National Character Area profile:

82. Suffolk Coast and Heaths

Supporting documents

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Introduction

As part of Natural England's responsibilities as set out in the Natural Environment White Paper[1], Biodiversity 2020[2] and the European Landscape Convention[3], we are revising profiles for England's 159 National Character Areas (NCAs). These are areas that share similar landscape characteristics, and which follow natural lines in the landscape rather than administrative boundaries, making them a good decision-making framework for the natural environment.

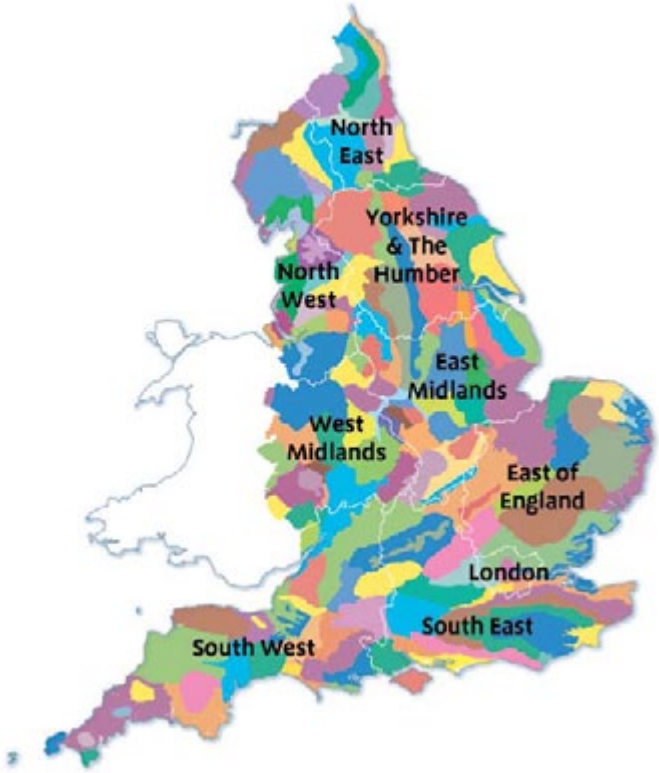
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and encourage broader partnership working through Local Nature Partnerships. The profiles will also help to inform choices about how land is managed and can change.

Each profile includes a description of the natural and cultural features that shape our landscapes, how the landscape has changed over time, the current key drivers for ongoing change, and a broad analysis of each area's characteristics and ecosystem services. Statements of Environmental Opportunity (SEOs) are suggested, which draw on this integrated information. The SEOs offer guidance on the critical issues, which could help to achieve sustainable growth and a more secure environmental future.

NCA profiles are working documents which draw on current evidence and knowledge. We will aim to refresh and update them periodically as new information becomes available to us.

We would like to hear how useful the NCA profiles are to you. You can contact the NCA team by emailing ncaprofiles@naturalengland.org.uk

National Character Areas map



[1] The Natural Choice: Securing the Value of Nature, Defra (2011; URL: www.official-documents.gov.uk/document/cm80/8082/8082.pdf)
[2] Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services, Defra (2011; URL: www.defra.gov.uk/publications/files/pb13583-biodiversity-strategy-2020-111111.pdf)
[3] European Landscape Convention, Council of Europe (2000; URL: http://conventions.coe.int/Treaty/en/Treaties/Html/176.htm)

Summary

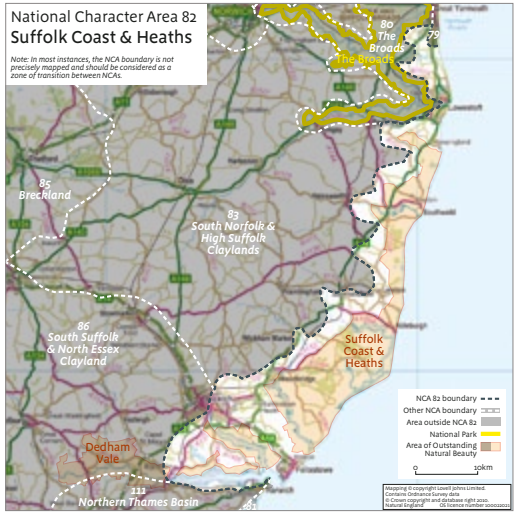
The Suffolk Coast and Heaths National Character Area (NCA) lies on the North Sea coast between Great Yarmouth in the north and the port town of Harwich in the south, forming a long, narrow band that extends between 10 and 20 km inland. Its inland western boundary is with the South Norfolk and High Suffolk Claylands and South Suffolk and North Essex Claylands NCAs, with projections up many small river valleys.

It is one of the driest parts of the country, with local rainfall typically only two-thirds of the national average. The distinctive landscape character is a product of its underlying geology, shaped by the effects of the sea and the interactions of people. It is mainly flat or gently rolling, often open but with few commanding viewpoints. In many places, and especially near the coast, wildlife habitats and landscape features lie in an intimate mosaic, providing great diversity in a small area. Some 45 per cent of the area is designated as the Suffolk Coast and Heaths Area of Outstanding Natural Beauty (AONB), while the south-western tip along the Stour Valley also contains a small part of the Dedham Vale AONB.

Farming utilises 57 per cent of the total land area. Cereal crops are most common but large-scale vegetable production is a distinctive feature, as are the free-range pig units that often form part of longer-term arable rotations. It is also an important area for turf production. Most of this area was heathland of low economic value until extensive irrigation and fertiliser inputs transformed the productivity of the light sandy soils during the second half of the 20th century.

The remaining coast and lowland heaths, which are known locally as the Sandlings, form particularly distinctive features, although traditional heath is now much fragmented owing to farmland conversion, forest use and housing development. The forest plantations at Dunwich, Tunstall and Rendlesham are known collectively as the Sandlings Forests. The mosaic of dry semi-natural habitats supports a rich biodiversity with colourful gorse and heather, woodlark and nightjar, Dartford warbler, adder and silver-studded blue butterfly. Their wildlife importance is recognised by the Sandlings Special Protection Area (SPA) and Staverton Park and The Thicks, Wantisden Special Area of Conservation (SAC).

The coast is interrupted by five estuaries (Stour, Orwell, Deben, Alde/Ore and Blyth) with extensive wildlife-rich intertidal areas of mudflat and salt marsh. The importance of the coast for biodiversity is recognised by its many wildlife designations include three Ramsar sites, four SPA, four SAC, three National Nature Reserves and many Sites of Special Scientific Interest (SSSI). In some places, old river mouths have become enclosed by sand and shingle bars, creating large areas of brackish or freshwater marshland, much of which is managed as nature reserves. Reclaimed estuarine intertidal areas bounded by centuries-old river walls are now important agricultural areas. The shoreline consists of predominantly shingle beaches, often extensive in nature. Important



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geomorphological features include shingle structures, such as the 16-kilometre Orford Ness and soft sandy cliffs that show signs of periglacial impacts and are often associated with emerging scatters of Palaeolithic and Mesolithic artefacts.

The area's rich archaeology provides evidence of a long history of settlement and significant past wealth and importance, including prehistoric burial mounds associated with the Anglo-Saxon Sutton Hoo site and a number of country house estates with historic parklands set back along the major estuaries. The coast is dotted with a diverse range of military heritage including the 12th-century Orford Castle, Napoleonic Martello towers and the highly significant 20th-century military research establishments at Orford Ness and Bawdsey. Consequentially the Suffolk Heritage Coast was designated in 1973, running from Kessingland to Felixstowe.

Settlement patterns are sparse, consisting mainly of small villages and iconic coastal market towns. Approximately 11 per cent of the area is urban with the larger settlements (Lowestoft, Ipswich and Felixstowe) restricted to the northern and southern extremes of the NCA. It remains a lightly populated, undeveloped area that is notable for its tranquillity, high-quality environment and culture, and outstanding wildlife. These values combine to offer authentic and revitalising experiences for people, making it popular for outdoor recreation and tourism.

Today the management of the Suffolk Coast and Heaths is focused around sustainable integrated management of farming, conservation and recreation interests. In recent years improvements have been made through conservation efforts supported by agri-environment grant schemes, resulting in 90 per cent of the SSSI area being in either favourable or recovering condition. Major infrastructure developments at Felixstowe and Harwich docks, Sizewell nuclear power station and offshore wind farms seeking to bring transmission cables ashore provide challenges as they have the potential to impact on the special qualities of the landscape and seascape. Climate change adds further challenges with critical issues in the short to medium term likely to relate to water (for example, droughts leading to increased fire risk and a threat to the survival of some species, coastal flood risk and sustainable use of resources). The need to adapt to coastal change over the medium to long term places importance on coastal management, as it will be neither possible nor desirable to artificially maintain the whole coastline in exactly its current position. How best to manage and adapt to coastal change presents significant challenges; however, these challenges may also present new opportunities for the NCA's local communities and landscape.

Statements of Environmental Opportunity

- **SEO 1:** Manage the nationally significant coastal landscapes, ensuring that coastal management decisions take full account of landscape, environmental and visual impacts as part of an integrated approach working with coastal processes. Improve people's understanding of the process of coastal change.

- **SEO 2:** Manage the components of characteristic productive agricultural landscapes to benefit food production, biodiversity and soil and water quality. Promote sustainable farming practices that are able to adapt to changing agricultural economics, the considerable challenges of climate change and water availability.

- **SEO 3:** Increase and enhance public awareness and enjoyment of the distinctive assemblage of historic landscapes. Sustainably manage the agricultural, semi-natural, geological and rich archaeological and historic environment, as well as seeking opportunities for more integrated access to support recreation and education, while protecting the area's wildlife habitats and tranquillity.

- **SEO 4:** Manage the forest plantations, to combine commercial forestry and fuel production with a mix of habitats for rare and endangered plants and animals, enhancing both their capability as a strategic recreational resource and their role in climate change adaptation and regulation.

Shingle, grazing marsh reedbed and woodland shape the historic landscape and low-lying land of the Dingle Marshes, part of the Suffolk Coast National Nature Reserve.

Description

Physical and functional links to other National Character Areas

The National Character Area (NCA) shares the underlying bedrock of late Cretaceous Chalk and overlying glacial tills (boulder clay) with the surrounding NCAs (The Broads, South Norfolk and High Suffolk Claylands, South Suffolk and North Essex Claylands, and Northern Thames Basin). It also shares with South Suffolk and North Essex Claylands and Northern Thames Basin early Tertiary mudstones (mainly London Clay) and late Tertiary Crag deposits.

The boundary between the Suffolk Coast and Heaths and the more wooded boulder clay plateau of central East Anglia (South Norfolk and High Suffolk Claylands and South Suffolk and North Essex Claylands) is incised by several small east–west river valley corridors. The rivers have fairly small catchments, with their headwaters further inland in the chalky uplands of these NCAs, which share a mainly flat or gently rolling landscape that limits views between them. The River Gipping flows from South Suffolk and North Essex Claylands into the River Orwell at the urban heart of Ipswich, which straddles the NCA boundary. The ecological status of the river valley habitats and many of their ecosystem values are dependent on sustainable water management and land use practices in these neighbouring NCAs.

In the south the NCA shares with the South Suffolk and the North Essex Claylands and the Northern Thames Basin NCAs part of the Dedham Vale Area of Outstanding Natural Beauty (AONB). Views to the Northern Thames Basin NCA are limited but can be had across the open waters of the River Stour and Holbrook Bay as well as along the coast to Walton-on-the-Naze.

View from Landguard Point across the mouth of the Stour and Orwell Estuary to Walton-on-the -Naze in Greater Thames Estuary NCA.

In the north, along the edge of the Waveney Valley, the NCA shares with the Norfolk Broads the landscape area known as the Norfolk and Suffolk Broads, which form part of one of the UK's largest wetland ecosystems. This shared landscape faces the critical challenges of climate change and sea level rise which could dramatically change the important ecological balance and landscape of the wetland area.

The natural erosion of the Central North Norfolk, North East Norfolk and Flegg, and The Broads NCAs soft coast supplies beach material from the north through the process of longshore drift, helping to maintain the beaches and sand dunes further south along the coast of the Suffolk Coast and Heaths. These physical geomorphological processes of erosion and sediment transfer underpin coastal management as the beaches and dunes help to shield the soft cliffs from wave attack and areas of low-lying hinterland from coastal flooding. They are also important in relation to the evolution of the coastal landscape as seen at Benacre Ness and Orford Ness.

Key transport links both for commercial freight and visitors include the East Coast Main Line (Edinburgh–London) and the East Suffolk Line (Ipswich–Lowestoft), the A14 trunk road linking the Port of Felixstowe with the Midlands and via the A12 to London in the south and Great Yarmouth in the north.

Distinct areas

- The Sandlings Forests (Rendlesham, Dunwich and Tunstall).

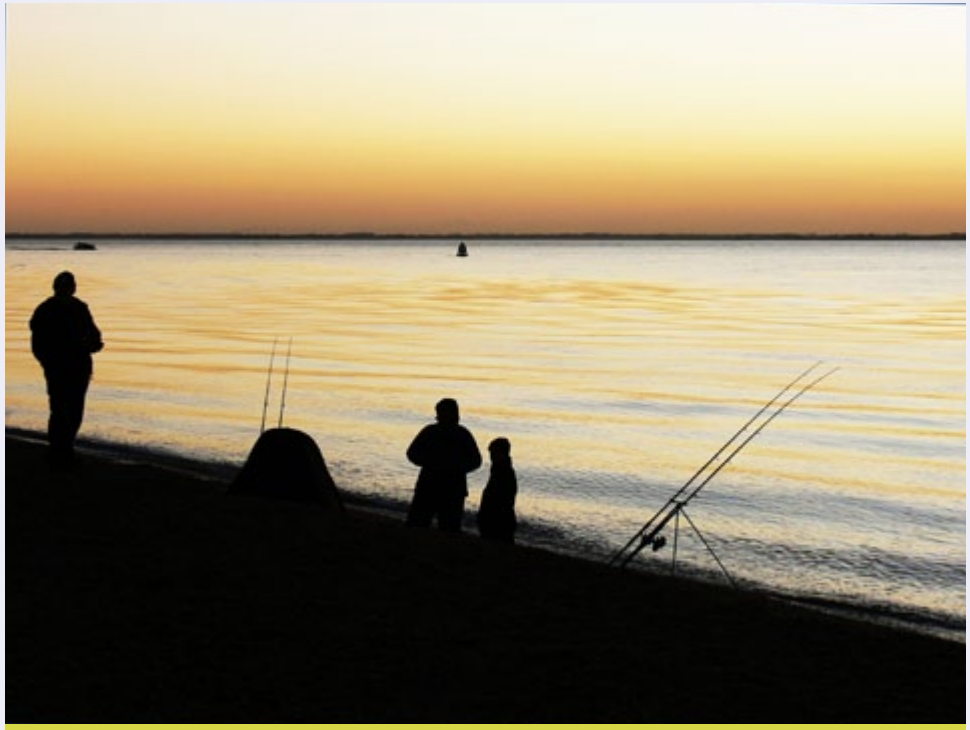
The nationally significant coastal landscape of Dingle Marshes, Dunwich, with its varied carpet of salt marsh plants and brackish pools.

Key characteristics

- A predominantly low-lying landscape with some areas along the coastal plain below or at sea level. Changes in relief are slight, but enough to distinguish the Sandlings, sandy rolling 'upland' between estuaries.
- Crag deposits covered by deep, free-draining sands, gravels and till, forming light, sandy, easily worked soils on the Sandlings, giving rise to characteristic variation in land cover.
- A dynamic coast, shaped by long, sweeping bays, cut by the series of more sheltered estuaries. The shoreline is defined by shingle beaches and structures, sea defence features and in places low, soft crumbling cliffs.
- Rivers flow west - east forming intimate, twisting alluvial valleys. Estuaries support internationally important salt marshes and intertidal flats with large numbers of waders and wildfowl, while their open waters are busy with pleasure and commercial craft.
- Expansive coastal level grazing marshes divided by drainage dykes contain internationally important reedbeds and fens. Many are managed as nature reserves owing to their rich biodiversity, which includes a nationally important concentration of breeding bittern.
- Fragments of internationally important lowland heathland support nightjar, woodlark, adder and silver-studded blue butterfly. Views across the dry farmland and heathlands are open and extensive, except where enclosed by woodland.
- Farm woodlands, plantations and field boundary trees provide a treed character with substantial coniferous forests (Rendlesham, Tunstall and Dunwich) in the core of the NCA. Ancient broadleaved woodland and parkland wood pasture cloak the southern river valley and estuary slopes. The coastal levels are largely devoid of trees.

Bracken, heather and birch on Westleton Heath, a fragment of the once extensive lowland heathland resource.

- High-quality vegetable production and outdoor pig units are distinctive agricultural land uses. Beef cattle graze the coastal levels although drainage has led to the conversion of many of the grazing marshes to arable production.
- Inland valleys contain small-scale historic patterns of irregular drained meadow enclosure, bounded by elm hedgerows. The Sandlings and the coastal plain show 18th- to mid-19th-century large-scale regular enclosure. Pine lines and shelterbelts are characteristic of the Sandlings.
- A rich archaeology includes Saxon burial mounds, medieval rabbit warrens and numerous country house estates. The coast supports Napoleonic Martello towers, Second World War pillboxes and the Orford Ness Cold War testing area with its distinctive 'pagodas'.
- Settlement is sparse, with small, isolated villages and farmsteads. Larger urban settlements are confined to the north and south (Lowestoft, Ipswich and Harwich). Distinctive coastal towns (Aldeburgh, Southwold and Felixstowe) enjoy a relatively unspoilt atmosphere.
- Traditional buildings utilise soft-hued red bricks with straw thatch, pantiles or peg tiles. Some are rendered and painted (often in 'Suffolk Pink') while others (including churches) use locally occurring split or knapped flint. Brightly painted beach huts line the coastal resort seafronts.
- Large commercial ports (Harwich and Felixstowe), Sizewell nuclear power station, the Cobra Mist transmitting station and the Orwell Bridge all contribute landmark diversity. Major transport infrastructure includes the A14 and A12 and the main East Coast rail line.
- Public access is extensive both on the land and on the rivers. The sense of tranquillity and wildness is integral to the distinctiveness of the NCA, inspiring many writers, artists and naturalists, and supports the area's popularity as a recreation and tourist destination.



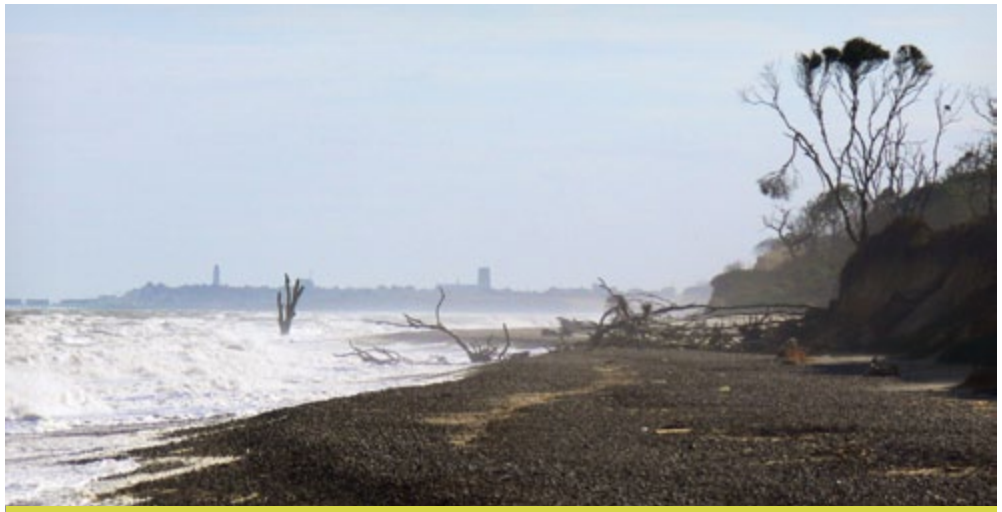
Night fishing by the tranquil waters of the Stour and Orwell estuary.

Suffolk Coast and Heaths today

The Suffolk Coast and Heaths NCA extends along the east coast in an open but narrow band from the edge of Great Yarmouth in the north to Harwich in the south. Its western boundary borders the boulder clay plateau of the Suffolk and Essex Claylands and is incised by the rivers Blyth, Deben, Alde and Minsmere, creating narrow, twisting, east–west pastoral valleys. The landscape is mainly flat or gently rolling, and although changes in relief are slight, they are enough to provide an intimate scale. There are few commanding viewpoints, which limits the scope of inland views.

The underlying geology consists of late Cretaceous Chalk and Eocene London Clay covered by Pliocene-Pleistocene Crag formations, overlain by a drift cover of sands and glacial tills of variable thickness. These sands and gravels are spread in narrow, discontinuous tracts along the coast from Yarmouth to Aldeburgh, extending inland over a low plateau past Woodbridge to Ipswich, giving rise to the characteristic variation in land cover. South of the River Deben the light soils are generally less impoverished and support large-scale rectilinear arable fields, separated by an enclosed network of winding lanes.

The coast is largely undeveloped and undefended with a coast road only between Aldeburgh and Thorpeness. The landscape is subtle with sections of low elevation, soft crumbling cliffs (for example, Dunwich, Covehithe and Pakefield) and shelved, sloping shingle beaches, sweeping in a series of wide bays. The cliff-lines are interrupted by broad inlets such as Minsmere and the Blyth Estuary. The cliffs mark a generally receding coastline that displays active coastal processes of erosion and accretion, the southward tidal current carrying eroded material to downdrift beaches. Offshore waters are generally shallow in nature, with highly mobile parallel shoal and sand bank systems, affecting wave and current interactions.



Low elevation, soft crumbling cliff and shingle beaches between Covehithe and Pakefield, ravaged by a winter storm.

The coastal forms created by the interaction between the complex marine and geological processes are important wildlife areas. Where large quantities of beach material have been accreted and become stabilised (for example, Shingle Street and Kessingland), they support nesting birds including little tern and communities of specialised plants (for example, sea pea, sea kale and yellow horned poppy). The most significant coastal feature is Orford Ness, Europe's largest shingle spit, which with its pattern of shingle ridges, vegetation and pools is a geological and geomorphological feature of national and international significance.

The open, exposed coastal character contrasts with the sheltered peace of the estuaries which display a strong sense of place, both at high and low tide, when vast expanses of mudflat are home to many hundreds of migratory waders and seabirds (for example, black-tailed godwit and avocet). Interest and texture are provided by

the subtle blend of reflective qualities of water and mud, the seasonally varied carpet of salt marsh foliage and the geometric shapes of river walls and the curvature of half-hidden creeks and channels. The Stour and Orwell estuaries are wide, relatively straight and bounded by well-wooded estate parkland valley sides with springs and landslides on the London Clay. Their open waters are busy with commercial and recreational craft, as are the waters of the Deben. On the smaller Blyth and Alde estuaries, boating is limited to the lower reaches, as extensive areas of drained marsh and former reclaimed land, now mudflats, encroach on the navigable water.

The wide open expanses of low-lying freshwater coastal levels are protected by low sea walls. Their fens/wooded fens and reedbeds support a rich biodiversity including bittern and marsh harrier and scarce plants such as whorled water-milfoil (for example, Corporation, Dingle and Minsmere Marshes and Covehithe, Benacre and Easton Broads). The remaining traditionally grazed marshlands feature a changing pattern of drainage ditches, older and curvilinear in the north, straighter and more recent in the south. Large, panoramic seascape views are dominated by busy offshore North Sea shipping waters and distant wind farms. Onshore private marinas and vibrant boatyards add a human element. Sense of space, isolation and tranquillity are special qualities of this naturally dynamic environment which offers authentic and revitalising experiences for visitors.

The diversity of coastal habitats and their importance for wildlife are recognised by four Ramsar, Special Protection Area (SPA) and Special Area of Conservation (SAC) designations, three National Nature Reserves and numerous Sites of Special Scientific Interest (SSSI). Offshore waters support populations of porpoises and both grey and harbour seals, while the benthic habitats are extensive spawning and nursery grounds for commercial fish and shellfish species including Dover sole, lobster and brown shrimp. A significant proportion of the open waters are also designated as an SPA because of the key bird species that they support (for example, red-throated diver).

Reflective qualities of the intertidal flats in the Deben Estuary.

Inland the landscape is characterised by fragments of ancient open lowland heathland (for example, Sutton and Hollesley Commons and Westleton Heath) with mosaics of heather, acid grassland, gorse, bracken and birch. Many of these wild, sandy stretches, known locally as the Sandlings, are included in the SPA designation. They are a vanishing refuge for species including nightjar, woodlark, adder and silver-studded blue butterfly. The large estates of Benacre, Henham, Sudbourne and Sutton provide a degree of uniformity to the land cover. Agriculture is dominated by commercial-scale cereal and vegetable cropping with turf production and the use of irrigation rigs and plastic covers contrasting with the surrounding naturalness. Outdoor pig units utilise the light soils, while conservation grazing takes place on the heathlands. Field boundaries in the Sandlings are defined by distinctive pine lines, shelterbelts and remnant elm

hedges. Further south, along the Shotley Peninsula, holly hedges predominate while to the north and west hedgerows are diminished in their extent.

The large 20th-century Scots and Corsican pine plantations of the Sandlings Forests (Dunwich, Tunstall and Rendlesham) offer vertical and textural landscape elements, giving a sense of uniformity, enclosure and tranquillity. Older, mainly broadleaf plantation woodlands occur within the country house estates and landscaped parklands along the Stour and Orwell valley slopes as well as along the A12 corridor (for example, Orwell Park, Wherstead Park, Holbrook Park and Freston Park). Elsewhere there is a scattering of mixed copses and coverts planted for shooting. Semi-natural ancient woodland and wood pasture is comparatively scarce. Most is located in the parishes of Sudbourne, Wantisden, Rendlesham and Iken. Staverton Park is a unique feature of national importance containing 4,700 medieval pollard oaks, forming a last remnant of the previous landscape.

The Port of Felixstowe busy with freight movements viewed across from the Shotley Peninsula.

Across the majority of the NCA settlements are small, sparse and tucked into the landscape. Larger later settlement is restricted to the north and south. The Sunrise Coast, a stretch of tourist coastline to the north-east of the NCA, encompasses the popular seaside resort towns of Lowestoft, the UK's most easterly town, and Southwold with its colourful beach huts overlooking Sole Bay. Further south the Heritage Coast runs from Walberswick to Felixstowe, which is known as the Garden Resort owing to its south-facing gardens and promenades. The Haven Ports, three deep-water ports (Harwich and Felixstowe on the confluence of the rivers Stour and Orwell, and Ipswich) are constantly busy with commercial freight movements. The urban centre of Ipswich extends eastward into the NCA with its 19th- and 20th-century suburban developments contrasting against the surrounding small rural settlements. Traditional coastal buildings are more often of brick than flint with clay pantiles, some showing the influence of Dutch architecture in their shaped gables. Inland, traditional buildings are timber frame with straw thatch and painted render in a variety of colours (often 'Suffolk Pink').

A rich archaeology including evidence for some of the earliest human occupation of Britain, the internationally important Sutton Hoo Anglo-Saxon burial site, Napoleonic Martello towers that appear as sentinels over the low-lying, coastal landscape and the Orford Ness 'pagodas', relics of the area's strategic military importance, add local distinctiveness, as do more recent structures including the Orwell Bridge, Sizewell nuclear power station and offshore wind farms. These imposing and dominant, vertical features add contrast to the otherwise level and natural stretch of coastline.

The diversity of landscapes, wildlife habitats, geomorphological and manmade features combine to make the area a major tourist destination, especially seaside resort towns such as Aldeburgh which are often packed on sunny summer days.

The landscape through time

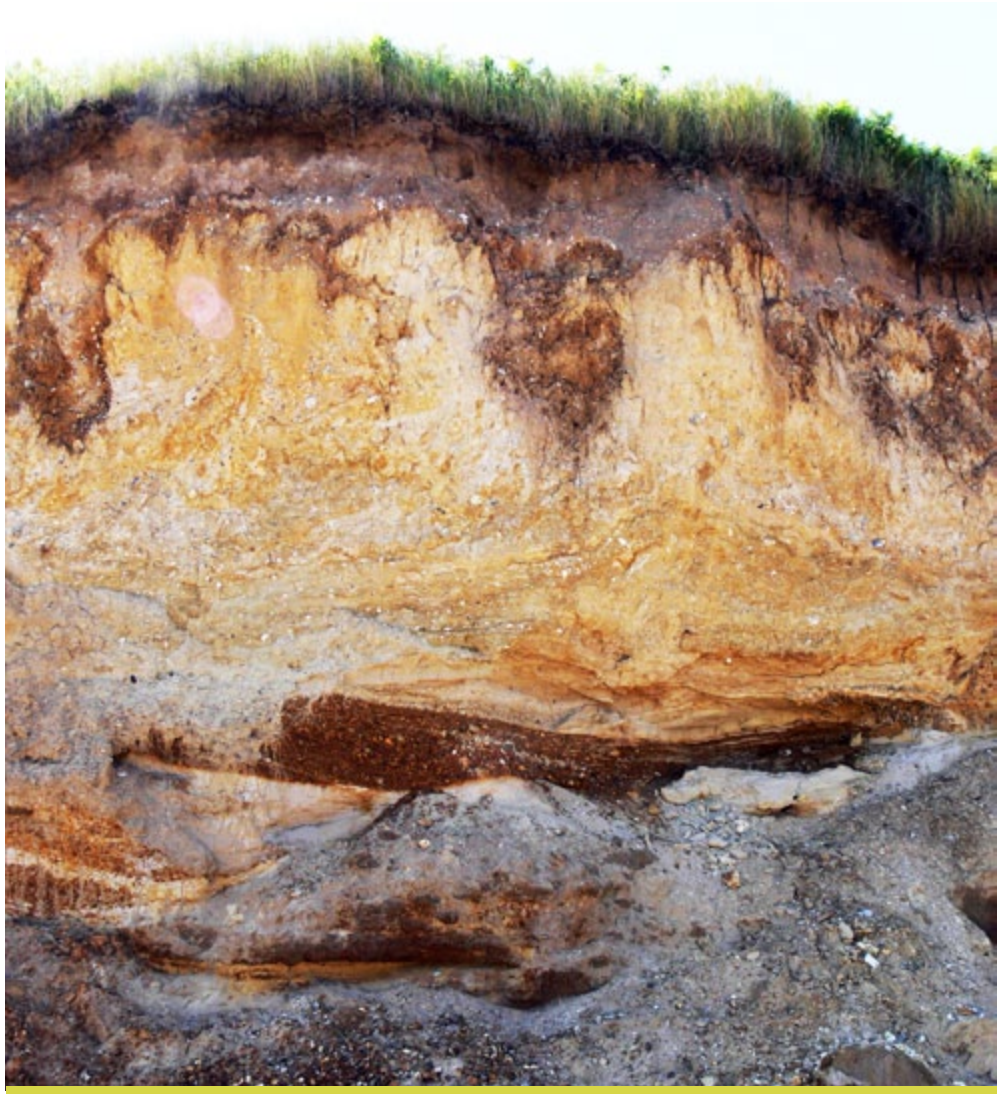
In geological terms, the Suffolk Coast and Heaths is a young landscape. Approximately 4–2 million years ago a series of shell-rich, muddy and sandy marine sediments were deposited on the sea bed, near the western margin of the southern North Sea, which covered the entire area, to form today's Pliocene-Pleistocene Crag formations.

Over the next few hundreds of thousands of years the climate cooled as the last ice age began. The ice sheets reached their peak with the Anglian glaciation (450,000 years ago), depositing vast amounts of chalk and clay as glacial tills (boulder clay). As the ice retreated, fast-flowing streams transported sands and gravels over the landscape, giving rise to some of today's sandy soils. At the end of the ice age the coastline was well to the north of its present position. As sea levels rose the sea encroached southwards and around 8,000 years ago the coast began to resemble its current outline.

Around 4,000 years ago Neolithic farmers began clearing woodland from the river valleys and areas of light soil to allow primitive cropping which continued into the Bronze Age 2,500 years ago. The sandy soils meant that farming was often temporary or marginal. Grazing was the main land use. This prevented the re-growth of trees and allowed heather and gorse to spread, initiating the Sandlings heaths, which stretched continuously from Ipswich to Lowestoft.

Roman occupation from 43 AD lasted for 350 years and contributed trading settlements and roads that still provide the backbone of today's transport links.

From the 5th century the area's wealth and importance grew and is evidenced by the Sutton Hoo Anglo-Saxon burial site and the development of early Christian



Soft sandy cliffs displaying Pilocene-Pleistocene Crag formations at Thorpeness.

centres in the 7th century (for example, Iken and Blythburgh, and somewhat later at Leiston, Butley, Dunwich and Campsey Ashe).

From the 12th century onwards, reclamation of large areas of estuarine salt marsh by enclosure with sea walls led to the creation of extensive low-lying grazing marshes. The coastal ports gained importance as centres for trade, ship-building and fishing, although Aldeburgh and Orford suffered the effects of longshore drift and deposition. Lowestoft developed as an important fishing town, with herring fishing acting as its main identity until the 20th century. Dunwich, one of the largest seaports in eastern England, fell foul of large winter storm surges from the 13th century, and was gradually worn away. Today's buildings were once a mile inland, demonstrating the changing nature of this coast.

By the 13th century, sheep farming dominated the local land use and economy, maintaining the vast heathlands as sheepwalks. Rabbits, too, were farmed in warrens from the 14th century until the 19th century. Place names arising from these traditional practices are still used today (for example, Aldringham Walks and Snape Warren). Settlement was sparse, with small, clustered villages and a scattering of estate farms. Dry tracks and boats meant that it was relatively simple to transport wood products from elsewhere. Woodland was subsequently unimportant to the area's economy, allowing the heathlands to expand.

From the 17th century onwards the use of brick, clay tile and render became characteristic. Up to about 1900, most house walls were either left as a raw 'plaster white' or given a coat of whitewash. A significant Dutch influence, the use of shaped gables, also became a feature of the coastal towns. Trade with Europe and aristocratic connections with London increased wealth in the area and saw a number of imposing houses and large estates developed on the fertile soils of the larger southern river valleys and claylands (for example, Broke Hall and Woolverstone Hall on the Orwell; Stutton Hall and Crowe Hall on the Stour; and Heveningham Hall and a dozen others situated inland).

The 'ancient countryside' of the inland river valleys and claylands underwent extensive piecemeal enclosure by 1700 and few new farms were built here after 1750. Strip-like patterns of medieval irregular drained meadow enclosure and small-scale fields define these areas (for example, around Falkenham, Wrentham and Blunderston). The 18th century saw much of the coastal strip divided into large leasehold or privately owned blocks of estate land, with large farms often over 120 ha, mainly grazing sheep, dairy cows and bullocks.

By the 19th century the area became renowned as sheep-breeding country, with famous flocks being kept, particularly at Martlesham and Butley Abbey. Few farms were entirely confined to Sandlings soils as estate farms straddling the varied soils and marshland could operate large-scale mixed farming. Formal enclosure of some extensive Sandlings heaths came in the 18th to mid 19th century, often associated with new farmsteads, following agricultural improvements fuelled by high corn prices. Many heaths were, though, 'held in severalty' (that is, privately owned and had been so for a long time). The impact of enclosure on the landscape was profound, creating a network of rectilinear fields with belts and coverts. Areas of coniferous plantations, such as Lord Rendlesham's Tangham Forest, were also trialled.

The arrival of the railways at the end of the 19th century increased the accessibility of the coast and the former fishing ports of Aldeburgh, Southwold and Felixstowe developed into flourishing seaside resorts with seafront villas and gardens. Thorpeness is noteworthy as an early-20th-century purpose-made holiday village, with Jacobean and Tudor Revival eccentric styling. The use of colour render (creams and pinks) became popular, with brighter colours by the 1930s.

Sheep farming became uneconomic in the early 20th century and many estates were purchased by the Forestry Commission and planted with conifers, forming the Sandlings Forests. After the Second World War, agricultural advances and irrigation allowed profitable arable farming on the light soils and many remaining heaths were ploughed, drastically changing the ancient landscape character. The once large mosaics of heath and acid grassland became fragmented and much reduced in size, with about 80 per cent being lost since 1900. Ancient woodland, on the interface with the claylands, was also felled to form arable land, or felled and replanted with conifers.

The 1970s saw the designation of the Suffolk Coast and Heaths AONB (1970) and Suffolk Heritage Coast (1973) as well as the outbreak of Dutch elm disease, which removed the once-common sight of mature elm trees from the landscape. Within the Sandlings Forests a process of age diversification was in progress, until a severe storm in 1987 devastated the plantations, particularly Rendlesham Forest. The replanting regimes that followed did, though, achieve greater habitat diversity.

While the area's fisheries had collapsed completely by the 1960s, the late 20th century saw the development of oil and gas exploitation in the southern North Sea with Lowestoft becoming a base for the industry. The ports of Felixstowe and Harwich rapidly developed and today the Port of Felixstowe is the UK's busiest container port, linked to the rest of the country by the A14 trunk road which crosses the Orwell Bridge, opened in 1982.

Today, Sizewell's A and B nuclear reactors (opened in 1967 and 1995 respectively) combine with significant historic military structures including Felixstowe's Landguard Fort (17th century to the Second World War), Napoleonic defences (late 18th and 19th century), Second World War gun emplacements and the Orford Ness 'pagodas' to form distinctive and ethereal features. Distant wind

The Orwell Bridge which opened in 1982, carrying the A14 trunk road over the River Orwell.

farms increasingly dominate the seascape, while onshore infill housing and a proliferation of retail development expand from the east of Ipswich. Major tracts of heath, marsh and shingle are now managed for nature conservation with historic practices such as sheep grazing and reed cutting helping to maintain them. Planned future habitat creation is taking place on a landscape scale in Dunwich Forest, with the creation of 640 ha of grazed woodland and heathland habitat linking the internationally important Walberswick and Minsmere reedbeds and Westleton Heath. This is the first time such a project has been undertaken on this scale within the UK.

Ecosystem services

The Suffolk Coast and Heaths NCA provides a wide range of benefits to society. Each is derived from the attributes and processes (both natural and cultural features) within the area. These benefits are known collectively as 'ecosystem services'. The predominant services are summarised below. Further information on ecosystem services provided in the Suffolk Coast and Heaths NCA is contained in the 'Analysis' section of this document.

Provisioning services (food, fibre and water supply)

- **Food provision:** In spite of low natural soil fertility, the area's free-draining soils and above-average sunshine are ideal for the production of cereals (wheat, barley and oats) and vegetables. These crops made up just under half (41 per cent) of the area farmed in 2009. One-third of Suffolk's potatoes, vegetables and salad crops are grown in the NCA and the area produces 200,000 tonnes of sugar beet annually and is responsible for about a fifth of the UK's pig production.[4] Coastal grazing marshes and valley pastures support high-value beef and lamb production while lobster, crab and whelk are extensively fished offshore. There is also a thriving artisan local food industry.

- **Timber provision:** Woodland covers 13 per cent of the total land area and includes a small amount of commercial hardwood timber production (approximately 500 m^3 per annum) and extensive tracts of conifer plantation. The Forestry Commission's holdings total some 3,110 ha and include the Sandlings Forests of Rendlesham (1,426 ha), Tunstall (1,170 ha) and Dunwich (514 ha). In 2010/11 these forests produced around 15,000 tonnes of timber. Annual output will increase slightly as the rest of the crops replanted following the 1987 storm come into production cycles.

Regulating services (water purification, air quality maintenance and climate regulation)

- **Climate regulation:** Carbon storage is provided by the high organic matter of the coastal levels,[5] intertidal flats and salt marshes. Erosion of the intertidal flats and salt marshes will deplete this storage and release carbon into the atmosphere. Carbon is also stored in the extensive conifer plantations, heathlands and acid grasslands, and small broadleaf estate woodlands, together with parkland and hedgerow trees, hedgerows and shelterbelts. The fen peat soils (covering 3 per cent of the NCA) are important stores of carbon, although cultivation is leading to ongoing loss (wastage) through shrinkage and oxidation, with loss of CO_2 into the atmosphere. The sandy and base-poor soils are predominantly low in organic matter. Oxidation of their organic matter is rapid, limiting the potential for carbon storage.

- **Regulating water quality:** Water quality is important for biodiversity, agriculture and public drinking water. Both ground and surface water quality is critically dependent on the land management in the NCA and surrounding NCAs (South Norfolk and High Suffolk Claylands, South Suffolk and North Essex Claylands, and Northern Thames Basin). The NCA's groundwater chemical status is poor. Available surface water chemical status results show that the rivers Orwell and Stour do achieve 'good' status while the River Waveney at Lowestoft is failing to achieve 'good' status. All major river catchments are priority catchments under the England Catchment Sensitive Farming Project as only 15 per cent of the 65 river waterbodies currently achieve at least 'good' biological status. The ecological status of rivers and other surface waters is varied.[6]

[4] *Future Landscapes: Climate change impacts and adaptation in the Suffolk Coast and Heaths AONB*, Suffolk County Council (March 2012).

[5] Coastal levels: flat coastal grazing land reclaimed from salt marsh, behind sea and river walls

[6] *The East Suffolk Catchment Abstraction Management Strategy*, Environment Agency (January 2008)

- **Regulating water flow (and coastal flooding):** The Environment Agency indicates that the low-lying coastal and estuarine land is at significant risk of flooding. Tidal flooding can occur in the Ipswich port/docklands area from a 0.5 per cent annual probability tidal flood. Significant tidal flood defences exist at Felixstowe and Woodbridge, while the construction of an Ipswich tidal barrier began in 2013. Felixstowe Ferry, Waldringfield, Shingle Street, Orford, Aldeburgh, Thorpeness, Dunwich and Walberswick are all vulnerable to varying degrees of flooding. The Lothingland Hundred River, Cove Run (Wrentham Watercourse) and the River Minsmere are all at risk from flooding resulting from tide locking (combined high water levels in both rivers and tides preventing river flows draining away). The Shoreline Management Plan 7[7] sets out a number of coastal management approaches (for example, 'Hold the Line' is proposed at Felixstowe, Lowestoft, Aldeburgh, south of Southwold and Sizewell where the level of protection provided by defences or the natural coastline will be maintained or upgraded).

- **Regulating coastal erosion:** In some places the coast continues to rapidly erode as a result of sea level rise and storm events. The soft cliffs, formed of heterogeneous materials (London Clay, Crag, sands and gravels) provide little resistance to wave attack and regularly succumb to mass movements caused by undercutting. In addition, when the cliff material is saturated with groundwater it can become unstable, resulting in large-scale slumps and a general retreat of the cliff-line. For the beaches and intertidal habitats to support the reduction of coastal flood risk, they are reliant on the continuation of the processes of erosion and accretion to maintain their sediment supplies. In recent years this process has been supplemented through mechanised beach recharging to address a shortfall in sediment supply (for example, Southwold and Felixstowe frontages). At some locations hard defences including rock armour offer current protection from coastal erosion, although in some places this has increased the rate of erosion downstream (for example, East Lane, Bawdsey).

- **Pollination:** Heathland, marshland, lowland meadow and newly created field-margin habitats provide important nectar sources for pollinating insects. Where cropping dominates, interstitial habitats (for example, edges of farm tracks) become the key sources of both pollen and nectar. These habitats are particularly important early in the year as they support the insects that pollinate and fertilise commercial crops, before the crops themselves are producing pollen and nectar. The degree to which crops rely on insect pollinators depends on both species and cultivar. Field beans, for example, depend to a large extent on insect pollinators (hence their absence can result in yield loss). Although many crops can be grown independently, insect pollinators can significantly increase fertilisation and seed set and therefore the quality and final yield. As a consequence, where beneficial habitats have been lost some farmers locate beehives around responsive crops.

- **Pest regulation:** Semi-natural habitats (for example, meadows, heathland and fen) and in-field habitats such as beetle banks provide important overwintering refuges for beneficial predatory invertebrates that feed on pests (for example, ground and rove beetles). Careful management of agro-chemicals (through integrated pest management approaches) may reduce the need for chemical intervention. Financial support for farmers channelled through agri-environment schemes (for example, Environmental Stewardship) helps to fund these habitats in cropping areas.

[7] *Shoreline Management Plan 7* (previously Sub-Cell 3C), Suffolk Coastal District Council (May 2012)

Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration:** This is provided by the dynamic low-lying coast with its sheltered estuaries, sweeping marshes, wetlands and drained pastures; the lush inland river valleys and the dry, rolling Sandlings that form a distinctive mosaic of heathland, woodland and farmland; rural settlements with their use of traditional building vernacular (for example, Dutch gables, painted render, straw and reed thatch); and distinctive seaside resort towns with their Victorian villas, promenade gardens and brightly painted beach huts (for example, Southwold, Aldeburgh and Felixstowe).

Sense of place provided by moored small boats on the Deben Estuary at sunset.

Writers, naturalists, artists and composers, including Benjamin Britten, have been inspired by the area's quality of light, open skies and unspoilt rural tranquillity. Benjamin Britten and Peter Pears founded the Aldeburgh Festival in 1948 and today it still maintains an international reputation of cultural importance. Authors such as PD James and Ruth Rendell have written novels located in part on the Suffolk Coast and artists including Paul Evans and Maggi Hambling have portrayed the dynamic landscapes.

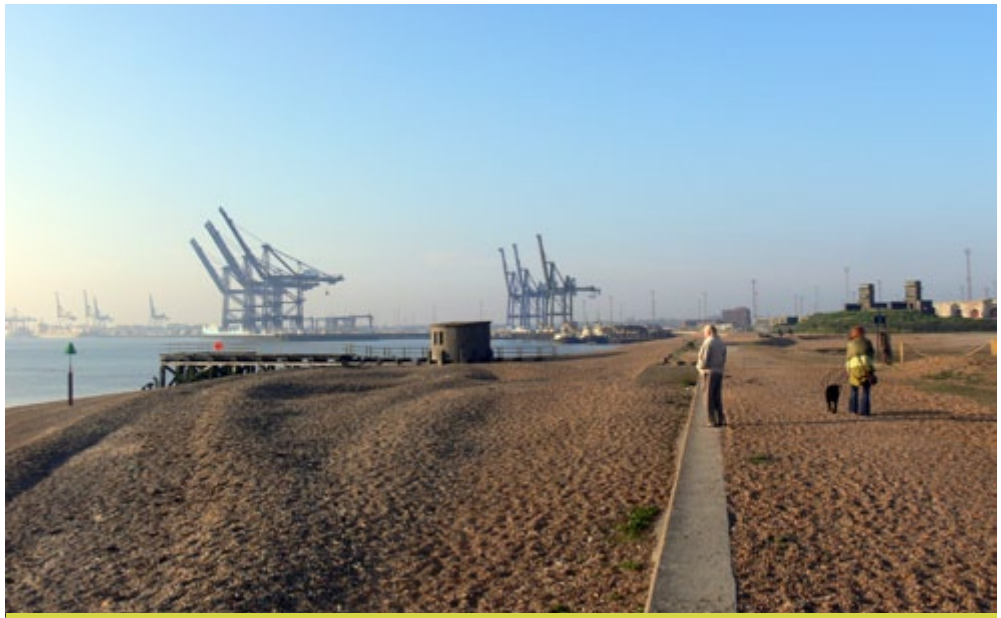
- **Sense of history:** Evidence for human occupation 700,000 years ago as well as the fossil evidence for the landscapes and climates of the past, medieval settlement patterns, river valley irregular field enclosures, Roman roads and, in particular, the internationally important Sutton Hoo burials (the most renowned collection of Anglo-Saxon burial mounds in the country) provide a strong sense of history. Some 13 per cent of the NCA is designated as a Heritage Coast and includes the historic port towns of Woodbridge with its fine late-medieval and post-medieval buildings and the village of Dunwich with the remains of a 13th-century Franciscan friary (Greyfriars) and the leper hospital of St James. A range of relic anti-invasion coastal defence works provide a sense of the wartime importance of the NCA (for example, Napoleonic Martello towers, Felixstowe's Landguard Fort and Harwich's Redoubt, radar development installations at Bawdsey Manor and the Cold War military testing area on Orford Ness). Other features include many large medieval churches, often since reduced in size reflecting changing populations and wealth distribution, country houses, historic parklands and estate lands. Sea defences constructed following the major floods of 1953 are a vivid reminder of a long history of coastal flooding.

- **Tranquillity:** Much of the NCA retains a remote, wilderness quality with a scale and sense of space that is unusual in eastern England. Some 52 per cent of the area is classified by the Campaign to Protect Rural England as 'undisturbed'.

Limited settlement, especially within the AONB, large forests, heathlands and remote coastal stretches, all contribute and are integral to the distinctiveness of the NCA. The urban centres of Ipswich and Lowestoft, the Haven Ports and the main transport corridors linking these centres are the least tranquil areas.

- **Recreation:** The Suffolk Coast and Heaths AONB covers 45 per cent of the NCA. A total of 142 ha also fall within the Dedham Vale AONB. The expansive network of semi-natural habitats, three National Nature Reserves and many other wildlife reserves (for example, the RSPB's Minsmere Reserve) underpin the area's thriving tourism trade, which is worth over £200 million per annum based directly on the natural environment of the AONB. Recreation is supported by 1,358 km of rights of way and around 7,560 ha of open access land (9 per cent of the NCA). The open shoreline provides access opportunities, while the estuaries are a valued resource for water-based recreation. Much of the coast is designated as a Royal Yachting Association sailing area and numerous golf courses are popular features. The heaths, forests and coastal towns all provide a highly significant regional recreational resource, which is supported by cultural festivals including the internationally renowned Aldeburgh Festival of Music and Arts centred on the Snape Maltings Concert Hall.

- **Biodiversity:** Some 16 per cent of the NCA is semi-natural and includes over 12,600 ha of strikingly varied Biodiversity Action Plan priority habitat including internationally significant lowland heathland and dry acid grassland and lowland mixed deciduous woodland with 1,028 ha of ancient woodland. Staverton Park with its medieval pollard oaks is of international importance. Coastal and flood plain grazing marsh, reedbeds and fens adjoin estuarine and shoreline habitats including intertidal flats and vegetated shingle. The Deben Estuary supports 40 per cent of Suffolk's remaining salt marsh.



Landguard Fort with its First and Second World War gun emplacements, contrasting with the more recent history of the Port of Felixstowe.

These habitats support an extremely diverse range of priority species including heathland birds such as stone curlew, nightjar and Dartford warbler, found on Blaxhall and Westleton Commons and Minsmere. Marshes (for example, Dingle and Snape wetlands and North Warren) are a magnet for breeding and wintering wildfowl and wading birds including avocet, white-fronted goose, lapwing and redshank. Reedbeds and grazing marshes hold a significant proportion of the UK's marsh harrier and breeding bittern together with otter and water vole. Watercourses support a reasonable cyprinid population dominated by roach, bream, dace and chub. Designations include five SPA, five SAC, four Ramsar sites and over 9,000 ha of SSSI.

- **Geodiversity:** The principal mineral resources are the sands and gravels present across the Sandlings and along the lower sides of the Stour and Orwell valleys. These are excavated for use in construction. Marine aggregates (sand and gravel) are also dredged offshore. In the 19th century Red Crag, which contains coprolite nodules rich in phosphate, was extracted to make fertiliser, supporting an important local industry centred along the River Deben. London Clay used to be extracted on a small scale at Chillesford and was used in the manufacture of bricks at the Aldeburgh Brickworks. Septaria (also known as cementstone) found with the London Clay has been used locally in old buildings (for example, Orford Castle) and exposures along much of this coast (for example, at Wrabness Cliff, Corton, Nacton and Pakefield) are of great geological and increasingly archaeological interest. The coastal geodiversity features (for example, soft cliffs, shingle spits and banks, including a unique ebb tidal shingle delta known as the Knolls at the mouth of the Deben Estuary) are particularly important for our understanding of Pleistocene geology and the evolution of the coastal landscapes.

The historic tranquil landscape of Pin Mill on the River Orwell.

Statements of Environmental Opportunity

SEO 1: Manage the nationally significant coastal landscapes, ensuring that coastal management decisions take full account of landscape, environmental and visual impacts as part of an integrated approach working with coastal processes. Improve people's understanding of the process of coastal change.

For example, by:

- Supporting the Estuary Partnerships in establishing a programme of community engagement, to explain the vulnerability of the National Character Area to coastal change and the interdependence between coastal erosion and a naturally functioning coast. Identify local concerns and aspirations to inform adaptation planning and encourage and promote local volunteering opportunities to further public engagement with the natural environment.
- In line with the Shoreline Management Plan 7, working in partnership to ensure that dynamic coastal processes continue to provide a coast protection function (for example, salt marsh creation in front of sea walls and natural evolution of coastal vegetated shingle and sand dunes) to enhance important habitats, the quality of the coastal landscape and natural coastal defence features.
- Delivering climate change and coastal change adaptation measures, through habitat enhancement and creation, managed realignment and habitat replacement where appropriate. This will be necessary where flood defences are currently inadequate and further defence work may result in losses to existing wetlands. Use the ecosystems services approach to develop wider understanding of the operation of natural processes.
- Ensuring that the coastal habitats, in particular vegetated shingle and coastal dunes, are conserved and protected from damage by recreational pressure, so that they continue to function as a natural coastal flood defence. Develop a strategy for coastal public access management, to protect coastal habitats.
- Raising awareness and improving the quality of understanding and enjoyment of the sensitive habitats and wildlife (for example, coastal heathlands, salt marsh, vegetated shingle and little tern nesting sites), through working in partnership with the Area of Outstanding Natural Beauty (AONB) and Estuary Partnerships and through clear signposting and interpretation.
- Facilitating community adaptation to coastal change, seeking new opportunities for access enhancements to the coast, estuaries and river valley flood plains and planning for the effects on local features of cultural heritage importance, including archaeological sites, such as Dunwich and Covehithe.
- Promoting and enhancing land management practices that help to restore natural features and support the active processes of the water environment that absorb floods and are beneficial for the rural economy and biodiversity (for example, reversion of flood plain arable land to grazing marsh and fen).

SEO 2: Manage the components of characteristic productive agricultural landscapes to benefit food production, biodiversity and soil and water quality. Promote sustainable farming practices that are able to adapt to changing agricultural economics, the considerable challenges of climate change and water availability.

For example, by:

- Working with landowners and partners to encourage sustainable farming practices and the diversification of cropping and livestock to assist adaptation to climate change, while restoring the connectivity of key habitats (especially lowland heaths and dry acid grassland) and enhancing the management of afforested land.
- Encouraging increased uptake of agri-environment schemes and options that improve soil quality and water infiltration (for example, cultivated margins) as well as supporting and increasing populations of farmland birds (for example, yellowhammer and tree sparrow) and rare arable weeds.
- Encouraging farmers to protect watercourses from water quality deterioration, reducing diffuse pollution by encouraging soil management improvements and the uptake of beneficial agri-environment schemes and options. Ensure compliance with regulations on nitrate vulnerable zones to manage fertiliser inputs.
- Working in partnership with farmers to encourage the uptake of and appropriate design and sensitive siting of new on-farm water storage, which will help to reduce the impacts of water abstraction and enhance biodiversity and landscape character.
- Encouraging new woodland creation on appropriate sites to improve soil quality and water infiltration, increase shading and help to prevent wind blow of light soils to reducing diffuse pollution, create wildlife habitats, sequester carbon, and eventually to provide income through sustainably produced timber.
- Enhancing the management of wetland habitats including wet pasture, coastal grazing marsh, fens and reedbeds. Carefully manage water availability and quality to achieve favourable ecological condition and secure their natural and cultural value.
- Ensuring that land management practices maintain and where necessary improve the condition of the Sites of Special Scientific Interest as well as continuing to conserve the wildlife species associated with the five Special Protection Areas and three National Nature Reserves.
- Reconnecting rivers to their flood plains where appropriate, to provide ecological and accessible green infrastructure networks at a landscape scale. Increase the use of river valleys and coastal wetlands for the storage of floodwaters, facilitating aquifer recharge and restoring and creating new habitats.

SEO 3: Increase and enhance public awareness and enjoyment of the distinctive assemblage of historic landscapes. Sustainably manage the agricultural, semi-natural, geological and rich archaeological and historic environment, as well as seeking opportunities for more integrated access to support recreation and education, while protecting the area's wildlife habitats and tranquillity.

For example, by:

- Facilitating the ability of viable agricultural businesses to undertake tailored agricultural and conservation management, to achieve a range of landscape enhancements such as the restoration of the historic Sandlings sheepwalk landscapes connected with arable enclosure, of traditional river valley pastoral landscapes and of acid grasslands where conversion to arable use has occurred.
- Managing woodland and hedgerow networks, including restoration of relict hedge-lines in prominent areas using locally distinctive species (elm in the north, Scots pine lines on the Deben Peninsula and holly on the Shotley Peninsula) to strengthen the historic landscape pattern, increase visual diversity and benefit habitat connectivity.
- Seeking to conserve important local geological features and enhance public understanding of geological and geomorphological resources (for example, exposures of Crag, sands, gravels and till).
- Promoting links between geological sites, archaeological evidence of human activity and the biological interest of these areas to achieve wider public understanding and enjoyment.
- Conserving historic parklands and estate lands, with their important veteran trees, located on the Sandlings/Clay divide (for example, Glemham, Somerleyton and Benacre Halls) and those associated with estuaries and forming a key characteristic of valley sides, in particular focusing on the continuity of the mature and veteran tree resource in the parklands and in the surrounding landscape.
- Maintaining and promoting the key physical and cultural elements that provide local identity, amenity and aesthetic value (for example, distinctive medieval and post-medieval timber-framed buildings and the use of colour-wash render), while allowing the landscape to continue to evolve and reflect the interactions between people and the environment.
- Promoting sustainable tourism, such as access to visitor attractions via green infrastructure networks, including cycling (for example, the Rendlesham Cycle Trail), walking (for example, the Sandlings Walk) and other sustainable transport options such as Coastlink – a bookable 'taxi/people carrier' service – to improve health and wellbeing and enjoyment of the environment, while supporting the local economy.
- Managing visitor pressures at popular and sensitive sites by investing in high-quality infrastructure and interpretation. Ensure that new infrastructure meets the different needs and levels of use of a range of visitors (for example, local communities, recreational day visitors and tourists) without being the cause of damage or degradation of natural assets.

SEO 4: Manage the forest plantations, to combine commercial forestry and fuel production with a mix of habitats for rare and endangered plants and animals, enhancing both their capability as a strategic recreational resource and their role in climate change adaptation and regulation.

For example, by:

- Understanding and balancing the different needs for commercial timber/fuel production, wildlife and public access to ensure that a sustainable integrated management approach is taken.
- Ensuring continued careful planning of felling and other woodland management to retain the variety of different woodland structures and transitions to lowland heath and woodland-edge habitats, for internationally important populations of woodlark and nightjar and rare and declining plants and invertebrates.
- Exploring the potential for new woodland types, including species more resilient to the potential challenges of climate change and new tree diseases.
- Ensuring careful management of the Sandlings Forests, helping to secure and enhance ecological networks and improving the recreational experience for visitors.
- Managing and mitigating the risk of potential widespread fires within the heathland and forest landscapes, guarding against the loss of life and property as well as damage to internationally significant habitats and local extinction of species.
- Encouraging the reinstatement of active management of existing farmland woodlands where they have been neglected, to strengthen the historic landscape character. Where appropriate, exploit commercial opportunities for resulting wood fuel and shooting.
- Encouraging local farm businesses to increase appropriate-scale generation of heat, utilising woody biomass for woodchip boilers, where it is sustainable to do so. This will in turn bring further opportunities for improved woodland management, while being mindful of locally valued landscape characteristics and sensitive habitats and species.
- Increasing the recreational benefits afforded by the Sandlings Forests, optimising the value of this currently under-utilised and extensive recreational asset, diverting pressure away from areas where biodiversity is adversely affected by public access.

Additional opportunity

1. Encourage measures which lead to the enhancement of existing settlements and the design and location of new developments and infrastructure. Provide wider associated social and cultural benefits through the provision and management of high-quality green infrastructure networks.

For example, by:

- Creating new multifunctional landscapes and habitats and extending at appropriate scales existing networks that are in character with the area and contribute to biodiversity through green infrastructure planning (for example, through delivery of the Haven Gateway Green Infrastructure Strategy).
- Working with partners to put in place the recommendations from the Haven Gateway Water Cycle Study, to ensure that water resources and flood risk management issues can be addressed in a sustainable way, to accommodate future planned growth.
- Conserving and appropriately managing the area's sense of place within the built environment and using this understanding, and the area's traditional settlement patterns, to plan for and inspire new development, particularly around Ipswich.
- Ensuring that high-quality green infrastructure is considered in all new build projects, encouraging developers and planners to consider this aspect at the outset of scheme design with the aim of promoting space for wildlife and outdoor recreation.
- Promoting the use of traditional building materials in building restoration or new development, where this would be appropriate to enhance the local character (for example, Coralline Crag 'rock bed', soft-hued red bricks and render painted in traditional colours).
- Protecting the unique characteristics of the coastal towns from inappropriate development (for example, Southwold, Aldeburgh and Walberswick).
- Ensuring that local development frameworks recognise the importance of conserving and enhancing the landscape to help to reduce the likelihood of negative impacts from new developments.
- Working in partnership with the holiday and leisure businesses to encourage best practice to ensure that measures are taken to control light and noise pollution in order to protect areas with high levels of tranquillity. This is particularly important within the AONB.
- Supporting the use of historic and landscape characterisations to inform change, and encouraging their use in community-based planning to help to identify locally valued townscapes, rural landscapes and heritage assets.
- Investigating ways of securing better management of heritage assets which contribute to the character of the area, particularly those which have been identified as 'heritage at risk'.

Supporting document 1: Key facts and data

Total area: 82,179 ha

1. Landscape and nature conservation designations

The Suffolk Coast and Heaths National Character Area (NCA) contains the Suffolk Coast and Heaths Area of Outstanding Natural Beauty (AONB) covering 37,257 ha, or 45 per cent of the NCA. 142 ha, less than 1 per cent of the National Character Area, fall within the Dedham Vale AONB. 10,508 ha, 13 per cent of the NCA, is designated as Heritage Coast.

Management plans for the protected landscapes can be found at:

- www.suffolkcoastandheaths.org
- www.dedhamvalestourvalley.org

Source: Natural England (2011)

1.1 Designated nature conservation sites

The NCA includes the following statutory nature conservation designations:

Tier	Designation	Name	Area (ha)	Percentage of NCA
International	Ramsar	Minsmere-Walberswick; Alde-Ore Estuary; Stour and Orwell Estuaries; Deben Estuary	3,836	5
European	Special Protection Area (SPA)	Sandlings SPA; Minsmere-Walberswick SPA; Alde-Ore Estuary SPA; Stour and Orwell Estuaries SPA; Deben Estuary SPA	7,596	9
	Special Area of Conservation (SAC)	Minsmere to Walberswick Heaths & Marshes SAC; Orford Ness-Shingle Street SAC; Alde-Ore & Butley Estuaries SAC; Benacre to Easton Bavents Lagoons SAC; Staverton Park & The Thicks, Wantisden SAC.	3,035	4
National	National Nature Reserve (NNR)	Suffolk Coast NNR; Orford Ness-Havergate NNR; Benacre NNR; Westleton Heath NNR	2,180	3
National	Site of Special Scientific Interest (SSSI)	A total of 50 sites wholly or partly within the NCA	9,086	11

Source: Natural England (2011)

Please note: (i) Designated areas may overlap (ii) all figures are cut to Mean High Water Line, designations that span coastal areas/views below this line will not be included.

In summary, land covered by international nature conservation designations totals 7,809 ha (9 per cent of the total area). National designations cover 9,176 ha (24 per cent of the total area).

There are 268 local sites in Suffolk Coast and Heaths covering 6,785 ha which is 8 per cent of the NCA.

Source: Natural England (2011)

- Details of individual Sites of Special Scientific Interest can be searched at: http://www.sssi.naturalengland.org.uk/Special/sssi/search.cfm
- Details of Local Nature Reserves (LNR) can be searched: http://www.lnr.naturalengland.org.uk/Special/lnr/lnr_search.asp
- Maps showing locations of Statutory sites can be found at: http://magic.defra.gov.uk – select 'Designations/Land-Based Designations/ Statutory'

1.2 Condition of designated sites

SSSI condition category	Area (ha)	Percentage of SSSI in category condition
Unfavourable declining	511	6
Favourable	5,686	63
Unfavourable no change	154	2
Unfavourable recovering	2,696	30

Source: Natural England (March 2011)

Details of SSSI condition can be searched at:
http://www.sssi.naturalengland.org.uk/Special/sssi/reportIndex.cfm

2. Landform, geology and soils

2.1 Elevation

The NCA is a lowland area, with elevation ranging from approximately 1.5 m below sea level to a maximum of 51 m above sea level. The average elevation of the landscape is 16 m.

Source: Natural England (2010)

2.2 Landform and process

The landform of the area is notably different from the rest of East Anglia and includes a low lying coast with open beaches and shingle structures including Benacre Ness and Orford Ness, both of which are actively moving through the continual erosion and deposition of shingle. At about 16 km in length, the Orford Ness is the largest spit of its type on the east coast. Along much of the coast between the estuaries and rivers, rapidly eroding low cliff lines are retreating inland by several metres each year, and salt marshes are steadily shrinking. Erosion will occur as long as sea level rise and a slow lowering of land level continue. Flandrian (the most recent interval of Earth history, the last 10,000 years) flooding of valleys draining the inland plateau has formed the more southern estuaries. The Orwell Bridge spans one such drowned valley. Changes in relief between the sandy rolling 'upland' and the estuaries are slight. Inland the plateau is dissected by gently sloping alluvial valleys which create a small-scale rolling landscape.

Source: Suffolk Coast and Heaths Natural Area Profile, Suffolk Coast and Heaths Countryside Character Area description.

2.3 Bedrock geology

The underlying geology of the area consists of late Cretaceous Chalk covered by Pliocene-Pleistocene Crag formations (shell-rich, muddy and sandy sediments), which was deposited over a long period of time in shallow marine or estuarine waters, in cool or temperate climates, approximately 2 to 4 million

years ago. In a few places deposits of Eocene London Clay underlie the Crag or are at the surface. The London Clay is well-exposed at Wrabness Cliff and on the foreshore at Harwich. The latter site is notable for its Tertiary fossil flora. Septaria (a compact mass of sedimentary rock formed by the precipitation of mineral cement) platforms at Wrabness Cliff and at Nacton are of great geological interest. Two types of Crag formation are present in the National Character Area; Coralline Crag and the Early Pleistocene Red Crag.

Source: Suffolk Coast and Heaths Natural Area Profile, Suffolk Coast and Heaths Countryside Character Area description.

2.4 Superficial deposits

Substantial quantities of outwash gravels and till derived from northern Britain and the North Sea basin were deposited on land following the Anglian glaciation, 450,000 years ago. The chalky till is best seen in coastal sections in the north of the NCA, although it is also found in excavations such as quarries. As the ice retreated fast-flowing streams also transported sands and gravels over the landscape, giving rise to some of today's sandy soils.

Source: Suffolk Coast and Heaths Natural Area Profile, Suffolk Coast and Heaths Countryside Character Area description

2.5 Designated geological sites

Tier	Designation	Number
National	Geological Site of Special Scientific Interest (SSSI)	20
National	Mixed interest SSSI	3
Local	Local Geological Sites	2

Source: Natural England (2011)

- Details of individual Sites of Special Scientific Interest can be searched at: http://www.sssi.naturalengland.org.uk/Special/sssi/search.cfm

2.6 Soils and Agricultural Land Classification

The soils are of glacial outwash sands, gravels and till in origin and are spread in narrow, discontinuous tracts along the coast from Great Yarmouth to Aldeburgh, spreading inland and extending over a low till plateau past Woodbridge to Ipswich. The soils are light and sandy and easily worked often resulting in wind erosion. Agricultural land is dependent on irrigation. The lower sides of the Stour and Orwell valleys contain a variety of sands, gravels and pockets of the underlying London Clay, which produces more fertile soils. The coast comprises shifting golden shingle and sand beaches and vulnerable eroding cliff lines.

Source: Suffolk Coast and Heaths Natural Area Profile, Suffolk Coast and Heaths Countryside Character Area description

The main grades of agricultural land in the NCA are broken down as follows (as a proportion of total land area):

Agricultural Land Classification	Area (ha)	Percentage of NCA
Grade 1	1,004	1
Grade 2	1,617	2
Grade 3	13,720	17
Grade 4	21,011	26
Grade 5	0	0
Non-agricultural	10,694	13
Urban	5,391	7

Source: Natural England (2010)

Maps showing locations of sites can be found at:
http://magic.defra.gov.uk – select 'Landscape' (shows ALC and 27 types of soils)

3. Key waterbodies and catchments

3.1 Major rivers/canals

The following major rivers/canals (by length) have been identified in this NCA.

Name	Length in NCA (km)
River Alde	9 (40)
River Blyth	4 (44)
River Deben	8
River Orwell	(17)
River Stour	<1 (19)

Source: Natural England (2010)

Please note: other significant rivers (by volume) may also occur. These are not listed where the length within the NCA is short. Figures including tidal stretches of the river running into the NCA are shown in brackets.

The rivers have fairly small catchments with their headwaters further inland in the uplands of the adjacent NCAs of South Norfolk and High Suffolk Claylands and South Suffolk and North Essex Claylands. Due to the catchment area receiving generally low rainfall the mean flow rates of these rivers are rather small. The rivers form intimate twisting valleys that widen as they get nearer to the sea.

The coastline is cut by a series of estuaries comprising the lower reaches of the rivers Stour, Orwell, Deben, Butley and Alde, together with the low-lying valleys of the Hundred River, Minsmere River, Dunwich River and the River Blyth.

The Orwell Estuary is long and narrow and heavily influenced by the sea which is the dominant source of sediments, and which causes the estuary to be saline far upstream. The upper tidal limits of the Orwell are enclosed by the town of Ipswich and its lower reaches are dominated by the Port of Felixstowe.

The Stour Estuary is long, with an indented shoreline that has five main bays; Seafield, Holbrook, Erwarton, Jacques and Copperas. The mouth of the estuary discharges into the lower reaches of the Orwell Estuary.

The Deben Estuary is long and narrow with extensive mudflats (40 per cent of Suffolk's salt marsh). It has been greatly modified by agricultural land-claim with the loss of large areas of mudflats and salt marsh. The settlement of Woodbridge lies at the head of the estuary. The mouth of the estuary lies between Bawdsey and Felixstowe Ferry where there is a narrow entrance and fast tidal stream. Outside of the entrance there are a series of unique ebb tide delta shingle ridges and banks known as The Knolls.

The estuary of the rivers Alde-Ore and Butley is dominated by the Orford Ness shingle spit that has been extending along the coast pushing the mouth of the River Alde-Ore progressively south-west to its present position.

The upper estuary of the River Blyth is a narrow channel that, downstream of Blythburgh, opens out into a broad sheltered intertidal flat. The estuary has been extensively altered with large areas claimed for grazing marsh although some areas have reverted to intertidal flats and salt marsh due to breaches of the sea wall. In its lower reaches the estuary connects with the sea by a narrow, canalised channel.

Alton Water (or Alton Reservoir) is a manmade reservoir. It is the largest area of inland water in Suffolk with a circumference of more than 13 km. It is fed from the River Gipping (NCA 86) and bore holes on the north side of the River Orwell.

Source: Suffolk Coast and Heaths Natural Area Profile, Suffolk Coast and Heaths Countryside Character Area description, An inventory of UK estuaries.

3.2 Water quality

The total area of Nitrate Vulnerable Zone is 80,155 ha or 98 per cent of the NCA.

Source: Natural England (2010)

3.3 Water Framework Directive

Maps are available from the Environment Agency showing current and projected future status of water bodies http://maps.environment-agency.gov.uk/wiyby/wiybyController?ep=maptopics&lang=_e

4. Trees and woodlands

4.1 Total woodland cover

This NCA contains 10,618 ha of woodland or 13 per cent of the NCA, of which there are 1,028 ha of ancient woodland.

Source: Natural England (2010), Forestry Commission (2011)

4.2 Distribution and size of woodland and trees in the landscape

The Sandlings have some substantial areas of woodland closely associated with heathland and birch scrub, including the 19th and 20th century coniferous plantations of Rendlesham, Tunstall and Dunwich Forests in the southern core of the NCA.

A great proportion of the trees associated with these forests were blown down in the 1987 October storm. Much of the plantation area now consists of trees planted after that date. Areas of older plantation woodland and wood pasture occur within the estate and landscaped parkland of the numerous country houses along the Stour and Orwell estuary slopes (for example Orwell Park, Wherstead Park, Holbrook Park and Freston Park) as well as the river valleys and the higher inland areas along the A12 in the west, together with farm woodlands and field boundary trees. More recent mixed plantations providing shooting cover are also a common attribute of the estates.

Semi-natural ancient woodland is comparatively scarce, the major example being Staverton Park which contains around 4,700 medieval pollard oaks and some of the mightiest hollies, birches and rowans to be found in the country.

The area has suffered significant tree loss as a result of Dutch elm disease.

The coastal marshes are largely devoid of woodland, and hedged boundaries are infrequent. Scrub growth is a growing trend.

Suffolk Coast and Heaths Natural Area Profile, Suffolk Coast and Heaths Countryside Character Area description.

The semi-natural ancient woodland of Staverton Park and The Thicks, Wantisden SAC.

4.3 Woodland types

A statistical breakdown of the area and type of woodland found across the NCA is detailed below.

Area and proportion of different woodland types in the NCA (over 2 ha)

Woodland type	Area (ha)	Percentage of NCA
Broadleaved	5,736	7
Coniferous	3,868	5
Mixed	680	1
Other	334	<1

Source: Forestry Commission (2011)

Area and proportion of ancient woodland and planted ancient woodland sites (PAWS) within the NCA.

Woodland type	Area (ha)	Percentage of NCA
Ancient semi-natural woodland	652	<1
Ancient re-planted woodland (PAWS)	376	<1

Source: Natural England (2004)

5. Boundary features and patterns

5.1 Boundary features

In some areas field boundary hedgerows have been removed and trees have been lost creating extensive open landscapes. Elsewhere hedgerows and tree belts have been retained creating a smaller scale landscape. The area is laced with lanes and minor roads which follow and reinforce the field boundaries.

Source: Suffolk Coast and Heaths Countryside Character Area description; Countryside Quality Counts (2003)

5.2 Field patterns

There is a contrast between the predominantly irregular field patterns of the inland alluvial valleys and the more regular ones of the more open coastal areas. The valleys support a historical field pattern of narrow strips of meadow on the valley floors and irregular small scale fields on the sides. Across the Sandlings the fields are larger and boundaries straighter, resulting mainly from 18th and 19th century enclosure of the formerly extensive areas of heath and sheep-walk, and the reorganisation of the areas of arable land. Some, but certainly not all of the arable land, formerly lay in common fields, but most of these were largely gone by the 18th century and formal parliamentary enclosure of common arable only occurred in a few areas around Orford and more extensively to the north of Lowestoft. Within this landscape large estates, such as Benacre, Henham, Sudbourne and Sutton, rather than the small farms of the adjoining clay plateau, give a degree of uniformity to the land cover.

Source: Suffolk Coast and Heaths Countryside Character Area description; Countryside Quality Counts (2003)

6. Agriculture

The following data has been taken from the Agricultural Census linked to this NCA.

6.1 Farm type

This area produces cereals, cash roots and vegetables. Livestock rearing is predominantly of pigs, sheep and cattle. The landscape's mixed farming character is supported by the breakdown of farm types: 114 general cropping (24 per cent); 52 grazing livestock holdings (11 per cent); 91 cereal (19 per cent); 20 specialist pigs (4 per cent); 13 specialist poultry (3 per cent); 16 mixed (3 per cent) and 36 horticulture (8 per cent). Trends show that there has been a 37 per cent decrease in general cropping farms (42 holdings). Horticultural holdings have also decreased in number by 30 per cent (15 holdings). Cereal farms have

increased in number by 28 per cent (20 holdings).The number of livestock holdings has increased overall by 18 per cent, with the largest percentage increase in specialist poultry of 85 per cent (6 holdings). Specialist pig holdings have increased in number by 33 per cent (5 holdings) and dairy farms have shown a modest increase in number of 18 per cent or 2 extra farms.

Source: Agricultural Census, Defra (2010)

6.2 Farm size

Farms in the largest size bracket of more than 100 ha are the most numerous, accounting for 136 holdings or 29 per cent. Close behind are holdings in the second smallest bracket of 5 to 20 ha, accounting for 124 holdings or 26 per cent. All the size brackets are well represented in the area as holdings of less than 5 ha account for 11 per cent of holdings (50 holdings), 20 to 50 ha account for 21 per cent (97 holdings) and 50 to 100 ha account for 13 per cent (60 holdings). Overall, holdings over 100 ha make up 83 per cent of the total farmed area, compared to those of 5 to 20 ha which cover only 2.5 per cent of the farmed area. The trend under 'farm size' varies within size brackets when comparing 2009 figures with 2000 ones, although the overall number of holdings has remained the same at 467 holdings. Holdings of 5 to 20 ha and 20 to 50 ha have increased in number while holdings of less than 5 ha, 50 to 100 ha and over 100 ha have decreased in number compared with 2000. The biggest increase has been numbers of holdings in the 5 to 20 ha size bracket which shows a rise of 20 per cent or 21 holdings, with the biggest decrease being in holdings in the less than 5 ha category which have fallen by 21 per cent or 13 holdings.

Source: Agricultural Census, Defra (2010)

6.3 Farm ownership

2009: Total farm area = 53,400 ha; owned land = 36,366 ha.
2000: Total farm area = 52,703 ha; owned land = 37,143 ha.

Sixty-eight per cent of the total farmed area is owner occupied, with 32 per cent tenanted. Compared with the 2000 figures, owned farmland has decreased by 777 ha or 3 per cent, and tenanted land has increased by 828 ha or 5 per cent. The total farmed area in 2009 compared with 2000 has increased by 697 ha or 1 per cent.

Source: Agricultural Census, Defra (2010);

6.4 Land use

The dominant land use is the growing of cereals accounting for 18,815 ha (35 per cent of the total farmed area). Grassland (including uncropped land) accounts for 13,825 ha (26 per cent), followed by cash root crops (potatoes and sugar beet) which account for 7,542 ha (14 per cent of the total farmed area). Between 2000 and 2009 there was a decrease in the area of land used for growing cereals of 2,691 ha or 13 per cent; grassland increased very slightly by 146 ha (1 per cent) and cash root crops increased by 748 ha (11 per cent). The same period saw a massive percentage increase in the area of land used for stock feeds which increased by 327 ha or 447 per cent, although overall stock feeds are a small land use. Land farmed for oilseeds increased by 95 per cent or 1,375 ha with growing of vegetables increasing by 1,214 ha or 72 per cent. Fruit, hardy nursery stock and glasshouses, which are all small land uses, all decreased over this period.

Source: Agricultural Census, Defra (2010)

6.5 Livestock numbers

Within this landscape pigs far outnumber sheep and cattle combined with 77,600 pigs, 19,000 sheep and 8,900 cattle. Between 2000 and 2009 there has been a decrease in the numbers of all stock with pigs dropping by 17,600 (19 per cent), sheep by 4,100 (18 per cent) and cattle by 3,500 (29 per cent).

Source: Agricultural Census, Defra (2010)

6.6 Farm labour

The figures suggest that the vast majority of holdings are run by dedicated principal farmers (including their spouses and business partners) compared to salaried managers (629 principal farmers, 75 salaried managers), with nearly double the number of full time workers compared to part time workers. Trends from 2000 to 2009 show a decrease in the number of principal farmers (down by 45 or 7 per cent), and also a decrease in salaried managers (down by 37 or 34 per cent). The numbers of full time employees has decreased substantially by 192 (36 per cent), with a very small decrease in part time workers of 2. Casual workers have also decreased during the same period falling by 73 or 17 per cent.

Source: Agricultural Census, Defra (2010)

Please note: (i) Some of the Census data are estimated by Defra so may not present a precise assessment of agriculture within this area (ii) Data refers to commercial holdings only (iii) Data includes land outside of the NCA where it belongs to holdings whose centre point is recorded as being within the NCA.

7. Key habitats and species

7.1 Habitat distribution/coverage

Coastal and flood plain grazing marsh: This important habitat supports large numbers of breeding wading birds, particularly redshank and lapwing. In winter, large flocks of wildfowl and waders feed and roost on the marshes, particularly at high tide when the adjacent mudflat and salt marsh is covered with water. Some grazing marshes are rich in plant species. The dyke systems within grazing marshes, some of which are medieval in origin, have a range of water salinities from fresh to brackish. They support a range of plant communities, from those with submerged and floating plants to those filled with tall emergent plants such as reed. Scarce plants such as whorled water-milfoil and soft hornwort can often be found, particularly where nutrient levels are low and there is a brackish influence. The invertebrate interest of dykes is often significant. Species diversity can be high, especially among groups such as water beetles.

Reedbed and fen: The largest and most important reedbeds are found associated with saline lagoons behind shingle banks which have diverted rivers (for example Pottersbridge Marshes) or where large areas of grazing marsh has been flooded and grazing has ceased (such as Minsmere Marshes and Westwood Marshes). Smaller reedbeds are found scattered throughout the coastal marshes, which are too wet or awkward to graze, or in narrow stands at the edge of the upper estuaries. There are two types of reedbed in the NCA; reedbeds on permanently flooded land or at the edge of waterbodies; and reedbed and fen where the water levels are lower. Reedbeds of over 20 ha are used by rare reedbed birds such as bittern, marsh harrier, bearded tit, Savi's warbler and Cetti's warbler, as nesting and/or overwintering habitat. A mosaic of wet and dry reedbed, open water and scrub margins provides suitable conditions for most of these species. Many rare and scarce invertebrates occur in the reedbeds, such as the white-mantled wainscot moth.

Coastal vegetated shingle and dune: The shingle present on the coast is derived from the erosion of cliffs and from marine deposits of flints. Over the last few centuries at least, there has been, and continues to be a general southerly movement of shingle along the Suffolk coast, driven by the tides and waves. This southerly movement has built up a number of large shingle structures, such as Benacre Ness and Orford Ness. Other shingle structures of particular interest along the coast are at Thorpeness, Shingle Street and the Landguard peninsula. The moving shingle has also blocked a few small river mouths, creating saline lagoons, such as Covehithe, Easton and Benacre Broads. The large size of these shingle structures means that a high proportion

of the shingle is not regularly exposed to wave action so has become sufficiently stable to allow plant growth. A wide range of plant communities is present, from pioneer communities of sea pea, sea kale and yellow horned poppy on more mobile shingle to a thin turf of 'shingle heath' on stable areas comprising of sea campion and plants more often found on inland acid grassland. The proportion of sand on the beaches varies. Most beaches are pure shingle but in places the proportion rises to resemble sand dune. Shingle beaches are used by nesting birds such as lesser black-backed gull, little tern and ringed plover, where there is little human disturbance.

Yellow horned poppy growing on accreted shingle at Minsmere.

Saline lagoons: These are an internationally important habitat, because of the very small size of the resource and the specialised invertebrate fauna found within them. There are three types of saline lagoon. The difference in them depends upon how they were formed. The largest ones (barrier lagoons) were formed when shingle is washed along the shoreline and blocks the mouths of small rivers, causing a pond to form, for example at Benacre Broad. Sea water seeps in through the shingle and mixes with the freshwater input, causing brackish conditions. Other lagoons occupy depressions in shingle beaches, where water from land and sea move through the shingle and mix in the lagoon. The third type of lagoon is formed in depressions on land behind ridged shingle beaches, often on land that was formerly grazing marsh. Some of these lagoons of the last two types are in man-made depressions, such as old gravel workings on Orford Ness or the RSPB's excavations at Minsmere. The starlet sea anemone *Nematostella vectensis* is found in the lagoons at Shingle Street, Orford Ness, in the Stour Estuary and at just two other places in the UK. The large, shallow lagoons at Minsmere and Havergate Island support many species of breeding waders and wildfowl, including a high proportion of the UK's breeding population of avocet. The larger lagoons, such as Benacre Broad, are also important in winter as they support high numbers of migrant waterfowl.

Inter-tidal mudflat and salt marsh: There are five estuaries in the NCA; the Blyth, Alde-Ore, Deben, Orwell and Stour. They all have extensive inter-tidal mudflats fringed by salt marsh and are internationally important for their overwintering bird populations. The estuaries support internationally important numbers of redshank, black-tailed godwit, teal, avocet, brent goose, grey plover, ringed plover, dunlin and shelduck. The Stour has the largest wintering population of black-tailed godwit in the UK and the Alde-Ore supports half of the country's avocets. Salt marshes are found at the edge of estuaries and represent a transition between mudflats and terrestrial habitat.

One-third of the Suffolk salt marsh area is within the Deben Estuary, while the Orwell and Stour estuaries have relatively little. In spring, about 250 pairs of redshank breed on the salt marshes. In winter they provide roosting areas for the large flocks of waders and wildfowl at high tide, and they are also grazed by over-wintering flocks of brent geese and wigeon.

Lowland acid grassland: This habitat is found in association with the Sandling heaths where the heaths are a mosaic of heather-dominated heathland, grassland, bracken, pine, birch and gorse scrub, and woodland.

Lowland heathland: The habitat is usually dominated by heather and sometimes bell heather. Other plants occurring include sheep's fescue, bent grasses, tormentil, heath milkwort, heath bedstraw, sheep's sorrel and harebell. The mosaic of different vegetation types provide ideal breeding habitat for woodlark and nightjar. Stone curlews once bred on the heaths, but the land is usually not grazed heavily enough to create the very short turf required by them. Disturbance by people is also a factor; however, these very rare birds now breed on arable land in the area. Natterjack toads have recently been re-introduced in an attempt to replace the population that became extinct in the 1920s. The heaths also support a wide range of invertebrates including the silver-studded blue butterfly, which now occurs on around one-third of the remaining heaths. Sandy track edges provide ideal conditions for the larval stage of ant-lions, which are found nowhere else in UK. Flies and grasshoppers are also represented by a large number of species including, some uncommon ones. One of the rarest plants found on heaths is the red-tipped cudweed which requires the sandy soil to be disturbed in autumn to allow its seeds to germinate.

Coniferous woodland: There are three large blocks of managed conifer plantation at Dunwich, Tunstall and Rendlesham, known collectively as the Sandlings Forests. Many much smaller plantations are scattered throughout the NCA, mostly in private ownership. It is the open spaces between blocks of conifers that are of most conservation interest. The open space is a direct link with the heaths upon which the trees were originally planted. The tree canopy is also of interest supporting birds like the crossbill and hobby. Permanent open space such as glades, recreation areas and wide rides (tracks) support heathland vegetation and associated invertebrates such as green hairstreak butterfly. Temporary open space created following tree felling operations is valuable in providing temporary habitat for some mobile heathland species. Tussocky vegetation and short grassland within temporary open spaces and the larger permanent open spaces are ideal breeding and feeding habitat for woodlark and nightjar.

Ancient broadleaved woodland: The ancient woodlands of the NCA are located mostly in the parishes of Sudbourne, Wantisden, Rendlesham, and Iken. They are mostly dominated by oak, with birch being a quick coloniser of openings in the canopy. In the south of the area sweet chestnut has been widely planted in the place of the original trees and shrubs. The typical understorey consists of hazel, with holly and rowan. Bracken bramble and honeysuckle are abundant in the ground flora, especially where there is a partially open canopy casting only light shade. Red campion, foxglove, climbing corydalis and stitchworts are common on track sides where there is soil disturbance. Bluebells are often abundant where the ground is shaded and there is little disturbance. Stour and Copperas Woods on the south bank of the Stour Estuary were originally oak/hornbeam woods, but sweet chestnut has been planted in place of the hornbeam. Stour Wood is the oldest recorded sweet chestnut plantation in the UK. These woods and adjacent ancient woods have an abundance of wild cherry. Iken Wood was managed from medieval times as a coppice wood and now has huge coppice stools of oak and hazel dominating the surviving part of the wood.

Wood pasture and parkland: Variations in historical management have made dramatic changes to the character of woods. Staverton Park contains one of the greatest collections of ancient oak, birch and holly trees in the UK; 4,700 pollards remain on this 89 ha site which is particularly renowned for the huge holly trees. The trees support a unique range of rare lichens, fungi, beetles, spiders and other invertebrates as well as many bird species including hole-nesting birds such as hawfinches and barn owls.

Source: Suffolk Coast and Heaths Natural Area Profile.

7.2 Priority habitats

The Government's new strategy for biodiversity in England, Biodiversity 2020, replaces the previous Biodiversity Action Plan (BAP) led approach. Priority habitats and species are identified in Biodiversity 2020, but references to BAP priority habitats and species, and previous national targets have been removed. Biodiversity Action Plans remain a useful source of guidance and information. More information about Biodiversity 2020 can be found at; www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/englandsbiodiversitystrategy2011.aspx.

The NCA contains the following areas of mapped priority habitats (as mapped by National Inventories). Footnotes denote local/expert interpretation. This will be used to inform future national inventory updates.

Priority habitat	Area (ha)	Percentage of NCA
Coastal and flood plain grazing marsh	3,209	4
Broadleaved mixed and yew woodland (broad habitat)	2,974	4
Lowland dry acid grassland	2,163	3
Lowland heathland	1,347	2
Reedbeds	1,089	1
Coastal vegetated shingle	606	1
Purple moor grass and rush pasture	564	1
Fens	444	1
Maritime cliff and slope	242	<1
Lowland meadows	193	<1
Mudflats	84	<1
Saline lagoons	79	<1
Coastal sand dunes	25	<1

Source: Natural England (2011)

- Maps showing locations of Priority Habitats are available at: http://magic.defra.gov.uk – Select 'Habitats and Species/Habitats'

7.3 Key species and assemblages of species

- Maps showing locations of some key species are available at: http://magic.defra.gov.uk – Select 'Habitats and Species/Habitats'

- Maps showing locations of S41 species are available at: http://data.nbn.org.uk/

8. Settlement and development patterns

8.1 Settlement pattern

The area, which spans three district authorities, is home to more than 200,000 people.

The majority of the character area is sparsely settled with small isolated, nucleated medieval hamlets and villages complementing a scatter of isolated farmsteads, traditional barns and cottages throughout the rural area.

Larger and later settlement is largely restricted to the northern and southern extremities of the area; the former fishing port of Lowestoft to the north and Ipswich in the south. The eastern flank of Ipswich has expanded significantly into the area. Harwich and Felixstowe have also seen growth around their more traditional centres.

Many of the coastal towns such as Aldeburgh and Southwold have seen little modern development. Settlement expansion around these once historic ports declined as a result of shifting coastal landscape.

Source: Suffolk Coast and Heaths Countryside Character Area description; Countryside Quality Counts (2003)

8.2 Main settlements

The main urban settlement within the Suffolk Coast and Heaths NCA is Ipswich (east). Coastal towns include; Lowestoft, Felixstowe, Aldeburgh and Southwold. The total estimated population for this NCA (derived from ONS 2001 census data) is: 286,384.

Source: Suffolk Coast and Heaths Countryside Character Area description; Countryside Quality Counts (2003), Natural England (2012)

8.3 Local vernacular and building materials

Buildings were predominantly constructed using timber frames until the 18th century. The wider use of brick, mainly locally produced soft hued red bricks, thatch and clay pantiles dates from the later 17th century and is now strongly characteristic. Some buildings are rendered and painted. Today this is done with modern masonry paints in a variety of colours, but in the past distemper or limewash were used. Earth pigments such as red or yellow ochre were most common, giving a range of colour from cream through pink to red. Other buildings, including churches, make extensive use of locally occurring split or knapped flint. Coastal settlements are distinctive in character, many enjoying a relatively unspoilt atmosphere. Some show the influence of Dutch architecture in use of shaped brick gables. Woodbridge retains an impressive selection of late-medieval and post-medieval buildings.

Source: Suffolk Coast and Heaths Countryside Character Area description; Countryside Quality Counts (2003)

9. Key historic sites and features

9.1 Origin of historic features

Visible evidence of a long history of settlement begins with the stone tools, knapped from the local flint, and cut marked bones that bear testament to the presence of early humans around 7,000 years ago. Prehistoric clearance of woodland, which initiated the Sandling heaths, is still marked by prehistoric burial mounds and other earthworks.

The Sandlings heaths have been maintained by centuries of grazing, mainly by sheep, hence the term 'sheepwalk' or just 'walk' applied to many heaths. Extensive areas of heath across the Sandlings and coastal fringe were enclosed from the 18th through to the mid 20th century.

The more fertile soils of the inland river valleys and claylands had undergone extensive piecemeal enclosure by 1700 and few new farms were created here after 1750.

Signs of significant wealth and importance in the Anglo-Saxon period are evidenced by the internationally import Sutton Hoo burials site.

The town of Dunwich, now a small coastal "village", was a substantial port in the 11th century and is one of the candidates to be Dommoc, the seat of the

East Anglian bishopric in the 7th century. Most of the buildings and the harbour that were present in the 13th century have since disappeared into the sea due to coastal erosion, including all eight churches. The remains of a 13th-century Franciscan friary (Greyfriars) and the Leper hospital of St James, both once on the inland edge of the town, are about the only medieval remains still present.

Wealth generated by trade and connections to London is evident in the number of country houses, historic parklands and estate lands set back along the major estuaries.

The coastal area has a range of anti-invasion defence works including the Napoleonic Martello towers, Felixstowe's Landguard Fort and Harwich's Redoubt, and First and Second World War pill boxes and gun emplacements.

Other highly significant elements of the 20th century military heritage of the coast are the radar development installations at Bawdsey Manor and the Cold War military testing area on Orford Ness.

Source: Countryside Quality Counts Draft Historic Profile, Countryside Character Area description

9.2 Designated historic assets

This NCA has the following historic designations:

- 10 Registered Parks and Gardens covering 623 ha.
- No Registered Battlefields.
- 111 Scheduled Monuments.
- 2,280 Listed Buildings.

Source: Natural England (2010)

More information is available at the following address:

- http://www.english-heritage.org.uk/caring/heritage-at-risk/
- http://www.english-heritage.org.uk/professional/protection/process/national-heritage-list-for-england/

10. Recreation and access

10.1 Public access

- Nine per cent of the NCA, 7,560 ha, is classified as being publically accessible.
- There are 1,358 km of public rights of way at a density of 1.6 km per km2.
- There are no National Trails within the NCA.

Sources: Natural England (2010)

The table below shows the breakdown of land which is publically accessible in perpetuity:

Access designation	Area (ha)	Percentage of NCA
National Trust (Accessible all year)	131	<1
Common land	697	<1
Country Parks	134	<1
CROW Access Land (Section 4 and 16)	4,624	6
CROW Section 15	220	<1
Village Greens	19	<1
Doorstep Greens	3	<1
Forestry Commission Walkers Welcome Grants	514	<1
Local Nature Reserves (LNR)	193	<1
Millennium Greens	11	<1
Accessible National Nature Reserves (NNR)	2,180	3
Agri-environment scheme access	24	<1
Woods for People	3,925	5

Sources: Natural England (2011)

Please note: Common Land refers to land included in the 1965 commons register; CROW = Countryside and Rights of Way Act 2000; OC and RCL = Open Country and Registered Common Land.

11. Experiential qualities

11.1 Tranquillity

Based on the CPRE map of tranquillity (2006) it appears that the lowest scores for tranquillity are associated with the urban centres of Ipswich, Felixstowe and Harwich in the south and Lowestoft in the north of the NCA. Other areas of disturbance can be seen to be associated with the main transport routes linking these centres. The A12 runs inland along the western edge of the NCA linking the major towns. The A14 corridor is the major transport route linking the port of Felixstowe with the rest of the country both by road and rail. Small areas of disturbance are also present along the rivers and coast, including the coastal towns of Aldeburgh and Southwold. The highest scores for tranquillity are within the sparsely populated arable, heath and forested Sandlings.

A breakdown of tranquillity values for this NCA is detailed in the table below:

Tranquillity	Score
Highest value within NCA	120
Lowest value within NCA	-83
Mean value within NCA	0

Sources: CPRE (2006)

More information is available at the following address:
http://www.cpre.org.uk/resources/countryside/tranquil-places

11.2 Intrusion

The 2007 Intrusion Map (CPRE) shows the extent to which rural landscapes are 'intruded on' from urban development, noise (primarily traffic noise), and other sources of visual and auditory intrusion. This shows a similar pattern to the Tranquillity Map, with areas of disturbed land associated with the urban centres of Ipswich, Felixstowe and Harwich in the south and Lowestoft in the north of the NCA together with the smaller coastal towns of Aldeburgh, Southwold and the main road corridors linking these centres. There is also some disturbance noted along the coast and rivers which is most probably due to local recreation activities associated with these areas and the prevalence of tourism particularly throughout the summer months. A breakdown of intrusion values for this NCA is detailed in the table below.

Intrusion category	1960s (%)	1990s (%)	2007 (%)	Percentage change (1960s-2007)
Disturbed	27	35	40	13
Undisturbed	65	57	52	-13
Urban	4	5	8	4

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are an increase in disturbed or intruded land by nearly 13 per cent which is matched by a reduction of around -13 per cent of undisturbed or un-intruded land over the same timescale.

More information is available at the following address:
http://www.cpre.org.uk/resources/countryside/tranquil-places

12. Data sources

- British Geological Survey (2006)
- Natural Area Profiles, Natural England (published by English Nature 1993-1998)
- Countryside Character Descriptions, Natural England (regional volumes published by Countryside Commission/Countryside Agency 1998/1999)
- Joint Character Area GIS boundaries, Natural England (data created 2001)
- National Parks and AONBs GIS boundaries, Natural England (2006)
- Heritage Coast Boundaries, Natural England (2006)
- Agricultural Census June Survey, Defra (2000,2009)
- National Inventory of Woodland & Trees, Forestry Commission (2003)
- Countryside Quality Counts Draft Historic Profiles, English Heritage (2004)*
- Ancient Woodland Inventory, Natural England (2003)
- Priority Habitats GIS data, Natural England (March 2011)
- Special Areas of Conservation data, Natural England (data accessed in March 2011)
- Special Protection Areas data, Natural England (data accessed in March 2011)
- Ramsar sites data, Natural England (data accessed in March 2011)
- Sites of Special Scientific Interest, Natural England (data accessed in March 2011)
- Detailed River Network, Environment Agency (2008)
- Source protection zones, Environment Agency (2005)
- Registered Common Land GIS data, Natural England (2004)
- Open Country GIS data, Natural England (2004)
- Public Rights of Way Density, Defra (2011)
- National Trails, Natural England (2006)
- National Tranquillity Mapping data, CPRE (2007)
- Intrusion map data, CPRE (2007)
- Registered Battlefields, English Heritage (2005)
- Record of Scheduled Monuments, English Heritage (2006)
- Registered Parks and Gardens, English Heritage (2006)
- World Heritage Sites, English Heritage (2006)
- Incorporates Historic Landscape Characterisation and work for preliminary Historic Farmstead Character Statements (English Heritage/Countryside Agency 2006)Detailed River Network, Environment Agency (2008)

Please note all figures contained within the report have been rounded to the nearest unit. For this reason proportion figures will not (in all) cases add up to 100%. The convention <1 has been used to denote values less than a whole unit.

Supporting document 2: Landscape change

Recent changes and trends

Trees and woodlands

- In 1999 about 7 per cent of the established eligible National Inventory of Woodlands and Trees stock was covered by a Woodland Grant Scheme management agreement. In 2003 the proportion of established stock was about 6 per cent. About 10 per cent of the woodland cover is on an ancient woodland site and the proportion of these sites covered by a Woodland Grant Scheme agreement has changed since 1999 from 13 per cent to 22 per cent in 2003. Woodland character has probably been maintained.

- Managing the Sandlings Forests to achieve profitability has continued to be challenging in the context of world timber markets. The Forestry Commission has sought to broaden the base of income generation, through formal recreation and tourism enterprises, increasing public recreational opportunities enabling more people to access and interpret some of the special habitats and species found in the Sandlings. Increases in visitor numbers, have in some cases increased the pressure on the sensitive habitats and species. Variation in felling and planting policies and provision and management of open areas, has increased support of the Sandlings Special Protection Area. The planting of Corsican pine has come to a temporary halt, due to infection of the species by red band needle blight.

- Semi-natural ancient woodland is under threat from the recent arrival of new species of *Phytophera*. Ash dieback (*Chalara maxima*) was first reported in 2012. Acute oak decline is also present within the NCA, including at Staverton Park and The Thicks which was designated as a Special Area for Conservation in April 2005.

- There has been some re-creation of heathland habitats through the removal of tree planting (for example at Sutton Heath, Dunwich, Tunstall and Rendlesham forests), helping to restore the Sandlings open character. Some heathland areas have suffered though from invading scrub and bracken, leading to a decline of breeding nightjars and woodlarks.

- There have been recent improvements in bringing existing farmland woodlands into active management, including the replanting of estate woodland and parkland trees.

Boundary features

- Commercial agricultural improvement has been a major force in the transformation of the landscape. Combined with a number of other factors this has resulted in the loss of structural landscape features (for example hedgerows, ditches, banks, copses and lines of trees), especially in the Sandlings large-scale arable areas. It has also resulted in the progressive loss of the visual distinction between estuary valley sides and estuary valley floor. Loss of these features has now largely ceased and hedgerow replanting and management is increasing.

- Between 1999 and 2003 Countryside Stewardship capital agreements for linear features included fencing (24 km), hedge management (28 km), hedge planting and restoration (41 km), restored boundary protection (7 km). The estimated boundary length for the NCA is about 3,220 km. The total length of agreements

between 1999 and 2003 is equivalent to about 10 per cent of this total. The resource has probably been maintained or possibly strengthened.

- The length of hedgerows in Environmental Stewardship boundary management in 2011 was 608,235 km, with 1,384 km of woodland, 159,049 km of ditch, 676 km of ditches in Environmental Stewardship boundary management schemes.

Agriculture

- The classic agri-environment schemes of Environmentally Sensitive Area (ESA) and Countryside Stewardship (CS) have helped to ensure that many potentially harmful changes within farming have been ameliorated. Significant areas of grassland have been retained under ESA and help for heathlands has come from CS. These schemes are now phased out, replaced by Environmental Stewardship's Entry and Higher Level Schemes (ELS and HLS) and the new Countryside Stewardship scheme in 2015.

- Between 2000 and 2009 land used for growing cereals decreased by 13 per cent, oilseed increased by 95 per cent and vegetable cropping increased by 72 per cent. The hectarage of grassland remained stable. Many floodplain and coastal grazing marshes have now largely been converted to arable. Most remaining grazed marshes are now within agri-environment schemes, or managed by conservation organisations.

- Livestock numbers increased during the 1990s, but significantly declined during the period 2000 to 2009. Sheep numbers decreased by 44 per cent and cattle numbers by 20 per cent. Dairy farming significantly declined as increased production costs and poor returns have made it unviable. Due to falling prices, pig numbers decreased by 60 per cent although holdings have increased, impacting negatively on the local landscape character. In some cases nutrient enrichment has also adversely impacted upon aquatic communities. The use of floodplains for free range poultry enterprises has increased.

The light sandy soils of the Suffolk Coast and Heaths have suited a recent expansion in out door pig rearing, leading to visual intrusion and high soil nutrient levels. These pigs are at Wenhaston.

- Agricultural practices, such as turf production, the use of fleece and plastic covers and the increase in farm reservoirs, are altering the traditional landscape character. While turf helps to retain the open vistas of the NCA, the continual loss of soil can damage the archaeological resource.

- Continued coastal erosion means the progressive loss of productive farmland along the coastal edge. This is particularly notable between Southwold and Kessingland.

Settlement and development

- The east of Ipswich has seen increasing new infill housing and retail development, such as at Ravenswood and Warren Heath and the old Ipswich Airport site. The airport closed in 1996. The development of Ipswich's Neptune Marina has seen the construction of new residential accommodation as part of the University Campus Suffolk. Increased development has increased recreational pressure on heathland habitats and lead to impacts on tranquillity.

- The Port of Felixstowe has seen further expansion and now deals with over 40 per cent of the UK's containerised trade. In 2008, work began on the construction and reconfiguration of Felixstowe South terminal creating 1,300 m of quay, which is expected to open in 2014. This is resulting in increased shipping activity and a greater visual prominence of the port in the landscape. The Port of Harwich has become the base for the installation of the offshore Greater Gabbard and Thanet windfarms, increasing levels of shipping activity utilising the port.

- The desirability of the coastal area has lead to a skewed housing market exacerbating the cost of homes. Many coastal properties are also now second homes, particularly in locations such as Southwold and Aldeburgh, impacting on the fabric of local communities.[8]

- Offshore has seen the development of the Greater Gabbard windfarm with 140 turbines located on sand banks 23 km from the coast. Onshore the 2011 Kessingland windfarm comprises of two 126-metre-high wind turbines that are visible from the AONB.

Semi-natural habitat

- Conservation work has targeted the re-creation of lowland heathland and the creation of new freshwater wetlands, linking fragmented sites and increasing favourable habitat for rare species (for example nightjar, Dartford warbler, adder, otter, water vole and bittern). In some unmanaged areas succession to scrub and woodland has reduced the ecological value of sites and lead to the fragmentation of habitats and a reduction in landscape character.

- Stone curlew returned to nest at the RSPB Minsmere reserve for the first time in 2003 and successful fledging of chicks in 2007. 2007 also saw the successful reintroduction of the silver studded blue butterfly at Blaxhall Common, after 60 years of extinction on the site.

- Coastal habitats (for example cliff-top heathland, reedbeds and fens) are being progressively lost due to continuing coastal erosion. Coastal squeeze is also leading to the loss of vegetated shingle and remnant salt marsh. 93 ha of Suffolk estuarine salt marsh have been lost in the last 27 years. 80 per cent of this loss is due to erosion, probably associated with coastal squeeze.[9] This process is likely to continue with predicted sea level rise.

- Increases in recreational use of the area (for example marinas, moorings, bait digging and dog walking) has progressively affected the sensitive habitats including vegetated shingle, lowland heathland and designated species including little turn, woodlark, nightjar. Improved public awareness and active management is though improving the declining condition of these habitats, providing better protection, particularly from recreational disturbance.

[8] *Touching the Tide: A Landscape Conservation Action Plan for the Suffolk Coast*, Suffolk Coast and Heaths AONB Unit (2013)

[9] *Suffolk Coast and Estuaries Coastal Habitat Management Plan*, Royal Haskoning (October 2002)

- Almost all (93 per cent) of the SSSI area is now in favourable or recovering condition.

- Recently installed coastal defence 'rock armour' revetments have rapidly developed a rocky-shore-type habitat and the diversity of marine life has been increased as a result of their presence. These habitats are not native to this coast, and taking into account their impact on geomorphology and the operation of active coastal processes, their creation should not necessarily be considered as a nature conservation benefit.

Historic features

- Over the last century over half of the historic parkland has been lost. In 2003 the last Countryside Quality Counts assessed about 27 per cent of the remaining parkland was covered by a Historic Parkland Grant, and about 24 per cent was included within an agri-environment scheme. Moreover, about 81 per cent of historic farm buildings remained unconverted in 2003 with about 91 per cent intact structurally. This data suggests that opportunities to strengthen the character of the historic landscape remained over the last decade.

- Continued coastal erosion means that there are continuing threats of potential loss of historic landmark features (for example Orford Ness lighthouse, Covehithe Church, Dunwich Friary and some Martello towers). Finds of geological and archaeological significance can though be revealed when the cliffs are eroded.

Coast and rivers

- Continued coastal erosion means the progressive change of the coastline. Some soft cliffs such as those at Kessingland and Covehithe are generally retreating at rates of 2 m per year. The footpath and access network to the coast is changing to take this into account. While some parts of the coast are steadily eroded other parts are accreting as the eroded material is deposited (for example Orford Ness, Benacre Ness and Shingle Street).

- Coastal hard flood defences (for example rock revetments and concrete walling) along much of the East Anglian coast have restricted the operation of active processes and led to a reduction in sediment supply from the north to the south and hence have resulted in reduced beach levels (for example at Southwold, Bawdsey and Felixstowe).

- Existing coastal defences at Felixstowe Ferry have been under severe pressure due to the arrangement of the Knolls (a series of shingle banks at the mouth of the Deben estuary), resulting in a heightened risk of coastal flooding at Felixstowe Ferry. Sea defences on the urban beachfront at Felixstowe have been restored and updated as part of a seafront regeneration project. One notable new feature is the 'armouring' of several hundred metres of coast at East Lane, Bawdsey, with Norwegian larvikite and French limestone boulders. The armour protects houses and a Martello tower as well as vulnerable areas of agricultural land. However the coast to the south is being rapidly eroded.

- High concentrations of both nitrate and phosphate in the river systems mean that all are priority catchments under the Catchment Sensitive Farming initiative. Only 15 per cent of the 65 river water bodies currently achieve at least 'good' biological status. Water quality in the rivers has though improved through measures implemented under agri-environment schemes.

Minerals

- Sand and gravel continues to be actively quarried across the Sandlings (for example Waldringfield). Where active quarrying is currently taking

place and proposals for site extensions exist there are challenges as well as opportunities for geodiversity. Opportunities for restoration include geological exposures, wetlands and lowland heathland and woodland.

- There are 25 geological SSSI and 21 publicly accessible County Geodiversity Sites. Some are in quarry settings, emphasising the importance of man-made exposures for geoconservation and accessing and understanding geological history.

Drivers of change

Climate change

- The most significant climate change challenge is that posed by coastal change and particularly by society's responses to it. Further erosion and reshaping of sections of this coast will inevitably occur over time. The exposed nature of the coast may mean that technically and economically it may become increasingly difficult to hold the present shoreline position in the longer term, where this has been identified in the Shoreline Management Plan (SMP 7). While there is the potential loss of property, coastal habitat, geological and heritage features, opportunities for new valued landscapes can be realised if change is managed creatively.

- A range of coastal strategies have been proposed. 'Holding the line' where the level of protection provided by defences or the natural coast will be maintained or upgraded. 'Managed realignment' where the coast will be managed to realign its natural profile, and 'no active intervention' where the coast has either never been defended or it has been shown to be not viable to continue to provide defence.[10] This provides valuable opportunities for geodiversity and active, dynamic processes.

Covehithe Church is one of many historic features in the area that is under threat through continued coastal erosion.

- There is an ongoing need to maintain and periodically renew the sea defences and river walls if they are to continue to function effectively in the face of rising sea levels and storm events. In many cases the defences are beginning to reach the end of their intended life span. The Environment

[10] *Shoreline Management Plan 7* (Previously Sub-Cell 3C), Suffolk Coastal District Council (May 2012)

Agency has previously maintained these under permissive powers, but in the future they will be mainly the responsibility of landowners, communities, and other agencies working in partnership.

- The lowland heathlands, coniferous and broadleaf woodlands and agricultural systems will all probably be modified as a result of climate change. Reduced water availability and rising temperatures may lead to the potential loss of specific drought-intolerant species (such as potatoes), resulting in changes to cropping patterns and land use. Higher temperatures and prolonged periods of drought will put heathland and forest vegetation under stress, impacting on habitat structure and species diversity. The risk of damage from wild fires is also likely to increase as is increased soil erosion from storm-related flash flooding.

- Higher temperatures and prolonged periods of drought may result in ground water abstractions increasing and fresh water river flows reducing. Estuaries may become increasingly saline negatively affecting the intertidal habitats. Increased groundwater abstraction may also lead to saline intrusion of the coastal marshes. As much of the freshwater aquifer underlies the coastal marshes, allowing saline intrusion may also threaten the NCA's food production, which is reliant on ground water irrigation drawn from these areas.

- The arrival of new non native species and diseases/invertebrates as vectors of disease for livestock and crops, could alter land use practices. The vulnerability of tree crops to pests and diseases is already being seen with red band needle blight effecting Corsican pine, lodgepole pine and more recently Scots pine across the Sandlings.

Other key drivers

- The perceived issue of food security may result in further change to farming practices that could impact on ecological habitats and landscape character. Agri-environment schemes provide opportunities to work with land managers to develop networks of linked habitats and enhance landscape character. Increasing the uptake of schemes remains challenging, due to high agricultural returns achievable in the area. As a consequence of the light soils, cropping is heavily reliant on chemical fertilisers coupled to irrigation. These processes pose major sustainability challenges for the future as well as opportunities (for example the increased need for winter storage reservoirs may provide opportunities for wildlife).

- Planning and management of coastal waters, while conserving and enhancing the seascape's natural beauty will be important, especially the interface between the land and the sea. Understanding and conserving the seascape character, its forces for change and sensitivities will be key drivers as the East Area Marine Plan is developed.

- The management of flood and coastal erosion risk remains one of the most important issues currently facing communities and businesses below the flood line or on the coastal strip. Estuary Partnerships will continue to lead the way for community-led coast defence planning.

- The dynamic coast has implications for public access as legally, there is no automatic roll back of public rights of way lost to the sea. Coastal Access as part of the Marine and Coastal Access Act is currently expected to be taken forward in Suffolk in 2015–16. Potential growth in the south-east may increase the pressures from increased visitor numbers.

- Major infrastructure development on- and offshore (for example nuclear new build at Sizewell, offshore wind farms and expansion of the Port of Felixstowe), will potentially impact on landscape character and tranquillity. The offsetting of residual impacts may though bring about opportunities for landscape, geodiversity and biodiversity enhancement.

- Major housing and economic growth scenarios around Ipswich, Lowestoft, planned for in the constituent Local Development Frameworks could increase pressure on the water resources, water quality and the integrity of sensitive sites from resource demands. Overall demand for water will increase with climate change, while the recharge of all water sources is likely to decrease. Locally determined planning and development control has the potential to impact adversely on the landscape. Ensuring that local development frameworks recognise the importance of conserving and enhancing the landscape will help reduce negative impacts.

- Potential growth may lead to increases in the importance of the recreational and environmental value of landscapes within the urban surround; the potential for green infrastructure funding; opportunities for improved access and climate change adaptation.

- Initiatives such as 'Suffolk – Creating the Greenest County' can act as a forum for developing new thinking and promoting carbon-reduction solutions within local communities and businesses.

Supporting document 3: Analysis supporting Statements of Environmental Opportunity

The following analysis section focuses on a selection of the key provisioning, regulating and cultural ecosystem goods and services for this NCA. These are underpinned by supporting services such as photosynthesis, nutrient cycling, soil formation and evapo-transpiration. Supporting services perform an essential role in ensuring the availability of all ecosystem services.

Biodiversity and geodiversity are crucial in supporting the full range of ecosystem services provided by this landscape. Wildlife and geologically-rich landscapes are also of cultural value and are included in this section of the analysis. This analysis shows the projected impact of Statements of Environmental Opportunity on the value of nominated ecosystem services within this landscape.

Brightly painted beach huts overlooking shifting shingle banks, caused by deposition and extensive longshore drift, at the mouth of the Deben Estuary.

Statement of Environmental Opportunity	Ecosystem service: Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place / Inspiration	Sense of history	Tranquillity	Recreation	Biodiversity	Geodiversity
SEO 1: Manage the nationally significant coastal landscapes, ensuring that coastal management decisions take full account of landscape, environmental and visual impacts as part of an integrated approach working with coastal processes. Improve people's understanding of the process of coastal change.	↗ ***	↔ ***	↗ ***	↗ ***	↔ ***	↑ ***	↑ ***	↑ ***	↗ ***	↑ ***	↑ ***	↑ ***	↑ ***	↑ ***	↑ ***	↑ ***	↑ ***	↑ ***	↑ ***
SEO 2: Manage the components of characteristic productive agricultural landscapes to benefit food production, biodiversity and soil and water quality. Promote sustainable farming practices that are able to adapt to changing agricultural economics, the considerable challenges of climate change and water availability.	↑ ***	↔ ***	↑ ***	↑ **	↔ ***	↑ **	↑ ***	↑ ***	↑ ***	↑ ***	↑ ***	↑ ***	↗ ***	↑ ***	↗ **	↗ ***	↗ ***	↑ ***	↗ **
SEO 3: Increase and enhance public awareness and enjoyment of the distinctive assemblage of historic landscapes. Sustainably manage the agricultural, semi-natural, geological and rich archaeological and historic environment, as well as seeking opportunities for more integrated access to support recreation and education, while protecting the area's wildlife habitats and tranquillity.	↑ ***	↗ **	↗ ***	↗ **	↗ **	↑ ***	↑ ***	↗ ***	↑ ***	↑ ***	↑ ***	↑ ***	↗ ***	↑ ***	↑ ***	↑ ***	↑ ***	↑ ***	↑ ***
SEO 4: Manage the forest plantations, to combine commercial forestry and fuel production with a mix of habitats for rare and endangered plants and animals, enhancing both their capability as a strategic recreational resource and their role in climate change adaptation and regulation.	↔ ***	↗ ***	↗ **	↗ **	↑ ***	↑ ***	↗ **	↗ **	↗ **	↗ ***	↑ ***	↑ ***	↔ ***	↑ ***	↗ ***	↗ ***	↑ ***	↑ ***	↗ ***

Note: Arrows shown in the table above indicate anticipated impact on service delivery ↑=Increase ↗ =Slight Increase ↔=No change ↘ =Slight Decrease ↓=Decrease.
Asterisks denote confidence in projection (*low **medium***high) ○ =symbol denotes where insufficient information on the likely impact is available .

Dark plum =National Importance; Mid plum =Regional Importance; Light plum =Local Importance

Landscape attributes

Landscape attribute	Justification for selection
The dynamic coastal environment including, coastal sand dunes, shingle structures and eroding soft cliff lines.	■ Coastal landform is intimately linked with coastal processes and geological makeup with the cliffs (for example between Covehithe and Southwold) being constantly attacked by the sea, resulting in erosion and deposition caused by extensive longshore drift. These processes contribute to a sense of fragility and vulnerability. They also provide an important sediment supply for downdrift beaches, facilitating coastal flood alleviation. ■ Cliffs display internationally important geological exposures of Pliocene-Pleistocene Crag formations, with sands and glacial tills and are often associated with Palaeolithic and Mesolithic artefacts. They are important educational resources that help to explain coastal change. Also these deposits allow us to reconstruct past environmental and climate change that may help us understand the landscape impacts of future climate change. The cliff section at Bawdsey is notified as a Site of Special Scientific Interest. ■ Stabilised areas of shingle (for example at Shingle Street, Orford Ness, Thorpness and Kessingland), support a wide range of rare plant communities (for example sea pea, sea kale, sea vetch and yellow horned poppy). 'Shingle heath' has formed in some areas, supporting sea campion and plants more often found on inland acid grassland. Where human disturbance is low these features are used by nesting birds (for example little tern and ringed plover). The NCA's coastal vegetated shingle makes up 21 per cent of national and 7 per cent of European resource. ■ Orford Ness is a geological and geomorphological feature of national and international significance, being one of the three major shingle landforms in the UK and the only one which combines a shingle spit with a cuspate foreland. It is notified as a Special Area of Conservation along with Shingle Street (Orford Ness-Shingle Street SAC) and also forms the Orford Ness-Havergate National Nature Reserve. ■ Saline lagoons formed within and behind the shingle, are of internationally importance for their distinct and rare wildlife including, the starlet sea anemone, breeding waders and wildfowl such as avocet. They are also important in winter for migrant waterfowl.

Landscape attribute	Justification for selection
The estuaries with areas of semi-natural habitat (saltmarsh, intertidal flats).	■ The estuarine areas are subject to varying periods of saline inundation each day. Where inundation is infrequent, specialist salt marsh plants thrive (for example samphire, spartina grass, sea couch, sea purslane, sea aster, sea lavender). Where inundation is more frequent, and especially where the tidal action is erosive, few plants survive and open mudflats predominate. The seasonally varied carpet of salt marsh foliage and reflective qualities of water and mud provide landscape interest and texture. The Deben Estuary supports 40 per cent of Suffolk's remaining salt marsh. ■ Saltmarsh and intertidal flats are important for migratory wildfowl and wading birds. The Stour has the UK's largest wintering population of blacktailed godwit and the Alde-Ore supports half the country's breeding avocets. The importance of the estuary habitats for wildlife is recognised by the Alde-Ore; Stour and Orwell and Deben Estuary Ramsar and SPA designations and the Alde-Ore and Butley Estuaries SAC. Intertidal areas are also important nursery areas for fish (herring, cod, sole, sea trout, sea bass and shore crab). ■ Salt marsh makes an important contribution to wave dissipation, lowering the cost/specification for backing flood defence structures. ■ The intertidal flats are a well used recreational resource. In places, they are much valued as a wildfowling location. The open waters provide navigation opportunities and are popular for sailing/ boating, especially the Orwell and Deben estuaries. Extensive moorings and boatyards contribute to the sense of place and local economy. ■ Cultural heritage is supported by abandoned craft on mudflats, wrecks, former fish traps and causeways. Passing sailing boats or craft on swinging moorings give a feeling of activity. ■ The ports of Felixstowe, Harwich and Ipswich located on the Stour and Orwell estuaries, provide a dramatic contrast to the areas of semi-natural estuarine habitats. Their huge cargo ships add popular dimension to visitor sightseeing. ■ The flat and open estuarine landscape provides extensive views and high levels of tranquillity.

Landscape attribute	Justification for selection
Low-lying open freshwater coastal levels and marshes, protected by sea walls.	■ These are sparsely inhabited areas with an undeveloped nature that generates a feeling of wildness, remoteness and tranquillity. The area holds a high amenity value for tourism and leisure based activities, especially ecotourism, which is centred on the extensive network of coastal nature reserves and river wall footpaths that allow long open views towards the sea. 10,508 ha of coast (13 per cent of the NCA) are designated as Heritage Coast. ■ Some coastal marshes are of historical significance, as they have been created by 12th- and 19th-century enclosure of former intertidal areas (for example the Minsmere River). Their changing pattern of drainage ditches provides a historic record of their drainage as well as supporting a range of plant communities, including scarce plants such as whorled water-milfoil and soft hornwort. ■ Other historic features include, duck decoys (from the mid-17th to mid-19th centuries), remnants of wind pumps and military defence structures dating from the two world wars and earlier. ■ Fresh water reedbeds managed by conservation organisations support rare and distinctive wildlife including bittern, marsh harrier, bearded tit, water vole and barn owl. They also provide important feeding, roosting and nesting areas for wetland and coastal birds, particularly in the winter months. ■ Valuable agricultural production is possible where the land has been improved as the marine alluvium soils are relatively fertile. Specialist organic beef herds also graze some marshes. ■ Many of the freshwater levels contain boreholes which essential supply irrigation water for food production on the dry soils of the inland Sandlings.

Landscape attribute	Justification for selection
Open coastal and wooded fens between Walberswick and Dunwich.	■ The deep peat soils of the coastal and wooded fens (for example Dingle, Corporation and Westwood Marshes as well as Covehithe, Benacre and Easton Broads) contrast sharply with the dry mineral soils of the inland Sandlings and the marine alluvium soils of the coastal levels. ■ The freshwater and occasionally brackish fens with their large reed beds are important for rare birds including bittern, bearded tit and marsh harrier. They also support rare invertebrates such as the white-mantled wainscot. Their wildlife importance is recognised by the Benacre to Easton Bavents Lagoons SAC designation. ■ Their ornithological value attracts many visitors to the area who support the local economy. ■ They are an important illustration of the changing coastal landscape of the NCA as historically they would have been inland river marshes. The sea has gradually eroded further inland to meet them. ■ The fens support a local economy based on reed cutting, primarily for thatching, which in turn supports the local vernacular of the NCA.
Small-scale, intimate twisting alluvial river valley corridors above the tidal influence, supporting traditional valley grasslands.	■ Valley grasslands provide a landscape contrast to the heathy Sandlings and have an uninhabited presence with very few buildings and so generate a feeling of remoteness and tranquillity. ■ The extent of the valley grasslands, located in the middle reaches of the river valleys, has been diminished due to extensive drainage and reversion to arable farming. Those which remain provide a historic record of a previous landscape. They are also of value for grazing livestock. ■ They are important fresh water and occasionally brackish habitats with reedbeds and occasionally wet woodland that support a rich biodiversity including bittern, bearded tit, marsh harrier and otter. ■ Most are now managed for their conservation interest, attracting many visitors who help support the local economy.

Landscape attribute	Justification for selection
The Sandlings (inland and north of the River Deben) consisting of a mosaic of farmland, lowland heathland, acid grassland, coniferous forest and ancient woodlands. (Forest and ancient woodlands detailed separately below).	■ Running the length of the coast, the Sandlings display a sense of openness and provide a historic record of mans attempts to tame and farm the light, sandy, acidic soils. Fragments of rare lowland heath and dry acid grassland (for example Sutton and Hollesley Commons) are small in comparison to the once extensive resource and so provide a historic record of a previous landscape. ■ The strong mosaic of open ground and scrub/woodland cover is a defining characteristic of the NCA. Its wildlife importance is recognised by the Sandlings SPA and Minsmere to Walberswick Heaths and Marshes SAC designations. Key species include; antlion (the only known UK population), nightjar, Dartford warbler, woodlark, adder, natterjack toad and red-tipped cudweed. Historically the area has supported the rare stone curlew, which is now largely restricted to nature reserves. ■ The use of the dry soils for high value vegetable cropping is a key distinctive feature of the area as are the increasing numbers of outdoor pig units and vivid green turf fields. Cereal field margins in this area are important for farmland birds and brown hare. ■ Field boundaries and heathlands are defined by characteristic pine lines and shelterbelts and ancient hedgerows (for example elm hedges in the Dunwich area). ■ The historical scarcity of water means that the Sandlings are sparsely settled, generating feelings of remoteness and tranquillity. Small clusters of villages and estate farms are characteristic. ■ The heaths provide a valuable recreational and educational resource. They have been designated as open access areas and are popular with visitors due to free-draining soils and open vistas.

Landscape attribute	Justification for selection
Sandlings Forests (Dunwich, Tunstall and Rendlesham), with some smaller areas of plantation woodland.	■ The forests form a major part of the landscape in the southern/central core of the NCA. They frame views, giving a sense of uniformity, enclosure and tranquillity and contribute to the sense of place. ■ The forests are important for timber production although management is increasingly focused upon both wildlife conservation and outdoor public recreation. The woodland sites are popular visitor locations for activities including walking, horse riding and cycling. ■ The forests form part of the Sandlings SPA. Their mix of coniferous and some broadleaved woodland and open heathland rides and clearings provide a range of habitats. These support internationally important populations of woodlark and nightjar and butterflies including the white admiral and white letter hairstreak. The dense forest provides nesting habitat for raptors including the hobby. Dunwich Forest has one of the most important reptile populations on the Suffolk coast and includes species such as common lizard and adder. ■ The high amount of woodland cover provides an important carbon sink within the area.
Mixed deciduous ancient woodlands and wood pasture.	■ Few iconic ancient woods exist north of the River Deben, with notable exceptions including Sudbourne Great Wood, Captains Wood and Staverton Park. Staverton Park contains one of the greatest collections of ancient oak (4,700 pollards) and it is particularly renowned for the huge holly trees. It is designated as Staverton Park and The Thicks, Wantisden SAC. ■ Historically they are important as they are the remaining parts of a great wooded landscape which was extensively cleared for agriculture in the post-war years. The remaining veteran oak trees, some of which are thought to be over 500 years old, are a direct link with this lost past landscape. ■ Substantial numbers of ancient woods exist south of the River Deben (for example around Bentley and Tattingstone and north of Tattingstone and south of the River Stour including the Stour and Copperas Woods). Stour Wood is the oldest recorded sweet chestnut plantation in the UK. These contribute strongly to the wooded character of the southern river valleys. ■ The ancient woods are important for wildlife, sustaining rare lichens, fungi (oak polypore and beefsteak fungus), beetles, spiders and other invertebrates, as well as barbastelle and Natterer's bat.

Landscape attribute	Justification for selection
Estate farmlands south of the River Deben particularly around the Stour and Orwell Estuaries' and along the Shotley peninsula.	■ The area's light, generally less impoverished soils, were historically considered to be the best in Suffolk and have had a significant impact of the landscape. These first farms and settlements were established on these soils, evidenced by the 5,000 year old Neolithic ritual enclosure at Freston. ■ Today its medium sized clusters of farms and large-scale arable blocks, divided into rectilinear fields separated by an enclosed network of winding lanes are distinctive characteristics. ■ The Shotley peninsula is notable for its field boundary holly hedges. ■ Designed parkland landscapes around large houses built overlooking the Stour and Orwell estuaries include, Orwell Park, Freston Park, Wherstead Park and Woolverstone Park. These quiet and undisturbed landscapes form a key component of the area and include many important ancient trees in a wood pasture setting. They are important for wildlife including hawfinches and barn owl. ■ Historically the country houses portray the past importance and wealth of the area. ■ Open, wide views from the valley sides across the estuaries are a strong characteristic. ■ Tranquillity levels are high and disturbance is low, apart from close to the major transport infrastructure routes of the East Coast Main Line and A14 and A12 roads. ■ Recreation opportunities are supported by the dense network of rights of way on the Shotley peninsula, and both land and water based activities at Alton Water Reservoir.
Local building vernacular.	■ Along the coast local character and sense of place and history are supported by the use of 'soft hued red brick with clay pantiles in traditional buildings. Weatherboarding is also typical. Some buildings show their historical influence of Dutch architecture in their shaped timber gables. ■ Seaside resort towns of Southwold, Aldeburgh and Felixstowe are characterised by their impressive brick-build Victorian seafront villas and brightly painted timber beach huts both of which contribute strongly to the sense of place and history. ■ Inland, traditional buildings are timber frame with straw thatch and painted render in a variety of colours (often 'Suffolk pink'). Spit 'knapped' flint is also characteristic. These vernacular building styles contribute to the rural setting and are sense of history.

Landscape opportunities

- Manage and expand the mosaics of Sandlings habitats (for example lowland heathland and dry acid grassland), reducing fragmentation. Where appropriate thin, conifer plantations to increase heathland understory, creating open vistas with scattered trees and varied textures, increasing the heathlands contribution to biodiversity, geodiversity and their contribution to retention of greenhouse gases.

- Manage and expand the mosaics of coastal plain wetland habitats (for example reedbeds, fen and grazing marsh), for their contribution to sense of place and biodiversity. Ensure that the important network of ditches and dykes is managed to encourage emergent vegetation and increase habitat connectivity.

- Protect the open character of the coastal landscape, with its long expansive views, as well as the more enclosed and sheltered estuaries and improve understanding of the coastal and seascape character, its associated ecology, geology and history and its forces for change and sensitivities.

- Enhance active management to allow the continuation of dynamic natural coastal processes, to maintain and conserve the range of estuarine, coastal habitats (for example vegetated shingle, shingle heath, saline lagoons and saltmarshes), that contribute to the sense of place, provide natural coastal flood defences and support the wide variety of wildlife species.

- Create new or extend intertidal areas where managed realignment of river walls is possible, provided there are negligible impacts in the context of the wider landscape and where multiple benefits to people and wildlife can be delivered.

- Create new or restore and extend river valley grasslands for their contribution to the historic record of traditional landscapes, their biodiversity value and contribution to the sense of place of the inland river valleys.

- Manage and extend freshwater semi-natural habitats on the coastal levels (for example reedbeds, fen and grazing marsh) to help alleviate coastal flooding, while benefiting wildlife and supporting the local economy by further developing ecotourism opportunities.

- Manage and enhance the mixed deciduous ancient woodlands and wood pasture of designed parkland landscapes and conifer plantations that make up the Sandlings Forests, for their contribution to the sense of place and history, biodiversity, recreational and retention of greenhouse gases.

- Enhance late enclosure windbreak hedgerows, Scot's pine lines, and holly hedges (in the Shotley peninsula) replanting where they have been lost and positively manage and maintain those which have become neglected, to bring about ecological and landscape benefits.

- Maintain the quality and knowledge of archaeological evidence and historic built features and enhance public awareness of the breadth of historic wealth by conserving in context or, where this is impossible, rescue and record and interpret the historic landscape features.

- Manage development and recreation to protect areas with a strong sense of remoteness, 'wildness' and tranquillity, to ensure these valued resources are maintained. Such areas include the Sandlings heathland and woodland mosaics, the coastal levels, dunes and heaths between Walberswick and

Thorpness and the remote coast between Orford Ness and Bawdsey. Where new development is considered, ensuring that new development enhances and complements the existing built and natural environment.

- Promote the use of traditional, locally sourced building materials and the incorporation of vernacular styles (for example painted render) in new developments.

Long expansive views across the River Orwell from the rich agricultural land of the Shotley peninsula.

Ecosystem service analysis

The following section shows the analysis used to determine key Ecosystem Service opportunities within the area. These opportunities have been combined with the analysis of landscape opportunities to create Statements of Environmental Opportunity.

Please note that the following analysis is based upon available data and current understanding of ecosystem services. It does not represent a comprehensive local assessment. Quality and quantity of data for each service is variable locally and many of the services listed are not yet fully researched or understood. Therefore analysis and opportunities may change upon publication of further evidence and better understanding of the inter-relationship between services at a local level.

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Food provision	Productive agricultural area Soils Predominantly arable farming and livestock rearing with some dairy farming Small commercial fisheries	Soils are predominantly dry and sandy: 1 per cent Grade 1, 2 per cent Grade 2 and 17 per cent Grade 3 and 26 per cent Grade 4. Light, easily worked soils support important vegetable growing areas, producing 200,000 tonnes of sugar beet annually and about a fifth of the UK's pig production.[11] High grade agricultural land is though dependent on irrigation, the use of plastic mulches and the addition of fertilisers to be productive. Grazing livestock (beef cattle or sheep) numbers have declined. Dairy farming has significantly declined due to increased production costs and poor returns. Sheep farming tends only to be viable with support through agri-environment schemes. Lobster, crab and whelk are extensively fished offshore.	National	Where irrigation is possible production can be intensive. The light dry soils mean that the land can be worked virtually all the year. The addition of water and fertilisers support precise cropping regimes that suit vegetable production. The presence of aerial irrigation rigs and the use of reflective plastic covers can result in adverse visual landscape impacts. The increasing weight of farm machinery and removal of stones to prevent damage to vegetable crops and harvesting equipment can cause negative impacts to local soil structure, making some areas vulnerable to increased run-off. Outdoor pig units on valley sides are vulnerable to run-off, resulting in soil loss and diffuse pollution. Unit infrastructure (straw stacks, pens and fencing) can cause visual clutter. Diffuse pollution from excessive agricultural nutrients entering water courses can impact on European Union designated wildlife sites (for example the growth of Enteromorpha mats is a problem on estuaries). Climate change is likely to have an increasing influence on food production with water stress being a key driver for change.	Maintain and enhance advice to farmers especially in areas where diffuse pollution can be a particular problem to encourage take up of Catchment Sensitive Farming initiatives to meet the Water Frameworks Directive targets. Engage, advise and influence farming practice, ensuring that it remains competitive, and supports food security, while increasing its sustainability. Ensure that as a land use it does not detract from the special qualities of the landscape.	**Food provision** **Water availability** **Regulating water quality** **Regulating soil quality** **Regulating soil erosion** **Sense of place/ inspiration** **Biodiversity** **Geodiversity** **Recreation**

[11] *Touching the Tide: A Landscape Conservation Action Plan for the Suffolk Coast*, Suffolk Coast and Heaths AONB Unit (2013).

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Timber provision	Dunwich, Tunstall and Rendlesham Forests Small privately owned woodlands Soils	The NCA contains 10,618 ha of woodland, 5,736 ha broadleaved, 3,868 ha coniferous, 680 ha mixed. The Forestry Commission holds 3,110 ha of woodland. The main timber provision comes from the Sandlings Forests in the southern half of the NCA. Small blocks of privately owned plantation occur along the A12 corridor. Older plantations occur within estate parklands along the rivers Stour and Orwell (for example Orwell Park, Wherstead Park). Minimal commercial timber production comes from these sources. Most timber produced is soft wood. There is a small amount of commercial hardwood production (approximately 500m^3 per annum).	Regional	In 2010/11 the Sandlings Forests produced around 15,000 tonnes of timber. Annual output will increase slightly as crops replanted following the 1987 storm come into production cycles. Increased timber production could increase open ground habitat and heathland creation and bring about local benefits to renewable energy through biomass production from forest waste. New planting in the area would decrease opportunities for heathland creation to benefit biodiversity. The forests provide vertical and textural elements to the landscape and contribute to the sense of place as they are locally recognised as important for both wildlife and people. The landscape, recreational and biodiversity benefits and potential of the Sandlings Forest are now probably more important than timber production.	Restructure coniferous forest plantations to produce more open heathland mosaics as part of a much wider ecological network of sites managed principally for nature conservation. Increase the sustainable management of small privately owned broadleaved woodland for timber production while at the same time benefiting biodiversity. There is potential for the creation of new woodland in conjunction with new developments around Ipswich, where the underlying geology and soils supports this and where this does not compromise other, more ecologically valuable habitats.	**Timber provision** **Climate regulation** **Biodiversity** **Geodiversity** **Water availability** **Regulating water quality** **Sense of place/ inspiration** **Biomass energy** **Recreation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability	Underlying chalk aquifer Crag, sand and gravel minor aquifer Main rivers/ estuaries: Stour, Orwell, Deben, Ald and Ore, Blythe) Lesser rivers: Hundred, Minsmere, Dunwich and Blythe Surface waters – Alton and Wherstead reservoirs Farm reservoirs	Local rainfall typically only two-thirds of the national average. Water availability is varied. The underlying chalk aquifer is over-abstracted. It is used for public water supply and agricultural irrigation. Freshwater abstraction takes place from local shallow aquifers (sands and gravels) and small watercourses (for example Levington Creek, Freston Brook, Mansbrook and Colton Creek in the Orwell Estuary and Bradfield Creek, Johnny All Alone Creek and creeks at Mistley and Manningtree in the Stour Estuary). The northern coastal crag aquifer and the crag associated with Felixstowe peninsula both have a CAMS 'over-licensed' status. The coastal crag associated with the Alde/ Ore and Deben Estuaries is classed as 'over abstracted'. These minor aquifers are used widely for crop irrigation. The rivers Deben and Alde have an 'over licensed' CAMS status. The River Blyth has a 'water available' status. The River Ore has an 'over abstracted' status. Alton Water Reservoir, Suffolk's largest area of inland water (160 ha), is fed from the River Gipping (NCA 83) and bore holes along the River Orwell. The majority of the reservoir water supplies Ipswich and Felixstowe via the Wherstead Reservoir. The remainder goes to villages on the Shotley peninsula and south Suffolk. Farming accounts for 30 per cent of the total annual water use in the area. Farm reservoirs help provide water for crop irrigation.	Regional	London Clay confines the major chalk aquifer, meaning that flow of groundwater in and out of it is restricted, although the Chalk bedrock, Crag and drift deposits provide good water storage. The catchments of all of the main rivers extend outside of the NCA into the surrounding NCAs. Water availability is therefore partly determined by resource use in these neighbouring NCAs. The Environment Agency Review of Consents project records no adverse effect on the integrity of designated European sites (SAC and SPAs) from existing abstraction licences in the NCA.[12] The requirement for public water will increase with further planned development in the NCA (that is around Ipswich). Climate change may increase the frequency of drought periods resulting in an increased use of abstracted water to support agricultural practices. Currently summer abstraction for cropping can reach two thirds of total daily water use.[13] This may mean that the recharge of the underlying aquifer is likely to decrease, with the result that low river flows will negatively impact on river biodiversity. Estuaries may also become increasingly saline as low flows and increased groundwater abstraction in coastal areas may also lead to saline intrusion damaging fresh water habitats and species.	Improve the sustainable use of water by employing sympathetic land management practices, which reduce the demand for ground water for crop irrigation (it is recognised that many land managers already operate sustainable practices). Expand farm water storage capacity to reduce the volumes of water abstraction from surface and groundwater sources. Ensure that new irrigation reservoirs safeguard the distinctive quality of the local landscape and benefit wildlife. Restore and increase areas of semi-natural habitats to increase infiltration (for example valley side grassland and wet grassland in the valley bottoms). Utilise agri-environment schemes to recreate low-input floodplain grassland benefiting landscape, habitat and aquifer re-charge, water quality, soil erosion as well as limiting flood risk further downstream.	**Water availability** **Biodiversity** **Geodiversity** **Regulating water flow** **Regulating water quality** **Climate regulation** **Food provision**

[12] *The Stour and Orwell Estuaries Scheme of Management*, Suffolk Coast and Heaths AONB Unit (2010)

[13] *Future Landscapes: Climate change impacts and adaptation in the Suffolk Coast and Heaths AONB*, Suffolk County Council (March 2012)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Genetic diversity	Suffolk Punch horse Red Poll cattle Blackfaced Sheep	The Suffolk Punch, also historically known as the Suffolk Horse or Suffolk Sorrel, is an English breed of draught horse. The Suffolk Punch stud is based at Hollesley. Red Poll cattle originated as a cross between Norfolk Red beef-type cattle and Suffolk Dun dairy cattle, both breeds of which are now extinct. With its long traditions of both dairy and beef qualities, the Red Poll is therefore one of the original native dual-purpose breeds. Blackfaced Sheep (or simply 'Suffolk') are a breed of domestic sheep raised primarily for meat. The Suffolk is one of the oldest, native British breeds. These three breeds make up what is known as The Suffolk Trinity. The Suffolk Wildlife Trust use Hebridean sheep and the Broxtead Estate use Norfolk Horn sheep to graze their heathlands.	National	Since the industrial revolution the Suffolk Punch horse has experienced a significant decline in numbers, being replaced by tractors and other mechanical ploughing devices. With a concerted effort, numbers are now slowly growing again, although it remains on the endangered breeds list. The Red Poll has maintained the dual-purpose characteristics, which now give it a valuable niche role in quality beef production. The ability of the Blackfaced sheep to grow and finish quickly is essential in a falling market. Suffolk lambs can also be taken to heavier carcase weights, if required. Increasing numbers of commercial producers now include Suffolk genetics in their ewe flocks as the breed has high milk output, hard hooves and wide pelvic dimensions for easy lambing. Neither the Blackfaced sheep nor Red Poll cattle are rare or endangered.	Protect the future of the endangered Suffolk Punch breed and support educational opportunities for people of all ages and backgrounds to learn about the history of this breed and the Suffolk Trinity.	**Genetic diversity** **Sense of place / inspiration** **Sense of history**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biomass energy	Woodland	Woodland cover is 10,618 ha 13 per cent of the NCA. Wood fuel markets continue to grow in the area. Cultivation of biofuel crops in the NCA is not common place. The yield potential for short rotation coppice is judged to be medium, but high for miscanthus. Miscanthus is better suited to this NCA as the crop is generally less demanding on the water resource than short rotation coppice. There is currently no planting of miscanthus or short rotation coppice within the NCA. Standing biomass (for example reed and sedge beds), is managed in a few places to provide thatching material.	Local	There is some capacity for appropriately-scaled heat production from biomass boilers existing in privately-owned smaller woodlands. The growth of the wood-fuel market may help drive enhanced management of these woodlands and the restructuring and future management of the Sandlings Forests. The impact of biomass planting on the historic environment can be detrimental. Any planting needs to be carefully sited in order to avoid the introduction of incongruous elements into the landscape. This is particularly the case across the open, largely un-wooded coastal plain. Further management of reed and sedge beds could bring neglected areas into improved condition, benefiting biodiversity, climate regulation and sense of place. For more detailed information on the possible landscape impact of biomass plantings, refer to the tables on the Natural England website: http://www.naturalengland.org.uk/ourwork/farming/funding/ecs/sitings/areas/default.aspx	Support and encourage the uptake of woodland management initiatives (for example Woodfuel East) to build capacity for renewable energy strengthening the link 'from forest to fire'. Enhance management of the woodland resource by thinning or coppicing especially as part of lowland heath and acid grassland creation to provide biomass. Consider planting short rotation coppice to strengthen existing vegetation frameworks where this does not conflict with landscape character or biodiversity (for example through linking existing networks of shelterbelts and small woodlands). Encourage the management of derelict reed and sedge beds and promote use of fen litter for biomass, reed for thatching and reed and sedge faggots (bundles of reed/ sedge used for river bank stabilisation.	**Biomass energy** **Climate regulation** **Regulating water flow** **Sense of place / inspiration** **Biodiversity** **Regulating soil erosion**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation	Soils Forests and woodlands Lowland heath and acid grassland Grazing marsh Wetlands Reedbeds Mudflats/ saltmarsh Hedgerows	The carbon content of the mineral soils in the majority of the NCA is low (0–5 per cent). Soil carbon will be higher in the fen peat soils covering 3 per cent of the NCA. Carbon storage is provided by the Sandlings Forests (3,110 ha), lowland heathland (1,347 ha), private woodlands and copses together with parkland and hedgerow trees. Areas of reedbeds (1,089 ha), fens (444 ha) as well as areas of wet woodland also sequester carbon.	Regional	Cultivated soils provide reduced carbon sequestration, due to their regular cultivation and drainage. Oxidation of soil organic matter is rapid in warm, sandy, base-poor soils, therefore limiting the potential for carbon storage of the Sandlings soils. Exposure of bare, dry soils can lead to wind erosion, depleting a soils ability to store carbon. Hedgerow and shelterbelt planting can increase carbon storage as well as reducing soil erosion. Cultivation of the fen peat soils leads to wastage of peat through shrinkage and oxidation (with loss of CO_2 into the atmosphere). Carbon sequestration and storage can be increased by reducing the cultivation frequencies and by shallow cultivation. The addition of organic matter will increase carbon storage. Reducing drainage and re-establishing permanent pasture on the valley floodplains and coastal levels can increase the carbon storage in these areas. Increasing woodland planting would increase carbon storage, although any new planting would need to be sensitively located to maintain landscape character. Standing biomass on the heaths/grasslands, fens and marshes, locks up carbon over a shorter timescale compared to woodlands. Maintaining, managing and where possible extending these resources will help increasing their carbon storage capacity.	Encourage the sustainable production of crops, including the reversion to grassland where soils are severely damaged, facilitating carbon retention as well as reducing soil erosion. Reduce frequencies of cultivation and seek opportunities to add organic matter to the soils and increase the coverage of uncultivated field margins. Restore and expand permanent pasture and semi natural habitats (for example lowland heathland, reed beds, grazing marsh), bringing them into sympathetic management. Encourage the commercial management of reedbeds for renewable building materials. Enhance management of under-managed woodland and restore and expand native broadleaved woodland where appropriate. Extend shelter belts and reinstate hedgerows where they have been lost from the landscape. Increase the size and connectivity of priority habitats such as heaths, wetlands, arable margins and forest land to provide for species adaptation and movement between favourable sites.	**Climate regulation** **Biodiversity** **Geodiversity** **Water availability** **Regulating water quality** **Biomass energy** **Regulating soil erosion** **Regulating soil quality**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality	Aquifers Rivers Wetlands Geomorphology and the operation of active processes	The groundwater chemical status for the NCA is poor. The River Waveney near Lowestoft is 'failing to achieve good' chemical status. The rivers Orwell and Stour have a 'good' surface water chemical status. Only 15 per cent of the 65 river water bodies currently achieve at least 'good' biological status. The ecological status of river waters and other surface waters is varied. All the catchments of the major rivers in the NCA are Catchment Sensitive Farming Priority Catchments, due to high concentrations of both nitrate and phosphate. Sedimentation of water courses resulting from soil erosion on adjacent land occurs in the rivers.	Regional	A reduction in fresh water river flows entering the estuaries results in the estuaries increasing in salinity, impacting upon their specialised habitats. Groundwater abstraction in coastal areas may also lead to saline intrusion. Prolonged periods of low precipitation (winter and summer) can create low flows in rivers, resulting in reduced dissolved oxygen and negative impacts on aquatic biodiversity. Excess nitrates and phosphates can be associated with the discharge from sewage treatment works, industrial processes, surface water drains, pleasure boats and agricultural practices such as excess farmyard manure and slurry applications. Localised diffuse pollution from pesticides and soil erosion leads to sedimentation, pollution and eutrophication in water bodies, resulting in negative impacts on fish spawning grounds.	Improve the sustainable use of water by employing sympathetic land management practices, which reduce the demand for ground water for agriculture to maintain water levels in rivers, flows rates into estuaries increasing dissolved oxygen levels and limiting saline incursion. Ensure continued improvement is made to waste water treatment works, to improve the quality of water being returned to the system. Encourage agricultural practices and the uptake of agri-environment options within the NCA and in adjacent NCAs (for example protecting grassland margins on slopes) to minimise soil erosion from land at risk of generating diffuse pollution in the catchments. Ensure the use of fertiliser and pesticide is more informed and associated with good in–field analysis to reduce diffuse pollution.	**Regulating water quality** **Biodiversity** **Geodiversity** **Sense of place/ inspiration** **Recreation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow	Rivers Estuaries Wetland habitats	Fluvial flood risk is associated with the river valley floodplains of the rivers Stour, Orwell, Deben, Alde and Ore, Blythe and Waveney. The rivers Orwell and Stour are fed from extensive catchments that extend into the higher ground of the upstream NCAs. River flood risk to people and property is low. The main exception is Ipswich which is identified in the East Suffolk Catchment Abstraction Management Plan[14] as being at particular risk from river flooding from the River Gipping and River Orwell. Engineering schemes have been introduced to help reduce this risk (for example Ipswich flood barrier). The future policy approach for Ipswich set out in the management plan is to maintain river defences.	Local	Flooding is a natural process within the river and estuary floodplain. It can disrupt wildlife habitats and where development has occurred within the floodplain it can cause significant damage to property, infrastructure as well as occasionally endangering life. Increasing the flood storage capacity by enhancing semi-natural features and through the creation of new washlands within river valley floodplains, can further help to alleviate flooding. This approach should be managed to ensure that any increase in water level within semi-natural habitats does not damage their wildlife interest.	Adopt strategic approaches to increasing the capacity of catchments to retain water, including addressing river management upstream (for example in the rivers Stour and Gipping) to reduce impacts downstream. Optimise design and implementation of future flood storage areas to provide a degree of flood resilience through the creation of floodplains and washlands, creating new wetland habitats (for example flood plain grazing marsh) and links with existing semi-natural habitats. Adopt alternative, 'softer', solutions to flood prevention through restoring previously engineered river channels to their natural profiles, allowing reinstatement of natural marginal vegetation to attenuate flows (where appropriate and with full consultation with landowners).	**Regulating water flow** **Water availability** **Regulating soil quality** **Regulating soil erosion** **Biodiversity** **Geodiversity** **Sense of place / inspiration**

[14] *East Suffolk Catchment Abstraction Management Plan Summary Report*, Environment Agency (December 2009)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil quality	Naturally low to moderately fertile soils	Soils mostly comprise sands, gravels and till of low fertility. They are easily worked and where fertilised and irrigated they are highly productive supporting one of the most important vegetable growing areas in the UK. The light, dry soils of the valley sides support outdoor pig farming (about a fifth of the UK's pig production). There can be a temptation to exploit seemingly-robust sandy soils for late or difficult harvesting of crops such as sugar beet.	Regional	Increasing organic matter levels in freely draining sandy and loamy soils, helps to reduce erosion risk. Maintenance of good soil structure aids water infiltration and recharge of the underlying crag and drift aquifers. Soil compaction and loss of structural cohesion on sandy soils can become problematic, increasing the vulnerability to run-off under storm conditions. Once these soils are compacted they are surprisingly difficult to rectify. The removal of stones to prevent damage to vegetable crops and harvesting equipment can have a significant negative impact on local soil structure and can impair drainage and exacerbate 'capping'.	Adopt cultivation practices that increase organic content of soils, such as introducing fallow cropping into rotations, direct drill and grass leys. Avoid overstocking or the use machinery where and when it would lead to the compaction of vulnerable soils. Promote agri-environment schemes at targeted sites to deliver resource protection gains (for example by working with farmers to retain soil quality and ensure a viable long term future for agriculture in the area).	**Regulating soil quality** **Regulating soil erosion** **Regulating water quality** **Climate regulation** **Biodiversity** **Geodiversity** **Sense of place/ inspiration**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion	Naturally low to moderately fertile soils Semi-natural vegetation cover Hedgerows and tree belts (shelterbelts) Woodland, copses, scrub	The majority of the soils are freely draining, making them susceptible to erosion. Priority Catchments under the ECSFDI include: the Gipping and Orwell; the Deben, Alde and Ore Priority Catchment, (both of which are located in the south of the NCA) and the Waveney Priority Catchment which is located in the north of the NCA. These have been prioritised by the ECSFDI in order to reduce the impact of agriculture on the environment. Soil erosion is identified as a key issue within all three priority catchments. In the Deben, Alde and Ore Priority Catchment, light soils on steep slopes (particularly where soils are over-cultivated and have no vegetation cover) have been eroded. In the Waveney Priority Catchment, maize and root cropping are a particular problem. Recent initiatives have encouraged landowners to conserve these fragile soils, particularly by protecting them from erosion and reducing run-off.	Regional	Freely draining sandy and loamy soils are at enhanced risk of surface-water run-off, resulting in soil erosion, especially on moderately or steeply sloping land where cultivated or bare soil is exposed. This is exacerbated where organic matter levels are low after continuous arable cultivation or where soils are compacted. There is potential for wind erosion on coarse textured variants where soils are cultivated or left bare, especially in spring, a characteristic shared with the fen peat soils and sand dune soils. Planting hedgerow wind brakes can alleviate wind erosion. Loamy and clayey soils with impeded drainage and freely draining base-rich soils are prone to compaction and capping/ slaking, leading to increased risk of soil erosion by surface water run-off, especially on steeper slopes. Reducing the use of heavy machinery and stocking numbers on these soils can help alleviate this. Loamy and clayey soils of coastal flats are at low risk of soil erosion although they are increasingly under threat from coastal erosion. The impact of predicted climate change (particularly increased periods of drought and increased rainfall intensity on bare dry arable soils, will increase the potential for soil erosion.	Replant hedgerow boundaries where appropriate to protect free draining soils from wind erosion. On free-draining fragile soils encourage agricultural practices that utilise minimum cultivation techniques and avoid leaving surfaces exposed (for example by introducing and incorporating green cover crops, fallow rotations, overwintering stubble, or reversion to permanent grassland). Encourage agricultural practices that retain cover and build up organic matter especially on free-draining soils. Ensure that soils with impeded drainage are not compacted by ensuring low rates of stocking where grazing takes place, the use of low ground pressure vehicles and by encouraging conversion to semi-natural habitat. Maintain and conserve saltmarsh and other inter-tidal habitats to providing a cost effective defence against coastal soil erosion as outlined in the Shoreline Management Plan 7.	**Regulating soil erosion** **Regulating water quality** **Biodiversity** **Geodiversity** **Regulating soil quality** **Food provision** **Sense of place / inspiration**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pollination	Semi-natural habitat: Lowland heathland Lowland dry acid grassland Wet grassland Grass margins Salt marsh Fen, reedbed Hedgerows and woodland	Semi-natural habitats including those within the Sandlings Forests, lowland dry acid grassland, lowland heathland, coastal and floodplain grazing marsh, fens and reedbeds support a variety of pollinators which are essential components to agricultural production. Interstitial habitats (for example the edges of farm tracks, ditches and dykes) that remain in the spaces between crops are also key sources of both pollen and nectar for insects that pollinate commercial arable crops such as field beans. Networks of interstitial habitats are more limited across the core arable areas on the higher inland areas.	Local	Pollinating insects are generally supported by a range of semi-natural habitats, in particular species-rich grasslands. Good networks of pollinator habitat assist the ability for pollinators to supply this service, aiding food production especially in areas that support arable and vegetable crops. The degree to which crops rely on insect pollinators depends on both species and cultivar. Increases in habitat for pollinators such as creation of areas of semi-natural habitat, hedgerow improvement and increases in field margins will increase the value of this service to agriculture. A strong pollinator population supports production of a wider variety of food products, supporting future food production.	Extend semi-natural habitat mosaics, particularly lowland dry acid grassland and lowland heathland that provide early and late nectar sources for pollinators that in turn will pollinate commercial food crops. Work with land managers and conservation organisations (such as RSPB and Suffolk Wildlife Trust) to further protect areas of semi-natural habitat, buffering existing habitats where possible, to increase hibernation sites for pollinating insects. Increase pollen and nectar resources in arable areas through the creation of species-rich grass margins and bespoke pollen and nectar strips, creating and connecting links with other semi-natural habitats.	**Pollination** **Biodiversity** **Sense of place/ inspiration** **Food provision**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pest regulation	Areas of semi-natural habitat: Woodland Lowland dry acid grassland Lowland heathland Lowland meadow, wet grassland Fen, reedbed Hedgerows/ grass margins	Interstitial and semi-natural habitats provide important over-wintering habitats for beneficial predatory invertebrates (for example ground and rove beetles), which can regulate the populations of pests such as aphids.	Local	Integrated pest management approaches may in some cases remove the requirement for chemical intervention, although evidence of efficiency is patchy. Financial support for farmers channelled through agri-environment schemes can assist with increasing the network of these habitats in arable areas.	Increase diversity of structure and composition within semi-natural habitats to support a variety of pest regulating species. Increase field margins, species-rich hedgerows and beetle banks to encourage a network of habitats for pest regulating species close to areas of agricultural production.	**Pest regulation** **Pollination** **Biodiversity** **Food provision**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating coastal erosion and flooding	Tidal stretches of all the main rivers Natural sand dune defences, estuarine salt marsh, intertidal flats, shingle ridges, coastal fens and reedbeds	Properties are at risk of flooding along the estuaries of the rivers Orwell, Deben, Ore, Alde and Blyth. Properties around the docks area in Ipswich are currently at risk from a 0.5 per cent annual-probability tidal flood.[15] Major infrastructure (for example parts of the East Suffolk Line, the A12 at Kessingland and the harbour area of Lowestoft) is at risk of a 1-in-100-year flood, although predicted climate change could increase the risk. Development has been restricted to areas where sea defences exist. Low-lying sections of the hinterland are shielded by natural sand dunes and shingle banks (for example between Walberswick and Dunwich, Thorpness and Bawdsey) although these areas have suffered flooding through the breaching of these natural defences, most notably in 1953. Sea walls, onshore groynes, beach nourishment revetments, rock armour and wave return walls and aprons, provide protection (for example Felixstowe, Aldeburgh, Southwold and Lowestoft). There is an on-going need to maintain sea defences if they are to continue to function effectively in the face of rising sea levels and storm events. In many cases the defences are beginning to reach the end of their intended life span.	Local	Flooding is a natural process within the coastal plain. It can disrupt wildlife habitats and farming. Where development has occurred within the floodplain it can cause significant damage to property, infrastructure as well as occasionally endangering life. Without maintained coastal defences approximately another 2,280 ha of low-lying arable land would also be directly affected .Over 7,000 ha of high-quality irrigated land would also have to be taken out of production due to the loss of irrigation following ground water saline intrusion.[16] High tide levels can prevent river flows from draining away (tide-locking) affecting Ipswich, along the Lothingland Hundred River, Cove Run (Wrentham Watercourse) and River Minsmere. Coastal semi-natural habitats are at risk (for example Benacre to Easton Bavents Lagoons (SPA, SAC), the Stour and Orwell Estuaries (SPA, Ramsar). Flooding of fresh water habitats with salt water causes long lasting damage to associated biodiversity. Climate change will increase the flood risk to low-lying areas, due to high tides and potential storm surges combined with rising sea levels. Wetlands and coastal habitats can offer protection to safeguard human life and property during extreme flooding events. Natural defences are an essential and cost-effective way of safeguarding life and property from coastal flooding.	Work with partners and stakeholders to implement the shared processes outlined in the Shoreline Management Plan policies (SMP 7), which will be key drivers for managing future coastal change. Put in place flood risk management plans to provide solutions that protect and retain the special assets (property, farmland, infrastructure, biodiversity and historic interest) in meeting society's needs, where flooding would have a negative impact. Plan to develop a more natural coastal hinterland through the conversion of areas of arable and grazing marsh to fen, including open water and saltmarsh and expanding traditional coastal grazing management to create habitats that help buffer against coastal flooding, while benefiting wildlife. Develop strategies to help mitigate the impacts of salt-water incursion (for example through the creation of washlands and new wetlands to moderate flooding of existing wildlife sites). Interpret the importance of the Suffolk Coast and Heaths geodiversity to assist understanding of past and future environmental responses to climate change coastal flooding scenarios.	**Regulating coastal erosion and flooding** **Regulating water flow** **Climate regulation** **Biodiversity** **Geodiversity** **Sense of place / inspiration**

[15] *East Suffolk Catchment Abstraction Management Plan Summary Report*, Environment Agency (December 2009)

[16] *Why Farming Matters in Coastal Suffolk*, NFU (2010)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating coastal erosion	Beaches Coastal sand dunes Soft cliffs Intertidal mudflats and coastal saltmarsh Beach and man-made defence structures Geomorphology and operation of active processes.	Over the last 11,000 years eastern England has been gradually sinking (isostatic readjustment) and is currently experiencing rising sea levels. Stretches of soft low elevation cliffs are highly susceptible to erosion, while sand/shingle beaches, shingle banks (for example Shingle Street) and dunes (for example Walberswick) shield areas of low-lying hinterland from coastal erosion. Sea walls (soft and hard defences) onshore groynes, beach nourishment revetments, rock armour and wave return walls and aprons, provide man-made protection. Some heritage features are at risk from coastal erosion (for example Martello towers, Greyfriars Priory at Dunwich), as well as many buildings and features associated with settlements such as Covehithe. The Shoreline Management Plan (SMP 7) [17] identifies that on the whole, coastal defences are in reasonable condition and the coast is functioning relatively well. Key areas of concern are at Lowestoft and Felixstowe, where erosion could result in loss both of recreational value and loss of hard assets. There is on-going loss of agricultural land in areas such as the Covehithe cliffs. The Shoreline Management Plan also outlines a number of coastal management approaches – 'Holding the line' (Felixstowe, Lowestoft, Aldeburgh, south of Southwold, and Sizewell), 'Managed realignment' (north Dunwich, south of Kessingland and the mouth of the Orwell Estuary), 'No active intervention' (Hollesley and Aldeburgh. At Covehithe a decision has been made not to maintain defences.	Regional	Isostatic readjustment and rising sea levels will increase pressure on the existing defences. Over the longer term this may result in the loss of beaches, shingle banks and sand dunes and impact on other areas, where the line of defence is held. A policy of not defending will have more immediate impacts on local communities and the local economy. As well as the risks of erosion of the soft cliffs, continued erosion is important to continue the supply of sediments to natural defence features (beaches, dunes, shingle banks) and helps maintain a healthy, naturally functioning coast. Sediment supply is important for sustaining many coastal habitats (for example vegetated shingle) as well as the sense of place. Coastal flooding would occur across large areas of low-lying hinterland in the absence of sea walls (soft and hard defences) and other man-made defence structures. The Shoreline Management Plan (SMP 7) details how hard defence of existing positions will prevent the natural movement of sediment, and how defences will become increasingly difficult to maintain over time, as the coast retreats. To mitigate impacts and help adapt to coastal change, particularly on coastal communities, social adaptation measures including limited works to existing defences could slow erosion and delay the impacts of change.	Reflecting the priorities of the Shoreline Management Plan (SMP 7), promote the natural adaptation and regeneration of coastal habitats to absorb wave energy and provide soft defences against coastal storm erosion and sea level rise. Ensure that realignments are managed to enable inter-tidal habitats to develop and expand effectively. Monitor coastal processes and work with partners to find solutions that enable dynamic coastal processes to continue. Seek opportunities for the creation of compensation habitats (fresh water habitats and brackish water bodies) to mitigate those lost through rising sea levels. If and where existing flood defences are reinforced, work with partners to ensure that there are no adverse impacts on features of biological and historic interest, ensuring that the open character of the area, the long views and access to the shoreline is maintained. Ensure that vegetated shingle habitats, salt marsh and dune systems are not damaged by recreational use leading to fragmentation and erosion. Work closely with partners and local communities in the identification and development of social mitigation measures (ie limited works to existing defences to slow erosion).	**Regulating coastal erosion** **Sense of place/ inspiration** **Sense of history** **Food provision** **Biodiversity** **Recreation** **Tranquillity** **Geodiversity**

[17] *Shoreline Management Plan 7* (previously Sub-Cell 3C), Suffolk Coastal District Council (May 2012)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of place/ inspiration	A low-lying farmed landscape with large areas of semi-natural habitat Pine lines and shelterbelts Rivers and sheltered estuaries The low-lying coast, sections of which are undeveloped and remote Varied topography Expansive views, big skies Large estates Traditional farming settlements, villages and hamlets and market towns Coastal 'seaside' resort towns Traditional buildings	The Sandlings dry sandy soils support distinctive vegetable growing, lowland heathland, semi natural woodland and plantation forest, providing colour and texture to the landscape. The Sandlings strong geometric field pattern, is clearly defined by in many places pine lines and shelterbelts. The area has a general absence of settlement, providing a sense of remoteness. The exposed coast contrasts with the sheltered peace of the estuaries. The coast supports remote sand and shingle beaches, vegetated shingle banks, spits, dunes, crumbling cliffs, saltmarsh and mudflats maintained by dynamic processes adding to a sense of vulnerability and fragility. Traditional seaside towns are popular with visitors and tourists who are attracted by their strong sense of place. Coastal plain marshes and wetlands are locally distinctive. They are rich in biodiversity, supporting important populations of breeding and wintering birds that add movement and interest. Inland alluvial valleys characterised by small irregular, hedged historic field patterns provide an intimate character and contrast with the more regular open fields of the isolated coastal plain. **Continued over...**	Regional	Agricultural practices, such as turf production, the use of fleece and plastic covers and the increase in farm reservoirs, can alter the traditional landscape character which is an important component of the local identity. While turf helps to retain the open vistas of the NCA, the continual loss of soil can damage the archaeological resource. The loss of structural landscape features (for example hedgerows, ditches, banks, copses and lines of trees) can result in the progressive loss of the visual distinction between estuary valley sides and estuary valley floor. The coast provides inspiring experiences because of its contrasting features; bustling seaside towns, boat yards, shipping ports and remote wild coastal stretches that provide a sense of 'wildness'. The popularity of these areas with visitors can impact upon the sense of place with negative impacts arising from increased car numbers, litter, and increased loss of tranquillity. Continued coastal erosion means that there are continuing threats of potential loss of historic land mark features. Coastal defence features (for example 'rock armour' revetments) can though reduce the naturalness of the coastal character as well as limiting open beach access. **Continued over...**	Conserve the rural mosaic of landscapes and habitats that are characteristic of the NCA and essential for the feelings of space and providing inspiration. Retain the contrasts with the local differences in landscape character, between the coast, estuaries, open marshes, river valleys and higher land of the Sandlings. Strengthen the historic character of the landscape, through heathland management, restoration and re-creation, improved multipurpose forest strategies and enhanced management and replanting of hedgerows and hedgerow trees. Conserve and enhance the biodiversity interest, so that people can continue to enjoy the rich ecology and experience it close at hand. Improve understanding of the landscape and its functions including its wildlife value and geomorphological processes (for example active coastal processes). **Continued over...**	**Sense of place/ inspiration** **Sense of history** **Recreation** **Geodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of place/ inspiration continued		**...continued from previous.** Inspiration is likely to be gained from the area's quality of the light, the huge open skies, historic features and unspoilt rural tranquillity. Varying views of open heaths and wooded skylines create a strong sense of enclosure in an otherwise open landscape. Localised river valleys, and large areas of quiet forests, add to feelings of inspiration and escapism. Traditional building includes farmsteads, barns and colourful straw-thatched cottages. Flint knapped churches, boat yards, fisherman sheds and boats and Martello towers and materials - soft-hued red bricks, thatch or pantiles and painted render all provide a sense of place to the NCA.		**...continued from previous.** Locally determined planning and development control has the potential to impact adversely on the landscape and sense of place. The growth in micro-generation, particularly small scale wind and solar photo voltaic installations can have a significant landscape and visual impacts that weaken the sense of place.	**...continued from previous.** Retain long views and the experience of big skies. New housing and other developments should support the local vernacular and be high quality to meet design and sustainability requirements. Encourage the development and use of specific design guidance to ensure that new developments fit in with the landscape character to retain local distinctiveness. Ensure that local development frameworks recognise the importance of conserving and enhancing the landscape to help reduce the likelihood of negative impacts from new developments. Retain long views and the experience of big skies.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history	Archaeology Roman roads Port towns of Lowestoft, Woodbridge, Ipswich, Felixstowe Seaside towns with Victorian villas (Felixstowe, Southwold) Country houses with historic parkland Ancient grazing marsh dyke systems Military features Traditional farmsteads and barns Colourful straw thatched cottages Churches Boat yards, and traditional sailing craft Palaeoecology and palynology Geology	Pakefield is one of the earliest known areas of human habitation in the UK. The internationally significant 2005 Palaeolithic stone tool artefacts found here suggest that our human ancestor, (most probably Homo erectus), arrived in northern Europe 700,000 years ago, much earlier than previously thought. The Quaternary deposits in this NCA also preserve the fossil evidence for ancient landscapes and climates. The internationally-important Sutton Hoo burial grounds are one of the UK's most important archaeological finds. The coastline's rich architectural history with Napoleonic Martello towers, forts, lighthouses, Victorian pleasure piers, First and Second World War structures, cold war installations and more recent nuclear power station buildings at Sizewell contribute to the sense of history. The sight of historic sailing craft and old boat yards provide a sense of history. There are 10 registered parks and gardens, 111 Scheduled Monuments (including the whole of Landguard peninsula at Felixstowe, and Orford Castle), and 2,280 Listed Buildings. Historic settlements (Southwold, Dunwich, Aldeburgh and Felixstowe), reveal a history of storms, flooding and coastal change. Thorpeness is unique as UK's the first purpose-built holiday settlement. Palaeoecological record including pollen-rich deposits (palynology).	National	Maintaining, conserving and enhancing the sense of history would achieve a wider understanding of the importance of the NCA. Increased opportunities to interact with the history of the NCA may have potential to increase the service. This may lead to increased recreation and tourism although management would be needed to ensure this is sustainable and does not have a negative impact on the assets themselves. The reinforced sense of history could contribute strongly to sense of place in the landscape. Loss of traditional village patterns through new infill development and the use of non traditional building materials in renovation work can lead to gradual erosion of historical assets and of the quality and distinctiveness of the built environment. Continued coastal erosion means the progressive change of the historic coastline and continuing threats of potential loss of historic land mark features (for example Orford Ness lighthouse, Covehithe Church, Dunwich Friary and some Martello towers). Finds of geological and archaeological significance can though be revealed when the cliffs are eroded. Agricultural practices, such as turf production which results in the continual loss of topsoil can damage the archaeological resource.	Conserve, enhance and promote the historic evidence of past human settlement, historic landscapes and their features and links between historical sites, archaeological evidence of human activity and the geological and biological interest of the area, where they are assessed as a priority in the area. Balance the need to protect the historic environment with aspirations for environmental enhancement while increasing the opportunities for sustainable recreation and tourism. Protect, maintain and restore historic buildings that are assessed as a priority in the region (for example Martello towers). Provide a sense of history through promotion of the archaeological record, as well as the value of geological sites in preserving a record of past landscapes, climate change and evidence for early human occupation. This will provide opportunities education. Use local evidence of past climate change (such as the pollen record) to reconstruct past environments and gain insights into the potential impacts of future climate change. **Coninued over...**	**Sense of history** **Tranquillity** **Recreation** **Sense of place / inspiration** **Geodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history continued					**...continued from previous.** Increase the sense of history by protecting the character and historic resource of agricultural areas and registered parks and gardens for the cultural history they contribute to the landscape character. Strength the historic settlement patterns where new development is proposed. Where the restoration of historic features is proposed encourage the use of local materials and local vernacular styles.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Tranquillity	Geomorphology Topography Forests and heaths River estuaries Marshes and broads Coast Dark night skies	52 per cent of the NCA is classified as undisturbed. Characteristics of the landscape that are particularly important in conveying a sense of tranquillity are the Sandlings forests and heaths, the coast (not including the towns of Lowestoft and Felixstowe) and the estuaries and valleys of the Stour, Orwell, Deben, Alde and Ore and Blythe. Areas of disturbance are associated with the urban centres of Ipswich, Felixstowe, Harwich and Lowestoft, together with the smaller coastal towns of Aldeburgh, Southwold and the main linking road corridors (A12, A14).	Regional	Tranquil areas have fallen slightly from 65 per cent in the 1960s to 52 per cent in 2007. This is primarily due to increases in traffic. The increased use of powered recreational water craft (particularly jet ski use), can be a particular problem reducing the tranquillity of the coast and estuaries. Levels of disturbance vary from the busy haven ports, the urban centres of Ipswich and Lowestoft, the bustling social seaside resorts of Southwold, Aldeburgh and Felixstowe, to the low-key tranquillity of the Sandlings Forests and heaths, the Deben, Alde and Ore estuaries and the coast and marshes. The richness of wildlife and limited settlement lends a, remote, wilderness quality to these tranquil areas. Increased housing development can increase recreational pressure on heathland habitats and lead to impacts on tranquillity. Major infrastructure developments onshore and offshore (for example Sizewell and offshore windfarms) have an impact on the landscape and the tranquillity of the NCA. Offsetting residual impacts of development can however bring about opportunities for landscape and biodiversity enhancement.	Ensure that forests and heaths, estuaries, marshes and coastline particularly within the AONB continue to provide a significant tranquillity resource offering silence and feelings of escapism. Manage the more tranquil areas and protect from further intrusion and development, including unnecessary night lighting to preserve tranquillity, so that they continue to provide solitude and inspirational views. Increase tranquillity by conserving and extending areas of semi-natural habitat, to benefits wildlife and people. Seek opportunities through the offsetting of residual impacts of major infrastructure projects to bring about landscape and biodiversity enhancement. Put in place Supplementary Planning Guidance to ensure future development recognises the essential value of tranquillity by securing measures. Explore how tranquil areas can be mapped and retained.	**Tranquillity** **Recreation** **Sense of place / inspiration** **Sense of history** **Geodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation	Forest and heaths Rivers and estuaries Coast Public rights of way network Local Nature Reserves National Nature Reserves Wildlife Historic features	The NCA attracts a diversity of visitors (for example ramblers, cyclists, artists, anglers, sailing enthusiasts, bird-watchers and seaside day trippers). Recreation is supported by 1,358 km of public rights of way and 7,560 ha of open access land covering 9 per cent of the NCA. The Forestry Commission has dedicated their freehold entire estate to open access. Increasing numbers of visitors now engage in ecotourism rather than the more traditional 'seaside holiday'. Numerous nature reserves, including the RSPB's Minsmere reserve, semi-natural habitats including heathland and forest, wetland avifauna and the area's scenic value support the area's ecotourism.	Regional	Recreation is on the increase as the population of the south-east grows. Increased recreation and open access can cause problems particularly during the bird breeding season when ground nesting birds (for example nightjar, woodlark and little tern) are very vulnerable to disturbance. Increasing the potential recreation opportunities within the Sandlings Forests and close to areas of growth on the outskirts of Ipswich may have the potential to take recreational pressure off more sensitive coastal and estuary locations. An increase in horse riding has lead to a slow growth in equestrian grazing leading to the development of some 'pony paddocks' that can bring intrusive infrastructure and little biodiversity gain. Increasing levels of public access can put pressure on popular locations, causing adverse impacts to local residents and increasing pressure on local resources. Increasing recreational access to local areas, particularly in the summer months, can impact on tranquillity.	Increase people's regular engagement with the natural environment to further benefit physical and mental health, by developing improved public access that contributes to feelings of well-being. During the development of coastal access, ensure that the sensitive habitats (for example vegetated shingle) are protected from disturbance. Support the development of a strategy for public access management. Increase recreational use of the Sandlings Forests, ensuring that this does not impact upon tranquillity, sensitive habitats, the rich geodiversity and historical sites. Improve people's understanding of landscapes through educational access, providing interpretation of local features at key sites. Support well planned green infrastructure to provide sustainable access routes.	**Recreation** **Biodiversity** **Geodiversity** **Regulating water quality** **Regulating soil erosion** **Sense of place / inspiration** **Recreation** **Water availability**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity	Designated sites Semi-natural habitats including: Woodland including ancient woodland and wood pasture Lowland heathland Salt marsh and intertidal mudflats Coastal and floodplain grazing marsh Reedbed, fen/ wooded fens Coastal vegetated shingle Coastal dune Saline lagoons	Land covered by international nature conservation designations (SPA SACs and Ramsar) totals 7,809 ha – 9 per cent of the total land area. There are four Ramsar, five SPA and five SAC sites. National Nature Reserves (NNR) and Sites of Scientific Interest (SSSI) total 9,176 ha – 24 per cent of the total land area. There are 3 NNR and 50 SSSI. In 2011 over 90 per cent of the SSSI area was in either favourable or recovering condition. 8 per cent was in 'unfavourable' condition. There are 268 Local Nature Reserves covering 6,785 ha. The NCA's semi-natural habitats are important for a extremely diverse range of animal and plant species, some of which are rare (for example stone curlew, nightjar, woodlark, Dartford warbler, bittern, water rail, marsh harrier, avocet, savi's warbler, bearded tit, little tern, antlion, great crested newt, adder, water vole and otter). Up to 30 per cent of the UK's breeding population of bittern are to be found at the RSPB's Minsmere reserve. Watercourses support a reasonable cyprinid (the carp/minnow family) population dominated by roach, bream, dace and chub.	International	Increasing threats to biodiversity come from non-native species, seasonal variability in river flows, depleted groundwater resources, drainage of wetland areas, and incursion of salt water from tidal flooding and diffuse pollution from land management. Climate change and rising sea levels add further challenges. Coastal habitats (for example cliff top heathland, reedbeds and fens) are being progressively lost due to continuing coastal erosion. Coastal squeeze is also leading to the loss of vegetated shingle and remnant salt marsh. The rich biodiversity supports high value landscapes, improvements in connectivity and benefits to other ecosystem services, where habitats are in favourable condition. Where in unfavourable condition the landscape condition is generally lower. Increases in recreational use (for example marinas, moorings, bait digging and dog walking) can progressively affected wildlife habitats including, vegetated shingle, lowland heathland as well as designated species including little turn, woodlark and nightjar. **Continued over...**	Improve the health and resilience of the habitat networks and associated biodiversity to safeguard against the consequential impacts of sea level rise and climate change. Identify opportunities and promote initiatives for a more naturally functioning coast and floodplain to benefit biodiversity, landscape character and sense of place, where this does not have an adverse impact upon local communities. Reinstate and extend the Sandlings heathlands for dry habitat species (for example nightjar, woodlark, Dartford warbler and adder) and reinstate and extend wet grassland in the river valleys and coastal plain for breeding waders (for example lapwing, redshank, and snipe) and wintering wildfowl. Raise awareness and improve the quality of understanding and enjoyment of the sensitive habitats and wildlife. Manage visitor pressures at popular and sensitive sites by investing in high-quality infrastructure and interpretation. **Continued over...**	**Biodiversity** **Geodiversity** **Recreation** **Sense of place/ inspiration** **Sense of history**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity continued				**...continued from previous.** Improved public awareness and active management can improve the declining condition of habitats, providing better protection, particularly from recreational disturbance. A lack of management of heathland habitats can lead to invasion of scrub and bracken, leading to a decline of breeding nightjars and woodlarks.	**...continued from previous.** Facilitate agricultural businesses to undertake more tailored conservation management, improving understanding of the area's ecology and requirements for specialist species, through support provided by agri-environment schemes. Encourage different remedies to improve water quality (for example increasing on-farm water storage to reduce water abstraction levels, increasing flow rates and water levels in rivers and continue to make improvement to waste water treatment works), to benefit aquatic biodiversity.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Geodiversity	Coastal geo-morphological processes and features River valley exposures Quarry exposures Geomorphology Archaeology Palaeo environ-ments	The underlying geology is almost exclusively sandy sediments known as Crag, which are exposed through the coastal erosion of the soft sediment cliffs that occur at many locations along the coast. These are of particular note between Kessingland and Southwold. Quaternary deposits provide evidence for past landscapes and climates as well as the activity of some of the earliest humans in Britain. Pleistocene chalky till is present along the coast in the north of the NCA, although it is also found in quarry excavations. There are notable examples of coastal geomorphology (for example Pakefield to Easton Bavents SSSI). Several geological type sites are also well represented (for example Bobbitshole SSSI – the type site for the Ipswichian; Corton Cliffs SSSI – the type site for the Anglian glaciation). Wrabness Cliff and the foreshore at Harwich (Stour Estuary SSSI) provide good exposures of London Clay (Harwich Formation). The Harwich foreshore is also notable for its Tertiary fossil flora, as well as nationally important for its volcanic ash deposits. Deposits of glacial sands and gravels are present across the Sandlings sides of the Stour and Orwell valleys and are exploited by quarrying. Marine aggregates are also dredged offshore. There are two publicly accessible County Geological Sites (Local Geological Sites) within the NCA and 25 geological SSSI.	International	Coastal processes are complex and operate at different scales. Waves are the main cause of change with their energy causing erosion and moving sediment along the shore. In some areas the tides are also important, particularly where the shoreline and estuaries interact with each other.[18] Much of the sediment that makes up the present shoreline has come from erosion of the coast and nearshore area. The most significant supply at present comes from the cliffs between Kessingland and Southwold. The cliffs and the continuing succession of exposed sediments are central to understanding the Quaternary climatic and environmental 'history' across the wider NCA, which may well, have implications for our understanding of the impacts of future. They subsequently provide a high educational resource. This large-scale erosion has created features such as Benacre Ness and the Orford Ness, maintaining the beaches, providing natural flood defence to other areas of the coast, as well as sustaining many of the important nature conservation habitats. In some places the shape of the coast would be very different if there were no man-made defences (for example Lowestoft Ness and Landguard Point, the entrance to the Blyth estuary and at East Lane, Bawdsey). Without defences the coast would continue to retreat over its whole length. Erosion will occur as long as sea levels rise and a slow lowering of land levels continues.	Use geological sites as a community educational tool, emphasising the integral role of geodiversity in underpinning the landscape character of the NCA. Ensure that geodiversity sites continue to be protected and improve these sites so that their status doesn't decline. Maintain and enhance the geological and geomorphological resource through implementation of the Suffolk Geodiversity Action Plan, specifically through maintenance of natural fluvial and coastal processes, together with the development of local geological conservation strategies and assessment of educational/research value of sites. Identify opportunities for geodiversity (and biodiversity) enhancement, which might develop through the reinstatement of semi-natural habitats and coastal functioning. Ensure that sand and gravel extraction sites are restored to contribute to local landscape character and exploit geodiversity opportunities and enhance biodiversity opportunities, providing improved access where possible.	**Geodiversity** **Regulating coastal erosion and flooding** **Biodiversity** **Recreation** **Sense of place/ inspiration** **Sense of history**

[18] *Shoreline Management Plan 7* (previously Sub-Cell 3C), Suffolk Coastal District Council (May 2012)

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Front cover: Suffolk Coast and Heaths. Looking north towards Dunwich from Minsmere.
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