National Character Area profile:

125. South Downs

NATURAL ENGLAND

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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.

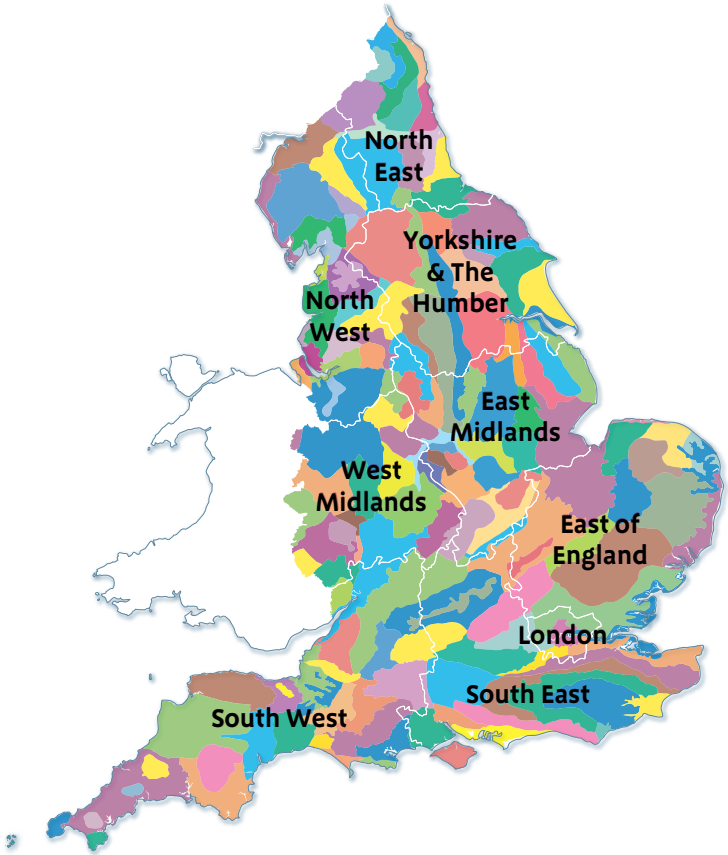
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and 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)

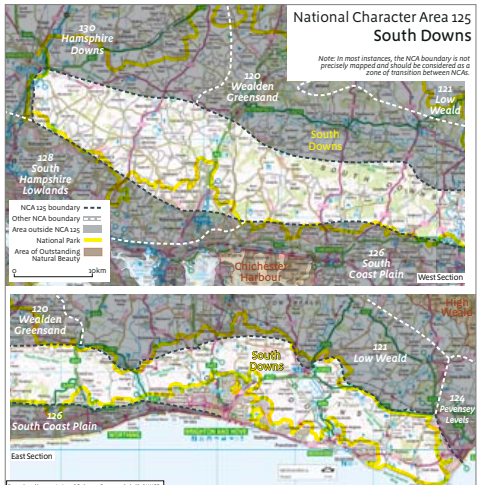
Summary

The South Downs National Character Area (NCA) comprises a 'whale-backed' spine of chalk stretching from the Hampshire Downs in the west to the coastal cliffs of Beachy Head in East Sussex; two per cent of the NCA between Eastbourne and Seaford is recognised as Heritage Coast. The majority of the area falls within the South Downs National Park, a recognition of its natural beauty and importance for access and recreation, and allowing for local decision-making processes to manage this nationally important area. Some eight per cent of the NCA is classified as urban, comprising the coastal conurbation of Brighton and Hove in the east. The South Downs NCA is an extremely diverse and complex landscape with considerable local variation representing physical, historical and economic influences; much of it has been formed and maintained by human activity, in particular in agriculture and forestry. International Biosphere status was confirmed for Brighton and Lewes Downs in June 2014, securing it as the first completely new Biosphere site in the UK established for almost forty years and the first ever in south-east England.

This is a landscape of contrasts. Dramatic white chalk cliffs and downland create a sense of openness. Enclosure and remoteness can be found in woodland and even in close proximity to urban areas. This NCA provides a rich variety of wildlife and habitats; rare and internationally important species, such as the Duke of Burgundy butterfly, mature elms and rare ground-nesting birds all benefit from the characteristic mixed farming systems. Recreational activities within the NCA include cycling, walking and horse riding on the South Downs Way National Trail which follows the ridge of the northern scarp and provides extensive panoramic views. National Park status enhances the NCA's recreational opportunities.

The Brighton groundwater management unit is the principal chalk aquifer supplying Brighton and surrounding areas. It has been identified as being under significant stress and is classified as having 'no water available', as is the River Ouse water resource management unit (WRMU). The River Adur WRMU, however, is classified as having 'water available'. [4]

In the west of the NCA, groundwater in the chalk feeds many of the rivers, streams and wetlands in the area and provides most of the water abstracted for public supply. The porosity of chalk is one of its most notable properties. Rain is largely absorbed through tiny, connected pores instead of lying on the surface and forming rivers, lakes and ponds. Rain water moves through the thin chalk soils and slowly replenishes the chalk aquifer below.



Click map to enlarge; click again to reduce.

[4] *Adur and Ouse Catchment Abstraction Management Strategy*, Environment Agency (March 2005) (accessed March 2013; URL: http://publications.environment-agency.gov.uk/pdf/GESO0305BVIG-E-E.pdf)

In the centre of the NCA, the Worthing chalk aquifer is classified as having 'no water available'. The Arun, Adur, Cuckmere and Ouse dissect the chalk ridge in its eastern half, separating it into blocks, as they drain from the Low Weald south to the sea. The River Meon in the west follows a similar course, though it is a chalk stream in a typically narrower valley that subsequently broadens in the adjoining coastal plain before it reaches the south coast.

The South Downs consist of an archetypal chalk landscape ofrolling hills, steep scarp slopes with dry valleys and a rich archaeological character. Centuries of sheep grazing on steep slopes have produced a network of tracks following the contours of the hills.

In many instances, farming has shaped the NCA over centuries; characteristic farming patterns range from arable in the west, wooded areas and mixed farming in the central areas and chalk grassland increasingly to the east. Over 80 per cent of the South Downs NCA is farmed.

The NCA has a wealth of well-conserved historical features including a range of archaeological sites from the Bronze and Iron Ages and early industrial sites from flint mines to ironworking furnaces. This is a landscape with a rich cultural heritage of art, music and rural traditions. Many well-known writers, poets, musicians and artists have drawn inspiration from its distinctive sense of place. Tranquillity is experienced most on the escarpment, dip slope and within the valleys of the chalk ridge and eastern and central downs, providing a sense of escape in a crowded corner of south-east England.

The coastline protects the area from increasing storms and rising sea levels while supporting important rare habitats for wildlife, from chalk cliffs and vegetated shingle beaches to the hidden treasures of chalk reefs that lie beneath the waves.

The chalk cliffs at the eastern extreme of the South Downs around Beachy Head represent yet another scarce type of habitat with its own ecological and geological importance. Constantly eroded by the sea, these magnificent cliffs support a range of specialised plants including algae and provide nesting sites for fulmar, kittiwake and peregrine falcon.

Statements of Environmental Opportunity

- **SEO 1**: Plan for an expansion of species-rich chalk grassland and other semi-natural habitats, and manage and enhance other existing chalk habitats for wildlife connectivity, reinforcement of the distinctive landscape character, and improvement to water resource management.

- **SEO 2**: Manage, expand where appropriate and enhance the downland farmed landscape, the arable mixed farmed landscape of the dip slope and the broadleaved woodland cover, conserving wildlife habitats, contributing to food provision, maintaining a distinct yet evolving landscape pattern, improving water quality and providing local sources of renewable fuels.

- **SEO 3**: Conserve and promote the South Downs' rich historic environment, its unique geodiversity and national and local geological sites for the contribution they make to cultural heritage, biodiversity and landscape. Maintain and enhance quality of access, including via the South Downs Way National Trail, providing interpretation to enhance educational and recreational opportunities.

- **SEO 4**: Manage, enhance and integrate recreational opportunities and public enjoyment with conservation of the natural environment and tranquillity, reflecting the ambitions of the South Downs National Park.

Cissbury Ring, one of the largest iron-age hill forts in England.

Description

Physical and functional links to other National Character Areas

The chalk ridge that comprises the South Downs National Character Area (NCA) extends west into the chalk plateau of the Hampshire Downs NCA, while the South Coast Plain NCA forms a transitional area between the central part of the southern chalk dip slope of the South Downs NCA and the sea. Extensive views are afforded from many of the scarp slopes to the north over the Low Weald NCA and Wealden Greensand NCA.

Walkers accessing the public rights of way along the downland providing panoramic views across the Downs and Low Weald.

The catchments of the rivers Cuckmere, Ouse, Adur and Arun drain south through prominent valleys in the eastern chalk ridge from the High Weald NCA via the Low Weald NCA – and the latter via the Wealden Greensand NCA – into the sea along the south coast, passing through major coastal settlements. River catchments that rise on the downs also drain into Chichester and Langstone Harbour Special Protection Area (SPA)/Ramsar site, while erosion of the chalk cliffs helps to feed the Dungeness shingle foreland to the east with a limited amount of new sediment.

The South Downs NCA shares many species with the adjacent Hampshire Downs NCA as they are ecologically and functionally linked. The South Downs Way National Trail extends westwards into the Hampshire Downs NCA.

A number of A roads dissect the ridge along its length, connecting the towns of the south coast to London. The area has linear parishes and estates reaching up to their former grazings from the farmland on either side, creating direct land use links and explaining the numerous lanes that climb and fall from the downs.

The Chichester chalk aquifer includes streams that feed into the internationally important habitat sites of Chichester and Langstone Harbour SPA[5] and Pagham Harbour SPA, both of which fall within the South Coast Plain NCA.

Distinct areas

- Lullington Heath
- Kingley Vale

[5] *The Arun and Western Streams Catchment Abstraction Management Strategy*, Environment Agency (April 2003) (accessed March 2013; URL: http://publications.environment-agency.gov.uk/pdf/GESO0403BNMT-E-E.pdf)

Key characteristics

- A broad elevated east–west chalk ridge with a predominantly steep north-facing scarp slope and a gentle southerly dip slope, breaking into a series of hills in the west and terminating in distinctive chalk cliffs in the east.
- Cliffs between Beachy Head and Seaford Head are part of a Geological Conservation Review (GCR) site of international importance for its landscape and for research into coastal geomorphology.
- The principal rivers – the Arun, Adur, Cuckmere and Ouse – slice through the eastern half of the downs as wide U-shaped valleys with steep sides and flat alluvial flood plains with intensive dairying and crops, and characterised by criss-crossing ditches and meandering river channels. The meanders of the River Cuckmere by Seven Sisters chalk cliffs are particularly significant. Remnant wetland habitats including flood plain grazing marsh, fens and reed beds.
- Chalk streams running off both the north- and south-facing scarp slopes providing a key habitat for the scarp and the flood plain landscape, supporting species such as the brown trout.
- Woodland a feature of the central downs and, to a lesser extent, the western downs, also concentrated on the steep scarp slopes, consisting of both broadleaved, mostly ancient, woodland with beech, veteran trees, ash and sycamore, and conifers, with some large plantations. Kingley Vale National Nature Reserve (NNR) contains a wealth of yew woodland.
- Several different types of heathland habitat, including wet heath, wooded heath and chalk heath dependent on loess soils. Lullington Heath NNR near Eastbourne is one of the largest areas of chalk heath in the UK.
- The eastern downs characterised by large open arable and grassland fields, mostly enclosed by the 16th century, with a general absence of woodland and hedgerow boundaries, creating an open, exposed landscape. To the west of the River Arun, where holdings were smaller and 'sheep-and-corn' farming less important, hedgerows enclose medium to large irregular fields between the woodlands and designed parkland landscapes, the latter a particular feature of the central areas.
- Poor soils on the north-west area of the downs with patches of birch woodland, conifer plantation, bracken and rough grassland. The Gault Clay forms shallow, gently rolling lowland crossed by many streams flowing northwards. On the chalk hills, the infertile soils are generally thin, well drained and rich in calcium.
- Distinctive fragments of semi-natural chalk grassland dotted with chalk springs on scarp and combe slopes, with important associated habitats including rare chalk heath and species-rich chalk scrub.

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Key characteristics continued

- A vast array of wildlife such as otters and barn owls; lesser known species such as the barbastelle bat, the chalk carpet moth, sundews (carnivorous plants) and the round-headed rampion, the county flower of Sussex; threatened species include the bee orchid, small blue butterfly and nightjar.
- Roads and villages concentrated in the river valleys, the more elevated areas sparsely settled with scattered farmsteads. The eastern end of the Downs is squeezed against the coastal plain conurbations of Brighton and Hove, and Worthing, which contain a wealth of architecture and give the area a strong sense of identity. There is also an almost continuous string of seaside towns: Rottingdean, Saltdean, Peacehaven, Newhaven and Seaford.
- Flint, brick and timber frame conspicuous in the built environment in walls, buildings, churches and barns, while roofs are of tile, slate or traditional thatch. The South Downs was once lined with windmills, some of which survive.
- Bronze-age round barrows and prominently sited iron-age hill forts, such as Cissbury Ring and Old Winchester Hill, are notable prehistoric features of the scarp and hill tops, especially in the west, as well as Mount Caburn in the east, and further bronze-age barrows and a causewayed camp at Willingdon (most of which are designated as Scheduled Ancient Monuments).
- The Long Man of Wilmington – a large hill figure located on the steep slopes near Eastbourne. One of only two extant human hill figures in England, it is 69 metres tall and is designated as a Scheduled Ancient Monument. Current archaeological research suggests that it dates from the 16th or 17th century. Others believe it to be more ancient, perhaps contemporary with the nearby Neolithic flint mines and barrows, or the work of medieval monks from Wilmington Priory.
- Public rights of way following drove roads and ancient routes along the accessible downland tops, benefiting from panoramic views across the downs and the Low Weald NCA. Roads and lanes striking across the downs perpendicularly and following historic tracks that originally brought livestock to their summer grazing.

The rivers Arun, Adur, Ouse and Cuckmere cut through the Downs and provide contrasting narrow belts of flat land within the rolling chalk landscape.

The South Downs today

The South Downs NCA is defined by a prominent ridge of chalk that stretches from Winchester in the west to Eastbourne and the East Sussex coastline in the east, where it meets the sea in the distinctive chalk cliffs of Beachy Head and the Seven Sisters. Ninety per cent of the NCA falls within the South Downs National Park. The eastern half of the NCA is cut into distinct blocks by the four major river valleys of the Arun, Adur, Ouse and Cuckmere. Here the chalk topography is most pronounced, with a dramatic north-facing escarpment and dry valley systems carving the dip slope, and a discontinuous secondary escarpment further south. The topography combines with large fields, the result of successive enlargement and reorganisation reflecting the size of its farms, and an absence of woodland to create a vast landscape. The area is further characterised by fragments of nationally and internationally important chalk grassland that cling to the steep scarp and valley slopes and support many threatened species of plants, such as the frog and musk orchids and the critically endangered red star-thistle, as well as many scarce butterflies and invertebrates. Dominant along the south coast are the conurbations of Brighton and Hove, and Worthing.

By contrast, the central downs between the River Arun and the A3 London to Portsmouth road are characterised by extensive areas of often ancient woodland, with beech, ash and sycamore, conifer woods, some large plantations and historic parkland. These combine with large, hedgerow-bounded arable fields to create a large-scale landscape of importance for farmland bird species such as grey partridge and corn bunting. The topography is also less articulated and forms a broad, gently-sloping plateau stretching south from the steep, north-facing scarp.

Further west, the chalk ridge separates into a series of hills that gradually merge into the plateau of the adjoining Hampshire Downs NCA. Though less extensive, woodland is still a feature of the area and combines with ancient hedgerows to create the appearance of a well-wooded downland landscape supporting species such as the yellow bird's-nest plant. The landscape is nevertheless dominated by arable fields and grassland. Where the woodland combines with species-rich grassland, it can support populations of the rare fly orchid and the Duke of Burgundy butterfly, for which the South Downs is a national stronghold.

The major rivers of the eastern section meander through wide flood plains enclosed by steep-sided slopes, forming distinctive U-shaped, pastoral valleys leading down to estuaries on the coast. Small pastures at the edge of the flood plain are often enclosed by hedgerows, copses and lines of alder, willow and poplar, the hedgerow boundaries contrasting with the more modern drainage ditches and engineered stretches of river sections. The River Meon in the west is a chalk river that runs through a typically narrower valley. Remnant wetland habitats, such as wet meadows and flood plain grazing marsh, and now mostly derelict watercress beds are important surviving features of the river valleys. These are largely the result of traditional management practices and provide habitat for breeding and wintering waders, as well as a wide range of wetland invertebrates and plants such as the critically endangered sharp-leaved pondweed.

At the coast, there are stretches of chalk cliffs, largely unaffected by coastal protection measures in the east. Where there is development, groynes and cliff toe protections have been installed to reduce rates of cliff erosion. There are areas of semi-natural vegetation on the cliff tops, but arable cultivation often extends right up to the cliff edge, resulting in a loss of natural transitions. The estuarine sections of the rivers have also had artificial constraints for navigation, development or flood prevention at their seaward end. As a result, the original shingle bars across the river mouths are limited in their natural function and some long-shore drift is prevented.

The Arun Valley in West Sussex, designated as an SPA/Ramsar site, is located north of the South Downs escarpment. It consists of low-lying grazing marsh, largely on alluvial soils but with an area of peat derived from a relict raised bog. Variation in soils and water supply lead to a wide range of ecological conditions and a rich flora and fauna. As the thin soils become saturated, the water moves slowly down through the porous chalk below. Southern parts of the Arun Valley are fed by calcareous springs, while to the north, where the underlying geology is Greensand, the water is more acidic. The ditches and margins between grazing marsh fields have outstanding aquatic flora and invertebrate fauna, although the majority of flood plain grassland in the Arun Valley is of poor quality for wildlife. Amberley/Pulborough/Waltham are the main high-quality areas. For its size, there is comparatively little good wetland habitat (fen or reedbed) in the flood plain, so the small areas which exist are extremely valuable. The Arun Valley supports important numbers of overwintering water birds, which feed in the wetter, low-lying fields and along ditches. There are over 900 ha of candidate Special Areas of Conservation (cSAC) providing increased protection to a variety of important habitats and species.

Today, remnant areas of reedbeds, fen, flood plain grassland and grazing marsh are of high biodiversity interest. They support large numbers of birds such as lapwing, redshank and snipe and plants such as flowering rush, water violet and greater water-parsnip.

Settlement away from the architecturally important coastal towns is sparse and concentrated in villages and hamlets that occur within the valleys, with dispersed farmsteads dating from the medieval period throughout. In the Hampshire section of the area, timber framing was used for most buildings until the 17th century and continued to be used for farm buildings until the 19th century. Flint and cobbles were used more widely in Sussex. Flint combined with brick for quoins, dressings to windows and as banding within the flintwork is characteristic of the 18th and 19th centuries. Straw thatch was the traditional roofing material, but the use of clay pan tiles, available from the nearby clay lowlands to the south, is widespread. Bronze-age round barrows and prominently sited iron-age hill forts, such as Cissbury Ring, are notable historical features of the scarp and hill tops and are particularly prominent in the west. Large estates, such as Goodwood and Cowdray Park, are features of the central downs, each with its own distinct livery.

Many of the footpaths and bridleways follow drove roads and transport routes along the scarp and cutting across the Downs, and have been used for centuries. These often afford panoramic views over surrounding areas and are valued for their apparent sense of remoteness and tranquillity. The 160 km of the South Downs Way National Trail follows the old routes and droveways along the escarpment and ridges of the South Downs, offering public access and recreational opportunities.

International Biosphere status was confirmed for Brighton and Lewes Downs in June 2014, securing it as the first completely new Biosphere site in the UK established for almost forty years and the first ever in south-east England. The Brighton and Lewes Downs Biosphere covers around 390 square kilometres of land and sea in Sussex, between the Rivers Adur and Ouse. It incorporates a variety of important habitats and species, including chalk grassland, undersea reefs, Adonis Blue butterfly and Short-snouted Seahorse and lies partly within the South Downs National Park.

The South Downs escarpment in West Sussex showing the mixture of land uses. All the chalk grassland visible on the escarpment is manged by countryside stewardship schemes.

The landscape through time

The chalk of the South Downs was formed by Cretaceous deposits laid down over 100 million years ago, and represents the southern remnant of a once extensive dome of Chalk eroded during the Tertiary Period. The chalk of the Upper Cretaceous Period is extremely rare in the whole of geological time. Apart from the Albanian red chalks and Tertiary chalks such as the Danian of Denmark and some Middle East deposits, nothing quite like it had been deposited before that time, and nothing has since. Chalk is a particularly pure form of limestone, a sedimentary rock formed by the deposition in water of solid calcium carbonate. The calcium carbonate in chalk is largely made up of the skeletons of marine algae, which accumulated in the sediments during the 35 million years of the Cretaceous Period. The geology of the South Downs is dominated by tilted layers of Upper Cretaceous Chalk which were deposited in a shallow sea and which contain many fossils and bands and seams of flint nodules. The Chalk dips to the south with the consequence that increasingly younger rocks are exposed in this direction.

At the margins of the NCA, Cretaceous Greensand and Palaeogene (Tertiary) Lambeth Group and London Group sediments are exposed at the surface. The South Downs are structurally part of the Wealden Anticline, a large dome of rocks folded during the Alpine Orogeny (mountain-building episode) and since eroded; the North and South Downs partially surround older sediments which have been exposed by erosion.

The most significant period of erosion of the chalk occurred during the Pleistocene glaciations, which eventually began to decline around 12,000 BC. All but the most hardy plant and animal species were driven south by the ice, only to begin re-colonising as the ice retreated. Many species never returned as their path had been blocked by the inundation of the English Channel around 5500 BC. People had already arrived in Britain in the early Pleistocene Period, mainly hunter-gatherer tribes, but archaeologists have detected forest clearances attributable to Mesolithic man from around 7500 BC.[6]

The Long Man of Wilmington is an extant human hill figure whose origin remains unclear.

[6] *Ecology of the English Chalk*, C.J. Smith (1980)

More recently, thin wind-blown loess, which formed in dry tundra-like conditions during the last ice age, remains over the chalk in a small number of places. Clay-with-Flints deposits occur over the dip slope.

Neolithic and bronze-age clearance of woodland for grazing and cultivation, particularly in the eastern half of the NCA, led to the open, treeless downland which remains characteristic of the area to this day, as well as to the acid loess soils in its surviving heathland which is critical for wildlife. Bronze-age farmers also left evidence of their settlements, hill-top enclosures, field systems and boundaries, known as cross-dykes. During the Bronze Age, there may have been a return to predominantly nomadic, pastoral farming. Cropmark evidence shows that in the Iron Age and Roman periods the landscape was intensively farmed, with characteristic square fields in large axial systems covering wide areas and with many scattered farmsteads. Iron-age hill forts sited at strategic locations, such as Cissbury Ring, served as political and economic centres, while in the Roman period villas administered large estates.

The first purpose-built road systems in the South Downs were constructed by the Roman army to link coastal landing places with London[7]. Since Roman times market conditions have influenced whether the semi-natural chalk grassland was used as open sheepwalks or for arable cultivation. The Saxon period saw the first development of towns, with Lewes being occupied in the late Saxon period. Some Roman land units were developed and became the basis for some of the large, wealthy estates of the medieval period. These were predominantly in ecclesiastical ownership, with owners including the Archbishop of Canterbury and the bishops of Winchester and Chichester. Much of the land held by monastic institutions up to the 16th century came into the hands of wealthy secular lords after the Dissolution of the Monasteries, leading to the creation of impressive country houses and parks concentrated in the central downs. The prominent parkland landscapes that characterise the area today are largely a product of the Georgian period, with distinctive beech woodlands framing planned views.

From the 15th century, sometimes earlier, the open fields and downland were subject to gradual or piecemeal enclosure, in tandem with sheep husbandry, though 'enclosure by agreement' was prominent. At times of greater demand for food, arable cultivation, which was usually centred on the richer soils of lower-lying areas, was extended to higher ground and steeper slopes. Stock-rearing dominated up to the end of the 16th century, with arable cultivation increasing after this time, establishing the mixed farming economy of the late 18th century. Considerable areas of open common fields survived into the 19th century, predominantly in West Sussex. Windmills were a feature of the landscape and some still survive.

From the 17th century, water meadows were constructed to allow the managed flooding of pastures during winter and thus protect the grass from frost to ensure early and rich hay harvests. Even where the common fields had been enclosed, the rich meadowland of the valley floors often remained in common use, some until the 19th century. The wide, flat flood plains of the main river valleys that dissect the eastern ridge have historically provided rich grazing land for dairy cattle and sheep and continue to do so today. The narrow chalk valley of the River Meon in the west was traditionally dammed to support the watercress beds that are a distinctive feature of chalk streams. The rivers of the South Downs played an important role as transport conduits, allowing trade to and from the South Downs, and as energy generators, with water and tide mills being used to mill grain, for example at

[7] *State of the National Park 2012,* South Downs National Park Authority (2012)

Bishopstone in East Sussex which operated until 1883. Over time, siltation of the rivers affected their natural courses, with historic inland ports such as Steyning and Arundel becoming land-locked[8].

By the mid-18th century, coastal towns such as Brighton, Hove and Worthing were in decline as fishing communities and experienced extensive growth as resorts, particularly after the opening of the London to Brighton mainline railway in 1841. Brighton and Hove's distinctive architecture reflects royal patronage and their transformation into a service sector economy. Further into the 20th century, the residential and economic development of the main settlements was further stimulated by their strong links to London.

Sheep farming has been important on the South Downs since prehistoric times; up until the early 20th century, sheep were grazed on the steep grass banks by day and moved to the lower, flatter arable areas at night where the flock would be 'folded' on fields near the village to provide manure for the naturally shallow and unproductive soil. As a result, the South Downs has linear parishes and estates reaching up to former grazings from farmland on either side and numerous lanes that climb and fall from the downs. By the end of the 19th century, this way of managing sheep was already in decline as chemical fertilisers became available and foreign imports made sheep farming less profitable.

The shoreline has been retreating for centuries and attempts have been made to control this natural process. Coastal defence works carried out over the last century have not prevented natural change from occurring; they have simply delayed its full implications from being felt. After the First World War, settlements expanded along the whole coastal plain. This development was often unplanned and uncontrolled. A few stretches of coastal chalk cliffs remained undeveloped, such as the section between Seaford Head and Beachy Head. Timely intervention and lobbying for development controls during the 1920s and 1930s began the task of conserving the beauty of this famous coastline[8].

Since the 1950s, the main roads that run north–south across the NCA in valleys and cuttings have also had an increasing impact. Post-war, the area's semi-natural chalk grasslands, woodlands and wetland habitats were further diminished through agricultural intensification.

In 1962 and 1966, the special scenic qualities of East Hampshire and the Sussex Downs respectively were formally recognised through designation as Areas of Outstanding Natural Beauty (AONB). The coastal cliffs of Beachy Head have also been identified as Heritage Coast. Access to the area was enhanced in 1972 with the opening of the South Downs Way National Trail. In 2009, there was further recognition of the area's importance for access and recreation and for scenic beauty with the designation of the South Downs as a National Park. Superseding the AONB, the National Park accounts for 90 per cent of this NCA and allows a local decision-making process to manage this nationally important landscape.

[8] *State of the National Park 2012*, South Downs National Park Authority (2012)

Ecosystem services

The South Downs 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 South Downs NCA is contained in the 'Analysis' section of this document.

Provisioning services (food, fibre and water supply)

- **Food provision**: The area is a major producer of cereals (including wheat and barley) grown on the dip slope, as well as meat (notably, South Downs lamb from the eastern downs) and dairy produce (from the valleys). These activities are historically important to the downland landscape. Oilseed rape is also a significant crop. There has been an increase in pig husbandry, so although sheep farming is more characteristic within the NCA, livestock farming is more diverse.

- **Water availability**: The chalk hills of the South Downs are the source of all the water for the NCA. They act as a natural filter system and storage reservoir, supplying drinking water, irrigation for farms and gardens, and water for industry. In the east of the NCA, the Brighton groundwater management unit is the principal chalk aquifer supplying Brighton and Hove and surrounding areas and is identified as being 'under significant stress'.[10] In the centre of the NCA, the Worthing chalk aquifer is classed as having 'no water available' while the Chichester chalk aquifer is classed as being 'over-licensed'.[11] To the west, groundwater below the chalk hills provides the majority of the water abstracted for public supply.[12]

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

- **Regulating soil erosion**: The lighter soils that dominate the NCA are prone to loss through both wind and water erosion. The small areas of soils with impeded drainage are susceptible to capping and slaking, increasing the risk of soil erosion. The thicker, more clayey soils have a low risk of soil erosion[13].

- **Regulating soil quality**: The shallow lime-rich soils over chalk, covering 63 per cent of the NCA, and the deeper, freely draining lime-rich loamy soils, covering 13 per cent of the area, are typically shallow and prone to drought, but have a degree of natural resilience due to their calcareous nature. Both these soil types and the freely draining slightly acid loamy soils, across 14 per cent of the area, are valuable for aquifer recharge[13].

[10] *Adur and Ouse Catchment Abstraction Management Strategy,* Environment Agency (March 2005) (accessed March 2013; URL: **http://publications.environment-agency.gov.uk/pdf/GESO0305BVIG-E-E.pdf**)

[11] *The Arun and Western Streams Catchment Abstraction Management Strategy,* Environment Agency (April 2003) (accessed March 2013; URL: **http://publications.environment-agency.gov.uk/pdf/GESO0403BNMT-E-E.pdf**)

[12] *The East Hampshire Catchment Abstraction Management Strategy,* Environment Agency (May 2003) (accessed March 2013; URL: **http://publications.environment-agency.gov.uk/pdf/GESO0503BNMR-E-E.pdf**)

[13] National Soils Resources Institute, Cranfield University: www.cranfield.ac.uk/sas/nsri

- **Regulating water quality**: The majority of the rivers within the NCA are classed as having 'moderate' ecological status. The River Meon is classified as having 'good' ecological status. The River Arun has a small stretch of poor ecological potential. The ecological potential for estuarine waters along the coastline is 'moderate' and the groundwater chemical status is 'good' at the eastern end of the NCA, but 'poor' to the west of the River Adur. The natural habitats of the NCA create a natural system of water cleansing, i.e. reedbeds, grasslands and flood plain areas which slow river flows and allow rivers to release silts and pollutants.

- **Regulating water flow**: The River Arun is identified in the *Arun and Western Streams Catchment Flood Management Plan* as an area of low to moderate flood risk where action should be taken to store water or manage run-off in order to reduce downstream flooding and provide environmental benefits. Similar policies are identified for the Adur catchment. The natural landscape also currently buffers a large amount of rainfall and flood plain areas already provide a service by storing vast amounts of floodwater. The flooding in Lewes in October 2000 was the worst in over 150 years. More than 600 homes and over 200 public and commercial premises were affected[14]. A number of targeted actions are proposed to mitigate flooding in this area.

- **Regulating coastal flooding and erosion**: Along the coast, between Eastbourne and Seaford, the Shoreline Management Plan predominantly identifies long-term policies of 'no active intervention' for the eastern stretches. At Brighton and Seaford, the long-term policy is to 'hold the line', while there are short-term policies of 'hold the line' at Peacehaven and Saltdean to maintain cliff-top assets[15]. The plan supports a range of schemes and there are proposals to allow dynamic coastal processes to continue where appropriate. Allowing natural coastal processes to operate creates new habitats which maintain and enhance local landscape character, biodiversity and geological assets; it also improves the sustainability of current management practices. The coastal habitats mitigate the severity of coastal flood events and rates of coastal erosion, while some erosion is favourable to and necessary for evolution of the coast and to provide sediment for areas further down the coast.

Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration**: Sense of place is provided by the highly distinctive elevated chalk ridge, scarp and dip slopes and numerous dry valleys. The dramatic chalk cliffs, defined as Heritage Coast within the South Downs National Park, are particularly distinctive and contrast with the ancient woodlands and parklands in the west. The downs have been a source of inspiration for generations of artists and writers, including Rudyard Kipling, John Constable, Eric Ravilious and the Bloomsbury Group.

- **Sense of history**: The area contains a wealth of visible prehistoric remains, including Neolithic flint mines, bronze-age barrows and prominent hill forts. Historic parklands are prominent within the NCA and Brighton and Hove and the other coastal towns provide a strong sense of history with their distinct architecture and Georgian and Victorian associations. The area's traditional architecture, in its farmsteads and settlements, is highly distinctive and includes a high proportion of buildings from the 16th century and earlier. Family farms and estates, often centuries old, carry the understanding and knowledge of the countryside's history which gives meaning to the landscape. Linear parishes and estates reaching up to former grazings from farmland on either side of the downs and numerous lanes that climb and fall from the downs reflect historic land use patterns such as sheep farming.

[14] *Lewes Flood Plan 2010*, Lewes District Council and East Sussex County Council (March 2010)
[15] Shoreline Management Plan 12 'Beachy Head to Selsey Bill', Environment Agency (2006) (accessed March 2013; URL: http://www.environment-agency.gov.uk/research/planning/105014.aspx)

- **Tranquillity:** A strong sense of tranquillity is associated with the open downland combes and ridges and with the ancient woodland and majestic beech hangers in the west. They provide a sense of freedom and escape within the highly developed south-east of England.

- **Recreation**: Recreation is a significant feature of the area, with the majority of the NCA falling within the South Downs National Park. Recreation is supported by nearly 2,000 km of rights of way, including the South Downs Way National Trail running along the crest of the scarp slope. More than 4 per cent of the area is open access land (defined as land open to access on foot by the Countryside and Rights of Way Act 2000), mainly areas of open chalk downland.

- **Biodiversity**: A total of 4,851 ha of the NCA are designated as Sites of Special Scientific Interest (SSSI); there are seven SAC; and seven NNRs. The Arun Valley is internationally designated as a Ramsar site and also as an SPA. Just over 3,000 ha of the NCA is considered Biodiversity Action Plan (BAP) priority habitat, including coastal and flood plain grazing marsh, maritime cliff and slope, lowland calcareous grassland, fens, lowland meadows, lowland dry acid grassland, coastal vegetated shingle, reedbeds, mudflats and saline lagoons. The Brighton and Lewes Downs Biosphere covers around 390 square kilometres of land and sea in Sussex, between the Rivers Adur and Ouse. It incorporates a variety of important habitats and species, including chalk grassland, undersea reefs, Adonis Blue butterfly and Short-snouted Seahorse and lies partly within the South Downs National Park.

- **Geodiversity**: The NCA has six geological SSSI, designated variously for geomorphological, structural, karst, stratigraphic, fossil and Quaternary interests. Other local sites are designated as geological SSSI. The Devil's Dyke valley is the deepest single combe in the chalk karst of Britain. The cliff coast between Beachy Head and Seaford Head is a GCR site of international importance to research into coastal geomorphology. In certain locations, such as at Lullington Heath, wind-blown soils called loess have been deposited on top of the chalk and are thought to have been laid down during the last ice age.

Visitors enjoying the view near Devil's Dyke, West Sussex.

Statements of Environmental Opportunity

SEO 1: Plan for an expansion of species-rich chalk grassland and other semi-natural habitats, and manage and enhance other existing chalk habitats for wildlife connectivity, reinforcement of the distinctive landscape character, and improvement to water resource management.

For example, by:

- Identifying real improvements to the conservation and management of the chalk grassland at the heart of the downland habitats to enhance ecological connectivity for wildlife.
- Restoring, expanding and re-linking remnant areas of lowland calcareous grassland on the steep scarp and dry valley slopes.
- Connecting historic ancient chalk grassland sites to improve their durability and permeability, benefiting the species plants and invertebrates.
- Conserving and extending species-rich wood scrub grassland habitats and controlling scrub invasion.
- Significantly restoring, creating and re-linking the fragmented chalk grassland habitats of the chalk ridge to provide opportunities for ecological connectivity for wildlife.
- Achieving favourable condition and restoration of rare chalk heath associated with localised acid loess soil.
- Identifying appropriate management actions to protect and enhance the assemblage of habitats derived from the underlying chalk, including coastal habitats, chalk streams, dry valleys and beechwoods, and the range of wildlife that they support.
- Protecting and enhancing rivers and other wetland environments, in particular rare chalk streams, as well as allowing for the natural mangement of river and stream corridors in accordance with the Water Framework Directive.
- Exploring opportunities for habitat enhancement in the stretches of river valley while not interfering with the active coastal processes that sustain the distinctive chalk cliffs on the eastern coastline; and where cliff recession or other coastal change occurs, maintaining and re-routing coastal recreational access.
- Exploring opportunities to restore natural marshland areas and to enhance the overall ecological quality of grazing marsh grasslands.
- Identifying key areas of vulnerability for the assemblage of habitats and identifying actions for adapting to changes in climate.
- Broadening the South Downs Way National Trail as a semi-natural corridor and improving the natural qualities of the route.
- Ensuring that sites are in favourable management through extensive grazing and scrub management, linked to the promotion of the South Downs sheep.

Continued on next page...

SEO 1: Plan for an expansion of species-rich chalk grassland and other semi-natural habitats, and manage and enhance other existing chalk habitats for wildlife connectivity, reinforcement of the distinctive landscape character, and improvement to water resource management.

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- Creating extensive interlinked areas of lowland calcareous grassland on the chalk plateau and dip slope through closely targeted reversion of arable land, while seeking opportunities to improve groundwater quality and aquifer recharge, aid biodiversity adaptation to changes in climate and conserve historic landscape character.
- Conserving and expanding the historic network of species-rich grassland and heathland, meadows, woodland and hedgerows to make biodiversity stepping stones and corridors, enhance historic landscape value and facilitate their key function to reduce surface water flows and soil erosion.
- Exploring opportunities to record and map existing areas of biodiversity value to facilitate the creation of cohesive habitat networks.

SEO 2: Manage, expand where appropriate and enhance the downland farmed landscape, the arable mixed farmed landscape of the dip slope and the broadleaved woodland cover, conserving wildlife habitats, contributing to food provision, maintaining a distinct yet evolving landscape pattern, improving water quality and providing local sources of renewable fuels.

For example, by:

- Restoring, where appropriate, historic hedgerow boundaries to enclose fields on the western downs and on slopes within river valleys (especially where they will help to impede cross-land water flows, encourage water infiltration and improve water quality), maintaining the characteristic irregular field pattern and the winding line of hedgerow trees that typically mark the outer boundary of the flood plain within valleys.
- Promoting a range of sustainable land management incentives, including creating areas of conservation headlands and winter stubbles supporting threatened arable wildflowers and farmland birds (such as the turtle dove) on the cereal-dominated dip slope, in support of the South Downs Farmland Bird Initiative.
- Creating conservation headlands and field margins throughout the arable-dominated dip slope to support rare arable wildflowers and farmland birds.
- Planning and negotiating with farmers, land managers and communities to resolve the lack of connectivity for access between the currently fragmented patches of land designated as open access areas.
- Working with farmers, land managers and communities to integrate sustainable grazing management of permanent chalk grassland and temporary grass leys into the farming system, while seeking opportunities to help improve groundwater quality and aquifer recharge, aid biodiversity adaptation to changes in climate and conserve historic landscape character.
- Working with farmers, land managers and communities to shape the way in which land is managed in the future, innovating and diversifying as appropriate to maintain farming systems and enhance the highly valued cultural landscape.
- Understanding and promoting the services provided by the specific management of ecosystems by land managers and seeking financial mechanisms to maintain these practices appropriately.
- Managing access in a way that balances the desire of people to enjoy and experience the geological, biological and cultural assets of the NCA while preventing damage to them.
- Promoting sustainable woodland management and local markets for woodland products such as wood fuel biomass and timber. Managing the area's diverse range of woodlands, veteran trees and wood pasture and parklands to enhance landscape character and safeguard their biodiversity value while seeking opportunities to enhance access.
- Exploring opportunities to plant woods and new areas of wood pasture, to expand existing sites and to create short-rotation coppice to enhance timber and biomass provision, increase carbon storage, regulate water flow and quality and reduce habitat fragmentation.

SEO 3: Conserve and promote the South Downs' rich historic environment, its unique geodiversity and national and local geological sites for the contribution they make to cultural heritage, biodiversity and landscape. Maintain and enhance quality of access, including via the South Downs Way National Trail, providing interpretation to enhance educational and recreational opportunities.

For example, by:

- Reverting areas of arable land to grassland, where appropriate, and reducing scrub to conserve records for reference and interpretation, ensuring that the opportunity for future generations to study monuments is not compromised. These include Neolithic causewayed enclosures (such as St Roche's Hill hill fort, known as the Trundle), prominent bronze-age round barrows and iron-age hill forts, and medieval lynchets on steeper pasture slopes.
- Maintaining, conserving and enhancing the area's distinctive historic architecture and traditional buildings which have details such as knapped flint, cobbles, brick quoins and timber framing, and which use locally produced bricks and have roofs of tile, slate or thatch.
- Using an understanding of the area's traditional and historic architecture, and its distinct patterns of settlement, to inform appropriate conservation of historic buildings and to plan for and inspire any environmentally beneficial new development which makes a positive contribution to local character.
- Maintaining and restoring the diverse stock of farm buildings, encouraging their continued agricultural use and managing proposals for re-use to ensure that their heritage interest is retained.
- Maintaining the exposed chalk of old quarries, chalk combes and dry valley exposures and any appropriate bare patches in the chalk grassland.
- Managing and restoring the extensive parkland landscapes that characterise the central downs.
- Restoring natural coastal processes and the coastal habitats and transitions between them, including saline lagoons, vegetated shingle, estuarine habitats (for example, Cuckmere), saltmarsh and chalk and greensand reefs, for biodiversity, coastal flood management, adaptation to sea-level rise and opportunities for natural regeneration as reflected in the Beachy Head to Selsey Bill Shoreline Management Plan.
- Continuing to provide high-quality interpretation and engagement activities to local people and visitors to the South Downs coast to highlight its importance on an international and local scale.
- Providing ongoing, high-quality access to the coast, via the South Downs Way National Trail, and ensuring that inland links to the public rights of way network are maintained and enhanced where appropriate.
- Managing the coastal strip and hinterland to ensure that new and existing developments do not have a negative impact upon the setting of the coast or pose a future threat to continued unimpeded natural processes.
- Exploring opportunities for the sympathetic restoration of disused cement works that will be in sympathy with landscape character, visual amenity, biodiversity and geological interests.

SEO 4: Manage, enhance and integrate recreational opportunities and public enjoyment with conservation of the natural and historic environment, a productive landscape and tranquillity, reflecting the ambitions of the South Downs National Park.

For example, by:

- Maintaining and enhancing the extensive rights of way network and open access land throughout the area, improving links to the South Downs Way National Trail and along the Heritage Coast, and from the main urban areas lying just outside the National Park, into the South Downs.
- Developing new permissive access to historical sites, open access land and other areas of interest as part of a cohesive network of inspiring access provision.
- Seeking opportunities to increase and improve the area of accessible natural green space in places that are currently failing Accessible Natural Greenspace Standards.
- Promoting sustainable tourism initiatives that target a broad range of visitors and, where practical, reduce car dependency, accommodating high visitor numbers while conserving the landscape, its biodiversity and tranquillity.
- Ensuring that the South Downs National Park planning policies are adhered to and implemented.
- Exploring partnership initiatives to disseminate clear environmental education messages to inform and to help people understand how and why recreation and public enjoyment have to be integrated with conservation of the natural and historic environment, using key sites and areas as examples of best practice.
- Promoting sustainable transport, green tourism and natural health initiatives.

Additional opportunities

1. Plan for the creation of a green infrastructure framework outside the South Downs National Park that could provide a setting for the major urban areas along the south coast while protecting the tranquillity and openness of the adjacent downs that fall within the National Park itself.

For example, by:

- Maintaining the distinctive character of the open downland dip slope as a setting, ensuring that new development and its associated infrastructure (including light, noise and air pollution) do not undermine the special qualities of the National Park and maintain tranquillity.
- Integrating the view of new and existing development from open downland by localised woodland planting on lower slopes that can also provide a local source of wood fuel and a local recreational resource as part of comprehensive green infrastructure planning.
- Linking with other areas of open natural green space that provide further recreational opportunities and help to manage pressures from the National Park.
- Promoting the use of open space areas for nature conservation and local food growing.
- Exploring opportunities that allow urban communities to become more sustainable and more permeable to wildlife, for example through green corridors and sustainable urban drainage systems.
- Promoting the added benefit of sustainable urban drainage systems in assisting groundwater recharge, reducing urban surface water flooding and pollution and increasing wildlife niches in urban areas.

2. Support farming systems to enhance agricultural viability through the promotion and extension of the 'South Downs brand' to add value and further enhance the sense of place of the area.

For example, by:

- Working with farming communities to increase food production in the South Downs while minimising any adverse impacts on the natural environment; supporting a variety of farming systems, including mixed farming systems where viable.
- Identifying opportunities to work with local business providers to promote the responsible use of the 'South Downs brand' and promote the benefits of locally produced food and drink.

Supporting document 1: Key facts and data

Total area: 101,855 ha

1. Landscape and nature conservation designations

Around 90 per cent of the NCA lies within the South Downs National Park formerly the Sussex Downs Area of Outstanding Natural Beauty (AONB) and East Hampshire AONB. Two per cent of the NCA forms part of the Sussex Heritage Coast (2,121 ha).

- More information about the protected landscape can be found at: http://www.southdowns.gov.uk/

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	Arun Valley	1	<1
European	Special Protection Area (SPA)	Arun Valley	1	<1
European	Special Area of Conservation (SAC)	Butser Hill SAC, Duncton to Bignor Escarpment SAC, Kingley Vale SAC, Lewes Down SAC, Castle Hill SAC, Singleton, Cocking Tunnels SAC	912	1
National	National Nature Reserve (NNR)	Butser Hill NNR, Kingley Vale NNR, Old Winchester Hill NNR, Lullington Heath NNR, Lewes Downs (Mount Caburn) NNR, Castle Hill NNR, Beacon Hill NNR.	623	<1
	Site of Special Scientific Interest (SSSI)	A total of 48 sites wholly or partly within the NCA	4,851	5

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.

There are 465 local sites in the South Downs NCA covering 8,896 ha which is 9 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 at: 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	47	1
Favourable	2,550	51
Unfavourable no change	57	1
Unfavourable recovering	2,171	45

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

Elevation ranges from just below sea level to a maximum of 270 m along the scarp tops, the highest point being at Butser Hill. The average elevation of the landscape is 93 m above sea level.

Source: Natural England 2010

2.2 Landform and process

The South Downs consist of a gentle but broad rolling dip slope inclined to the south and a steep, narrow and mostly northerly-facing scarp that is broken by the Meon, Arun, Adur, Ouse and Cuckmere river valleys. Processes of erosion and deposition during the ice ages contributed significantly to the formation of the present landscape.

Source: South Downs Countryside Character area description, South Downs Natural Area Profile

2.3 Bedrock geology

The South Downs are structurally part of the Wealden Anticline, a large dome of rocks folded during the Alpine Orogeny (mountain-building episode). The North and South Downs partially surround the older sediments which have since been exposed by erosion. The geology of the South Downs is dominated by tilted layers of Upper Cretaceous Chalk containing bands and seams of flint nodules. The Chalk dips to the south with the consequence that increasingly younger rocks are exposed in this direction. At the margins of the NCA, Cretaceous Greensand and Tertiary Lambeth Group and London Group sediments are exposed at the surface.

Source: South Downs Countryside Character area description, South Downs Natural Area Profile, British Geological Survey maps

2.4 Superficial deposits

Thin wind-blown 'loess', formed in dry tundra-like conditions during the last ice age, remains over the Chalk in a small number of places. Water-borne silts, supporting highly fertile soils cover the river flood plains. Clay-with-flint deposits occur over the dip slope.

Source: South Downs Countryside Character area description, South Downs Natural Area Profile, British Geological Survey maps

2.5 Designated geological sites

Tier	Designation	Number
National	Geological Site of Special Scientific Interest (SSSI)	4
National	Mixed Interest SSSIs	40
Local	Local Geological Sites	49

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 South Downs is comprised of tilted layers of relatively soft chalk containing bands and seams of flint nodules. Water-borne silts, supporting highly fertile soils cover the river flood plains. Clay-with-flint deposits occur over the dip slope. The more gentle and south-facing dip slope supports well-drained, easily worked soils.

Source: South Downs Natural Area Profile

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	n/a	n/a
Grade 2	3,258	3
Grade 3	57,567	56
Grade 4	21,086	21
Grade 5	1,668	2
Non-agricultural	11,041	11
Urban	7,131	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 Meon	18
River Arun	14
River Ouse	11
River Adur	5
Cuckmere River	1

Source: Natural England (2010)

The Arun, Adur, Cuckmere and Ouse dissect the chalk ridge in its eastern half, separating it into blocks, with typically flat valley bottoms and a meandering river course enclosed by steep-sided slopes, as they drain from the Low Weald southward to the sea.

The River Meon in the west follows a similar course, though it is a chalk stream in a typically narrower valley that subsequently broadens in the adjoining coastal plain before it reaches the south coast.

Please note: Other significant rivers (by volume) may also occur. These are not listed where the length within the NCA is short.

3.2 Water quality

The total area of Nitrate Vulnerable Zone is 88,966 ha or 87 per cent of 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 at:

http://maps.environment-agency.gov.uk/wiyby/wiybyController?ep=maptopics&lang=_e

4. Trees and woodlands

4.1 Total woodland cover

The NCA contains 17,995 ha of woodland (where woodlands are over 2 ha in size), covering 18 per cent of the NCA and including 7,081 ha of ancient woodland.

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

4.2 Distribution and size of woodland and trees in the landscape

Ancient woodland on the South Downs is concentrated in the western half of the NCA and includes some areas of relict large leaved lime woodland. The present day tree cover is either broadleaved woodland, with beech, ash and sycamore, or is mixed with conifers. Chalk ash or beech hangers are notable features of the western escarpment particularly in Hampshire, a notable example being at Selborne Common. Ancient yew woodland can be found at Kingley Down, Butser Hill and West Harting. There are also some large plantations of Corsican pine and western red cedar. The Downs between the Rivers Adur and Ouse supports the largest remaining population of English elm in the world; protected in part from Dutch elm disease by the English Channel to the south, the treeless Downs to the north, and an active control programme of felling and removing infected trees.

Source: Natural England 2010

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	15,012	15
Coniferous	1,748	2
Mixed	617	1
Other	618	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	3,471	3
Planted ancient woodland sites (PAWS)	3,610	4

Source: Natural England (2004)

5. Boundary features and patterns

5.1 Boundary features

Hedgerows and hedgerow trees are a feature of the central Downs and river valleys. Field boundaries in parts of the flat Ouse and Arun valleys are formed by drainage ditches.

Source: South Downs Countryside Character Area description; Countryside Quality Counts (2003)

5.2 Field patterns

Fields are typically medium to large in size with a degree of irregularity, sometimes reflecting former open fields. A greater degree of regularity, more typical of parliamentary enclosure, occurs in east Sussex.

Source: South Downs 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 is a major producer of cereals as well as grazing livestock, especially sheep. The mixed farming character is supported by the breakdown of farm types: 150 cereal (30 per cent); 113 grazing livestock, mainly sheep (22 per cent); 50 mixed (10 per cent); 15 dairy (3 per cent); 14 horticulture (3 per cent); 12 specialist poultry (2 per cent); and 7 generally cropping (1 per cent). All of the farm types have decreased in numbers of holdings since 2000, apart from specialist poultry which has remained the same. Horticulture lost the most proportionately (36 per cent), but mixed farming lost the most holdings (20).Cereals farms decreased by 19 holdings, from 169 to 150, while grazing livestock decreased by 8 holdings from 121 to 113.

Source: Agricultural Census, Defra (2010)

6.2 Farm size

In this NCA farms of 100 ha or more dominate with 203 holdings (40 per cent), followed by farms sized between 5 ha and 20 ha (24 per cent). The largest farm size accounts for 40 per cent of holdings and makes up around 90 per cent of the farmed area. The trend in farm sizes has been a reduction in the largest size bracket (over 100 ha), losing the most number of holdings, down by 13 from 216, followed by the smallest farms (under 5 ha), down by 12 holdings from 83 to 65. The middle bracket of farm sizes (20 to 50 ha and 50 to 100 ha) have both gained slightly in numbers, by 1 and 2 respectively, while farms between 5 and 20 ha lost 10 holdings.

Source: Agricultural Census, Defra (2010)

6.3 Farm ownership

Owned land makes up 58 per cent of total farm area, while the remainder is tenanted. There has been a decrease in owned land of 5 per cent over the 2000 to 2009 period, while tenanted land has increased by 6 per cent. Total farm area has decreased by 408 ha since 2000.

2009: Total farm area = 68,534 ha; owned land = 39,510 ha

2000: Total farm area = 68,126 ha; owned land = 41,509 ha

Source: Agricultural Census, Defra (2010)

6.4 Land use

Between 2000 and 2009 there was a significant decrease in the area of land used for cereals, which lost the most area in hectares of any land use (3,100 ha or 12 per cent of the farmed area). There was proportional increase in grass and uncropped land during this same period, of 3,642 ha, again 12 per cent of the farmed area, accounting for the most significant increase of any land use area. There was also an increase in oil seeds (694 ha) and vegetables (184 ha), and a decrease in all the other land uses.

Source: Agricultural Census, Defra (2010)

6.5 Livestock numbers

Sheep are the most numerous livestock (97,700), followed by cattle (27,600) then pigs (2,400). There has been a radical decrease in the number of pigs between 2000 and 2009, a decline of 20,600 animals, with cattle decreasing by around 4,600 and sheep increasing by 3,100.

Source: Agricultural Census, Defra (2010)

6.6 Farm labour

The figures suggest that that the great majority of holdings are run by dedicated principal farmers compared to salaried managers; 667 principal farmers and 70 salaried managers. There are more full-time workers (307) than part-time workers (240), with fewer still casual/gang workers (115).Trends from 2000 to 2009 show a decrease in the number of principal farmers, down by 87, and an increase in the number of salaried managers, up by 5. The number of full-time workers has decreased by 144, in contrast to the number of part-time workers which has increased by 77. The number of casual/gang workers has decreased by 86.

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

Highly distinctive fragments of lowland calcareous grassland survive on the steep scarp and valley slopes, especially in the east. These flower-rich grasslands also support rare invertebrates such as the Adonis blue, small blue and the Duke of Burgundy fritillary butterflies.

Small fragments of rare chalk heath, associated with loess deposits, also remain; the largest remnant being at Lullington Heath National Nature Reserve. Species-rich chalk scrub, including juniper scrub, can be found in the West Sussex and Hampshire parts of the NCA.

Around half of the orchid species that are native to Britain occur in the grassland and woodland of the South Downs. Of these, the early spider and burnt orchid are nationally rare while the musk orchid has its stronghold on the steep scarp slopes.

Broadleaf woodland and ancient woodland is concentrated in the western half of the NCA. This includes relict large leaved lime woodland, the distinctive beech hangers of the north-facing scarps in Hampshire, and yew woodland in West Sussex.

A small number of coppiced ancient woodlands support populations of pearl-bordered fritillaries, white admirals and purple emperor butterflies can be seen flying along woodland rides and edges particularly along the scarp slopes.

Chalk cliffs at the eastern extreme of the NCA and inland chalk exposures support a range of specialised plants, including algae, and provide nesting sites for fulmar, kittiwake and peregrine falcon. The intertidal wave-cut platforms, which run along the base of the chalk cliff outcrops, support diverse and specialised plant and animal communities that are adapted to the exposed conditions.

Coastal habitats, other than those associated with the chalk cliffs, are limited in extent and largely confined to the Cuckmere estuary. These include salt marsh, vegetated shingle, mudflats and saline lagoons. They provide important habitat for waders such as ringed plovers and redshank.

River valley habitats, most notably flood plain grazing marshes, ditch systems and reed beds, have important communities of invertebrates and wetland plants. They support overwintering wildfowl such as wigeon, teal, Bewick's swan and breeding waders such as redshank, snipe and lapwing.

Arable habitats support farmland birds, including important populations of corn bunting, grey partridge and lapwing. In addition, rare arable wildflowers such as pheasant's eye, cornflower, red hemp-nettle and shepherds needle also occur.

Parkland is also an important habitat to the western end of the Downs supporting populations of bats and deadwood loving species of invertebrates.

Source: South Downs 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:

http://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	1,339	1
Maritime cliff and slope	676	1
Lowland calcareous grassland	574	1
Fens	330	<1
Lowland meadows	85	<1
Lowland dry acid grassland	62	<1
Coastal vegetated shingle	26	<1
Reedbeds	17	<1
Mudflats	16	<1
Saline lagoons	14	<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

Settlement is sparse, mainly concentrated in small to medium sized villages located in river valleys, with scattered isolated farmsteads across the downland, some of medieval origin. The eastern end of the Downs is hemmed in by the coastal plain conurbations of Brighton, Hove and Worthing, which are visually intrusive along the southern edge of the dip slope. On the lower parts of the Downs there are scattered groups of modern farm buildings tucked into the dry valleys of the dip slope, or clustered along the foot of the escarpment.

Source: South Downs Countryside Character Area description; Countryside Quality Counts (2003)

8.2 Main settlements

The main towns and cities within the NCA (with populations recorded in 2001) are: Brighton and Hove (206,628); Lewes (15,988); Seaford (21,851); Horndean (12,639) and Newhaven (12,276). The total estimated population for this NCA (derived from ONS 2001 census data) is: 428,067.

Source: Office for National Statistics census data 2001, South Downs Countryside Character Area description; Countryside Quality Counts (2003), Natural England (2012)

8.3 Local vernacular and building materials

The traditional buildings are of brick or flint, with brick quoins and window details, and roofs of tile or slate, or also traditionally thatch. Timber framing is common in traditional farm buildings in the Hampshire part of the NCA, with flint and cobbles more traditional in Sussex.

Source: South Downs Countryside Character Area description; Countryside Quality Counts (2003)

9. Key historic sites and features

9.1 Origin of historic features

There are remains of Neolithic flint mines at sites across the NCA, including Cissbury Ring, Wilmington and Old Winchester Hill. The Trundle, a causewayed camp prominently sited on the dip slope, is one of the best examples of a Neolithic enclosure in the country. Barrows dating from the Bronze Age are a common feature found on the downs, for example Devil's Jumps near Hooksway, those on Bow Hill above Kingley Vale and at Old Winchester Hill. There are prominently sited hill forts such as Mount Caburn, Cissbury Ring and Old Winchester Hill, plus earthworks such as cross dykes all dating from the Iron Age. Medieval lynchets survive on many of the steeper pasture slopes. The castle at Lewes was one of the first to be built after the Norman Conquest and large country houses and parkland estates are a highly distinctive feature of the central downs, for example Uppark, Stansted, West Dean, Goodwood and Arundel. The South Downs was peppered with windmills until the twentieth century and some of these survive.

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

9.2 Designated historic assets

This NCA contains the following numbers of designated heritage assets:

- 18 Registered Parks and Gardens covering 2,902 ha
- 1 Registered Battlefield covering 97 ha
- 46 Scheduled Monuments
- 3,863 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

- Twelve per cent of the NCA, 12,291 ha, is classified as being publically accessible.
- There are 1,970 km of public rights of way at a density of 1.9 km per km^2.
- There is 1 national trail (South Downs Way) within the NCA extending over 173 km.

Sources: Natural England (2010)

Walking is a popular pastime in the NCA, supported by nearly 2,000 km of rights of way.

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

Access designation	Area (ha)	Percentage of NCA
National Trust (Accessible all year)	1,449	1
Common Land	693	<1
Country Parks	162	<1
CROW Access Land (OC and RCL)	4,448	4
CROW Section 15	115	<1
CROW Access Land (Section 16 Dedicated)	1,183	<2
Village Greens	5	<1
Doorstep Greens	<1	<1
Forestry Commission Walkers Welcome Grants	152	<1
Local Nature Reserves (LNRs)	76	<1
Millennium Greens	0	0
Accessible National Nature Reserves (NNRs)	2,280	2
Agri-environment Scheme Access	9	<1
Woods for People	850	<1

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) there are areas of tranquillity found throughout the NCA especially in the central and western regions away from major transport routes and settlements. Substantial development along the coast from Worthing to Newhaven, and particularly around Brighton, is where the NCA is the least tranquil although the Downs behind these coastal areas and the area to the west of Eastbourne at the eastern end of the NCA have a relatively high degree of tranquillity.

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

Tranquillity	Score
Highest value within NCA	45
Lowest value within NCA	-94
Mean value within NCA	80

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 that around half of the NCA is classified as 'disturbed', with 41 per cent classified as 'undisturbed'. The majority of 'undisturbed' land occurs in the western half of the NCA, on the scarp and dip slope in between the major roads that cut across the Downs.

A breakdown of intrusion values for this NCA is detailed in the table below.

Intrusion category	1960s (%)	1990s (%)	2007 (%)	Percentage change (1960s-2007)
Disturbed	22	45	51	29
Undisturbed	71	48	41	-30
Urban	6	6	8	2

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are the significant loss of undisturbed land – a decline from 71 per cent to 41 per cent.

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

Cattle grazing near Seaford with a view towards Cuckmere Valley.

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 AONB GIS boundaries, Natural England (2006)
- Heritage Coast Boundaries, Natural England (2006)
- Agricultural Census June Survey, Defra (2000,2009)
- National Forest Inventory, Forestry Commission (2011)
- Countryside Quality Counts Draft Historic Profiles, English Heritage (2004)*
- Ancient Woodland Inventory, Natural England (2003)
- BAP 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)

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

- An increase in the cover of woodland grant management schemes between 1999 and 2003, including a rise from 24 per cent to 48 per cent of the area's ancient woodland sites, suggests that woodland character has been maintained for that four-year period.
- There has been a loss and decline in quality of beech hangers and woodlands in the western chalk downland and escarpment due to lack of management and storm damage over this period.
- New woodland planting has assisted with natural regeneration and in linking fragmented semi-natural ancient woodland sites. However, new woodland planting has also occurred in some inappropriate locations such as the open downs to the east[16].
- In 2011, 649,249 m of hedgerow and 157,386 m² of woodland were managed by land managers under environmental stewardship.

Boundary features

- Between 1999 and 2003 countryside stewardship agreements for the restoration or management of linear features included; fencing, 38 km; hedgerow management, 12 km; hedgerow planting and restoration, 31 km; and restored boundary protection,17 km.
- Around 8 per cent of the NCA's field boundaries were covered under an agri-environment scheme during 1999 and 2003.
- In 2011, 50,608 m of ditch and 729 m of stone walling were managed by land managers under environmental stewardship.

Agriculture

- There has been a reversion of arable areas to grassland and restoration of sheep grazing particularly in the eastern chalk upland. However, grazing livestock numbers fell by 25 per cent between 1990 and 2003 and are likely to decline further with the result that scrub will colonise chalk grassland sites.
- Increases in grassland area and the level of agri-environment schemes for grassland management indicate traditional pastoral character was increased by 2003.

Settlement and development

- Pressures for road improvements, often with major cuttings and/or tunnels in the NCA (such as the construction of the A27 bypass in Lewes), have been an issue in the eastern downs. This has led to perceptions of reduced tranquillity in open downland landscapes, especially adjacent to urban conurbations.

[16] *State of the National Park Report 2012*, South Downs National Park (2012)

- The open landscape has been vulnerable to urban edge pressures extending from the heavily built-up coastal fringe onto the Downs, as well as from prominent communication masts on exposed skylines and from pylons and transport corridors in the principal chalk valleys.

- An increase in the number of large, new farm buildings in the east of the area is resulting in a change in the character of the landscape.

- Disused chalk quarries are visually prominent features within the downland slopes and some have been utilised as major landfill sites.

- Infrastructure development often does not require planning permission and can have significant impacts on landscape character. However, there have been some improvements, such as efforts to lessen the impact of power lines with successful undergrounding schemes, for example at Birling Gap.

- There has been some deterioration of historic farm buildings as they have fallen out of use, but there is also a continuing trend in conversion to residential properties[17].

- More recent major developments within the NCA include a new 22,500-seat football stadium for Brighton and Hove football club completed in 2011 which although outside the National Park, impacts on views from the Downs and surrounding areas.

Semi-natural habitat

- From 2003 onwards, over 2,777 ha of land was in the process of being reverted from arable to species-rich chalk grassland and 96 per cent of SSSI on the Downs were in favourable or recovering condition. This suggests that overall character has been maintained or strengthened. However, chalk grassland remains fragmented and too small to support viable populations of key species such as the Adonis blue butterfly.

- Although the area of woodland within the NCA has remained relatively constant, the quality of the woodland for biodiversity has declined due to lack of positive management. This has resulted in declining numbers of woodland birds and butterflies, such as the pearl bordered fritillary.

- Arable intensification, particularly a switch to autumn sown cereals and better seed clearing, has resulted in a significant loss of rare arable plants. Subsequently, the disappearance of winter stubble has contributed to the reduction in farmland bird species in some parts of the NCA.

- Non-native species are a particular problem in the river valleys where invasive species such as Himalayan balsam and giant hogweed have become abundant.

- Drainage of river valley flood plains and the lowering of the water table has altered their traditional landscape character and resulted in a loss of wet pastures and a more formal pattern of arable fields, particularly in the Cuckmere, Arun and Ouse river valleys. This has had a dramatic effect on the number of breeding waders.

[17] Ibid.

Historic features

- In 1918 around 6 per cent of the NCA was parkland. By 1995 it is estimated that 40 per cent had been lost. About 46 per cent of remaining parkland is covered by an historic parkland grant, and about 34 per cent is included within an agri-environmental scheme.
- About 74 per cent of listed historic farm buildings remain unconverted, of which about 95 per cent are intact structurally.
- Loss of historic assets and local vernacular features, such as the loss of traditional wooden road signage and replacement with standardised metal signage, has had an effect on the landscape character of the NCA.

Coast and rivers

- Drainage and agricultural improvement of river valley flood plains, with the lowering of water tables, has altered their traditional landscape character[18].
- Winterbournes are becoming increasingly dry from continued over-abstraction of the chalk aquifer and the lack of recharge during successive dry years.
- Diffuse pollution in the form of fertilisers and pesticides is affecting water quality in both surface and groundwater. Many water courses and aquifers are now failing to meet Water Framework Directive targets.
- Coastal squeeze and sea level rise have impacted on the tidal reaches of all the major rivers. This has lead to increased pressure on flood defences and the loss of small areas of saltmarsh. Sea level rise has also resulted in increased rates of erosion of the chalk cliffs.

Minerals

- Working quarries continue to exist to provide a mixture of chalk and aggregates.
- A number of disused chalk quarries have been converted to major landfill sites while others, such as the Shoreham Cement Works, remain.

Coastal erosion at Birling Gap cliffs.

[18] Ibid.

Drivers of change

Climate change

- Hotter, drier summers, changing precipitation patterns and extreme events such as flooding are likely to have the most significant impact upon the area, resulting in impacts on landscape character and a range of ecosystem services including water availability, food production, biodiversity, climate regulation and sense of place[19].

- Rivers, chalk streams and ponds may dry out due to drought and experience changes in flow. Combined with influx of large quantities of sediment this may lead to substantial changes in slope and channel morphologies. There is greater potential for drying out of winterbournes in their upper courses, with impacts upon associated wetlands.

- The pattern of rainfall may also reduce the opportunities for aquifer recharge with winter events increasingly concentrated in major downpours, where much of the water is lost to surface run-off.

- Pressure on public water supply will increase with the growth of development. The problem will be exacerbated by an increased demand for water abstraction during the summer months.

- Thermal stress will impact on species and may increase competition from invasive non-native species.

- Flood plain grazing marsh may be impacted by increased flooding, water-logging, siltation or drought.

- Increased run-off will lead to increased diffuse pollution and surface and fluvial flooding.

- Risk of flooding of properties and agricultural land within the main valleys is likely to increase.

- The coastline is undergoing constant change due to the large-scale impacts of climate change, namely sea level rise, and the day-to-day effects of waves and tidal currents. Increasing rainfall in between longer periods of drier weather can lead to increased weathering of cliff faces.

- The risk of coastal flooding will increase due to sea level rise, the lowering of land (due to glacial isostatic adjustment), weathering of the cliff face, and loss of habitat and development pressures.

- Increased erosion from heavy rain is likely to affect soils on the chalk ridges, valleys and combes. The chalk outcrops, cliffs and valleys will experience impacts on the geomorphological processes operating here.

- Increased erosion of chalk cliffs and quarry faces could lead to the migration of interest features beyond designated site boundaries and impacts on extent of cliff top habitats.

- Species-rich chalk grassland and associated rare chalk heath habitats may see changes in habitat and species composition with greater incidents of parching and effects of drought.

[19] *Responding to the impacts of climate change on the natural environment: the South Downs National Park*, Natural England (2011)

- The current condition and fragmentation of habitats make adaptation to climate change difficult for the species dependent upon them; species migration between habitat patches is limited by the distance and any barriers between them and loss of small or isolated habitats can lead to local extinctions of populations, notably in unimproved chalk grassland.

- Potential shifts northwards in species range, bringing new species into the NCA and potential losses of other species.

- Broadleaved and ancient woodland may see changes in composition of vegetation types and ground flora. Drought-sensitive species such as beech are particularly vulnerable and may be lost over time. This habitat may also be impacted by increased incidence of disease, disruption in synchronicity between species interactions, changes in range of current native species, new and increasing pest species, increased forest fires and loss of mature trees to wind blow[20].

- Loss of condition of designated sites and BAP habitat may also occur. Planting of non-native tree species may lead to decreases in condition and species composition of woodland.

- Forestry plantations may suffer damage due to strong winds and storm events.

Other key drivers

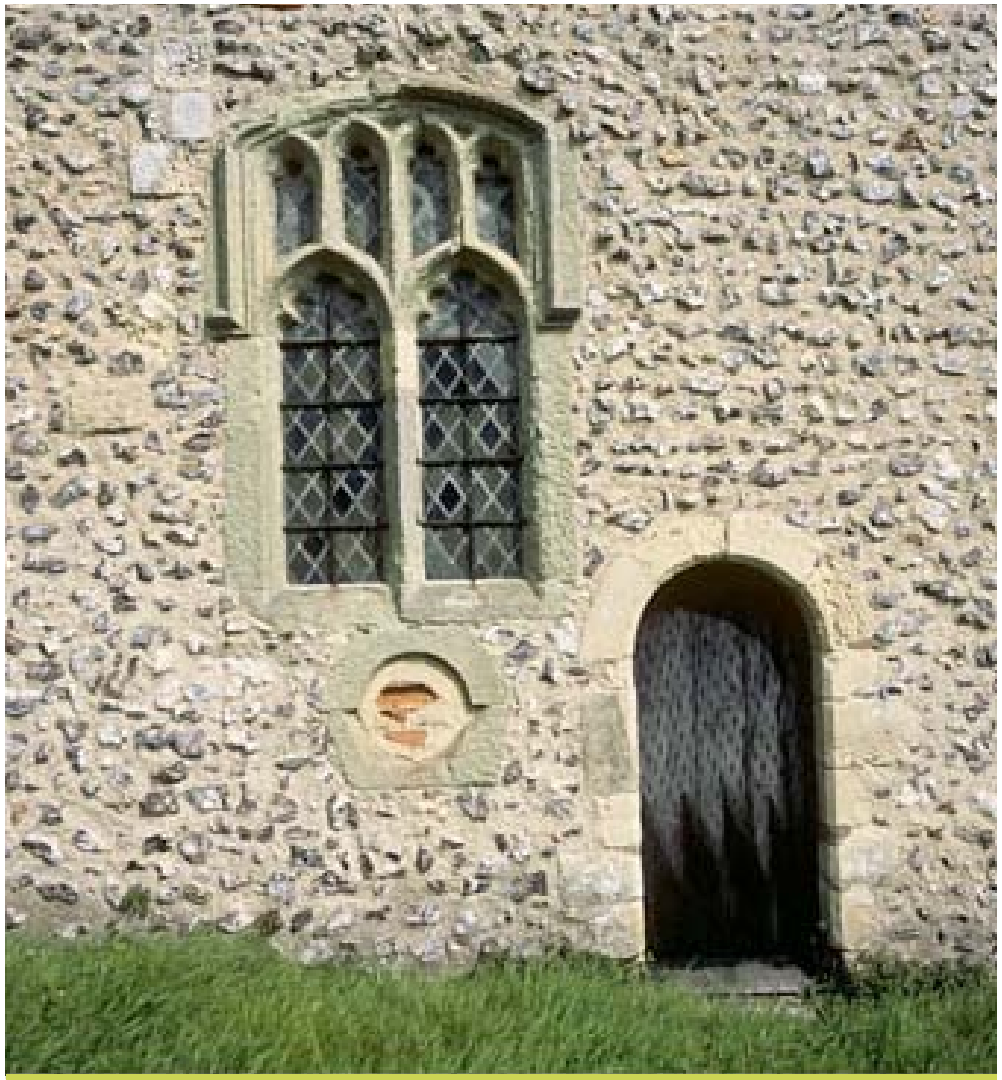
- Development pressure around the towns and larger commuter villages in and around the Downs will remain a challenge, but offers some opportunities for well-designed developments that contribute to landscape and settlement character and utilise sustainable technologies such as renewable energy supply and increased energy/water efficiency. This could provide green Infrastructure gains as an integral component of development.

- Opportunities for reconnecting rivers with their flood plains and delivering Catchment Flood plain Management Plan (CFMP) targets will provide flood storage and save the cost of maintaining potentially unsustainable flood defences as well as offer new opportunities for both biodiversity and access. An increased demand for wood fuel and/or timber may have benefits for woodland management if schemes have sufficient environmental protocols built in at the outset. There could also be benefits for diversifying the rural economy and creating and expanding markets for timber and wood products.

- Changing farming practices can impact on habitats and ecological networks and have a great influence in changing landscape character. There are opportunities to work with land managers to conserve and enhance farmland habitats, as well as the rural character of the landscape, through effective targeting of environmental stewardship schemes.

[20] *The implications of climate change for the conservation of beech woodlands and associated flora in the UK,* English Nature Research Reports Number 528, English Nature (2003)

- There is pressure to grow renewable energy crops, which would have a significant visual impact in open areas of the east and west chalk upland.
- Opportunities exist for the reversion of arable to species-rich chalk grassland, plus management of traditional wetland meadows in river valleys and the creation of conservation headlands, winter stubble and field margins in arable areas to support farmland bird species.
- Hedgerows are vulnerable to loss of woody species due to drought, flood or wind throw. Species composition may change as well as an increase in pests and diseases and a loss of diversity of hedgerow flora occur, leading to a loss of resources for wildlife and a reduction in ecological connectivity. The decline of traditional woodland management along with the introduction and establishment of deer and squirrel populations and disease has had an impact on many of these woodlands.
- Intensification of agricultural could lead to the removal of hedgerows or a decline in management, conversely, the need for greater soil erosion measures could lead to an increase in this habitat.
- Flint boundary walls are a traditional feature of many farmsteads and nearby fields and could be subject to decline if not appropriately maintained.
- Larger farm buildings and other infrastructure are likely to continue to be a result of modern farming techniques and food supply chain influences.



View of a traditional flint church wall in Adur Valley, West Sussex.

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.

The Royal Pavilion in Brighton is the former residence of King George lV.

Statement of Environmental Opportunity	Ecosystem service																		
	Food provision	Timber provision	Water availability	Genetic diversity	Biomass energy	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	Tranquility	Recreation	Biodiversity	Geodiversity
SEO 1: Plan for an expansion of species-rich chalk grassland and other semi-natural habitats, and manage and enhance other existing chalk habitats for wildlife connectivity, reinforcement of the distinctive landscape character, and improvement to water resource management.	↘ *	↗ *	↑ **	n/a	↔ ***	↗ *	↑ **	↑ *	↑ *	↔ *	↑ **	↑ **	↔ **	↑ ***	↗ **	↑ **	↗ **	↑ ***	↗ **
SEO 2: Manage, expand where appropriate and enhance the downland farmed landscape, the arable mixed farmed landscape of the dip slope and the broadleaved woodland cover, conserving wildlife habitats, contributing to food provision, maintaining a distinct yet evolving landscape pattern, improving water quality and providing local sources of renewable fuels.	↗ *	↗ *	↗ *	n/a	↑ **	↗ *	↑ ***	↗ **			↗ *		↔ **	↑ ***	↗ **	↔ **	↗ *	↑ ***	↗ **

Note: Arrows shown in the table above indicate anticipated effect 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 effect is available.

Dark plum = national importance; mid plum = regional importance; light plum = local importance

Statement of Environmental Opportunity	Ecosystem service																		
	Food provision	Timber provision	Water availability	Genetic diversity	Biomass energy	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	Tranquility	Recreation	Biodiversity	Geodiversity
SEO 3: Conserve and promote the South Downs' rich historic environment, its unique geodiversity and national and local geological sites for the contribution they make to cultural heritage, biodiversity and landscape. Maintain and enhance quality of access, including via the South Downs Way National Trail, providing interpretation to enhance educational and recreational opportunities.	↔ *	↔ *	↔ **	n/a	↔ *	↔ *	↔ *	↔ *	↗ *	↗ *	↔ **	↔ **	↗ **	↑ ***	↑ ***	↗ *	↗ **	↑ ***	↑ ***
SEO 4: Manage, enhance and integrate recreational opportunities and public enjoyment with conservation of the natural environment and tranquillity, reflecting the ambitions of the South Downs National Park.	↔ *	↔ *	↔ *	n/a	↔ *		↔ *	↔ *	↔ *		↔ *	↔ *	↔ *	↑ ***	↗ **	↑ ***	↑ ***	↗ **	↗ **

Note: Arrows shown in the table above indicate anticipated effect 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 effect is available.

Dark plum = national importance; mid plum = regional importance; light plum = local importance

Landscape attributes

Landscape attribute	Justification for selection
A broad elevated east-west chalk ridge with a steep north-facing scarp slope and a gentle southerly dip slope, cut by numerous dry valleys and combes.	■ The chalk ridge and its carved topography define the South Downs and its landscape character, and are prominent in views from surrounding areas. ■ The distinctive carved topography is important for geomorphology, most pronounced in the eastern half of the NCA. ■ Panoramic views across the downs and the Low Weald from the scarp and hill tops are a particular feature of the NCA.
Chalk cliffs at the eastern end of the NCA and important inland exposures of chalk in old quarries and on some steep scarp slopes.	■ The eastern chalk cliffs around Beachy Head and Seven Sisters form part of the Sussex Heritage Coast and are highly distinctive landscape features. Small but significant chalk areas occur at the mouths of estuaries and along the developed and undeveloped coastline, at risk from 'coastal squeeze' due to various factors including sea level rise. ■ The chalk cliffs are constantly eroding and support a range of specialised plants, including algae, and provide nesting sites for fulmar, kittiwake and peregrine falcon. ■ Inland exposures provide opportunities to study the Chalk geology, are often starkly prominent and have wildlife habitats at threat from infilling and scrub encroachment. ■ Cliffs between Beachy Head and Seaford Head form a Geological Conservation Review (GCR) site of international importance for its landscape and research into coastal geomorphology.
Remnant areas of species-rich chalk grassland surviving on the steep scarp and valley slopes, most notably in the east, with associated rare chalk heath and species-rich scrub habitats.	■ Chalk grassland is a defining habitat of the South Downs chalk ridge. ■ The chalk grassland supports a diverse array of scarce plants and important populations of invertebrates and breeding birds if in close association with arable production. ■ Remnant areas form a significant proportion of the remaining British species-rich chalk grassland resource, with several areas of international importance, designated Special Area of Conservation (SAC), and significant Sites of Special Scientific Interest (SSSI), many at risk due to a lack of traditional grazing. ■ Rare chalk heath occurring in association with loess deposits and species-rich chalk scrub, including juniper scrub in the West Sussex and Hampshire, are important wildlife habitats.

Landscape attribute	Justification for selection
Large areas of ancient and broadleaved woodland within the western half of the NCA, and localised areas in the east.	■ Ancient woodland is a particular feature of the central downs and, to a lesser extent, the west, and includes relict large-leaved lime woodland, the distinctive ash and beech hangers of the scarp, including Duncton to Bignor escarpment Special Area of Conservation (SAC) (with the East Hampshire Hangers SAC falling outside the NCA to the north), and the notable yew woodland of West Sussex, including several areas of international importance. ■ In this area there can be found a significant population of surviving English elm, the greatest concentration worldwide.
Rivers and associated wetland habitats, including the principal rivers of the Arun, Adur, Ouse and Cuckmere in the east, and the chalk River Meon in the west and the winterbournes of the chalk ridge.	■ The four principal eastern rivers cut through the Chalk in distinctive U-shaped valleys, their flood plains largely drained and agriculturally improved and their courses often engineered. ■ Arun Valley is internationally designated as a RAMSAR site and also as a Special Protection Area (SPA). ■ The Cuckmere estuary is of particular importance and although affected by human intervention, it is the only undeveloped estuary in the south-east of England. ■ The River Meon has typical chalk stream ecology, with remnant wetland habitats including wet meadows and watercress beds under threat due to lack of traditional management.
Coastal habitats including saline lagoons, vegetated shingle, estuaries and saltmarsh, chalk and greensand reefs.	■ Small but significant areas at the mouths of estuaries and along the developed and undeveloped coastline are at risk from 'coastal squeeze' due to sea level rise. ■ Coastal environments include cliff tops, cliff faces, wave-cut platforms, beaches, coastal springs and salt marshes. ■ Chalk cliffs and inland chalk exposures support a range of specialised plants including algae and provide nesting sites for fulmar, kittiwake and peregrine falcon, as well as other coastal habitats including saltmarsh and vegetated shingle. ■ The South Downs Way National Trail provides easy access to the coastline for the local population and visitors alike.
Large historic parklands are a feature of the central downs.	■ Examples include, Uppark, Stansted, West Dean, Goodwood and Arundel. ■ Large numbers of ancient and veteran trees and associated flora and fauna. ■ Designed landscapes represent many phases of the development of the English landscape Collections of native and non-native trees provide a bright assemblage of autumn colours. ■ Largely accessible by the public, providing opportunities for recreation.

Landscape attribute	Justification for selection
A strong field pattern enclosed by hedgerows with numerous hedgerow trees.	■ Hedgerows enclosing medium to large irregular fields in the western half of the NCA, with hedgerow trees typically marking the outer boundary of the flood plain within the principal valleys. ■ Hedgerows provide important wildlife habitats and linkages between the woodlands and parklands of the western downs, while reinforcing historic field patterns. ■ Hedgerows support a range of species-rich flora and fauna.
Dispersed downland settlement of villages mainly within valleys and scattered farmsteads, with local vernacular of flint and brick plus roofs of tile or slate.	■ Settlement pattern is typical of the downland area, with villages established where water is available in valleys. and along spring lines. ■ Flint is a particularly distinctive building material of the South Downs.
Prominent and accessible heritage assets.	■ Bronze-age round barrows and prominently-sited iron-age hill forts on the scarp and hill tops, especially in the west. ■ Earthworks, including one of the best examples of Neolithic enclosures in the country, the Trundle, and medieval lynchets on steeper pasture slopes, ■ Mixed use farmsteads which reflect the variety of the South Downs landscape. ■ Hill figures such as the mysterious Long Man of Wilmington.
Drove roads and ancient routes along the accessible downland tops that provide rights of way and contribute to recreation.	■ The NCA is predominantly covered by National Park designation, and is particularly well used and highly valued as a recreational resource. ■ The South Downs Way National Trail. ■ Around 4,500 ha of open access land (4.4 per cent of the NCA).

Landscape attribute	Justification for selection
Expansive views from open scarp, hill tops and beyond.	■ Large open skies and distinctive panoramic views. ■ The dramatic scale of the landform and the large swathes of chalk grassland and woodland create a large-scale exposed landscape which is dominant in views from an extensive area beyond the South Downs. ■ From open summits there are panoramic views across the lowlands to the north. The scarp forms a distinctive backdrop ridgeline in views from this area – a symbolic feature of the South Downs.
Tranquillity.	■ 41 per cent of the NCA is classified as undisturbed. ■ Tranquillity, actual and perceived, is an important feature of the South Downs, especially within the context of surrounding development – it is primarily associated with the open scarp and hill tops and the woodland and parkland landscapes. ■ Extensive development and major roads that cut through the east of the NCA plain poses a significant threat to the tranquillity of the adjoining downland, as do the major roads that cut through the chalk ridge – very little 'undisturbed' land remains along the open eastern downs according to the CPRE Intrusion map. ■ The steepness of the scarps means there is little human activity in these landscapes. As a consequence they are peaceful, which combined with the swathes of chalk grassland, scrub and woodland, are perceived as highly natural and tranquil.
The city of Brighton and Hove and large coastal towns such as Eastbourne and Worthing.	■ The city of Brighton and Hove is a former historic seaside tourist resort and contemporary centre for the arts, digital industries and conferences. The city developed through Regency and Victorian times to expand over the surrounding hills and valleys in to the last century. ■ Brighton and Hove, Eastbourne, Worthing and other coastal towns provide a strong sense of history with their distinct architecture and Regency and Victorian associations such as Brighton Pavilion, a former royal palace built as a home for the Prince Regent during the early 19th century and notable for its indo- gothic architecture and oriental interior. ■ The National collection of elms in Brighton provides a valuable example of genetic diversity with many trees being exceptionally rare. English elm in Brighton is the largest population worldwide. This collection includes seven endangered types of elm.

Landscape opportunities

- Conserve the tranquillity and special character of the chalk ridge, conserving the dispersed downland settlement pattern and traditional flint vernacular, as well as drove roads and ancient routes along the accessible downland tops that afford panoramic views over the downs and the Low Weald.
- Manage recreational pressures to protect historic rights of way and tranquillity.
- Protect and manage the area's geodiversity, conserving important inland exposures and the distinctive chalk cliffs along the eastern coastline by ensuring that active coastal processes enable them to be sustained providing nesting sites for fulmar, kittiwake and peregrine falcon.
- Conserve distinctive earthwork features that include bronze-age barrows and iron-age hill forts, and restoring and managing historic estate and parkland landscapes that are a particular feature of the central downs.
- Managing and significantly enhancing the area's rivers and their associated wetland habitats, through the restoration of river geomorphology and the expansion of flood plain habitats to help manage river flooding.
- Positively manage and expand the area's broadleaved woodlands, ancient woods and parklands, seeking opportunities for the restoration of planted ancient woodland sites. Conserve the English elms surviving in the Ouse and Cuckmere valleys. Bring areas of ancient and/or semi-natural woodland under sustainable management, especially the internationally designated beech hangers and yew woodlands, expanding and re-linking woodlands to enhance landscape character and provide a robust habitat with enhanced adaptation to climate change.
- Traditional management practices should be re-introduced to conserve remnant wetland habitats include flood plain grazing marsh, reedbeds and fens.
- Manage and significantly enhance the area's rivers and river valley landscapes through restoration and significant re-linking of wetland valley habitats including lowland meadows, reedbeds, fens and flood plain grazing marsh, and restoring natural river morphology of engineered sections where of particular benefit to biodiversity.

Landscape opportunities continued

- Manage and enhance the agricultural landscape, including the restoration and management of hedgerow boundaries on the western downs and slopes within river valleys to enhance the wildlife network.
- Conserve historic field patterns and create conservation headlands and field margins and promote winter stubble on the arable-dominated dip slope for the benefit of farmland birds and wildflowers.
- Plan for a landscape-scale expansion of semi-natural chalk grassland within appropriate fields of thin chalk soil on the chalk plateau and dip slope, protecting existing valued habitat and assemblages of species. Identify opportunities for linking, expanding and restoring existing fragments on the scarp and valley slopes to create a robust, inter-linked wildlife network with enhanced adaptation to climate change.
- Plan for an evolving landscape outside of the National Park surrounding the south-eastern conurbations, maintaining food production and areas of semi-natural woodland that help to preserve and enhance the tranquillity of the National Park while maintaining the expansive, open downland character of its eastern extent.
- Plan for the regeneration and replanting of existing, predominantly, small hill-top beech plantations particularly in the west and east chalk uplands.
- Encourage restoration and ongoing management of estate and parkland landscapes and the management and conservation of veteran parkland trees for biodiversity and heritage value.

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 the 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	Cereals Livestock production Dairy units	A major producer of cereals grown on the dip slope covering just less than 22,000 ha. South Downs lamb is produced in quantity, most notably on the eastern downs, with just less than 100,000 sheep. There is some dairy output in the valleys.	Regional	The land use pattern is predominantly focused on cereals and sheep. Cereals are grown on the deeper soils of less exposed lower slopes. The vegetation of the river valleys is markedly different, including permanent semi-improved pastures, proving grazing for cattle in late spring and summer. The South Downs lamb is the oldest of the terminal sire breeds in the UK and as the name suggests originates from the sheep which have roamed the South Downs for hundreds of years. By 1987 the breed in the UK was reduced in numbers to about 1300 breeding ewes. The South Downs lamb is now making its mark as a small farm meat producer, well suited to the modern market. There is a South Downs lamb marketing scheme for flocks within the National Park. **Continued on next page...**	Optimise benefits for farmland birds and rare arable plants by maintaining stubble and field margins providing summer and winter food, and safe nesting habitats. There is a need to maintain and support mixed farming systems, with a good balance of arable crops and permanent pasture grazed by sheep and cattle linked to clear environmental criteria. Work with the farming community to appropriately manage livestock carrying capacity and contribute to the increasing provision of South Downs lamb while avoiding adverse impacts on other services.	**Food provision** **Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Biodiversity** **Regulating water flow** **Sense of place / inspiration**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Food provision cont.				**... continued from previous page** The 'South Downs' brand has been established and builds on the cultural associations between food and place.	Improve the economic viability of mixed farming through the promotion and extension of the South Downs brand and promoting 'sense of place' for the area.	
Timber provision	Existing conifer plantations Broadleaved woodland Woodcraft and specialist timber processors / artisans, for example fencing manufacture	Timber is provided by just less than 1,000 ha of coniferous woodland, around 1per cent of the NCA, from extensive plantations on the enclosed uplands of the dip slope in West Sussex. Many estate woodlands, including broadleaved woodlands, on the central and western downs are managed commercially.	Local	Commercial management of coniferous plantations within the NCA is limited. There are more extensive areas of broadleaved woodland, much of which would benefit from being brought back into active management and could, where viable, support small-scale timber production for the local wood fuel markets. There are opportunities to improve the viability of woodland, and particularly coppice woodland, through the development of new markets.	Explore opportunities to develop links with the South Down's brand to link timber provision to cultural services such as sense of place. Explore opportunities to bring existing broadleaved woodland back under traditional management to support small-scale timber and local-wood fuel production and improve viability. Managed coppice can produce material suitable for products such as charcoal.	**Timber provision** **Biomass energy** **Sense of place / inspiration** **Climate regulation** **Regulating soil quality**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability	Chalk aquifers Rivers, streams and wetland areas Shallow lime-rich soil Freely draining lime –rich loamy soils Freely draining acid loamy soils	In the east, the Brighton groundwater management unit is the principal chalk aquifer supplying Brighton and surrounding areas and it is classed as having 'no water available'. The River Ouse water resource management unit (WRMU) is classed as 'no water available'; the River Adur WRMU is meanwhile classed as having water available[21]. In the west of the NCA, groundwater in the chalk feeds many of the rivers, streams and wetlands in the area and also provides all of the water abstracted for public supply. In the centre of the NCA, the Worthing chalk aquifer is classed as being 'no water available' while the Chichester chalk aquifer is classed as over licensed'; both are significant sources of public water supply, while the latter also supports baseflows to a number of spring fed streams. This includes streams that feed into the internationally important habitat sites of Chichester and Langstone Harbour SPA and Pagham Harbour SPA[22].	Regional	Chalk aquifers provide water supply for the NCA and feed rivers and streams. Brighton groundwater management unit is identified as being under significant stress. Shallow lime-rich soils over chalk, freely draining lime-rich loamy soils and the freely draining slightly acid loamy soils are valuable for aquifer recharge requiring the maintenance of good soil structure to aid water infiltration and the matching of nutrients to needs to prevent pollution of the underlying aquifer. Restoring chalk grassland could have a major impact in relation to aquifer recharge through a reduction in run-off rates and increased water infiltration with reduced soil compaction.	Seek opportunities for the restoration of low –input and unimproved grassland and creation of buffer strips for wildlife where appropriate within catchments in the NCA to reduce run-off and provide improvements to water availability of the rivers and main aquifer. Maintain and restore semi-natural habitats and woodlands to intercept and infiltrate surface water down into the aquifers.	**Water availability** **Regulating water quality** **Biodiversity** **Regulating soil quality** **Climate regulation**

[21] *Adur and Ouse Catchment Abstraction Management Strategy, Environment Agency (March 2005) (accessed March 2013;* URL: http://publications.environment-agency.gov.uk/pdf/GESO0305BVIG-E-E.pdf)

[22] Ibid.

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biomass energy	Existing woodland	The NCA contains 14,969 ha of woodland (where woodlands are over 2 ha in size), covering 16 per cent of the NCA and including 7,081 ha of ancient woodland. Energy crops, particularly Miscanthus, may be appropriate in central Downs lower flood plain arable areas, albeit bringing a new character through creating some enclosure.	Local	The existing woodland resource provides significant potential for the local provision of biomass (where timber production is not a viable option) through bringing existing woodlands under management in central and western areas. Biomass crops (short rotation coppice- SRC and miscanthus) do not form part of the current landscape and there are limited locations for new biomass plantings. Broadleaved woodland, predominately within the western half of the NCA, has potential to supply biomass in the form of local wood fuel. Locations for miscanthus and SRC are few and heavily constrained and existing woodland resources are underutilised. Traditional management of broadleaved woodlands and arisings from timber production would provide local biomass in the form of wood fuel.	Explore opportunities to bring appropriate areas of broadleaved woodland (predominately within the western half of the NCA) under traditional management including non- intervention options and establish a supply chain for local timber and biomass to help sustain them. Maintain short rotation coppice regimes (SRC) where appropriate. Support existing and establish new markets to encourage the use of woodlands for local biomass and potential benefits for biodiversity.	**Biomass energy** **Biodiversity** **Sense of place / inspiration**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation	Mineral soils Existing woodland Organic matter in soils Wetlands Semi- natural grassland	Mineral soils are largely low in organic matter where under continuous arable cultivation. Across the NCA there is a relatively low proportion of carbon stored in the top oil horizon (0-10 per cent), although the eastern end, especially around Brighton, has more areas in the upper extent (5-10 per cent). Higher carbon content is likely to be associated with the soils of wetland areas and in both the soils and vegetation of woodlands. The woodland cover of the NCA (19 per cent of the area) will also make a contribution to the sequestration and storage of carbon dioxide.	Local	Low level of organic matter in soils is largely widespread across the NCA. Carbon storage can be increased by increasing organic matter inputs and increasing the area of permanent vegetation; permanent grassland and woodland. The NCA appears to offer a low contribution to carbon capture. The NCA's extensive areas of semi-natural grassland and smaller areas of wetland hold locally significant carbon in their soils.	Seek opportunities to manage organic matter inputs in arable areas and employ sympathetic cultivation techniques to reduce soil carbon loss and improve soil carbon storage and sequestration. Small-scale woodland planting and management will have a minimal added impact on carbon capture. Restore, expand and re-link the wetland habitats of the river valleys and woodland habitats to provide further potential carbon stores.	**Climate regulation** **Regulating water quality** **Regulating soil quality** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality	Chalk aquifers Streams and rivers Semi-natural habitats Shallow lime-rich soil Freely draining lime –rich loamy soils Freely draining acid loamy soils	The River Meon has good ecological status, while where assessed the rivers Arun, Adur, Ouse and Cuckmere are predominantly classed as having moderate ecological status or potential. The Arun also has a small stretch of poor ecological potential and forms part of the Arun and Western Rother priority catchment where diffuse agricultural pollution is a key issue with high levels of nutrients and sediment (the Western Rother lies outside this NCA)[23]. The ecological potential for estuarine waters along the coastline is moderate. The chemical status of rivers, lakes and coastal waters in the NCA is good where assessed (including the River Meon), while the groundwater chemical status is good at the eastern end of the NCA but poor to the west of the River Adur[24].	Regional	Water quality is important to this NCA as the rivers and waterbodies support a range of associated biodiversity. Many of the rivers in the NCA, such as the Arun, Rother and Ouse, support a range of fish populations. Chalk streams in the eastern end of the NCA are also very important for their biodiversity value and it is important that good water quality is maintained to support important wildlife habitats. Significant restoration and creation of low-input chalk/unimproved grasslands within river catchments, most notably the Arun (a Defra Priority Catchment), as well as across the arable dip slope to the west of the Arun valley could help to reduce nutrient run-off and improve the water quality of the area's rivers and of the main chalk aquifer. Shallow lime-rich soils over chalk, freely draining lime-rich loamy soils and the freely draining slightly acid loamy soils are valuable for aquifer recharge requiring the maintenance of good soil structure to aid water infiltration and the matching of nutrients to needs to prevent pollution of the underlying aquifer.	Explore opportunities for significant restoration and creation of low-input chalk/unimproved grasslands within river catchments, most notably the Arun (a Defra Priority Catchment), as well as across the arable dip slope to the west of the Arun valley to help reduce sediment and nutrient run-off and improve the water quality of the area's rivers and of the main chalk aquifer. Explore opportunities for the expansion of semi-natural wetland habitats such as reed beds adjacent to watercourse to act as nutrient sinks, plus creation of grassland buffer strips running across slopes within catchments (notably the Arun) to reduce sediment and nutrient run-off into adjacent water courses, thereby improving the quality of rivers.	**Regulating water quality** **Regulating soil erosion** **Regulating soil quality** **Biodiversity**

[23] Defra catchment priorities identified under the England Catchment Sensitive Farming Delivery initiative http://www.defra.gov.uk/foodfarm/landmanage/water/csf/documents/catchment-priorities.pdf

[24] South East River Basin District Management Plans, Environment Agency (September 2010) (accessed March 2013; URL: http://www.environment-agency.gov.uk/research/planning/33106.aspx)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow	Wetland habitats Chalk and chalk soils	The River Arun is identified in the Arun and Western Streams Catchment Flood Management Plan as an area of low to moderate flood risk. This is also the case for the Adur catchment. Significant risk of flooding occurs along the River Ouse at Lewes and tidal flooding represents the main risk at Newhaven[25].	Regional	There is a low to moderate flood risk in the west of the NCA but significant risk of flooding in the east. The river Arun is at low to moderate risk of flooding and action should be taken to store water or manage run-off in locations that reduce downstream flooding (in Arundel and Littlehampton) and provide environmental benefits. Similar policies are identified for the Adur catchment, where increasing water storage and infiltration on the downs can assist in controlling or reducing surface water flood risk (due to 'muddy flooding' which is caused by an accumulations of run off over agricultural land) in the downstream urban areas such as Lancing, Worthing, Findon and Brighton and Hove (the main part of which lies within the NCA). Significant risk of flooding occurs along the River Ouse at Lewes, with a number of targeted actions proposed to mitigate this, including increased flooding downstream (coinciding with increasing the wetland area of Lewes Brooks Site of Special Scientific Interest), while tidal flooding represents the main risk at Newhaven[26]. Restoration and creation of new wetland habitats will help to increase the storage of water in the flood plain and reconnect, enhance existing habitats for the benefit of biodiversity and landscape.	Explore and realise opportunities for restoration and creation of favourably managed wetland habitats along the flood plains of the Arun and Adur in particular. Bring rivers back into continuity with their flood plains where appropriate to allow for more regular flooding of identified areas and to store flood waters to help alleviate downstream flooding, as identified under the catchment flood management plans. Explore and realise opportunities to expand the wetland area of Lewes Brooks SSSI to enable increased flooding of the Ouse upstream of Lewes and help to regulate flood risk in the town, as further identified in the catchment flood management plan.	**Regulating water flow** **Regulating soil erosion** **Biodiversity**

[25] Arun & Western Streams, River Adur and River Ouse Catchment Flood Management Plans, Environment Agency (December 2009) (accessed March 2013; URL: http://www.environment-agency.gov.uk/research/planning/33586.aspx) [26] Ibid.

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating coastal flooding and erosion	Chalk cliffs Saline lagoons Saltmarsh Intertidal rock Intertidal sediment	From Eastbourne to Seaford the shoreline management plan identifies long-term policies of 'no active intervention' for the eastern stretches, where Beachy Head, Seaford Head and Cuckmere Haven comprise important chalk cliffs and estuarine habitats. At Brighton and Seaford, the long-term policy is to 'hold the line'. Short-term policies of hold the line are suggested at Peacehaven and Saltdean to maintain cliff top assets[27].	Regional	The chalk cliffs to the east of the NCA are likely to be affected by rising sea levels. As a result, coastal erosion may occur with loss of cliff-top and landward habitats and impacts on the South Downs Way National Trail. The effects of wave erosion and the instability of the chalk cliffs are starkly evident along the dramatic sea cliffs of Beachy Head and the Seven Sisters. There were significant major cliff falls as recently as April 2001. Current rates of erosion on this section of coastline range between 10 cm and 50 cm per year. These natural processes of erosion can be modified with the construction of seawalls and coastal defences, which often affect or disrupt erosion rates and deposit of sediments further along the coast. **Continued on next page...**	Coastal flooding should be regulated in accordance with the shoreline management plan, to reduce flood risk. Enable continued erosion of chalk cliffs in accordance with the shoreline management plan, allowing the landward migration of important cliff-top habitats and also the coastal path including the South Downs Way National Trail as necessary. Promote and allow the natural development, adaptation and regeneration of other coastal habitats including saltmarsh and shingle beach as sea levels rise, again reflecting the policies of the shoreline management plan. Create compensation habitats where areas of saltmarsh and shingle beach are lost to coastal squeeze in front of fixed hard sea defences, investigating potential beach nourishment at Brighton and Seaford.	**Regulating of coastal flooding and erosion** **Regulating water flow** **Regulating soil erosion** **Water availability** **Biodiversity** **Recreation**

[27] Shoreline Management Plan, Beachy Head to Selsey Bill (accessed March 2013; URL: http://www.environment-agency.gov.uk/research/planning/105014.aspx)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating coastal flooding and erosion cont.				**... continued from previous page** At Brighton and Seaford, the narrowing of beaches potentially mitigated through beach nourishment). Some coastal beaches are starved of sediment and various engineering techniques have been used to address this problem. In some cases these engineering works can also affect the scenic quality and unspoilt nature of the landscape. Estuaries, such as the Cuckmere, are a crucial component of drainage within coastal areas, taking surface water downstream and into the sea. Where drainage of either the estuary itself or its tributaries is blocked this can create localised flooding Estuaries are hugely important in recycling nutrients and supporting the food chain within the marine environment[28].	Maintenance and restoration of processes to improve their ability to function as coastal systems is important to prevent coastal squeeze due to sea level rise.	

[28] State of the National Park Report 2012, South Downs National Park (2012)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil quality	Highly fertile soils cover the river flood plains Well-drained easily worked soils are found on the gentle south facing dip slopes	There are 7 main soil types in this NCA: shallow lime-rich soils over chalk, covering 63 per cent of the NCA; freely draining slightly acid loamy soils, 14 per cent; freely draining lime-rich loamy soils, 13 per cent; slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils, 4 per cent; loamy and clayey soils of coastal flats with naturally high groundwater, 2 per cent; freely draining slightly acid but base-rich soils, 1 per cent; and slightly acid loamy and clayey soils with impeded drainage, 1 per cent.	Regional	The shallow lime-rich soils over chalk have a degree of natural resilience due to their calcareous nature. These characteristics are also shared with the deeper freely draining lime-rich loamy soils. Both these soil types and the freely draining slightly acid loamy soils are valuable for aquifer recharge requiring the maintenance of good soil structure to aid water infiltration and the matching of nutrients to needs to prevent pollution of the underlying aquifer[29]. Thin chalk soils support slow rates of plant growth. Deeper soils with greater fertility are found on the dip slope and in valley bottoms. In certain places, such as Lullington Heath, windblown soils called 'loess' have been deposited on top of the Chalk and supports nationally important chalk heath.	Work with farmers and land managers to seek opportunities to employ best practice methods of minimal tillage, increase soil organic matter and relieve soil compaction aiding water infiltration. This will also have the benefit of reducing run-off and associated flood risk and aid aquifer recharge. Ensure levels of long-established organic matter are maintained in higher-value agricultural soils, where found, minimising tillage operations where possible. Protect areas of permanent pasture and ancient woodland sites.	**Regulating soil quality** **Regulating water quality** **Regulating water flow** **Food provision** **Biodiversity**

[29] Soils Data © Cranfield University (NSRI)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion	Shallow lime–rich soils over chalk over 90 per cent of the NCA Thicker more clayey soils cover 9 per cent of the NCA	Soils on the chalk are thin, well-drained and poor in nutrients. The small areas of soils with impeded drainage (1per cent) are susceptible to capping and slaking, increasing the risk of soil erosion. They are easily compacted by machinery or livestock if accessed when wet, increasing the risks of soil erosion by surface water run-off. The thicker, more clayey soils have a lower risk of erosion[30].	Regional	The lighter soils that dominate the NCA are shallow, sometimes unstable and prone to loss through erosion. They are particularly at risk on sloping cultivated ground or where bare soil is exposed along footpaths and tracks This is exacerbated where organic matter levels are low after continuous arable cultivation or where soils are compacted. Soils under permanent pasture and woodland are less prone to erosion being more stable with rough sward that slows cross-land water flow.	Explore opportunities to expand areas of unimproved chalk grassland onto the steeper arable slopes to minimise soil compaction and allow denser vegetation to improve water retention and minimise soil runoff, in combination with the restoration of hedgerows (where they are characteristic in the landscape) running across slopes to limit surface runoff. Explore opportunities to expand areas of broadleaved woodland on steeper slopes where appropriate within the western NCA to help minimise soil runoff, while expanding river valley wetland habitats. Regulate erosion of soils with impeded drainage through sympathetic management that avoids the compaction and poaching of soils during wet conditions.	**Regulating soil erosion** **Regulating soil quality** **Climate regulation** **Regulating water quality** **Regulating water flow**

[30] Soils Data © Cranfield University (NSRI)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pollination	Semi-natural habitats including: Chalk species-rich grassland Hedgerows Wetland areas Gardens Community orchards	Existing heathland, meadows and grassland provide limited nectar sources for pollinating insects. Nectar sources will be provided by the gardens of Brighton and the larger towns such as Worthing, Seaford and Lewes.	Local	A variety of habitats support a range of plants which provides a sound base for pollination. Networks of pollinator habitat limit the ability for pollinators to supply this service. Increases in habitat for pollinators such as the creation of areas of semi-natural habitat, hedgerow improvement and increases in field margins will increase the delivery of this service. These measures would create important corridors and habitat mosaics for pollinator species. Increases in habitat for pollinators may cause a reduction in food provision due to further semi-natural habitat creation, hedgerow improvements and increases in field margins. Such measures would create important corridors and habitat mosaics for pollinator species and a strong pollinator population would then support production of a wider variety of food products and food production in the future. Insect pollination in this NCA is of importance for semi–natural habitats rather than for food production.	Bring areas of semi-natural grassland into suitable grazing management, including areas of coastal grassland that fall outside of grazing regimes. Explore opportunities for restoration and expansion and chalk grassland on the chalk ridge and of wetland habitats within the valleys. Manage scrub to prevent / reduce invasion of open grassland habitats. Work with farmers to enhance the floristic content and value to invertebrates of the extensive lengths of grass verges, alongside farm tracks and outside the managed field areas.	**Pollination** **Food provision** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pest regulation	Existing semi-natural habitats Field margins Hedgerows Mixed farm systems including crop rotations	The semi-natural habitat network within the NCA will provide support for a high level of predators.	Local	The impacts of the majority of pest- reducing species is not widely understood, the status of farmland bird species within the NCA is either stable or still declining.	Explore opportunities to increase and manage appropriately semi-natural habitats. Seek opportunities to increase diversity of structure and composition within areas of semi-natural habitat to support a variety of pest regulating species. Seek opportunities to 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. Identify where relevant studies have been undertaken to control invasive species and ensure consistency with measures to improve habitats for pest regulation species.	**Pest regulation** **Pollination** **Biodiversity** **Food production**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
A sense of place/ inspiration	Open expansive areas of wooded heath Open rolling downland and dramatic chalk cliffs offering expansive uninterrupted panoramas Historic coastal towns such as Brighton	The highly distinctive elevated chalk ridge running east-west with a steep north-facing scarp slope and southerly dip slope dissected by numerous dry valleys. Remnant tracts of chalk grassland surviving on steep scarp and valley slopes. To the east the open, exposed downland scenery, divided by four U-shaped river valleys with flat alluvial flood plains supporting wetland habitats. A coastline of dramatic chalk cliffs, including the dramatic Beachy Head and Seven Sisters cliff tops). To the west extensive ancient woodlands and parklands, including beech hangers on the scarp slope and remnants of yew forest including the internationally renowned Kingley Vale National Nature Reserve on the southern dip slope. Further sense of place is provided by the typically dispersed downland settlement pattern and the distinctive use of flint in traditional buildings and walls, as well as the rare English elms of the Ouse and Cuckmere valleys in the east. Continued on next page...	National	The South Downs has a strong and very clear sense of identity with the majority of the NCA being designated as a National Park. Dispersed downland settlement, the use of flint in traditional buildings and rare English elms contribute to the distinctiveness of the area. The South Downs has a rich cultural heritage of art, music and rural traditions. The dramatic and expansive coastline has inspired and continues to inspire artists, poets, musicians and well-known writers including Virginia Woolf, Jane Austen and Rudyard Kipling amongst others[31]. A range of breweries and vineyards and community orchards across the South Downs also contribute to the distinctiveness of the 'South Downs brand'. The town of Lewes also has 'The Lewes Pound ' which provides a	Conserve and significantly expand the areas of chalk grassland on the steep slopes and open ridges that comprise one of the most distinctive elements of the downs, while restoring and managing the ancient woodlands and parklands that characterise the western half of the NCA, and expanding and re-linking the wetland habitats that are characteristic of the rivers valleys. Realise opportunities to conserve the traditional dispersed downland settlement pattern of villages in river valleys and scattered farmsteads. Promote the use of flint and brick as traditional building materials and roofs of tile, slate or thatch to maintain local character.	**Sense of place/ inspiration** **Recreation** **Tranquillity** **Sense of history** **Biodiversity** **Food provision**

[31] *State of the National Park Report 2012*, South Downs National Park (2012)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
A sense of place/ inspiration cont.		**...continued from previous page** Brighton has national collection of 19,000 elm trees spread across the city and is the only place in Britain where such a diversity of different aged elm trees of different varieties of cultivars can be appreciated[32]. Brighton and Hove is the largest conurbation is Sussex and is nationally renowned as a vibrant and cosmopolitan location based upon a historic seaside resort, contemporary arts.		creative yet practical way for local people to support local businesses within the town encouraging demand for local goods and services. There is substantial interest in wildlife and conservation among local groups in Brighton including a range of 'Friends' groups that are actively engaged in conservation management on their local sites across the city[32]. The national collection of elms in Brighton provides a valuable example of genetic diversity with many trees being exceptionally rare. English elm in Brighton is the largest collection worldwide. This collection includes seven endangered types of elm. Many forms are resistant to Dutch elm disease which devastated many elm trees in England in the 1970s. Elm trees also provide critical habitats for the white letter hairstreak butterfly and dependent lichen species[32].	Maintain the open downland summits with expansive views over the Low Weald and downs, with expanded areas of chalk grassland. Explore opportunities to promote the heritage and landscape to inspire contemporary artists to celebrate the 'South Downs' brand. Explore opportunities to work with local businesses to promote responsible use of the 'South Downs' brand and the benefits of local food and produce. Explore opportunities to work with local environmental groups to develop a sense of belonging to the area and promote environmental initiatives. Explore opportunities to conserve the internationally rare English elms of the Ouse and Cuckmere valleys in the east and opportunities to conserve and diversify the elm population by working with national and international bodies.	

[32] Brighton, Hove and Lewes Downs Biosphere Strategy 2012, Brighton and Hove City Council

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history	Prehistoric sites Iron-age hill forts Historic parklands Neolithic flint mines Victorian and Regency influenced architecture in coastal towns Historic county towns	A wealth and variety of heritage assets that reflect the long history of human activity in a chalk landscape. Prehistoric remains such as the Neolithic flint mines at Cissbury Ring and the Trundle (one of the best examples of Neolithic causewayed enclosures in the country), and medieval lynchets. Prominently sited iron-age hill forts (such as Cissbury Ring) and ridgeline bronze-age barrows that are linked by ancient ways over the open downland summits. Historic parkland and estate landscapes that are a particular feature of the central downs, such as Uppark, Stansted, West Dean, Goodwood and Arundel. The Long Man of Wilmington one of two main extant human hill figures in England. Brighton and the other coastal towns provide a strong sense of history with their distinct architecture and Regency and Victorian associations such as the Regency inspired Brighton Pavilion.	National	South Downs NCA is well known for its various historic features and history of land use. It provides a strong historic landscape with visible links to the past including pre-historic ritual and settlement sites including flint mines, burial mounds and visually dominant hill forts. Abandoned field systems survive as earthworks on the high downland, but extensive below-ground archaeology elsewhere indicates the centuries of cultivation and use by farming communities from the Neolithic to the present day. Many heritage assets are fragile and highly susceptible to loss or damage due to direct and indirect impacts or inappropriate management. The range of features present in the area allows for study of past human activity, informing current land management. Emphasis should be placed on the need to continue to protect and interpret the wealth of heritage present. **Continued on next page...**	Seek opportunities to protect and manage the distinctive prehistoric monuments along the downland ridge, including prominently sited iron-age hill forts and bronze-age barrows, as well as the ancient route ways over the open downland summits that form part of the South Downs Way National Trail. Seek opportunities to protect, manage and enhance historic features and their settings in relation to land management or land use changes, managing visitor pressures to prevent soil erosion and littering. Seek to protect historic earthworks through reversion of arable land to grassland and ongoing scrub removal.	**Sense of history** **Sense of place / inspiration** **Recreation** **Geodiversity** **Regulation soil erosion** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history cont.				**... continued from previous page** Archaeological features remain vulnerable from deep ploughing on arable land as well as livestock damage and scrub encroachment. Historic parklands contribute to providing distinctive character within the central downs. Brighton and Hove enjoys a national reputation as a vibrant and liberal cosmopolitan location, based upon a historic seaside tourist resort and contemporary centre for the arts, digital industries and conferences. The city developed through Regency and Victorian times to expand over the surrounding hills and valleys in to the last century.	Explore opportunities to enhance the setting, interpretation and legibility of heritage assets. Manage and conserve the large historic parklands that characterise the central downs. There are opportunities to protect the range of features and provide interpretation to develop wider public understanding and appreciation of the NCA's coastal towns and Victorian and Regency associations.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Tranquillity	Vast 'openness' of the landscape Dark night skies Undeveloped coast and secluded combes Ancient woodland Beech hangers Historic parkland	The NCA has suffered significant loss in tranquillity in the past 50 years with a decline in 'undisturbed' areas from 71 per cent in the 1960s to 41 per cent in 2007. On the chalk ridge of the eastern and central Downs, the most tranquil areas are found on the escarpment, dip slope and within the valleys. This is notably furthest away from the major settlements and transport networks. The lowest tranquillity scores are found around the conurbations of Brighton, Hove and Worthing.	Regional	The South Downs conveys a strong sense of space, remoteness and quietness which is a special and sometimes rare quality in the south-east of England, one of the most crowded parts of England. It provides an accessible landscape while retaining a sense of wilderness such as on the chalk downland at Beachy Head. Despite the most popular locations in the South Downs National Park being heavily visited, the sense of tranquillity and unspoilt places still provides a sense of peace and space. In some areas, the landscape possesses a timeless quality, largely lacking intrusive modern development and retaining areas of dark night skies. The ancient woodland, majestic beech hangers and parklands in the west also provide tranquil and undisturbed areas. Remaining areas of tranquillity and dark night skies are under continued threat, particularly in the eastern half of the NCA where the conurbations of the south coast have a significant impact upon the adjacent downland. Extensive development in the east of the NCA and in the adjacent coastal plain poses a significant threat to the tranquillity of the adjoining downland, as do the major roads that cut through the chalk ridge. Very little 'undisturbed' land remains along the open eastern downs according to the CPRE Intrusion map. Tranquillity is further threatened by increasing visitor pressures, including high car dependency.	Explore opportunities to expand and create broadleaved woodlands outside the National Park surrounding the eastern conurbations where this helps to prevent light, noise and air pollution spilling onto adjacent downland areas, while at the same time maintaining the distinctive open downland character. Manage visitor pressures and encourage greater reduction in car dependency to help maintain/ enhance tranquillity, while pursuing the other objectives of the National Park that include enhanced lighting design and reducing traffic volumes on non-trunk roads. Explore opportunities to ensure that any new development within or close to the South Downs are explored to ensure that they do not or are mitigated to adversely affect the peace and dark night skies of the South Downs through traffic generation, noise, light or visual intrusion. Explore opportunities to conserve the sense of remoteness and 'wildness', particularly along the coast. Tranquillity should be enhanced where possible through the removal of obtrusive features, such as signage, lighting and overhead lines and poles.	**Tranquillity** **Sense of place / inspiration** **Recreation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation	Public rights of way network South Downs Way National Trail Open access land Access to coastline South Downs National Park	Recreation is a significant feature of the area, with the majority of the NCA falling within the South Downs National Park. Recreation is supported by just less than 2,000 km of rights of way, at a density of 1.93 km per km^2, including the South Downs Way National Trail running along the crest of the scarp slope. There are around 4,500 ha of open access land formed of areas of open chalk downland The National Park attracts some 39 million visitor trips a year, making a major contribution to the health and well-being of the population of the south-east[33]. Some of the area's major attractions include Old Winchester Hill, the Queen Elizabeth Country Park, Butser Hill, Goodwood, Chanctonbury Ring and Cissbury Ring, Kingley Vale, Devil's Dyke, the Seven Sisters Country Park and Beachy Head. **Continued on next page...**	National	There is a need to ensure that the distribution and management of visitors conserves and enhances the area's natural beauty and heightens visitor experience. All sectors of society are welcomed and active exercise is encouraged for its benefits to health and well-being; alternative transport options reduce reliance on the private car; localised recreational impacts are managed; and the access network is enhanced. The vast range of experiences available to visitors and residents allows for a dispersal of activities across much of the area, although the coast remains the main focus of attention. The NCA has extensive recreation and relaxation opportunities including the South Downs Way National Trail and popular coastal areas such as Brighton in the east. There is currently a high car dependency of visitors, with associated impacts upon tranquillity within the area, with potential threat of erosion and degradation through littering due to high visitor numbers.	Explore opportunities to maintain and enhance recreation provision throughout the area in accordance with the ambitions of the National Park. This includes the development of agreed permissive and improved rights of way and access to sites and areas of interest, maintaining the strategic importance of the South Downs Way National Trail. Seek to maintain a grassland band along the heritage coast to enable open access, develop alternative, affordable, and integrated transport modes for accessing the South Downs to reduce car dependency, and maintain the quality of rights of way and open access land, targeting as broad a range of users as possible.	**Recreation** **Sense of place / inspiration** **Sense of history** **Tranquillity**

[33] Open Country GIS data, Natural England (2004), Public Rights of Way Density, Natural England (2003)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation cont.		**... continued from previous page** The coastal towns, including Brighton and Hove, provide important recreational opportunities, including notable features such as Brighton Pier. Popular activities across the area include walking, riding and cycling and taking time to enjoy the open countryside. Adventurous activities include paragliding, hang-gliding and a range of water sports.		Explore opportunities to create new areas of recreational green space outside the National Park surrounding and within the eastern conurbation to provide a significant local recreational resource and help to reduce pressures on the National Park itself. Work with bodies such as the South Downs National Park to promote the visitor 'codes of conduct' to minimise pressure on the NCA.		

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity	Internationally and nationally important designated sites and habitats Woodland Chalk grassland Wetland habitats Rare species Historic parkland	Just over 3,000 ha of the NCA is covered by BAP priority habitats; including, coastal and flood plain grazing marsh, maritime cliff and slope, lowland calcareous grassland, fens lowland meadows, lowland dry acid grassland, coastal vegetated shingle, reedbeds, mudflats and saline lagoons. 912 ha of the NCA is designated as SAC.4, 851 ha is designated as SSSI with around half of these areas being in favourable condition and the other in unfavourable recovery. The NCA is of importance for a number of rare invertebrates species such as the Adonis blue, small blue and the Duke of Burgundy butterflies. Around half of the orchid species that are native to Britain occur in the grassland and woodland in the South Downs. Coppiced ancient woodlands also support relict populations of pearl-bordered fritillaries. The chalk cliffs at the eastern extreme of the NCA and inland chalk exposures support a range of specialised plants. **Continued on next page...**	National	The unique combination of geology and microclimates of the South Downs has created a rich mosaic of habitats that supports many rare and internationally important wildlife species. Duke of Burgundy butterflies and many other invertebrates have benefitted from concerted habitat management and creation work. A number of farmland birds have also benefitted from habitats management and creation works across the area. Coastal and estuarine habitats are potentially most affected by climate change and rises in sea level and adaptation to change will be critical. The Brighton and Lewes Downs Biosphere covers around 390 square kilometres of land and sea in Sussex, between the Rivers Adur and Ouse. It incorporates a variety of important habitats and species, including chalk grassland, undersea reefs, Adonis Blue butterfly and Short-snouted Seahorse.	Explore opportunities to create more coherent and resilient ecological networks for wildlife to encourage connectivity of habitats. Identify opportunities to expand priority area habitat extensions to existing wildlife sites to benefit national and local biodiversity priorities. Work with landowners to integrate sustainable land management options and provide benefits for farming, while benefitting biodiversity. Enhanced buffering and connectivity of designated sites should be undertaken in line with Biodiversity 2020 principles.	**Biodiversity** **Sense of place / inspiration** **Food provision**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity cont.		**... continued from previous page** The intertidal wave-cut platform, which runs along the base of the chalk cliff outcrops, supports diverse and specialised plant and animal communities that are adapted to the exposed conditions. Salt marsh, vegetated shingle, mudflats and saline lagoons along the coast. Arable habitats support farmland birds and historic parkland is an important habitat to the western end of the downs supporting populations of bats and deadwood loving species of invertebrates. 'Flashy rivers' such as the Ouse and Cuckmere support ecological communities associated with clay-dominated lowland rivers including populations of fish such as brown trout[34].				

[34] Ibid.

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Geodiversity	Dramatic chalk cliffs Nationally designated sites Local stone used in building materials Rolling landscape of the downs Chalk soils	There are six geological Sites of Special Scientific Interest (SSSI) within the NCA. These consist of gravel, sand or chalk pits and quarries, many of which are remnants of past industrial or agricultural activity within the NCA. There are a further 47 sites of local interest. The geological SSSI are designated variously for geomorphological structural, karst, stratigraphic, fossil and Quaternary interests. Important local landforms include Birling Gap and Devil's Dyke which is the deepest dry chalk valley in Britain. At Southeram outside Lewes, three former chalk quarries are of national geological importance. Layers of chalk contain bands of flint nodules, a common feature of the walls and buildings in downland villages. There are also areas of chalky sandstone known as 'Malmstone'. This is an historic, and locally distinctive, building material used in areas of east Hampshire and west Sussex. Free-draining chalk soils cover most of the area and have influenced the pattern and type of land use.	National	Quarries and fluvial geomorphological sites feature in the rich range of geodiversity present. Coastal stretches of the NCA particularly provide an important opportunity to observe and interpret geological formation and geomorphological processes. The bedrock geology also impacts on many of the habitats. Geology and geomorphology also influence the aesthetic and cultural qualities of the area, the scale and drama of cliffs, the visible remains of prehistoric and bronze-age occupation, and local buildings.	Identify opportunities for enhanced access to and understanding of the area's geodiversity. Maintain natural geomorphological processes along the coast and rivers to contribute to regulating coastal flooding. Support the use of local stone as a building material to maintain local distinctiveness.	**Geodiversity** **Regulating coastal flooding and erosion** **Regulating water quality** **Sense of place / inspiration** **Sense of history** **Biodiversity**

Photo credits

Front cover: The white cliffs of the Seven Sisters, Beachy and Seaford Head mark the spectacular eastern end of the South Downs where they join the sea. © South Downs Joint Committee

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Catalogue Code: NE432 ISBN 978-1-84754-298-4

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