National Character Area profile:

92. Rockingham Forest

Supporting documents

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Introduction

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

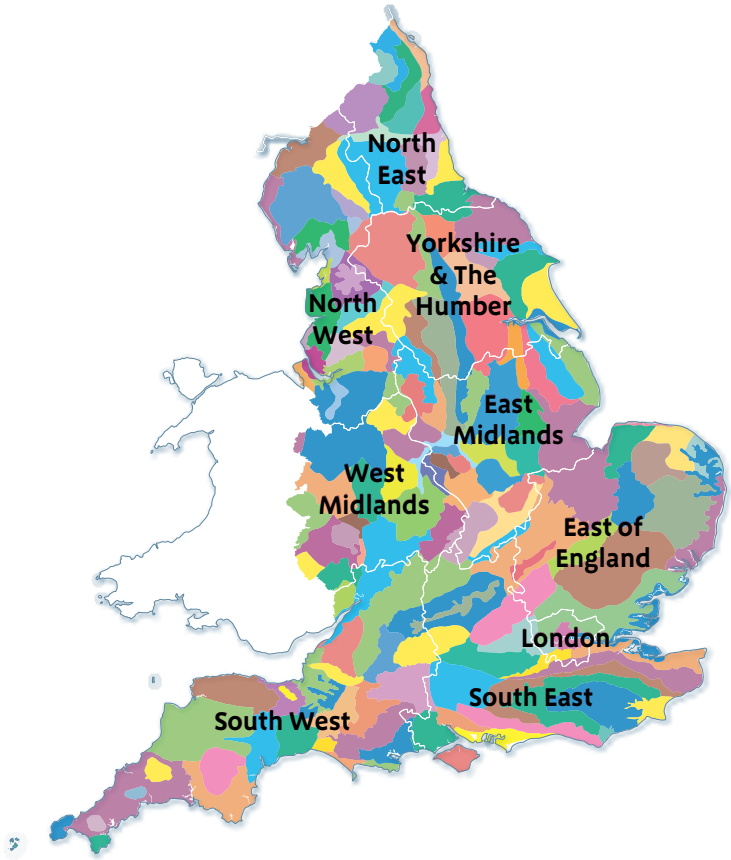
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and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

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

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

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

National Character Areas map



[1] The Natural Choice: Securing the Value of Nature, Defra (2011; URL: www.official-documents.gov.uk/document/cm80/8082/8082.pdf)

[2] Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services, Defra (2011; URL: www.defra.gov.uk/publications/files/pb13583-biodiversity-strategy-2020-111111.pdf)

[3] European Landscape Convention, Council of Europe (2000; URL: http://conventions.coe.int/Treaty/en/Treaties/Html/176.htm)

Summary

Rockingham Forest National Character Area (NCA) is essentially a broad, low, undulating ridge underlain by Jurassic limestone which falls away from a prominent, steep northern scarp overlooking the Welland Valley. Large areas of woodland remain a significant feature of the landscape and, while not forming continuous belts, the blocks of woodland often coalesce visually with hedgerow trees and smaller copses to increase the perception of extensive woodland cover across the landscape.

The landscape is a patchwork of woodland and large- to medium-sized fields of mixed arable with some pastoral use surrounding small nucleated villages. Fields are commonly bounded by well-managed hedgerows with mature trees or drystone walls and display the rectilinear pattern of the enclosures set within a more sinuous pattern of older enclosures, winding lanes and watercourses.

Popular today as a recreational resource, Rockingham Forest takes its name from the Royal Hunting Forest that existed across the area from the 11th to the 19th century. Historically, the heavy clay soils deterred widespread clearance for agriculture and so many of the woodlands are ancient. Formerly extensively coppiced, these woodlands contain a rich diversity of species that are of considerable nature conservation interest; several sites are designated as Sites of Special Scientific Interest (SSSI) and National Nature Reserves (NNRs) for this reason.

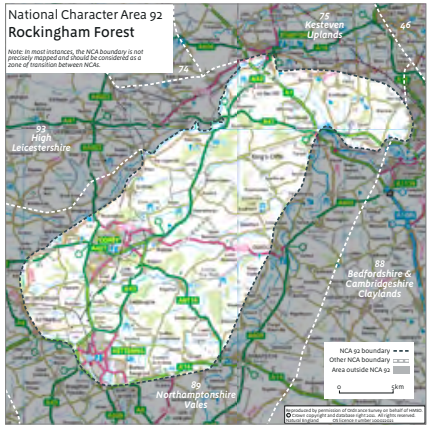
The NCA is noted for its population of the black hairstreak butterfly. Due to changes in woodland management over the past 50 to 100 years, it is now restricted in its UK distribution to a narrow belt of woodlands between Oxford and Peterborough. The red kite now has a strong and expanding local population; these stunning birds can readily be seen soaring over pastures and woodlands and are rightly a popular visitor attraction.

Thirty-four SSSI lie wholly or partly within the NCA and there are three NNRs, one of which (Barnack Hills and Holes) is also designated as a Special Area of Conservation to protect its internationally important orchid-rich grassland which colonised this former limestone quarry.

The area contains many outstanding 17th- to 19th-century country houses, and there are 11 Registered Parks and Gardens. These include large country houses and mature parkland estates – such as Deene Park, Kirby Hall and Rockingham Castle – which are important landscape features, adding to the overall wooded character of the area. Imposing churches with towers and spires are a striking feature of the villages. These churches contain architectural features dating from the 13th to the 15th century and there are significantly earlier buildings in the east of the NCA.

Settlements generally lie along the river valleys and are linked by narrow winding lanes which contribute to the remote rural character of much of the area. The older buildings are generally of attractive creamy-grey limestone in the east and ironstone in the west. Roofing materials include thatch, the distinctive thick Collyweston slates, clay pantiles and Welsh slate.

Large-scale, modern, mixed-use development is evident on the fringes of larger settlements such as Kettering and Corby, creating visual intrusion and extending the urban fringe. These settlements are targeted for further growth. There is also pressure for residential development in the villages, potentially eroding architectural and historical character.



Click map to enlarge; click again to reduce.

Landscape view showing the typical small mixed arable and pasture fields enclosed by well maintained hedgerows with numerous hedgerow trees.

Statements of Environmental Opportunity

- **SEO 1:** Extend the area and connectivity of broadleaved woodland, individual trees and hedgerows in the core Rockingham Forest area, seeking to enhance historic landscape character and biodiversity and increasing the potential for timber, biomass, access and recreation, while helping to regulate the impacts of climate change and maintaining and improving water and soil quality.

- **SEO 2:** Maintain and enhance the quality of natural sites of interest across the area, and particularly within the farmed landscape, seeking to realise opportunities to strengthen ecological networks and increase the quantity and quality of semi-natural habitat mosaics and geodiversity sites, providing additional benefits to recreation and so enhancing visitors' experiences and understanding as well as the local economy.

- **SEO 3:** Manage and enhance the distinctive elements that contribute to the overarching sense of place and history of the Rockingham Forest area. Seek to retain its predominantly rural character and core areas of tranquillity while planning to accommodate sensitively designed new development, including functional green infrastructure.

- **SEO 4:** Enhance the functionality, biodiversity and historic features of the many small rivers and streams that cross the Rockingham Forest area. Seek to strengthen their contribution to regulating water flow and quality in the Nene and Welland catchments, enhance their role as landscape features, and improve riparian corridors for wildlife and recreation.

Description

Physical and functional links to other National Character Areas

Rockingham Forest National Character Area (NCA) is a broad, low, undulating ridge falling away from a steep scarp in the north-west which overlooks the broad Welland Valley, which lies largely in the adjoining High Leicestershire NCA. The higher land here is capped by glacial boulder clay forming a continuous geological and visual link with High Leicestershire to the west, and the Kesteven Uplands NCA to the north.

Separated by the A1 corridor, the culturally distinct Rockingham Forest and Soke of Peterborough areas within the NCA are unified by the common boundaries of the Welland and Nene rivers which flow eastwards to The Wash. These two areas also share similar geology – and extensive areas of ancient woodland are another strong unifying characteristic.

The town of Kettering lies on the south-west border of the area which is almost surrounded by the open clay vales of the Northamptonshire Vales NCA to the west, south and east. The north-east corner of the area abuts the city of Peterborough which lies in the more open and intensive arable landscape of the Bedfordshire and Cambridgeshire Claylands NCA.

Water is abstracted from the rivers Nene and Welland, at Stamford and Wansford, to supply Rutland Water reservoir (located in the Leicestershire and Nottinghamshire Wolds NCA) which is a regionally important source of water for surrounding urban areas. Rutland Water is also internationally important for nature conservation, reflecting its designation as a Special Protection Area and Ramsar site.

There are frequent open views in the south of the NCA looking over the Northamptonshire Vales NCA but views looking north are often contained by the woodland cover. Historically, long narrow parishes extended up from the River Nene in the Bedfordshire and Cambridgeshire Claylands NCA towards the plateau of Rockingham Forest, each having a share of the riverside, flood plain, fertile gravel terrace and open woodland. This historical sharing of resources can still influence the distribution and pattern of farms linking the forest and valley landscapes.

Publicly accessible woodlands are popular with visitors for their amenity and aesthetic value, including those from residential areas in neighbouring NCAs such as High Leicestershire. The visitor centre at Fineshade Wood offers opportunities to view red kites on the nest, cycle hire and trails for all abilities in surrounding woodlands, and attracts visitors from across the East Midlands and beyond.

Distinct areas

- Rockingham Forest
- Soke of Peterborough

Key characteristics

- Principally broad undulating plateau and ridge which falls away from a prominent steep northern scarp towards the Welland Valley.
- The distinct scarp and ridge of the Rockingham Forest area are comprised mainly of Jurassic limestones of the Great Oolite Group, with shallow or exposed Lincolnshire Limestone Formation and Northampton Sand Formation rocks of the Inferior Oolite Group along the river valleys. Boulder clay (glacial till) caps the plateau, giving rise to heavy, intractable soils unattractive for cultivation.
- The area is well wooded with large commercial conifer and broadleaved plantations, and ancient semi-natural woodlands. Large woodlands – such as Wakerley Great Wood, Geddington Chase and Fermyn Woods – form a prominent feature on the skyline.
- Ancient woodlands of national importance for nature conservation contain a diverse range of species; many are designated as National Nature Reserves (NNRs) and Sites of Special Scientific Interest (SSSI), such as Bedford Purlieus, Collyweston Great Wood and Easton Hornstocks. Some are also noted for their population of the black hairstreak butterfly and the now well-established red kites that nest among them.
- A patchwork of large- to medium-sized fields, of mixed arable and some pastoral land use, displays the rectilinear pattern of 18th- and 19th-century enclosures set within a more sinuous pattern of older enclosures, winding lanes and watercourses.

View along a narrow country lane bounded by a well maintained hedgerow with numerous hedgerow trees to one side and a typical drystone wall along the other.

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Key characteristics continued

- Fields are commonly bounded by well-managed hedgerows with characteristic mature trees or drystone walls which become more common in the Soke of Peterborough.
- A network of shallow streams, which have carved out the many small valleys, drain and run as tributaries of the rivers Nene and Welland that ultimately flow eastwards to The Wash.
- Remnant unimproved grasslands occur throughout the area. Areas of former grazing land exist within the woodlands, with low-lying grassland on the broader flood plain of the River Nene. Limestone heaths and fragments of acid bogs are found in the Soke of Peterborough where the Jurassic limestones and river gravels are exposed.
- Large country houses and mature parkland estates, such as Deene Park, Kirby Hall and Rockingham Castle, are important landscape features.
- Prominent disused ironstone quarries (gullets) and abandoned Second World War airfields are also notable historic landscape features.
- The settlement pattern is small nucleated villages with a few isolated farmsteads and houses, the former often in sheltered streamside locations. The buildings are constructed in local stone, ironstone in the west and limestone in the east. Larger historic market towns include Stamford in the north and Kings Cliffe.
- Retains a largely rural and tranquil character, particularly in the heart of the Rockingham Forest. There is a sharp transition between the countryside and the main urban areas of Peterborough, Kettering and Corby, which remain the focus for future development growth.

Rockingham Forest today

The area comprises two culturally distinct sub-units, the Rockingham Forest and Soke of Peterborough, which nevertheless share many similar physical characteristics. The Rockingham Forest area takes its title from the Royal Hunting Forest that existed across the area from the 11th to the 19th century. The forest's modern extent is defined by a combination of these former legal boundaries and its physical characteristics. The Soke of Peterborough was also a distinct administrative area for many centuries and this title is still used to define the physically distinctive countryside to the west of Peterborough.

Duddington village high street, typical of the area, with houses built with local limestone and using the heavy Collyweston roofing slates.

The distinct scarp and ridge of the Rockingham Forest area are comprised mainly of Jurassic limestones of the Great Oolite Group, including Blisworth Limestone Formation and Cornbrash Formation. Along the river valleys, both the Lincolnshire Limestone Formation and Northampton Sand Formation of the Inferior Oolite Group are exposed or near the surface. The Northampton Sand Formation contains substantial deposits of ironstone. The ironstone deposits have been mined for centuries, most recently as strip mines, resulting in deep linear quarries known as 'gullets', surrounded by extensive areas of spoil. The higher ground is capped with boulder clay (glacial till) which gives rise to heavy, intractable soils unattractive for cultivation. In the north, within the Soke of Peterborough, the land flattens out. Cornbrash and river gravels predominate near the surface, and the western margin of the area is strongly influenced by the alluvial clays and gravels along the Nene Valley.

Large areas of woodland are a significant feature of the landscape, especially the core area of historical Rockingham Forest, with areas of broadleaved as well as commercial plantations extending across the elevated plateau and ridges emphasising the topography of the landscape. Extensive areas of ancient woodland – such as Wakerley Great Wood, Geddington Chase and Fermyn Woods – form prominent features on the skyline. The blocks of woodland often coalesce visually with hedgerow trees and smaller copses to increase the perception of extensive woodland across the landscape.

Woodlands are generally separated by large fields, mainly in arable use, with cereals and oilseed rape being the most common crops. These fields have low, well-maintained hedgerows with intermittent trees, and drystone walls are a feature in some areas. There are also more enclosed areas of pasture, particularly in the valleys and the Soke of Peterborough, where sheep and cattle graze and the rectilinear pattern of Parliamentary enclosure is obvious.

The network of small streams which cross the area are tributaries of the rivers Nene and Welland. At the southern edge of the area, the Ise Valley drains southwards towards the Nene. Harpers Brook drains south-eastwards across the area.

Willow Brook, rising near the steep north-west escarpment, winds across the landscape to the Nene, to which shallow streams also flow within the Soke of Peterborough. Locally important historic riparian features such as wet meadows, pollards and ponds are becoming increasingly rare within the area's river valleys.

Historically, the heavy clay soils within Rockingham Forest deterred widespread clearance for cultivation and so many of the woodlands present today are ancient. Formerly extensively coppiced, these woodlands contain a diverse range of species that are of considerable nature conservation interest; several sites are designated as SSSI and NNRs for this reason.

The lower ground of the Soke of Peterborough supports varied remnants of semi-natural vegetation, including limestone heaths and species-rich limestone grasslands. Barnack Hills and Holes NNR is nationally important for nature conservation and is designated as a Special Area of Conservation (SAC) to protect the orchid-rich grassland which colonised this former medieval limestone quarry.

The NCA is also noted for its population of the black hairstreak butterfly. Due to changes in woodland management over the past 50 to 100 years, this butterfly is now restricted in its UK distribution to a narrow belt of woodlands between Oxford and Peterborough, including a notable population in Glapthorn Cow Pastures in the south-east of the area. The red kite, re-introduced to the area in the mid-1990s, is now has a strong and expanding local population. Popular with visitors, they can readily be seen soaring over pastures and woodlands.

Publicly accessible woodlands are popular with visitors for their amenity and aesthetic value. For example, the centre at Fineshade Wood offers opportunities to view red kites on the nest, cycle hire and trails for all abilities in surrounding woodlands.

The area contains many outstanding 17th- to 19th-century country houses and there are several Registered Parks and Gardens – such as Deene Park, Boughton House and Rockingham Castle – which make an important contribution to a sense of place and history and add to the overall wooded character of the area. Imposing churches with towers and spires, containing features dating from the 13th to the 15th century, are a striking feature of the villages.

Settlements generally lie along the valleys surrounded by small pasture fields, bounded by robust old hedgerows or stone walls, and are linked by sinuous minor roads contributing to their remote character. Larger settlements also contribute to the character of the area, notably the historic market town of Stamford in the north with its network of historic trackways converging on the centre with its collection of fine 18th-century and earlier stone buildings, and similarly for other larger settlements such as Kings Cliffe.

Despite being in close proximity to several large towns, the absence of development across wide areas imparts a distinctive, remote and tranquil character. Where long-distance views are possible, a sense of exposure prevails. This contrasts with the more settled character along river valleys. Here landform, small woodlands and hedgerow trees serve to limit views and create a more intimate landscape.

The older village centres usually have houses set parallel to the line of the single main street, their consistency of style often reflecting estate ownership. Older buildings are generally of the creamy-grey limestone in the east and ironstone in the west. Roof pitches are characteristically steep to accommodate thatch and the heavy Collyweston slates. Modern development within and around the villages is now common, with new developments tending to replicate the older vernacular stone style.

At the edges of the NCA, its character is more influenced by the brick buildings around the towns of Corby, Kettering and Peterborough and the large, modern industrial buildings and out-of-town shopping developments on their outskirts.

The landscape through time

The rocks which characterise this NCA were deposited during the Jurassic Period between about 195 and 160 million years ago, with later Pleistocene glacial sands and clays laid down on top of the Jurassic bedrock some time during the last 450,000 years. The Northamptonshire Sand Formation (including ironstones) and the Lincolnshire Limestone Formation, which are both part of the Inferior Oolite Group, were deposited in a shallow tropical sea. Overlying these deposits, the Great Oolite Group, consisting of limestones and clays, was also deposited in what was a tropical coastline environment in conditions that fluctuated between marine and brackish water. The Oxford Clay Formation was then deposited in a fully marine environment. Much later, around 450,000 years ago, ice sheets deposited stony, sandy, clay till, which drapes the bedrock in many parts of the southern two-thirds of the NCA.

The underlying rocks have been moulded by rivers and streams to form valleys, with a more pronounced slope profile and undulating landform on the rim of the plateau and ridges. Where water action has been limited, the landscape retains a plateau-like appearance. The pattern of large tracts of woodland interspersed with farmland that extends across much of the landscape reflects the widespread deposits of glacial till and associated heavy, wet soils. These were less favourable for cultivation and settlements evolved along the valleys where lighter soils are exposed (although there is increasing evidence for prehistoric settlement and land use on the heavier soils).

During the Neolithic and Bronze Age, the freely draining soils of the valleys were cleared of woodland. There were significant settlement and ritual sites on the edge of the area within the Nene Valley and the Soke around Fengate. Settlement and agriculture penetrated into the heart of the forest along the Willow Brook. The Iron Age and Roman periods saw extensive settlement by scattered, small farmsteads on the heavier claylands with the development of a major iron industry within the forest, with associated exploitation of the timber resource to produce charcoal. An ordered agricultural landscape dominated with scattered, small farmsteads. Archaeological excavations of iron kilns in Rockingham Forest suggest that the iron industry here may have been working on a scale not to be seen again until the Industrial Revolution. There was also a large Roman settlement at Castor where Ermine Street and King Street met. Substantial areas were cleared of woodland and large villas such as those found at Weldon and Barnack were established.

The striking historic Kings Cliffe village church, built using local limestone.

Woodland spread again at the end of Roman occupation and Saxon settlements lay mainly around the edge of the area as Royal or former Royal manors controlling the central woodlands. Indeed, the pattern of principal settlements lying around the edge of the forest has persisted to the present day and the centre of the area remains sparsely settled. On the north-eastern edge Meadhampstead, later to become Peterborough, was the site of one of the major monasteries of early Anglo-Saxon England. In the late Anglo-Saxon period, limestone was quarried in the northern part of the area, not least to produce the Saxon churches such as Wittering and Barnack. Barnack stone was transported by wagons and boats as far south as Essex, Bedfordshire and Hertfordshire.

Kirby Hall, one of many fine country houses found in the landscape.

By the early post-conquest period, most of the area had become Royal Forest and when the bounds were first recorded in the late 13th century they stretched from the gates of Northampton to the gates of Stamford. By this time, following centuries of clearance, much of the land was in agricultural use with open fields surrounding nucleated villages. There were also isolated farmsteads cut out of the woodland (assarted) and there were extensive areas of waste and common, particularly in the north-east.

Iron working re-emerged as a major activity during the Middle Ages when an important pottery industry also developed, along with other associated industries including charcoal produced from the woodlands. A stone slate industry developed in the Collyweston area, and limestone from quarrying activity at Barnack became some of the most prized building material of medieval England, providing stone for nationally important buildings such as Peterborough and Ely cathedrals as well as for local buildings. In the valleys around the edge of the forest area lay the principal small towns such as Oundle and Kettering, with lesser towns and market areas including Kings Cliffe and Brigstock nearer the centre. Small areas of ridge and furrow have survived due to their long use as pasture and represent fragments of the medieval strip fields that once extended across much of the landscape.

Royal and private parks developed and often these formed the basis of the post-medieval landscape, including parks and country houses such as Milton, Boughton House and Apethorpe Hall. The Dissolution of the Monasteries saw the enforced closure and selling of land of all the medieval religious houses in Northamptonshire. Pipewell Hall, Delapré Abbey and Fineshade Priory ended up in private hands and the buildings were converted to secular use or abandoned. A developing new aristocracy created, on the back of Royal patronage, sheep farming and trade, a number of large estates at this time which still dominate the landscape today. The area contains many outstanding country houses – including Rockingham Castle, Deene Park, Kirby Hall, Milton and Drayton – and the notable collection of Tudor buildings and designed landscapes associated with Thomas Tresham: Rothwell Market House, Rushton Triangular Lodge, Rushton Hall,

and Lyveden Manor and the New Bield at Lyveden. The extent of parkland has been significantly reduced by agricultural changes in the 20th century and the condition of many of the surviving areas is poor.

The iron industry petered out in the post-medieval period, but saw a brief revival in the 1850s, with a chain of quarries excavated following the arrival of the railways. As a result, some of the remaining woodland was cleared, and both Corby and Kettering saw a rapid expansion. The iron industry became centred in Corby in the 20th century. Most recently, the ironstone deposits were mined as strip mines, resulting in deep linear quarries known as 'gullets'.

Activity during both World Wars had a lasting impact on this part of the country with the establishment of military camps and bases, and a number of airfields. Following the Second World War, a new town was developed at Peterborough and an increase in arable cultivation, accompanied by the removal of hedgerows (some of pre-enclosure origin) and hedgerow trees, has opened up the agricultural land. During the 1930s and the 1960s, many wooded areas were replanted as conifer forests. More recently these have been developed as recreation centres with surfaced, self-guided trails for walkers, horse riders and cyclists.

The distinctive character of the area's stone-built and nucleated villages is very vulnerable to intrusive new development. Large-scale, modern, mixed-use development is evident on the fringes of larger settlements such as Kettering and Corby, creating visual intrusion and extending the urban fringe. These settlements are targeted for further growth. There is also pressure for residential development in the villages, which are popular with commuters, which – unless well designed and integrated sympathetically into the existing settlement pattern – will erode locally distinct historic vernacular and character.

Ecosystem services

The Rockingham Forest 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 Rockingham Forest NCA is contained in the 'Analysis' section of this document.

Provisioning services (food, fibre and water supply)

- **Food provision:** Cereals are grown on 40 per cent of farmed land in the NCA. Winter cereals and oilseed rape are the predominant crops. There is an opportunity to ensure that agriculture is managed sustainably and does not have a significant detrimental effect on the value of other ecosystem services or assets, for example water availability, water quality, soil quality and biodiversity. This will in turn bring benefits to agricultural land and assist with future provision of food.

- **Timber provision:** The NCA contains 7,720 ha of woodland (15 per cent of the total area), of which 4,195 ha is ancient woodland. The area's commercial timber woodland sites are associated with many of the NCA's important wildlife resources and also provide valuable recreational opportunities. The conifer plantations are not in character with the historic ash, small-leaved lime, oak and hazel coppice woodlands of the area. There is an opportunity to ensure that the sustainable management of the commercial forests in the NCA delivers multiple social and environmental benefits, for example recreation and biodiversity, alongside economic timber production.

- **Water availability: P**arts of the rivers Nene and Welland catchments are within this NCA. Only a short section of the River Nene passes through the NCA. Water is abstracted from these rivers, when flow rates are above agreed levels, to supply Rutland Water reservoir (in the Leicestershire and

Nottinghamshire Wolds NCA) which is used as a strategic resource for water supply within the Anglian region. Rutland Water is an important nature reserve which supports an internationally important assemblage of waterfowl and so is designated as a Special Protection Area and Ramsar site. The NCA is in a low rainfall area and prolonged droughts are not uncommon, leading to low river flows. Levels of abstraction, particularly downstream of Stamford, may be having an effect on water flows. The shallow, lime-rich soils to the north of the NCA are typically free draining and have a degree of natural resilience due to their calcareous nature; they can be valuable for aquifer recharge. Elsewhere, the area's impermeable soils mean that run-off rates are high, especially during intense rainfall episodes and following prolonged drought. This limits the volume of water able to percolate the aquifer.

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

- **Climate regulation:** The notable woodland cover of this NCA (15 per cent), both deciduous and coniferous, brings benefits for carbon sequestration but this may be increased by the planting of new woodlands. Soils beneath ancient woodland and permanent pasture, both elements of this landscape, will have higher levels of stored carbon than regularly cultivated soils.

- **Regulating water quality:** Parts of the rivers Nene and Welland catchments are within this NCA. Only a short section of the River Nene passes through the NCA. The chemical quality of the Nene is not failing at present. The ecological quality of the Welland is poor. All of the NCA is within a nitrate vulnerable zone (51,001 ha) in respect of both surface and groundwater. Diffuse pollution is an issue in the catchments, where discharges from sewage treatment works and run-off from roads or industrial areas can all be sources of pollution. When combined with pollution from rural areas, the excessive levels of nutrients, sediments and pesticides are having a severe impact in the catchments, not only on water quality in rivers but also on groundwater. Drinking Water Protected Area status applies to the catchments and water is abstracted, when flow rates are above an agreed level, to supply Rutland Water reservoir which is a strategic regional domestic water resource. It is also designated as an SSSI and SAC.

- **Regulating water flow:** Natural flow rates in the Nene and Welland vary markedly. Largely due to the impermeable nature of many of the soils, which lead to high run-off rates, both the river catchments are prone to flash flooding during periods of intense rainfall and when the ground is already saturated. At such times, Stamford and Peterborough are particularly prone to flooding as are many low-lying villages further upstream within this NCA. The NCA is in a low rainfall area and prolonged droughts are not uncommon, leading to low river flows. Levels of abstraction, particularly downstream of Stamford, may be having an effect on water flows. Land management measures in the river catchments may have beneficial effects to reduce flood risk downstream, for example additional planting of woodland and hedgerows and re-establishing flood meadows to slow cross-land water flow.

Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration:** A characteristic of the area are the stone-built, nucleated villages. Settlements generally lie off the boulder clay, along the valleys, and are surrounded by small pasture fields (often conserving medieval ridge and furrow), more robust hedgerows and occasional stone walls. They are served by minor country roads with the typical wide verges of the enclosure period, which often follow circuitous routes so that many areas are very remote and deeply rural. Networks of tributary streams of the rivers Nene and Welland occur throughout as do extensive areas of ancient woodland which are a strong unifying characteristic, with large woodlands – such as Wakerley Great Woods, Geddington Chase and Fermyn Wood – forming a prominent feature on the skyline. Many of these woodlands are of high nature conservation interest and are important landscape features in their own right, as is Rockingham Forest. John Clare, the 19th-century poet born at Helpston, drew inspiration from agricultural changes that took place in the area at this time. The many majestic country houses and their designed landscapes are striking and inspirational features in their own right.

- **Sense of history:** A rich time-depth is illustrated by the many Listed Buildings and Scheduled Monuments found here, such as a Roman villa at Little Weldon and the medieval settlement at Pipewell, as well as the industrial activities of quarrying building stone and iron ore and the history of land use and enclosure which provides the setting to them. There are 11 Registered Parks and Gardens, many of which have outstanding country houses with imposing fabric ranging from the 16th to the 19th century. The character of Rockingham Forest is shaped by its former status as a Royal Hunting Forest. This restricted settlement and encouraged the establishment of hunting lodges that were later developed into the distinctive great houses and parklands still present today. The area's iron deposits have been extensively mined throughout time, most recently as strip mines resulting in the abandoned deep linear 'gullets' still present today.

- **Recreation:** The centre at Fineshade Wood is a popular visitor attraction, with upwards of 250,000 visits per year. It offers opportunities to view red kites on the nest and other wildlife. Additionally there are trails for all abilities, cycle hire, horse riding trails, a café, a shop and a campsite. The area's many historic houses and parklands are another popular visitor attraction. Four per cent of the NCA is classed as publicly accessible; this includes woodlands, NNRs and 114 ha of parklands. The network of 562 km of public rights of way offers the visitor opportunity for more informal exploration, recreational pursuits and tranquillity.

- **Biodiversity:** Although only 22 ha in size, Barnack Hills and Holes NNR and SAC is designated to protect its orchid-rich grassland. More than 300 kinds of wild plant have been found here, including eight species of orchid (for example man, pyramidal, fragrant and frog orchids). The site is renowned for its population of the rare pasque flower. A total of 34 SSSI lie wholly or partly within the NCA (2 per cent of the area) and 59 per cent are in unfavourable recovering condition. There are 259 local sites of biodiversity interest in Rockingham Forest (14 per cent of the NCA). These are an important biological resource which should form part of any ecological networks that might be created in the future. The NCA is noted for its population of the black hairstreak butterfly, and red kites, re-introduced in the 1990s, are now a common sight in the skies.

- **Geodiversity:** There are two geological SSSI and 28 Local Geological Sites within the NCA. Barnack Hills and Holes is a redundant medieval limestone quarry which now supports internationally important species-rich limestone grassland. Around the fringes of the area, river gravels and sands are still being extracted for the construction industry. Both limestone and ironstone deposits were formerly quarried for use in local buildings. Limestone was transported far afield and used in the construction of Ely and Peterborough cathedrals. The distinctive Collyweston slate was quarried and used extensively as a roofing material in the local area. Iron deposits supported an important medieval and mid-19th-century iron industry.

Rockingham village high street with the ironstone buildings typically found in the east of the NCA, roofed in Collyweston slates and thatch.

Statements of Environmental Opportunity

SEO 1: Extend the area and connectivity of broadleaved woodland, individual trees and hedgerows in the core Rockingham Forest area, seeking to enhance historic landscape character and biodiversity and increasing the potential for timber, biomass, access and recreation, while helping to regulate the impacts of climate change and maintaining and improving water and soil quality.

For example, by:

- Supporting the planting of new broadleaved woodlands that are well integrated with the surrounding landscape and do not impact negatively upon the integrity of other sites of biological, geological or historical interest. New woodlands should connect existing ancient woodland and historic parkland sites and provide both biodiversity and recreational opportunities.
- Developing and promoting mechanisms for the re-introduction of cost-effective ancient woodland management and managing recent woodlands similarly to enhance their biological and structural diversity in the long term. This should include reinstating the use of rotational coppice systems, especially where neglected in ancient woodlands, by supporting the establishment of markets for coppice system produce.
- Addressing the impact the deer population has on the capacity for woodland regeneration and structural and biological diversity.
- Supporting partnership initiatives that seek to re-introduce appropriate management of neglected woodland rides and glades to provide suitable habitat for expansion of the black hairstreak butterfly and other woodland fauna and flora. This includes establishing new woodlands and shelterbelts to provide a network along which the butterflies can disperse across the National Character Area (NCA).
- Supporting initiatives that replace coniferous monoculture plantations with mixed-species woodlands as commercial crops reach maturity, releasing quantities of timber to stimulate the local woodland economy.
- Looking for opportunities to extend and enhance the public rights of way network and to create other areas of permissive access. In particular, where new development is planned, looking for opportunities to establish green infrastructure links out into the surrounding countryside and woodlands. Offering local communities and visitors alike opportunities to learn more about and get involved with the local woodland environment.

View of the enclosed wooded landscape looking across to Finneshades woodland.

SEO 2: Maintain and enhance the quality of natural sites of interest across the area, and particularly within the farmed landscape, seeking to realise opportunities to strengthen ecological networks and increase the quantity and quality of semi-natural habitat mosaics and geodiversity sites, providing additional benefits to recreation and so enhancing visitors' experiences and understanding as well as the local economy.

For example, by:

- Looking for opportunities to work in partnership across the environmental, business and voluntary sectors to increase the quality, quantity and connectivity of wildlife sites in the NCA. Supporting the establishment of new networks which incorporate isolated wildlife sites and establishing a variety of new habitats – such as lowland grasslands, flood plain meadows, hedgerows and scrub – to best reflect the character of the local landscape.
- Seeking opportunities to enhance the farmed landscape by creating more semi-natural habitats (such as grasslands, scrub, field margins and hedgerows), including provision of habitats for pollinators and species that could assist in the control of crop pest species and establishing ecological networks, especially utilising riverine and woodland corridors. This will help to protect soils, improve water quality and enhance biodiversity.
- Continuing to implement the management plan for Barnack Hills and Holes Special Area of Conservation, seeking to further enhance its ecological and geological value, looking for opportunities to create an accessible, non-agricultural buffer around its fringe to help absorb recreational pressures, and closely involving the local community in its long-term care.
- Looking for opportunities to enhance the quality, quantity and connectivity of lowland limestone grasslands – including improved management regimes, provision of non-arable buffers to existing grasslands and the creation of new meadows using existing species-rich grasslands as a seed source that might help to connect isolated sites in the long term. Examine the feasibility of establishing a viable regional grazing livestock resource to manage the meadows.
- Supporting the establishment of new broadleaved woodland areas that connect existing ancient woodland sites and provide landscape, biodiversity and recreational benefits.
- Conserving and enhancing the geological, intellectual accessibility and biodiversity of abandoned limestone quarries and ironstone workings, incorporating geological sites into any ecological networks.
- Promoting important geological features by making links between geology, landscape and industrial and cultural heritage, reflecting the fact that geology has played a major role in shaping the landscape, providing an iron industry and the building stones that characterise the area.
- Recognising that landscape and biodiversity in the NCA are key attractions for visitors and are important for recreation and creating a sense of place that has intrinsic and societal value and can be interpreted to enhance recreational experience.
- Promoting the health and wellbeing benefits, recreational and educational opportunities afforded by the rights of way network, accessible local woodlands and other wildlife sites. Offering local communities opportunities to enjoy and take action to improve and care for their local green spaces.

SEO 3: Manage and enhance the distinctive elements that contribute to the overarching sense of place and history of the Rockingham Forest area. Seek to retain its predominantly rural character and core areas of tranquillity while planning to accommodate sensitively designed new development, including functional green infrastructure.

For example, by:

- Limiting the visual impact of new housing, agricultural and energy infrastructure developments by ensuring that they are appropriate in terms of design and scale and sited so that they do not intrude visually upon the open landscape or distinctive landmarks.
- Encouraging the use of innovative architectural and planning solutions that take inspiration from local distinctiveness and character while utilising eco-friendly and high-quality design and, where appropriate, locally sourced building materials.
- Seeking to prevent development coalescence, ensuring that separation is maintained between the urban fringe and surrounding settlements. Maintaining the dispersed settlement pattern of small, nucleated, generally stone-built villages along sheltered valleys.
- Planning for new green infrastructure links, such as appropriately sited woodland and hedgerow corridors, to screen and soften the visual impact of new developments.
- Preparing and implementing historic parkland management and restoration plans as appropriate, including the smaller parkland landscapes which are often more vulnerable to neglect.
- Maintaining and enhancing the characteristic networks of hedgerows and drystone walls that enclose the landscape and display the rectilinear pattern of enclosures set within a more sinuous pattern of older enclosures, winding lanes and watercourses. Encouraging replanting of hedgerows and hedge-laying, establishing a programme for the ongoing replacement of mature hedgerow trees and reinstating priority drystone walls found particularly in the north of this area.
- Maintaining and enhancing the historical and biodiversity interests of remnant ridge-and-furrow ploughland that often survives around the fringes of settlements on permanent pasture. Seeking to retain and enhance their interrelationship to historic buildings and farmsteads.
- Expanding the public rights of way network, especially near to where people live and visit, to offer better opportunities for informal exploration of the NCA. In particular, increasing green infrastructure links to and from urban areas such as Corby and Kettering out to the recreational areas in the centre of the NCA would help to encourage more sustainable exploration of the local countryside on foot, by bike and on horseback.
- Enhancing the intellectual accessibility of the area's many historical, cultural and natural assets, including the history of Rockingham as a Royal Hunting Forest, the many historic houses and parklands, the history and values of its National Nature Reserves, and the importance of the area for its notable species such as the red kite and black hairstreak butterfly.
- Growing and strengthening the local visitor economy and infrastructure, in a manner which is sympathetic to the rural nature and tranquillity of the area.

SEO 4: Enhance the functionality, biodiversity and historic features of the many small rivers and streams that cross the Rockingham Forest area. Seek to strengthen their contribution to regulating water flow and quality in the Nene and Welland catchments, enhance their role as landscape features, and improve riparian corridors for wildlife and recreation.

For example, by:

- Identifying opportunities within the Nene and Welland catchments to create and extend semi-natural habitats (such as lowland flood meadows and reedbeds) to enhance biodiversity, slow down the movement of water in the system, hold back water in peak flow events and so reduce flood risk downstream, and improve water quality and aquifer recharge.
- Encouraging the adoption of agricultural land management practices that reduce diffuse pollution, slow run-off rates and reduce soil erosion to improve water quality and thus biodiversity. This could include creating rough grassland buffer strips along water corridors, planting riverside willows and creating small wet meadow or carr areas on marginal low-lying agricultural land.
- Looking for opportunities to manage and enhance locally important historic riparian features (such as wet meadows, pollards and ponds) that are becoming increasingly rare within the area's river valleys.
- Looking for ways to enhance the recreational opportunities offered by riparian corridors, creating permissive access routes that link to the existing public rights of way network and seeking to give people access out to the wider countryside from residential areas.

Looking west along a flooded Welland Valley and the Haringworth Viaduct and into High Leicestershire NCA.

Supporting document 1: Key facts and data

Area of Rockingham Forest National Character Area (NCA): 51,001 ha

1. Landscape and nature conservation designations

There are no National Parks or Areas of Outstanding Natural Beauty in this NCA.

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	n/a	0	0
European	Special Protection Area (SPA)	n/a	0	0
	Special Area of Conservation (SAC)	Barnack Hills and Holes SAC	24	<1
National	National Nature Reserve (NNR)	Bedford Purlieus Collyweston Great Wood and Easton Hornstocks NNR; Castor Hanglands NNR; Barnack Hills and Holes NNR	473	1
	Site of Special Scientific Interest (SSSI)	A total of 34 sites wholly or partly within the NCA	1,093	2

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.

At Bedford Purlieus the SSSI is bigger than the NNR, at Collyweston the NNR and SSSI have the same boundary, at Barnack Hills and Holes the SSSI, SAC and NNR boundaries are the same, and at Castor Hanglands the NNR and SSSI boundaries are the same.

There are 259 local sites in Rockingham Forest covering 6,406 ha, which is 14 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	112	10
Favourable	141	13
Unfavourable no change	190	17
Unfavourable recovering	648	59

Source: Natural England (March 2011)

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

2. Landform, geology and soils

2.1 Elevation

The NCA is a lowland area. The lowest parts of the county (below 10 m Ordnance Datum) are situated along the base of the Nene Valley where the river runs through the parishes of Yarwell, Nassington and Fotheringhay close to the border with Cambridgeshire. The glacial clay plateau of Rockingham Forest NCA is a maximum of around 130 m in height.

Source: Natural England 2010

2.2 Landform and process

Rivers have cut into the glacial clay plateau to form the valley of the River Nene to the east and the River Welland to the west, both of which contain river sands and gravels. The area is defined in the north-west by a steep scarp slope which overlooks the Welland valley and decreases to much more gentle landforms around the northern edge of the Soke of Peterborough. To the south-east it is bordered by the Nene valley and, to the east, by the urban edge of Peterborough. In the south-west it ends against the open clay vales of Northampton and the town of Kettering.

Source: Rockingham Forest Countryside Character Area Description

2.3 Bedrock geology

The scarp and ridge which forms the Rockingham Forest area is mainly Jurassic limestone of the Great Oolite, including Blisworth Limestone and Cornbrash. Along the river valleys, the Lincolnshire Limestone and Northampton Sand of the Inferior Oolite are exposed or near the surface. The Northamptonshire Sand contains substantial deposits of ironstone.

Source: Rockingham Forest Countryside Character Area Description; Rockingham Forest Natural Area Profile

2.4 Superficial deposits

The plateau (and highest point) of NCA is capped by glacial boulder clay. To the north the land slopes into lower ground where the Jurassic limestones are exposed and river gravels are present towards Peterborough and the Nene valley.

Source: Rockingham Forest Countryside Character Area Description; Rockingham Forest Natural Area Profile

2.5 Designated geological sites

Tier	Designation	Number
National	Geological Site of Special Scientific Interest (SSSI)	2
National	Mixed Interest SSSI	0
Local	Local Geological Sites	28

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

There are 7 main soilscape types in this NCA; lime-rich loamy and clayey soils with impeded drainage, covering 28 per cent of the NCA, slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (23 per cent), shallow lime-rich soils over limestone (19 per cent), freely draining lime-rich loamy soils (10 per cent), restored soils mostly from mineral operations (8 per cent), freely draining slightly acid but base-rich soils (7 per cent), and slightly acid loamy and clayey soils with impeded drainage (4 per cent).

The lime-rich loamy and clayey soils with impeded drainage (28 per cent) are calcareous soils with some natural resilience and enhanced workability. These soils are at risk of topsoil compaction and poaching requiring careful management of weak top-soils to maintain good soil structure, including through minimum tillage and addition of organic matter.

The slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (23 per cent) may also suffer compaction and/or capping as they are easily damaged when wet. In turn, this may lead to increasingly poor water infiltration and diffuse pollution as a result of surface water run-off.

The shallow lime-rich soils over limestone (19 per cent) are typically shallow and droughty while the freely draining lime-rich loamy soils (10 per cent) are typically of moderate depth and droughty. Both soils have a degree of natural resilience due to their calcareous nature and can be valuable for aquifer recharge, requiring the maintenance of good soil structure to aid water infiltration (aided by enhanced organic matter levels) and the matching of nutrients to need to prevent groundwater pollution.

Source: Natural England (2010), National Soils Research Institute Soilscape maps

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	0	0
Grade 2	1,082	2
Grade 3	40,790	80
Grade 4	1,561	3
Grade 5	0	0
Non-agricultural	5,164	10
Urban	2,406	5

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 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.

- Harper's Brook 24 k m
- River Ise 19 km
- River Welland 9 km
- River Nene <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 River Nene forms part of the upper Nene Gravel Pits SPA, and forms the east and south boundary of the NCA. Only a short section of the river passes through the NCA. The River Ise and Harper's Brook cross the southern part of the NCA and join the Nene in the Northamptonshire Vales NCA. The River Welland forms the west and north boundary of the NCA. Both the Welland and the Nene pass across the Fens and into the Wash, which is designated SPA, Ramsar and SAC. The River Nene flows through the Nene Washes SPA, SAC and Ramsar into the Wash. Willow Brook, arising near the steep north-west escarpment, winds across the area to the Nene, to which shallow streams also flow within the Soke of Peterborough.

3.2 Water quality

The total area of Nitrate Vulnerable Zone is 51,001 ha which is 100 per cent of the NCA.

Source: Natural England (2010)

3.3 Water Framework Directive

Maps are available from the Environment Agency showing current and projected future status of water bodies 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 7,720 ha of woodland (15 per cent of the total area), of which 4,195 ha is ancient woodland.

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

4.2 Distribution and size of woodland and trees in the landscape

Extensive areas of ancient woodland are a strong unifying characteristic of this NCA. The highest points of the NCA are capped by glacial till and it is here that the surviving ancient woodlands lie, emphasising the relief. Extensive woodlands like Wakerley, Geddington Chase and Fermyn are prominent features on the skyline. Many of these woodlands are of high nature conservation interest and are attractive landscape features in their own right. They were formerly extensively coppiced and small-leaved lime is a particular feature of the eastern woods. Large woodlands are located on higher ground. Apart from the woodlands, the main tree cover comes from the frequent large historic parks like Rockingham, Deene, Drayton and Boughton. Large mature landscape parks and country houses are also present. In the valley floors trees line the watercourses. The crest of the ridge above the Welland valley is almost continuously lined with woodland.

Source: Rockingham Forest Natural Area Profile; Rockingham Forest Countryside Character Area Description

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	5,501	11
Coniferous	1,539	3
Mixed	121	<1
Other	559	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	2,099	4
Planted Ancient Woodland (PAWS)	2,096	4

Source: Natural England (2004)

5. Boundary features and patterns

5.1 Boundary features

Large arable fields between the woodlands generally have low hedgerows and intermittent trees, localised in distribution, with willow pollards along stream sides and wetter areas. There are also some more enclosed areas of pasture with a better hedgerow structure, particularly in the valleys, as well as areas with drystone walls. The Soke of Peterborough has many low hedgerows and wide horizons and areas with drystone wall. Settlements are surrounded by small pasture fields, more robust hedgerows and occasional stone walls. Locally prominent stone walls face dereliction or have been inappropriately restored. As of March 2011 Environmental Stewardship schemes were supporting the management of 946 km of hedgerow and 7 km of drystone wall within this NCA.

Source: Rockingham Forest Countryside Character Area description; Countryside Quality Counts (2003)

5.2 Field patterns

The period since the 1970s has seen an increase in arable cultivation, with corresponding removal of hedgerows and hedgerow trees giving the open agricultural land an abrupt contrast with the woodland. Hedgerow removal and neglect has changed the field patterns and is having a significant effect on landscape character. This is compounded by the loss of hedgerow trees. Between the Forest and the Soke of Peterborough there are both hedgerows and drystone walls and the rectilinear pattern of parliamentary enclosure is very obvious.

Source: Rockingham Forest Countryside Character Area description; Countryside Quality Counts (2003)

6. Agriculture

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

6.1 Farm type

This NCA is predominantly an area of arable farming. In 2009 117 holdings were growing cereals, an increase from 112 in 2000. Farm holdings grazing livestock increased from 39 to 44 between 2000 and 2009.

Source: Agricultural Census, Defra (2010)

6.2 Farm size

In 2009 there were 106 farms over 100 ha (40 per cent of all holdings in the NCA, 87 per cent of the area of farmed land or 29,879 ha of the NCA or 60 per cent of the NCA), a decrease from 115 in 2000. In the small farm category, in 2009 49 were properties between 5 ha and 20 ha (20 per cent of all holdings or 1 per cent of the farmed land area). Between 2000 and 2009 the biggest change in farm size category was in the 20 ha to 50 ha bracket which increased from 24 in 2000 to 33 in 2009. In 2009 there were 15 holdings of <5 ha in size. In 2009 the total number of farm holdings was 237.

Source: Agricultural Census, Defra (2010)

6.3 Farm ownership

Farms are divided roughly equally between tenanted (17,816) and owned (16,648) farms.

2009: total farm area = 34,031 ha; owned land = 16,648 ha (49 per cent)
2000: Total farm area = 36,124 ha; owned land = 17,249 ha (48 per cent)

Source: Agricultural Census, Defra (2010)

6.4 Land use

In 2009 farmland was predominantly used to grow crops (117 holdings and 13,789 ha) and graze livestock (9,854 ha). Between 2000 and 2009 the number of holdings growing cereals increased, while the land area on which crops are grown decreased from 16,623 ha to 13,789 ha. The area on which stock feed was grown decreased between 2000 and 2009 by 72 per cent to 13 ha. The area on which oil seeds were grown increased by 77 per cent between 2000 and 2009 to 5,701 ha. Between 2000 and 2009 the area of land under fruit production increased by 212 per cent to 25 ha. The area of land on which cash roots were grown decreased by 55 per cent to 270 ha.

Source: Agricultural Census, Defra (2010)

6.5 Livestock numbers

The numbers of livestock in this NCA fell between 2000 and 2009 as follows: cattle by 12 per cent to 8,900, sheep by 46 per cent to 29,800, and pigs by 78 per cent to 1,700. The area of uncropped grassland decreased by 16 per cent.

Source: Agricultural Census, Defra (2010)

6.6 Farm labour

In 2009 there were 24 salaried managers and 321 principal farmers. In 2009 there were almost twice as many full-time workers (99) as part-time (52) and in 2000 there were nearly four times as many full-time workers (134) as part-time (32). Between 2000 and 2009 the number of part-time workers increased by 63 per cent and the number of full-time workers decreased by 25 per cent.

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

Ancient semi-natural broadleaved woodland is the major habitat resource of the NCA, and is well represented throughout the area. Most of the woods stand on poorly drained calcareous clays and their characteristic tree and shrub species are ash, pedunculate oak, field maple, hazel, hawthorn, midland hawthorn and wild service tree with local concentrations of wych elm, small-leaved lime and English elm. Pockets of acid sands occur locally, where the woodland supports sessile oak, small-leaved lime, silver birch and hazel. Unimproved calcareous grassland is found on quarries, some of which were abandoned in the medieval period such as Barnack Hills and Holes.

Source: Rockingham Forest Natural Area Profile

7.2 Priority habitats

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

http://www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/englandsbiodiversitystrategy2011.aspx

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

Priority habitat	Area (ha)	% of NCA
Broad-leaved mixed and yew woodland (broad habitat)	3,422	7
Lowland calcareous grassland	382	1
Coastal and flood plain grazing marsh	347	1
Lowland meadows	253	<1
Fens	43	<1
Purple moor-grass and rush pastures	5	<1
Reedbeds	5	<1

Source: Natural England (2011)

Maps showing locations of 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 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

A distinctive characteristic of the area is stone-built, nucleated villages. Settlements generally lie off the boulder clay, along the valleys and are surrounded by small pasture fields, with robust hedgerows and occasional stone walls. They are served by minor country roads with the typical wide verges of the enclosure period, which often follow circuitous routes so that many areas are very remote and deeply rural. To the north of the NCA there are isolated farmsteads. There is a sharp transition between the countryside and the main towns of Kettering, Corby and Peterborough (which lies just outside the area) which have developed rapidly in recent years. The edge of Peterborough is well-integrated with substantial new woodlands and extensive new town planting. The principal small towns, like Oundle and Kettering lie in the valleys at the edge of the forest. At the edges of the area the village character is more influenced by high density post-war housing. Lesser towns and ancient market areas like Kings Cliffe and Brigstock lie nearer the centre. Royal and private parks formed the basis of post-medieval landscape parks and the settings of country houses. The towns of Corby, Kettering and Peterborough have extensive areas of 19th and early 20th century brick buildings with large modern industrial buildings and out-of-town shopping development on their outskirts. The area contains many outstanding country houses including Rockingham Castle, Deene Hall, Milton, Drayton, Apethorpe and Boughton.

Source: Rockingham Forest Countryside Character Area description; Countryside Quality Counts (2003)

8.2 Main settlements

The main settlements are Kettering and Corby. The total estimated population for this NCA (derived from ONS 2001 census data) is: 144,640.

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

8.3 Local vernacular and building materials

The predominant building material of the 19th and early 20th century buildings is brick, usually red, with Welsh slate roofs. There are some timber-framed buildings of medieval to 17th century date. Sandstone was used for some of the more important buildings, particularly churches. Furnace slag was used locally as a material for walls.

Source: Rockingham Forest Countryside Character Area description; Countryside Quality Counts (2003)

9. Key historic sites and features

9.1 Origin of historic features

There is a lack of upstanding monuments in the county of Northamptonshire as a result (almost exclusively) of the many centuries of intense agricultural activity which has seen monuments being ploughed out. There are 50 scheduled monuments, from Roman villa sites, for example at Little Weldon, through the Cistercian abbey and medieval settlement at Pipewell, to the Elizabethan warreners' lodge and rabbit warren at Rushton Triangular Lodge. Monastic buildings from the middle ages have been lost. There are 11 Registered Parks and Gardens in the NCA, many of which have outstanding country houses, including Rockingham Castle, Deene Hall, Milton, Drayton, Apethorpe and Boughton, with imposing fabric ranging from the 16th to the 19th centuries. More recent monuments include memorials at Second World War airfields and gullets produced by iron workings.

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

9.2 Designated historic assets

This NCA has the following historic designations:

- 11 Registered Parks and Gardens covering 1,872 ha
- 0 Registered Battlefields
- 50 Scheduled Monuments
- 1,516 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

- 4 per cent of the NCA 1,842 ha is classified as being publically accessible.
- There are 562 km of public rights of way at a density of 1.1 km per km^2.
- There are no National Trails within this NCA.

Source: Natural England (2010)

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

Access designation	Area (ha)	% of NCA
National Trust (Accessible all year)	n/a	n/a
Common Land	30	<1
Country Parks	114	<1
CROW Access Land (Section 4 and 16)	85	2
CROW Section 15	6	<1
Village Greens	9	<1
Doorstep Greens	0.5	<1
Forestry Commission Walkers Welcome Grants	15	<1
Local Nature Reserves (LNRs)	54	<1
Millennium Greens	0	0
Accessible National Nature Reserves (NNRs)	321	1
Agri-environment Scheme Access	74	<1
Woods for People	1,678	3

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) the area of this NCA with the lowest tranquillity score is to the east of Corby. The least disturbed area is to the south of Woodnewton. Areas least disturbed are in the heart of the forest between the villages of Apethorpe, Southwick and Blatherwycke.

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

Category of tranquillity	Score
Highest value within NCA	111
Lowest value within NCA	-70
Mean value within NCA	-0.2

Source: CPRE (2006)

- More information is available at the following address: **http://www.cpre.org.uk/what-we-do/countryside/tranquil-places/in-depth/item/1688-how-we-mapped-tranquillity**

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 the area considered most disturbed is in the west of the NCA, around Corby and the Rockingham Speedway Track as well as around Kettering. Areas of undisturbed land occur mainly in the east and north of the NCA in the heart of Rockingham Forest.

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

Category of intrusion	1960s (%)	1990s (%)	2007 (%)	% change (1960s-2007)
Disturbed	27	42	49	+22
Undisturbed	67	53	45	-22
Urban	5	6	7	+2

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are that the area considered urban has increased, disturbed areas have increased by more than three quarters and the area considered undisturbed has decreased by one third.

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

The limestone grassland at Barnack Hills and Holes National Nature Reserve with the stunning pasque flower growing in the foreground.

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)
- 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

- The proportion of woodland sites covered by Woodland Grant Scheme agreements changed between 1999 and 2003 from 12 per cent of all woodlands in the NCA to 35 per cent.
- Many of the ancient woodland sites have been replanted as commercial conifer forests, though this trend has now ceased. When the Norway spruce, which had been planted in many of the woodlands, suffered large scale dieback in the 1980s and 1990s, the results of a policy review decided to concentrate on the restoration of native woodland. The Ancient Woodland Project was launched in March 2000 and involves the removal of conifer plantations and the restoration of semi-natural woodland with species such as ash, oak and field maple.
- Most of the remaining woodland coppice suffers from neglect due to a combination of ongoing management costs, lack of a viable market for coppice products and the impacts of the high deer populations, particularly browsing of coppice regrowth. The decline of this traditional woodland management threatens the long-term survival of historic broadleaved woodland across many parts of the area, and its associated flora and fauna such as the now restricted UK population of the black hairstreak butterfly for which the area is noted.

Boundary features

- In some areas, hedgerow removal and neglect, including the continued loss of hedgerow trees, has changed the field patterns and has had a significant impact on the landscape character of the NCA.
- 2011 Environmental Stewardship data for linear features includes 945,767m of hedgerow restoration, 7,119 m of drystone wall repair and 68,386 m of ditch management.
- Boundary loss (hedgerows and stone walls) as a result of neglect and poor repair continues to threaten the integrity of the historic landscape pattern and its intrinsic character across the area.
- The Rockingham Forest Trust aims to conserve and enhance the best-preserved networks of hedgerows and establish hedgerow trees in suitable locations. They also aim to manage and establish green corridors, including ditches, headlands and green lanes, as visual and wildlife links across arable areas.

Agriculture

- Large- to medium-sized fields of mixed arable and some pastoral land use, with arable land generally on the broader flat plateau areas and smaller pastures often on the valley slopes.

- Agricultural intensification has led to hedgerow removal and decline, significantly changing the field pattern in the landscape. Locally, stone walls have been removed or are in need of repair. The biodiversity of lowland grassland and meadows along river valleys has declined, with conversion of permanent pasture to improved grassland for silage and grass leys, resulting in a more uniform and homogenous landscape. Uptake of Stewardship options in some areas has gone someway to help reverse these trends over the past 10 years.

Settlement and development

- In 2003 development pressure was described as being relatively low compared to other NCAs. However, for the future significant levels of growth are targeted in the area, notably Corby and its wider setting that falls within the Milton Keynes growth area.

- The distinctive character of the area's stone built and nucleated villages is vulnerable to intrusive new development. Large-scale modern mixed-use development is evident on the fringes of larger settlements such as Kettering and Corby, creating visual intrusion and extending the urban fringe. These settlements are targeted for further growth. There is also pressure for residential development in many villages, which are popular with commuters. The impact of the new development on the setting and views of churches and other notable historic buildings is particularly important, as these are often distinctive local landmarks.

- The towns of Corby, Kettering and Peterborough have extensive areas of 19th- and early 20th-century brick buildings with large modern industrial buildings and out of town shopping developments with associated road networks.

- The urban areas of Kettering, Corby and Peterborough have expanded and new residential and commercial developments now occupy former agricultural land on their fringes. Further growth of these areas is planned.

Semi-natural habitat

- Many of the area's older biologically rich grassland have been lost in recent times through agricultural improvement and cultivation and those that remain are consequently of increased importance. Uptake of agri-environment schemes for regeneration of grassland/semi-natural vegetation and lowland hay meadows over the past 10 years has made a positive contribution to conserving this resource.

- During the 1970s, parts of the Welland catchment were straightened and deepened as part of a flood alleviation and land drainage programme. The change to the natural course of the river has led to loss of habitat, and flood defence structures within the channel have affected fish passage. The physical modifications within the catchment will make it hard to achieve good ecological status. The chemical and ecological quality of the Welland is poor and the Nene fails chemically and is of moderate ecological status, diffuse pollution is an issue being actively addressed in the catchments but ecological quality is unlikely to improve significantly in the short term.

- Although many of the ancient woodlands remain neglected, steps have been taken by the Forestry Commission, for example, to re-introduce positive management to these areas. The practice of felling broadleaved woodland and replanting with conifers has stopped and is being reversed by replanting with native broadleaved species in some forestry compartments.

- The populations of wild deer in the area have significantly expanded over the past 10 years and this is having a detrimental impact on the structure of woodlands and their ability to regenerate naturally. Steps are being taken to control deer populations and where there is new planting or coppice, to protect regrowth from damage by deer browsing.

- Uptake of Environmental Stewardship has had a positive influence on the replanting and restoration of hedgerows in many areas of the NCA going some way to help reverse the widespread losses seen in previous decades. Alongside the uptake of field margins this has increased biodiversity habitat across the farmed landscape.

- The areas NNRs, SSSI and local wildlife sites remain the core biological resource for the NCA albeit as fragmented and isolated sites. Active management of many of these sites has improved; in 2011 59 per cent of designated sites in the NCA were in unfavourable recovering condition.

Historic features

- There is limited evidence of Countryside Stewardship agreements for management of historic landscapes. In 1918 about 8 per cent of the NCA was historic parkland by 1995 it is estimated that 23 per cent had been lost.

- The former extent of parkland in the area has been reduced by agricultural changes in the 20th century. Many of the surviving areas are neglected and would benefit from appropriate conservation management.

- About 28 per cent of the remaining parkland is covered by a Historic Parkland Grant and about 25 per cent is included within an agri-environment scheme. Thus, the resource probably remains neglected. It should also be noted that about 65 per cent of the listed historic farm buildings remain unconverted, although most are still structurally intact. There is a need for constant investment in the upkeep of historic houses to avoid structural decay.

- Wet meadows, pollards and ponds are locally important historic riparian features that are becoming increasingly rare within the area's river valleys and where present suffer from neglect.

Coast and rivers

- Water is abstracted from the Nene and Welland rivers, when flows are above agreed levels, to supply Rutland Water reservoir (NCA 74) which is used as a strategic resource for water demand within the Anglian region. Rutland Water is also an important nature reserve which supports an internationally important assemblage of waterfowl and so is designated as a Special Protection Area and Ramsar site.

- Largely due to the impermeable nature of many of the soils leading to high run-off rates, both the river Nene and Welland catchments are prone to flash flooding during periods of intense rainfall and when the ground is already saturated. Land management measures, such as the creation of flood storage areas in the river catchments, are being explored and implemented to reduce flood risk to residential areas.

- The ecological status of the Welland in the Rockingham Forest NCA is poor; the Nene does not fail chemically at present and is of moderate ecological status. Diffuse pollution is an issue being actively addressed in the catchments (nitrate vulnerable zone status applies to the whole NCA) but ecological quality is unlikely to improve significantly in the short term. However, by 2015 chemical quality in both the Nene and Welland is predicted to improve.

Minerals

- Historically the ironstone quarrying industry has been important. The gullets which remain from this activity are important landscape features today.
- Abandoned workings have been used as landfill sites such as at Kings Cliffe. Abandoned quarries are key features in the landscape today.

Drivers of change

Climate change

- Climate trends suggesting increased periods of intense rainfall, periods of drought, and more frequent storm events.
- Periods of intense rainfall may exacerbate soil run-off and localised flash flooding events in this NCA.
- An increase in summer droughts is likely to lead to an increase in soil erosion through wind-blow and run-off, along with nutrient loss.
- Prolonged droughts also significantly affect crop yields due to the poor water retention properties of the clay soils. This will have an impact on the types of crops grown in the future.
- Prolonged drought reduces the amount of water that is available for abstraction to supply Rutland Water and to irrigate food crops leading to lower yields.
- Warmer summers and milder winters will bring a change in the range of invertebrate and vertebrate species able to colonise the area.

Other key drivers

- The unregulated deer population has a negative impact on woodland structure and biological diversity.
- Given the Government's commitment to renewable energy provision, elevated areas of the NCA may be under pressure for wind farm development. Such development can create visual landmarks and reduce the sense of remoteness, isolation and tranquillity that is present within parts of this wooded landscape.
- Ash dieback may have a significant impact on the character and extent of ancient semi-natural woodlands, their flora and fauna, and on characteristic hedgerow trees of the NCA.
- The NCA has distinctive small, nucleated settlements and inappropriate residential development can be particularly damaging, eroding the architectural and historic character, creating visual intrusion, and creating a new urban edge to the countryside. However, significant levels of growth are targeted for some parts of the area, notably around Kettering and Corby.

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.

Woodland at Bedford Purlieus National Nature Reserve.

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: Extend the area and connectivity of broadleaved woodland, individual trees and hedgerows in the core Rockingham Forest area, seeking to enhance historic landscape character and biodiversity and increasing the potential for timber, biomass, access and recreation, while helping to regulate the impacts of climate change and maintaining and improving water and soil quality.	↔ **	↑ **	↔ **	n/a	↗ **	↗ **	↗ **	↗ **	↔ **	↗ **	↔ **	↔ **	n/a	↗ **	↔ **	↗ **	↗ **	↑ ***	↔ ***
SEO 2: Maintain and enhance the quality of natural sites of interest across the area, and particularly within the farmed landscape, seeking to realise opportunities to strengthen ecological networks and increase the quantity and quality of semi-natural habitat mosaics and geodiversity sites, providing additional benefits to recreation and so enhancing visitors' experiences and understanding as well as the local economy.	↔ ***	↗ **	↗ *	n/a	↗ *	↗ **	↗ **	↗ **	↔ **	↗ **	↗ **	↗ **	n/a	↗ **	↔ **	↗ **	↑ ***	↑ ***	↔ **

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 distinctive elements that contribute to the overarching sense of place and history of the Rockingham Forest area. Seeking to retain its predominantly rural character and core areas of tranquillity while planning to accommodate sensitively designed new development, including functional green infrastructure.	↔ **	↗ **	↗ **	n/a	↗ **	↗ **	↗ **	↗ **	↔ **	↗ **	↗ **	↗ **	n/a	↗ **	↗ **	↔ **	↗ **	↑ **	↔ **
SEO 4: Enhance the functionality, biodiversity and historic features of the many small rivers and streams that cross the Rockingham Forest area. Seek to strengthen their contribution to regulating water flow and quality in the Nene and Welland catchments, enhance their role as landscape features, and improve riparian corridors for wildlife and recreation.	↔ **	↔ **	↗ **	n/a	↔ **	↔ **	↑ **	↑ **	↔ **	↗ **	↗ **	↗ **	n/a	↗ **	↗ **	↔ **	↗ **	↗ ***	↔ **

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

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

Landscape attributes

Landscape attribute	Justification for selection
Woodland cover, especially in the old Rockingham Forest, is a distinctive feature of this NCA. There is a mixture of commercial conifer and broadleaved plantations, ancient woodland as well as semi-natural and replanted ancient woodland sites.	■ Large area of woodland cover is a significant feature of the landscape, especially the core area of Rockingham Forest, with areas of broadleaved as well as commercial coniferous plantations extending across the elevated plateaux and ridges. While not forming continuous belts across the plateaux, the blocks of woodland often coalesce visually with hedgerow trees, smaller copses and game coverts around farmsteads to increase the perception of an extensive woodland cover across the landscape. ■ Historically, the characteristics of the heavy clay soils deterred widespread clearance and cultivation resulting in much of the area remaining as woodland and forests. Rockingham Forest is of historical importance as a remnant of former Royal Hunting Forests. Many woods are ancient, former coppice woods and contain a diverse range of species that are of considerable nature conservation interest, several are designated as SSSI/NNR for this reason. ■ The publicly accessible woodlands, such as the Forestry Commission estate, are popular with visitors for their amenity and aesthetic values. The centre at Fineshade Wood is a popular visitor attraction. It offers opportunities to view red kites on the nest and other wildlife. Additionally there are trails for all abilities, cycle hire, horse riding trails, cafe, shop and campsite. ■ Damage by pests (such as grey squirrels, rabbits, hares and deer) prevents natural woodland regeneration and affects the success of new planting schemes and regrowth from woodland management. In particular, high deer populations browse new growth from coppice stools and new planting and affect the quality of woodland ground flora. Control of pest species, and particularly deer populations, is essential for successful woodland management.
Fields are commonly bounded by well-managed hedgerows in most areas with characteristic mature trees and some drystone walls especially to the north-east of the NCA. Predominantly large- to medium-sized fields, mixed arable and some pastoral land use, displaying the rectilinear pattern of 18th- and 19th-century enclosures.	■ Hedgerow trees, notably of oak and ash, and lines of trees fringing watercourses add to the wooded character of the landscape by providing visual containment and networks of habitat throughout the agricultural landscape. ■ It is possible that many areas remained unenclosed until the 18th and 19th centuries. During this time, the landscape was divided up as part of parliamentary and non-parliamentary enclosures, resulting in today's pattern of rectangular hedged fields set within a more sinuous pattern of older enclosures, winding lanes and watercourses. ■ Boundary loss (hedgerows and stone walls) as a result of neglect and poor repair continues to threaten the integrity of historic landscape and its character across this area.

Landscape attribute	Justification for selection
Country houses and the parks associated with them are important features of the landscape, adding to the overall wooded character of the area.	■ There are 11 Registered Parks and Gardens in the NCA. This includes large country houses and mature parkland estates such as Deene Park, Kirby Hall and Rockingham Castle which are important landscape features. There are also numerous unregistered parks and gardens of various sizes across the area. ■ The former extent of parkland in the area has been significantly reduced by agricultural changes in the 20th century. The condition of many surviving areas is poor, and would benefit from appropriate conservation management
The limestone outcrop to the north-east is an important feature of this NCA giving rise to distinctive semi-natural habitats, including grasslands. Barnack Hills and Holes NNR and SAC, for example, is of high biodiversity value for the species-rich grassland it supports as well as an important local recreation asset.	■ Although only 22 ha in size, Barnack Hills and Holes NNR and SAC represents half of the surviving limestone grassland in Cambridgeshire. It is designated as an SAC to protect the orchid-rich grassland. More than 300 kinds of wild plant have been found here, including eight species of orchid. The site is renowned for its population of the rare pasque flower. It is a popular local amenity and a 'Friends of Group' is being established to involve the community in its management and care. ■ Other small unimproved relic grasslands of biological interest can be found on the fringes of settlements, often marked by the presence of ridge-and-furrow earthworks. These add to the pastoral, enclosed and rural quality of the areas around the villages and would often benefit from enhanced management to improve their long term biological diversity.
The network of small, shallow rivers and streams that wind across the NCA are tributaries of the rivers Nene and Welland. They have shaped the form of the landscape by moulding the underlying rocks to create the many small sheltered valleys in which settlements are often found. However, where water action is limited to minor streams and brooks, the landscape retains a plateau like appearance.	■ The rivers and streams in this NCA are tributaries which feed in to larger rivers downstream namely the rivers Nene and Welland. Water is abstracted from these two rivers in adjacent NCAs to feed Rutland Water reservoir (NCA 74) which is used as a strategic resource for water demand within the Anglian region. Rutland Water is also an important nature reserve which supports an internationally important assemblage of waterfowl and so is designated as a Special Protection Area and Ramsar site. ■ Settlements tend to lie along the valleys and the smaller streams and rivers often flow through or near to the villages, contributing to their rural character. ■ The smaller streams and rivers are prone to localised flash flooding impacting on the silt load of rivers and also contributing to flooding problems downstream in adjacent NCAs. The streams and rivers run largely through arable land and so diffuse pollution and high run-off rates are issues which impact negatively on water quality. ■ Wet meadows, pollards and ponds are locally important historic riparian features that are becoming increasingly rare and where present suffer from neglect. They are most commonly found along small watercourses adjacent to villages.

Landscape opportunities

- Aim to increase the biological quality, quantity and landscape connectivity of woodland in the NCA. Support the establishment of new broadleaved woodland areas that are well integrated with the surrounding landscape. These should connect existing ancient woodland and parklands sites and provide biodiversity, landscape character and recreational enhancement opportunities. The area's more recent woodlands include a high proportion of even-aged, mixed and conifer woodland nearing maturity which could provide an opportunity to enhance the areas landscape character, biodiversity and amenity values in the future if replanted with mixed broadleaved woodlands.

- Look for opportunities to improve the quality, quantity and connectivity of other isolated but significant wildlife habitats including SSSI. In particular, identify opportunities to enhance relic lowland grasslands surviving on ridge and furrow, and to establish new grasslands, including flood plain meadows, where appropriate. There is also an opportunity to enhance the quality and connectivity of wildlife habitats throughout the farmed landscape and use farm woodland, riverine and hedgerow corridors as the basis of strengthening landscape character by establishing a better connected and diverse semi-natural landscape.

- Plan and manage for the re-introduction of cost-effective ancient woodland management and manage recent woodlands similarly to enhance their landscape character, biological and structural diversity in the long term. Any such plan would need to address the impact the deer population has on the capacity for woodland regeneration, structural and biological diversity.

- Aim to maintain the rural character of the landscape and limit the visual impact of any new development by ensuring it is appropriate in terms of design, scale and materials. Specific mechanisms could include Design Statements for those villages and market towns most prone to infill development and the larger scale expansion of settlements lying within the Growth Points. Encourage the use of innovative architectural and planning solutions that take inspiration from local distinctiveness and character while using eco-friendly and high quality design. Seek to prevent development coalescence, ensuring separation is maintained between the urban fringe and surrounding settlements. Where appropriate take the opportunity to design in green infrastructure links to connect residential areas with the surrounding countryside and to reduce the visual impact of new developments.

- Conserve and enhance the characteristic networks of hedgerows and drystone walls that enclose the landscape. Encourage replanting of hedgerows, hedgelaying and establish a programme for the ongoing replacement of mature hedgerow trees, to ensure that the strong characteristic pattern of hedgerows is retained throughout the area particularly along roads and public rights of way and adjacent to settlements. Reinstate priority stone walls found particularly in the north of the area.

- Seek to enhance the area's existing public rights of way network and establish new permissive access within and between woodlands and other areas of countryside where there is an opportunity to link people with places. This might include designing green infrastructure links to new developments and enhancing the existing hedgerow, river and woodland corridors.

- The historic parklands are designed landscapes from the 16th to the 18th century and many are in need of positive management and appropriate planned restoration. Prepare and implement historic parkland management plans throughout this area including the smaller parkland landscapes which are often more vulnerable to neglect.

- Look for opportunities to manage and enhance locally important historic riparian features such as wet meadows, pollards and ponds that are becoming increasingly rare within the area's river valleys.

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	Soils Mixed farming regime	Soils are mainly clayey with impeded drainage or slowly permeable and seasonally wet. They are predominantly Grade 3. Cereals are grown on 40 per cent of farmed land in the NCA and 7 per cent of the farmed land is used for other arable crops. Livestock grazing is also a feature of the NCA. Winter cereals and oilseed rape are the predominant crops.	Regional	There is an opportunity to ensure agriculture is managed sustainably and does not have a significant detrimental effect on the value of other ecosystem services or assets for example water availability, water quality, soil quality and biodiversity. This will in turn bring benefits to agricultural land and assist with future provision of food. Improvement to soils may be achieved through actions such as using low pressure machinery, encouraging use of green manure crops (such as nitrogen-fixing legumes) within arable systems to replace nutrients, bind soils and improve the quality of water percolating through to the aquifer. The large and unregulated wild deer population impacts negatively on the structure and biodiversity of both the commercial and ancient woodlands, they also graze extensively on arable crops grown on land adjacent to the woodlands. Sustainable management of the wild deer population could provide a locally sourced, sustainable food source as well as local business and employment opportunities, while bringing benefits to arable farmers and the biodiversity of the ancient woodlands.	Work with the farming community to ensure best practice in soil management to improve structure and quality of soils and productivity from the farmed environment. Encourage the creation of semi-natural habitats and ecological networks within and across the farmed landscape which will help to protect soils and water and enhance biodiversity. Introduce more widespread regulation of the wild deer population to supply a local 'high-value' food market and to support the growth of local businesses seeking to undertake such management.	**Food provision** **Sense of place/ inspiration** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Timber provision	Large commercially managed woodland blocks	The NCA contains 7,720 ha of woodland (15 per cent of the total area), of which 1,539 ha is conifer plantation. There are 4,195 ha of land identified as ancient woodland of which 2,096 ha is currently plantations on ancient woodland sites (PAWS). Extensive areas of ancient woodland are a strong unifying characteristic of this NCA. Extensive woodlands such as Wakerley Great Wood, Geddington Chase and Fermyn Woods are prominent features in the landscape. Managed commercially they also provide recreational opportunities and are of value for biodiversity. Many of these woodlands are of high nature conservation interest and are attractive landscape features in their own right. They were formerly extensively coppiced and small-leaved lime is a particular feature of the eastern woods.	Regional	The areas of commercial timber woodland are associated with many of the NCA's important wildlife resources and provide valuable recreational opportunities. The conifer plantations are not in character with the historic ash, small leaved lime, oak and hazel coppice woodlands of the area. Restoring PAWS to broadleaved woodland would release a single crop of softwood timber with the potential to generate hardwoods of natural and economic value in future. Increasing the woodland hectarage of the NCA could contribute long term to climate change regulation through increased carbon sequestration and storage, and strategically located, would help reduce rates of cross-land water flow, reduce soil erosion and subsequent sedimentation in watercourses and enhance biodiversity and recreation networks while increasing the availability of timber resources from the area. Increasing the production of charcoal/ logs by working more of the neglected hazel coppice could bring benefits to renewable energy by providing local heating energy sources. There is potential for new woodland sites on some marginal agricultural land and land bordering existing woodlands.	Ensure that commercial forests are sustainably managed across the NCA to deliver multiple social and environmental benefits (for example recreation, biodiversity and carbon sequestration and storage) alongside economic timber production. Support initiatives to restore plantations on ancient woodland sites to semi-natural broadleaved woodland. Support the establishment of new and an expansion of existing charcoal and log production businesses that seek to reinstate neglected ancient coppice systems. Support the establishment of new broadleaved woodland areas that connect existing ancient woodland sites and provide biodiversity and recreational opportunities as well as future sources of economically viable hardwood timber.	**Timber provision** **Sense of place / inspiration** **Climate regulation** **Sense of history** **Recreation** **Biodiversity** **Regulating water flow** **Regulating soil erosion**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability	Rivers and streams Soils	The smaller rivers and streams in this NCA are tributaries which feed in to the rivers Nene and Welland. Water is abstracted from these rivers by the water authority, when flow rates are above an agreed level, to supply Rutland Water reservoir (NCA 74) which is used as a strategic resource for water demand within the Anglian region. It is also designated as a Special Area of Conservation and Ramsar site. The NCA is in a low rainfall area and prolonged droughts are not uncommon, leading to low river flows. Levels of abstraction, particularly downstream of Stamford, may be having an effect on water flows. The shallow lime-rich soils to the north of the NCA are typically free draining and have a degree of natural resilience due to their calcareous nature. They can be valuable for aquifer recharge. Elsewhere the areas impermeable soils mean that run-off rates are high especially during intense rainfall episodes and following prolonged drought. This limits the volume of water able to percolate the aquifer. Since August 2011, the Welland Valley Partnership has been identifying the issues within the catchment and what can be done to improve it.	Regional	The free draining, shallow lime-rich soils to the north of the NCA which can be valuable for aquifer recharge require the maintenance of good soil structure to aid water infiltration (for example by enhanced organic matter levels). The creation of flood meadows, field margins, use of winter stubble with direct drilling and maintenance of hedgerows can all slow run-off rates and aid aquifer recharge increasing general water availability. Low flows and high temperatures lead to low oxygen levels, which impacts on the plant and wildlife in the rivers. It also impacts on the water available to supply Rutland Water and for abstraction to irrigate crops. Levels of abstraction, particularly downstream of Stamford, may be having an effect on water flows.	Sustainably manage water quality and availability within the NCA by slowing run-off rates and increasing infiltration rates into the aquifer through careful management of vulnerable soil types. This could include the use of crop types and cultivation methods that help to retain water allowing it to permeate in to the aquifers. Encourage the uptake of agri-environment scheme options such as provision of field margins especially along watercourses, planting of woodland cover, hedgerows and creation of flood plain meadows where appropriate.	**Water availability** **Sense of place/ inspiration** **Recreation** **Regulating soil erosion** **Biodiversity** **Regulating water flow** **Regulating water quality**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Genetic diversity	n/a	n/a	n/a	n/a	n/a	n/a
Biomass energy	Woodlands Stands of short rotation coppice	The existing relatively high woodland cover (15 per cent) offers potential for the provision of biomass as a by-product of commercial timber production, as well as through bringing unmanaged woodland under management. There are currently prominent stands of neglected coppice systems (predominantly of hazel/ ash) in many of the ancient woodlands.	Local	The area has potential for reworking the ancient coppice systems and to establish new systems as part of new woodland creation. This could provide a local fuel source as well as hazel stakes for use in the traditional hedge laying which is still widely practiced on some land holdings. It also has the potential to sequester carbon and provide renewable supplies of energy, but could decrease future food provision if sited on farmed areas.	Secure opportunities to increase production of biomass as a by-product of existing commercial timber production. Bring unmanaged woodlands back into appropriate management. Where appropriate plant new woodlands which are suitable for managing under a coppice regime. Realise opportunities for planting biomass energy crops where they would help mitigate the effects of urban expansion and not adversely impact on semi-natural and historic elements of the area.	**Biomass energy** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation	Woodland Permanent pasture	The notable woodland cover of this NCA (15 per cent), both broadleaved and coniferous, offers benefits for carbon sequestration and storage. Soils under woodland cover and permanent pasture have higher soil carbon content and contribute to the sequestration and storage of carbon.	Regional	Woodland carbon sequestration and storage is relatively high but may be increased by the planting of new woodlands. Permanent pasture, particularly wet meadows and flood plain grasslands, are at risk from cultivation. Cultivation of permanent grassland releases stored carbon and much reduces the process of carbon sequestration.	Where it is in keeping with the character of the landscape, plant new woodlands to ensure there is an overall net increase of woodland cover. Seek to protect permanent pasture from cultivation and inappropriate land use, and encourage the establishment of permanent pasture particularly in wet areas and areas prone to flooding.	**Climate regulation** **Sense of place/ inspiration** **Timber provision** **Biodiversity** **Recreation** **Regulating soil quality** **Regulating water flow**
Regulating water quality	Rivers and streams Winter stubbles, hedgerows and field margins Woodland coverage and other semi-natural habitats	Parts of the rivers Nene and Welland catchments are within this NCA. Only a short section of the river Nene passes through the NCA. All of the NCA is within a nitrate vulnerable zone (51,001 ha) in respect of both surface and groundwater. Discharges from sewage treatment works and run-off from roads or industrial areas can all be sources of pollution in the catchments. **Continued on next page...**	Regional	Diffuse pollution is an issue in the catchments affecting water quality and the ecological quality of the rivers. Nitrate vulnerable zone guidelines aim to reduce diffuse pollution from agricultural land. For example, adopting land management measures to improve soil structure and permeability by increasing organic matter levels, or deeper root penetration under permanent pasture, the timing and extent of fertilizer and pesticide applications.	Work with the farming community to encourage careful management of vulnerable soil types, the planting of hedgerows and woodlands, creation of grassland buffers along watercourses and making use of winter stubbles to help reduce run-off rates and diffuse pollution and improve the ecological quality of rivers. Encourage management measures that follow NVZ guidelines such as restricting livestock access to watercourses and appropriate timing and use of fertilizer applications to reduce diffuse pollution.	**Regulating water quality** **Regulating water flow** **Regulating soil erosion** **Biodiversity**

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** When combined with pollution from agricultural areas, the excessive levels of nutrients, sediments and pesticides are having a severe impact on river and groundwater quality in the catchments. Drinking Water Protected Area status applies to the catchments and water is abstracted, when flow rates are above an agreed level, to supply Rutland Water reservoir which is a strategic regional domestic water resource. It is also designated as an SSSI and SAC. The chemical quality of the Welland is poor. The Nene does not fail chemically at present. The ecological quality of the Welland is poor and the Nene moderate.		The River Nene flows through the Nene Washes SPA/SAC /Ramsar and across the Fens into the Wash estuary, which is also SPA/Ramsar/ SAC. Water quality of the river could therefore have an influence on their ecological quality. Changes to the natural flow within the catchments can make the problems associated with increased nutrients levels worse. Unnatural high flows can increase the amount of nutrient entering the river.	Create semi-natural habitats such as flood plain meadows and reedbeds to improve water quality by allowing the nutrient loaded silt to settle out before reaching the main watercourses. Raise awareness with landowners, the water company and householders about the issues associated with diffuse pollution and actions they can take to reduce the levels of pollutants entering the catchment.	

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow	Rivers and streams Impermeable soils Woodlands	Flow rates in the Nene and Welland vary markedly. Largely due to the impermeable nature of many of the soils, which lead to high run-off rates, both the river catchments are prone to flash flooding during periods of intense rainfall and when the ground is already saturated. At such times the town of Stamford and city of Peterborough are particularly prone to flooding as are many low lying villages further upstream within this NCA. The NCA is in a low rainfall area and prolonged droughts are not uncommon, leading to low river flows. Levels of abstraction, particularly downstream of Stamford, may be having an effect on water flows.	Regional	The role of sustainable land management practices may also result in a reduction in localised flooding. Actions to be considered could include; changing land drainage practices; reducing practices that keep soil bare in wet periods; buffer and/or fallow strips; restoring grassland and flood meadows along stream and river margins; and reinstating previously removed hedgerows, particularly across slopes. The River Nene flows through the Nene Washes SPA/SAC/Ramsar and so low flow rates impact upon the ecological quality of this site.	Support the creation of, and extend existing semi-natural flood plain habitats such as flood meadows and reedbeds to slow down the movement of water in the system to hold back water in peak flow events reducing flood risk downstream and increasing aquifer recharge. Work with the farming community to encourage the careful management of vulnerable soil types and adoption of agri-environment measures that help to slow run-off rates.	**Regulating water flow** **Sense of place/ Inspiration** **Biodiversity** **Regulating water quality** **Regulating soil erosion**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil quality	Soils Permanent pasture Woodland	There are seven main soilscape types in this NCA: ■ Lime-rich loamy and clayey soils with impeded drainage, covering 28 per cent of the NCA. ■ Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (23 per cent). ■ Shallow lime-rich soils over limestone (19 per cent). ■ Freely draining lime-rich loamy soils (10 per cent). ■ Restored soils mostly from mineral operations (8 per cent). ■ Freely draining slightly acid but base-rich soils (7 per cent). ■ Slightly acid loamy and clayey soils with impeded drainage (4 per cent).	Local	The lime-rich loamy and clayey soils with impeded drainage are at risk of topsoil compaction and poaching requiring careful management of weak top-soils to maintain good soil structure, including through minimum tillage and addition of organic matter. The slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils may also suffer compaction and/ or capping as they are easily damaged when wet. In turn, this may lead to increasingly poor water infiltration and diffuse pollution as a result of surface water run-off. Maintenance of good soil structure to aid water infiltration is also important for the shallow lime-rich soils. Management measures that help reduce these problems include maintaining permanent vegetative cover where it exists (pasture and woodland), increasing organic matter levels in ley grasslands and soils under arable cultivation, use of low pressure machinery and where necessary fencing watercourses to prevent bankside erosion from livestock access.	Work with the farming community to ensure best practice in soil management to improve structure and quality of soils. Encourage the use of green manure crops such as nitrogen fixing legumes within arable systems to replace nutrients and bind soil, and informed infield nutrient application.	**Regulating soil quality** **Biodiversity** **Sense of place/ inspiration** **Regulating water flow** **Regulating water quality** **Water availability** **Regulating soil erosion**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion	Soils Semi-natural habitats including woodland, hedgerows, permanent pasture and rough ground Arable margins and headlands	Due to the impermeable nature of many of the soils in the NCA there are issues with high run-off rates and thus loss of surface soils. The majority of soils in the NCA are vulnerable to erosion from wind scouring especially during periods of prolonged drought (which are not uncommon in this low rainfall area). Semi-natural habitats within the farmed landscape such as woodlands and shelterbelts and well-maintained hedgerows help to regulate soil erosion.	Local	Good soil management and agricultural practice reduces the vulnerability of soils to erosion. Maintaining a good soil structure aided by enhanced organic matter levels, minimal tillage, avoiding compaction and poaching all benefit soil structure. Beneficial measures to reduce run-off rates and wind scour include maintaining good hedgerow networks, use of field margins, leaving winter stubble and direct drilling in autumn.	Work with the farming community to ensure best practice in soil management to improve structure and quality of soils. Seek opportunities to create semi-natural habitats and ecological networks within the farmed landscape which will protect soils and water and enhance biodiversity.	**Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Regulating water flow** **Biodiversity** **Sense of place/ inspiration**
Pollination	Lowland meadows Areas of semi-natural habitat Woodlands Historic parklands and gardens	The NCA contains areas of floristically rich lowland meadows and other semi-natural habitats which have become established on marginal arable land, abandoned quarries and wartime airfields. The nucleated settlements are often surrounded by rough pastoral land which together with gardens is likely to support sources of nectar. There is also a good network of hedgerows throughout the NCA, floristically diverse areas around and within the woodlands and historic parklands which provide good habitats for a range of pollinators.	Local	The contribution of pollination services to commercial food production is an important service to the area. Oilseed rape is a commonly grown crop which benefits from the presence of pollinating invertebrates. An increase in the populations of pollinators may facilitate an increase in the types of crops that could be grown in the future. Increasing the extent of the semi-natural areas that support sources of nectar within the farmed landscape would also result in an increase in biodiversity.	Making use of agri-environment measures that establish field margins and hedgerows, planting of new woodlands and lowland meadows to help enhance the diversity and distribution of pollinators.	**Pollination** **Sense of place/ inspiration** **Food provision** **Biodiversity** **Pest regulation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pest regulation	Lowland meadows Areas of semi-natural habitat Historic parklands and gardens	Areas of floristically rich lowland meadows and other semi-natural habitats, the hedgerow network and field margins which are proximal to areas of agricultural production support diverse insect populations that could aid pest regulation. The nucleated settlements are often surrounded by rough pastoral land which together with gardens is likely to support a diversity of insects. The extensive woodlands and historic parklands provide additional habitat which support insect and bat populations that could aid pest regulation.	Local	Semi-natural habitats, hedgerows, woodlands and field margins proximal to areas of commercial agriculture may support species of predators which can help regulate populations of pests that adversely affect crops.	Make use of agri-environment measures that establish field margins and hedgerows, planting of new woodlands and lowland meadows to provide a network of varied habitats and contribute to enhancing the diversity and distribution of insects within a more robust ecosystem.	**Pest regulation** **Sense of place/ inspiration** **Climate regulation** **Food provision** **Biodiversity** **Pollination**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
A sense of place/ inspiration	Low undulating landform Woodlands Hedgerows and stone walls Streams Nucleated villages Historic country houses and parkland Red kites	A sense of place is given by the broad, low, undulating landform which is covered by extensive woodlands especially on the higher ground, interspersed with streams and areas of semi-natural habitats, pastures and arable fields enclosed by hedgerows and drystone walls. The distinctive and imposing country houses with extensive mature parklands, contribute to a sense of place. Readily seen in the NCA, the red kites are striking birds which are inspirational as they soar gracefully over pastures and woodlands. They present a highly visible example of successful nature conservation.	Regional	Many of the woodlands are publicly accessible and offer a sense of place and tranquilly for local people and those from nearby cities, but also offer opportunities for informal recreation such as walking, study of wildlife, cycling and horse riding. The historic country houses, parklands and the red kites are all popular visitor attractions and testimony to past aesthetic ideals and current nature conservation endeavours.	Protect, manage, enhance, interpret and, where appropriate, promote the historic, cultural and environmental assets that contribute to an already strong sense of place. Ensure that new development is designed and planned to respect intrinsic character and settlement patterns while allowing access to this inspirational landscape. Protect and appropriately manage woodlands and the historic parklands and strengthen the hedgerow network which combined contribute to the overall wooded character and sense of place of historic Rockingham Forest. Protect and manage the network of distinct stone walls. Promote the nature conservation successes in the area, particularly the partnership working involved in the red kite re-introduction programme, as a way of stimulating and inspiring similar nature conservation activities.	**Sense of place/ inspiration** **Sense of history** **Biodiversity** **Recreation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history	Rockingham Forest Buried and above ground archaeological remains Relic ridge and furrow Parks and gardens with associated country houses Second World War remains and memorials	Rockingham Forest was once the largest of a number of extensive Royal Hunting Forests that extended the length of Northamptonshire (the others being Salcey and Whittlewood to the south). There are 50 Scheduled Monuments in the NCA, such as a Roman villa at Little Weldon and medieval settlement at Pipewell. Areas of ridge-and-furrow earthworks survive in many of the pasture fields on the edge of settlements. There are 11 Registered Parks and Gardens in the NCA. Many of these have outstanding country houses, including Rockingham Castle, Deene Park and Apethorpe. They have imposing fabric ranging from the 16th to the 19th century. Additionally there are 1,516 Listed Buildings. More recent monuments include memorials at Second World War airfields and gullets produced by iron workings.	Regional	The character of Rockingham Forest is shaped by its former status as a Royal Hunting Forest. This restricted settlement and encouraged the establishment of hunting lodges that were later developed into the distinctive great houses and parklands still present today. Managing and interpreting the historic attributes has potential to increase education, recreation and tourism which contributes to the local economy. It also has the potential to increase a sense of place by reinforcing the historic character of the area. The long-term continuity of land use and tenure has also sustained some areas of semi-natural habitat, most notably woodland and parkland. Fragmentation and division of estates has and continues to threaten the character and condition of these assets. Areas of ridge and furrow are often associated with semi-natural grassland and a rich flora. Introducing appropriate management, where it is absent, would have the additional benefit of increasing biodiversity.	Conserve, enhance and interpret the heritage assets that contribute to a sense of history. Work with land owners and farmers to ensure that heritage assets are identified and managed according to best practice. Work with landowners, farmers and other partners to identify and realise opportunities for positive woodland management, new woodland planting and the management and planting of hedgerow trees to maintain the wooded character of the landscape reflecting its former forest status. Encourage the use of traditional, and where possible locally sourced building materials, and a local vernacular architecture in any new developments within the more rural parts of the area. Encourage the uptake of agri-environment options for parklands and designed landscapes to ensure their character, condition and natural history is conserved and enhanced.	**Sense of history** **Sense of place/ inspiration** **Biodiversity** **Recreation** **Tranquillity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Tranquillity	Rockingham Forest Remote valleys and settlements	Areas of undisturbed land occur mainly in the east and north of the NCA in the heart of Rockingham Forest and in its surrounding remoter valleys and settlements. The 2007 Intrusion Map (CPRE) shows that the area considered most disturbed is in the west of the NCA, around Corby and the Rockingham Speedway Track as well as around Kettering. Notable trends from the 1960s to 2007 are that the area considered disturbed has increased by more than three quarters and the area considered undisturbed has decreased by one third.	Regional	Expanding the area and connectivity of woodland could have a beneficial effect on tranquillity, biodiversity and climate regulation, particularly in and around the fringes of the larger settlements. Rockingham Forest is popular with visitors from the expanding urban areas in the East Midlands and the resultant increased use of this recreational asset will need to be planned for carefully to manage recreation pressure and disturbance. The CPRE data shows that the area considered to be urban increased between the 1960s and 2007. It continues to do so, and new development on the urban fringe should be located and planned for sensitively.	Protect the core areas of tranquillity within the NCA, particularly the heart of Rockingham Forest itself. Sensitively plan any expansion to urban areas and roads and other infrastructure by planting woodlands and shelterbelts to reduce visual impact, and noise and light pollution. Maintain the balance between undisturbed territory and public access especially in the currently more tranquil areas.	**Tranquillity** **Sense of place/ inspiration** **Sense of history** **Recreation** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation	Forestry Commission estate Historic parkland and houses Footpaths and bridleways	The visitor centre at Fineshade Wood is a popular attraction, with upwards of 250,000 visits each year. It offers opportunities to view and information about red kites on the nest and other wildlife. Additionally there are trails for all abilities, cycle hire, horse riding trails, cafe, shop and campsite. The many historic houses and parklands are another popular amenity. Four per cent of the NCA is classed as publicly accessible – this includes woodlands, NNRs and 114 ha of parklands. The network of 562 km of public rights of way offers residents and visitors the opportunity for more informal exploration, recreational pursuits and access to tranquil and inspirational places. Despite being sparsely populated, the NCA is readily accessible by car from the urban conurbations of Corby, Kettering and Peterborough and from Northampton and Leicester further afield.	Regional	It is likely that recreational opportunities could be enhanced if planned for carefully so that the assets are well managed for both biodiversity and recreation. This could also have a beneficial effect on the quality of local sites through more community engagement and voluntary intervention (for example, the planned Friends of Group for Barnack Hills and Holes NNR). Expansion of the public rights of way network, especially near to where people live and stay, will offer better opportunities for informal exploration of the NCA. In particular, increasing green infrastructure links from urban areas out to the recreational areas in the centre of the NCA would help make recreation more sustainable. Growing and strengthening the local tourism industry, in a manner which is sympathetic to the tranquillity, biodiversity and water resources of the area will bring benefits for the local economy.	Enhance the intellectual accessibility of, and physical access to, the area's many historical, cultural and natural assets in a manner which does not detract from the quality of provision of other services. Involve local communities in the care and improvement of their local woodlands, wildlife sites and footpath networks. Enhance the area's existing public rights of way network and where possible establish new permissive access within and between woodlands and other areas of countryside to link people with places and help to make recreation more sustainable.	**Recreation** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity	Lowland grasslands Ancient woodlands Other semi-natural habitats Black hairstreak butterfly	Although only 22 ha in size, Barnack Hills and Holes NNR/ SAC is designated as an SAC to protect its orchid-rich grassland. More than 300 kinds of wild plant have been found here, including eight species of orchid (for example man, pyramidal, fragrant and frog orchid). The site is renowned for its population of the rare pasque flower. A total of 34 SSSI (2 per cent of the area) and four NNRs lie wholly or partly within the NCA. Fifty-nine per cent of SSSI land is in unfavourable recovering condition. There are 259 local sites of biodiversity interest in Rockingham Forest (14 per cent of the NCA). These are an important biological resource which should form part of ecological networks that might be created in the future. **Continued on next page...**	International	Throughout the NCA the sites of biodiversity interest are now fragmented and often isolated as a result of changed agricultural management practices. Enhancing the quality, quantity and connectivity of these sites would benefit biodiversity and landscape character. Strengthening the woodland network, aiming to join up the now fragmented areas of ancient woodland, would benefit for example the dispersal of key species such as the black hairstreak and other woodland butterfly populations, in addition to woodland birds and flora. Re-introduction of management to neglected coppice systems in the ancient woodlands would benefit ancient woodland indicator flora and woodland butterflies. The farmed environment includes ditches, hedgerows, copses and field margins dispersed through the landscape providing important connections across it and providing biodiversity habitats. There is considerable scope to improve biodiversity by working with land managers through agri-environment schemes.	Build cross-sectoral partnerships to work towards enhancing the quality, quantity and connectivity of wildlife sites in the NCA. This should include woodlands, lowland limestone grassland and isolated sites of high biodiversity value. Work with landowners and farmers to ensure biodiversity features are incorporated into the farmed landscape and encourage the uptake of land management practices that benefit biodiversity and aid the reduction of soil run-off rates, diffuse pollution and pest control such as use of winter stubbles, field margins and hedgerow and shelterbelt planting.	**Biodiversity Recreation** **Timber provision** **Climate regulation** **Regulating soil quality** **Regulating soil erosion** **Pollination** **Pest regulation** **Regulating water flow** **Sense of place/ inspiration** **Sense of history**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity cont.		**... continued from previous page** The NCA is noted for its population of the black hairstreak, a butterfly associated with mature stands of blackthorn in woodland clearings and glades. The black hairstreak is now restricted in its UK distribution to a narrow belt of woodlands between Oxford and Peterborough, including Glapthorn Cow Pastures, owned and managed by the local Wildlife Trust. The extent of continuous woodland cover has also declined over the years preventing the re-population of new woodland areas.		Biodiversity in the NCA is a key tourism asset, important for encouraging recreation and creating a sense of place. It is therefore valued not only for its intrinsic value but also for its societal values. The use of green infrastructure links from areas of habitation out in to the rural hinterland is important to enable people to connect with and explore their rural environment. It is thought that the decline in the UK population of black hairstreak is due to changes in woodland management practices over the past 50–100 years. The ancient woodlands were once actively managed for timber and contained rotational coppice systems. As this management practice declined, the abundance and quality of woodland clearings and glades declined, having a negative impact on woodland butterflies including the black hairstreak. A local partnership led by Butterfly Conservation is seeking to realise the opportunities reinstating appropriate woodland management could bring to increase the black hairstreak population.	Increase the availability of information about the areas biodiversity assets and closely involve local communities in their care. Encourage the use of green infrastructure links in and around areas of habitation to improve the accessibility of local wildlife sites and enable people to connect with and experience their rural environment. Support the reinstatement of appropriate woodland management techniques to help support the resilience of the population of the black hairstreak butterfly. Support the planting of new woodlands and shelterbelts (in locations that are not detrimental to the landscape character and history of the area) to improve the connectivity of woodlands, particularly ancient woodlands.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Geodiversity	Abandoned limestone quarries Gullets from ironstone workings Local stone reflected in historic buildings and villages Sand and gravel Soils	There are two geological SSSI and 28 Local Geological Sites within the NCA. Barnack Hills and Holes NNR/SAC is a redundant medieval limestone quarry prized for the quality of its building stone. Its neutral soils now support an internationally important species-rich limestone grassland. The Northampton Sand Formation contains substantial deposits of ironstone which were formerly quarried and abandoned gullets still remain today. Both limestone and ironstone were formerly quarried for stone used locally in buildings. Limestone was transported further afield and used for example in the construction of Ely and Peterborough cathedrals. The distinctive Collyweston slate was quarried and used extensively as a roofing material in the local area. Sand and gravel is still being quarried, around the fringes of the area, for the construction industry.	Regional	Rivers have cut into the glacial clay plateau to form the valley of the River Nene to the east and the Welland to the west both of which contain river sands and gravels. The scarp and ridge which forms the Rockingham Forest comprises mainly Jurassic limestones of the Great Oolite Group, including Blisworth Limestone Formation and Cornbrash Formation. Along the river valleys, the Lincolnshire Limestone and Northampton Sand formations of the Inferior Oolite Group are exposed or near the surface. To the east, south and west the NCA merges with the open clay vales of Northamptonshire. Abandoned limestone and ironstone quarries often support rich assemblages of semi-natural vegetation. Restoration of sand and gravel quarries offer potential to enhance both biodiversity and recreational services in the future. Active sand and gravel quarries continue to provide new exposures. Scrub encroachment of abandoned quarries and gullets can reduce the legibility of the geological record.	Conserve and enhance the geological and biodiversity values of abandoned limestone quarries and ironstone workings, having particular regard for internationally important sites and geological SSSI. Increase the intellectual accessibility of, and where appropriate physical access to, geological sites of interest. Quarry restoration plans should include consideration of opportunities to enhance recreation and biodiversity alongside geological interests. Maintain historic buildings and structures that reflect the local geological resources, notably those constructed of local limestone and using Collyweston slate roofing and seek to ensure that repairs and restoration continues to use local resources.	**Geodiversity** **Sense of place/ inspiration** **Sense of history** **Biodiversity** **Water availability**

Photo credits

Front cover: Looking south into the NCA across a flooded Welland Valley towards the village of Harringworth and the Harringworth Viaduct. © Natural England/Tim Collins

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