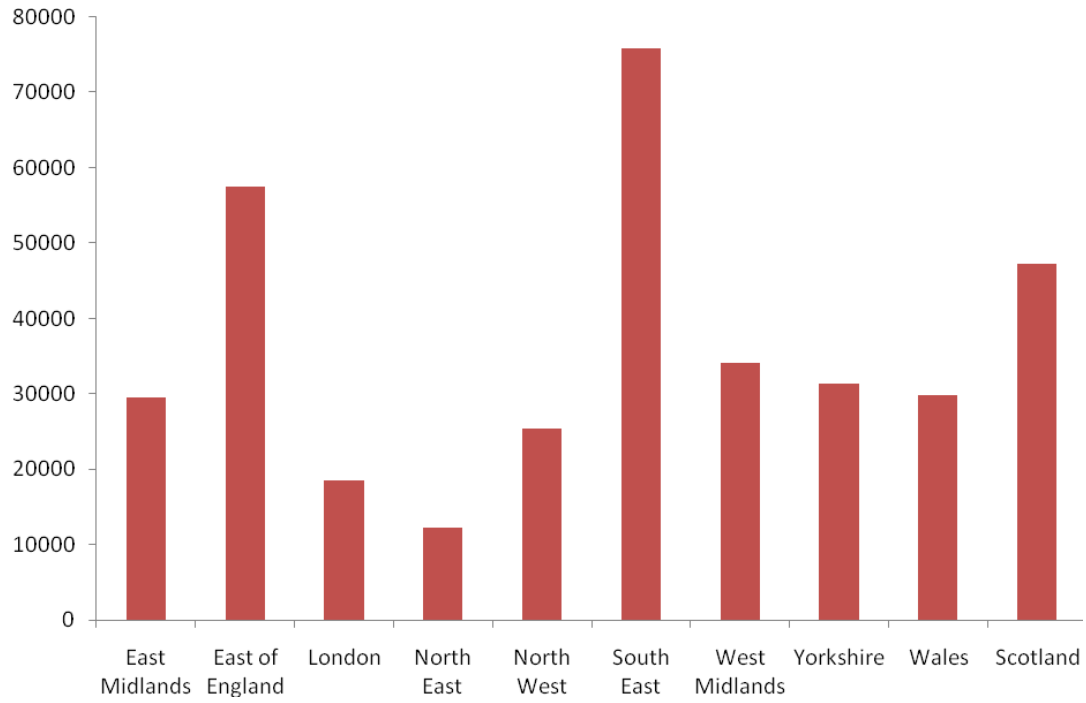
The number of designated heritage assets in each UK country considered in this SEA has been increasing in recent years, continuing a trend of increasing protection for buildings and monuments as their importance is recognised by relevant authorities. England is the only country for which indictors of change in the historic environment have been produced (as part of its Heritage Counts programme), though the devolved administrations of Scotland and Wales are now preparing their own analogous reports. Figure A4i.6 shows the increase in listed building and scheduled monument designations in England between 2005 and 2008, the total number of designations by region for England, and totals for Scotland and Wales, are provided in Figure A4i.7 and Figure A4i.8. When interpreting these figures, it should be borne in mind that they represent significantly different areas (e.g. London vs. Yorkshire) which will, in part, account for the variation in figures.

Figure A4i.6 – Number of Listed Buildings and Scheduled Monuments in England



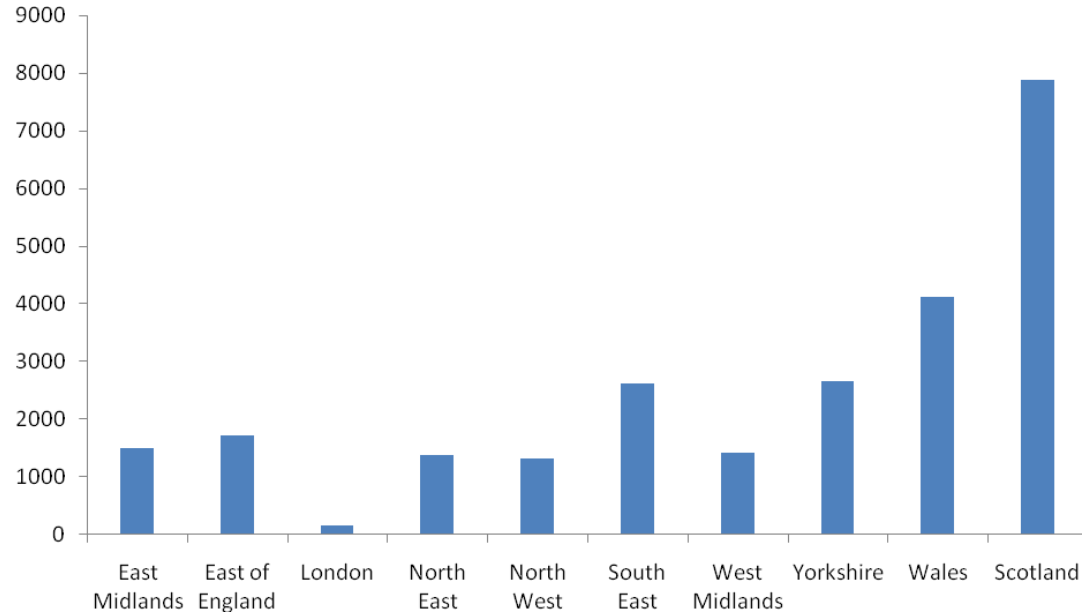
Source: English Heritage (2003, 2004, 2005, 2008a, 2009)

Figure A4i.7 – Listed Buildings by Region



Source: Historic Scotland (2007), English Heritage (2009), Cadw (2009a)
Note: Figures for English regions are for 2009, Wales for 2008, and Scotland 2007

Figure A4i.8 – Scheduled Ancient Monuments by Region



Source: Historic Scotland (2007), English Heritage (2009), Cadw (2009a)
Note: Figures for English regions are for 2009, Wales for 2008, and Scotland 2007

A4i.1.5.2 Historic Environment at Risk

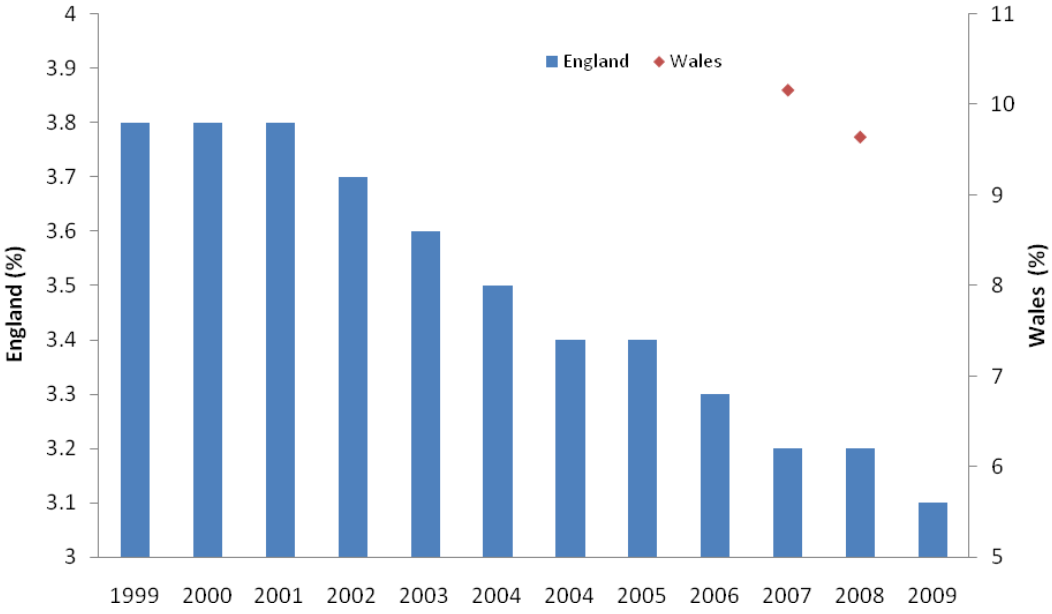
The percentage of grade I and II listed buildings in England protected by the Ancient Monuments and Archaeological Areas Act 1979 (see above) which are at risk has gradually declined by a very small percentage in recent years from 3.8% in 1999 to 3.2% in the latest survey of 2008 (Figure A4i.9). These figures are regionally disparate; the least affected areas are the East of England, South East and South West (1.8-2.1%), rising to as much as 7.4% in the North East (English Heritage website).

Unlike the list of scheduled monuments or archaeological sites which are likely to continue to grow as sites are located and surveyed, the Heritage at Risk register is a rolling database of listed buildings and structural scheduled monuments which can both increase and decrease. Between 1999 and 2008 there was a net decrease in the number of monuments at risk of ~15% (from 1,428 to 1,242), though this masks a turnover of 934 properties being removed and 748 being added to the register (English Heritage 2008). 2008 is the first year since 1999 that that the number of registry entries has increased, in this case from 1,235 to 1,242 entries.

Information relating to the change in the percentage of listed buildings at risk in Scotland and Wales are not readily accessible, though in 2007, Cadw commissioned a baseline report on listed buildings at risk in Wales (see: Cadw 2008). Cadw (2009a) indicate that between the baseline year of 2007 and the most recent survey of 2008, there has been little change in risk. There has been a small decline in the total number of listed buildings at risk, from 10.16% to 9.64%. The underlying figures reveal that all of this reduction is in grade II and II* listed buildings (II* being regarded as more important than grade II), and that between 2007 and 2008, the percentage of grade I listed buildings at risk rose a quarter of 1 percent from 5.75 to 6%. In the longer term, Cadw (2009a) state that there has been a general decline in buildings at risk of between 1 and 1.5%, spatially restricted to being as much as 5%, over the past 10 years.

Figures for Scotland are less certain as the Scottish Civic Trust's Buildings at Risk register for Scotland is not presently comprehensive or a representative sample of all older or potentially listable buildings (Historic Scotland 2007). Similarly to Wales, Historic Scotland has commissioned a three year project with the Scottish Civic Trust to improve the coverage of the BAR. In January 2006, 3,055 buildings were recorded in the BAR register, 1,036 which were considered to be at risk, 82% of which are listed (Historic Scotland 2007).

Figure A4i.9 – Percentage of Listed Buildings (I and II*) at Risk



Source: English Heritage (2003, 2004, 2005, 2008a, 2009), Cadw (2008, 2009a)
Note: the figures for Wales include grades I, II and II of listed buildings. Grade II* are considered of greater importance than grade II, though their condition and level of use often do not reflect this.*

English Heritage presents a 'high risk' baseline figure of 22% (a further 33% are at medium risk) in the 2008 Heritage Counts report. Figures were compiled on a regional basis as part of the *Scheduled Monuments at Risk* project, piloted in the East Midlands in 2002, revealing that 35% of the 1,500 monuments in the region were at risk (English Heritage 2005). This work builds on the previous *Monuments at Risk* (MARS) project of 1998, which revealed that since 1945 agriculture had been the largest contributor to unrecorded loss of archaeological sites (see: Appendix A4b for details on soil and cultural heritage), with agriculture currently posing risk to 19% of monuments, primarily through ploughing (English Heritage 2008). A further 34% of monuments were at risk due to natural phenomenon such as unmanaged tree and shrub growth or animal burrowing (English Heritage 2008a). This indicator is likely to develop further in subsequent years as the condition of sites is monitored.

In Wales, Cadw has monitored and collected condition data on all statutorily protected monuments on a five year programme since 1985-86, resulting in three condition reports, the fourth of which was due in 2009. The 2007 historic position statement (Cadw 2008) contains data which is used to compare figures for 1996 and 2003, which shows a slight increase in stable and improved monuments, but a persistence in the level of disturbed features, ranging from destroyed (0.13% in 2003) to superficially disturbed (7% in 2003 – mainly accounted for by the growth of invasive vegetation and scrub encroachment, probably due to less intensive agriculture).