National Character Area profile:

119. North Downs

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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.

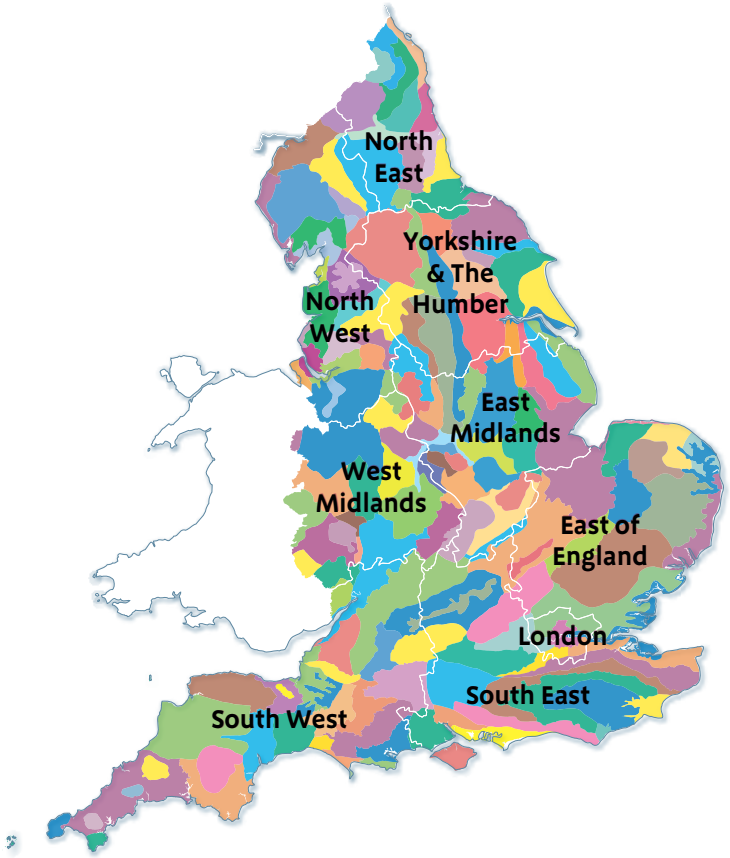
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and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

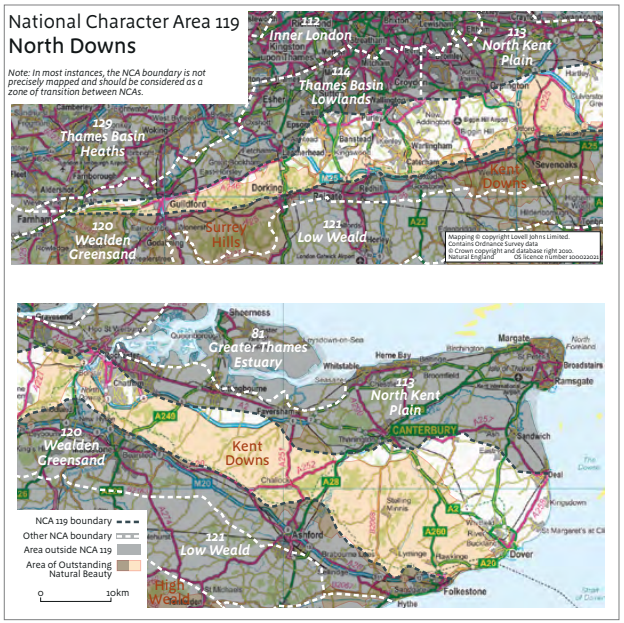
Summary

The North Downs National Character Area (NCA) forms a chain of chalk hills extending from the Hog's Back in Surrey and ending dramatically at the internationally renowned White Cliffs of Dover. The settlement pattern is characterised by traditional small, nucleated villages, scattered farms and large houses with timber framing, flint walls and Wealden brick detailing. Twisting sunken lanes, often aligned along ancient drove roads, cut across the scarp and are a feature of much of the dip slope. The Kent Downs and Surrey Hills Areas of Outstanding Natural Beauty designations are testament to the scenic qualities and natural beauty of the area.

Agriculture is an important component of the landscape, with variations in soils supporting mixed farming practices where arable, livestock and horticulture have co-existed for centuries. The woodlands, many of which are ancient, are a prominent feature of the landscape, yet their ecological value has suffered in recent years due to a reduction in active management, particularly of mixed coppice, since the 1990s. Two Special Areas of Conservation (SAC) are designated for their rare woodland compositions. Chalk grassland is particularly notable, with seven SAC designated for chalk grassland interest including outstanding assemblages of rare orchids. The chalk downland habitats support rare species, including the late spider orchid – wholly restricted to Kent – and the black-veined moth and straw belle moth which are currently found only within the North Downs.

The North Downs are cut by the valleys of the Stour, Medway, Darent, Wey and Mole with their associated wetland habitats. The chalk aquifer of the North Downs is important for supplying water within Kent and to London.

The coast is of international significance with an SAC designation due to the presence of rare maritime cliff communities found within the cliff face and on cliff-tops. Two stretches of the coast are recognised as Heritage Coast: South Foreland and Dover to Folkestone. An outstanding range of historical and geological features are found along the coast, including Dover Castle and the White Cliffs with their strong cultural associations. Other historical features, including numerous Scheduled Ancient Monuments and buildings dating from the medieval period, are scattered throughout.



Click map to enlarge; click again to reduce.

More urban-fringe influence and modern development is associated with the land fringing Croydon, Purley and south London in the western part of the downs, with Dorking, Redhill and Guildford located on the fringes of the NCA. In the east, Dover is the main settlement, but the Medway towns of Rochester and Chatham and the town of Folkestone also lie on the periphery of the NCA. Other towns, including Maidstone, Ashford and Sevenoaks, and the city of Canterbury, although within adjacent NCAs, lie close to the boundary. Views from the eastern scarp are dominated by generally undeveloped landscapes much valued by visitors, with outstanding views across the Vale of Holmesdale to the Weald and from many parts of the downs to France. These views are affected to varying degrees by the Channel Tunnel terminal development and the M25 and M20 corridors.

Chalk grassland is an important component of the North Downs NCA supporting a range of wildlife.

Development pressures and agricultural practices continue to be forces for change throughout the NCA; high-quality and well managed green infrastructure both within and surrounding the NCA could help to service the demands of a growing population, a changing climate and increased pressures on natural resources, including the chalk aquifer, critical for water provision. Opportunities to create more robust and resilient ecological networks across the agricultural landscape should be maximised, working in partnership to secure positive environmental outcomes. The natural and cultural assets of the NCA support food production, regulation of water and soils, biodiversity, recreation, tranquillity, sense of place and sense of history.

Statements of Environmental Opportunity

- **SEO 1**: Manage, conserve and enhance the distinctive rural character and historic environment of the North Downs, including the long-established settlement pattern, ancient routeways and traditional buildings. Protect the tranquillity of the landscape and sensitively manage, promote and celebrate the area's rich cultural and natural heritage, famous landmarks and views for future generations.

- **SEO 2**: Protect, enhance and restore active management to the diverse range of woodlands and trees of the North Downs, for their internationally and nationally important habitats and species, cultural heritage and recreational value and to help to deliver climate change mitigation and adaptation. Seek opportunities to establish local markets for timber and biomass to support the active management of local woods, while recognising their contribution to sense of place, sense of history and tranquillity.

- **SEO 3**: Manage and enhance the productive mixed farming landscape of the North Downs and the mosaic of semi-natural habitats including the internationally important chalk grassland. Promote sustainable agricultural practices to benefit soils, water resources, climate regulation, biodiversity, geodiversity and landscape character while maintaining food provision.

- **SEO 4**: Plan to deliver integrated, well-managed multi-functional green space in existing and developing urban areas, providing social, economic and environmental benefits and reinforcing landscape character and local distinctiveness, particularly on or alongside the boundaries of the designated landscapes within the North Downs.

Children enjoy the extensive views from Wye NNR across adjoining NCAs. The NCA offers opportunities for access and education.

Description

Physical and functional links to other National Character Areas

The North Downs National Character Area (NCA) borders the Wealden Greensand NCA to the south, while to the north it borders the Thames Basin Lowlands NCA between Farnham and Purley, and the North Kent Plain NCA in west, mid and east Kent. The scarp forms a defining feature along the length of the NCA and panoramic views provide links with adjoining NCAs and beyond. Views across London, the Thames Estuary and to the south help provide the context and setting of this NCA.

The steep scarp slope provides extensive views over adjacent NCAs as shown here in Surrey.

The catchments of the rivers Wey, Mole and Darent drain through valleys dissecting the downs from the Wealden Greensand in the south to the Thames in the north, while further east the River Medway runs north to the Thames Estuary and the Stour runs north-east to the Kent coastline. Flooding is an issue along localised stretches of the rivers and activities within the NCA may have the potential to exacerbate or alleviate downstream flooding in adjacent NCAs. The chalk bedrock supports a principal aquifer which supplies water to both London and Kent. Spring flow from the Chalk is an important feed for the internationally designated habitats of the north Kent marshes and the Thames Estuary.

Coastal processes link NCAs and the construction of harbours at Dover and Folkestone has prevented any continuing sediment transport around South Foreland, but there is a moderate northwards movement of shingle into the North Kent Plain NCA coast. The role of this sediment supply in the development and denudation of beaches has a critical influence on the rate of coastal erosion. The proximity of this NCA to mainland Europe is notable, with the significant activity at the Port of Dover allowing for the passage of goods and people between England and the rest of Europe.

The M20 runs from Folkestone and Ashford along the southern boundary of the NCA until it cuts across to London. The M2/A2 skirts the northern boundary, connecting Dover and Canterbury to Chatham and south and east London. High Speed 1 (the Channel Tunnel Rail Link) has reduced the travel time by rail between Dover and London.

Key characteristics

- Cretaceous Chalk forms the backbone of the North Downs. A distinctive chalk downland ridge rises up from the surrounding land, with a steep scarp slope to the south providing extensive views across Kent, Surrey and Sussex and across the Channel seascape to France.
- The broad dip slope gradually drops towards the Thames and the English Channel, affording extensive views across London and the Thames Estuary. The carved topography provides a series of dry valleys, ridges and plateaux.
- Chalk soils are predominant across the NCA but the upper part of the dip slope is capped by extensive clay-with-flint deposits. Patches of clay and sandy soils also occur with coombe deposits common in dry valleys.
- The North Downs end at the dramatic White Cliffs of Dover, one of the country's most distinctive and famous landmarks. Most of the coast between Kingsdown and Folkestone is unprotected, allowing for natural processes. The cliffs are home to internationally important maritime cliff-top and cliff-ledge vegetation.
- The area is cut by the deep valleys of the Stour, Medway, Darent, Wey and Mole. The river valleys cut through the chalk ridge, providing distinctive local landscapes which contrast with the steep scarp slope.
- The south-facing scarp is incised by a number of short, bowl-shaped dry valleys, cut by periglacial streams and often referred to as combes. The undulating topography of the dip slope has also been etched by streams and rivers, today forming dry valleys, some of which carry winterbournes that occasionally flow in the dip slope, depending on the level of the chalk aquifer.

The fertile and lighter soils of the footslopes and valley bottoms support arable farming.

Key characteristics continued

- The footslope of the escarpment supports arable cropping, the dominant land use within the NCA. In the east, the richer, loamy soils of the lower dip slope support large tracts of mixed arable and horticultural production.
- Woodland is found primarily on the steeper slopes of the scarp, valley sides and areas of the dip slope capped with clay-with-flints. Well-wooded hedgerows and shaws are an important component of the field boundaries, contributing to a strongly wooded character. Much of the woodland is ancient.
- Tracts of species-rich chalk grassland and patches of chalk heath are important downland habitats and of international importance.
- Ancient paths, drove roads and trackways, often sunken, cross the landscape and are a distinctive feature of the dip slope. Defensive structures such as castles, hill forts and Second World War installations, and historic parks, buildings and monuments are found throughout.
- Small, nucleated villages and scattered farmsteads including oasts and barns form the settlement pattern, with local flint, chalk and Wealden brick the vernacular materials.
- In the western part of the area, around and to the west of Sevenoaks and into Surrey, there is increased urban development.

Rare orchids are a feature of the chalk downland habitats of the NCA including the lady orchid shown here.

The North Downs today

The ridge of chalk hills forming the North Downs is a distinctive landform within southern England, familiarly encountered as the steep-sided south-facing escarpment which forms a backdrop to the flatter land to the south. This dramatic feature, a sweeping arc of hills from the White Cliffs of Dover in the east through to the heartlands of Surrey in the west, affords expansive views which are a typical feature of some of the area's renowned beauty spots. Perhaps less well known is the dip slope of secluded country extending northwards from the escarpment, a country of undulating ridges, hidden dry valleys, wooded plateaux and small fields connected by hedgerows, shaws, sunken trackways and copses. The scenic beauty and special qualities of the landscape are recognised in the designation of 57 per cent of the area as Areas of Outstanding Natural Beauty (AONB): the Kent Downs AONB to the east and the Surrey Hills AONB to the west.

The mix of light, workable chalky soils on the valley sides and heavy clay soils on the plateau country, mantled in places by sands and gravels, has led to a long history of mixed farming practices which have co-existed for centuries.

The fertile footslope of the escarpment supports arable cropping where larger field sizes and fertile chalk loams favour cereals and oilseeds. In the east, the richer, loamy soils of the lower dip slope support tracts of mixed arable and horticultural production with orchards and occasional hop gardens. Permanent grassland is typical of the steep scarp, valley sides and less productive land.

Woodland is a dominant feature of the landscape and covers much of the dip slope country. Variations in woodland composition indicate contrasting soils, with oak and ash typical of the upper part of the dip slope, capped with clay-with-flints soils. Beech, ash, yew, hornbeam and maple cover the numerous dry chalk valleys, linked to shaws and thick hedgerows which surround fields, emphasising the strongly wooded character. However, a dominant characteristic of the downland woodland is sweet chestnut which has been managed for centuries as coppice. While sweet chestnut is not native, it is regarded as naturalised as it was first introduced in Roman times and was planted extensively in the early 19th century. The Kent Downs are one of the last bastions of active coppice management in England and it is this regime which has maintained a diversity of habitats within the woods, benefiting native woodland flora and fauna. The upper scarp slopes are also often wooded and extensive areas of the scarp in Surrey and western Kent are distinguished by dark green yew and box woodland.

Nearly half of the woodlands are ancient and many are designated for their biodiversity value. Mole Gap to Reigate Escarpment Special Area of Conservation (SAC) supports the only area of stable box scrub in the United Kingdom. The North Downs Woodlands SAC consists of internationally important mature beech woods and in particular ancient yew woodland. The woodlands of the NCA are important for recreation and accessible natural green space.

Chalk grassland is often found in fragmented tracts across dry valley sides and the escarpment. Seven SACs are designated for their chalk grassland interest with many rare orchids found among other species typical of calcareous grasslands, including the rare straw belle moth. Wye and Crundale Downs SAC and National Nature Reserve and Folkestone Downs support some of the largest colonies in the UK of late spider orchid. Like other sites in the downs, in summer the meadows are spectacular, supporting a profusion of wildflowers. The patchwork of smaller downland banks, unimproved hay meadows, pockets of heath and acid grassland, flower-rich roadside verges, uncultivated field corners and chalk pits are well-loved features of the downland landscape and are part of a complex habitat mosaic.

Patchwork field pattern. Well wooded hedgerows and shaws are an important component of the field boundaries.

Rivers supporting a variety of freshwater fish cut through the chalk ridge, creating locally distinctive valleys with important associated wetland habitats. Many invertebrates, mammals and birds, including lapwing and snipe, are drawn to the river corridors, a source of water in an otherwise dry chalk landscape. They also provide for recreation and access.

The famous White Cliffs, a landmark of the NCA, frame a hinterland of country dominated largely by open farmland interspersed with small villages and, in the Dour Valley, the town of Dover. The NCA is of international significance for coastal geodiversity. At Folkestone Warren, a series of landslips where the chalk has slumped over the underlying Gault Clay has given rise to a succession of steep broken slopes; these have been extensively studied and help us to understand similar landslips around the world. In addition, the cliffs support and are topped by important habitats, while the ledges attract various and numerous cliff-nesting birds. The stretch of coast from Dover to Kingsdown Cliffs is internationally protected as an SAC due to the presence of rare maritime cliff communities found within the cliff face and on cliff-tops. South Foreland and Dover to Folkestone are recognised as Heritage Coasts – an indication of the beauty of this undeveloped stretch of coastline and the rich cultural and historical significance of the cliffs.

Twisting sunken lanes overhung by yew, wayfaring tree and whitebeam cut across the scarp and are a strong feature of the dip slope. The traditional settlement pattern is characterised by small, nucleated villages and scattered farmsteads, with oasts, barns and large houses scattered throughout. Local materials used for buildings include flint, chalk ragstone, Wealden bricks and timber.

Modern development is associated with the land fringing Guildford, Croydon and south London in the western part of the NCA; in the east, most notably with Dover and Folkestone (for example at Hawkinge); and with the larger towns in adjoining NCAs. However, the imposing landform of the North Downs has confined major transport links to its edges and along the river valleys, which gives much of the NCA an often remote and tranquil atmosphere, offering dark night skies in places – a rare find in the much developed south-east of England.

The woodlands of the NCA, many of which are ancient are an important resource.

The landscape through time

The geology of the North Downs is the result of erosion and deposition over millions of years. It is dominated by the Cretaceous Chalk which was laid down on the floor of a tropical sea that covered much of Europe (from about 98 to 65 million years ago). The Chalk is a rich source of marine fossils which provide evidence for an understanding of the Cretaceous environment and link Chalk sequences across Britain and the rest of Europe. The Alpine mountain building phase (starting about 50 million years ago) raised and folded the chalk, creating the distinctive anticline of the Weald; the northward-dipping North Downs chalk escarpment today forms the northern edge of this Wealden anticline.

Dover Castle at the eastern end of the NCA with unimproved chalk grassland in the foreground.

Over the last 2 million years the landscape of Northern Europe has been affected by the advance and retreat of ice (known as the ice ages). The North Downs was never covered by ice, but its landscape was affected by extreme tundra-like conditions during the cold phases of the Quaternary Period. This has left a network of dry valleys dissecting the chalk escarpment, valley floors filled with sediments (known as coombe rock) gradually transported down slope and river terrace gravels and sands reflecting the changing course and evolution of the river system draining into the Thames and the Weald.

The landscape of the North Downs bears testament to a deeply rooted interaction of people with the area's soils, topography and terrain, all of which have presented greater challenges to arable farming than the other downland areas of southern England. Large areas of clay-with-flints supported woodland areas. Consequently, a smaller proportion of the higher downs were converted to arable than in most other downland areas – except in the richer East Kent Downs. In contrast to other chalk downland areas, extensive sheepwalks are also a comparatively rare feature of the North Downs, due to the clay and woods, and tend to occur in smaller pockets on the edge of the scarp and the scarp face.

Early occupation of the downland region was concentrated in the river valleys and footslope of the escarpment where soils are more fertile and easily worked. Evidence of early occupation includes megaliths on the lower scarp in western Kent and Roman sites along the Darent. Origins of the modern-day settlement pattern of villages, hamlets and associated field patterns can be traced to the Anglo-Saxon period when more extensive irregular, piecemeal clearance of woodland took place as population levels gradually increased. Much of the distinctive road pattern and ancient routes of the downs date from this time. The downland region provided areas of temporary summer

pasture for Anglo-Saxon estates aligned across the downs and extending into the Weald. As settlements developed, many of these pastures came to be used as areas of rough grazing, shared by surrounding settlements in the form of commons and 'minnis'. Often situated on the clay and acidic soils of the higher plateau of the downs, these areas supported trees, shrubs and plants characteristic of heathland such as gorse and bracken. Piecemeal enclosure and succession to woodland have reduced this once widespread habitat to just a few sites. Stelling Minnis Common in the east Kent Downs remains as one of the few surviving areas.

The medieval period witnessed large areas of pasture and woodland converted to arable, as population increased further and marginal areas were exploited. The agricultural revolution in the 18th and 19th centuries resulted in widespread cultivation of lower slopes for arable crops and horticultural production. This continued during the Second World War and, as arable farming increased, so the areas of unimproved chalk downland decreased, either directly lost to the plough or gradually scrubbed over as livestock numbers declined. Evolution of the landscape in broader terms has been characterised by these successive cycles of reclamation and abandonment of woodland, pasture and arable as population and agricultural pressures have ebbed and flowed over the centuries. In the last 50 years, market conditions have resulted in the dramatic reduction in the area of orchards in the Kent part of the NCA and also a decline in hop production. These land uses now remain only in isolated patches.

Woodland has always been a dominant feature of the landscape and woodland products have been used through the centuries for building materials and fuel. The composition of many traditional coppice woodlands has been modified over time to include species such as sweet chestnut and, more recently, conifers. As markets for local woodland products decreased, so too did woodland management and many areas have been neglected. The great storm of 1987 caused damage to the area's woodland resource, particularly on the exposed scarp. Today, the woodlands of the NCA are again starting to be managed for both biomass and timber products but there is still much potential to be realised, depending on market conditions.

Chalk has been dug out of the downs for at least 2,000 years, principally to 'sweeten' clay lands, making them easier to plough. For centuries chalk was dug locally from small quarries, pits and shafts (deneholes) scattered throughout the downland countryside. As chalk and lime came to be replaced by widely available fertiliser and lime products, the use of chalk pits rapidly declined. Today the hundreds of long-abandoned chalk pits, while overgrown and often hidden from view, remain a widespread feature of the landscape. The Industrial Revolution witnessed rapid expansion in 'industrial' chalk quarrying, mainly for cement and related materials. This scale of chalk quarrying in the Medway Gap has left a more lasting impact on the landscape, as has the Kent coalfield, a concealed coalfield at the eastern end of the NCA, which operated during a short but important period of coal mining, with the last collieries closing in the mid-1980s.

The close proximity to mainland Europe of the bastion-like cliffs results in the coastline having a defensive nature, both physically and perceptually. This is most dramatically in evidence at Dover Castle with its fortifications and the Second World War anti-invasion defences and radar sites around it. Traditional parklands are also a feature, the wooded landscape providing the perfect setting for parkland, from functional and productive medieval parks to the designed parklands of the 18th and 19th centuries. The North Downs Way, following ancient paths along the ridge, is today a popular National Trail. It

follows part of the Pilgrims' Way, thought to be an important iron-age trading route. There is a widely held belief that this route was used by pilgrims travelling from Winchester to Canterbury Cathedral to pray at the shrine of Thomas Becket.

At the coast, following a major landslip in 1915, the frontage of Folkestone Warren was protected by a complex of coastal defences. More recent infrastructure and housing developments have also led to protection at St Margaret's Bay and Dover, in contrast to much of the unprotected cliffs. In 1997, Samphire Hoe, comprising 30 ha of new land, was completed at the base of Shakespeare Cliff using the spoil from the Channel Tunnel works.

The scenic beauty and special qualities of the North Downs landscape were recognised with the Surrey Hills AONB designation in 1958 and the Kent Downs AONB designation which followed in 1968.

Recent decades have witnessed mixed fortunes for different aspects of the NCA's character. Research has suggested that between 1990 and 1998, while changes in woodlands and semi-natural habitats were largely consistent with its character, changes in settlement that were inconsistent were shown to be more widespread. This is likely to reflect its close proximity to London, to the M25 and M20 corridors and to major towns where associated development pressure is high and has had an influence on the NCA. This is particularly notable in Surrey and the West Kent Downs.

Ecosystem services

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

Provisioning services (food, fibre and water supply)

- **Food provision**: The NCA is a significant producer of beef, lamb, wheat and oilseed and also retains over 1,000 ha under fruit; the majority of orchard crops are now grown from dwarf varieties rather than traditional standard trees. More recently, there has been an increase in novel crops, for example viticulture.

- **Timber provision**: The existing resource provides good opportunities for timber production with over 25,000 ha of woodlands covering 19 per cent of the NCA. A significant unused or underutilised resource is the large areas of sweet chestnut coppice in the Kent part of this NCA.

- **Biomass energy**: A very considerable potential biomass resource resides in the area covered by woodlands that are largely unmanaged and could be brought back under management. This includes the areas of derelict sweet chestnut coppice and areas of ancient woodland that were traditionally managed under a coppice regime.

- **Water availability**: The chalk bedrock is a principal aquifer. In Kent, 73 per cent of public water is taken from groundwater, although this figure is likely to be even higher for the North Downs area, most notably from the chalk aquifer underlying this NCA[4]. All of this aquifer is already considered to be of poor quantitative status[5]. The abstraction pressure on water supplies is considered by the Environment Agency to pose a risk to seasonal low river flows in much of the area, including the Darent and Middle Stour. Due to the underlying geology the area is cut by relatively few rivers (the Great Stour in the east, Medway and Darent in the centre and Mole and Wey in the west). Watercourses also flow seasonally as winterbournes.

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

- **Climate regulation**: The woodlands and soils of the NCA are important stores of atmospheric carbon, as to a limited extent are the valley wetlands and areas of remnant heath[6]. The woodland resource is particularly important for climate regulation in terms of adaptation and mitigation. Given the extent of arable farming, low carbon arable production could also be important throughout the NCA.

- **Regulating soil erosion**: The majority of soils within the area are shallow chalky or deeper loamy soils prone to erosion, particularly on the steeper slopes. Given the extent of cultivated land, this is an important service, having knock-on effects; for example, soil erosion from slopes within river catchments contributes to deterioration in the water quality of the area's rivers, including the Defra priority catchment of the Great Stour.

- **Regulating water quality**: In the Water Framework Directive's first river basin management plan classification, most of the stretches of the rivers which fall within the NCA are considered to be of moderate ecological status and potential. The Great Stour, a Defra priority catchment, is of poor ecological status. The chemical status of rivers is variable, with the Medway and Wey both failing on chemical quality but the Stour, Mole and Darent achieving good chemical status[7]. At both the eastern and western ends and in the central portion, the groundwater quality is classified as poor. However, between Westhumble and Biggin Hill and between Bredhurst and Challock, groundwater quality is classified as good. There is potential to improve both the surface and groundwater status of the NCA.

- **Regulating water flow**: Flooding is a localised issue along stretches of the NCA's rivers, in particular the River Medway in the east, with recent flooding affecting both Maidstone and Chatham[8] (through a combination of surface water, fluvial and tidal flooding), and the River Wey in the west, with a history of significant flooding affecting Guildford[9]. Flooding of the Stour affects Canterbury to the north of the NCA. Potential exists to increase the storage of water along the flood plain of the Stour within the NCA itself to help to alleviate downstream flooding as well as to enhance the important wetland environment. This also applies along the Darent, while flooding on the River Mole can be alleviated by maintaining the existing capacity of the river and flood plain[10].

[4] *The State of Water in Kent,* Environment Agency (2012) [5] Annex A, Current State of Waters, Thames and South East River Basin Management Plans [6] Carbon storage by habitat: Review of the evidence of the impacts of management decisions and condition of carbon stores and sources, Natural England (2012) [7] Annex A, Current State of Waters, Thames and South East River Basin Management Plans [8] Medway Strategic Flood Risk Assessment, Medway Council (2006) [9] Environment Agency Flood Risk Map [10] Stour, North Kent Rivers and Thames Catchment Flood Management Plans, Environment Agency (December 2009)

- **Regulating coastal flooding and erosion**: The coastline between Folkestone and Deal is relatively high and as a result inundation is not a significant issue, but more relevant are coastal erosion and rate of erosion, which could lead to the loss of cliff-top habitats. The Shoreline Management Plans have proposed policies of 'No Active Intervention' where possible to allow for natural regeneration of the cliffs and thus maintenance of the geological and wildlife interest. Maintenance of existing flood defences is identified around areas of important development, such as Dover's Channel Tunnel infrastructure and Deal in the north[11].

Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration**: The North Downs have been a source of inspiration throughout the centuries. The dramatic landscape which terminates at the famous White Cliffs of Dover is much cherished and the two AONB designations and the Heritage Coastline are a testament to the natural beauty afforded by this predominantly chalk landscape. The NCA has inspired the life and work of various famous individuals including Charles Darwin, Winston Churchill, Samuel Palmer, Henry Moore and Jane Austen. The image and perception of the White Cliffs of Dover make them an iconic feature and they have close associations with our military history, representing strength and defence. It is not only the more obvious dramatic features of the scarp and cliffs that provide a sense of place, but also the intricate mosaic of habitats, sunken lanes and droves, parklands and other historic features and buildings which overlay the underlying geology, together making this NCA both unique and inspiring.

- **Sense of history**: The NCA has a strong sense of history from Neolithic monuments, bronze-age barrows, iron-age hill forts, Roman villas and towns, ancient routeways, medieval villages, and post-medieval stately homes with their associated parks and gardens. Historic defence structures span from Norman times to the 20th century and today the White Cliffs of Dover and Dover Castle are still perceived to have strong associations with military history. Equally, the geology of the chalk cliffs provides a sense of the Earth's history – the laying down of the bedrock and the movement of land masses.

- **Tranquillity:** The landscape is highly developed along its boundaries and therefore can lack a sense of remoteness, but the areas of extensive woodland cover and farmland offer tranquillity and calm even where development is present. According to the Campaign to Protect Rural England Intrusion Map (2007), 11 per cent of this NCA is developed, 60 per cent disturbed and 29 per cent undisturbed.

- **Recreation**: The landscape offers significant opportunities for leisure and recreation with good access for walking and gentle heights and upland areas. It is traversed by both the North Downs Way National Trail, largely following the chalk scarp, and the Pilgrims' Way long-distance route. This is supported by a relatively dense rights of way network, particularly within the two AONB, as well as more than 3,500 ha of open access land, accessible parkland, country parks and National Nature Reserves. This is of particular importance given the proximity of the North Downs to large centres of population. These recreational opportunities offer benefits to physical and mental health and to local economies.

[11] Shoreline Management Plans, Isle of Grain to South Foreland and South Foreland to Beachy Head)

- **Biodiversity**: The NCA includes a range of priority habitats including lowland mixed deciduous woodland, lowland calcareous grassland, lowland beech and yew woodland, and lowland heathland. Much of the woodland is ancient. These provide a genetic resource, comprising nine SAC covering over 1,500 ha, with a significant proportion relating to calcareous grassland, and 51 Sites of Special Scientific Interest, covering over 5000 ha. The NCA is renowned as the home of some of the richest chalk grassland plant communities within the British Isles; the influence of a continental climate provides the conditions for a range of flora and fauna on the edge of the northern and western ranges, including the lady orchid and late spider orchid, which have their stronghold in this NCA.

- **Geodiversity**: The White Cliffs of Dover are one of England's most distinctive landmarks and an area of international importance. The Chalk exposed along this coast is critical to our understanding of Chalk sequences across Europe and understanding the landslips at Folkestone Warren helps us understand how similar landslips work around the world. Inland the mix of disused chalk quarries and pits provide critical evidence of our geological past. Many are now identified as geological SSSI and Local Geological Sites, for example Britain's most prolific source of Chalk (Upper Cretaceous) marine vertebrates including fish, turtles, marine lizards, pliosaurs and plesiosaurs come from chalk pits near Bulham. Similarly, the network of dry valleys and features such as the Devil's Kneading Trough and their associated sediments are critical in interpreting the more recent environmental changes of the Quaternary Period.

The White Cliffs of Dover - an internationally important stretch of coastline.

Statements of Environmental Opportunity

SEO 1: Manage, conserve and enhance the distinctive rural character and historic environment of the North Downs, including the long-established settlement pattern, ancient routeways and traditional buildings. Protect the tranquillity of the landscape and sensitively manage, promote and celebrate the area's rich cultural and natural heritage, famous landmarks and views for future generations.

For example, by:

- Conserving the downland settlement pattern of nucleated villages, irregular fields and scattered farmsteads linked by a network of narrow, winding lanes and characteristic sunken 'hollow ways' through appropriate planning policies and development management, and in particular promotion of Kent Downs and Surrey Hills Area of Outstanding Natural Beauty (AONB) design guides.
- Protecting from damage the rich and varied heritage of historic buildings, settlements and sites dating from the prehistoric period onwards, including iron-age hill forts, defensive coastline installations and traditional farmsteads, and improving management, access to and sensitive interpretation of historic features.
- Improving management of historic parklands and any associated key habitats such as ancient and veteran trees, ancient woodland and species-rich grassland. Works such as successional planting, coppicing or reversion of arable back to grassland should be prioritised and informed by assessment of the historic design and significance of parkland.

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The NCA has a number of heritage assets including the megalithic remains at Kit's Coty as shown here.

SEO 1: Manage, conserve and enhance the distinctive rural character and historic environment of the North Downs, including the long-established settlement pattern, ancient routeways and traditional buildings. Protect the tranquillity of the landscape and sensitively manage, promote and celebrate the area's rich cultural and natural heritage, famous landmarks and views for future generations.

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- Conserving and appropriately managing ancient trackways such as the North Downs Way National Trail which links Dover and Guildford, and the Pilgrims' Way which links Canterbury and Winchester; and working across sectors to promote and strengthen the network through high-quality interconnecting routes, increasing the benefits of these routes for biodiversity, health and local businesses.
- Using AONB design guidance and understanding of the area's traditional and historic architecture, and its distinct local materials (flint, chalk, brick, timber and tiles) and patterns of settlement, to inform appropriate conservation and use of historic buildings, and to plan for and inspire any new development which makes a positive contribution to local character.
- Seeking opportunities to minimise the impact of new developments, including visual intrusion, disturbance and noise, on the tranquillity and beauty of the countryside. Green infrastructure planning should be maximised for its multiple benefits and best practice should be shared locally.
- Working in partnership with Kent Downs and Surrey Hills Areas of Outstanding Natural Beauty to identify management opportunities in accordance with their respective management plans[12].
- Seeking to increase awareness and maximising the potential of the various historic, natural and cultural assets, improving access to and interpretation of sites and features, including the world-renowned White Cliffs of Dover, as a platform for enhanced education and to enthuse local communities, linking them with their local geology, wildlife and cultural and historic environments. At the same time there is a need to recognise and manage the impact of increased visitor numbers on sensitive sites.

[12] *Surrey Hills Area of Outstanding Natural Beauty Management Plan 2009–2014*, Surrey Hills Board (2009); *Kent Downs Area of Outstanding Natural Beauty Management Plan 2009–2014*, Kent Downs AONB Unit (2009)

SEO 2: Protect, enhance and restore active management to the diverse range of woodlands and trees of the North Downs, for their internationally and nationally important habitats and species, cultural heritage and recreational value and to help to deliver climate change mitigation and adaptation. Seek opportunities to establish local markets for timber and biomass to support the active management of local woods, while recognising the contribution to sense of place, sense of history and tranquillity.

For example, by:

- Supporting the sustainable re-establishment of coppice management to appropriate areas of woodland, where this will improve biodiversity interest while providing a local resource including wood fuel.
- Seeking to work in partnership to aid co-ordinated conservation management, particularly where there are woodlots. Managing all woodlands as single entities aimed at benefiting the whole wood, its biodiversity, its contribution to landscape character, and the provision of community and other benefits where appropriate.
- Supporting existing markets and encouraging new markets for the products of native woodland underwood and timber. This will provide the market driver to encourage and maintain viable and sustainable woodland management.
- Encouraging the positive management of open habitats and spaces, such as rides and glades, for their landscape, biodiversity and cultural benefits, especially where they will support rare species, such as Duke of Burgundy fritillary. Maintaining an appropriate balance of well-structured woodland and transitional and open habitats will produce a mixed structure of tree species and stand age, benefiting biodiversity.
- Working to increase public understanding and appreciation of the importance of woodlands, including the impacts of harmful activities and inappropriate management. Utilising the woodland resource for education, appropriate recreation and research, furthering our understanding of the role of woodlands in a changing climate.
- Ensuring that the North Downs Woodland and Mole Gap to Reigate Escarpment Special Areas of Conservation attain and retain favourable conservation status as an element of the Natura 2000 network. Also, ensuring that the woodland Sites of Special Scientific Interest are in favourable condition and that local sites are in positive management.
- Protecting and expanding the existing urban tree resource, recognising its multiple benefits, including its role in climate change mitigation.
- Targeting the expansion and re-linking of existing semi-natural woodland, benefiting biodiversity and landscape, where it can re-connect isolated woodland blocks and help to prevent soil erosion and nutrient run-off (where this does not result in loss of existing important habitats such as chalk grassland). Taking into account future climate change, looking to enhance the coherence and resilience of woodlands, hedgerows, trees and other habitats to create robust networks of woody and open semi-natural habitats.
- Creating new areas of broadleaved woodland, where it accords with the landscape character of the area, helping to maintain tranquillity while providing a local recreational resource and further source of wood fuel and high-quality timber products.
- Encouraging conservation management of game woodlands as promoted by the British Association for Shooting and Conservation and sharing best practice locally, as shown in the Kent Downs AONB game management guidance.

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SEO 2: Protect, enhance and restore active management to the diverse range of woodlands and trees of the North Downs, for their internationally and nationally important habitats and species, cultural heritage and recreational value and to help to deliver climate change mitigation and adaptation. Seek opportunities to establish local markets for timber and biomass to support the active management of local woods, while recognising the contribution to sense of place, sense of history and tranquillity.

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- Recognising and managing the risks of tree diseases and woodland pests, taking co-ordinated conservation action to safeguard the woodland resource, and considering the close vicinity to the continent from where diseases can spread.
- Conserving ancient and veteran trees within the landscape for the benefit of species that depend upon them, and for their heritage value and contribution to a sense of place. Planning and implementing a programme to develop the next generation of hedgerow trees and future veterans, choosing appropriate species and taking into account their resilience to climate change.
- Ensuring that populations of deer are managed to reduce the damage caused to the natural regeneration of woodland (and woodland flora). High populations will have major impacts on ancient woodland flora and coppice management.

Wood chipping in action. The woodland resource provides an excellent opportunity for biomass energy in the form of wood chip.

SEO 3: Manage and enhance the productive mixed farming landscape of the North Downs and the mosaic of semi-natural habitats including the internationally important chalk grassland. Promote sustainable agricultural practices to benefit soils, water resources, climate regulation, biodiversity, geodiversity and landscape character while maintaining food provision.

For example, by:

- Working with farmers, land managers and communities to positively shape the agricultural landscape while preserving and enhancing ecological and cultural assets.
- Restoring and strengthening the mosaic of connecting landscape and habitat features including the patchwork of smaller downland banks, hedgerows, unimproved hay meadows, pockets of heath and acid grassland, flower-rich roadside verges and uncultivated field corners, field margins and woodlands.
- Managing and restoring existing chalk grassland habitats. Seeking to integrate chalk grassland management into the farming business to allow for extensive grazing, promoting initiatives which allow for the sustainable management of chalk grassland and help to secure best practice management of this internationally important habitat type.
- Working with landowners to seek opportunities for arable reversion to chalk grassland in locations with the highest potential for the re-creation of this habitat and in areas where it will bring the greatest benefits. Considering arable reversion to chalk grassland where it will bring particular benefits for aquifer recharge and to assist in water quality regulation, looking for locations that maximise these benefits along with benefits for biodiversity and the landscape.
- Conserving and appropriately managing associated chalk habitats that include rare chalk scrub and heath and calcareous flushes at the foot of the scarp, strengthening the overall mosaic of chalk downland habitats and benefiting their dependent species.
- Working in partnership to enable the restoration of chalk grassland at a landscape scale, seeking to secure grazing where required on difficult sites, identifying and linking green hay donor and recipient sites and piloting restoration techniques. Supporting research to increase our understanding of chalk grassland habitats and species and to advance our knowledge of what is needed to create coherent and resilient ecological networks within the chalk landscape and the multiple benefits this may provide, including enhancement of landscape character.
- Restoring and planting new hedgerows to reinforce historic field boundary patterns, especially where they: run across slopes to provide a buffer to soil erosion and nutrient run-off (important in the Great Stour Priority Catchment); follow parish boundaries or long-established rights of way (especially historic drove ways) or otherwise support the distinctive character of the landscape; and provide a link between isolated habitats.
- Creating wide grassland buffer strips across steeper slopes and alongside hedgerows, rivers and other watercourses, particularly in areas of arable farmland, to help to prevent soil erosion and nutrient run-off and to enhance the habitat network.

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SEO 3: Manage and enhance the productive mixed farming landscape of the North Downs and the mosaic of semi-natural habitats including the internationally important chalk grassland. Promote sustainable agricultural practices to benefit soils, water resources, climate regulation, biodiversity, geodiversity and landscape character while maintaining food provision.

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- Working with landowners to integrate arable habitats into the farming system. Encouraging the uptake of measures such as conservation headlands, low-input cereals and grassland buffer strips to optimise the multiple benefits for biodiversity, water, soil regulation and pollination services while conserving, enhancing and expanding the range of arable wild flowers. In particular, maximising opportunities for providing high-quality nesting and feeding habitat for farmland birds such as corn bunting and grey partridge.
- Conserving and enhancing traditional orchards of the National Character Area (NCA), seeking new markets for their products and exploring potential for community orchards.
- Working with landowners to integrate any new and novel crops into the NCA as a result of market or climatic drivers, promoting sustainable management and integrating the crops into the landscape appropriately. Seeking to monitor the impacts of changing farming practices.
- Sympathetically managing soil and water resources to ensure the long-term productivity and economic viability of agriculture and increasing the ability of agricultural systems to withstand extreme weather and adapt to and mitigate climate change, improving water and soil quality.
- Managing land in a way that retains the legibility of the dry valleys and associated geomorphology and seeks to retain and improve the network of geological exposures in disused pits and quarries across the area.

SEO 4: Plan to deliver integrated, well-managed multi-functional green space in existing and developing urban areas, providing social, economic and environmental benefits and reinforcing landscape character and local distinctiveness, particularly on or alongside the boundaries of the designated landscapes within the North Downs.

For example, by:

- Creating high-quality, well-managed accessible natural green space within and surrounding urban areas as part of comprehensive green infrastructure planning, providing significant local recreational opportunities that meet the Accessible Natural Greenspace Standard (ANGSt) while benefiting health and wellbeing and providing habitats and green space linkages, increasing the permeability of the urban landscape to biodiversity and building on existing networks.
- Improving water quality by careful design to address the potential issues of pollution and contamination by run-off and leakage through water pathways. Creating new wetlands as part of sustainable drainage systems, helping to provide flood alleviation. In addition, creating extensive reedbeds where potentially polluted waters enter these wetlands to filter out pollutants and provide benefits for water quality.
- Promoting the use of London's existing frameworks to inform the design of new landscapes associated with new development and green infrastructure within Greater London, including implementation of the All London Green Grid.
- Maintaining the existing downland character as a setting for new development (where allocated and approved), ensuring that this does not impact adversely on the special qualities of the designated landscapes, conserving the tranquillity and geodiversity of the area through planning and sympathetic design, in particular minimising light spill and traffic noise to retain the 'undisturbed' feel of parts of the NCA and enhancing local landscape character.
- Promoting the use of sustainable and locally sourced materials, vernacular building techniques and styles, and existing landscape character to inform design and ensure integration with the surrounding landscape.
- Targeted planting of woodland and trees surrounding existing and new development and major transport corridors where appropriate within the existing context, helping to provide climate change adaptation and mitigation, flood alleviation, landscape character and biodiversity benefits.
- Identifying opportunities for community involvement in projects through design and implementation to foster ownership, involvement and support of local communities and to help to create environments which improve the lives, livelihoods and health of local people and communities.
- Planning schemes which connect to or incorporate an existing or planned low carbon transport network, such as walking and cycling routes.
- Developing a strategic approach to green infrastructure across the NCA and its boundaries to take account of the existing urban areas and proximity of the NCA to areas of growth, planning a network of green spaces in the urban and urban fringe areas and adjacent countryside.

Additional opportunities

1. Conserve and enhance important geological sites and exposures of international importance, inland and along the coastline, including the White Cliffs of Dover, in order to maintain and enhance their geodiversity and biodiversity interest, cultural significance and sense of place.

For example, by:

- Protecting, conserving and enhancing important inland geological exposures, for their geological, cultural and biological interest. In particular, raising awareness of the geological, ecological and cultural interest within the rich heritage of abandoned chalk pits and quarries throughout the area, providing links to the area's cultural history.
- Planning for and managing the effects of coastal change, by allowing the operation of natural coastal processes and improving the sustainability of current management practices, allowing for maintenance of the geological interest of the highly distinctive chalk cliff coastline. This will benefit the maritime cliff-ledge plant communities and breeding bird colonies, while maintaining the dramatic landscape which provides a powerful sense of place.
- Promoting continued research into coastal geology, helping to inform future decision making.
- Maximising the opportunities presented by the geodiversity of the NCA for education, research and tourism, in particular seeking to use the assets to engage with local communities. The geological features are an international scientific resource and can help people to appreciate the evolution of the landscape, its habitats and wildlife. Awareness of this value should be promoted, including the interrelationships between geology, wildlife and human activity, with improved access and interpretation where appropriate to inspire and enthuse.

Additional opportunities continued

2. Protect the important water resources of the NCA, including the North Downs chalk aquifer, rivers and associated wetlands, to safeguard the quality and quantity of public, private and agricultural water supplies and to bring about benefits for biodiversity, water quality and regulation of flooding.

For example, by:

- Protecting the chalk aquifer by promoting good agricultural and land management practices, helping to bring improvements to groundwater quality. Further, promoting sustainable use of water resources across sectors, protecting the aquifer from over-abstraction and safeguarding the water supply which is derived from the aquifer.
- Adopting a landscape-scale approach and working at the catchment scale to safeguard the surface water resources of the NCA, especially those failing to meet Water Framework Directive objectives for good ecological status. Working in partnership across sectors and NCA boundaries to tackle the challenges associated with flood risk, pollution and low flows.
- Managing, restoring and expanding the wetland habitats of the valley floors of the rivers Mole, Darent, Medway and Great Stour. Affording priority to flood meadows, flood plain grazing marsh, fen and reedbeds, and intertidal mudflats such as on the River Medway, and optimising opportunities for restoring natural river geomorphology where this is of particular benefit to biodiversity but is designed to meet the challenges of low flow conditions, and bringing rivers back into continuity with their flood plains to help to sustain these habitats for the benefit of biodiversity and the alleviation of downstream flooding.
- Identifying opportunities for research that improves our understanding of how to respond to and plan for climate change impacts and future consumer demands, and the interrelationships between supply and demand in adjoining NCAs, including the impacts of water availability on key biodiversity sites.
- Drawing on best practice principles such as those established under catchment sensitive farming and building on and supporting existing stakeholder groups to help to deliver a good water environment across the North Downs, benefiting biodiversity and local communities.
- Improving linear and car-free access along river corridors where appropriate, increasing opportunities for enhanced access, recreation and community engagement.

Supporting document 1: Key facts and data

Area of North Downs National Character Area (NCA): 137,447 ha

1. Landscape and nature conservation designations

Two Areas of Outstanding Natural Beauty fall within the NCA covering 57 per cent of the area: the Kent Downs AONB (66,944 ha) and the Surrey Hills AONB (11,361 ha). Small areas of the coastline, less than 1 per cent, fall under Heritage Coast designation – South Foreland (558 ha) and Dover-Folkestone (267 ha).

- Management plans for the protected landscapes can be found at:
  http://www.kentdowns.org.uk/
  http://www.surreyhills.org/

Source: Natural England (2011)

1.1 Designated nature conservation sites

The NCA includes the following statutory nature conservation designations:

Tier	Designation	Name	Area (ha)	% of NCA
International	Ramsar	Thanet Coast & Sandwich Bay	<1	<1
European	Special Protection Area (SPA)	n/a	0	0
European	Special Area of Conservation (SAC)	Mole Gap to Reigate Escarpment SAC; North Downs Woodlands SAC; Folkestone to Etchinghill Escarpment SAC; Dover to Kingsdown Cliffs SAC; Wye and Crundale Downs SAC; Lydden & Temple Ewell Downs SAC; Peters Pit SAC; Queendown Warren SAC	1,596	1
National	National Nature Reserve (NNR)	Wye NNR, Lydden Temple Ewell NNR	189	<1
	Site of Special Scientific Interest (SSSI)	A total of 51 sites wholly or partly within the NCA	5,206	4

Source: Natural England (2011)

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

There are 345 local sites in the North Downs covering 14,249 ha, which is 10 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/website/magic/ – select 'Rural Designations Statutory'

1.1.1 Condition of designated sites

SSSI Condition Category	Area (ha)	Percentage of NCA SSSI Resource
Unfavourable declining	25	<1
Favourable	2,761	53
Unfavourable no change	128	3
Unfavourable recovering	2,249	43

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 0 m to a maximum of 268 m on the chalk escarpment in Surrey. The White Cliffs of Dover at their highest point reach 150 m above sea level.

Source: Natural England 2011, North Downs Natural Area Profile, Countryside Character Area description

2.2 Landform and process

The backbone of the Downs is a distinctive ridge with a steep south-facing scarp and northern dip slope. The ridge is cut by numerous dry valleys, some containing winterbournes. The Downs end abruptly in the east at the distinctive landmark of the White Cliffs. During the ice ages although not glaciated the area was under the influence of very cold tundra-like conditions at the edge of the ice sheets. Processes of erosion and deposition during this period have contributed significantly to the formation of the present landscape.

Source: North Downs Natural Area Profile, North Downs Countryside Character Area Description British Geological Survey map

2.3 Bedrock geology

The North 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 North Downs is dominated by tilted layers of Upper Cretaceous Chalk containing bands and seams of flint nodules. The Chalk dips to the north with the consequence that increasingly younger rocks are exposed in this direction. This Chalk makes up 94 per cent of the NCA area – the remainder is composed of small areas of Palaeogene sediments including shallow marine sands from the Thanet Sand Formation

and sands, silts and clays – deposited on a coastal plain or under shallow marine conditions – of the Lambeth Group. Some of Britain's youngest Tertiary (Pliocene) sediments – the Lenham Beds – are found in chalk solution pipes exposed in Lenham and Hart Hill quarries.

Source: North Downs Natural Area Profile, North Downs Countryside Character Area Description, British Geological Survey maps

2.4 Superficial deposits

The upper part of the dip slope is capped with extensive drift deposits of clay-with-flints. Deposits of Coombe Rock, derived from periglacial weathering are found at the foot of the downs. There are also some river terrace deposits.

Source: North Downs Natural Area Profile, North Downs Countryside Character Area Description, British Geological Survey maps

2.5 Designated geological sites

Tier	Designation	Number
National	Geological Site of Special Scientific Interest (SSSI)	5
National	Mixed Interest SSSIs	9
Local	Local Geological Sites	22

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

Shallow lime rich soils over chalk and deeper freely-draining loams where windblown deposits have particularly influenced soil development, cover nearly two thirds of the NCA. Slightly acid loamy and clayey soils with impeded drainage typically associated with clay-with-flints cover about a third; the remaining soils are deep freely draining loamy drifts over chalk and slowly permeable, seasonally wet soils developed over clays. The shallowest chalk soils, typically on the escarpment, at its base and in the dry valleys, support areas of high quality unimproved chalk grassland and arable farming with rare arable weeds. Clay-with-flint soils on the upper parts of the dip slope supports oak/ash woodland and scrub with beech, ash and maple common on the valley sides, such as Box Hill. Occasional small pockets of acidic sandy soils on the Downs in Surrey give rise to heathland and chalk heath.

Source: North Downs Countryside Character Area Description, North 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):

Grade	Area (ha)	% of NCA
Grade 1	4,263	3
Grade 2	22,774	17
Grade 3	75,805	55
Grade 4	7,333	5
Grade 5	158	<1
Non-agricultural	13,649	10
Urban	12,957	9

Source: Natural England (2010)

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

3. Key water bodies and catchments

3.1 Major rivers/canals

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

- Darent 13 km
- Great Stour 11 km
- River Mole 8 km
- River Wey 2 km
- Little Stour 1 km

Source: Natural England (2010)

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

The Tidal Medway also cuts through the scarp. The dip slope is incised by a number of dry valleys some contain streams which occasionally flow, depending on the level of the chalk aquifer.

3.2 Water quality

The total area of Nitrate Vulnerable Zone is 73,909 ha, 54 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 25,808 ha of woodlands over 2 ha, 19 per cent of the total area, of which 12,695 ha is ancient woodland.

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

4.2 Distribution and size of woodland and trees in the landscape

Woodland is a dominant feature of the landscape and is found primarily on the steeper slopes of the scarp, valley sides and areas of the dip slope capped with clay-with-flints. Nearly half of the woodland is ancient and many are designated for their biodiversity value. There are extensive areas of yew with box woodland on parts of the scarp in Surrey. The NCA also has large areas of replanted woodland with sweet chestnut or conifers. Well-wooded hedgerows, shaws and individual trees, including many ancient and veteran trees, are important components of the landscape and contribute to the strongly wooded character.

Source: North Downs Natural Area Profile, North Downs Countryside Character Area Description, Countryside Quality Counts

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)	% of NCA
Broadleaved	21,933	16
Coniferous	2,410	2
Mixed	347	<1
Other	1,118	1

Source: Forestry Commission (2011)

Area and proportion of ancient woodland and planted ancient woodland within the NCA.

Type	Area (ha)	% of NCA
Ancient semi-natural woodland	9,352	7
Planted Ancient Woodland (PAWS)	3,343	2

Source: Natural England (2004)

5. Boundary features and patterns

5.1 Boundary features

Hedgerows, often well wooded and as wider woodland shaws, are the main boundary types. The estimated boundary length is 8,613 km. As of March 2011 a total of 864 km were under an Environmental Stewardship hedgerow boundary option.

Source: Natural England 2011 Countryside Character Area description; Countryside Quality Counts (2003)

5.2 Field patterns

Much of the area is characterised by small irregular fields. This pattern reflects a gradual and piecemeal clearance of woodland (assarting) over a long period of time. Early enclosure of fields and land was driven by the Kentish custom of 'Gavelkind' where land was divided between all brothers and sisters leading to a fragmented and partitioned field pattern. Evidence of parliamentary type late enclosure is limited to a few areas of the NCA which encompass flatter and more easily worked terrain such as in east Kent where the chalk dip slope extends across the gently undulating landscape north of Dover.

Source: Draft historic profile, 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

Fifty-three per cent of the character area is in agricultural use, with a total farmed area of 73,038 ha, comprising a total of 976 holdings. All figures below relate to 2009 unless otherwise stated. The landscape's mixed farming character is supported by figures on farm type: there are 237 grazing livestock farms (24 per cent), 210 cereal farms (22 per cent) and 106 horticultural holdings (11 per cent). Farms classified as 'other' (likely to be smallholdings) total 295, or 30 per cent of total agricultural holdings.

Source: Agricultural Census, Defra (2010)

6.2 Farm size

Farms sized between 5 ha and 20 ha are the most numerous (348), although they make up just 5 per cent of the total farmed area. Those over 100ha (203) make up 76 per cent of the farmed area. Between 2000 and 2009 there was a decrease across all categories of farm size except for those sized between 5 ha and 20 ha, which increased slightly by 10 holdings. The largest farms decreased the most, with those between 50 ha and 100 ha falling by 27 holdings and those over 100 ha falling by 19.

Source: Agricultural Census, Defra (2010)

6.3 Farm ownership

2009: Total farm area = 73,038ha owned land = 47,701 ha
2000: Total farm area = 76,868 ha owned land = 50,099 ha

Source: Agricultural Census, Defra (2010)

6.4 Land use

Grass and uncropped land, along with cereals dominate the farmed landscape of the North Downs, covering 26,409 ha (36 per cent) and 25,415 ha (35 per cent) respectively. Oilseeds cover 8,938 ha (12 per cent), while there are also areas of other arable crops (4,219 ha or 6 per cent) and fruit (1,121 ha or 2 per cent). Between 2000 and 2009, the area of grass and uncropped land declined by 3,152 ha (11 per cent), while cereals fell by 1,966 ha (7 per cent). Oilseeds by contrast increased by 2,076 ha (30 per cent), while most other land uses declined, including fruit which fell by 623 ha (36 per cent).

Source: Agricultural Census, Defra (2010)

6.5 Livestock numbers

In 2009 there were 20,200 cattle (22,900 in 2000), 80,000 sheep (124,500 in 2000) and 4,607 pigs (9,200 in 2000).

Source: Agricultural Census, Defra (2010)

6.6 Farm labour

In 2009 there were 1,283 principal farmers compared with 115 salaried managers, 416 full-time workers and 347 part-time workers, with 623 casual/gang workers. Between 2000 and 2009 the numbers of principal farmers and salaried managers both fell by 144 and 29 respectively. The numbers of farm workers also fell across the board, with full-time workers down by 146, part-timers down by 57 and casual/gang workers by 45.

Source: Agricultural Census, Defra (2010)

Please Note: (i) Some of the Census data is estimated by Defra so will not be accurate for every holding (ii) Data refers to Commercial Holdings only (iii) Data includes land outside of the NCA belonging to holdings whose centre point is within the NCA listed.

7. Key habitats and species

7.1 Habitat distribution/coverage

Large tracts of native and ancient semi-natural woodland, including oak-ash on the upper dip slope, beech-yew-ash-hornbeam covering the dry chalk valleys, and large areas of yew-with-box on the Surrey scarp.

Areas of species-rich unimproved chalk grassland are concentrated on steep slopes, cliffs and verges, supporting numerous scarce and rare plant and invertebrate species. There is a notable distinction between swards east and west of the Medway, with those to the east characterised by tor grass and those to the west more typically dominated by upright brome and fescue.

Maritime vegetation associated with the White Cliffs, including chalk grassland and a full zonation of maritime cliff communities found on chalk substrates, supporting many rare and scarce plant species and breeding seabird colonies.

Wetland complex in the Medway gap sustained by the tidal river, including intertidal mudflats, flood plain grazing marsh, reedbeds and flooded gravel pits. The Rivers Mole, Darent and Stour also provide important wetland habitats. The Darent and Stour are chalk rivers - a nationally important habitat type.

There are also localised patches of heathland and chalk heath on the sandy soils on top of the Downs, notably in Surrey. Localised areas of calcareous flushes are found at the foot of the escarpment.

In addition the NCA contains important arable habitats. These support nationally important assemblages of arable birds and rare arable plants.

Source: North Downs Natural Area Profile

7.2 Biodiversity Action Plan (BAP) 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

Habitat	Area (ha)	% of NCA
Broadleaved mixed and yew woodland (Broad habitat)	12,737	9
Lowland calcareous grassland	1,559	1
Maritime cliff & slope	190	<1
Coastal and flood plain grazing marsh	62	<1
Coastal vegetated shingle	53	<1
Lowland meadows	38	<1
Lowland heathland	35	<1
Lowland dry acid grassland	26	<1
Reedbeds	5	<1

Source: Natural England (2011)

Please note that there are known errors within these national datasets. For the most up to date and accurate habitat data relating to Kent please use the outputs from the ARCH (Assessing Regional Habitat Change) project: http://www.archnature.eu/

- Maps showing locations of UK BAP priority habitats are available at: http://magic.Defra.gov.uk/website/magic/ select 'Habitat Inventories'

7.3 Key species and assemblages of species

- Maps showing locations of UK BAP priority habitats are available at: http://magic.Defra.gov.uk/website/magic/
- Maps showing locations of S41 species are available at: http://data.nbn.org.uk/

8. Settlement and development patterns

8.1 Settlement pattern

Most settlement in the area is in the form of small, nucleated villages, scattered farmsteads including oasts and barns. A predominantly rural landscape punctuated by a few large settlements but with significant urban development along the boundaries of the NCA. There has been increased urban development in the western part of the area towards London.

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

8.2 Main settlements

More urban-fringe influence and modern development is associated with the land fringing Croydon, Purley and south London in the western part of the Downs, with Dorking, Redhill and Guildford located close to the boundaries of the NCA. In the east, Dover is the main settlement, but the Medway towns and the towns of Folkestone, Canterbury, Maidstone, Ashford and Sevenoaks are again within close proximity to the boundary of the NCA. The total estimated population for this NCA (derived from ONS 2001 census data) is: 588,203.

Source: North Downs Countryside Character Area description; Countryside Quality Counts (2003). Natural England (2012)

8.3 Local vernacular and building materials

Distinct local materials of flint, chalk, brick, timber and tiles are found within the NCA. Timber-framing was the traditional building form with thatch for roofing, although thatch has largely been replaced by plain clay tiles from the Weald. Wealden bricks were widely used from the later 17th century onwards, often for the corners and door / window surrounds, combined with walls of local flint.

Source: Draft historic profile, North Downs Countryside Character Area description; Countryside Quality Counts (2003)

9. Key historic sites and features

9.1 Origin of historic features

Evidence of early human activity or settlement within the area is supported by prehistoric megaliths and barrows. Drove roads and ancient routes including the Pilgrims Way cross the Downs in addition to Roman roads. This NCA has strong associations with military history and remains include Rochester, Guildford and Dover Castle (with command centre), Tudor forts, Napoleonic defences, gun emplacements and pill boxes. Historic parklands are also a feature of the area, from the functional medieval park to the designed 'English landscape' parkland of the 18th and 19th centuries.

Source: Draft Historic Profile, North Downs Countryside Character Area description

9.2 Designated historic assets

This NCA has the following historic designations:

- 28 Registered Parks and Gardens covering 2,851 ha
- 0 Registered Battlefields
- 202 Scheduled Monuments
- 4,177 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

- Three per cent of the NCA, 3,566 ha, is classified as being publically accessible.
- There are 2,872 km of public rights of way at a density of 2.1km per km^2.
- There is 1 National Trail within the NCA, the North Downs Way extending over 210 km within the NCA boundaries.

Sources: Natural England (2010)

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

Access designation	Area (ha)	% of NCA
National Trust (Accessible all year)	1,075	8
Common Land	1,903	1
Country Parks	1,227	1
CROW Access Land (Section 4 and 16)	4,824	4
CROW Section 15	3,454	3
Village Greens	94	<1
Doorstep Greens	11	<1
Forestry Commission Walkers Welcome Grants	3,806	3
Local Nature Reserves (LNRs)	589	<1
Millennium Greens	6	<1
Accessible National Nature Reserves (NNRs)	218	<1
Agri-environment Scheme Access	374	<1
Woods for People	5,865	4

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) lowest scores for tranquillity are associated with the fringes of London in the west and the bordering settlements of Chatham, Guildford, Maidstone and Reigate, along with the port of Dover in the east. Higher scores for tranquillity are found on the hinterland of the dip slope.

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

Category of tranquillity	Score
Highest value within NCA	37
Lowest value within NCA	-102
Mean value within NCA	-13

Sources: CPRE (2006)

- More information is available at the following address: http://www.cpre.org.uk/what-we-do/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 30 per cent of the area is classified as 'undisturbed'. The majority of undisturbed land is concentrated in the east of the NCA, although small patches associated with wooded areas are found south of Cobham, around Lullingstone Castle at West Kingsdown and the Downs east of Guildford. A breakdown of intrusion values for this NCA is detailed in the table below.

Category of intrusion	1960s (%)	1990s (%)	2007 (%)	% change (1960s-2007)
Disturbed	32	58	60	28
Undisturbed	61	37	29	-7
Urban	6	6	11	4

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are the significant increase in disturbed or intruded land – 28 per cent.

- More information is available at the following address: http://www.cpre.org.uk/resources/countryside/tranquil-places/item/1790-developing-an-intrusion-map-of-england?highlight=YToxOntpOjA7czo5OiJpbnRydXNpb24iO30=

The river Mole in Surrey. The rivers of the NCA are important for wildlife and recreation.

12. Data sources

- British Geological Survey (2006)
- Natural Area Profiles, Natural England (published by English Nature 1993-1998)
- Countryside Character Descriptions, Natural England (regional volumes published by Countryside Commission/Countryside Agency 1998/1999)
- Joint Character Area GIS boundaries, Natural England (data created 2001)
- National Parks and AONBs GIS boundaries, Natural England (2006)
- Heritage Coast Boundaries, Natural England (2006)
- Agricultural Census June Survey, Defra (2000,2009)
- National 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

Trees and woodlands

- Opportunities for further strengthening of woodland character were identified by the Countryside Quality Counts research (2003); in particular, extensive areas of broadleaved woodland, especially in the west, mid and east Kent Downs were identified as in need of active management, especially by rotational coppice.

- There has been an increased interest in wood fuel initiatives within the NCA and particularly in both the Kent and Surrey AONB with projects aiming to create local markets for wood fuel. These have the potential and are already helping to get unmanaged woodlands back into management with re-establishment of coppicing cycles[13]. There appears to have been an uplift in wood fuel markets. In addition, there has been resurgence in interest in other wood products such as those derived from cleft chestnut.

- Tree diseases and pests are an increasing threat to the woodlands of the NCA including the ash dieback, oak processionary moth and Phytophthora ramorum.

- While it is difficult to quantify there is a perception that deer populations have increased. This can have implications for native woodland flora and for re-establishing and maintaining coppice cycle in woodlands, due to browsing of re-growth.

Boundary features

- The total length of countryside stewardship capital agreements between 1999 and 2003 was equivalent to around 3 per cent of the total estimated NCA boundary length of 8,613 km. As of March 2011, 864 km of hedgerows were managed under environmental stewardship schemes, equivalent to 10 per cent of the total estimated NCA boundary length. It should be noted that CSS options related to restoration and creation of boundary features, whereas environmental stewardship has included maintenance options on existing hedgerows.

- Some hedgerows have developed gaps, become overgrown or been lost with corresponding impacts on local landscape character.

- Roadside boundaries are notable given the number of flower-rich roadside verges, these are a particular feature in the NCA and conservation efforts have resulted in new roadside verge habitats being created and appropriately managed in the last 10 years.

[13] Kent Downs Area of Outstanding Natural Beauty, Management Plan 2009 – 2014, Surrey Hills Area of Outstanding Natural Beauty, Management Plan, 2009- 2014

Agriculture

- The landscape's mixed farming character is supported by figures on farm type from recent agricultural data which shows a mix of livestock, cereals and horticultural holdings. Between 2000 and 2009 there were reductions in the area of land recorded under fruit, cash roots, stock feed, vegetables and grass and uncropped land but with increases in oilseeds and other arable crops. There was also a corresponding reduction in the numbers of livestock recorded during this period.

- While data and evidence is currently lacking at the NCA level, it is likely that changes in horticultural production methods such as the use of polytunnels has increased, driven by market changes in the United Kingdom soft fruit sector.

- In the last 10 years there have been increased opportunities through agri-environment schemes to integrate a range of conservation measures into the farmed landscape. These have included habitats for rare arable plants, farmland bird options and management of chalk and neutral grasslands.

- Highly convenient and commutable distances to London have put pressure on land and house prices, particularly in Surrey. In some instances a move towards recreational land uses are replacing agricultural uses in parts of the NCA.

Settlement and development

- Countryside Quality Counts research assessed the changes in settlement and development between 1998 and 2003. At this time the area was considered to have a high share of the national build outside of existing urban and fringe areas. There was evidence of expansion into the peri-urban around Caterham along with more dispersed settlement along the M25 corridor, especially south of Biggin Hill, around Swanscombe and Northfleet, along the A228 south of Rochester and the A249 and around Hawkinge in the east. It was also considered that development associated with the M2 had impacted locally.

- Since 2003 development has continued to have an impact with significant new developments completed or proposed within or on the boundaries of the NCA, including at Ashford, Thames Gateway, Maidstone, Guildford, Purley, South London and Dover where major housing allocation is identified in the Whitfield urban expansion. This NCA is subject to the impacts of significant development pressures outside the NCA boundaries and within its setting.

- High Speed 1, the first high speed rail project in the UK, was fully completed in 2007 and runs through part of the NCA. The route connects London with the Channel Tunnel. Other improvements to the existing road network have also taken place, with the M20, M25 and M2 all running through the NCA at some point.

- Dover Harbour Board operates Europe's biggest roll-on roll-off ferry port for both freight and passenger traffic. There are proposals for expansion in capacity[14] .

Semi-natural habitat

- Agri-environment schemes have resulted in the enhancement and creation of semi-natural habitats. Most notable for this NCA is the maintenance, restoration and creation of species rich semi-natural grassland associated with the calcareous grassland resource. Other areas of grassland interest will have been captured under HLS options for target species and entry level options where grasslands are managed under low and very low inputs.

[14] Local Transport Plan for Kent 2011 – 2016, Kent County Council

- Of the 51 SSSI, 96.7 per cent are in favourable or unfavourable recovering position. This percentage has increased as a result of continued efforts to improve favourability of sites.

- Partnership work over recent years has been successful in securing habitat benefits. These include restoration and re-creation of chalk and neutral grasslands with wildflower hay/seed spreading and landscape scale approaches to habitat restoration. Landscape Partnership Schemes have had a positive impact in the area securing benefits for a range of habitats including chalk grassland and grazing marsh.

- The outputs from the ARCH (Assessing Regional Habitat Change) project should be used for a review of the habitats in Kent and the most recent habitat data and trends. Please note this information is only available for Kent and does not include areas of the NCA that fall into Surrey[15].

Historic features

- In 1918, around 7 per cent of the NCA was historic parkland (in terms of the share of the resource the area was ranked 9). An estimated 52 per cent was lost by 1995 with about 25 per cent of the remaining parkland covered by a Historic Parkland Grant. In 2003 around 30 per cent was included within agri-environment schemes. Parkland has been identified as a priority within this NCA based on original extent within the landscape and subsequent rates of loss[16].

- In 2006 it was recorded that there is a high proportion of listed working farm buildings converted to non-agricultural use (41.9 per cent, the national average being 32 per cent)[17] in this National Character Area.

- Since the introduction of Environmental Stewardship (ES) schemes in 2005, options and standard capital items have been targeted at historic features and include the restoration and maintenance of parkland including the restoration of parkland structures such as ice houses, parkland railing and buildings. Parklands have also been captured under Entry Level Stewardship (ELS) or Countryside Stewardship (CSS) options, although those options may not always directly relate to management of the historic aspects of the parkland. Gains have also been made through taking archaeological features out of cultivation and securing low depth cultivations on archaeological features.

- Two sites within the NCA (Belvedere, and Western Heights fortifications) have both been identified on the Priority Heritage at Risk Sites 2012[18].

- The NCA has a number of heritage assets. Sites within the NCA are identified on the Heritage at Risk Register[19] with neglect, decay or inappropriate change still presenting threats to heritage assets. However, a number of sites which were previously identified on the register have been restored under Environmental Stewardship.

[15] For more information on the ARCH project visit URL: http://www.archnature.eu/
[16] English Heritage, 2006
[17] North Downs, Farmstead Character Assessment, English Heritage.
[18] Heritage at risk 2012, Priority Sites, English Heritage URL: http://www.english-heritage.org.uk/publications/priority-har-sites-2012/
[19] Heritage at Risk Register, English Heritage: URL: http://risk.english-heritage.org.uk/register.aspx

Coast and rivers

- Recent data using Water Framework Directive methods indicates that most of the rivers are of moderate ecological status and potential, but notably of poor status in the Great Stour (a Defra priority catchment), while chemical quality is variable[20].

- Samphire Hoe was opened to the public in 1997 and is a new piece of land that was created using spoil from the construction of the Channel Tunnel. It is a 30 ha site at the foot of Shakespeare Cliff surrounded by a protective sea wall. This land has developed in wildlife interest and is a recreational resource.

- Flood defence work is occurring along the coast at Deal with a rock revetment at the Castle end of the beach. Shingle recharge and a low sea wall in the town of Deal are currently underway.

Minerals

- A history of chalk quarrying has had an important impact on the downs scarp face and there are still a number of small-scale quarrying activities in the North Downs. The legacy of past quarrying has left some non-active quarries in the Kent part of the NCA but these are not identified in the Kent Minerals Plan to be reopened. There have been proposals for new sites and the extension of existing sand working sites and primary aggregates within the NCA and its setting in Kent and Surrey. For more information refer to the Kent Minerals Plan[21] and Surrey Minerals and Waste Development Framework[22].

Drivers of change

Climate change

- The UKCP09 climate change projections suggest that by 2050 there may be an increase of winter mean temperature of 2.2°C, an increase in summer mean temperature of 2.8°C and a change in precipitation distribution, with a decrease of 19 per cent in summer and increase of 16 per cent in the winter throughout the south-east (central estimate under a medium emissions scenario, UKCP09)[23].

- The predicted changes in sea levels and increased storminess may lead to accelerated coastal processes and increased erosion at the coast. This could have impacts on biodiversity, geodiversity, recreation and the heritage along the coastline as well as impacts on areas adjacent to the Tidal Medway.

- Summer droughts may lead to an increase in water demand for crop growth and may also affect aquifer recharge, having implications for water resources, especially in meeting the demands of a growing population and maintaining flows of the chalk rivers. Equally, more intense winter rainfall may increase soil erosion and reduce effective rainfall for aquifer recharge, increasing river pollution and sedimentation and increasing stress on already over abstracted aquifers.

[20] River Basin Management Plan, Thames River Basin District, Annex A, Current state of waters, 2009
[21] Kent Minerals and Waste Development Framework, Scheme 2010-2014, Kent County Council: URL http://www.kent.gov.uk/environment_and_planning/planning_in_kent/minerals_and_waste/mineral_sites_document/preferred_options/mineral_sites.aspx)
[22] Surrey Minerals Plan 2011, Core Strategy Development Plan Document, 2011 URL: http://www.surreycc.gov.uk/__data/assets/pdf_file/0004/177259/Adopted-Core-Strategy-Development-Plan-Document.pdf
[23] UK Climate Projections science report: Climate Change projections, 2010

- Changes might affect species migration or local extinction and loss or deterioration of small or isolated habitats such as chalk grassland on the steep sections of the scarp. This may make the re-creation of chalk grassland habitats, particularly on the more gentle slopes of the scarp foot and the less steep sections of the scarp, increasingly important to help mitigate effects of climate change on the steeper south facing slopes.

- The resilience of woodlands and trees in the NCA may be increasingly important as the climate changes, in terms of their role in providing a source of low carbon fuel and in terms of adaptation to and mitigation of climate change. The composition of the woodlands may be affected due to pests and diseases and there may be direct tree loss due to the changing climatic conditions, with impacts on associated woodland biodiversity.

- Climate change may result in changes to the type of crops which are grown with changes in land management in response to climate change potentially impacting on biodiversity and landscape character.

- Water resources within the NCA are likely to be impacted on by future climate change with potential implications for the North Downs chalk aquifer.

- Climate change may result in greater instances of flooding.

- A requirement for a greater proportion of energy generation from renewable sources could result in increased pressure for; wind turbines, either within the NCA or its setting; photovoltaic solar arrays, either within or affecting the NCA's setting; and the growth of biomass crop production.

Other key drivers

- Development pressures offer a challenge but where permitted it will be important to maximise opportunities for landscape and ecological enhancements through delivery of priority habitats and greenspace. The topography of the North Downs means that housing developments or industrial activities may be particularly visible from the escarpment and developments within the setting of both AONB create particular challenges. Well planned green infrastructure which strengthens or restores landscape character alongside an expansion of ecological and environmental functionality, integrated with socio-economic improvement within and reaching out from urban areas can help mitigate climate change and provide other ecosystem benefits for people and biodiversity.

- Major development at Dover including Whitfield Urban expansion, which when complete will include 5,750 new homes and associated infrastructure, including widening of the A2, will increase the impact of the urban fringe on local landscape character In the east. Equally in the west there are significant development pressures in Surrey. Increased development may cause associated urban fringe and suburban pressures including increased traffic and recreational activities on sensitive and vulnerable sites and habitats.

- Continuing conversion of farm buildings to residential and commercial uses is expected especially if there is an increase in farm diversification potentially impacting on sense of place and history.

- The North Downs NCA is particularly close to large centres of population and planned housing developments either within or in adjacent NCAs may generate additional recreational pressures, this provides both challenges but also opportunities for good quality greenspace provision. An integrated approach to recreation management will be required especially to mitigate threats to key biodiversity sites including European sites.

- New markets, changing climate and increased pressure for food production is likely to have an effect on existing agricultural practices and land use. Changes in climate may result in opportunities for the growth of new crops such as vines, especially given the south-east location and topography of the NCA. Changes in horticultural production could also result in changes to the farmed landscape, for example through the increased use of polytunnels or glass houses.

- Landscape-scale partnerships have already delivered benefits for habitats, species and people but there is potential to deliver more and across a larger area to create robust ecological networks and place the NCA in the best place possible to respond to future challenges.

- Any new transport infrastructure which links to existing major route ways, within and adjacent to the NCA may have an impact depending upon the chosen option.

- Future water resource issues are likely to have an impact on the NCA. The chalk aquifer is an important source of water and is likely to come under increasing pressure. It will be important to work in partnership and across sectors to help safeguard the water resources.

- Woodland economics and establishing markets for wood fuel and high quality timber products could be critical for securing sustainable management of the woodland resource. There is potential to manage woodlands for their multiple benefits, addressing the threats of pests, diseases, inappropriate or poorly managed recreation and wood-lotting. Effective management and a co-ordinated approach to woodland management will also help with resilience to climate change.

- Expansion or increase in poorly managed equine developments would have impacts on the NCA. It will be important to promote best practice management guidance.

- The location of this NCA, close to the continent and with good links through the ports with significant trade, travel, tourism and transport connections means that the likelihood of new species being found here and the possibility of some of them proving to be invasive is quite high.

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.

Scattered farmsteads including oasts and barns form part of the settlement pattern as shown here.

Statement of Environmental Opportunity	Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place/inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
	Ecosystem Service																		
SEO 1: Manage, conserve and enhance the distinctive rural character and historic environment of the North Downs, including the long-established settlement pattern, ancient routeways and traditional buildings. Protect the tranquillity of the landscape and sensitively manage, promote and celebrate the area's rich cultural and natural heritage, famous landmarks and views for future generations.	↔ *	↔ *	↔ *	↔ *	↔ *	↔ *	↔ *	↔ *	↔ *	↔ *	↔ *	o	↑ *	↑ **	↑ **	↑ **	↑ **	↗ **	↑ **
SEO 2: Protect, enhance and restore active management to the diverse range of woodlands and trees of the North Downs, for their internationally and nationally important habitats and species, cultural heritage and recreational value and to help to deliver climate change mitigation and adaptation. Seek opportunities to establish local markets for timber and biomass to support the active management of local woods, while recognising their contribution to sense of place, sense of history and tranquillity.	↔ **	↑ ***	↗ *	↔ *	↑ ***	↑ **	↗ *	↗ *	↗ *	↗ *	↑ *	o	↔ ***	↑ **	↑ **	↑ *	↑ *	↑ ***	↔ *

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

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

Statement of Environmental Opportunity	Ecosystem Service																		
	Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place/inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
SEO 3: Manage and enhance the productive mixed farming landscape of the North Downs and the mosaic of semi-natural habitats including the internationally important chalk grassland. Promote sustainable agricultural practices to benefit soils, water resources, climate regulation, biodiversity, geodiversity and landscape character while maintaining food provision.	o	↔ *	↗ **	↗ **	↔ *	↗ *	↑ ***	↑ **	↑ **	↑ **	↑ **	o	↔ ***	↑ **	↑ **	o	↔ *	↑ ***	↗ *
SEO 4: Plan to deliver integrated, well managed multifunctional green space in existing and developing urban areas, providing social, economic and environmental benefits and reinforcing landscape character and local distinctiveness, particularly on or alongside the boundaries of the designated landscapes within the North Downs.	o	↗ *	o	↔ *	↗ *	↗ **	↗ *	↗ *	o	o	↗ *	o	↔ ***	↗ *	↗ *	↗ *	↑ *	↗ **	↗ *

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

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

Landscape attribute	Justification for selection
A distinctive chalk downland ridge rising up from the surrounding landscape, extending from west to east as a series of undulating ridges and rounded hills with extensive views.	■ Chalk downland ridge dominated by chalk soils define the area. The carved topography provides local variations and land marks and the elevated ridge allows for impressive long views south, and at Dover across the Channel to France. ■ The shape of the downland ridge is of geomorphological interest, contributing to our understanding of mountain formation and erosion processes.
Tracts of unimproved chalk grassland, scrub and heath, concentrated on steep slopes, cliffs and verges.	■ Much original chalk grassland has been lost to intensive arable cultivation and scrub encroachment through loss of grazing and the habitat is now rare in the UK. Remaining tracts are important for biodiversity including over 1,000 ha with SAC designation and reinforce landscape character. ■ Chalk grassland is a distinctive downland habitat, supporting a wide variety of vegetation types. This includes nationally rare plant species such as early gentian, groundpine, early spider orchid and late spider orchid, and nationally scarce species such as man orchid and lady orchid. Several of these species are at the edge of their continental range and have their stronghold in this NCA. Late spider orchid in particular is wholly restricted to Kent. Rare invertebrates include the black-veined moth and straw belle moth. The area is also important for chalk grassland bryophytes. ■ Chalk scrub supports box and juniper and rare plant species, for example. meadow clary, lady and man orchids, greater yellow rattle, ground pine, cut leaved germander, white mullein, burnt orchid, green winged orchid, narrow lipped helleborine and yellow birds nest. It also supports a wealth of invertebrates for example Duke of Burgundy fritillary, grizzled skipper, brown hairstreak, silver spotted skipper and rufous grasshopper which is almost entirely confined to the chalk hills of southern England. There are breeding bird communities including numbers of linnet, lesser whitethroat and whitethroat. All add interest, variety, colour and sound to the landscape ■ Wye National Nature Reserve (NNR) and Lydden Temple Ewell NNR are both home to chalk downland of international importance, these reserves are key sites for biodiversity and also offer a range of access and education opportunities.

Landscape attribute	Justification for selection
A rich historic landscape, including prehistoric barrows and megaliths, iron-age hill forts, defensive coastline installations, historic parklands, wood pasture, veteran trees and orchards as well as dene holes, ancient paths, drove roads and trackways. A rich cultural heritage and connections with science, art, politics and music.	■ Barrows and iron-age hill forts form important features along the ridgeline of the open downs. ■ A range of historic assets including 202 Scheduled Monuments, 28 Registered Parks and Gardens covering 2 per cent of the NCA and 4,177 Listed Buildings. ■ Ancient routes are found across the NCA including the 'Pilgrims Way', an ancient trackway running from Winchester to Canterbury. Stane Street Roman Road runs from Chichester, passing through the western end of the NCA on its route to London. Watling Street and Stone Street in the East of the NCA are also both important. ■ Parkland has been identified as a priority within this NCA based on original extent within the landscape and subsequent rates of loss (English Heritage 2006). ■ Strong associations with military history including the Second World War. Military remains include Dover Castle (with the command centre used for the Dunkirk evacuation located within its earlier tunnels), Tudor forts, Napoleonic defences, gun emplacements and pill boxes. ■ Rochester Cathedral and Castle fall into the NCA, on the boundary with the North Kent Plain. Guildford Castle also sits on the boundary with Thames Basin Lowlands. ■ Traditional orchards still exist in the east although are limited in extent. ■ The NCA has evoked inspiration to a range of famous individuals including Churchill, Darwin, Henry Moore, Samuel Palmer, Paul Nash and Jane Austin.
Small nucleated villages along spring lines, within valleys and on the lower dip slope with scattered farmsteads and farm buildings linked by rural, often sunken lanes, with a strong local vernacular of flint, chalk and Wealden brick.	■ Historic buildings include tile-hung oast houses in Kent. A high density, by national standards of pre-1750 and pre-1550 buildings[24]. Hop farming and resulting oast houses had a major impact on the landscape in the 19th and 20th centuries. Farmsteads that retain unconverted oast houses, early to mid 20th century hop buildings and features such as hop-pickers huts are highly significant[24]. ■ With increased urban development associated with the London fringes to the west and transport infrastructure further east, the importance of maintaining the rural settlement patterns grows – contributing to the area's historic sense of place, reinforced by the distinctive local vernacular. ■ Vernacular building materials are an expression of the underlying geology both from the NCA (chalk and flint) and from adjacent NCA (Wealden brick).

[24] Farmstead Character Statement, North Downs, English Heritage

Landscape attribute	Justification for selection
Distinctive chalk cliffs in the east where the chalk meets the sea and inland chalk exposures.	■ As well as an immediately recognisable landscape feature the chalk exposures are of importance for their geodiversity and biodiversity. Inland chalk quarries also provide important exposures as well as other designated and non-designated sites of geological interest. Mole Gap to Reigate escarpment SAC and SSSI contains important exposures, supporting bat roosts, including those of Beckstein Bats and a range of other wildlife. ■ The chalk cliff foreshore sequence along this stretch of coast is a reference section, critical to understanding the development of the European chalk sequence ■ The White Cliffs of Dover are one of England's most distinctive landmarks and an area of international importance (Dover to Kingsdown SAC) The chalk exposed along this coast is critical to our understanding of chalk sequences across Europe and understanding the landslips at Folkestone Warren helps us understand how similar landslips work around the world. ■ Two stretches of the coast are defined as Heritage Coast, South Foreland and Dover –Folkestone. Heritage coasts represent stretches of our most beautiful, undeveloped coastline, which are managed to conserve their natural beauty and where appropriate to improve accessibility for visitors. ■ Chalk cliff exposures include cliff-ledge and maritime rock crevice plant communities, with an occurrence of rare and scare species such as sea stock, wild cabbage and oxtongue broomrape. Associated breeding bird colonies include kittiwakes and nesting peregrines. ■ Coastal defences are associated with major areas of port development. ■ Inland chalk exposures within numerous quarries along the length of the downs are of geological and biological interest. Numerous smaller chalk pits are scattered throughout. In land the mix of disused chalk quarries and pits provide critical evidence of our geological past. Many are now identified as geological SSSIs and Local Geological Sites. For example form chalk pits near Bulham are Britain's most prolific source of chalk (Upper Cretaceous) marine vertebrates including fish, turtles, marine lizards, pliosaurs and plesiosaurs. ■ The Mole Gap is one of the classic geomorphological localities in south-east England, noted for its variety of landforms which include periglacial debris fans, river cliffs and swallow-holes.

Landscape attribute	Justification for selection
Extensive ancient semi-natural woodland cover, including oak-ash on the upper dip slope, beech-yew-ash-hornbeam covering the steeper slopes of the dry chalk valleys, and large areas of yew-with-box on the Surrey scarp. Sweet chestnut coppice is a feature of the Kent dip slope.	■ This is a well-wooded NCA, containing over 25,800ha of woodlands over 2ha of which 12,700ha is ancient woodland, a nationally important resource. ■ Woodland is primarily found on the steeper slopes of the scarp and valley sides and areas of the dip slope capped with clay-with-flints. ■ A variety of woodlands support rare plant species such as box and green hound's-tongue, as well as invertebrates and notable breeding bird and mammal communities such as hawfinch and dormice, with those located on thin chalk soils possessing a highly distinctive character. The North Downs Woodlands SAC consists of internationally important mature beech woods and in particular ancient yew woodland, which occurs here and within the Mole Gap to Reigate Escarpment SAC. ■ The lotting up of some woodlands particularly in the east of the NCA, makes their co-ordinated conservation management very difficult to implement. ■ The existing woodland resource of the NCA offers good potential for biomass and high quality timber products. ■ Ranmore Common in Surrey comprises a block of ancient and secondary woodland. An area of acidic soils has given rise to open heathy woodland. Several species of butterflies and moths have been recorded including satin weave moth and the site also supports a breeding bird community including nightjar.
The river landscapes of the Wey, Mole, Darent, Medway and Stour, that cut broad valleys through the chalk ridge in addition, important chalk streams and remnant wetland habitats.	■ The river valleys cut through the chalk ridge, producing distinctive local landscapes and hosting areas of important wetland habitat. Chalk rivers are a priority habitat and nationally they are relatively rare as a river type, located in south and east England they are the principal resource of chalk rivers in Europe. ■ The Stour is a typical chalk river while the Darent, which rises in the Greensand to the south, exhibits many of the characteristics of a chalk river, rich in plant and animal life and supporting brown trout fisheries. ■ The stretches of the Wey and the Mole pass through the North Downs and the latter is of geomorphological interest for its swallow-holes, chalk cliffs and periglacial debris fans. The rivers attract bird life such as kingfisher and Lapwing. ■ The tidal Medway supports important tracts of UK BAP priority habitat, including areas of intertidal mudflat, flood plain grazing marsh, reedbed and fen.

Landscape attribute	Justification for selection
Thick hedgerows and shaws	■ Hedgerows and shaws enclose a predominantly irregular field pattern and contribute to the wooded character of the landscape. ■ Fields across the downs are generally bounded by thick hedgerows, shaws and woodland edges, but can vary in shape and size reflecting a process of piecemeal enclosure by agreement; there is little evidence for Parliamentary-type enclosure across the majority of the landscape. Often the scarp tops are an assart landscape with irregular field patterns bounded by woodland. These hedgerows and shaws have multiple benefits from their contribution to landscape character to their role as wildlife corridors
Rare arable habitats within a mixed-farmed landscape.	■ Arable farmland occupies a large area within the North Downs. Historically there was a profusion of wildflower species, especially associated with the thin chalky soils, and mammal and farmland bird species, including yellow hammer, corn bunting and grey partridge. ■ Ranscombe Farm is a nationally important botanical site and has been considered one of the richest sites for arable plants in the UK[25]. The site hosts a range of rare arable plant species including corncockle, rough mallow and broad-leaved cudweed[26]. ■ More intensive land management has restricted arable plants, and these are now a threatened group of species both locally and nationally with several species considered nationally rare. Pockets do remain where conserved in unsprayed field edges and following other management practices such as those under Agri-Environment Schemes aimed at enhancing biodiversity in arable farming.

[25] Byfield, A.J. & Wilson, P.J (2005) Important arable plant areas; identifying priority sites for arable plant conservation in the United Kingdom, Plantlife International, Salisbury. UK

[26] Ranscombe Farm Reserve: URL: http://www.plantlife.org.uk/nature_reserves/ranscombe_farm/

Landscape attribute	Justification for selection
Significant remaining areas of tranquillity relative to the developed nature of much of the surrounding landscape	■ Around 30 per cent of the area is still classified as undisturbed according to CPRE data, with these areas highly valued given the proximity of London and the expanding Thames Gateway immediately to the north and the line of large towns to the south including Reigate and Redhill in Surrey and the growth area of Ashford in Kent. ■ The sense of tranquillity is much enhanced by the extensive woodland cover to the urban areas immediately outside the NCA boundary.
Extensive public access, including North Downs National Trail and Pilgrims Way plus other recreational land uses	■ There are just over 2,826 kilometres of Public Rights of Way, while just under 3 per cent of the NCA (3,566 ha) is Open Access / Registered Common. This is of particular importance given the location of the North Downs so close to large centres of population and with the Kent part of the downs lying between areas of growth along the Thames corridor area to the north and Ashford to the south. In Surrey, Purley, Caterham, Leatherhead, Dorking, Reigate, Redhill and Guildford fall within or close to the boundary of the NCA. ■ The North Downs Way runs through much of the NCA and is of significant strategic importance, both as a long distance path and as a link between other local routes.
Small patches of remaining dark night skies in the east.	■ The area of dark night skies in the east has decreased since the 1990s, leaving small patches that are particularly significant given the generally high levels of light pollution in the region as a whole.

Landscape opportunities

- Protect, conserve, enhance and appropriately manage the highly distinctive chalk cliff coastline, heritage coast and seascape, maintaining natural processes needed to conserve the internationally important stretches valued for their wide variety of rare and scarce species and geological interest as well as important inland geological exposures found predominantly in quarries.

- Protect, conserve and enhance the character of much of the downland landscape devoid of development and urban intrusions, retaining and expanding the remaining areas of tranquillity and dark night skies.

- Protect, conserve and enhance the characteristic medieval settlement pattern of small nucleated villages along spring lines, within valleys and on the lower dip slope linked by winding, often sunken lanes, along with the strong local flint, chalk and Wealden brick vernacular of traditional architecture, with new building sensitive to local styles and materials.

- Protect from damage and appropriately manage and enhance the area's archaeological evidence, historic environment and cultural heritage, including prehistoric megaliths and hill forts, defensive coastline installations, historic parklands, in-field and lane-side veteran trees, traditional orchards on the Kent dip slope, and ancient paths, drove roads and 'hollow ways'. Identify opportunities for the interpretation, further research of, education and access to the surviving historic resources.

- Manage arable cropping patterns to encourage rare arable plants and habitats for farmland birds and mammals. In particular encourage land management interventions which provide food and shelter for farmland birds such as grey partridge, corn bunting, turtle dove and lapwing. Manage, conserve and enhance the areas of ancient semi-natural and broadleaved woodland, ensuring that each woodland area can be managed as a single entity. This includes the oak-ash woodland on the upper dip slope, beech-yew-ash-hornbeam of the dry chalk valley sides and scarp slopes, and large areas of internationally important yew-with-box on the Surrey scarp. Reintroduce active coppice management where this will enhance wildlife interest, especially in the large areas of sweet chestnut coppice on the dip slope within Kent. Managing woodlands will also provide a source of fuel and timber products.

- Manage, conserve and enhance the rivers Darent and Stour and other chalk streams to maintain their wildlife interest, while restoring, significantly expanding and re-linking the wetland habitats of the Medway Gap and those of the area's other valley floors, bringing rivers back into continuity with their flood plains where this will help sustain these wetland habitats.

- Manage, conserve, enhance and restore the characteristic pattern of thick well-treed hedgerows and shaws, forming a predominantly irregular field pattern.

Landscape opportunities continued

- Plan for significant expansion of extensively grazed areas of internationally important unimproved chalk grassland, including expanding and re-linking existing fragments to create a habitat network, through restoration of suitable arable and scrub-encroached areas to chalk grassland, while managing important associated habitats and enhancing traditional downland character including chalk scrub heath, and calcareous flushes at the foot of the scarp.

- Improve peoples' physical and mental health through contact with inspirational landscapes, and help boost rural businesses. Preserving and improving national trails and other main routes. Increase the number of connecting permanent and permissive routes to link national trails, high profile green spaces and tourist attractions. Where appropriate, upgrade paths to increase capacity for horses and cyclists and provide new sustainable routes along the river valleys.

- Protect the chalk pits and disused chalk quarries, for their landscape, biodiversity and geodiversity value, maintaining important inland geological exposures.

- Work with the protected landscape partnerships of the Kent Downs and Surrey Hills AONBs to help meet the ambitions of their management plans and conserve and enhance the outstanding scenic and natural beauty of the area.

- Work in partnership to tackle the challenges associated with urban fringe pressures on the North Downs, sharing best practice and learning from landscape scale projects which have successfully driven forward improvements in the urban fringe environment[27] and strengthened local landscape character, biodiversity and engagement with local communities.

[27] Valley of Visions http://www.valleyofvisions.org.uk/

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	Thin free-draining chalk soils support arable farming Livestock production systems Warm and dry climate	Food provision is an important service with a long tradition of mixed farming. The NCA is a significant producer of beef, lamb, wheat and oilseeds. Most of the produce is sold as undifferentiated commodities. The NCA is also important for horticultural production. Over the last 50 years there has been a dramatic reduction in the area of orchards and hop production in the Kent part of this NCA; however, orchard crops including apples, pears and cherries are found in Kent as the dip slope meets the North Kent Plain. Changes in production methods are notable, for example the use of polytunnels.	National	Changes in this service will be driven by changes in the market and longer term potentially by climate change. There have been shifts in the balance between pasture, horticulture and arable through time but the mixed farming landscape has remained intact. If arable cultivation expanded significantly this could lead to impacts on a range of other services including sense of place, water availability and biodiversity. Soil and water quality could also suffer if any expansion was not achieved sustainably. **Continued on next page...**	Work with landowners to support the long tradition of a mixed farmed landscape, promoting land management interventions which will help safeguard future yields and protect the water and soils of the area. Traditional orchards should be appropriately managed and conserved and new traditionally spaced orchards created where they would serve a wider community benefit as well as fruit production. There may be some limited opportunities to rebuild populations of traditional varieties of top fruit but this is likely to be dependent upon local initiatives to ensure economic viability.	**Food provision** **Water availability** **Regulating soil erosion** **Regulating water quality** **Genetic diversity** **Pollination** **Regulating water flow** **Regulating soil quality**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Food provision				**... continued from previous page** A move to increase extensive livestock production could result in the restoration of chalk downland habitats, although the viability of this will be dependent upon market conditions and the feasibility of extensive grazing. Increasing traditional varieties of top fruit would enhance the existing sense of place, cultural heritage and genetic diversity. Climate change may present opportunities for new crops, especially given the location, climate and topography of the North Downs. Predicted changes may make the NCA particularly suitable for intensive vineyards[28]. Changes in growing methods may also have an impact in the NCA, for example increasing use of polytunnels.	Where opportunities arise for novel crops and vineyards or other crops, these should be sensitively integrated into the landscape and care taken to avoid adverse impacts on other services Identify opportunities for local produce initiatives, especially where it provides links between food provision, landscape character and biodiversity.	

[28] Kent Downs Area of Outstanding Natural Beauty, Management Plan 2009 – 2014 URL: http://www.kent.gov.uk/environment_and_planning/planning_in_kent/minerals_and_waste/development_scheme.aspx

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Timber provision	Areas of existing conifer and broadleaved woodland Heavy and deep clay-with-flint soils predominantly support woodland	Timber production is localised despite a good resource. Large areas of chestnut coppice in the Kent part of the NCA are a significantly under-utilised resource. This was originally used for fencing, hop poles and a source of paper pulp, however with the closure of paper mills, reduction in hop growing and increased competition from cheaper fencing products, large areas of sweet chestnut coppice are no longer managed.	Regional	Timber provision in this area could be increased from the existing woodland resource. An increase could have benefits for biodiversity through bringing unmanaged woodlands under management as well as providing socio-economic benefits. The threat of pests and diseases should be recognised and appropriately managed in order to protect the woodland resource.	The existing extensive woodland resource presents an opportunity to explore and stimulate new markets for local wood while also supporting existing initiatives. Seek opportunities to work in partnership and across sectors to support and promote the benefits of sustainable woodland management and local wood products.	**Timber provision** **Biodiversity** **Climate regulation** **Regulating soil quality** **Sense of place / inspiration** **Pest regulation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability	Chalk aquifer Rivers Abstraction	The NCA overlays the North Downs chalk aquifers. This chalk bedrock supplies water predominantly for domestic use and to a lesser extent industry and agriculture. In Kent, 73 per cent of public water supply is taken from groundwater, most notably from chalk aquifers[29] . This aquifer is also important for water supply for other NCAs and forms a key part of the water supply system in south-eastern England Conflicts exist between supply and demand. Current quantitative status of the aquifers is poor[30] and all of the aquifer is already considered to be either over abstracted or over-licensed[31]. The chalk bedrock is dissected by relatively few rivers.	Regional	The development and population pressures within and surrounding this NCA pose a challenge for maintaining the quantity of water required to meet the increasing demands of the public water supply and industry, affecting both surface and ground waters. Poorly planned or designed development may have an adverse affect on water resources. This pressure on water supplies is considered to pose a risk to river flows in much of the area. Spring flow from the Chalk is an important feed for the internationally designated habitats of the north Kent marshes and the Thames Estuary. The Environment Agency's Restoring Sustainable Abstraction (RSA) programme aims to reverse the environmental damage caused to rivers and wetlands through over-abstraction[32]. **Continued on next page...**	Adopt a landscape-scale approach which seeks to increase recharge of the underlying aquifers. This could be achieved by a mix of land management interventions including expansion of chalk grassland, creation of buffer strips or better soil management to reduce compaction and increase water infiltration. This will also provide benefits for biodiversity, soil and water quality, and pollination services. Work in partnership and across sectors to safeguard the water resources and promote more efficient water consumption through increased engagement and awareness-raising among consumers.	**Water availability** **Soil erosion** **Soil quality** **Water quality** **Biodiversity**

[29] The State of Water in Kent, Kent Water Summit, Environment Agency, 2012

[30] River Basin Management Plans, Thames and South East, River Basin District, Environment Agency, 2009

[31] Environment Agency – Southern Region. Groundwater Body, Groundwater Quality Reports, North Kent Medway Chalk Groundwater Body, Final Report, 2008
URL: http://publications.environment-agency.gov.uk/PDF/GEHO0309BPTD-E-E.pdf

[32] LUC Data – no reference?

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability cont.				**... continued from previous page** Groundwater is particularly important in this NCA and is vulnerable to over-abstraction and drought[33]. A multi-faceted approach to managing water resources will be required to meet future demands. Managing abstraction and increasing the rate of aquifer recharge will be beneficial. Restoration of chalk grassland and other landscape features distinctive to the NCA may have the potential to make a contribution to aquifer recharge through a reduction in run-off and increased water infiltration with reduced soil compaction and a diverse grass sward There may be impacts on the biodiversity and landscape of the NCA as it adapts to changing water regimes as a result of climate change.	Ensure complementary and beneficial green and blue infrastructure measures are incorporated into new developments to help safeguard water resource and promote water efficiency.	

[33] West Kent Darent and Cray chalk, Groundwater Body, Final report, Environment Agency, May 2008 http://publications.environment-agency.gov.uk/PDF/GEHO0309BPTE-E-E.pdf -

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Genetic diversity	Orchards	Areas of fruit production including many traditional and local varieties still exist on the Kent part of the dip slope and the range of cherries, pears and apples provide a genetic resource. Orchards are one of the defining cultural and landscape elements of the northern fringes of this area Rare arable plants make an important contribution to the genetic diversity of the NCA associated with arable farmland. Ramscombe Farm has been considered one of the richest sites for arable plants in the United Kingdom[34].	National	There has been a shift from traditional to commercial production and an overall reduction in the area of land under orchards. Orchards containing old and traditional varieties have been removed and remaining orchards are often under threat from lack of management or competing land uses. Genetic diversity afforded by traditional varieties of fruit is important for maintaining future food provision and resilience to disease and climate change. Rare arable plants have declined due to changes in agricultural practices and still remain threatened.	Work with local communities and landowners to rebuild populations of traditional varieties of top fruit where appropriate, maintaining genetic diversity, pollination and sense of place and history. Implement appropriate land management interventions to safeguard and expand the existing extent of rare arable plants.	**Genetic diversity** **Climate regulation** **Pollination** **Biodiversity** **A sense of place / inspiration** **A sense of history**

[34] Byfield, A.J. & Wilson, P.J (2005) Important arable plant areas; identifying priority sites for arable plant conservation in the United Kingdom, Plantlife International, Salisbury. UK

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biomass energy	Existing woodland	Significant woodland cover means that there is biomass potential from bringing existing woodlands under management. Biomass crops such as short rotation coppice (SRC) and miscanthus) do not form part of the current landscape.	Regional	The existing woodland cover provides biomass potential and this underutilised resource should take precedent over short rotation coppice or other energy crop plantings. If 80 per cent of the 25,808 ha of woodland within the NCA were actively managed they could produce more than 80,000m^3 of wood per year which has an energy value of more than 160,000,000kWh's. The cost of heating oil to deliver a similar amount of heat would be > £9,000,000 per year). Recent studies on wood fuel potential by Kent Downs and Surrey Hills AONBs have demonstrated the multiple benefits of supporting local wood fuel[35].	Support existing and establish new markets to encourage the use of woodlands for local biomass. Restoration of coppice management to appropriate areas of woodland will improve biodiversity and provide a local source of wood fuel with potential benefits for climate regulation.	**Biomass energy** **Climate regulation** **Biodiversity**

[35] Add AONB reference to wood fuel pathfinder

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation	Mineral soils Woodlands, hedgerows and shaws Grasslands, heathlands and wetland habitats Green infrastructure	The woodlands of the NCA are important stores of atmospheric carbon and help to regulate climate through carbon sequestration. Research has considered the role of UK woodlands in mitigating and adapting to climate change [36]. Other habitats within the NCA are also important for carbon storage, particularly permanent grasslands, wetlands and heathlands. The diversity of habitat types and extent of woodland coverage suggests that this NCA has an important role to play in its contribution to climate regulation through its existing and potential role in carbon sequestration[37]. Urban centres in the NCA are using green infrastructure strategies to plan a network of green infrastructure capable of sequestering carbon and contributing to reducing the impacts of urban heat island effects. **Continued on next page...**	Local	It has been recognised that woodlands and trees have the potential to play an important role in reducing greenhouse gas emissions[36]. Sustainable management of the NCA's woodlands with sustainably produced wood fuel and wood products could help fulfil this potential. This would also provide other services for example by restoring some of the local traditional woodland management techniques which have existed for centuries, benefiting both sense of place and history, and biodiversity. Favourably managing wetland, heathland and grassland habitats and maintaining their extent will also be of benefit for carbon sequestration and soil carbon storage with potential for multiple benefits such as regulating water flow and soil quality, reducing soil erosion and gains in biodiversity.	Work with farmers and land managers to improve the management of existing habitats across the NCA to maintain and increase carbon storage while achieving multiple benefits for other services. Opportunities for the creation of new habitats may also be appropriate and of benefit both for climate regulation and other services such as regulating soil erosion and water flow. Any creation of habitats needs to be carefully considered to ensure they are sited appropriately. There are opportunities to further our understanding of the role of the NCA's woodlands in a changing climate, work in partnership and promote the multiple benefits of sustainable woodland management.	**Climate regulation** **Biodiversity** **Regulating water flow** **Regulating soil erosion** **Regulating soil quality** **Sense of place / inspiration** **Sense of history**

[36] Combating climate change – A role for UK Forests: Main report, An assessment of the potential of the UK's trees and woodlands to mitigate and adapt to climate change, National Assessment of UK Forestry and Climate Change Steering Group, 2009 [37] Carbon Storage by habitat: Review of the evidence of the impacts of management decisions and condition of carbon stores and sources, Natural England

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation cont.		**...continued from previous page** Mineral topsoils within the NCA are also important as extensive carbon stores; it is important that levels are maintained and enhanced where possible.		There may be opportunities to reduce emissions from arable cultivations. Mineral soils may have potential for carbon storage by increasing organic matter inputs, employing minimum tillage techniques, retaining buffer strips, or where appropriate through conversion to chalk grassland.	Work with local planning authorities and developers to ensure a strong network of green infrastructure is included in new developments, with retro-fitting encouraged to support climate regulation. A strategic, cross-NCA approach should be taken to the provision of green infrastructure given the close proximity of existing urban areas and major growth areas.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality	Uncultivated areas Hedgerows and buffer strips Good soil husbandry	The section of Great Stour (a Catchment Sensitive Farming priority catchment) that falls within this NCA is of poor ecological status; overall biological quality is poor, and general physico-chemical quality is moderate[38]. The Little Stour is heavily modified and is of poor ecological potential with overall biological quality poor and overall physico-chemical quality moderate. Mid Darent is of good ecological status. The River Darent is unusual for its size in that there are virtually no discharges into the river and therefore the water quality is generally good. The Mole is of poor ecological status, with an overall biological quality which is poor and is also classified as being poor for phosphate levels. The Wey is a heavily modified waterbody and is of moderate ecological potential, also classified as poor for phosphates levels. **Continued on next page...**	National	The quality of water is fundamental, given the reliance on the resource within the NCA for water supply and maintaining favourable habitat conditions for wetlands and rivers. Good land management is essential in protecting the quality of water both of the underlying aquifers and surface rivers. Chalk grassland and other permanent semi-natural habitats may assist in a reduction in ground water pollution from diffuse agricultural inputs by creating and conserving a habitat that would receive no or very low levels of fertiliser.	Expand semi-natural wetland habitats adjacent to watercourses, including reedbeds and grazing marsh, plus the creation of grassland buffer strips / restoration of hedgerows across slopes within river catchments (especially the Great Stour priority catchment), and re-creation of calcareous grasslands around boreholes and springs. Work at a catchment-scale with landowners, the private and public sector, and in partnership with water companies across rural and urban areas to reduce surface and groundwater pollution, while simultaneously improving aquifer recharge, sharing best practice and adopting a collaborative approach to sustainable water management.	**Regulating water quality** **Regulating soil quality** **Biodiversity**

[38] **Note:**
[1] Note: For surface waters there are now two separate classifications for water bodies under the Water Framework Directive, ecological and chemical. To be in 'good' status both ecological and chemical status must be at least good. Ecological status integrates both biological, physico-chemical and morphological factors and is not purely a measure of water quality. For more information on Water Framework Directive statuses in this NCA please see, River Basin Management Plan, Thames River Basin District, EA website URL: http://www.environment-agency.gov.uk/research/planning/33362.aspx

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality cont.		**... continued from previous page** The Wey is a heavily modified waterbody and is of moderate ecological potential, also classified as poor for phosphates levels. The Tidal Medway (falls within the Medway and Eden Catchment Sensitive Farming priority catchment) is a heavily modified waterbody and is of moderate ecological potential, classified as moderate for nitrogen levels. Chemical status is variable with both the Medway and Wey failing to meet good chemical status but the Darent and Stour both achieving good status. The chemical status of groundwater under the downs varies along their length. At both the eastern and western ends and in the central portion, the groundwater quality is classified as poor. However, between Westhumble and Biggin Hill and between Bredhurst and Challock, groundwater quality is classified as good. The East Kent groundwater aquifer is currently considered to be of poor quality status due to levels of nitrates, pesticides, solvents and hydrocarbons from various sources both current and historical. This falls within the Stour priority catchment.		The river water quality is particularly vulnerable where it is dependent on groundwater discharge to feed the base flow, for example into the Darent[39] Maintaining quality of the groundwater is therefore critical. A good quality water environment can also have benefits for the economic and social amenity value of developments and improve the quality of urban areas[40].		

[39] Environment Agency – Southern Region. Groundwater Body, Groundwater Quality Reports, North Kent Medway Chalk Groundwater Body, Final Report, 2008

[40] River Basin Management Plan, Thames River Basin District, Environment Agency, 2009

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow	Chalk streams and rivers Wetland habitats Woodland, hedgerows and trees Soils	Flooding is an issue along localised stretches of the NCA's rivers, both within and outside the NCA, in particular the River Medway in the east, with flooding affecting both Maidstone and Chatham[41] (through a combination of surface water, fluvial and tidal flooding), and the River Wey in the west, with a history of significant flooding affecting Guildford[42]. Flooding of the Stour affects areas within and to the north of the NCA.	Regional	Climate change predictions suggest that there may be an increase in the volume and frequency of flooding events with potential impacts on the NCA's rivers. Restoration of wetland habitats adjacent to watercourses can have multiple benefits; not only will it help to increase the storage of water in the flood plain, but it may also help to re-link, enhance and expand existing habitats for the benefit of biodiversity and landscape character. Potential exists to increase the storage of water along the flood plain of the Stour within the NCA itself to help alleviate downstream flooding as well as enhance the important wetland environment. This also applies along the Darent, while flooding on the River Mole can be alleviated by maintaining the existing capacity of the river and flood plain[43].	Create wetlands within the valley of the Medway, upstream of flood risk areas and on the Darent and Stour to help reduce downstream flooding, as identified within the relevant catchment flood management plans. Target expansion of semi-natural woodland and other permanent habitats on steeper slopes to aid water infiltration and help to reduce cross-land flows where appropriate. Identify sustainable management practices to improve soil structure and permanent sward to increase infiltration and reduce cross-land flows Opportunities for delivery on the ground which contribute to a wider catchment-based approach with actions targeted both within and outside of the NCA boundaries. Green infrastructure can have multiple benefits and play an important role in the regulation of flooding, including sustainable drainage systems, improved soil management within urban areas, and reducing and regulating runoff from hard standing.	**Regulating water flow** **Biodiversity** **Regulating soil quality**

[41] Medway Strategic Flood Risk Assessment [42] Environment Agency Flood Risk map
[43] Stour, North Kent Rivers & Thames Catchment Flood Management Plans, December 2009, Environment Agency

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil quality	Permanent grassland Woodland Livestock production systems Arable cultivations	Most soils are either directly derived from the Chalk or from loamy or clayey deposits above the Chalk. There are 6 main soilscape types in this NCA: shallow lime-rich soils directly over the chalk, cover about a third of the NCA; slightly acid loamy and clayey soils with impeded drainage covering another third and are associated with clay-with-flints, the remainder comprise deep freely draining lime-rich loamy soils in drift over chalk or, slightly acid loamy soils associated with deposits of silty 'brickearth' materials. Other soils make up only a small proportion of the area.	Local	The freely draining soils are valuable for aquifer recharge, requiring maintenance of good structural conditions to aid water infiltration and avoidance of run-off. Aquifer recharge will become increasingly important as pressures on water resources increase. There is potential to increase the organic matter of the soils to help improve soil quality. Organic matter may be lost on the intensive arable fields which dominate the dip slope and lower slopes of the escarpment where they are under frequent tillage. Lack of organic matter makes these soils more susceptible to compaction and erosion. Soils with a high clay content such as those derived from clay-with-flints, can be easily poached by livestock and damaged by machinery when wet.	Work with landowners to promote the principles of good soil husbandry to improve soil quality, protect the sustainability of future yields, while benefitting other regulatory services such as water availability, water quality and reducing soil erosion through improving soil structure and water infiltration.	**Regulating soil quality** **Regulating soil erosion** **Regulating water quality**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion	Soils Hedgerows, shaws and woodland Permanent pasture Well- managed livestock systems Sustainable arable systems	The majority of soils within the area are prone to erosion. The extensive, arable fields are at particular risk, especially on the steeper sides of the scarp and valleys of the dip slope, where continuous arable cultivations damage soil structure and reduce the organic matter content of the soils. Soil erosion from slopes within river catchments contributes to deterioration in the water quality of the area's rivers, including the Defra priority catchment of the Great Stour. Woodland, permanent grassland and heathland support soils under stable conditions, with good soil structure, flora and fauna Shaws ,hedgerows and grass buffer strips reduce the rate of cross-land migration of soils and reduce the velocity of cross-land water flows thereby reducing the erosive effects of water.	Local	Given the well-wooded character of the North Downs and the dense network of hedges and shaws there is potential to increase this service through a series of land management interventions which would accord with the existing landscape character. Options such as restoration of hedgerows, creation of chalk grassland or woodland habitats or buffer strips on steeper slopes could help reduce soil erosion. This would have added benefits for biodiversity and sense of place.	Work with landowners to implement land management options, especially on steeper slopes to reduce soil erosion. This includes provision of buffer strips, restoration and creation of hedgerows, woodland creation where appropriate and creation of other areas of low input grasslands and semi-natural habitats, seeking to minimise soil compaction, improve water infiltration and reduce soil migration. In addition, seek to link habitats and improve connectivity where possible, contributing to the area's sense of place.	**Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Regulating water flow** **Biodiversity** **Sense of place / inspiration**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pollination	Calcareous grassland, heathland and woodland Buffer strips and uncultivated land Roadside verges Orchards	Existing habitats provide important sources of nectar for pollinating insects within an otherwise intensively farmed landscape. Market changes have been responsible for declines in the orchard and hop industry, with significant losses of favourable habitat. Since the 1990s, land management incentives have led to the establishment of more pollinator habitats supported by agri-environment schemes.	Regional	The mixed farming landscape of pasture, arable and horticulture means that pollination services are important in maintaining future food provision and viability of crops. While stewardship schemes have focused on creating pollinator habitat, these can be fragmented and may not have the connectivity or provide the mosaic of habitats in close proximity to function effectively as pollinator habitats. A landscape-scale approach to creating the right pollinator habitats in the right places throughout the farmed landscape would be beneficial building on the existing gains made over the last 20 years through stewardship. A network of flower-rich roadside verges evokes a strong sense of place while also acting as valuable pollinator habitats. Linking and expansion of the existing network would be beneficial.	Increase the pollinator habitat through expansion and linking of semi-natural habitats seeking to increase the diversity of habitats in close proximity to food crops requiring pollination. In particular look to create and link calcareous and neutral grasslands, chalk heath, flowering hedgerows and buffer strips. Identify opportunities for working across sectors and with local communities to increase awareness and appreciation of pollinator habitats.	**Pollination** **Biodiversity** **Food provision** **Sense of place / inspiration**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pest regulation	Existing semi-natural habitats Agricultural field margins Species-rich hedgerows Woodland Mixed farming	There are large areas of semi-natural habitat which will support species that will aid pest regulation. Since the 1990s, land management incentives have led to the establishment of more habitats suitable for predatory species, for example arable margins and in some instances beetle banks.	Regional	Pest regulation is currently provided by the existing spread of semi-natural habitat across the NCA. However, there is scope to improve the condition of this habitat through appropriate management and to extend it where possible, reducing the impacts of pests across the agricultural landscape.	Maintain and expand the area of semi-natural habitats, throughout the NCA to provide a range of niches to support pest-regulating species including invertebrates, birds and mammals. In addition, through mechanisms such as agri-environment schemes, encourage the use of field margins, beetle banks and headlands in arable land, to encourage pest-regulating species in close proximity to food crops.	**Pest regulation**
Regulating coastal erosion	Chalk cliffs Hard defences	The coastline between Folkestone and Deal is relatively high and not at risk of inundation. The shoreline management plans have proposed policies of No Active Intervention where possible to allow for natural regeneration of the cliffs and thus maintenance of the geological and wildlife interest, with maintenance of existing flood defences identified around areas of important development, such as Dover's Channel Tunnel infrastructure and Deal in the north[44].	National	The high chalk cliffs will be affected by a rising sea level and while not at risk from inundation, coastal erosion may occur at an accelerated rate with loss of cliff top habitats and coastal paths. Erosion from the cliffs has enabled the shingle and shell sand beaches between Kingsdown and Sandwich Bay, in the adjacent North Kent Plain NCA, to build up serving as a natural defence against the sea[45].	Provide space for natural coastal erosion where appropriate, as identified within the shoreline management plan, ensuring no net loss of nationally important cliff-top habitats and re-creating access and cliff top habitats where necessary. This will also benefit biodiversity and both sense of place and history, and continue to feed sediments to neighbouring stretches of coastline.	**Regulating coastal erosion** **Biodiversity** **Sense of place / inspiration** **Sense of history**

[44] Shoreline Management Plans, 'Isle of Grain to South Foreland' & 'South Foreland to Beachy Head'

[45] East Kent Coast Maritime Natural Area Profile, English Nature, 1997

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of place / inspiration	Chalk cliffs and heritage coastline Woodlands The escarpment and dip slope Ancient road patterns Protected landscapes (Kent Downs and Surrey Hills) Heritage assets Mixed farming	A landscape with a distinctive sense of place, from its openness and expansive views to the intimate dry valleys, extensive woodlands, chalk grasslands, orchards, predominantly in the Kent part of the downs, dense wooded shaws and hedgerows set among a network of sunken lanes and ancient routes. At the coast the White Cliffs of Dover are an outstanding landscape feature, with two stretches of coastline defined as heritage coasts. The built environment and settlement pattern also exert a strong sense of place, for example the use of locally derived building materials, such as flint, provides a strong link back to the chalk country. The area has featured in the arts and many world renowned individuals have connections with the NCA from Darwin to Churchill. Downe House is recognised for its international significance as Charles Darwin's home from which he developed his scientific theories[46].	National	The NCA has a strong sense of place and the two AONB designations are testament to the natural beauty and scenic qualities that inspire and create a distinctive sense of place across much of the NCA. The White Cliffs of Dover are renowned and one of the most recognisable features within England. Maintaining sense of place may become more challenging as the NCA responds to new challenges such as economic growth, population increase and climate change.	Conserve and enhance the long-distance open views from the escarpment and the enclosed, secluded and sparsely-settled character of nucleated villages in valleys and scattered farmsteads linked by winding, often sunken lanes, with a local vernacular of flint, chalk and Wealden brick. Conserve and enhance the mosaic of semi-natural habitats set within a mixed farming landscape which creates such a distinctive sense of place. Conserve, enhance and celebrate the distinctive white cliffs that reflect the unifying geology of the NCA and which have inspired musicians, artists, writers and scientists over the centuries. Capture, promote and celebrate the inspiration that this NCA affords, seeking to educate, enthuse and reconnect people with their local landscape.	**Sense of place / inspiration** **Sense of history** **Biodiversity** **Geodiversity**

[46] Kent Downs Area of Outstanding Natural Beauty, Management Plan 2009 – 2014 URL: http://www.kentdowns.org.uk/guidance-management-and-advice/management-plan

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history	Chalk cliffs Ancient routeways Military installations Chalk pits and deneholes Parklands Archaeology and historic features Cultural associations (artists, musicians, scientists) Traditional buildings and settlements including oast houses.	The NCA is a landscape which has a strong sense of history. This is sensed not only through the historic sites or remains but through the numerous artistic, scientific and other cultural influences. Ancient ways provide links to the past. The North Downs are also perceived to have strong associations with the Second World War, especially on the downs above Dover. Equally, the geology of the NCA provides a sense of earth history from changing environments, to the uplift of mountains and the ever-dynamic natural processes we see today. Rich heritage of defence structures, including Dover castle and the western heights, 19th century Martello towers, and concrete and brick remains of anti-invasion structures of the two world wars.	National	The strong time depth of this NCA contributes significantly to sense of place and creates a notable and tangible historic environment. Protecting and enhancing the historic assets will have multiple benefits including for biodiversity, geodiversity and also for the local economy through maximising income from tourism. Some nationally significant heritage assets have been identified on the heritage at risk register and a number of historic assets are vulnerable to further loss or damage. The coherence of the historic environment is at risk in places from increased development and infrastructure pressures. The distinctive historic character of some settlements is being eroded.	Increase protection and appropriate management of above and below ground archaeology, designed parkland, defensive coastline installations, historic buildings, ancient trackways, and the established vernacular of settlements for example through the use of flint, chalk and Wealden brick. Identify and promote opportunities for enhanced recreation and education associated with historic interest of the NCA.	**Sense of history** **Sense of place / inspiration** **Biodiversity** **Geodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Tranquillity	Landscape of undulating ridges, hidden 'dry' valleys, wooded plateaux and small fields connected by hedgerows, shaws, sunken trackways and copses	A landscape which is highly developed along its boundaries and therefore can lack a sense of remoteness but where the landscape character offers a strong sense of tranquillity and calm. According to the CPRE Intrusion Map (2007), 11 per cent of this NCA is developed, 60 per cent disturbed and 29 per cent undisturbed - with patches of 'undisturbed' land mostly associated with wooded areas.	National	The area's natural limitations have allowed the NCA to retain a sense of tranquillity, however proximity to London and larger towns means that development pressure is high with potential to impact on the tranquillity of the NCA. Tranquillity of green space is important for relaxation and mental health, with added economic benefits of a population that is healthier through participation in walking, cycling, and other activities. Conversely, recreational pressures also have the potential to impact on tranquillity, especially due to illegal or inappropriate recreation The wooded character and topography of the landscape does offer a mechanism to help reduce the impacts on tranquillity for example of visual disturbance or noise in the form of woodland buffers.	Maintain the tranquillity afforded by this NCA, especially within the dry valleys of the dip slope. Maintain the sparsely-settled character and provide woodland buffers to either side of major transport routes and around urban development. Promote awareness, understanding and interventions to address the impacts of inappropriate recreation on the tranquillity of the NCA and other services. Best practice should be shared locally and lessons learnt from the Valley of Visions Securing the Landscape Scheme[47].	**Tranquillity** **Sense of place / inspiration** **Sense of history**

[47] Valley of Visions: http://www.valleyofvisions.org.uk/

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation	North Downs Way National Trail Pilgrim's Way Public rights of way, including promoted routes such as the Thames Down Link, Mole Gap Trail, Elham Valley Walk, Stour Valley Way, Medway Valley Walk and Darent Valley Walk Open access land Coast Woodlands	The NCA offers good opportunities for recreation. Walking routes include the North Downs Way National Trail and the long distance Pilgrims Way. These are supported by a dense rights of way network as well as 3,500 ha of open access land, accessible parkland, country parks and National Nature Reserves.	National	Recreation is of particular importance in this NCA, both in terms of the opportunities on offer and managing the impacts of recreational pressures, which can impact on the tranquillity and biodiversity of the NCA if not managed appropriately. This is particularly pertinent given the location of the North Downs so close to large centres of population including London, Thames Gateway Maidstone and Guilford. The challenge is therefore achieving a balance between promoting access opportunities, recognising the wider health and economic benefits while reducing the impacts of inappropriate recreation on key biodiversity and heritage sites. Given the extent of existing recreation opportunities, priorities should focus on maintaining and enhancing these assets. Access and recreational activities, particularly close to where people live, bring mental and physical health benefits. A network of trails linking quality green spaces and other visitor destinations can also provide significant benefits in terms of income from local visitors and tourists.	Maintain the quality of existing access and enhance opportunities throughout the area and along the coast, creating new permissive access that links to settlements and the North Downs Way, as well as to historic sites and other areas of interest. Explore opportunities for recreational use in woodlands to promote health benefits while giving due regard and minimising impacts of inappropriate recreation on key biodiversity sites. Develop quality greenspace on the edge of towns, close to where people live. This can provide valuable links from towns to the countryside.	**Recreation** **Sense of place / inspiration** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity	Woodlands Chalk grasslands Chalk heath Wetland habitats Chalk cliffs Rare species Climate South-facing escarpment Diversity of international, national and local sites.	The NCA offers a range of BAP habitats (over 13,000 ha) including lowland mixed deciduous woodland, lowland calcareous grassland, lowland beech and yew woodland, and lowland heathland providing a major genetic resource, with many of these habitats designated as of international importance (comprising 9 SAC covering over 1,500 ha) with 7 relating to calcareous grassland). At the time of publication, 96.7 per cent of the 51 SSSI were either in favourable or unfavourable recovering condition.	National	This NCA has a rich diversity of habitats and associated species. While many protected sites are currently in good condition, maintaining the quality and quantity of habitats both in and outside protected sites may be challenging as the NCA comes under increasing pressure from for example development, climate change, pests and diseases. As the climate changes the importance of robust ecological networks and connectivity across the landscape will be paramount, giving species the best chance of adapting. The south-eastern position of the North Downs makes it ideally placed for new colonists from Europe with warmer and dryer conditions favouring many southern or continental species. As the population continues to increase, there will be further pressures on biodiversity, if not directly from land take then from associated impacts such as increased recreational pressure. Illegal and inappropriate access is already a threat to some of the NCA's key woodland habitats. Green infrastructure planning both within the NCA and adjoining areas will have a critical role to play in helping to protect and secure benefits for biodiversity in the future.	Improve the quality and increase the area of priority habitats, notably chalk grassland, woodlands, chalk heath, arable habitats and river valley habitats including reedbeds and grazing marsh, looking to connect, buffer, improve and create habitat patches, creating more coherent and resilient ecological networks. Use evidence to adopt a landscape-scale approach to habitat restoration and to prioritise action on the ground, benefiting sense of place and strengthening the landscape character. In particular use tools such as habitat mapping to target appropriate action. Protect and enhance designated sites aiming to achieve favourable condition on all sites and linking them to the wider habitat network. Maximise opportunities through green infrastructure to encourage biodiversity gains. Continue to work with landowners to integrate sustainable land management options into their faming businesses, seeking ways to make sensitive land management economically viable, allowing for continued food provision, while benefitting biodiversity, particularly extensive grazing of chalk grassland.	**Biodiversity** **Food provision** **Sense of place / inspiration** **Sense of history** **Climate regulation** **Pest regulation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Geodiversity	Chalk cliffs Quarries and chalk pits Dry valleys cut by periglacial streams Deposits of coombe rock Steep south-facing escarpment	The geodiversity of this NCA is of international importance. There are 12 geological SSSI of which 5 are dedicated solely for their geodiversity interest; the remaining 7 are mixed interest SSSI. All but one SSSI are in favourable condition. The famous white cliffs rise to over 150 m, displaying important sections of Chalk strata. The coastline exposes rocks of Cretaceous age. Cliff sections at the western end expose 50 m of Folkestone Beds (Lower Greensand and Gault Clay) and these are considered the most important sites for studying these rocks in England. Gault Clay exposures are particularly important for preserved fossils. The chalk cliffs of the Warren are considered an internationally important reference site, with geological principles tested here during the development of geology. **Continued on next page...**	National	The 'White Cliffs' are a famous feature of geological importance. Continued natural coastal processes will allow for the maintenance of the geological interest. This will also benefit biodiversity. Geology in this NCA has a very obvious bearing on both sense of place and history, from use of flints in local vernacular to the landscape form (dramatic cliffs, dry valleys and steep scarp to mention but a few) and land cover which is so strongly defined by the underlying Chalk geology and clay-with-flints soils. This NCA offers considerable opportunities for geo-tourism, -education and -research. The geodiversity of the area helps us to understand how landscapes have evolved over time, how they continue to evolve and what may occur in the future. This is not only of local importance but internationally significantly.	Maximise opportunities presented by the geological exposures throughout the NCA to further our understanding of geological processes over time. Where appropriate provide access (intellectual and physical) to the geodiversity of the NCA, providing opportunities for learning, research and recreation – inspiring local communities. Protect and celebrate the geodiversity of the NCA, helping to maintain sense of place and sense of history throughout. Continue to manage the geodiversity sites including designated sites, ensuring they achieve and remain in favourable condition. The number of mixed interest SSSI provides opportunity to take an holistic approach to management, benefitting not only geodiversity but also maximising the benefits for biodiversity.	**Geodiversity** **Regulating coastal erosion** **Biodiversity** **Recreation** **Sense of place / inspiration** **Sense of history** **Water availability** **Regulating water quality**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Geodiversity cont.		**... continued from previous page** Landslides at Folkestone Warren have been intensively studied, with 12 major slips since 1765. Natural exposures of pure chalk are rare except at the coast but there are artificial cliffs in quarries. Old chalk pits are of cultural significance as well as being of geological and biological interest. The angles of the dip slope and escarpment contain a record of how the Chalk was folded, while erosion and weathering have left features such as combes and valleys. The network of dry valleys and features such as the Devils Kneading Trough and their associated sediments are critical in interpreting the more recent environmental changes of the Quaternary Period.		Although the majority of SSSI are in favourable condition, management will be required to ensure they remain in this condition. Geological exposures are at risk of loss through development, and lack of scrub management.		

Photo credits

Front cover: Box Hill, on the North Downs Way National Trail with unimproved grassland in the foreground. The NCA is renowned for its far reaching views from the scarp. © Natural England/McCoy Wynne & Associates

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