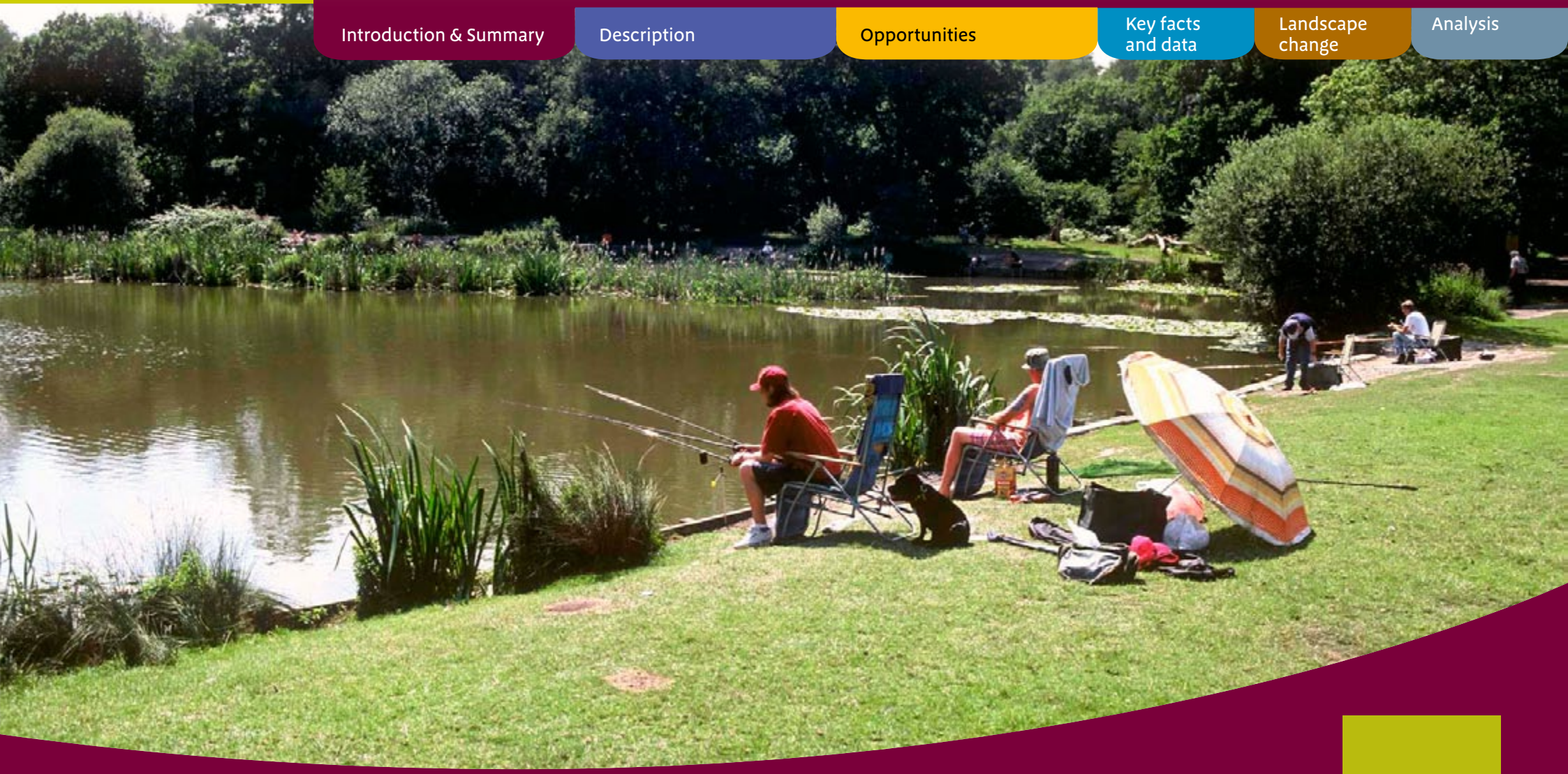
National Character Area profile:

114 Thames Basin Lowlands

Supporting documents



NATURAL ENGLAND

www.naturalengland.org.uk

Introduction

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

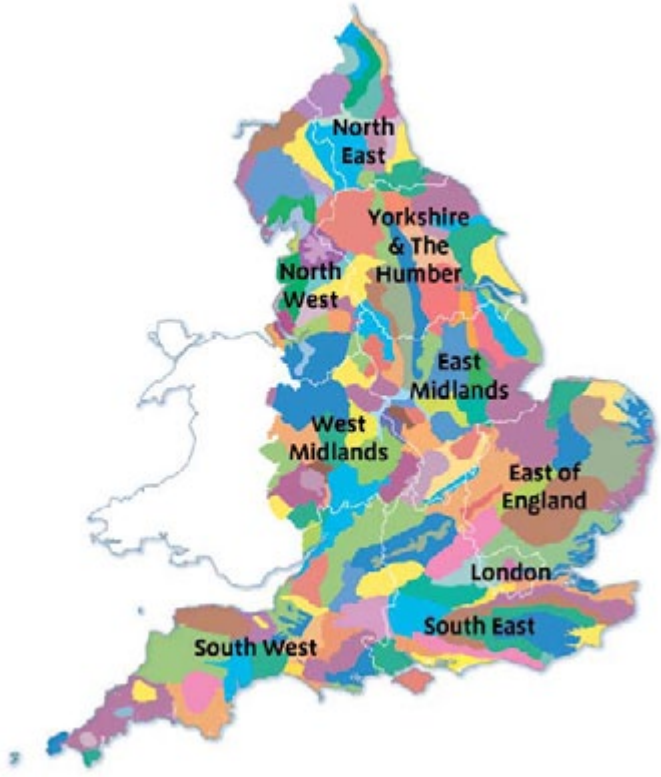
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and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

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

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

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

National Character Areas map



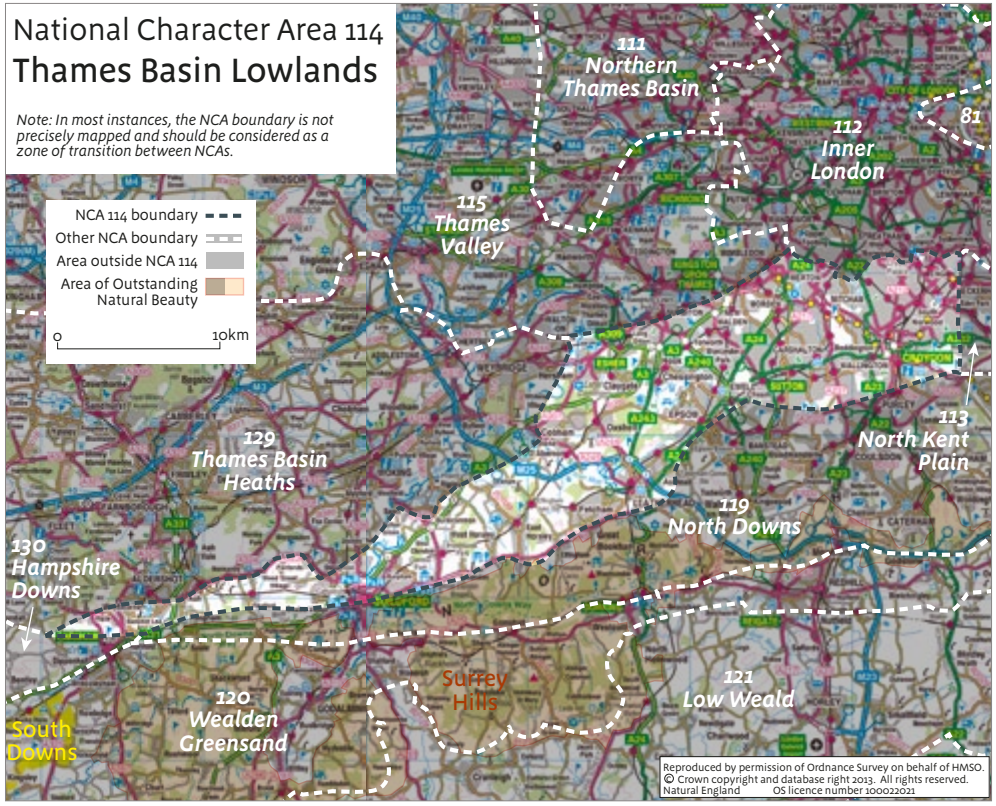
[1] The Natural Choice: Securing the Value of Nature, Defra (2011; URL: www.official-documents.gov.uk/document/cm80/8082/8082.pdf)
[2] Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services, Defra (2011; URL: www.defra.gov.uk/publications/files/pb13583-biodiversity-strategy-2020-111111.pdf)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

Summary

The Thames Basin Lowlands National Character Area (NCA) is a low-lying plain within the London Basin. It stretches from the London suburbs of South Norwood in the east to Hale on the Surrey/Hampshire border in the west. The landscape is generally flat but in places is gently undulating. The underlying geology is predominantly London Clay with small outcrops of Bracklesham and Barton Group sand, silt and clay between Esher and Cobham. Part of the North Downs Chalk bedrock, fringed with Thanet Formation and Lambeth Group sediments, underlies Croydon and Sutton.

To the north-east, the NCA is highly urban, incorporating parts of Greater London and its suburbs. To the south-west, it is a small-scale farmed landscape dissected by the meandering river valleys of the Wey and Mole. The farmland consists of small-to-medium-sized fields interspersed with woodlands and shaws, villages and farmsteads as well as parklands. Less than 4 per cent of the NCA is designated for its biodiversity or landscape interest although there is a small section of the Surrey Hills Area of Outstanding Natural Beauty between Leatherhead and East Horsley, and at Hatchford End is the edge of the Thames Basin Heaths Special Protection Area, which lies within the adjacent NCA. Providing space for recreation for the large population within this area would take pressure off the SPA. Ashtead Common National Nature Reserve supports an important population of veteran pollarded oaks with associated lichen and invertebrate interest.

Flooding is a significant issue for several towns including Guildford and Cobham. Careful management of the Wey and Mole flood plains within the NCA may help to alleviate this.



Click map to enlarge; click again to reduce.

Statements of Environmental Opportunity

SEO1: Maintain and restore the natural functions of the rivers Wey, Mole, Hogsmill and Wandle at a landscape scale, providing improvements in water quality and water availability and helping to regulate water flow while reducing pollution and the risk of flooding to benefit biodiversity, geodiversity and enhance a sense of place.

SEO2: Conserve and manage the semi-natural vegetation and farmed landscape of the Thames Basin Lowlands to reduce fragmentation between the semi-natural habitats and enhance ecological connectivity, provide benefits for water quality, enhance biodiversity, strengthen the landscape character and increase a sense of well-being.

SEO3: Promote creative and effective sustainable urban development, including a well-connected network of high quality green infrastructure in and around Greater London and other urban areas incorporating sustainable transport, while managing and enhancing public green space and recreational opportunities for local communities to enjoy, and to benefit biodiversity and landscape character.

Rivers within the NCA, such as the Hogsmill at Surbiton, are often highly modified.

Description

Physical and functional links to other National Character Areas

The Thames Basin Lowlands National Character Area (NCA) lies entirely within the London Basin. It shares a bedrock geology of Thames Group (London Clay) in common with the neighbouring Inner London NCA and Thames Valley NCA. Here the London Clay is fringed by Lambeth Group sediments, small areas of Thanet Formation and Chalk on the southern border between Ewell and Croydon.

Several rivers including the Wey, Mole, Hogsmill and Wandle, flow north across the NCA to join the Thames, forming part of the Thames catchment area. The Mole and Wandle have their origins in the North Downs while the Wey rises in the Hampshire Downs.

In the north-east of the NCA are the Greater London suburbs and the area is highly urban in character. The area has good rail and road transport links into the capital, allowing many residents to commute and work in central London. Several major roads cross the region such as the A3 and A24 cross the area, linking central London with ports and seaside resorts on the south coast. In addition the M25 London Orbital dissects the area.

There are extensive views across the Thames Basin Lowlands from the neighbouring North Downs NCA, particularly from the Hog's Back chalk ridge outside Guildford.

A small proportion of the Surrey Hills AONB falls within the NCA around Leatherhead and East Horsley. The Thames Basin Heaths Special Protection Area is adjacent to this NCA, and is vulnerable to the high population, so there are opportunities to create natural green space within this NCA to ease the recreational pressures.

River Mole.

Key characteristics

- Gently undulating lowlands crossed by meandering rivers with broad and flat valley plains.
- Underlying geology of predominantly London Clay with sediments and Chalk to the south and small sand / clay bands; river terrace gravels and alluvium overlie the bedrock along the river valleys.
- A pastoral landscape interspersed with woodland and shaws, hedgerows and trees, remnant commons, villages and farmsteads.
- Increasing fragmentation of farmland character from spread of development, urban fringe influences and transport infrastructure.
- Modified and straightened rivers marked by riparian woodlands and meadows in more rural sections.
- Small-to-medium irregular fields bounded by hedgerows, often with gaps or replaced by wire fences close to urban areas.
- Densely populated and urban towards the east and the Greater London area with sparser settlement in the west around Esher and Guildford.
- Numerous major road and rail networks criss-cross the area.

Major transport links, such as the M25, fragment some habitats within the NCA.

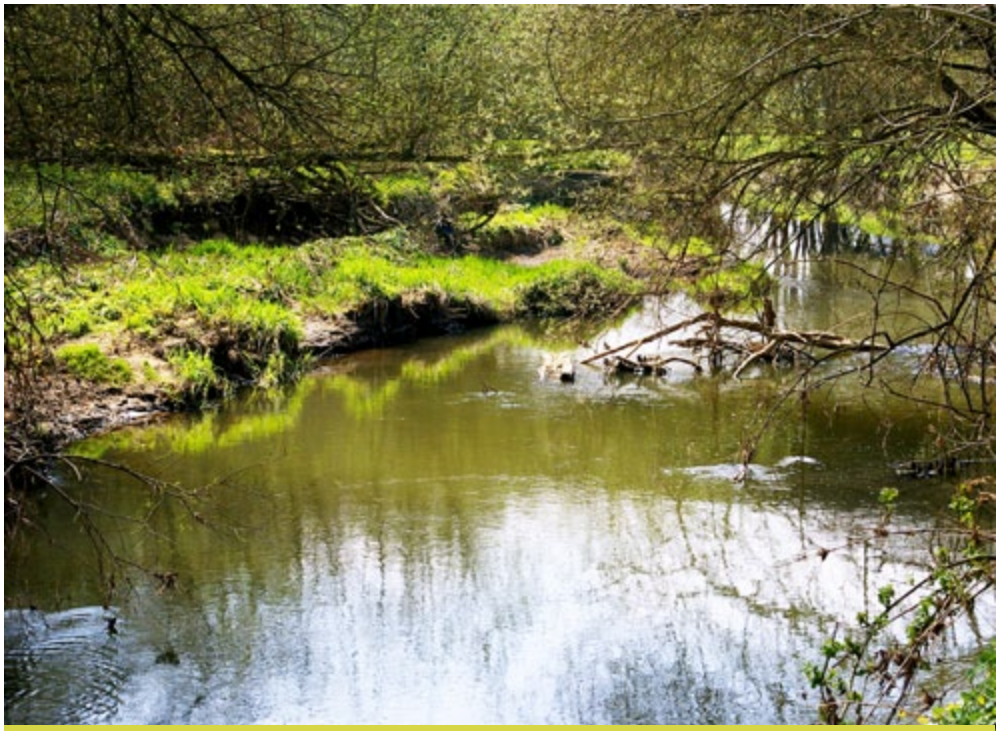
Thames Basin Lowlands today

The Thames Basin Lowlands lies at the southern end of the London Basin. Finger-shaped, it stretches from the London suburbs of South Norwood in the east to Hale on the Surrey / Hampshire border in the west. The landscape is gently undulating but flat in places, for instance within the river valleys. The underlying geology is mostly London Clay with small outcrops of sandstone between Esher and Cobham. Around Sutton and Croydon, there is a small outcrop of the Chalk bedrock that underlies the North Downs, fringed with sediments, and there are sand and gravel river terraces and alluvium along the river valleys. Several rivers including the Wey, Mole, Hogsmill and Wandle meander northwards through this lowland landscape to meet the Thames, forming part of its catchment. Rivers such as the Wey have changed their course during the Quaternary period due to river capture. All have been heavily modified in places, ranging from the straightening of the river course to the installation of concrete banks and culverts. The Wey and Mole are the least developed and their broad, wide valleys support riparian habitats, scattered trees and wet woodlands of alder, oak, lime, willow and poplar, as well as hazel and holly.

The NCA is well-wooded, predominantly broadleaved, with oak, or oak / ash on the more base-rich soils in the west and oak / birch more dominant on the less fertile acidic soils in the east. The largest blocks of woodland are concentrated around East Horsley, Fetcham and Oxshott. The west of the area is more sparsely wooded where ancient semi-natural woodland is an important habitat and feature of the landscape, including the veteran pollarded oaks of Ashtead Common. Towards the east and London, much of the woodland is mixed and the result of afforestation or natural woodland regeneration on heaths.

Horse paddock.

In the west, the landscape is mostly pastoral. Farmland is interspersed with woodlands and shaws (narrow belts of woodland that stretch out along field boundaries), villages and farmsteads. Fields are small-to-medium-sized, irregular shaped and bounded by hedges, resulting from a complex mix of enclosure from woodland in the medieval period, from medieval farmland strips and, in the late 18th and 19th centuries, from heathland. Occasional hedgerow trees include oak, ash and field maple. Closer to urban areas, these



River Mole at Leatherhead.

A 19th century terrace of brick and slate cottages facing the common at Downside Common, near Cobham.

have been replaced by wire fencing or are neglected, gappy and in poor condition. Horse paddocks are a common feature. Field trees in straight lines frequently indicate the position of a lost hedgerow.

To the north-east towards London, the farmland character becomes heavily fragmented by increasing suburbia and the major transport links that cross the NCA such as the M25, A3 and A24. This densely populated part of the NCA includes the Greater London suburbs of Croydon, Mitcham, New Malden and Sutton as well as the north Surrey fringes of Esher, Epsom and Ewell. Towards the south west, with the exception of Guildford, it is more sparsely populated with a varied settlement pattern ranging from large towns such as Leatherhead, with housing estates to scattered houses and farmsteads. Almost nowhere in the NCA can be considered tranquil but throughout the NCA, the remaining commons, parks and river valleys are highly valued for their green space and recreational opportunities.

The landscape through time

The Thames Basin Lowlands NCA lies at the most southerly point of the London Basin; a shallow bowl formed 40 to 60 million years ago during the Alpine orogeny, the period of mountain building that formed the Alps. Over the millennia, this became filled with marine and riverine deposits. Some 55 million years ago, a sequence of shallow marine sediments was deposited under semi-tropical climatic conditions, to form the Thames Group sediments (London Clay), which is the thickest and most widespread Tertiary deposit within the London Basin. During the Quaternary Period (last ice age), rivers including the Wey changed their course due to river capture. Quaternary deposits in the area include sands and gravels forming river terraces, and alluvium along the valley floors.

Transport links have been a dominant feature within the NCA since the Roman conquest when Stane Street, now the A24, was built to connect London with the south coast. However, settlement of the area during this period does not seem to have been extensive, although the remains of a Romano-British villa have been found on Ashtead Common. The area was however densely settled in the medieval period. Land use was a complex mix of heathland, arable strips and ancient woodland with assarted fields relating to a varied settlement pattern of isolated farmsteads and houses, hamlets and small villages. Hunting and recreational parks with grand houses were established across the area, including Henry VIII's Nonsuch Palace. The area west of Croydon was used for growing lavender and in a time when foul air was associated with disease, the area became a popular retreat from London.

Guildford probably had its origins in the early Saxon period, located at a crossing point on the River Wey. Its central position for passing traffic across

Ashtead Common National Nature Reserve is designated in part for its pollarded oaks, which are host to a rich assemblage of invertebrates.

the Wey or between London and the coast ensured its prosperity and it became the county town of Surrey, by the 17th century boasting a grammar school, alms houses and a hospital.

Although shallow, the rivers of the NCA were used from the early Middle Ages as a source of power for driving mills and Domesday records mills on the banks of the Hogsmill. Industry grew up alongside the Mole, Wandle and Wey. The construction of the Wey Navigation canal from the 17th century onwards allowed boats to reach Guildford.

During the 18th century, villages such as Cobham, Esher, Ripley and Send grew up along what is now the A3, providing stopping points for coaches as they travelled between London and Portsmouth. Industries such as copper, iron-working and snuff production grew up around the area's rivers towns. The Wandle was probably the most industrialised, housing the famous William Morris mill and the Liberty factory at Merton Abbey Mills. Improved transport links added to the prosperity and many fine houses were built or older ones renovated, such as the Palladian mansion at Clandon.

Until the 19th century, the character of the NCA remained predominantly rural, Guildford being the most significant settlement. The arrival of the railways brought fast transport links into London, allowing people to work in central London but live on the periphery several miles from their place of work. When towns such as Croydon, New Malden and Sutton were linked to central London by rail, there was a significant influx of population to the area and agriculture and horticulture gave way to extensive urban development. Today commuting to central London is still an important feature of the NCA.

Industrial activities and their infrastructure, including London's first airport at Croydon, led to the area being a target for bombing during the Second World War. A defence line was constructed and features such as pill boxes survive in the west. After the war, land around both Greater London and Guildford was designated Green Belt to prevent further urban expansion. Under the Local Government Act 1963, the London Boroughs were reorganised and parts of the NCA including Croydon, Sutton and Merton which were previously part of Surrey, became part of Greater London.

Hatchlands Park.

Ecosystem services

The Thames Basin Lowlands 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 (under the constituent headings) Further information on ecosystem services provided in the Thames Basin Lowlands NCA is contained in the 'Analysis' section of this document.

A line of field trees follows the line of a former hedgerow.

Provisioning services (food, fibre and water supply)

- Water availability: The rivers Mole, Hogsmill and Wandle are fed by the chalk aquifers of the North Downs while the River Wey receives its headwaters from the Hampshire Downs. Water is abstracted from the Mole and Wey within the NCA for domestic water supply. The Mole, Hogsmill and Wandle within the NCA have water available for licensing at high and moderate flows. The Wey has water available for licensing only at high flows.

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

- **Regulating water quality:** Great efforts have been made to clean the Hogsmill and Wandle in recent years. However all rivers within the NCA are seeing increasing levels of nitrates and phosphates, mainly due to effluent, and three quarters of the area falls within a Nitrate Vulnerable Zone. Agricultural run-off and run-off from roads is also affecting the water quality of the NCA.

- **Regulating water flow:** There are several flooding hotspots including Guildford, Cobham, Esher and Leatherhead. The greatest risk comes from river flooding but surface water flooding can also be a problem. This is expected to become more severe if there are more intense rainfall events and an increase in winter rainfall as a result of climate change.

Cultural services (inspiration, education and wellbeing)

- **Recreation:** The NCA has reasonable provision for recreation including 400 km of rights of way, a number of commons with Open Access, and several accessible woodlands, all covering some 9 per cent of the NCA. Access provision however is not evenly spread across the NCA. Some areas within Greater London such as Beddington, Carshalton and Mitcham are classed as Areas of Deficiency as defined by the Greater London Authority.

Statements of Environmental Opportunity

SEO 1: Maintain and restore the natural functions of the rivers Wey, Mole, Hogsmill and Wandle at a landscape scale, providing improvements in water quality and water availability and helping to regulate water flow while reducing pollution and the risk of flooding to benefit biodiversity, geodiversity and enhance a sense of place.

For example by:

- Encouraging the use of water recycling and the use of greywater systems.
- Promoting water resource efficiency amongst all consumers through water metering, careful use of water and installation of water efficient devices.
- Encouraging the prevention of water leakage through the renewal and improvement of pipe and sewer infrastructure.
- Ensuring that all new development is built to the highest water efficiency standards as set out in the Code for Sustainable Homes.
- Restoring the natural functions and geomorphology of the Rivers Wey, Mole, Hogsmill and Wandle and reconnecting the rivers with their flood plains.
- Allowing seasonal inundation of wetlands and flood plain grasslands as part of flood alleviation measures.
- Protecting the flood plains of the rivers from development so that they have room to store excess water.
- Raising awareness of the problems with overland flows caused by hard surfacing gardens;
- Encouraging the installation of rain gardens and green roofs in urban and urban fringe areas to improve water absorption and ensuring that all new developments include sustainable drainage systems.
- Reducing diffuse pollution in rivers and streams by managing existing or creating new permanent vegetation cover on riverbanks.
- Encouraging the creation of backwaters as a refuge for aquatic species in times of drought.
- Removing barriers and impediments to fish movement along rivers and installing fish ladders on weirs.
- Identifying and removing non-native invasive species such as Himalayan balsam and signal crayfish from riverbanks and aquatic habitats.
- Linking, extending, restoring and improving the management of meadows and wet pastures alongside the rivers promoting the planting of native species to strengthen and link riparian habitats where appropriate.
- Encouraging the planting of native short rotation coppice, using native species where possible, to strengthen riparian habitats where appropriate.
- Supporting opportunities through development and regeneration, to promote and interpret river-based industrial heritage.

SEO 2: Conserve and manage the semi natural vegetation and farmed landscape of the Thames Basin Lowlands to reduce fragmentation between the semi-natural habitats and enhance ecological connectivity, provide benefits for water quality, enhance biodiversity, strengthen the landscape character and increase a sense of well-being.

For example by:

- Managing and restoring the historic network of field boundaries, including hedgerows and hedgerow trees, to allow them to function as corridors for wildlife and improve the landscape and visual appearance of the NCA as well as reducing overland flows.
- Encouraging the planting of new species-rich hedgerows and field boundary trees, particularly oak, ash and field maple.
- Conserving and managing ancient semi-natural woodland and broadleaved woodland through the uptake of woodland grant schemes.
- Encouraging the re-introduction of traditional woodland management techniques such as coppicing and pollarding and encouraging the ongoing management of veteran pollarded trees, especially oaks on Ashtead Common National Nature Reserve.
- Connecting and linking ancient semi-natural woodland through restoring and managing hedgerows and other woodland habitats and seeking opportunities to establish new woodlands of native trees.
- Encouraging the conservation and good management of wood pasture.
- Conserving, managing and restoring historic landscaped parklands where possible with their distinctive ornamental woodland features including avenues, roundels and specimen trees.
- Encouraging the management and restoration of open heaths and commons and protecting their rich but fragile historic and natural environment through re-introduction of appropriate grazing regimes, bracken clearance and removal of secondary woodland.
- Conserving archaeological and other historic features in the landscape with heritage interest, while recognising the potential for undiscovered remains.
- Encouraging the adoption of good agricultural practices for soil, water and land management.
- Raising awareness of the benefit of urban gardening for wildlife.
- Promoting the use of allotments to provide sustainable, healthy food.
- Encouraging the good management of Local Nature Reserves and other local sites so that they can act as stepping stones for wildlife, reduce the fragmentation of the semi-natural habitats and provide ecological links into and from Greater London.
- Promoting the management of green space for biodiversity within Greater London.
- Encouraging the management and planting of road verges with native wildflowers and grasses to develop as wildlife corridors and support pollinators.
- Promoting and developing good horse pasture management.
- Identifying and removing non-native invasive species, for example rhododendrons, from semi-natural grasslands and woodlands.
- Supporting the implementation of the Surrey Hills AONB Management Plan.

SEO 3: Promote creative and effective sustainable urban development including a well-connected network of high quality green infrastructure in and around Greater London and other urban areas incorporating sustainable transport, while managing and enhancing public green space and recreational opportunities for local communities to enjoy, and to benefit biodiversity and landscape character.

For example by:

- Engaging early in the scoping and planning of new developments to ensure that they maximise their contribution to sustainable development.
- Ensuring that any development does not adversely affect the Surrey Hills AONB or the Thames Basin Heaths Special Protection Area or Ashstead Common National Nature Reserve including through light noise and air pollution and additional recreational pressures.
- Creating new areas of accessible green space and developing green corridors around towns to help divert recreational pressures from the designated habitats and landscapes within and adjacent to the NCA.
- Ensuring new and infill buildings adopt a style, design and materials that are sympathetic to and reflect the local built heritage.
- Encouraging understanding of the area's traditional and historic architecture, and its distinct patterns of settlement, to inform appropriate conservation and use of historic buildings, and to plan for and inspire any environmentally beneficial new development which makes a positive contribution to local character.
- Ensuring that any new development is connected to the existing public rights of way to form a cohesive network of sustainable access.
- Encouraging the implementation of the Surrey Rights of Way Improvement Plan.
- Ensuring all new developments incorporate well-designed, high quality green infrastructure.
- Managing and maintaining existing green infrastructure, urban parks, country parks and local nature reserves, ensuring that they meet the needs of the local community.
- Promoting the planting and management of trees in streets, social housing and other appropriate areas within the public realm.
- Incorporating the planting of biomass into green infrastructure projects to buffer and screen new developments.

Supporting document 1: Key facts and data

Total area: 32,783 ha

1. Landscape and nature conservation designations

Less than 1 per cent of the NCA lies within the Surrey Hills Area of Outstanding Natural Beauty (AONB).

Management plans for the protected landscape can be found at:

- www.surreyhills.org/

Source: Natural England (2011)

1.1 Designated nature conservation sites

The NCA includes the following statutory nature conservation de1signations:

Tier	Designation	Name	Area (ha)	% of NCA
International	Ramsar	N/A	0	0
European	Special Protection Area (SPA)	Thames Basin Heaths SPA	4	<1
	Special Area of Conservation (SAC)	N/A	0	0
National	National Nature Reserve (NNR)	Ashstead Common NNR	182	<1
National	Site of Special Scientific Interest (SSSI)	A total of 8 sites wholly or partly within the NCA	900	3

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.

Ashstead Common NNR lies within a SSSI; Thames Basin Heaths SPA is also a SSSI.

There are 214 local sites within the Thames Basin Lowlands NCA covering 3,497 ha, 11 per cent of the NCA.

Source: Natural England (2011)

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

1.1.1 Condition of designated sites

SSSI condition category	Area (ha)	% of SSSI land in category condition
Unfavourable declining	0	0
Favourable	526	59
Unfavourable no change	0	0
Unfavourable recovering	373	41

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

At its lowest, the land is only 9 m above sea level, but it rises to a maximum of 179 m. The mean height is 49 m and the range of elevation is 171 m.

Source: London Basin Natural Area Profile, Thames Basin Lowlands Countryside Character Area Description

2.2 Landform and process

This is an essentially lowland area lying within the London Basin. The land is a gently undulating plain for the most part, rising towards the dip slope of the North Downs to the south and east and to the Thames Basin Heaths in the west.

Source: London Basin Natural Area Profile, Thames Basin Lowlands Countryside Character Area Description

2.3 Bedrock geology

The Thames Basin Lowlands is geologically part of the London basin which is a syncline – a concave fold with the oldest sediments at its periphery – formed 20 to 40 Ma as a result of the Alpine Orogeny (mountain-building). The region became dry land during this time. The oldest rock here is the chalk, which was laid down in warm shallow seas during the Cretaceous period. It is overlain by Palaeogene and Neogene sands and mudstones. Following a marine transgression some 55 Ma, the London Clay was laid down. Overlying this are the Bagshot, Barton and Bracklesham Beds. These sands and clays were deposited on a large coastal plain. There are very small areas of sediments of other formations.

Source:London Basin Natural Area Profile, Thames Basin Lowlands Countryside Character Area Description

2.4 Superficial deposits

Important Quaternary sediments are present, recording the changing temperatures during this period and the presence and absences of ice-sheets. The Anglian ice sheet advanced as far south as the northern rim of the London basin and forced the young River Thames to change its course to its current one. Fluvial sediments deposited by the Thames river system before the Anglian Ice Age, occur predominantly along the northern edge of the London basin, parallel with the axis of the syncline. Sediments deposited after the Anglian Ice Age are found along the flood plains of the current rivers. The youngest sediments are sands and gravels deposited by the Thames in its current location since the last ice age.

Source: London Basin Natural Area Profile, Thames Basin Lowlands Countryside Character Area Description

2.5 Designated geological sites

Designation	Number of sites
Geological Site of Special Scientific Interest (SSSI)	0
Mixed interest SSSI	1

There is 1 Local Geological Sites within 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

2.6 Soils and Agricultural Land Classification

Heavy clayey soils result from the underlying geology.

Source: London Basin Natural Area Profile, Thames Basin Lowland Countryside Character Area Description

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

Agricultural Land Classification	Area (ha)	% of NCA
Grade 1	15	<1
Grade 2	345	1
Grade 3	7,405	23
Grade 4	2,986	9
Grade 5	0	0
Non-agricultural	2,570	8
Urban	19,461	59

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.

Name	Length (km)
River Mole	17
River Wey	7
River Blackwater	4

Source: Natural Area Profile, Countryside Character Area Description, main rivers identified from OS Strategic data

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

3.2 Water quality

The total area of Nitrate Vulnerable Zone is 25,706 ha, 78 per cent of the NCA.

Source: Source: Natural England (2010)

3.3 Water Framework Directive

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

4. Trees and woodlands

4.1 Total woodland cover

The NCA contains 4,288 ha of woodland (13 per cent of the total area), of which 855 ha (3 per cent) is ancient woodland.

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

4.2 Distribution and size of woodland and trees in the landscape

Woodland is predominantly oak, with oak/ash on the more basic rich soils in the west, oak/birch favours the less fertile, acidic land over the sands and gravels in the east.

The west of the area is generally more sparsely wooded but most of this is semi-natural ancient woodland. Ashtead Common is a distinct and unique landscape of gnarled old pollard oaks in pasture.

Source: London Basin Natural Area Profile

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	3,823	12
Coniferous	264	1
Mixed	97	<1
Other	104	<1

Source: National Inventory of Woodland and Trees, Forestry Commission (2011)

Area and proportion of Ancient Woodland and Planted Ancient Woodland within the NCA.

Woodland type	Area (ha)	% of NCA
Ancient semi-natural woodland	604	2
Ancient re-planted woodland (PAWS)	251	1

Source: Ancient Woodland Inventory, Natural England (2003)

5. Boundary features and patterns

5.1 Boundary features

Fields are mostly bounded by hedges, although wire fences, often associated with pony paddocks, sometimes replace hedges particularly when close to urban areas. Oak is the commonest hedgerow tree.

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

5.2 Field patterns

Fields are generally small or medium-sized and uneven.

Source: Countryside Quality Counts Draft Historic Profile, Thames Basin Lowlands Countryside Character Area

6. Agriculture

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

6.1 Farm type

The NCA is not very mixed in character. The commonest farm type was other types with 59 holdings followed by grazing livestock with 23 holdings. The only other farm types of any significance were cereals and horticulture, both with 19 holdings. Most farm types had seen an increase in the period 2000 to 2009, cereals by 6 holdings and other types and grazing livestock lowland each by 5. Horticulture, however, saw a decline by 5 holdings over the same period. The number of holdings decreased slightly by 4 per cent from 135 to 129.

Source: Agricultural Census, Defra (2010)

6.2 Farm size

The commonest farm size by number of holdings was between 5 ha and 20 ha with 48 holdings covering 504 ha, followed by those between 20 and 50 ha with 27 holdings and covering 890 ha. By area, farms over 100 ha covered the largest portion of the farmed area with 4,008 ha.

Over the period 2000 to 2009 farms between 5 ha and 20 ha had increased by 4 holdings, while those under 5 ha had decreased by 7.

Source: Agricultural Census, Defra (2010)

6.3 Farm ownership

Owned land made up 69 per cent of the total farm area, while the remainder was held in tenancy. There had been an increase in owned land by 215 ha or 5 per cent, but a sharp decrease in land held in tenancy by 1084 ha or 36 per cent during the period 2000 to 2009.

2009: Total farm area = 6,635 ha; owned land = 4,550 ha
2000: Total farm area = 7,253 ha; owned land = 4,335 ha

Source: Agricultural Census, Defra (2010)

6.4 Land use

The greatest land use by area was grass and uncropped land (3,921 ha) followed by cereals (1,076 ha). Most crops declined by area during the period 2000 to 2009. The exceptions were grass and uncropped land which increased by 221 ha and oilseeds which increased by 202 ha. The largest reduction by area was in cereals, a fall of 569 ha followed by other arable crops which fell by 338 ha.

Source: Agricultural Census, Defra (2010)

6.5 Livestock numbers

The most numerous livestock were sheep with 3,300 animals followed by cattle with 1,000, then pigs with 400. During the period 2000 to 2009, the numbers of all livestock fell, most dramatically in cattle by 77 per cent and pigs by 75 per cent. By contrast the number of sheep fell slightly by 4 per cent.

Source: Agricultural Census, Defra (2010)

6.6 Farm labour

Most farms were run by principle farmers (140) as opposed to salaried managers (31). Between 2000 and 2009, there was a reduction in the number of principle farmers by 15, while salaried managers increased by 20. The number of full-time workers had increased by 15, as had the number of part-time workers by 38. The number of casual/gang workers had decreased by 10.

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

Patches of semi-ancient woodland are found in the central and western half of the NCA.

Source: London Basin Natural Area Profile

7.2 Priority habitats

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

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

Priority habitat	Area (ha)	% of NCA
Wet woodland	806	2
Undetermined grassland	741	2
Lowland heathland	589	2
Fens	361	1
No decision	148	<1
Lowland meadows	16	<1
Lowland beech and yew woodland	12	<1
Lowland mixed deciduous woodland	5	<1
Lowland calcareous grassland	2	<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

Settlement density ranges from the heavily developed landscape in the north-east, in or close to Greater London, through to much sparser settlement in the west. Here settlements vary from scattered houses or farmsteads to small patches of more built-up estate developments.

Source: Office for National Statistics census data 2001

8.2 Main settlements

Main settlements include Croydon, Sutton, Guildford, Epsom and Esher. The total estimated population for this NCA (derived from ONS 2001 census data) is 959,476.

Source: Office for National Statistics census data 2001

8.3 Local vernacular and building materials

There are a number of distinctive brick and flint farmhouses with a similar building style built during the 19th century and also examples of fine half-timbered buildings.

Source: Country Quality Counts Draft Historic Profile, Thames Basin Lowlands Countryside Character Area Description

9. Key historic sites and features

9.1 Origin of historic features

A number of landscaped parks are prominent in the area; these include Claremont at Esher, renowned for Bridgeman's earthworks; Clandon landscaped by Capability Brown, and also Ockham and East Horsley. On the Wey, north of the M25, there are traces of the former industrial use of the river and navigation in the form of old mills and factories.

Source: Countryside Quality Counts Draft Historic Profile, Thames Basin Lowlands Countryside Character Area Description

9.2 Designated historic assets

This NCA has the following historic designations:

- 14 Registered Parks and Gardens covering 911 ha.
- 25 Scheduled Monuments.
- 1,260 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

- 9 per cent of the NCA (3,107 ha) is classified as being publicly accessible.
- There are 400 km of public rights of way at a density of 1.2 km per km2.

Sources: 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)	255	1
Common Land	1,246	4
Country Parks	282	1
CROW Access Land (Section 4 and 16)	1,296	4
CROW Section 15	2,185	7
Village Greens	45	<1
Doorstep Greens	13	<1
Forestry Commission Walkers Welcome Grants	1,500	5
Local Nature Reserves (LNR)	911	3
Millennium Greens	4	<1
Accessible National Nature Reserves (NNR)	182	1
Agri-environment Scheme Access	0	0
Woods for People	1,680	5

Sources: Natural England compiled data 2011, Woodland Trust, National Trust, Forestry Commission

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 NCA is subject to heavy disturbance particularly in the north east where it is close to or part of Greater London. The most tranquil areas can be found in the south west between Guildford and Fetcham and Guildford and Ash.

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

Tranquillity	Tranquillity Score
Highest value within NCA	22
Lowest value within NCA	-133
Mean value within NCA	-58

Sources: 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 almost the entire NCA is disturbed by visual and auditory intrusion. A breakdown of intrusion values for this NCA is detailed in the following table.

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

Intrusion category	1960s (%)	1990s (%)	2007 (%)	Percentage change (1960s-2007)
Disturbed	30	51	39	9
Undisturbed	16	<1	<1	-16
Urban	53	48	60	7

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are a steady growth in urban areas.

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

12 Data sources

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

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

Supporting document 2: Landscape change

Recent changes and trends

Trees and woodlands

- The proportion of woodland and trees covered by a Woodland Grant Scheme management agreement nearly doubled between 1999 and 2003 from 18 per cent to 35 per cent. Over the same period, the proportion of ancient semi-natural woodland covered by a Woodland Grant Scheme rose slightly from 31 per cent to 34 per cent.

- The majority of woodland (89 per cent) within the NCA is broadleaved or mixed but suffers from a lack of regular management. The re-introduction of active management and traditional practices such as coppicing would improve age structure and biodiversity interest.

Boundary features

- Many hedgerows suffer from a lack of appropriate management due to over-trimming and intensive land use. In some areas, this has led to a significant loss of hedgerows and hedgerow trees. In addition, the increased use of land for horse pasture and pony paddocks on the urban fringe has resulted in more use of post and wire fencing and sometimes the removal of hedges altogether.

- Recently, however, the number of agri-environment schemes with hedgerow options within the NCA has been increasing and, although still very low, now accounts for about 7per cent of the total estimated boundary length.

Ashtead Common

Agriculture

- The farmed landscape character has changed quite markedly. According to statistics from the Defra census, the total farmed area within the NCA declined by 9 per cent between 2000 and 2009.

- Grass or uncropped land rose by 6 per cent, reflecting an increase in the amount of grazing and use for horse paddocks. Oil seed rape increased by 51 per cent while other arable crops fell by 64 per cent and cereals by 35 per cent.

- Livestock numbers also decreased during the same period; sheep by 4 per cent but cattle and pigs quite dramatically by 77 per cent and 75 per cent respectively.

Settlement and development

- Green Belt designation around Guildford and Greater London covers 41 per cent of the NCA. This has limited the rate of development outside urban areas.

- The exception to this has been on the western fringes of Greater London around Epsom and Ewell where there has been some expansion into the peri-urban area. Within urban areas, in particular Croydon, Merton and Sutton but also within Aldershot and Guildford, the density of housing has increased considerably.

- The presence of the A3 and M25 and development within their road corridors has had a significant impact on the landscape character of the NCA.

Semi-natural habitat

- Sites of Special Scientific Interest condition is gradually improving with the majority (59 per cent) of designated sites in favourable condition and the remainder (41 per cent) in unfavourable but recovering condition.

- A reduction or lack of traditional grazing on some commons has led to the diminution of biodiversity interest with areas of heathland becoming increasingly scrubbed over, invaded by gorse and birch.

Historic features

- The area's historic parkland landscapes and their characteristic features such as imposing mature ornamental trees, avenues and roundels, are in some cases being lost or degraded through neglect, lack of management and occasionally through direct removal. Conversion of parkland from grazing to arable, recreation or horticulture has reduced the distinctiveness and landscape setting of parkland features.

A suburban road at Effingham Junction on the Guildford to London railway line; a landscape much influenced by commuter development south-west of London.

Rivers

- The chemical status of the rivers was considered to be good in 1995 and most continue to achieve a good status. The Wey is now judged to be failing for the presence of benzo (ghi) perelyene and indeno (123-cd) pyrene. The biological quality was also judged to be predominantly good in 1995 but rising levels of phosphate and low numbers of fish mean that the Wey is now considered to be moderate and the Mole, Hogsmill and Wandle poor.

Minerals

- There is currently no extraction of minerals in this NCA.

Drivers of change

Climate change

- A reduction in river flows during summer months due to low rainfall could lead to reduced water quality through diffuse pollution. The demand for water abstraction from agricultural businesses could increase with a greater need for irrigation. Higher temperatures would also increase demand for potable water. The aquifer recharge capacity of the North Downs, South Downs and Hampshire Downs (which provide the headwaters for the Wey, Mole, Hogsmill and Wandle) could become slower.

- Conversely, winter rainfall may be heavier, increasing the likelihood of flooding events as well as the number of properties affected, in settlements close to rivers such as Guildford and Cobham.

- Non-native invasive species may gain a stronger foothold if higher temperatures prevail.

- Continental European species may extend their range into Britain. This is already happening with some species of butterflies and dragonflies.

- Prolonged droughts in summer may change the biodiversity value of the wet riparian woodlands along the rivers Wey and Mole.

- Woodland cover, especially ancient semi-natural woodland, may experience a decline or change in species composition as drier sites become more vulnerable to fire and some species struggle to adapt to drier conditions and higher temperatures. The capacity of the woodland resource within the Thames Basin Lowlands to adapt to climate change may be reduced because of its fragmentation.

- Veteran trees within parkland or wood pasture such as those on Ashstead Common may not be able to withstand long periods of drought. This may also lead to the loss of specialised species associated with them such as fungi and invertebrates.

- Hedgerows can be sensitive to drought, leading to die-back of hedgerow trees and possibly to hedgerow removal. Berry-bearing species may be affected by a reduction in the number of frosts as many require low winter temperatures to stimulate flower production. A decrease in berries, seeds and fruit would also reduce winter food available for wildlife.

Other key drivers

- There has been a considerable amount of development in recent years particularly within Croydon, Guildford and the Epsom area. However, the high proportion of land designated as Green Belt will continue to have a strong influence on the development of the landscape.

- The decline in the importance of agriculture to the local economy is likely to continue because of the proximity of the NCA to London and other large urban areas.

- An increase in population may put additional recreational pressure on sensitive sites in adjacent NCAs such as the Thames Basin Heaths and the Surrey Hills AONB as well as on local water resources which are already stretched.

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.

Field tree within an arable and wooded landscape.

Statement of Environmental Opportunity	Ecosystem service																		
	Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place / Inspiration	Sense of history	Tranquillity	Recreation	Biodiversity	Geodiversity
SEO 1: Maintain and restore the natural functions of the rivers Wey, Mole, Hogsmill and Wandle at a landscape scale, providing improvements in water quality and water availability and helping to regulate water flow while reducing pollution and the risk of flooding to benefit biodiversity, geodiversity and enhance a sense of place.	↔ ***	↔ ***	↑ ***	n/a	↔ **	↔ **	↑ ***	↑ ***	↗ ***	↗ ***	↗ **	↗ **	n/a	↑ ***	↔ ***	↗ **	↔ **	↑ ***	↔ ***
SEO 2: Conserve and manage the semi-natural vegetation and farmed landscape of the Thames Basin Lowlands to reduce fragmentation between the semi-natural habitats and enhance ecological connectivity to provide benefits for water quality, enhance biodiversity, strengthen the landscape character and increase a sense of well-being.	↔ ***	↔ ***	↗ **	n/a	↗ ***	↗ ***	↗ ***	↗ ***	↗ ***	↗ ***	↗ ***	↗ ***	n/a	↑ ***	↔ ***	↗ ***		↑ ***	↔ ***
SEO 3: Promote creative and effective sustainable urban development including a well-connected network of high quality green infrastructure in and around Greater London and other urban areas incorporating sustainable transport, while managing and enhancing public green space and recreational opportunities for local communities to enjoy, and to benefit biodiversity and landscape character.	↔ ***	↔ ***	↗ ***	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
A generally flat but gently undulating landscape at the southern edge of the London Basin.	■ The mean height of the NCA is only 49 m while the landform ranges from 9 to 179 m above sea level. ■ The vast majority of the NCA lies on a bedrock of Thames Group (London Clay) with bands of sand (Bracklesham Group and Barton Group) around Esher and Cobham and chalk fringed with Lambeth Group and Thanet Formations sediments underlying Croydon and Sutton, with river terraces of sand and gravel along the river valleys.
A moderately wooded landscape.	■ Tree cover is currently 13 per cent including woodlands, shaws, field boundary trees and parkland. ■ It is predominantly broadleaved, with oak, and oak/ash on the more base-rich soils in the west and oak / birch more dominant on the less fertile acidic soils in the east. ■ The largest blocks of woodland are found around Fetcham, Oxshott and East and West Horsley. ■ The west of the area is more sparsely wooded with ancient semi-natural woodland an important habitat and feature of the landscape, including the veteran pollarded oaks of Ashtead Common. ■ Towards the east and London, much of the woodland is mixed and the result of afforestation or natural woodland regeneration on heaths. ■ Riparian/wet woodlands along river valleys of alder, oak, lime, willow and poplar.
Irregular small-to medium-sized fields commonly bounded by hedges.	■ Fields are small to medium-sized, irregularly shaped and bounded by hedgerows. ■ Fences replace hedges closer to urban areas. ■ Field trees in straight lines can be an indicator of lost hedgerows. ■ Field trees are mainly oak with some ash and field maple.

Landscape attribute	Justification for selection
Mixed farmed landscape.	■ Heavy clay soils support a predominantly pastoral landscape. ■ 59 per cent of the farmed area is grass or uncropped land. ■ Increasing area of poorly managed, weedy fields and grasslands fenced for horse pasture and pony paddocks, especially in urban fringe areas / edges of towns and villages. ■ Farmland often interspersed with woodland and shaws, hedgerows and trees, remnant commons, villages and farmsteads. ■ Scattered pockets of landscaped estates with remnant parkland features.
Rivers with broad, flat valley plains drain the area north-wards.	■ The main rivers within the NCA have undergone considerable modification ranging from widening and straightening to confinement within concrete banks. ■ Artificial modification has been undertaken for flood prevention but also historically to improving potential for providing water power to mills. ■ River valleys in rural areas meander across undulating farmland plains marked by riparian woodlands, meadows and larger open fields.
Highly urban in character with less densely settled areas to the south-west.	■ 60 per cent of the NCA is urban according to data from the Campaign to Protect Rural England. ■ Dense urban settlement within the Greater London area and its fringes in north Surrey but more thinly settled and rural to the west and south-west between Esher and Guildford. ■ Numerous major road and rail networks criss-cross the area.

Landscape opportunities

- Expand, link and enhance riparian habitats along river corridors through habitat creation of wet grassland and planting of wet woodland.
- Protect, manage and enhance the rivers Hogsmill, Mole, Wandle and Wey and their rich and diverse riparian habitats that support a wide range of flora and fauna.
- Plan for the anticipated higher frequency of flood events and higher levels of winter rainfall through the restoration of traditional flood meadows and expansion of riparian habitats such as wet grassland and wet woodland along river corridors.
- Discourage inappropriate development on the flood plains of the rivers Wey, Mole and Hogsmill and promote the restoration of the natural river geomorphology. Where possible reconnect the rivers with their flood plains.
- Restore and enhance the hedgerow network to improve ecological networks and enhance the landscape character.
- Improve management of local nature reserves and where possible extend and link the network so that they can act as stepping stones for wildlife and help overcome the fragmentation of the semi-natural habitats of the NCA.
- Restore and manage woodland, particularly semi-ancient woodland, parkland and wood pasture, by encouraging and reintroducing management practices such as pollarding and coppicing. Where possible link existing sites to avoid fragmentation.
- Encourage sensitive development within and around the edge of villages so that their character is preserved.
- Ensure new good quality recreational opportunities are provided for any new development including in areas experiencing a high degree of infill and construction on brownfield sites.

River Wey Navigation Canal.

Ecosystem service analysis

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

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

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Food provision	Grasslands Mixed livestock farming Arable land Horticulture/ market gardening Allotments	The soils are moderate or poor with only about 1 per cent being grades 1 or 2, 23 per cent grade 3 and 9 per cent grade 4. The remainder (67 per cent) is either urban or non-agricultural. In 2010, the farmed area is predominantly pastoral with 59 per cent classified as grassland or uncropped land. 30 per cent is cereals and 6 per cent oilseed rape. The commonest livestock is sheep (71 per cent) followed by cattle (21 per cent) and pigs (8 per cent).	Local	Historically the area had many mixed farms with wheat an important crop. However, now food production is not an important industry in the NCA. Only 20 per cent of the land is farmed and the total farmed area declined between 2000 and 2009 by 9 per cent. Between 2000 and 2009 grass or uncropped land increased by 6 per cent, probably reflecting an increased demand in the number of horse paddocks. Oilseeds increased in area by 51 per cent while other arable crops fell by 64 per cent and cereals by 35 per cent. Livestock numbers fell during the same period; sheep by 4 per cent but cattle and pigs quite dramatically by 77 per cent and 75 per cent respectively. This again probably reflects the difficulties of livestock farming on the edge of densely populated urban areas. Allotment holdings are popular in the NCA providing a good source of cheap and sustainable food as well as opportunities for recreation and education. There is some potential for increasing agriculture but in order for this to be commercially viable specialisation would be necessary, such as rare breeds and niche food markets.	Encourage sustainable farming practices through implementation of soil, land and water best practice management to protect and maintain resources. Promote the development of specialist food products and markets for locally produced food, especially those associated with rare breeds, low input and extensive livestock management systems. Seek to safeguard food provision through measures such as agri-environment schemes, which also enhance the landscape and biodiversity. Support and extend where possible the provision of local allotments so that people can grow their own food sustainably and reinforce links between food sources and urban populations. Promote wildlife-friendly management of allotments.	**Food provision** **Sense of place/ inspiration** **Biodiversity** **Recreation**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Timber provision	Existing woodlands Ancient semi-natural woodland	Woodland cover is reasonably high at about 13 per cent and made up of small woodlands, shaws and wet woodlands in the river valleys. Woodland is privately owned; the Forestry Commission does not manage any plantations in the NCA. The majority of the woodland cover (89 per cent) is broadleaved, of which 20 per cent is classified as ancient semi-natural woodland.	Local	Bringing woodlands back into sustainable active management through coppicing and pollarding would help to improve their biodiversity interest, recreational value and strengthen a sense of place and tranquillity while providing a long-term source of timber, especially hardwoods. There is scope to extend timber provision within the area although this would probably be most successful linked to production of biomass or firewood provision particularly for local use	Encourage and stimulate local markets for wood products, particularly around Guildford and north Surrey, such as charcoal, wood fuel and sustainable timber production. Encourage the re-introduction of traditional management techniques such as pollarding and coppicing, especially in ancient semi-natural woodland and broadleaved woodlands to improve health and biodiversity, strengthen landscape and provide sustainable sources of local wood fuel. Encourage and promote the planting of new woodlands, where beneficial, to link existing habitats or provide access to quality green space for urban populations.	**Timber provision** **Biomass energy** **Biodiversity** **Sense of place/ inspiration** **Tranquillity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability	Relatively low rainfall Aquifers, rivers and streams Wey Navigation canal	The rivers Mole, Hogsmill and Wandle are dependent on the chalk aquifers of the North Downs. The River Wey is fed by the chalk aquifers of the Hampshire Downs. Water is abstracted from the Mole and Wey within the NCA for domestic water supply. The Mole, Hogsmill and Wandle in the NCA have water available for licensing at high and moderate flows. The Wey has water available for licensing only at high flows.[4][5][6][7] A small portion of the Epsom North Downs aquifer underlies Sutton and Croydon. This is classified as having no water available.	Regional	The rivers of the NCA are managed as part of the Thames catchment area, one of the driest areas in the country with only about three quarters of the national average rainfall but with the highest population. All the rivers within the Thames catchment area are managed to protect the drinking water supply for London. Leakage from water pipes is a particular problem within Greater London where it can be more difficult to access the infrastructure. Managing demand through water efficiency measures such as water recycling and metering will help to ensure that water supplies are sustainable. All new development should be built to high water efficiency standards. Extending and improving the management of low-lying grasslands, particularly water meadows in the river valleys, would improve their capacity to absorb water. Good land management practices such as adding organic matter to soils where levels are low could help improve infiltration and reduce diffuse pollution such as ground water run-off. Increase in number of winter storage reservoirs on farmland would help to regulate seasonal water supplies for agriculture and reduce the need for abstraction.	Encourage the renewal and improvement of pipe and sewer infrastructure to prevent water leakage. Promote good soil, land and water management through the codes of practice, such as the addition of organic matter to soils where levels are low to assist infiltration, reduce surface water run-off and diffuse pollution. Extend, link and improve the management of semi-natural habitats such as the water meadows and riparian habitats alongside the Wey, Mole and Hogsmill to aid infiltration and increase water storage capacity especially in winter. Encourage the uptake of water saving measures such as best practice in harvesting and recycling rainwater, and greywater recycling, in new and existing developments. Promote water efficiency and the use of water-efficient devices and water meters among all users; domestic, agricultural and commercial. Ensure that all new development is built to the highest water efficiency standards as set out in the Code for Sustainable Homes[8]. Encourage the building of water storage reservoirs on agricultural land to reduce demand on water resources.	**Water availability** **Regulating water flow** **Regulating water quality** **Climate regulation** **Regulating soil erosion** **Sense of place/ inspiration** **Biodiversity**

[4] London Abstraction Licensing Strategy, Environment Agency (February 2013)

[5] Mole Abstraction Licensing Strategy, Environment Agency (February 2013)

[6] Wey Abstraction Licensing Strategy, Environment Agency (December 2012)

[7] http://maps.environment-agency.gov.uk/wiyby/wiybyController?ep=maptopics&lang=_e (accessed March 2014)

[8] Code for Sustainable Homes, Department for Communities and Local Government (2006)

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	Existing broadleaved woodlands	Existing woodland cover is around 13 per cent the majority of which is broadleaved; around 3 per cent is ancient semi-natural woodland. There is currently no large-scale biomass provision within the NCA.	Local	Existing broadleaved and ancient semi-natural woodland offers the best potential for biomass provision through improved management of woodlands. Potentially there is a large market for biomass and wood products locally. Reintroduction of coppice management could increase biomass provision and benefit biodiversity and the character of ancient coppiced woodlands. There is predominantly medium potential yield for short rotation coppice (SRC) throughout the NCA, except for a small patch of low potential around West Horsley and one of high potential around Effingham. SRC plantations could link and contribute to woodland cover on the edge of existing woodlands and riparian habitats, where it does not disturb semi-natural vegetation. Miscanthus plantations would probably be best placed in the urban fringe or used to break up views of visually intrusive developments. Some heathlands and commons have secondary woodland growth from a lack of management or grazing. Restoring the open grassland habitat could provide a short term biomass source.	Encourage local initiatives and markets for wood fuel biomass. Work with partners and woodland managers to promote and reinstate coppice management of woodlands for biomass and wood fuel. Encourage the planting of SRC along the banks of rivers where it is in keeping with the landscape character and will support biodiversity. Encourage and support the restoration of open heathlands and commons through the removal of secondary woodland to provide short term biomass and benefit biodiversity landscape.	**Biomass energy** **Climate regulation** **Biodiversity** **Sense of place/ inspiration** **Timber provision** **Regulating water quality** **Regulating water flow**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation	Soils Broadleaved woodland Semi-natural vegetation Pasture and parkland Hedgerows Wetlands Street trees Private gardens Urban green space	The soils of the NCA generally have a low content (0 to 5 per cent). There are small areas of naturally very wet acid sandy and loamy soils (4 per cent), some of the flood plain soils with naturally high groundwater (3 per cent) and the freely-draining very acid soils (2 per cent) which are peaty at depth or include some organic and peaty topsoils that provide a store of carbon. Carbon storage is provided by over 3,000 ha of woodland within the NCA and its underlying humus-rich soils. There are nearly 4,000 ha of grassland and uncropped land and nearly 1,000 ha of Registered Parks and Gardens.	Local	The majority of the area's soils are mineral soils that can be low in organic matter. Carbon will be stored where soils have remained undisturbed for very long periods, including flood plain grasslands, parkland and permanent pasture. A large proportion of the NCA is urban (59 per cent) but still makes a contribution to climate regulation through its street trees, urban green space and private gardens. This can be increased by the installation of green roofs, additional planting of street trees (preferably native broadleaved) and by ensuring all new housing and other developments incorporate high quality greenspace. Green roofs also make good insulators and can help reduce the need for heating or cooling. In addition they enhance the efficiency of solar panels.[9] All new development should be built to the highest energy efficiency, where possible meeting the Code for Sustainable Homes[10], the national standard for sustainable construction which aims to reduce carbon emissions. The well-managed woodlands of the NCA are the most efficient at carbon sequestration. However, fragmentation limits their potential to adapt to climate change and store carbon. Carbon sequestration could be increased in the majority of the area's soils by increasing organic matter content and by reducing the frequency and extent of cultivations.	Encourage developers and planners to meet the highest energy efficiency standards in all new development, working to the Code for Sustainable Homes. Promote and encourage planting of street trees, particularly native species, to act as carbon stores. Encourage the good management of existing street trees and urban greenspace. Promote and encourage the installation and management of green roofs within urban areas to insulate and contribute to energy efficiency. Support and encourage the reintroduction of active management to existing woodlands, shaws and hedgerows. Support and encourage the planting of new woodlands, shaws and hedgerows to link and expand woodland cover to increase their resilience to climate change and their ability to sequester carbon and improve habitat connectivity, and strengthen landscape character. Conserve, manage and restore wetlands, meadows and flood plain grazing. Encourage farmers and landowners to adopt good land, water and soil management practices. Encourage farmers to improve soil structure and potential to store carbon through an increase in soil organic matter content, introducing cover crops and restoring arable to permanent grassland where possible.	**Climate regulation** **Water quality regulation** **Pollination** **Biodiversity** **Geodiversity** **Sense of place/ inspiration** **Regulating soil erosion** **Regulating soil quality**

[9] http://www.environment-agency.gov.uk/business/sectors/91970.aspx (accessed March 2014)

[10] Code for Sustainable Homes, Department for Communities and Local Government (2006)

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality	Rivers and streams Aquifers Wetlands, riparian habitats and aquatic vegetation Hedgerows, shaws and woodlands Soils	A significant proportion (78 per cent) of the area is classified as a Nitrate Vulnerable Zone, where landowners are required to adopt practices that will protect water quality. The Wey has moderate ecological status. Its morphology is not good and it has a high level of phosphates. It is good chemically but judged to be failing for the presence of benzo (ghi) perelyene and indeno (123-cd) pyrene[11]. The Mole has poor ecological status because of high levels of phosphates and it is poor for fish and diatoms. Its chemical status is good[12]. The Hogsmill has poor ecological status because of the low numbers of fish and invertebrates and suffers from high phosphate levels. It has good chemical quality. The Wandle has poor biological quality. This is because it is poor for diatoms and fish and moderate for macrophytes and macro-invertebrates. It has very high levels of phosphates. The chemical quality however is good.[13]	Regional	All the rivers in the NCA suffer from high phosphate levels mostly as a result of effluent. The problem is exacerbated by misconnected homes and businesses discharging waste water directly into the rivers. Run-off, particularly from roads and surface water from dense urban and hard surfaced areas, is another major source of pollution. Urban growth will increase demand on water resources but may also provide opportunities to improve the water environment through the incorporation of measures such as sustainable urban drainage systems (SUDS). The hedgerow network in some parts of the NCA is in poor repair and has often been replaced by fencing. Restoring hedgerows where possible will help reduce overland flows and remove sediment and pollutants. Semi-natural habitats including woodland, grasslands, wetlands, reedbeds and bankside vegetation can also act as effective filters of pollutants and sediment.	Encourage water authorities to increase the detection and correction of misconnections to reduce discharge of pollutants directly into rivers. Encourage the identification of sources of pollution and seek and promote long-term solutions. Encourage the adoption of Nitrate Vulnerable Zone measures where appropriate. Work with land managers and partners at a catchment scale to coordinate implementation of measures such as buffering water courses, improving vegetation cover on banks, limiting stock access and restoring riparian habitats to filter effluents and pollutants and reduce sediment loss. Encourage the restoration and good maintenance of the hedgerow network, particularly on slopes close to rivers, to capture run-off and help to filter out pollutants. Extend and improve the management of river meadows, wetlands and reedbeds so that they can trap and filter pollutants more effectively. Encourage and support the planting of new native woodlands, shaws and field boundary trees to help filter pollutants. Ensure all new development incorporates SUDS.	**Regulating water quality** **Water flow** **Soil quality** **Soil erosion** **Biodiversity**

[11] Wey Abstraction Licensing Strategy, Environment Agency (December 2012)

[12] Mole Abstraction Licensing Strategy, Environment Agency (February 2013)

[13] http://www.environment-agency.gov.uk/homeandleisure/37793.aspx (accessed March 2014)

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow	Rivers and streams Flood plains Wetlands Infrastructure Agricultural land Semi-natural habitats including hedgerows and woodlands Soils and geology	The rivers in the NCA form part of the larger Thames catchment and flood management area. They are fed by headwaters from the South, North and Hampshire Downs in the neighbouring NCAs. There are several large centres of population in the NCA including Beddington, Cobham, Epsom, Guildford and Leatherhead which are potentially at risk of flooding from the rivers Mole, Wey and tributaries. This is mainly due to river flooding but in some places, for instance Croydon, surface water flooding is also an issue.[14]	National	The impermeable nature of the clay soils in the NCA means that little water infiltrates the ground and water levels rise quickly in response to rainfall. In addition, dense urban areas with extensive hard surfaces exacerbate rapid run-off. Climate change may exacerbate problems of flooding through an increase in frequency and intensity of rainfall events. All the rivers running through the area have been heavily modified. Restoration to a more natural state would help to reduce the risk of flooding while greatly enhancing their landscape character. Development pressure is high in the NCA including on existing flood plains. A key element in alleviating or preventing future flood events will be avoiding inappropriate development on flood plains and managing them well so that they can function effectively. Measures to improve flood plain capacity to absorb excess water could include restoring permanent flood plain grazing, extending wetlands and enhancing riparian habitats. Creation of seasonal flood storage lagoons on farmland may help to alleviate flooding pressure. **Continued over...**	Work with local authorities to avoid inappropriate development on flood plains. Work with partners to restore natural river channels, improve river morphology to slow fluvial flows and create flood storage and remove artificial barriers to reduce flood risk. Where possible work with farmers, landowners and water authorities to reconnect rivers with their flood plains and extend and link flood plains to improve their capacity to absorb flood waters Encourage farmers and landowners to manage and restore permanent grassland, hedgerows, shaws, woodland, wetlands and riparian habitats in good condition to improve infiltration and slow run-off, and seek opportunities to provide further flood storage capacity. Support the creation of backwaters as a refuge for aquatic species in times of drought, allowing seasonal inundation of wetlands and flood plain pastures as part of flood alleviation measures, reflecting the policies of the Thames Catchment Flood Management Plan, as well as sustaining wetland habitats. **Continued over...**	**Regulating water flow** **Regulating water quality** **Regulating soil quality** **Regulating soil erosion** **Climate regulation** **Sense of place** **Biodiversity** **Pollination** **Geodiversity**

[14] Thames Catchment Flood Management Plan, Environment Agency Summary Report (December 2009)

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow continued				**...continued from previous.** Within urban areas prone to flooding the most effective defence can be to design buildings to be resilient or resistant to flooding. The Environment Agency's preferred policy at Guildford is to encourage greater flood resilience within new development. The Lower Mole Valley is currently defended through the Lower Mole flood alleviation scheme which includes the realignment of the eastern branch of the Mole, the Ember channel, to remove excess water swiftly. Future improvement in flood defences will focus on designing new development to minimise flood risk. The urban environment can also be adapted to mitigate flooding through, for instance, installation of sustainable urban drainage systems including swales, rain gardens and green roofs as well as permeable pavements. Greenspace can help store and absorb excess water.	**...continued from previous.** Promote the better management of existing green spaces to improve rates of absorbance of surface waters. Promote urban greening measures such as rain gardens and green roofs where surface water flooding is identified as a significant risk to increase infiltration. Encourage the installation of sustainable urban drainage systems in all new developments.	

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil quality	Soils Semi-natural vegetation	There are eight soilscapes within the NCA. The most significant is slowly permeable, seasonally wet, slightly acid but base-rich loamy and clayey soils, covering 52 per cent of the area. Other significant soil types are loamy soils with naturally high groundwater (15 per cent), freely draining slightly acid but base-rich soils (11 per cent) and freely draining slightly acid loamy soils (9 per cent). To the north-east of the NCA, within the Greater London Area, the area is very urban and the amount of exposed soil is limited.	Local	The majority of the soils in the NCA, especially the slowly permeable, seasonally wet, slightly acid but base-rich loamy and clayey soils, are subject to problems of diffuse pollution. They are easily damaged when wet and may suffer from compaction and capping which in turn leads to poorer water infiltration and increased diffuse pollution from increased surface water run-off. This can be exacerbated by the application of manures during periods of flooding or high groundwater levels. Compaction and capping can occur from machinery, intensive or insensitive livestock grazing or heavy recreational use. Climate change may bring more intense rainfall events which are likely to increase diffuse pollution problems. Good soil structure management will aid water infiltration thus improving aquifer recharge, and help to prevent pollution of groundwater. Increasing permanent semi-natural vegetation cover can improve infiltration slow run-off and filter out sediments.	Encourage agricultural practices which reduce compaction and capping such as re-routing and limiting the use of heavy machinery, direct drilling, including fallow cropping in rotation, timely application of manures, careful control of livestock and managing grazing regimes to increase water infiltration and reduce diffuse pollution. Encourage farmers and landowners to adopt catchment-wide landscape scale measures to improve soil structure, including increasing organic matter content and careful applications of nutrients, pesticides, herbicides and fertilizers.	**Regulating soil quality** **Food provision** **Climate change** **Water availability** **Regulating water flow** **Regulating water quality** **Regulating soil erosion** **Biodiversity** **Geodiversity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion	Soils Semi-natural vegetation including grasslands, hedgerows, shaws, woodlands Riparian habitats	Soil erosion is not a major problem for the NCA. The commonest soil type, slowly permeable, seasonally wet, slightly acid but base-rich loamy and clayey soils, accounting for 52 per cent of the soilscape, is not very prone to soil erosion. Some of the soils are prone to erosion but these tend to occur in urban areas where soil exposure is much reduced.	Local	Maintenance of permanent ground cover and management of buffer strips, hedgerows, shaws and woodland, particularly adjacent to water courses, may help reduce cross- land water flows and subsequent erosion.	Encourage good land management practices to minimise erosion problems such as avoiding compaction, increasing organic matter content in soils and timely / reduced arable cultivations, to improve soil structure. Encourage installation of buffer strips adjacent to rivers and water courses. Restore and maintain hedgerows, manage and replant shaws, woodland and riparian habitats to control cross- land water flow and reduce soil erosion whilst improving wildlife habitat and sense of place.	**Regulating soil erosion** **Regulating soil quality** **Food provision** **Regulating water quality** **Regulating water flow** **Biodiversity** **Sense of place/ inspiration**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pollination	Semi-natural habitats Parkland Woodland Roadside verges Hedgerows Field margins Gardens and urban green spaces Allotments	The semi-natural habitats and parklands of the NCA support a variety of pollinators, while gardens within the urban areas also make significant contributions. Semi-natural vegetation provides a key source of pollen and nectar for pollination of commercial crops.	Local	Pollinating insects are supported by a range of semi-natural habitats, particularly species-rich grassland in the river valleys, the field boundary network, shaws and broadleaved woodlands. Increasing these habitats and their management and connectivity will benefit pollinators. The hedgerow network is in poor condition over much of the NCA, increasing the isolation of habitats. Pasture benefits from pollination to increase and support the sward variety and improve the quality of food for livestock. Clovers which are beneficial for the health of pasture rely on bee pollination. Allotments and home grown crops also rely on bees. Use of agricultural pesticides and herbicides can have a detrimental impact on pollinators. Urban green spaces, allotments, parks and gardens and road verges can all also provide a good refuge for pollinators with a wide variety of pollen and nectar often available.	Encourage conservation and restoration of semi-natural vegetation, such as species-rich pastures, meadows, verges and flood plain grazing, to connect fragmented habitats and support a wide variety of pollinators. Promote the development of green roofs, urban parks and high quality green infrastructure to provide urban habitats for pollinators. Encourage improved and timely management and the planting of verges with native nectar-rich flowers alongside major routes such as the M25, A3 and A247 to extend flowering times and support a wider range of pollinators. Raise awareness of the importance of pollinators with all land and woodland managers and the wider public and help them identify and reduce threats to pollinating species. Support the creation and restoration of the hedgerow network to support pollinators and provide links between habitats.	**Pollination** **Food provision** **Sense of place/ inspiration** **Pest regulation** **Biodiversity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pest regulation	Semi-natural habitats Hedgerows Road verges and field margins	Semi-natural vegetation and habitats support a variety of natural predatory species including invertebrates, birds and mammals.	Local	In this predominantly urban NCA, fragmentation and breaks in the ecological network result in a lack of connectivity which inhibit the movement of predatory species. Extending the area and improving the connections between these habitats would allow pest predators to move more easily, for instance into areas of crops.	Encourage farmers and landowners to manage, improve and expand habitats and ecological networks, to aid the movement of predatory species through the landscape, thus increasing biodiversity and benefitting pest regulation and pollination. Encourage creation and restoration of the hedgerow network to link habitats and strengthen the structure of the landscape. Promote farming and gardening methods which reduce impact on beneficial species, such as organic pest control. Promote the management of green space and local nature reserves for wildlife to encourage a greater range of invertebrates.	**Pest regulation** **Food production** **Biodiversity** **Sense of place/ inspiration** **Pollination**
Regulating coastal erosion	n/a	Add text		Add text	Add text	

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of place/ inspiration	River valleys Commons Historic parklands Ancient semi-natural and other woodland Urban greenspace Urban parks	The NCA is very urban but gets its sense of place in part from its semi-natural habitats such as the river valleys and commons. The river valleys of the Mole and the Wey towards the west are more pastoral and tranquil with flood plain grasslands and riparian woodlands.	Local	The woodlands, parklands, commons, fragmented farmland with scattered farmsteads, small traditional villages and pastoral river valleys provide an escape from the pressures of urban living for many residents of the NCA. However, the loss and poor maintenance of hedgerows have weakened the traditional field patterns. Parklands are an important feature with their distinctive landscapes, avenues, and trees. However, several, such as Crystal Palace, are on the English Heritage at Risk register and others are now intensively farmed. Commons, both urban and more rural, are valued by local residents and give the surrounding settlements a focus. Land around the outskirts of London has been designated as Green Belt but it often has an untidy, unkempt feel. This is due to the urban fringe influences, a- rise in non-agricultural use, - the conversion of fragmented agricultural land to poorly- managed horse paddocks and neglected hedges, sometimes with gaps or replaced by wire fencing. All the rivers have been heavily modified. Restoration to a more natural state would help to reduce the risk of flooding while greatly enhancing their landscape character. Only a small portion of the NCA is designated as part of the Surrey Hills but the AONB does lie close to the boundary between Ash and Fetcham. Care should be taken to ensure that any development within the NCA does not impinge on the quality of the landscape of the AONB. **Continued over...**	Where open to the public, encourage the management and restoration of landscaped parklands for their contribution to a sense of well-being and to protect their historical value. Support and encourage the development of green infrastructure in urban / suburban areas in all new developments to enhance landscape character, link to the wider countryside and improve a sense of health and community cohesion. Encourage farmers and landowners to manage and restore hedgerows to strengthen historic field patterns, to support landscape character and improve wildlife habitat and connectivity. Support and encourage the multifunctional use of Green Belt land around Greater London for recreation as well as for agriculture and woodland. Encourage the re-introduction of traditional woodland management, such as coppicing and pollarding, to strengthen the landscape character and provide biodiversity and recreational benefits. **Continued over...**	**Sense of place / inspiration** **Biodiversity** **Sense of history** **Recreation** **Food provision** **Timber provision** **Geodiversity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of place/ inspiration continued				**...continued from previous.** Within the London Boroughs, some remnants of the natural landscape, for instance commons or woodland, survive as described in London's Natural Signatures[15]. Improvement to the management of these features would make a direct and powerful contribution to the sense of place and local distinctiveness. For example, the Wandle has a natural signature of water meadows echoing the meandering course of the river, backed by bands of wet woodlands.	**...continued from previous.** Plan, promote and encourage the improved grazing management of horse paddocks and the restoration of hedged field boundaries. Encourage and support the implementation of the Surrey Hills AONB Management Plan. Ensure that any development does not adversely affect the special qualities of the Surrey Hills AONB, including through light noise and air pollution. Encourage the use of 'natural signatures' where possible for new developments within Greater London.	

[15] London's Natural Signatures: the London Landscape Framework, 2011, Natural England.

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history	Industrial heritage Historic towns and villages Registered Parks and Gardens Listed buildings Scheduled Monuments Military defences Ancient woodland Commons Veteran trees	There are 25 Scheduled Monuments and 1,260 Listed Buildings within the NCA, along with historic market towns such as Guildford and smaller historic rural villages such as West Horsley and Ockham. The 14 Registered Parks and Gardens and designed estates reflect the period of wealthy merchants and landed gentry moving out of London between the 17th and 19th centuries. Several buildings, parklands and Conservation Areas are considered 'at risk'. Within the settlements there are a number of traditional buildings, while on the rivers there are remnants of past industrial heritage. Ashstead Common is a 200 ha ancient wood pasture site with over 2,300 ancient oak pollards. There is also a Roman Villa site on the Common. Although it is known that the Common was wooded since 1600, the heavy, difficult to work, clay soils make it likely that the woodland cover is far older.	Local	The rivers in the NCA have a long industrial heritage. The Wey, Mole, Hogsmill and Wandle were all exploited for their water power; the Domesday Book records mills on the banks of the Hogsmill.[16] Abandoned and derelict mills and water features are historical reminders of past land use. The most famous examples of mills are probably those on the Wandle at Colliers Wood where the remains of the Liberty Mills and William Morris' dyeworks can still be seen. Isolated farmsteads, market towns and small rural villages built in the vernacular style and local materials reflect historical land use. Improved woodland management employing techniques such as coppicing and pollarding will ensure long-term wooded character and retain characteristic features.	Work with partners and local interest groups to seek opportunities to enhance the setting and interpretation of assets such as Liberty Mills, to increase public awareness and their enjoyment and appreciation of the local heritage. Increase public awareness of the past industrial heritage of the rivers through improved interpretation such as educational trips and information boards and restoration and re-use of historic industrial buildings where appropriate. Encourage the conservation and restoration, including re-use where appropriate, of historic parklands, Scheduled Monuments and landscape features, particularly those 'At Risk'. Work with partners to encourage respect for landscape character and use of traditional methods and materials in new development around villages. Encourage the conservation, repair and restoration of historic buildings, including farmsteads, using local traditional materials to strengthen sense of history and landscape. Encourage reintroduction of traditional woodland management techniques such as coppicing and pollarding to ensure long term viability and presence of trees in the landscape. Promote and support grazing on historic commons, particularly using rare breeds typical of the area.	**Sense of history** **Sense of place/ inspiration** **Biodiversity** **Recreation** **Geodiversity** **Timber provision**

[16] Hogsmill Information Pack, 2013. Environment Agency

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Tranquillity	Woodlands Parklands and Commons River valleys Urban green spaces Farmland	According to 2007 Campaign for Rural Protection data, less than 1 per cent of the NCA can be considered undisturbed. 60 per cent is urban and over 39 per cent is disturbed. The west of the area is less densely populated. Generally tranquillity is to be found in pockets scattered across a heavily developed area such as in the parklands, on commons and in the river valleys.	Local	Tranquillity is not a strong characteristic of the area. A large proportion of the NCA in the north-east is close to Greater London and is urban and heavily disturbed by development, housing, light pollution and noise / intrusion from major transport routes such as the M25 and A3. Some small pockets of tranquillity, however, can still be found within the farmed landscape, the area's commons, woodlands and pastoral river valleys, particularly between Guildford and Ash, and Guildford and Fetcham in the south-west. The Surrey Hills AONB lies adjacent to the NCA along its northern boundary, and any future development here needs to be carefully considered, to avoid impacting on the special qualities of the AONB.	Enhance and maintain remaining tranquil areas by conserving and managing existing semi-natural habitats, particularly, woodlands, shaws, hedgerows, commons and farmed landscape. Seek to improve tranquillity by incorporating features such as green spaces, hedgerows, ponds and woodland into new and existing development. Retain the transport network within existing corridors and buffer and shield by tree planting and hedgerows to reduce intrusion / disturbance. Ensure that tranquillity is taken into account when managing urban green spaces and parks within urban fringes and Greater London. Promote and encourage the inclusion of high quality greenspace in all new developments to provide local pockets of tranquillity within urban areas to benefit the public and wildlife. Ensure that new housing, development and its associated infrastructure, does not intrude upon the wider landscape and the special qualities of the Surrey Hills AONB (including light, noise and air pollution).	**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	Rights of way Ashtead Common National Nature Reserve Registered Parks and Gardens, country parks Local Nature Reserves Commons Rivers and river valleys Urban parks and green space	The NCA is well provided with 400 km of rights of way and nearly 9 per cent accessible land, including Open Access land on Commons, and woodlands. The river valleys are well used for quiet recreation, the Wey for example being used for both walking and canoeing.	Local	The NCA has good opportunities for recreation with footpaths, Commons, Local Nature Reserves, country parks and Ashtead Common National Nature Reserve al providing greatly valued assets. Recreational facilities are usually low-key, associated with walking, cycling and horse-riding as well as fishing and canoeing on rivers. However, access provision and recreational facilities are not evenly spread across the NCA. Croydon, Mitcham, New Malden, North Cheam, Sutton and Thornton Heath are all considered to be Areas of Deficiency as defined by the Greater London Authority.	Encourage greater provision where possible both of green space and rights of way for those areas within the NCA that are currently poorly provided for. Maintain, promote and manage public rights of way, recreational facilities, historical and cultural sites, and natural heritage resources to provide benefit to local residents while maintaining intrinsic value. Work with partners to support and implement the Surrey Rights of Way Improvement Plan. Encourage all new developments to include high quality green infrastructure and open space for recreation.	**Recreation** **Sense of place/ inspiration** **Tranquillity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity	European and nationally designated sites Priority habitats and species	A tiny proportion (0.01 per cent) of the NCA is designated as part of the Thames Basin Heaths Special Protection Area (SPA) for its breeding populations of Dartford warbler, nightjar and woodlark. Ashtead Common NNR is designated for its pollarded oaks and invertebrate assemblages. The 8 SSSI within the NCA cover about 900 ha, just under 3 per cent of the area. 59 per cent are deemed to be in favourable condition and 41 per cent unfavourable but recovering due to improved management. There are 855 ha of ancient semi-natural woodland mainly in central and western parts of the NCA. Other significant areas of priority habitats include lowland broadleaved woodland (5 per cent) and fens (1 per cent).	Regional	The Thames Basin Heaths SPA is very fragmented and surrounded by a large population. This has led to disturbance of ground nesting birds and abandonment of nests. To ease recreational pressure on the SPA, developers and Local Planning Authorities have been asked to provide and develop suitable alternative natural green space (SANGS). Ashtead Common NNR in the centre of the NCA near Epsom supports a rich mosaic of habitat types from rough grassland and ponds to woodland. Two ponds, the Stew Pond and Great Pond are medieval in origin. Several fine old pollards of pedunculate oak, characteristic of former wood pasture are of special importance for the rare insects and invertebrate assemblages associated with them. Epsom and Ashtead Commons SSSI and Esher Common SSSI are former heaths and still retain patches of heather but suffer from a lack of grazing management and bracken, scrub and secondary woodland is encroaching. 20 per cent of the woodland is classed as ancient semi-natural woodland. It is in a highly fragmented state and undermanaged but could be strengthened by linking through hedgerows or new plantations of native trees and bringing woodland back into coppice management. **Continued over...**	Promote awareness among the wider public locally of the importance of the Thames Basin Heaths SPA for rare birds such as the Dartford warbler, nightjar and woodlark and their susceptibility to disturbance. Work with Local Planning Authorities and developers to provide SANGS for recreation locally to reduce disturbance pressure on the SPA. Encourage the restoration and good management of ponds, grassland and hedgerows, particularly where they link ancient semi-natural woodland or other semi-natural habitat, to improve connectivity for wildlife and strengthen landscape character. Encourage good management for all SSSIs, Local Nature Reserves and other local wildlife sites so that they can act as stepping stones for wildlife between fragmented sites within the NCA Manage pollarded trees on Ashtead Common NNR and support the re-introduction of pollarding techniques as part of active woodland management to benefit biodiversity and increase landscape and historic interest. **Continued over...**	**Biodiversity** **Sense of place/ inspiration** **Regulating water quality** **Regulating soil erosion** **Recreation** **Climate regulation**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity continued				**...continued from previous.** Other semi-natural habitats such as grassland and lowland meadows are highly fragmented and thus species movement is constrained, particularly as a result of major transport routes and urban sprawl. Improving the condition and extent of hedgerows, shaws and broadleaved woodland, as well as maintaining Local Nature Reserves and other local sites in good condition will help to improve connectivity, strengthen the ecological network and benefit the landscape. There has been considerable work to clean up the rivers of the NCA in recent years, in particular the Hogsmill and Wandle. However, the prevalence of invasive species, for example Himalayan balsam and signal crayfish remains as issues. All the rivers within the NCA have been heavily modified often to provide power to water mills and also for flood prevention but their morphologies are now detrimental to wildlife. For instance, migrating fish can be hindered by obstacles such as weirs.	**...continued from previous.** Promote the use of the best practice guidance provided by the Surrey County Council for the management of horse pasture.[17] Encourage the restoration and good management of heathland on Ashstead and Esher Commons through improved grazing regimes, bracken control, clearance of scrub and removal of secondary woodland to enhance biodiversity interest and strengthen landscape character. Encourage the re-introduction of active management of ancient semi-natural woodland and broadleaved woodlands to improve age structure, diversity, supply timber products / wood fuel locally, as well as provide benefits for biodiversity, landscape and recreation. Plan and create new woodlands, shaws and field boundary trees to link fragmented woods and buffer developments to increase biodiversity, landscape character and tranquillity. Raise awareness among nurseries and the wider public of the problems caused by the introduction of non-native invasive species, particularly to rivers and ponds. Support improvements to the morphology of the local rivers, restoring them to more natural courses, to benefit wildlife.	

[17] http://www.surreycc.gov.uk/environment-housing-and-planning/countryside/explore-surreys-countryside/looking-after-the-countryside/countryside-advice/horse-care-and-pasture-management (accessed March 2014)

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Geodiversity	Geology Soils	The NCA does not have high national geological interest with only one mixed national and no local geological sites. The geological interest of the mixed site lies outside the NCA.	Local	The area does not have a lot of exposed geological interest. However a local geology site to explain the geological processes that formed the area, for instance the change in course of the river Wey after the last ice age and the development of river terraces, could help to encourage greater interest in geodiversity and foster a sense of place.	Explore the possibility of creating a new local geological site for educational purposes to raise awareness of the role of geological processes locally.	**Geodiversity** **Sense of place/ inspiration** **Sense of history**

Photo credits

Front cover: Golf courses, fishing lakes and other recreational greenspace are elements of the landscape, as here near Byfleet. © Martin Jones/Natural England

Page 4 & 30: © Nicola Trafford/Natural England

Page 5, 6, 7, 11 & 26: © Georgina Terry/Natural England

Page 8: © Mike Waite (left) & © Martin Jones/Natural England (right)

Page 9 & 23: © K Gower

Page 10: © Mike Waite

Page 24: © Martin Jones/Natural England

Natural England is here to secure a healthy natural environment for people to enjoy, where wildlife is protected and England's traditional landscapes are safeguarded for future generations.

Catalogue Code: NE571

ISBN: 978-1-78367-131-1

Should an alternative format of this publication be required, please contact our enquiries line for more information: 0845 600 3078 or email enquiries@naturalengland.org.uk

www.naturalengland.org.uk