National Character Area profile:

111: Northern Thames Basin

Supporting documents

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Introduction

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

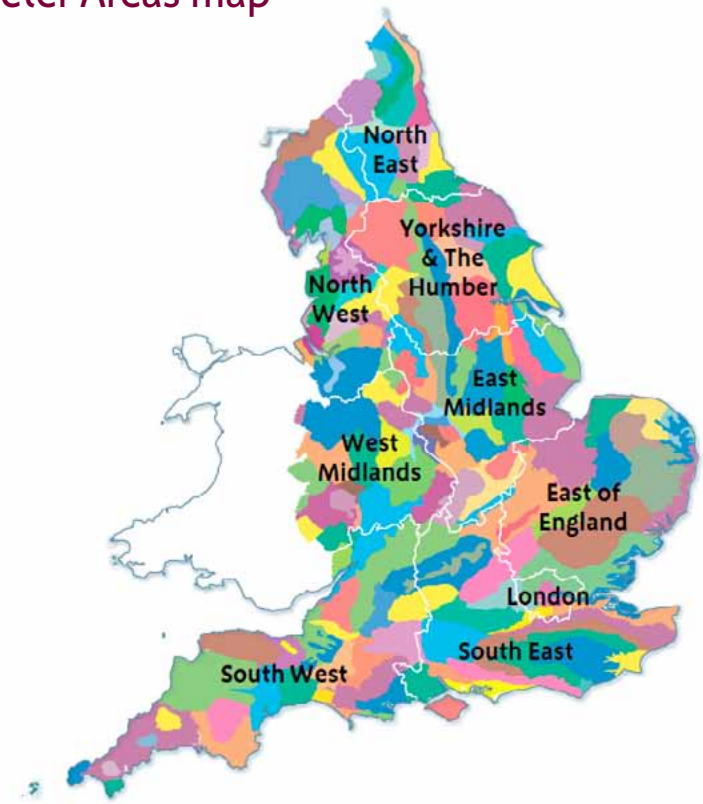
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and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

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

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

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

National Character Areas map



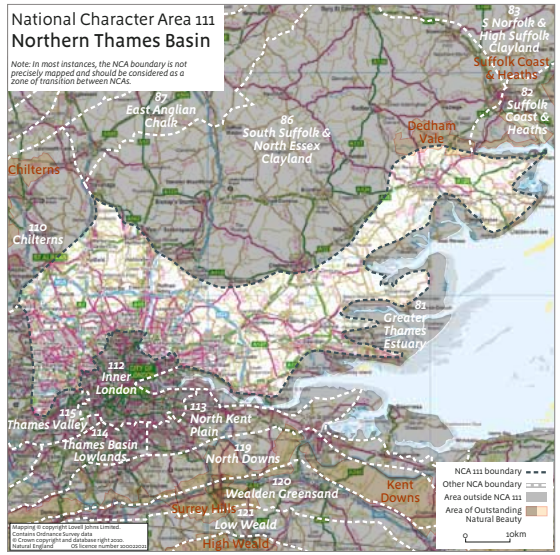
[1] The Natural Choice: Securing the Value of Nature, Defra (2011; URL: www.official-documents.gov.uk/document/cm80/8082/8082.pdf)
[2] Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services, Defra (2011; URL: www.defra.gov.uk/publications/files/pb13583-biodiversity-strategy-2020-111111.pdf)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

Summary

The Northern Thames Basin is a diverse area which extends from Hertfordshire in the west to the Essex coast in the east. It is separated from the North Sea and Thames Estuary by a narrow band of land that makes up the Greater Thames Estuary National Character Area (NCA). Included within this NCA are the suburbs of North London and also historic towns and cities including St. Albans and Colchester, as well as new and planned towns such as Welwyn Garden City, Hatfield and Basildon. Although arable agriculture is a large industry in the area the soil quality ranges from good to poor quality. The London Clay provides a poor quality soil that becomes waterlogged in winter and cracks and shrinks in summer. Better quality soil is found in areas that contain alluvial deposits from the Thames and other rivers in the area as they formed and changed position over time.

The Northern Thames Basin is an area rich in geodiversity, archaeology and history and diverse landscapes ranging from the wooded Hertfordshire plateaux and river valleys, to the open landscape and predominantly arable area of the Essex heathlands, with areas of urbanisation mixed in throughout. Urban expansion has been a feature of this area since the 16th century when wealthy merchants who were conducting business in London built homes on its outskirts, mainly in the Hertfordshire area. This trend increased dramatically from the mid-19th century as infrastructure improved and people could travel to work in London from the surrounding areas in an hour or less. This has put increased pressure on the area in terms of extra housing developments, schools and other necessities for expanding populations, with a consequential reduction in tranquillity. Tranquil areas can still be found in parts of Hertfordshire and Essex in areas that have a more dispersed settlement pattern broken up by arable land and semi-natural habitats.

There are a wide variety of semi-natural habitats in the area and these support many important species. However, the habitats have become fragmented over time and a landscape-scale approach is needed to connect them so that they can be sustained and provide beneficial functions including; increasing pollinating insects, acting as flood defences and water storage areas, preventing soil erosion and helping to improve soil and water quality as well as maintaining the area's sense of place and history. This NCA includes many internationally and nationally designated sites including 72 Sites of Special Scientific Interest (20 of which are designated wholly or in part for their national geological importance), 6 Ramsar sites, 6 Special Protection Areas, 3 Special Areas of Conservation and 2 National Nature Reserves. The majority of these sites are estuaries and woodlands. The estuaries support migrating and overwintering birds as well as rare or locally important plants and invertebrates. The selected woodlands are ancient and have a long history of management through coppicing and pollarding, which has allowed rich ground flora to develop and also supports rare mosses and deadwood invertebrates.



Click map to enlarge; click again to reduce.

The main changes to the area have resulted from increased construction and commercial-scale farming. Both of these have increased pressures on water availability, water flow, soil quality, biodiversity and sense of place. Although housing, other construction and agriculture are significant for the area it is important that these are developed in a sustainable way so that predicted changes in climate and the effects on the area's character are considered and sense of place and history are preserved.

The main opportunities available to this area are the continuation of the agricultural tradition, but within this land management should consider methods that are more sustainable in terms of water use and soil quality in order for it to continue to be a viable industry in the future. The areas of various semi-natural habitats also present opportunities to improve water storage and soil quality for surrounding agricultural land as well as to increase advantageous species that will aid pollination and reduce pest species. In addition to this the woodlands in the area could be an important resource to supply timber and fuel to the local area if they were managed effectively.

Farmland next to the River Colne in Essex.

Statements of Environmental Opportunity

SEO 1: Manage rivers and river valleys to protect and improve water quality and help to alleviate flooding in the downstream urban areas, while also helping to improve aquifer recharge and provide a sufficient store of water to meet future need, especially with predicted climatic changes. Conserve the riparian landscapes and habitats, for their recreational and educational amenity for their internationally significant ecological value.

SEO 2: Manage the agricultural landscape and diverse range of soils which allow the Northern Thames Basin to be a major food provider, using methods and crops that retain and improve soil quality, water availability and biodiversity.

SEO 3: Protect and appropriately manage the historic environment for its contribution to local character and sense of identity and as a framework for habitat restoration and sustainable development, ensuring high design standards (particularly in the London Green Belt) which respect the open and built character of the Thames Basin. Enhance and increase access between rural and urban areas through good green infrastructure links to allow local communities recreational, health and wellbeing benefits.

SEO 4: Manage and expand the significant areas of broadleaf woodland and wood pasture, and increase tree cover within urban areas, for the green infrastructure links and important habitats that they provide, for the sense of tranquillity they bring, their ability to screen urban influences and their role in reducing heat island effect and sequestering and storing carbon.

Ancient woodland at Pound Wood in Benfleet, Essex.

Description

Physical and functional links to other National Character Areas

The Northern Thames Basin forms the rising land above the low-lying marshy landscapes adjoining the coast and estuaries of the Greater Thames Estuary and the Suffolk Coast and Heaths National Character Areas (NCAs) to its east and south-east extent and enjoys associated views of these areas. Chalk geology commonly underpins this NCA and the neighbouring Chilterns and South Suffolk and North Essex Claylands NCAs to the west and north; The Chilterns, a formation of chalk hills and plateaux with a prominent escarpment, offers views across to this similarly elevated NCA. To the south-west the Thames Valley NCA forms a wedge-shaped area containing the open Thames flood plain surrounded by rolling clay farmland. Directly south is the Inner London NCA on the banks of the Thames where the river valley widens out into a broad flood plain.

The London Basin Chalk aquifer, which underlies much of the western section of the Northern Thames Basin NCA, is the principal aquifer supplying water to Inner London. The Chalk is confined in the basin by the overlying Tertiary formations of London Clay, which means recharge largely occurs in the extensive Chalk outcrop of the Northern Thames Basin and into the Chilterns NCA to the north and the North Downs to the south.

A small part of the Dedham Vale Area of Outstanding Natural Beauty (AONB) straddles the eastern edge of this NCA, the more northerly South Suffolk and North Essex Claylands and the south- western tip of the Suffolk Coast and

Major transport links include the M25 motorway.

Heaths NCA. The urban character in the south of the Northern Thames Basin continues into the Thames Valley and Greater Thames Estuary NCAs.

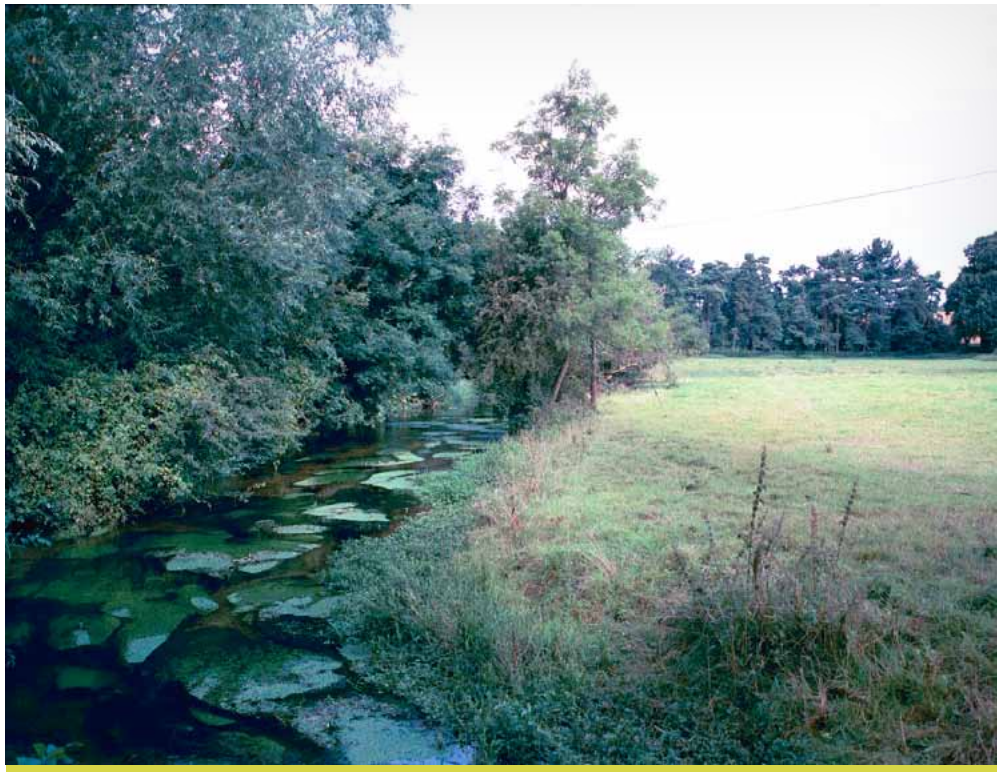
The landscape becomes extensively urbanised towards the Inner London NCA and includes major transport links from outside the area such as the East Coast mainline railway, M11 which connects to London and Cambridgeshire, the M1 which passes north-west through the Chilterns to the Midlands beyond, and

the M25 which provides circular access to all parts of London and the south. Important A roads providing wide physical links include the A12 and A120 and the A1(M), which has a similar route to the M1 but diverts towards the East Anglian Chalk and Bedfordshire Claylands NCAs.

Many watercourses feed in or flow from surrounding areas, often along courses incised into boulder clays or tills, for instance the Blackwater and Colne flowing from the South Suffolk and North Essex Claylands and the Ver and Lea from the westerly Chilterns NCA which flow into Hertfordshire before joining the Thames in inner London. These, along with others, form a series of river valleys draining south to the Thames and east to the North Sea and Thames Estuary, including the Roding, Wid, Chelmer, Roach and Crouch. Also notable is the Grand Union Canal, which runs from here through several other NCAs northwards to Birmingham.

Distinct areas

- Hertfordshire plateaux and river valleys
- Essex wooded hills and ridges
- London Clay lowlands
- Essex heathlands



River Mimram valley flood plain, Hertfordshire.

Key characteristics

- The landform is varied with a wide plateau divided by river valleys. The prominent hills and ridges of the 'Bagshot Hills' are notable to the north-west and extensive tracts of flat land are found in the south.
- Characteristic of the area is a layer of thick clay producing heavy, acidic soils, resulting in retention of considerable areas of ancient woodland.
- Areas capped by glacial sands and gravels have resulted in nutrient-poor, free-draining soils which support remnant lowland heathlands, although these are now small. Areas that have alluvial deposits present are well drained and fertile.
- The water bearing underlying Chalk beds are a main source of recharge for the principal London Basin Chalk aquifer.
- A diverse landscape with a series of broad valleys containing the major rivers Ver, Colne and Lea, and slightly steeper valleys of the rivers Stour, Colne and Roman. Numerous springs rise at the base of the Bagshot Beds and several reservoirs are dotted throughout the area
- The pattern of woodlands is varied across the area and includes considerable ancient semi-natural woodland. Hertfordshire is heavily wooded in some areas as are parts of Essex, while other areas within Essex are more open in character. Significant areas of wood pasture and pollarded veteran trees are also present.
- The field pattern is very varied across the basin reflecting historical activity. Informal patterns of 18th-century or earlier enclosure reflect medieval colonisation of the heaths. Regular planned enclosures dating from the Romano-British period are a subtle but nationally important feature on the flat land to the south-east of the area. In the Essex heathlands 18th- and 19th-century enclosure of heathlands and commons followed by extensive 20th-century field enlargement is dominant.
- Mixed farming, with arable land predominating in the Hertfordshire plateaux, parts of the London Clay lowlands and Essex heathlands. Grasslands are characteristic of the river valleys throughout. Horticulture and market gardening are found on the light, sandy soils of former heaths in Essex, particularly around Colchester, along with orchards, meadow pasture and leys following numerous narrow rivers and streams.
- The diverse range of semi-natural habitats include ancient woodland, lowland heath and floodplain grazing marsh and provide important habitats for a wide range of species including great crested newt, water vole, dormouse and otter.
- Rich archaeology including sites related to Roman occupation, with the Roman capital at Colchester and City of St Albans (Verulamium) and links to London. Landscape parklands surrounding 16th- and 17th-century rural estates and country houses built for London merchants are a particular feature in Hertfordshire.
- The medieval pattern of small villages and dispersed farming settlement remains central to the character of parts of Hertfordshire and Essex. Market towns have expanded over time as have the London suburbs and commuter settlements, with the creation of new settlements such as the pioneering garden city at Welwyn and the planned town at Basildon.
- Brick-built dwellings are characteristic from the late 17th century onwards. Prior to this dwellings and farm buildings tended to be timber built with weatherboarding, now mainly painted white but traditionally black or tarred, and whitewashed plaster walls.

Northern Thames Basin today

The Northern Thames Basin is a large and diverse landscape with a similar overarching character of agricultural land, interspersed with woodland, dissected by rivers and influenced by the urban areas of North London. It falls naturally into several distinct areas, shaped by their geology, topography and land use which are called: Hertfordshire plateaux and river valleys, Essex wooded hills and ridges, London Clay lowlands and the Essex heathlands

The Hertfordshire plateaux and river valleys to the north-west of the NCA are high, broad arable plateaux divided by wooded and pastured valleys which have a mainly rural feel with, on the whole, small developments. Rivers that drain the plateaux are the Colne, Ver and Lea and the soils are mainly underlain with London Clay, resulting in heavy, acidic, nutrient-poor soils with poor drainage; however, in the river valleys alluvial deposits provide fertile and well-drained soils. The area is underlain by extensive Chalk beds of the principal London Basin chalk aquifer, which provides the main source of water for London. Recharge of the aquifer largely occurs from the Chalk as water flows underground to London from the Chilterns, and water quality and availability within the aquifer are largely dependent on land management practices in the area.

While the plateaux are predominantly in arable use, the valleys by contrast contain areas of pasture and have a more intimate character, although some have been heavily modified by reservoirs, gravel workings, landfill sites and river realignments. The valleys contain all the main settlements within the area. Field boundaries are dominated by informal enclosure patterns of the 18th century, with thorn hedges relating to rationalisation and amalgamation of this pattern in the 18th and 19th centuries. It is a well-wooded landscape, especially to the east, with a number of ancient broadleaved woodlands including oak and hornbeam coppice. Isolated areas of remnant heathland survive within commons. The area retains a substantial legacy of funerary monuments and settlement sites associated with the prehistoric period and was intensively settled in the Roman times, with a number of major and minor towns (including St Albans and Welwyn) having a Roman origin. Today, a medieval pattern of small villages and dispersed farming settlement is central to the area's character and there is good survival of medieval timber-framed houses and barns, moated sites and small medieval castles. The 16th and 17th centuries saw the growth of rural estates and country houses for London merchants and the landscape parklands surrounding these houses are a particular feature of the

Grazing marsh at Kings Meads Valley Meadowlands alongside the urban landscape of Hertford.

area today. The area merges with the outer London suburbs of Enfield, Barnet, Harrow, Hillingdon and Hounslow. It also contains many large towns including Watford, Hatfield, Hertford and St Albans which have developed as commuter settlements as well as the pioneering and influential garden cities of Ebenezer Howard at later Welwyn. Road and rail routes plus utility infrastructure are now dominant features of some parts of the area. To the far south the area is heavily urbanised as it becomes part of London, where housing, industrial areas and shops dominate. Green areas are restricted to city parks, grassed areas in front of housing developments and residents' gardens.

The Lea Valley within the area has been exploited for supplying London with water and for generating power for a wide range of industries, together with extraction of sand and gravel. This historic use has underpinned its current importance for wildlife. The Lower Lea valley, which lies in the south of the area and in the adjacent Inner London NCA, was heavily regenerated for the 2012 London Olympics, bringing ecological landscape, recreational and economic benefit.

The designations afforded to this area are Ramsar, which is an international designation for wetland habitats, and Special Protection Area (SPA), which is a European designation; also, within the Lea Valley and the surrounding areas there are many Sites of Special Scientific Interest (SSSI). The main reasons for the designations within the Lea Valley area are its importance as a wetland site; wetlands and reservoirs occupy a large part of the valley and support many important overwintering waterfowl. The species of particular importance are bittern, which over-winter in the reedbeds in the area which at peak times can support around 6 per cent of the UK's population, as well as gadwall and shoveler which also over-winter here (representing almost 2 per cent of their overwintering European population). There are also two important woodland complexes within the area: Wormley and Hoddesdon Park Wood, which is a Special Area of Conservation (SAC) and Broxbourne Wood, which is a National Nature Reserve (NNR). Wormley and Hoddesdon Park Wood is an almost exclusively hornbeam woodland which has been managed through coppicing with oak standards. The ground flora supports bluebells and great wood-rush as well as important mosses. Broxbourne Wood is an ancient woodland which supports the rare butterfly purple emperor and also has historical value as the area has been managed since Roman and medieval times as a source of wood

The Essex wooded hills and ridges lie to the east of the Hertfordshire plateaux and river valleys to the north of the NCA. This area has several ridges where the soils are acidic and stony and have low fertility but are easily cultivated. This and the wet soils at the base of the Bagshot Beds limit the agricultural potential for the hill slopes, but farmland can be found in the lower-lying areas. The ridges of Epping Forest, Brentwood to High Wood, Thorndon to Billericay and Danbury to Wickham Bishops are dissected by the river valleys of the Roding, Wid and Chelmer. The Ter, Brain and Blackwater also contribute to the drainage of the area and Hanningfield Reservoir provides an area of open water.

This area is in the central part of the NCA, and extends roughly from Epping Forest in the west to Danbury in the east. It is a transitional landscape between the London Clay lowlands and the South Suffolk and North Essex Claylands NCA. It is formed by a series of hills and ridges created by the resistant Bagshot Sands which rise up above the clay lowland as at Epping Forest, Brentwood to High Wood, Thorndon to Billericay and Danbury to Tiptree. These well-wooded hills contain extensive areas of ancient woodland, remnant wood pasture and secondary woodland on commons as well as more recent plantations. These include the substantial wooded areas of Hainault Forest and Epping Forest, formerly Royal Forests, now managed for conservation and recreation.

Historically, settlement was sparse with scattered villages associated with the commons and areas of wood pasture. Today, settlement is dominated by large, 20th-century urban areas. The A12, the former Roman road connecting London with Colchester, is a major commuter route through the area.

Within this area Epping Forest is an important site for wildlife and as such has been designated as an SAC. The main reason that this site is important is the beech forests found here and the rare species that these support – rare mosses and also fungi and deadwood invertebrates owing to the high number of veteran trees present. Also found here are significant populations of stag beetle.

The London Clay lowlands lie south and east of the Essex wooded hills and ridges and are characterised by the heavy, acidic soils associated with this area, which is the dominant feature of the London Basin, although lighter soils can be found on some footslopes. The heavy soils are difficult to drain and easily become waterlogged. The area is drained by numerous rivers such as the Roach, Crouch and Blackwater, which merge to create the flat marshes to the east. The large expanse of open water at Abberton Reservoir, formed by the damming of the Layer Brook on its way to the Roman River, is a notable feature.

This area embraces the outer east London suburbs at Grays and Thurrock and extends eastwards to the Dengie Peninsula. It includes the town of Basildon.

This area is essentially a flat to gently undulating lowland landscape. Local variation is created by the Laindon and Hockley Hills, formed of the more resistant sandy Bagshot Beds which cap the clay.

The east of the area is characterised by a planned Roman landscape with a rectilinear pattern of fields which is a nationally important but subtle feature

Wet heathland, acid grassland and coppiced ancient woodland at Bricket Wood Common, Hertfordshire.

of the landscape today. The heavy clays were difficult to work and remained in pasture; however, during the 1950s and 1960s the land was improved so that arable is now also a dominant land use. By contrast, the hills around Laindon, Hockley and Rayleigh are relatively well wooded. In addition, 19th- and 20th-century plantations and regenerated, formerly urbanised plotland landscapes add a further wooded aspect to parts of the area. The landscape today has an urban character, including the expanded resort of Southend, the 1950s planned

town of Basildon and extensive 20th-century commuter settlements such as at Laindon and Rayleigh. Large areas of recreational land including parkland, golf courses and horse paddocks serve the urban population.

This area has many important wetland sites including Abberton Reservoir (designated as a Ramsar site and SPA) and also two reservoir areas recognised as SPA, the Crouch and Roach Estuary and Blackwater Estuary: however, only a small proportion of the two estuaries is found in this NCA with the majority falling within the Greater Thames Estuary. Abberton Reservoir is a significant site as it supports many important overwintering waterfowl such as golden plover, gadwall, shoveler and teal, as well as breeding cormorant, and also qualifies as a wetland of importance as it supports more than 20,000 waterfowl. The Crouch and Roach Estuary is an important site for overwintering dark-bellied Brent goose and the Blackwater Estuary (which is also an NNR) is important for overwintering avocet, golden plover, hen harrier, dark-bellied Brent goose, redshank and breeding little tern: it too is recognised as a wetland of international importance because it supports more than 20,000 waterfowl.

The Essex heathlands lie north-east of the London Clay lowlands and Essex wooded hills and ridges, in the north-east of the NCA. The geology of the area is predominantly sands and gravels, which were deposited by the Thames as it changed its course over time to its present location. Around the Tendring area deposits of wind-borne silty loam overlie the sands and gravels but overall the soils are light and free draining. The area is relatively flat with contrast provided by the steep-sided slopes of the Stour, Colne and Roman river valleys which, along with their tributaries, drain the plateau and are eventually discharged into the North Sea.

The east of this area is broadly bounded by the Stour Estuary to the north and the Thames Estuary to the south and east, and covers the land around Colchester and the Tendring plain. It is separated from the North Sea and Thames Estuary by a narrow strip of coastal marshes which form part of the Greater Thames Estuary.

The area consists of a broad, sandy plateau created by ancient river deposits from the Thames. Historically it was dominated by extensive heaths and commons, although these are now restricted to isolated fragments of heath and scrub within an intensively farmed and largely arable agricultural landscape. Agriculture includes improved grassland and arable fields as well as distinctive areas of horticulture and market gardening associated with the light, sandy soils of former heaths. Orchards are a feature around Colchester.

A pattern of small but intricate creeks and valleys breaks up the plateau edges where the land falls to the Thames Estuary along the coast and extends the coastal influence inland. The narrow river valleys which incise the plateau also create areas of contrasting enclosed landscape, with abundant woodland and meadows, some with wider flood plains and wetland vegetation. Much of the woodland is ancient; however, in general the plateau has an open, treeless character owing to the loss of field boundaries.

Vernacular buildings are constructed of timber, with either weatherboarding or whitewashed plaster. The principal settlement is Colchester, the walled Roman capital and England's oldest town, dating from 49 AD.

Within this area is Hamford Water, designated as a Ramsar site as well as an SPA and SSSI owing to the important waterfowl that use it. Many species over-winter here, including avocet, golden plover, ruff, black-tailed godwit, grey plover, ringed plover and teal – up to 25 per cent of the UK population of overwintering avocet has been recorded here. In addition, little tern use it

as a breeding site and the area is considered to be a wetland of international importance as it supports more than 20,000 waterfowl. Part of the Colne Estuary is in this area (although the majority of it falls within the Greater Thames Estuary NCA); this is also a Ramsar site and SPA, and of national importance for geology. Similar species are found here to those found in Hamford Water, and in addition overwintering hen harrier, dark-bellied Brent goose and redshank. This area is also considered a wetland of international importance and includes a small part of the predominantly pastoral character of the Dedham Vale AONB. St Osyth marsh is an important site for salt marsh morphology dating back around 4,000 years, while geological exposures at East Mersea show important deposits beneath gravels which are attributed to the Thames and Medway system and are of considerable importance in Pleistocene studies.

The whole area is a combination of countryside mixed in with urban areas, with important habitats and species, especially woodland and wetland habitats and associated species. The rural area acts as a recreational opportunity for those living in the surrounding towns and cities and the urban areas offer work and recreation opportunities for those living in more isolated villages and settlements in the rural environment. There is strong historical association throughout the area owing to its close proximity to London and the Roman occupation of Colchester and the links that this creates within the area as a whole. Dedham Vale is strongly associated with the artist John Constable whose paintings were inspired by the landscape.

The landscape through time

The NCA is the northern part of the London Basin, a broad, concave fold which opens out towards the East Coast. This structure means that the oldest rock strata are at the periphery, with younger deposits towards the centre. Chalk deposited in the tropical seas of the Cretaceous Period (65–95 million years ago) underlies the area and forms the bedrock of adjacent NCAs, extending beneath London and providing the major aquifer for the capital. The folded structure, a syncline, developed some 20–40 million years ago during the Tertiary Era (2–64 million years ago) at the time that the Alps were being formed in southern Europe. During this period of uplift, the area became dry land and rivers developed, including the proto-Thames along a course to the north of its present location. Overlying the chalk is a series of sands and mudstones (Reading Beds) deposited during the Tertiary Era by ancient river systems that drained into the basin. The thick layer of London Clay which characterises this NCA today was laid down as a sequence of fossiliferous, shallow marine sediments under semi-tropical seas some 55 million years ago. Overlying the London Clay are sands and clays of the Bagshot, Barton and Bracklesham Beds.

The diverse geology has considerable influence on the landscape. The London Clays are heavy and typically difficult to work, resulting in the retention of pasture and considerable areas of ancient woodland. The lighter, sandy soils of the Bagshot Beds are likely to have remained relatively open and unwooded since prehistoric times and areas of remnant heath are a feature, particularly within the Essex heathlands and wooded hills. In Essex, the harder rocks of Bagshot Beds deposits form distinctive features, creating low hills and ridges such as at Danbury Hill, rising to a high point of 116 m.

The Quaternary deposits which overlie the clay provide an insight into Britain's most recent geological past. The Anglian ice sheet which reached

the outskirts of London approximately 500,000 years ago (evidenced at Hornchurch SSSI) advanced to the rim of the basin, leaving a series of glacial sands, gravels and clays and moving the course of the Thames southwards to its present location. Quaternary deposits have yielded artefacts illustrating early human presence (approximately 300,000 years ago) in the Thames Basin and more recently the evolution of prehistoric society. By the time that Britain was cut off as an island during the Holocene, humans had settled along the margins of the Thames and its tributaries. The light, sandy soils of the Essex heathlands to the east are particularly rich in buried archaeological remains associated with prehistoric and Roman occupation. Funerary monuments and settlement sites visible as cropmarks and earthworks are also a feature of the Hertfordshire plateaux and valleys and were extensively cleared and occupied in the prehistoric period. Here, the limited survival of coaxial field systems potentially of bronze-age origin is highly significant.

Roman occupation has left a significant impact on the area. A major road, now the A12, connected the Roman capital at Colchester to London. Other major and minor Roman towns and cities include St Albans and Welwyn and there are extensive villa estates, notably in the west of the area (in Hertfordshire). Also in Hertfordshire, the distinctive settlement pattern of 'homestead moats' aligned with the grid pattern is thought to be influenced by Roman estate management techniques. The London Clay lowlands are also characterised by planned landscapes created during the Roman period, forming a still distinct rectilinear pattern of enclosure on the Dengie Peninsula and in the area between Thurrock and Wickford. By comparison, the central part of the NCA (the Essex wooded hills) was relatively sparsely settled. Orchards were established around Colchester, as well as a significant area of meadow pasture and leys following the numerous narrow rivers and streams.

Traditional medieval timber-framed houses in Colchester, Essex.

Throughout the Northern Thames Basin, settlement is essentially based on a pattern of dispersed nucleated villages and farming settlements established in the medieval period. Post-Roman decline in Hertfordshire is evident in the number of medieval place names and settlement patterns which imply re-colonisation and clearance of a wooded landscape and late-medieval timber-framed houses and moated sites are a distinctive feature. In the Essex heathlands the dispersed settlement pattern was established within extensive tracts of heathland. In the London Clay lowlands some larger villages and small towns developed in the medieval period associated with local centres of civil

or religious authority. The exception to this dispersed pattern is in the Essex wooded hills where settlement remained sparse in the medieval period and was associated with the extensive commons or management of wood pasture and other resources belonging to medieval monastic houses.

The 16th, 17th and 18th centuries saw the growing influence of London, particularly in Hertfordshire, with the growth of market towns and rural estates and country houses for London merchants. Profitable farming conditions saw the demise of much medieval parkland in the 17th and 18th centuries, alongside the growth of substantial farming estates for the London merchants, rising nobility and gentry. The remaining associated parkland landscapes form a distinctive feature of the area today, particularly within the Hertfordshire plateaux area.

Industries based on agricultural produce (such as malting and brewing, paper making, hat making and tanneries) contributed to the prosperity of the market towns and developed further in the 19th century, aided by the growth in communications. This also stimulated the development of commuter settlements in the 19th and 20th centuries, and the urbanisation and expansion of existing towns and villages. The creation of new settlements is a particular feature, with the pioneering garden city at Welwyn and the planned 1950s town of Basildon. The edge of London has also expanded outwards with suburbs now embracing former villages. Communication routes – motorways (the M1, A1(M) and M11), main roads and railways running north–south connecting to London, plus the M25 radial route – are dominant features.

In the 1970s Dutch elm disease transformed many parts of the landscape, with the loss of tree and woodland cover, and the area continues to change with pressure for housing and industrial growth associated with, for instance,

Mixed coppice ancient woodland at Norsey Wood near Billericay, Essex.

the Thames Gateway, Haven Gateway and other strategic growth points such as Chelmsford, identified in the East of England Improvement Plan, the Lea Valley regeneration area (including the Olympics legacy) and changes in the agricultural landscape.

Ecosystem services

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

Provisioning services (food, fibre and water supply)

- **Food provision:** This is a predominantly arable landscape with arable crops covering 53 per cent of the area – primarily wheat and oilseed rape. The area also includes a sizeable sheep flock (approximately 18,800 breeding ewes in 2007) but relatively few cattle (only approximately 2,600 breeding dairy cattle and 3,200 breeding beef cattle), all of which have declined in number since 2000.

- **Timber provision:** The area only has 6 per cent woodland cover. This resource is unevenly distributed and some parts of the NCA have a relatively high woodland cover. The main areas of commercial timber are the coniferous plantations situated on former lime tree woods in the river valleys of Hertfordshire; these cover some 0.7 per cent of the total area of the NCA.

- **Genetic diversity:** Remnant traditional orchards provide a genetic stock of old apple varieties, many of which are no longer commercial. There are also rare animal breeds associated with the area including the British Saddleback Pig (which is partially bred from the Essex Pig), White Park Cattle, Red Poll Cattle, Jacob Sheep, Bagot Goat, Hackney Horse, Hackney Pony, shire horses and British Percheron Horse.

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

- **Climate regulation:** Soils, woodland and hedgerows are likely to be significant stores of organic carbon across this area.

- **Water availability:** The Chalk which underlies the west of the area is extensively abstracted for drinking water in the NCA and provides a main source of recharge for the principal aquifer supplying Inner London.

- **Regulating soil erosion:** The sandy soils of the Essex heathlands and hills and ridges are susceptible to erosion if high risk crops are cultivated on sloping ground and in dry summers will become increasingly prone to wind erosion if they are left exposed. The restoration of hedgerows across the landscape can reduce the scale of wind erosion.

The River Lee near Hertford.

- **Regulating soil quality:** This NCA has a range of soil types and the condition of these soils varies significantly. Within the area as a whole more than 50 per cent of the land is classified as excellent to good/moderate quality, which supports a wide range of agricultural and horticultural crops.

- **Regulating water quality:** The rivers flowing south and east from the chalk strata into the Thames and to the coast are of variable ecological quality. While most are considered to be of moderate quality, parts of the Lea are of poor quality as are some of the smaller rivers, such as the Rib. These classifications are based on results from the Environment Agency within their work under the European Water Framework Directive. Land management practices within the NCA will have a major impact on water quality in the underlying aquifer.

- **Pollination:** The areas of semi-natural habitat – heathlands, grasslands and woodland edges in parts of Essex and Hertfordshire – provide important habitats for pollinating insects. The extensive agricultural lands can provide habitats in the form of hedgerows, edges of farm tracks and 'set aside' areas. This in turn will be beneficial for food production through pollination of food crops, particularly oilseed rape, through pollinating invertebrates.

- **Pest regulation:** The presence of semi-natural habitats such as grasslands, woodlands, road-side verges and uncut farm tracks can provide overwintering habitats for beneficial predatory invertebrates which will help to control populations of many pest species. An example of this is the Carabidae family of beetles which feed on a number of pest species. Careful management of land to encourage such species can reduce the need for chemical control measures.

Cultural services (inspiration, education and wellbeing)

- **Sense of history:** A strong sense of history is captured in the ancient woodlands and trees of the area – the Broxbourne Woods and Epping Forest – and also the built environment, including significant estates.

- **Recreation:** There is a strong appreciation of the local landscape as a 'green lung', offering opportunities for active and passive recreation away from the Greater London conurbation, and a ready recognition of the coast as offering a nearby visitor destination. The easy accessibility of the countryside and coast is a very important aspect of the lives of local residents.

- **Biodiversity:** The diverse range of semi-natural habitats present in the NCA, which includes 3 SAC and 3 SPAs, include ancient woodland, lowland heath and floodplain grazing marsh and provide important habitats for a wide range of species including great crested newt, water vole, dormouse and otter. The area is also important for wetland birds, especially the Ramsar wetland sites of Lee Valley, Hamford Water and Abberton Reservoir.

- **Geodiversity:** The area has a clear identity created by the geodiversity underpinning the diverse landscape. The underlying sediments themselves contain a record of ancient landscapes and climates. There are 20 geological SSSI in the area and 3 Local Geological Sites which are of local and national importance. These sites preserve important deposits of chalk stratigraphy and evidence for the formation of the London Clay as well as conserving several key geomorphological features. The majority of sites within this NCA, however, preserve evidence for past glaciations and the evolution of the Thames during the Quaternary. These sedimentary deposits and the fossils contained within them represent significant records of climate and environmental change that provide an important context for our understanding of and insights into the potential impacts of future climate change on our landscapes. Several sites also preserve important evidence for early human occupation of the area dating back around 300,000 years.

Statements of Environmental Opportunity

SEO 1: Manage rivers and river valleys to protect and improve water quality and help to alleviate flooding in the downstream urban areas, while also helping to improve aquifer recharge and provide a sufficient store of water to meet future need, especially with predicted climatic changes. Conserve the riparian landscapes and habitats, for their recreational and educational amenity for their internationally significant ecological value.

For example by:

- Managing and enhancing the river valleys and wetland habitats for the important habitats and species that they support, their geodiversity, landscape and recreational value, and to increase water storage capacity to reduce flood events in downstream urban areas.
- Sustainably managing the water resource including watercourses and aquifers, by implementing catchment-wide land management practices to help reduce pollution and aid aquifer recharge.
- Maintaining, enhancing and increasing the network of hedgerows along river valleys, especially in flood plains, to act as water stores which will absorb excess water during high rainfall, slowly release water in drier periods and reduce wind evaporation on fields in drier periods.
- Enhancing and creating riverside buffer strips of natural vegetation, including the conservation and planting of a new generation of riverside willows that will reduce overland run-off and help to minimise the deposition of soil and silt in channels and stop nitrates entering the watercourse in order to prevent adverse effects on aquatic life.
- Creating reedbeds in areas of potential pollution including along roads and near road bridges and agricultural drainage areas. This will help to improve urban diffuse pollution.
- Utilising semi-natural habitats to replace current engineered flood management. Current flood management will be insufficient to counteract future flooding, so allowing natural processes to reduce water levels in priority areas is the most sustainable alternative. Allowing rivers to flood naturally will also increase biodiversity and enhance geomorphology, wetland habitats and riverine character.
- Restoring river valley mineral sites to wetlands and washlands while enhancing geodiversity and archaeological interest.
- Raising awareness within the general public as to how they can individually help to reduce water waste and prevent contamination.
- Encouraging landowners to store water for individual usage, from using water butts for small gardens to larger storage systems for arable land and golf courses.
- Growing crops that are more resilient to drought so that less irrigation is needed in drier periods when water availability decreases.
- Restoring and improving the natural geomorphology of rivers in the area including urban rivers so that the quality of not only the water but also the river ecology as a whole improves by reducing pollution, sedimentation, invasive species etc; reducing the prolificacy of invasive aquatic and marginal plant species, including floating pennywort and Himalayan balsam, which cause waterways to become blocked, increase sedimentation, reduce biodiversity and affect movement of aquatic life as well as recreation activities along watercourses.

SEO 2: Manage the agricultural landscape and diverse range of soils which allow the Northern Thames Basin to be a major food provider, using methods and crops that retain and improve soil quality, water availability and biodiversity.

For example by:

- Retaining the overall agricultural diversity with areas of arable land, horticulture and pasture which are so important for food provision in the area, while encouraging sustainable management to protect agricultural soils and enhance biodiversity. Encouraging the use of sustainable farming methods to enhance soil quality, such as maintaining vegetation cover, reducing tillage and encouraging the use of organic manures and composts. This will help to retain organic matter, which is vital for productive soils.
- Managing, enhancing and, where appropriate, expanding hedgerows and grass strips as field boundaries as these help to bind the soil, reducing soil erosion, while also providing habitats for pollinating insects as well as various farmland birds, mammals and invertebrates. Hedgerows will also create habitat corridors, connecting habitats and so allowing wildlife to disperse and increase its range, creating a more diverse landscape.
- Encouraging a reduction in compaction of the clay-based soils in the area which can damage their structure and drainage potential and reduce aquifer recharge. This includes reduced poaching from livestock and careful use of heavy machinery.
- Encouraging the management of the heathland soils to prevent wind and water erosion using hedgerow and tree boundaries to reduce overland run-off and to act as a wind shield. These soils are more prone to erosion than the more clay-based soils and are usually of high quality in terms of arable usage.
- Encouraging improvements to water management within agricultural land using boundary features such as hedgerows and grass buffer strips to store water during wet periods and retain it in drier periods.
- Adopting land management practices, including the use of buffer strips next to watercourses, to reduce diffuse pollution from agricultural sources, prevent contamination of groundwater and safeguard future water quality and availability.
- Improving biodiversity in the area by putting aside less productive land and creating semi-natural habitats such as wildflower meadows and grasslands. The promotion of agri-environment schemes can help to establish these opportunities

SEO 3: Protect and appropriately manage the historic environment for its contribution to local character and sense of identity and as a framework for habitat restoration and sustainable development, ensuring high design standards (particularly in the London Green Belt) which respect the open and built character of the Thames Basin. Enhance and increase access between rural and urban areas through good green infrastructure links to allow local communities recreational, health and wellbeing benefits.

For example by:

- Conserving historic features in the landscape with heritage interest and improving the condition of heritage assets through appropriate measures, and seeking to reduce conflicting or unsympathetic management regimes.
- Conserving and interpreting archaeological earthworks and sub-surface archaeology while recognising the high potential in this landscape for undiscovered remains.
- Preserving and enhancing current public access sites including nature reserves, common land, country parks and public footpaths and rights of way to attract the wider community.
- Creating better access to the countryside with an increased number of public footpaths and rights of way so that more of the area is open access. Enhancing current public access paths would also be beneficial to make the experience of the countryside more inviting and enjoyable.
- Restoring the connectivity of key habitats as well as expanding and creating new habitats which will maintain and enhance their attraction for visitors. Also, working to increase species diversity and density to increase this attraction for the community.
- Preserving the open landscape, enhancing geodiversity and biodiversity, for example the iconic species and habitats that attract visitors, to preserve their appeal to the wider community.
- Maintaining and enhancing the status of Sites of Special Scientific Interest, Special Protection Areas, Special Areas of Conservation, National Nature Reserves and Ramsar sites. This will preserve the character of the landscape, protecting and enhancing the sense of place.
- Increasing awareness and raising understanding within the community of the natural environment to improve their appreciation of their landscape so as to help to enhance their experience. This will also help to instil a sense of place.
- Planning for future pressure from urban expansion and urban-related development, major roads and other infrastructure as a result of the expansion of Stansted and Luton international airports (impacting from adjacent NCAs) and the impact of strategic growth in and around the NCA, such as at the Thames and Haven Gateways, Chelmsford and Southend, and the regeneration in the Lea Valley. Seeking measures to help to implement the All London Green Grid frameworks in order to ensure that associated design standards are of a high quality and pay due regard to the natural environment for the benefit of people and wildlife.
- Planning for a new vision of agricultural landscapes in areas of significant planned growth such as within the Thames Gateway, Haven Gateway and M11 corridor, including, potentially, the exploration of new forms of community food growing and community land ownership, providing a 21st-century interpretation of the plotlands of the 1920s and 1930s that are characteristic of this NCA.
- Ensuring positive management of land that may be developed in the future to preserve the character of the area and not adversely affect the rural areas that provide many resources, including food provision, carbon sequestration and recreation for the rural and urban communities.

SEO 4: Manage and expand the significant areas of broadleaf woodland and wood pasture, and increase tree cover within urban areas, for the green infrastructure links and important habitats that they provide, for the sense of tranquillity they bring, their ability to screen urban influences and their role in reducing heat island effect and sequestering and storing carbon.

For example by:

- Promoting the establishment of a coherent and resilient network of treescapes (native woodland, wood pasture, parkland, coppice, scrub, field trees and hedgerows) through expanding and linking existing woodland with areas of new planting.
- Managing the area's diverse range of historic woodlands, veteran trees and wood pasture and parklands to enhance landscape character and safeguard their biodiversity value while seeking opportunities to enhance access.
- Expanding current woodlands to create a greater resource and re-introduce coppicing and other management back into woodlands so as to make wood available to be sold commercially.
- Working within established management plans to ensure that the viability of the woodlands is not affected and that biodiversity is maintain or enhanced.
- Creating new woodlands, taking into account natural processes and bringing them into wood production management. Sensitively incorporating them into and around new developments to enhance landscape character. Community woodlands should be maintained and increased where possible for this purpose as well as for recreation.
- Creating new woodlands around or near to urban areas, which will, through carbon sequestration, help to counteract the carbon that is produced. Woodlands within urban areas will help to reduce the heat island effect.
- Incorporating woodland rides and paths within woodlands to allow for public access but also to create a variety of habitats within the woodlands which will increase biodiversity.
- Maintaining and enhancing woodland habitats which support important invertebrate species such as stag beetles, rare fungi and priority species such as dormouse. Ancient woodlands also support ground flora such as bluebells.
- Maintaining the diverse appearance of the landscape and shield developments and infrastructure from the wider landscape. This character should be maintained within any future developments that are built.
- Managing, restoring and re-linking areas of remnant lowland heathland and acid grassland found on areas capped by glacial sands and gravels, notably within the Essex heathlands and wooded hills and ridges.
- Conserving characteristic landscapes linked to the arts, such as Dedham Vale in the north- easternmost corner of the NCA (the inspiration for Constable), and the rich heritage of designed parklands associated with estates (particularly in the Hertfordshire plateaux and river valleys and the Essex wooded hills and ridges).

Additional opportunity

Continue to utilise the mineral resource as appropriate, ensuring screening and restoration plans are in place to protect landscape assets. Restore, enhance and manage previous mineral sites as suitable habitats or sites of key geological importance to demonstrate the significance of the rich mineral resources in shaping the area's landscape, and their potential as recreational and ecological assets of the future.

For example by:

- Appropriately utilising the minerals which are a much-needed resource in the area, with the continuing demand for new housing and other building projects. Ensure long term restoration plans seek landscape and ecological benefit so this resource can provide a source of revenue and jobs for the area as well as an opportunity to enhance our knowledge and awareness of geodiversity, and provide new assets for the community in the long term
- Restoring previous extraction to habitats that are appropriate for the area to improve the network of semi-natural habitats, and the recreational and educational opportunities for local communities.
- Provide appropriate access and interpretation to important geological sites once mineral extraction is completed to use this exposed resource to educate and inform people of the geological and geomorphological features.
- Encouraging an understanding of the interrelationships between the geological and archaeological heritage of the area.
- Ensuring appropriate management, educational access and interpretation of important geological and above and below ground archaeological features and sites throughout the area.

Supporting document 1: Key facts and data

Total area: 251,000 ha

1. Landscape and nature conservation designations

The Northern Thames Basin NCA contains 1,208 ha of the Dedham Vale Area of Outstanding Natural Beauty (AONB) covering less than one per cent of the NCA.

The management plan for the protected landscape can be found at: www.dedhamvalestourvalley.org/

Source: Natural England (2011)

1.1 Designated nature conservation sites

The NCA includes the following statutory nature conservation designations:

Tier	Designation	Name	Area (ha)	% of NCA
International	Ramsar	Abberton Reservoir; Lee Valley; Crouch and Roach Estuaries (Mid-Essex Coast Phase 3); Colne Estuary (Mid-Essex Coast Phase 2); Blackwater Estuary (Mid-Essex Coast Phase 4); Hamford Water	1,123	<1
European	Special Protection Area (SPA)	Abberton Reservoir SPA; Lee Valley SPA; Crouch and Roach Estuaries (Mid-Essex Coast Phase 3) SPA;	1,123	<1
	Special Area of Conservation (SAC)	Epping Forest SAC; Wormley-Hoddesdonpark Woods SAC; Essex Estuaries SAC	2,041	1
National	National Nature Reserve (NNR)	Broxbourne Woods NNR; Blackwater Estuary NNR	241	<1
National	Site of Special Scientific Interest (SSSI)	A total of 72 sites wholly or partly within the NCA	6,156	2

Source: Natural England (2011)

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

All of the Ramsar sites are also SAC. Some of the areas covered by international and European designations are also designated nationally (SSSI or NNR).

There are 1,814 local sites in Northern Thames Basin covering 23,482 ha, which is 9 per cent of the NCA.

Source: Natural England (2011)

- Details of individual Sites of Special Scientific Interest can be searched at: http://www.sssi.naturalengland.org.uk/Special/sssi/search.cfm
- Details of Local Nature Reserves (LNR) can be searched: 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

A breakdown of SSSI condition as of March 2011 is as follows:

SSSI condition category	Area (ha)	% of SSSI land in category condition
Unfavourable declining	125	2
Favourable	3,232	53
Unfavourable no change	328	5
Unfavourable recovering	2,453	40

Source: Natural England (March 2011)

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

2. Landform, geology and soils

2.1 Elevation

Elevation in the NCA ranges from 0.02 m below sea level to a maximum of 155 m above sea level. The average elevation of the landscape is 47 m. The 'Bagshot Hills' are prominent features of the Essex part of the NCA, rising to a high point of 116 m at Danbury Hill.

Source: Natural England 2010

2.2 Landform and process

This NCA can be broken down into four sub-character areas: Hertfordshire plateaux and river valleys; Essex wooded hills and ridges; London Clay lowlands; and Essex heathlands. The Hertfordshire plateaux and river valleys area is topographically complex, having many valleys cut into the broad plateau landform which is often obscured by vegetation cover. In places river erosion has created isolated landforms such as the Shenley Ridge. The Essex wooded hills and ridges rise above the London Clay lowlands to an altitude of approximately 100 m AOD. The London Clay lowlands are generally flat and typically gently undulating. Broadly, the Essex heathlands landform is relatively flat with only minor undulations; however, some of the river valleys are steep sided such as the Stour, Colne and Roman.

Source: Northern Thames Basin Countryside Character Area description, London Basin Natural Area Profile

2.3 Bedrock geology

The London Basin is a concave dish which formed as a result of the Alpine Orogeny (mountain building episode). It overlies the Chalk, which was laid down in warm shallow seas during the Cretaceous (95 to 65 Ma) and which is the main aquifer for London. As a result of the Orogeny the land here rose above sea level and it was subject to major erosion. The sea level then rose again and the basin was filled by Palaeogene and Neogene (Tertiary, 64 to 2 Ma) sands and mudstones. After continued sea-level rise some 55 Ma, the London Clay was laid down. Overlying the London Clay are the Bagshot, Barton and Bracklesham Beds. These sands and clays were deposited on a large coastal plain as the sea level fell again.

Source: Northern Thames Basin Countryside Character Area description, London Basin Natural Area Profile, British Geological Survey maps

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. These latter deposits are found at lower altitudes than their predecessors, as a result of a combination of factors. The youngest sediments are sands and gravels deposited by the Thames in its current location since the last ice age.

Source: Northern Thames Basin Countryside Character Area description, London Basin Natural Area Profile, British Geological Survey maps

2.5 Designated geological sites

Designation	Number of sites
Geological Site of Special Scientific Interest (SSSI)	17
Mixed interest SSSI	3

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

London Clay gives rise to heavy acidic soils often prone to flooding in winter and cracking in summer. River valleys are fringed by well-drained fertile brown earths, produced from alluvial deposits. Sand and gravels give rise to nutrient poor, free draining soils, for example in the Bagshot Hills and Essex heathlands. Light sandy soils of former heaths are found in Essex, particularly around Colchester.

Source: Northern Thames Basin 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	23	<1
Grade 2	28,676	11
Grade 3	120,556	48
Grade 4	5,418	2
Grade 5	39	<1
Non-agricultural	19,032	8
Urban	70,745	28

Source: Natural England (2010)

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

3. Key water bodies and catchments

3.1 Major rivers/canals

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

Name	Length (km)
River Lea or Lee	41
River Colne	33
Grand Union Canal	28
River Crouch	15
Roman River	13
Cobbin's Brook	9
River Ver	8
River Beane	6
River Chelmer	6
River Blackwater	5
River Rib	3
Chelmer and Blackwater Navigation Cobbin's Brook	2
Langford Cut	1
River Stort	<1
River Ter	1

Source: Natural England (2010)

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

Hertfordshire plateaux and river valleys: Rivers cut through the broad plateaux, draining into the Colne and Ver to the north-west and Lea to the east. Reservoirs and canals are features of this area.

Essex wooded hills and ridges: The ridges of Epping Forest, Brentwood to High Wood, Thorndon to Billericay and Danbury to Wickham Bishops are dissected by the valleys of the rivers Roding, Wid and Chelmer. The Ter, Brain and Blackwater also contribute to the drainage of much of the area. Hanningfield Reservoir provides a notable body of open water within the sub-area.

London Clay lowlands: Undulating lowlands drained by numerous streams including the Roach, Crouch and Blackwater, which merge before widening into the flat marshes to the east. Layer Brook in the north is dammed on its way to the Roman River to form Abberton Reservoir.

Essex heathlands: Steep sided valleys of the Stour, Colne and Roman and their tributaries drain the plateau before discharging into the North Sea.

3.2 Water quality

The total area of Nitrate Vulnerable Zone is 185,636 ha or 74 per cent of the NCA.

Source: Natural England (2010)

3.3 Water Framework Directive

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

4. Trees and woodlands

4.1 Total woodland cover

The NCA contains 20,914 ha of woodland, 10 per cent of the total area, of which 7,742 ha is ancient woodland. Twelve per cent or 29,366 ha of the NCA is land within Community Forests; Watling Chase 18,522 ha and Thames Chase 10,843 ha.

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

4.2 Distribution and size of woodland and trees in the landscape

Significant areas of wood pasture and notable numbers of pollard ancient and veteran trees are found across the area, including Hainault Forest, at Thorndon Country Park, Wormley and Hoddesdon Great Park, Epping Forest and Richmond Park. Epping Forest, within the Essex wooded hills and ridges sub-area, includes mixed woodland and blocks of broadleaved woodland greater than 500 ha in extent.

The eastern part of the Hertfordshire plateaux is heavily wooded, including coppiced hornbeam woods with oak standards. Areas of coppice are up to 20 ha in size. Large blocks of woodland occur along river valleys in Hertfordshire, including former lime woods replanted with conifers. Some conifer blocks are over 150 ha. The hilltops and ridges of Essex are crowned by woods, including ancient woodland and secondary woodland on commons. These woods are mainly smaller than 50 ha.

The distinctive 'plotland' woods of Laindon and Thundersley can be found in the London Clay lowlands sub-area. These are mainly less than 50 ha in size. Small clusters of secondary and ancient woodland exist along shallow valleys in the Essex heathlands area, which is predominantly open. Apple orchards are a feature of the London Clay lowlands and Essex heathlands.

Source: Northern Thames Basin Countryside Character Area Description

4.3 Woodland types

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

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

Woodland type	Area (ha)	% of NCA
Broadleaved	20,914	8
Coniferous	1,760	1
Mixed	290	<1
Other	1,104	<1

Source: 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	6,090	2
Ancient re-planted woodland (PAWS)	1,652	1

Source: Natural England (2004)

5. Boundary features and patterns

5.1 Boundary features

In the Hertfordshire plateaux and river valleys woody and species rich hedgerows are the main boundary types. Hawthorn hedgerows surround more recent fields with wire fencing commonly around horse paddocks close to settlements. In the London Clay lowlands boundaries are often formed by long lengths of hedgerows which historically have been dominated by elm, although there has been significant loss through Dutch elm disease. Blackthorn hedgerows are now the most common. In the Essex heathlands hedgerows are the dominant boundary feature on land surrounding the heaths. These vary much in species richness and composition.

Source: Northern Thames Basin Countryside Character Area description; Countryside Quality Counts (2003)

5.2 Field patterns

Field pattern is varied across the basin reflecting historical enclosure patterns. The Hertfordshire plateaux and river valleys are dominated by the informal patterns of 18th century or earlier enclosure reflecting the medieval colonisation of the heaths and woodland. This is particularly noticeable in the east where small organic-shaped fields are common. In the west ancient organic-shaped fields can be found alongside regular 'Enclosure Acts' fields. Similar pre-18th century irregular small enclosures can be found in the Essex wooded hills and ridges with some later, more regular, medium sized fields present. Within the London Clay lowlands large rectangular fields dominate arable land on the heavy clay soils. Early, Roman planned 'Dengie' form regular enclosure patterns occur, which are a subtle but important feature of land in the east of the area. In the Essex heathlands 18th and 19th century enclosure of heathlands and commons followed by extensive 20th century field enlargement is dominant. Straight edged fields surround areas of remnant heath with small fields characterise the river flood plains. Some areas of regular enclosure are associated with the rationalisation and amalgamation of farms and estates in the 18th and 19th centuries.

Source: Northern Thames Basin Countryside Character Area description; Countryside Quality Counts (2003)

6. Agriculture

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

6.1 Farm type

Broader plateaux areas in the NCA are mainly in agricultural use, with a mix of arable and pastoral farming. There has been a 62 per cent decrease in dairy farms from 37 to 14 farms. Trends also show a decrease in the number of specialist pig farms from 26 to 14 farms or a 46 per cent reduction. There have also been reductions in the number of horticulture holdings from 298 to 165 or 45 per cent, of mixed holdings from 92 to 62 or 32 per cent, of specialist poultry farms from 54 to 45 or 17

per cent, of general cropping from 132 to 110 holdings or 17 per cent, and of lowland grazing livestock units from 215 to 190 or 12 per cent. The general category of 'other' holdings, most commonly associated with small-holdings, has seen an increase of 9 per cent from 373 to 405 holdings. The number of cereal holdings has remained relatively static with 494 reducing to 480 or a decline of 3 per cent.

Source: Agricultural Census, Defra (2010)

6.2 Farm size

Farms between 5 and 20 ha are the most common in the area, 428 holdings accounting for 29 per cent of all holdings, followed by farms over 100 ha, 340 in number or 23 per cent of holdings, farms between 20 and 50 ha, 323 or 22 per cent of holdings, and farms under 5 ha, 207 or 14 per cent of holdings. The least common farms in the area are those holdings between 50 and 100 ha at 187 or 13 per cent of holdings. The largest holdings, those over 100 ha, make up 75 per cent of the total farmed area, compared to those under 5 ha which cover less than 0.5 per cent of the farmed area. The trends in farm size show a significant decrease in the number of farms of less than 5 ha decreasing by 42 per cent from 358 to 207. The number of holdings between 5 and 20 ha also decreased by 12 per cent from 485 to 428, as did the number of holdings between 50 and 100 ha by 7 per cent from 200 to 187, and the number of holdings over 100 ha also by 7 per cent from 366 to 340. The number of holdings between 20 and 50 ha increased by 4 per cent from 311 to 323.

Source: Agricultural Census, Defra (2010)

6.3 Farm ownership

Sixty-six percent of the total farmed area is owner occupied. There has been a 3 per cent increase in the owned area of farmland over the 2000 to 2009 period and a 2 per cent increase in the tenanted farm area.

2009: Total farm area = 113,572 ha; owned land = 74,843 ha
2000: Total farm area = 113,897 ha; owned land = 72,846 ha

Source: Agricultural Census, Defra (2010)

6.4 Land use

The dominant agricultural land uses are cereals, accounting for 48,817 ha or 43 per cent of the total farmed area, and grass and uncropped land which accounts for 32,804 ha or 29 per cent. These are followed by oilseeds which cover 11,742 ha, 10 per cent of the area, and 'other' arable crops which cover 7,252 ha or 6 per cent of the area, with other agricultural land uses each representing less than 5 per cent of the total farmed area. Between 2000 and 2009 there was a 6 per cent decrease in the area of cereals, a reduction by 2,937 ha, and a 7 per cent decrease in the area of grass and uncropped land, a reduction by 2,352 ha. The area under oilseeds increased by 4,284 ha, or 57 per cent, and the area under 'other' arable crops increased by 519 ha, or 8 per cent. There have also been increases in the area of land used for growing stock feed by 325 ha or 183 per cent, cash roots by 377 ha or 11 per cent, and vegetables by 62 ha or 5 per cent. A decrease was seen in the area of land used for fruit growing, down by 374 ha or 47 per cent, and glasshouses, down by 46 ha or 26 per cent. Other agricultural land uses were relatively static or related to less than five holdings.

Source: Agricultural Census, Defra (2010)

6.5 Livestock numbers

Sheep are the most numerous livestock within this landscape, numbering 35,500 animals. Pigs are the next most numerous with 17,500 animals and cattle numbered 16,500. All livestock numbers have decreased during the period 2000 to 2009. Pig numbers decreased by 52 per cent (19,100 animals), cattle by 39 per cent (10,500 animals) and sheep by 27 per cent (12,900 animals).

Source: Agricultural Census, Defra (2010)

6.6 Farm labour

The majority of holdings are run by principal farmers, including their spouses and business partners, rather than salaried managers; 1,974 principal farmers and 317 salaried managers. Together, employed full time and part time workers

(1,520 full time and 620 part time) are more numerous than casual/gang workers (1,147). Trends from 2000 to 2009 show a decrease in the number of principal farmers, down by 509, and an increase in salaried managers, up by 30. During this period the number of casual/gang workers also increased, by 148, as have full time workers, up by 89, but the number of part time workers has decreased, down by 293.

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

Hertfordshire plateaux and river valleys:

Woodland: The river valleys contain some of the largest blocks of woodland. Many woods have been felled and replanted with non-indigenous species, such as former lime woods which are now coniferous plantation. These woods often follow and accentuate the valley form, following the contours of the valley sides above flat and predominantly open valley floors. The woodland cover also comprises a number of small ancient beech and oak woods found mainly in the valleys to the west. The eastern part of the plateaux is heavily wooded with some traditional coppice woodland, with oak as standards and coppiced hornbeam; the unusual prevalence of hornbeam is related to its historical use as a quality firewood crop for London. Birch and ash are also frequent in this area. Wood pasture and parkland was once more widespread. Remaining areas such as around Broxbourne contain many veteran trees.

Flood plain grazing marsh: Remaining areas of grazing marsh can be found throughout the river valleys.

Wetlands and open water: Many of the river valleys have been modified by reservoirs, current and reclaimed gravel pits, landfill sites, artificial wetlands, river realignments and canals many of which are important as a recreational and wildlife resource, for example along the River Lea.

Lowland heathland: Only isolated remnants remain within commons such as at Bricketwood Common or Colney Heath Common.

Essex wooded hills and ridges:

Woodland: The woodland found on the prominent hills and ridges of Epping Forest, Hainault, Thorndon, Galleywood and the Danbury to Tiptree ridge, exists on a belt of sand often referred to as the 'Bagshot Hills' stretching through Essex from Epping Forest to Tiptree. Many are ancient but there are also some large areas of secondary woodland on former common land. Many of the wooded commons have veteran trees associated with them and some secondary woodland is defined in many places by medieval wood banks. There are also some notable areas of wood pasture and parkland associated with historic 'gentry' houses and their grounds.

Flood plain grazing marsh: Remnants of grazing marsh remain within the river valleys.

London Clay lowlands:

Woodland: The south-east Essex Hills around Langdon, Hockley and Rayleigh are quite well wooded relative to the heavily developed surrounding land. The 'plotland' woods of Laindon and Thundersley provide wildlife benefits on former urbanised land.

Open water: To the north, the tiny Layer Brook has been dammed on its way to the Roman River to form Abberton Reservoir. The open expanse of Abberton Reservoir provides a popular wildlife resource.

Essex heathlands:
Arable land and field margins: Improved grassland and arable fields, punctuated by a regimented pattern of horticultural holdings and market gardening on the light sandy soils of the former heaths dominate the area. It is important for farmland birds and other species associated with farmland for example brown hare.

Lowland heathland: Historically there were extensive heaths and commons north of Colchester and as far as Dedham. However, the area is now generally characterised by small isolated pockets of largely scrub-dominated heathland within the mixed agricultural landscape.

Rivers and streams: The steep-sided slopes of the Stour, Colne and Roman River valleys, with their tributaries, have associated abundant woodland and small fields with dense hedgerows. Gentler slopes have areas of coastal and flood plain grazing marsh, fen and reedbed at the river margins. An intricate pattern of hidden creeks and small valleys extend the influence of the coastal grazing marshes inland.

Source: London Basin Natural Area Profile

7.2 UK Biodiversity Action Plan (BAP) priority habitats

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

UK BAP priority habitat	Area (ha)	% of NCA
Broadleaved mixed and yew woodland (broad habitat)	10,598	4
Coastal and flood plain grazing marsh	1,677	1
Lowland heathland	838	<1
Lowland dry acid grassland	517	<1
Lowland meadows	377	<1
Reedbeds	304	<1
Fens	252	<1
Mudflats	22	<1
Purple moor grass and rush pasture	8	<1
Lowland calcareous grassland	3	<1

Source: Natural England (2011)

- Maps showing locations of UK BAP Priority Habitats are available at: http://magic.defra.gov.uk/website/magic/ – select 'Habitat Inventories'

7.3 Key species and assemblages of species

- Maps showing locations of UK BAP Priority Habitats are available at: http://magic.defra.gov.uk/website/magic/ – select 'Habitat Inventories'
- Maps showing locations of S41 species are available at: http://data.nbn.org.uk/

8. Settlement and development patterns

8.1 Settlement pattern

There is generally a high degree of dispersed settlement in the landscape. The creation of new settlements is also a feature of the area, beginning with the pioneering new Garden Cities at Welwyn and Letchworth. There has been a high rate of change to urban fringe areas. There is evidence of an extension of urban influences into fringe areas creating peri-urban centres around some of the larger towns such as Colchester, Tiptree, Wickford, Greys, Hatfield, St Albans and Rickmansworth. In addition there is evidence of more scattered development on greenfield sites throughout especially between Benfleet and Billericay.

Source: Northern Thames Basin Countryside Character Area description; Countryside Quality Counts (2003)

8.2 Main settlements

The main settlements within the NCA are; North London suburbs, Watford, Chelmsford, Basildon, Southend-on-Sea, Colchester, Harwich, St Albans, Welwyn Garden City, Hertford, Brentwood, Billericay, Benfleet, Clacton-on-Sea and Harwich. The total estimated population for this NCA (derived from ONS 2001 census data) is; 4,080,214.

Source: Northern Thames Basin Countryside Character Area description; Countryside Quality Counts (2003), Natural England (2012)

8.3 Local vernacular and building materials

Throughout the NCA brick was increasingly used from late 17th century. In the London Clay lowlands traditional buildings are of timber with brownish red plain tiled roofs. Weatherboarding is usually more typical than colour-washed plaster as the principal walling material. The weatherboards are often painted white, although traditionally they were painted black or tarred. The browns and reds of the tiled roofs form a contrast with the black or white painted weatherboards. The principal building type characteristic of the Essex heathlands are antique timber buildings with weatherboarding and white-washed plaster typically used as wall finishing materials. Brick is generally more common in the north of the Heathlands.

Source: Northern Thames Basin Countryside Character Area description; Countryside Quality Counts (2003)

9. Key historic sites and features

9.1 Origin of historic features

The Hertfordshire plateaux and river valleys were extensively cleared and occupied in the prehistoric period leaving a substantial legacy of funerary monuments and settlement sites, visible as both crop marks and earthworks. Prehistoric and early historic settlement pattern in the London Clay lowlands area is also extraordinarily rich in evidence, in particular of extensive Roman and Saxon settlement. In addition the Essex heathlands offer evidence including territorial earthworks, perhaps most famously relating to the powerful tribes of the Iron Age and the establishment of the Roman capital at Colchester – Britain's earliest urban settlement, and first Roman capital.

Limited survivals of co-axial field systems are present in the woodlands east of Broxbourne and north of Borehamwood and are potentially of Bronze Age origin and therefore highly significant. There is also significant, if limited, survival of co-axial and irregular sinuous enclosures in the vicinity of Waltham Abbey and Loughton.

Profitable farming conditions saw the demise of much medieval parkland in the 17th and 18th centuries, alongside the growth of substantial farming estates.

The Hertfordshire plateaux area is dominated by informal enclosure patterns of 18th century or earlier framed by woody hedgerows. Parliamentary enclosure had little impact on the adjacent Essex woodland hills, and then mostly on the

late surviving common, the remaining examples of which, for example Nazing, are infrequent but highly significant. The Essex wooded hills have a characteristic pattern of substantial farmsteads within regular patterns of enclosure from the late 18th and 19th centuries especially in the more low lying areas.

Extensive areas of ancient woodland with remnant wood pasture occur and are now mainly managed for conservation and recreational values. The survival of ancient woodlands, such as Broxbourne and Wormley Woods, is a feature of the area. Smaller copses and belts of ancient woodland and modern plantation are commonly associated with areas of former medieval and post medieval parkland.

The heathlands were intensively farmed for centuries and subjected to widespread enclosure in the 19th century, which brought about the pattern of new farmsteads and mixed farming still in evidence today.

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

9.2 Designated historic assets

This NCA has the following historic designations:

- 58 Registered Parks and Gardens covering 5,159 ha
- 2 Registered Battlefields covering 119 ha
- 181 Scheduled Monuments
- 8,363 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

- Five per cent of the NCA, 12,028 ha, is classified as being publically accessible.
- There are 3,084 km of public rights of way at a density of 1.2 km per km2.
- There are no national trails within the NCA

Sources: Natural England (2010)

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

Access designation	Area (ha)	% of NCA
National Trust (Accessible all year)	96	<1
Common Land	1,289	<1
Country Parks	3,261	1
CROW Access Land (Section 4 and 16)	184	<1
CROW Section 15	3,368	1
Village Greens	184	<1
Doorstep Greens	11	<1
Forestry Commission Walkers Welcome Grants	4,268	2
Local Nature Reserves (LNR)	1,907	1
Millennium Greens	3	<1
Accessible National Nature Reserves (NNR)	241	<1
Agri-environment Scheme Access	86	<1
Woods for People	7,054	3

Sources: Natural England (2011)

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

11. Experiential qualities

11.1 Tranquillity

Based on the CPRE map of Tranquillity (2006) it appears that the least tranquil areas are associated with urban centres such as the north London suburbs of Watford, Chelmsford and Basildon together with Colchester towards the north and the coastal towns of Southend-on-Sea, Clacton-on-Sea and Harwich. Other areas of disturbance are associated with the main transport routes linking these centres including the M25, M11, A1(M), A12 and A127 roads. The most tranquil areas tend to be the lowland areas to the east of the NCA towards the coast. These more rural areas are more sparsely inhabited, such as around the Maldon District and to the south of Colchester around the Abberton Reservoir, and less disturbed. In the west of the NCA the area around Broxbourne Woods to the east of Hatfield provides some tranquillity from the surrounding disturbed areas.

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

Tranquillity	Tranquillity Score
Highest value within NCA	44
Lowest value within NCA	-135
Mean value within NCA	-30

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 a similar pattern to the tranquillity mapping, with areas of disturbed land associated with urban areas, for example Watford and Chelmsford, and towns, such as Colchester and Harwich, and the main road and rail transport corridors linking these centres. Light pollution resulting from intensive agriculture, growth of settlements and road infrastructure improvements (A1M) is particularly apparent in the flat terrain.

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

Intrusion category	1960s (%)	1990s (%)	2007 (%)	Percentage change (1960s-2007)
Disturbed	40	56	55	15
Undisturbed	36	20	13	-22
Urban	24	24	32	7

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are that disturbed or intruded land has increased by nearly 15 per cent during the period between 1960 and 2007 which is matched by a reduction of around -22 per cent of undisturbed or un-intruded land over the same timescale.

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

12 Data sources

- British Geological Survey (2006)
- Natural Area Profiles, Natural England (published by English Nature 1993-1998)
- Countryside Character Descriptions, Natural England (regional volumes published by Countryside Commission/Countryside Agency 1998/1999)
- Joint Character Area GIS boundaries, Natural England (data created 2001)

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

- Woodland cover is extensive across the Hertfordshire plateaux and the Essex wooded hills and ridges. Smaller intimate tree-lined valleys provide a strong contrast through un-wooded areas. About 50 per cent of the woodland cover is on ancient woodland sites. The proportion of these sites covered by a woodland grant scheme has remained around 40 per cent since 1999. There have been a significant number of agreements for coppice management. Evidence suggests woodland character has at least been maintained. New tree planting is concentrated into larger blocks with apparent targeting within the Community Forests that occur in the area.

- Deer impact on woodland flora and succession of tree species is an increasing pressure on woodlands locally.

Boundary features

- The main boundary feature in this area is hedgerows which accounts for most of the existing boundary features found here. The other two features found are ditches and woodlands.

- Between 1999-2003 Countryside Stewardship capital agreements for linear features including hedge management, planting and restoration, amounted to only two per cent of the total resource.

Agriculture

- The area has a varied land use pattern comprising a mix of arable and pasture land. There has been an overall loss of mixed and general cropping and horticulture since 1998, although the rate of grassland loss has slowed and the mix of farm holding types has stabilised.

- There has been a reduction in livestock numbers across the NCA with cattle numbers suffering the steepest decline of 52 per cent between 2000 and 2009. The number of livestock farms reduced during this time by 21 per cent. There was a reduction of grazing intensity between 1990 and 2003, which is below the national average.

Mixed farming at Nyn Manor Farm in Hertfordshire.

- A loss of landscape character of agricultural land during the period between 1998 and 2003 is suggested by CQC data from inappropriate management of set aside land in some areas of the Hertfordshire plateaux and river valleys and a decoupling of historic farmsteads from modern agriculture resulting in a redundancy of traditional barns and other buildings. In London Clay lowlands mineral extraction is also replacing some farmland.

Settlement and development

- London has an expanding population and pressure to meet housing demand and other changes is placing pressure on existing greenspace which varies considerable in quality. There is an overall lack of access to greenspace especially in the case of deprived urban communities.

- Small parts of the Northern Thames Basin NCA fall within The Thames Gateway Growth Area, including the new town of Basildon, the hinterland of Thurrock and most of Southend. Industrialisation has left a legacy of industrial and minerals sites that are now used as geology and wildlife nature reserves or to house development for example in Thurrock. The sub-regional priorities include promoting green infrastructure to improve the quality of the environment and create habitats and attract visitors through the ongoing application of the All London Green Grid more widely. Thames Chase Community Forest provides a substantial new element of green infrastructure in this area.

- Within the Heart of Essex sub-region, as defined within the East of England Implementation Plan, growth is focussed within the character area on the town of Chelmsford due to its good links with London and proximity to Stansted airport. Chelmsford is a strategic Growth Point, but retains issues in relation to flood risk in the town centre. It is an area heavily influenced by its proximity to London, containing the M25 and the London section of the M11, as well as high quality natural environments such as Epping Forest, the Lee Valley Regional Park and Hatfield Forest. The proximity to London already puts strong pressure for housing on the area, and affordable housing is a need. The Lee Valley is identified as a priority area for regeneration.

- The part of the Northern Thames Basin in Colchester Borough lies within the Haven Gateway Growth Point. This sub-region is one of the key international gateways to the UK. Colchester is part of the regional 'cities' east initiative. The rural hinterland includes nationally important landscapes (Dedham Vale AONB) and internationally important ecological designations. The sub-region is subject to major housing and jobs growth putting potential pressure on sensitive landscapes and habitats through increased public access and recreation. Water resources are predicted to become stretched.

- Brownfield sites can be a great source of biodiversity in developed areas, becoming a haven for many invertebrate species some of which may be locally or national important. Demand for housing and development in the area often results in the loss of these sites.

Semi-natural habitat

- Recent reductions in heathland extent and quality in the NCA have been caused by development pressure, a lack of active management (including traditional grazing practices) resulting in succession to woodland, over-management by amenity cutting, and recreational pressure. Major heath restoration and recreation works are currently progressing in Essex under Environmental Stewardship concentrated in Epping, Danbury and Tiptree with the aim of creating 20 ha of habitat and restoring 75 per cent of the existing resource.

- Lack of management of coppice woodlands in Hertfordshire and Essex has resulted in the growth of dense 'high forest'. Less than one per cent of woodland types are classified as coppice. This could be one cause for the lack of shrubs and young trees found in the NCA as less than 0.5 per cent of the woodland include these. This is also exacerbated by the high numbers of deer found in woodlands and rural areas.

Restoration of acid heathland at Layer Breton in Essex.

- Major losses of semi-natural woodland especially in the Essex wooded hills and ridges. In 2010 woodland covered 6 per cent of the total NCA area. This includes ancient semi-natural woodland (2 per cent) and ancient re-planted woodland (1 per cent).Community woodlands make up the largest proportion of woodlands with a total area of 12 per cent. There are two community woodlands – Watling Chase, which is in the south Hertfordshire/ north London area straddling three major roads, the M25, M1 and A1, and Thames Chase, which is found in the south Essex/east London area. Both where established in the early 1990s.

- A decline in orchards, especially apple, has mainly affected Essex. Since 1990 orchards have declined significantly and this trend is continuing. Steps are in place to stop the reduction and future plans are to restore and increase the areas of orchards.

- There is a localised loss of hedgerows due to the creation of larger fields and the loss of elm trees to Dutch elm disease. Through initiatives that use a landscape scale approach, hedgerow planting is being utilised to connect up isolated habitats which may help increase the viability of existing hedgerows and increase the total number.

- A loss of pasture land on the flood plains due to changes in agricultural practices has mainly impacted on the Hertfordshire area.

- The majority of SSSI within the Northern Thames Basin are in favourable condition and only seven per cent are classified as unfavourable declining or unchanged.

Historic features

- This area has a rich historical heritage and has historical evidence of settlement in the Hertfordshire, Essex heathlands and London areas dating back to prehistoric period along with palaeoenvironmental, Palaeolithic and archaeological evidence.

- Although evidence of early settlements in the Essex wooded hills is sparse it is possible this area was managed for timber and fuel.

- This area has nine sites on the English Heritage at risk register and many listed buildings. The main threats to these sites are the continued need for urban expansion and housing or industrial development and the management of agricultural land. This can be counteracted in some ways by the land owners entering into agri-environmental schemes.

Coast and rivers

- In recent years rivers and coastal features have been enhanced in terms of chemical and biological quality and SSSI condition by uptake of agri-environmental agreements for management and restoration of riverine and/or coastal features.

- Research from 2006 on nitrate vulnerable zones found that in the Hertfordshire and London area, nitrates have the biggest impact on surface water, with only a small affect on groundwater. In the Essex area nitrates affects both ground and surface water, with a greater affect on groundwater toward the coast. Phosphorus is another factor that can affect the health of river systems and can enter the water from agricultural land. This is having an increased impact in the Essex part of this character area.

- Other factors affecting the rivers are invasive species, such as floating pennywort. This blocks water courses, preventing movement of animals and affects some recreational activities such as boating and canoeing. Himalayan Balsam grows alongside river banks and creates a monoculture, out-competing other plants and preventing their growth. It also increases sedimentation in rivers as it dies back in winter leaving the banks exposed, so soils are easily washed into the rivers during heavy rainfall or flooding. Efforts are being made to remove these plants and others from river habitats through funding from Defra and as of 2014 some species of invasive plant, including floating pennywort, will be banned from being sold commercially in the UK.

- Recreational activities such as boating can lead to increased rates of sedimentation within watercourses, especially along the River Lea and the Grand Union Canal. Modification of many watercourses can also have a detrimental effect on water overall water quality and the ecology of the area's rivers. There has been extensive morphological alteration of rivers over many years, mainly in the London areas, to create canalised river systems with reinforced banks to prevent flooding and allow dredging to occur. This has resulted in a loss of habitat for species that cannot survive in fast flowing waters (including the young of many fish), the potential for increased erosion of banks that are not enforced, loss of bank/marginal habitats and potential loss of in-channel habitats through dredging. These problems need to be remedied as part of the Water Framework Directive (WFD), in order to obtain a 'Good' status. Funding is currently being invested in creating in-channel habitats for species that do not flourish in fast flowing waters, improvements/removal of bank profiling where suitable and reversal of canalisation where possible.

- Urban diffusion pollution is also affecting parts of this character area and results from runoff from roads, air emissions contributing to acidification, organic waste (mainly from dog fouling), fertilisers and pesticides from gardens, parks and road verges, phosphorus from incorrectly plumbed washing machines and sediment from construction sites. These may result in high metal levels and biodegradable organic matter within the water (resulting in increased oxygen demand reducing the oxygen available for aquatic life).

Urban character of Raynham Street in Hertford.

Drivers of change

Climate change

- The Northern Thames Basin is among the warmest and driest parts of the UK. A number of characteristic specialist species, more typical of continental climates, survive here on the edge of their European range.

- With predictions of increased temperatures, it is projected that species will advance their range northwards therefore the range and types of species found will change over time.

- To facilitate the migration of species, better connectivity between habitats is required to prevent their extinction through loss of appropriate habitats and an inability to move to other areas.

- Agricultural land is also at risk from soil erosion and nutrient loss as the soil becomes more susceptible to wind erosion in the predicted hotter and drier periods and water erosion in the wetter, colder periods. Increasing the size and connectivity of surrounding habitats, such as grasslands, will help support new species and improve biodiversity as well as reduce the affects of soil erosion. Also pollinating insects will benefit from the increase in semi-natural habitats and these in turn will benefit the local agricultural landscape. Predicted longer growing seasons and earlier onsets of spring will present an opportunity for introducing growth of new drought tolerant species.

- There is a possibility that there will be species gains and losses, due to changes in season lengths and weather fluctuations. This could result in new combinations of species and communities.

- Water availability will be a concern, with the potential loss of specific drought intolerant species, as a result of reduced soil water moisture and rising temperatures.

- Woodland habitats (which make up a large proportion of semi-natural habitats in this area) may have increased above ground biomass due to increased carbon dioxide and nitrogen availability. This may have an impact on ground or lower growing flora.

- Wetlands and open water habitats and associated species are likely to have to cope with greater fluctuations in water levels which could be droughts or low rainfall in the summer with flooding or heavy rainfall in the winter. As great crested newts are found in relatively large numbers in this area, it may have an adverse affect on this protected species.

- The characteristic geological and archaeological deposits are susceptible to predicted changes in soil moisture content and the patterns of stability on exposed sections will change, necessitating new management methods.

- Inner London and surrounding areas, which already have a micro climate/ urban heat island (UHI) effect, are likely to experience higher temperature increases than surrounding areas and this could result in species changes, possibly supporting more exotic invasive species such as parakeets that are already living wild in city parks. It is likely that water availability will become an increasing pressure.

- Ideas to reduce the UHI affect include, creating urban forests and parklands to increase vegetation and to use all public green space as potential carbon sequestration. Other adaptations could be to increase the use of garden roofs on high buildings or creating 'green roofs' (where grass or other vegetation is able to grow in the roofs) on housing.

Other key drivers

- Pressure for continued urban expansion and regeneration including industrial development, offers opportunities to improve well-being conditions for local communities such as, improving greenspace quality and provision, but will also put pressure on water availability and habitat fragmentation. Future mitigation needs to ensure these factors are considered when developments occur.

- The Environment Agency, through the Water Framework Directive (WFD), is obligated to engage with stakeholders and communities to help improve the ecological status of the rivers by 2027. In this area most river stretches are classified as 'moderate' but some are classified as 'poor' or even 'bad' ecological status, especially those in the Thames area.

- The affects of agriculture practices on water quality, abstraction and surrounding habitats and wildlife will continue to be a challenge. This can be negated through continued support from agri-environmental schemes, which will enable landowners to continue their involvement in creating a diverse and productive environment.

- Fragmented habitats could be improved by buffering and putting in place measures to create a network of connected habitats to allow species to disperse and become more healthy and resilient to the impacts of climate change. Gapping up of patchy hedgerows is one method that could be used and improvements in urban planting in gardens and public parks could also help support biodiversity for example, planting nectar-rich species.

- There is scope to expand the area of recreation provision by improving public access, while ensuring the needs of sensitive sites are not adversely damaged through for example disturbance or excessive trampling.

- The increased pressure for infrastructure development around London is going to continue to grow and create difficulties in preserving the London green belt. Care must be taken so that important habitats, geological, archaeological features and recreational greenspace is not destroyed in the process and the character of the area adversely affected.

- There is significant opportunity to engage urban and rural communities in educational and volunteering activities for the benefit of the natural environment.

- There are many existing mineral sites in the area and the demand for building material is large so this creates industrial opportunities. However, priority habitats need to be preserved to maintain the geodiverse and biodiverse nature of the area. There are also opportunities to return abandoned mineral sites back to the habitats that were previously found there and expand the biodiversity of the area. These mineral sites also reveal important and interesting geological features allowing greater understanding in the development of the local area and provide an important context and insight into our understanding of the potential impacts of future climate change and global warming. These can be useful research and education sites.

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.

River Ver chalk stream near Drop Lane in Hertfordshire.

Statement of Environmental Opportunity	Ecosystem service: Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place / Inspiration	Sense of history	Tranquillity	Recreation	Biodiversity	Geodiversity
SEO 1: Manage rivers and river valleys to protect and improve water quality and help to alleviate flooding in the downstream urban areas, while also helping to improve aquifer recharge and provide a sufficient store of water to meet future need, especially with predicted climatic changes. Conserve the riparian landscapes and habitats, for their recreational and educational amenity for their internationally significant ecological value.	↘ *	↗ *	↑ ***	↗ *	↑ *	↑ ***	↑ **	↑ ***	↗ *	↗ *	↗ **	↗ **	N/A	↗ *	↔ **	↗ **	↗ *	↑ **	↑ **
SEO 2: Manage the agricultural landscape and diverse range of soils which allow the Northern Thames Basin to be a major food provider, using methods and crops that retain and improve soil quality, water availability and biodiversity.	↑ ***	↔ **	↑ **	↗ *	↔ ***	↗ **	↗ **	↗ *	↑ ***	↑ **	↗ ***	↗ ***	N/A	↗ *	↗ *	↔ ***	↗ *	↗ ***	↔ ***
SEO 3: Protect and appropriately manage the historic environment for its contribution to local character and sense of identity and as a framework for habitat restoration and sustainable development, ensuring high design standards (particularly in the London Green Belt) which respect the open and built character of the Thames Basin. Enhance and increase access between rural and urban areas through good green infrastructure links to allow local communities recreational, health and wellbeing benefits.	↗ *	↗ **	↔ ***	↗ *	↗ *	↗ **	↔ ***	↔ ***	↔ ***	↔ ***	↗ *	↗ *	N/A	↑ ***	↑ ***	↗ ***	↑ ***	↗ *	↗ *
SEO 4: Manage and expand the significant areas of broadleaf woodland and wood pasture, and increase tree cover within urban areas, for the green infrastructure links and important habitats that they provide, for the sense of tranquillity they bring, their ability to screen urban influences and their role in reducing heat island effect and sequestering and storing carbon.	↔ **	↑ ***	↗ **	↔ ***	↑ ***	↑ **	↗ **	↗ *	↗ *	↗ *	↗ **	↗ **	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 diverse mixture of large urban areas, smaller urban settlements, as well as remote villages and hamlets surrounded by agricultural lands, grasslands/heathlands and woodlands.	■ The CPRE Intrusion Map (2007) found the area to be 32 per cent urban, 55 per cent disturbed and only 13 per cent classified as undisturbed due to the network of towns, roads and other infrastructure that criss-cross this area. ■ Since the 1960s the area of disturbance and urbanisation has expanded out from London, Colchester and other towns to encase most of the Hertfordshire area and South Essex and has extended to most of the Essex heathlands and wooded hills and ridges. ■ Remoteness is still achievable in parks, woods and fields throughout the area. A recent addition to this is the development and management of the community woodlands, Watling and Thames Chase. ■ Levels of tranquillity are still high in the more rural areas of the Northern Thames Basin.
Underlying Chalk aquifer. London Clay gives rise to heavy acidic soils often prone to flooding in winter and cracking in summer. The river valleys are fringed by well-drained fertile brown soils, produced from alluvial deposits which in Essex creates a more open 'heathy' landscape.	■ The chalk layer that underlies the London Clay in the west of the NCA is a main source of recharge for the principal aquifer supplying London. ■ London Clay has traditionally been used as pastoral lands due to its poor quality soil but with developments in farming such as use of fertilisers and improved ploughing methods and a drive for self-sufficiency after the Second World War caused this area to develop into arable farming in the 1950s. ■ Almost 60 per cent of agricultural land is Grades 1 to 3 with the majority of the grade 1 and 2 land in the 'heathy' areas of Essex. ■ From 2000 to 2009, the dominant agricultural land use was cereal production (43 per cent) and grass and uncropped land (29 per cent) as fits in with the soil types in this area. The areas of cereal grown decreased by 6 per cent and grass and uncropped land decreased by 7 per cent. These have probably been replaced by oilseed, stock feed and other arable crops as these increased during the same period.

Landscape attribute	Justification for selection
A varied pattern of woodlands across the area including considerable ancient semi-natural woodland.	■ Woodlands help to maintain the distinction between urban and rural areas by filtering views and helping to visually contain the extent of individual settlements. ■ Many areas of larger woodland offer key recreational resources. ■ Overall woodland covers 6 per cent of the area (15,488ha.) which understates the influence of woodland within this NCA and its very high recreational value. Reflecting this, the NCA includes the areas of two Community Forests – Watling Chase (Hertfordshire) and Thames Chase (east of Ilford and Romford and south of Brentwood) which now form part of the Green Grid of the Thames Gateway. ■ The pattern of woodlands is varied across the area. The eastern part in Hertfordshire is heavily wooded both on the plateaux and in the river valleys including the Broxbourne Wood complex as are the Bagshot hills and ridges of Essex. ■ Other areas within the London Clay lowlands and Essex heathlands are more open in character although woodland is found in areas of now derelict plotlands, in the remnant shelterbelts around Colchester, on the well-wooded hills around Laindon, Hockley and Rayleigh and in the river valleys of the Essex heathlands. ■ Nearly half of the remaining woodlands are ancient semi-natural (2.4 per cent of the area) and a further 0.7 per cent is made up of planted ancient woodland sites (PAWS) including past lime woods within Hertfordshire. The ancient semi-natural woodland is a distinctive feature of much of the area, dominated by hornbeam coppice with oak standards, as in the Broxbourne woods complex of Hertfordshire. These ancient woodlands are of high nature conservation value and include the Epping Forest SPA (1,700 ha) and the Wormley-Hoddesdon Park Woods (336 ha). Priority habitats include 2,500 ha of wet woodland and 1,900 ha of lowland mixed broadleaf woodland. ■ Woodlands in the area include Epping Forest and Wormley-Hoddesdon Park Wood both of which are Special Areas of Conservation (SAC) and also Broxbourne Wood which is a National Nature Reserve (NNR). ■ They are a haven for wildlife in a heavily urban and agricultural environment, allowing a more diverse species population to continue in this area, for example the BAP priority species, the dormouse, has good populations in the woodlands of the south Essex area and along the Essex hills and ridges.

Landscape attribute	Justification for selection
Significant areas of remnant wood pasture and pollarded veteran trees, including Hainault Forest, Thorndon Country Park, Wormley and Hoddesdon Great Park, and Epping Forest, comprising a distinctive ecological habitat and recreational resource.	■ Wood pasture was once a dominant feature of this NCA providing the interlinking fabric between the wooded and open commons and areas of ancient woodland in the Essex wooded hills and ridges and the Essex heathlands. It was a characteristic of the Royal Hunting forests of the area as still preserved within Epping and Hainault forests within the Essex wooded hills and ridges. This is a particularly important habitat and landscape asset having suffered a dramatic reduction in area over the last century as sites have been lost to development, agricultural intensification and recreational development – especially as golf courses. ■ The ancient pollards provide local oases of species richness for lichens. This is especially where old forest species have survived in undisturbed pockets of woodland (with the surrounding woodland buffering the ancient pollards from the damaging effects of air pollution) and where old exposed trees are set in undrained, unploughed valley parkland. Management by pollarding over the centuries has produced boles of increasing age and decay, which provide the habitats vital to deadwood feeding invertebrates as well as bats.
Field patterns are very varied across the basin reflecting historical patterns.	■ Informal patterns of enclosure from the 18th century or earlier reflect the medieval colonisation of the heaths and woodlands and are common in the Hertfordshire plateaux and river valleys and Essex wooded hills. ■ Within the London Clay lowlands regular Roman planned enclosures are a subtle but important feature to the east of the area. In the Essex heathlands 18th and 19th century enclosures of heathlands and commons followed by extensive 20th century field enlargement is dominant. ■ These features represent the long history of human settlement in the area and it gives an historical character to the area that can be promoted and maintained in future developments. ■ In many areas a scattered appearance of settlements creates open views of the landscape and gives a sense of place. ■ The tradition of enclosures gave rise to the use of hedgerows as boundaries. Although many are now gone due to the change in recent years to larger field farming they can still create important habitats for many species and connect fragmented habitats to provide connectivity throughout the landscape.

Landscape attribute	Justification for selection
A series of river valleys draining south to the Thames and east to the North Sea/Thames Estuary, including the Ver, Colne and Lea in Hertfordshire, and the Roding, Wid and Chelmer, Roach, Crouch and Blackwater in Essex.	■ River valleys are a prominent and distinctive feature; cutting into the clay lowlands they often intimate pastoral character contrasting with the more open arable land surrounding. ■ Many contain remnant flood plain wetlands and new wetlands created both through gravel extraction as in the Lea Valley and through the construction of reservoirs. ■ Much reduced in extent, the NCA still includes some 5,100 ha of wet woodland, 2,500 ha of coastal and flood plain grazing marsh and 300 ha of fen. SPAs associated with wetlands include Abberton Reservoir, the gravel pits and reservoirs of the Lea Valley, and parts of the estuaries of the Crouch and Roach, Blackwater and Essex Colne. ■ Many river systems have been adapted to cope with urban development affecting their ecological status so future work through the Water Framework Directive will have the challenge of improving these sections of river. ■ Recent work to improve the chemical and biological status of the rivers has resulted in their improvement and work is continuing to maintain and improve their status further. ■ This area includes 4 Ramsar sites which provide habitats for over wintering birds as well as various important plant and invertebrate species. Some of the species found in these sites are internationally important and British Red Data Book species.
A rich heritage of geological, archaeological and historical evidence chronicling past landscape and climate change, human settlement and activities within this landscape since the prehistoric period, that have all helped to shape the landscape of today.	■ Characteristics of the landscape today links to historical settlement patterns such as the scattered arrangement of villages and hamlets surrounded by dispersed farming settlements. ■ After the Anglian glaciations the area - particularly the Thames and its tributaries - was occupied at times by early humans, with flint artefacts found at many sites throughout the London Basin. ■ Field boundaries are dominated by informal enclosure patterns of the 18th century surrounded by thorn hedgerows which have become patchy over time due to enlargement of the fields after the Second World War and lack of management. ■ Interspersed throughout the landscape is evidence of Roman occupation including the origins of towns such as Colchester (the largest Roman city in Britain), St. Albans and Welwyn and roads such as the A12 as well as the East Coast mainline railway. ■ During the 16th, 17th and 18th centuries the growth of London's importance had an influence which resulted in the development of market towns and also rural estates and country houses created by London merchants. This particularly impacted on the Hertfordshire area.

Landscape attribute	Justification for selection
A mixture of priority habitats, the most abundant being woodlands (wet and lowland mixed deciduous), and coastal and flood plain grazing marshes.	■ Wet woodlands are the largest priority habitat found in this area with the majority present in south Essex and Hertfordshire. A large area of this woodland type is found in the Waltham Abbey/Loughton area of Essex. ■ The lowland deciduous woodlands are the second largest habitat and are found most abundantly in the Essex heathland area and in Hertfordshire. ■ Coastal and flood plain grazing marshes are the most abundant habitat after woodlands and they are found evenly distributed over the whole area except for London. ■ Habitats found within the London area are small patches of reed beds, lowland meadows and fens. On the very edge of this area are also wet woods and lowland heaths. ■ As the greatest amounts of habitats are made up of those reliant on water, how water is used and preserved in this area could have a huge impact. ■ These habitats are now rare as a consequence of agricultural land drainage, gravel extraction and landfill and river valleys providing the routes of transport infrastructure and power lines (much evident in the Lea Valley).
A significant complex of designed parklands, especially in Hertfordshire, with their mature parkland trees.	■ Within Hertfordshire, the 16th, 17th and 18th centuries saw the growth of rural estates and country houses for London merchants. The landscape parklands surrounding these houses are a particular feature of the area, such as the grounds of Brockett Hall near Welwyn and Hatfield House. These extend the character and habitat of remnant wood pasture.
A number of distinctive landscapes captured in the arts through the centuries.	■ Landscape settings for the arts include Epping Forest and Dedham Vale (on the Stour in the very north-east of this NCA), the setting for Constable's painting the Hay Wain. ■ The Hertfordshire countryside was also the setting to E. M. Forster's book, Howards End.
Important Tertiary and Quaternary deposits, the latter demonstrating the close inter-relationship between geological history and human development.	■ Exposures of Tertiary sedimentary deposits reveal fossil remains at a number of SSSI within the NCA. The fluvial Quaternary sediments deposited by the Thames river system before the Anglian glaciation occur predominantly along the northern edge of the London Basin, while sediments deposited after the Anglian glaciation are found along the flood plains of the current rivers, including the Thames and Lea. ■ The youngest sediments are sands and gravels deposited by the Thames in its current location since the last ice age. These deposits also preserve a record of past landscapes and climates. ■ Archaeological artefacts found in these Quaternary deposits assist in deciphering our human history with evidence of some of the earliest human occupation.

Landscape attribute	Justification for selection
Providing comparatively undeveloped countryside on the very edge of London, accentuated by its well-wooded and prominent hills and ridges, particularly on the Hertfordshire plateaux and the Essex wooded hills.	■ The comparatively undeveloped nature of the countryside is felt by residents to be one of the over-riding characteristics of this disparate landscape. ■ It is both a product of the Metropolitan Green Belt that has restricted the coalescence of settlements over much of the NCA and the medieval origins of parts of the landscape that, in the main, has created a relatively enclosed and intimate 'bosky' landscape with development off the higher plateaux. This characteristic tends to contain the visual influence of development in parts (but not all) of the NCA.The NCA provides easily accessible countryside both to the large and growing population of the NCA and that of north London, serving a population in excess of 4 million.
An area of mixed farming, with arable land predominating on the Hertfordshire plateaux, parts of the London Clay lowlands and the Essex heathlands, and grassland often characteristic of the river valleys, while orchards and horticulture are found on the lighter sandy soils of past heathland.	■ Differences in agriculture reflect the underlying soils with arable, up until the post Second World War years, associated with the lighter soils of the Hertfordshire plateaux and the Essex heathlands. With agricultural improvements and under-drainage, arable production has spread into the London Clay lowlands and some river valleys, although since 2000 there has been a slight increase in the areas under grassland and a slight fall in the areas under arable and horticulture. ■ Orchards and horticulture are found on the lighter sandy soils of past heathland north of Colchester in the Essex heathlands and in parts of the Essex wooded hills and ridges.
A varied field pattern reflecting historical evolution with hedgerows and hedgerow trees once a common feature contributing considerably to the enclosed and wooded character of the Hertfordshire plateaux and river valleys and the Essex wooded hills and ridges, while some strong hedgerow patterns remain in the London Clay lowlands and the Essex heathlands.	■ Roman grid field divisions are still evident on the Dengie Peninsula while medieval and later informal enclosures are characteristic of the Hertfordshire plateaux and river valleys and parts of the Essex wooded hills and ridges, and river valleys elsewhere. ■ Parliamentary enclosures are more characteristic of the Essex heathlands and London Clay lowlands. ■ Across much of the area hedgerows were characteristically thick with a large population of hedgerow elms that have been lost in the last 40 years to Dutch elm disease, significantly opening up the landscape.

Landscape opportunities

- Protect and enhance the character of 'undeveloped' countryside on the edge of London, much assisted by significant areas of woodland cover, which retains a strong sense of tranquillity and aids the retention of a clear distinction and separation between different settlements.

- Protect the overall agricultural diversity of the wider countryside with areas of arable, intensive horticulture and pasture, encouraging sustainable management to protect agricultural soils and enhance farmland biodiversity.

- Protect the underlying dispersed medieval settlement pattern characteristic of much of the NCA with attractive hamlets and villages with their distinctive vernacular, (including timber-framed houses often with timber weatherboard and small parish churches with timber spires and shingle cladding) important historic towns (including Colchester and St Albans - Verulamium) of Roman origin, and the more recent garden city of Welwyn and the plotlands of the 1920s and 1930s.

- Protect and appropriately manage the rich archaeology of the area including buried archaeology, iron-age hill forts and the sites of abandoned prehistoric settlements (especially found on the Hertfordshire plateaux and Essex heathlands), and the rich heritage of designed parklands associated with estates of Hertfordshire and Essex, while also conserving landscapes linked to the arts – most notably Dedham Vale, the inspiration for the painter, Constable.

- Protect and appropriately manage important exposures of the Tertiary and Quaternary sedimentary deposits with the latter demonstrating the close inter-relationship between geological history and human development.

- Manage and significantly reinforce the distinctive and varied hedgerow pattern with medieval enclosures contributing to the enclosed and wooded character of the Hertfordshire plateaux and river valleys, the Essex wooded hills and ridges and river valleys elsewhere. Replace lost hedgerows to reinforce field pattern in the Essex heathlands and London Clay lowlands. Significantly increase the population of hedgerow trees that were once a common feature across the NCA before the onset of Dutch elm disease.

- Manage and significantly expand areas of remnant wood pasture that was once a dominant feature of this NCA, providing the interlinking fabric between the wooded and open commons and areas of ancient woodland and royal hunting forests in the Essex wooded hills and ridges and the Essex heathlands. Re-link remaining fragments of wood pasture where possible and create new areas where this can contribute to enhancing recreational opportunities and biodiversity and can provide appropriate restoration of past mineral workings.

- Manage, restore and re-link areas of remnant lowland heathland found on areas capped by glacial sands and gravels, notably within the Essex heathlands and Essex wooded hills and ridges sub-areas, through localised restoration of agricultural land, conversion of conifer plantations and the sympathetic management of recreation facilities, especially golf courses.

- Manage, restore and significantly expand the wetlands of the river valleys of the NCA including wet grassland, valley woodlands, flood plain woodlands, non-coastal grazing marsh, fens, rush pasture, swamp and valley mires which, with their high water tables are important sites for over-wintering wildfowl, adding significantly to biodiversity and landscape character. Restore river valley minerals sites to wetlands and washlands and seek

opportunities to restore the natural geomorphology of rivers where this will significantly enhance their biodiversity and landscape contribution, including the conservation and planting of a new generation of riverside willows.

- Manage water quality impacts to the principal chalk aquifer by implementing land management practices to reduce sources of pollution, and to improve recharge.

- Plan for a significant expansion in the woodland cover of this NCA, conserving and re-linking areas of ancient woodland, bringing enhanced landscape structure to the open landscapes of the NCA, and providing new woodland as a recreational resource close to settlements. This will provide a means of creating a clear division between expanding settlements, building on proposals for the Green Grid and of the Community Forests of the area, and through the restoration of mineral workings, potentially providing a mosaic with wetland habitats.

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	Fertile soils Climate	53 per cent of land use in this area is arable, mainly wheat and oilseed rape, but in addition to this there are sizable flocks of sheep grazed on the land with an estimated 18,800 breeding ewes in 2007. The most fertile soils are found in the river valleys of Hertfordshire and Essex heathlands with the majority of Grade 1 and 2 agricultural land found in the latter. In the London Clay areas improvements in knowledge and technology over time has allowed this poorer quality soil to be used for arable but it is also used as pasture land too which is its traditional use.	Regional	Arable farming is a major industry within the area and provides a significant food resource. Farming can have an impact on the surrounding environment especially in terms of water availability. Demands for water in the area are high due to the size of the local population so extraction of water for irrigating crops can create an added pressure on this limited resource. Crop type and the cultivation techniques may need to be modified in coming years to increase drought resilience and reduce diffuse pollution. The sandy soils of the Essex heathlands and the Essex hills are susceptible to erosion on slopes and in dry summers to wind erosion. Climate change predictions indicate that summers will become longer and drier and this will create many challenges of farming. Careful crop selection and cultivation may be required in response to reduced water availability and as a means of reducing soil erosion as conditions become hotter and drier.	Manage the landscape to retain the value of food provision, employing sustainable farming practices to increase the value of other ecosystem services including biodiversity, water availability, and soil and water quality. The uptake of agri-environment schemes will help to achieve this.	**Food provision** **Regulating soil quality** **Water availability** **Regulating water quality** **Regulating soil erosion** **Sense of place / inspiration** **Sense of history** **Biodiversity** **Geodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Timber provision	Conifer plantations planted on previous lime woods in Hertfordshire Semi –natural woodlands (ancient, wet and deciduous woodlands) Recreational woodlands	Coniferous plantations (0.7 per cent of the area) and woodland cover as a whole makes up only 6 per cent of land use. Many of these woodlands have evidence of previous management through coppicing and pollarding going back several hundred years where the wood was used for fuel and building materials. Management today is patchy or non-existent reflecting the declining trend of woodland management since the Second World War but the opportunity remains to reinstate this management. Within the area there are two community forests; Watling and Thames Chase, which are currently managed as recreational areas for the heavily urbanised areas around London. They represent large areas of potential timber resource.	Local	Although woodlands only make up a small proportion of the area they are one of the largest BAP priority areas and are important for wildlife and biodiversity. Commercial timber provision is relatively small scale but the woodland area provides an important role for carbon sequestration and as a recreational resource. They also provide a sense of tranquillity and preserve the landscape character. Timber production gives the opportunity to expand habitats and the biodiversity associated with woodlands. Coppicing in selected areas of the woodland has potential to increase the overall biodiversity of the habitat, improving conditions for many species of invertebrates, birds and mammals. Expansion of the forest area would not only increase timber availability but also help to increase climate change regulation, as woodlands offer one of the most effective means of carbon sequestration within this landscape. If woodlands are to be expanded then it is important that other key habitats are not damaged in the process, for example planting on existing heathlands, species rich grasslands and wetlands. It is important to consider the land which is most important in terms of food provision when considering woodland expansion along with historical and geological features.	Seek opportunities to increase woodland management and return existing woodland to active management where this will benefit timber provision, the landscape and biodiversity. Recreational woodlands should be managed and extended to include timber provision. Other opportunities that would support the creation or expansion of woodlands should also be secured in appropriate locations.	**Timber provision** **Biodiversity** **Recreation** **Biomass energy** **Climate regulation** **Sense of place / inspiration**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability	London Basin Chalk aquifer Extensive network of rivers Expansion of Abberton Reservoir	The west of the NCA is underlain by an extensive chalk outcrop of the principal London Basin Chalk aquifer, which provides the main source of water for London. Recharge of the aquifer largely occurs from the chalk outcrop as water flows underground to London from the Chilterns[4]. The aquifer is extensively abstracted for public water supply, both within the NCA and Inner London. Currently there is no groundwater available for extraction in the western section of the NCA but water is available around the River Lee and M11 areas[5]. In the east the groundwater is over abstracted so the central area is the only place that has surplus water available. There is an attempt to address this by the use of reservoirs and attempts to expand them where possible as has recently been done in Abberton, Essex. With recent trends of drought weather in summer there has been increasing pressure on water systems in the area with rivers and groundwater being over abstracted which causes major problems to natural habitats and the species that they support. **Continued over...**	Regional	Meeting the large demand for potable and irrigation water in this area is a big challenge and one that needs to be addressed to meet the needs of an expanding population and the impacts of climate change. The west of the NCA also provides the main source of water for Inner London through recharge to the principal aquifer, and as such land management practices within this area will have major impacts on the availability of water in the confined chalk under London. Urban areas are continuing to expand and new housing estates are created within the more rural areas increasing the local demand for water supply. Many of these houses will have gardens further increasing demand for water especially in the hotter months when demand is already high. Current management of arable land often involves using drains to remove excess water from fields into nearby water systems to prevent water logging. This enables nitrates and pesticides to enter the water system and also removes water that maybe needed when conditions become drier. **Continued over...**	Work with land managers to improve land management practices, such as increasing soil organic matter and reducing soil compaction, to improve infiltration and aid aquifer recharge. Ensure the sustainable management of the principal chalk aquifer through catchment-wide integrated water management policies. Secure measures to reduce water wastage in the home and commercial enterprises by using rainwater recycling measures and promotion of drought resistant planting schemes including in domestic gardens. Work with land managers to put in place storage measures to help meet their water demands in drier periods. Similar measures should be encouraged on recreational sites such as golf courses. Measures to reduce wind evaporation on fields particularly in drier periods, such as the through planting of hedgerows, should be encouraged. **Continued over...**	**Water availability** **Regulating water quality** **Regulating soil erosion** **Biodiversity** **Geodiversity**

[4] *Management of the London Basin Chalk Aquifer – Status Report*, Environment Agency (2012) https://publications.environment-agency.gov.uk/skeleton/publications/ViewPublication.aspx?id=e068d7b0-7eb2-4461-b5d7-07dc3be75c28

[5] *London Abstraction Licensing Strategy*, Environment Agency (Feb 2013) http://www.environment-agency.gov.uk/business/topics/water/132669.aspx

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability continued		**...continued from previous** Due to large demand for water for this area, in extremely dry summers water has needed to be obtained from outside of the area to meet these demands. This is supplied by the rivers in the Norfolk area which feed into the Ouse Groundwater system and transfer water to the Abberton Reservoir. Therefore the requirement for water within this area also has an impact on other NCAs including the Brecklands. Predictions of the impact of climate change on water availability expect that there will be shorter winters with increased precipitation and longer summers with reduced precipitation, therefore future planning will need to consider how water availability will be affected.		**...continued from previous** During drier conditions, this area cannot meet the high demand for water from its own supplies and relies on supplies being met from groundwater aquifers in Norfolk. Predicted future weather patterns indicate that summers will be longer, dry and hotter suggesting demands for water during these months will increase. Relying on water supplies from surrounding areas will not be sustainable in the long term as the pressures on these areas for water are also likely to increase. The area needs to become more sustainable in regards to its water use but this becomes increasing difficult with continuous demands for new housing. As demand increases reservoir capacities will be insufficient requiring increased capacity. Abberton Reservoir in Essex has recently been expanded to meet growing demands and work has been accomplished without impacting significantly on the wildfowl that use this important Ramsar site.	**...continued from previous** Promote the planting of drought tolerant crops. Encourage land managers to allow natural flooding to help restore wetlands helping to store water in wetter periods; increasing water availability during drier months while limiting over abstraction.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Genetic diversity	Orchards with heritage species of fruit trees including rare species Local breeds of pig, cattle, sheep, goat, horse and pony	Traditional orchards are still in existence but in a poor state and are declining. The decline in Essex has been significant. There are many local varieties still grown including a very old variety dating back to 1785 (the D'Arcy Spice apple). There are rare breeds of cattle, pig, sheep, goat, horse and pony that are still likely to be found in small numbers.	Local	Many orchards have been neglected or destroyed, but efforts are underway to protect these habitats and prevent further losses. The preservation of the different types of orchard fruit is important to retain the genetic diversity of food crops. Increased genetic diversity affords an increased ability to respond to climate change and disease. Some varieties of apples are still sold in the area but on a small scale such as in farm shops or markets.	Return existing orchards into active management. Establish new orchards using traditional varieties of fruit trees and encourage local markets for the produce.	**Genetic diversity** **Food provision** **Biodiversity** **Sense of history** **Sense of place / inspiration** **Pollination**
Biomass energy	Woodland management (coppicing / felling) Growth of miscanthus Short rotation coppice (SRC) using willow and poplar	Woodlands only make up 6 per cent of the area with an additional 12 per cent of community woodland. Management of the woodlands in the area is low and has rapidly decreased since the end of the Second World War. In 2013 there was only one area in Hertfordshire growing energy crops.	Local	In terms of woodlands being used as a biomass resource the current area is relatively small and under-managed but there is potential to increase capacity provided management enhances the health of the woodland habitat. The majority of this area has been highlighted as having a high yield potential for both miscanthus and SRC but a balance has to be struck between the need for this crop and the need for food production. It is also important that existing habitats are not destroyed to meet the demand for energy.	Secure the management of existing woodlands and establish the opportunity for woodland creation in appropriate locations for biomass production. Evaluate the potential to grow miscanthus and the short rotation coppice as sustainable source of biomass where appropriate.	**Biomass energy** **Biodiversity** **Regulating soil erosion** **Pollination** **Regulating water quality**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation	Field boundaries – hedgerows Woodland Heathlands (small contribution) Soils (limited contribution) Unimproved grasslands	Over 50 per cent of this area is arable land which is not the optimal form of land management for carbon sequestration (storage) as soil disturbance often results in the release of carbon stored in the substrate. The presence of hedgerows and woodlands in the area helps as these habitats are good carbon stores. Heathland and grassland habitats also help with carbon sequestration and storage.	Regional	Woodland habitat can perform an important role in carbon sequestration but the woodland habitats in this area are currently small in extent so their impacts in reducing carbon levels are limited. Hedgerows are also a feature of the landscape but over time many have been removed to make way for larger fields as farming practices have changed. The most extensive land use in the area is agriculture. It is important that the arable cultivation techniques employed do not deplete soil carbon levels further. Careful cropping techniques, the use of cover crops and measures to actively increase the organic content of soils could enable increased carbon sequestration within some areas of the NCA. The relatively high levels of organic matter in the soils within wetland habitats also helps with carbon storage but again these habitats only make up a very small part of the overall landscape.	Support woodland and tree planting and enhance the hedgerow network to enhance landscape character and improve carbon sequestration by for instance expanding woodland edges into improved grassland and reinstating hedgerow field boundaries. Promote the planting of trees and hedgerows within new developments. Encourage measures to reduce tillage and increase the planting of cover crops and the organic matter within the soil. Secure opportunities to improve heath land and grassland management by reducing cutting and over grazing.	**Climate regulation** **Food provision** **Regulating soil quality** **Regulating soil erosion** **Biodiversity** **Biomass energy** **Water availability** **Sense of place / inspiration** **Sense of history** **Geodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality	Rivers Wetlands Woodland Hedgerows	Groundwater status is poor in much of the NCA, although it has been classed as good in large parts of the underlying Chalk beds that provides the main source of recharge for the principal chalk aquifer[6]. The current ecological status of the rivers shows that the majority of rivers are of moderate status and only part of the River Lee was found to have good ecological status. Several rivers were found to be poor including the rivers Chelmer, Hanningfield and parts of the River Rib, the Stort and Lee. The River Ver and the Cobbins Brook were found to be in bad ecological status. The majority of the failures are associated with either poor morphology and/or pollution.	Regional	High population densities within the NCA put pressure on water quality through discharges from sewage treatment works and diffuse pollution. Growth and regeneration of urban areas will be increasing demands on the water resource but also present an opportunity to make improvements to the water environment. Diffuse pollution from agricultural areas is also a major pressure on the water environment in the NCA. Aquifers supply 40 per cent of the drinking water and supply flow for rivers and wetlands within the area. Safeguarding supplies and the environment by protecting groundwater from pollution is essential. The majority of rivers are classified as having moderate ecological status or lower mainly due to high levels of phosphates effecting the biological systems within the river. High levels of phosphates can have detrimental impacts on the ecology of rivers and other water bodies by reducing the amount of available oxygen within the water which in turn can reduce the diversity of aquatic plants, invertebrates and fish. **Continued over...**	Implement catchment-wide water management plans to ensure a coordinated approach to reducing the impacts of pollution. Ensure local development plans include the sustainable management of water resources and promote measures to reduce adverse impacts on water quality in the future, including the use of sustainable drainage systems (SuDS), sewage treatment options and reducing nutrients from diffuse pollution. Reinstate natural water filters such as reed beds, tree lines, hedgerows and grass verges to help filter surface water run-off from roads, gardens arable fields and other areas before surface run-off enters watercourses. Improve the morphological features of the rivers, including urban rivers to help reinstate natural biological processes to help maintain and improve surface water quality. **Continued over...**	**Regulating water quality** **Biodiversity** **Food provision** **Regulating soil quality** **Geodiversity**

[6] *Thames River Basin District Management Plan*, Environment Agency (Dec 2009). Accessed March 2013 at http://www.environment-agency.gov.uk/research/planning/125035.aspx

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality continued				**...continued from previous** There are chemical failures in local rivers which are likely to be related to run-off from roads in the urban areas. The loss of morphology within many urban rivers has reduced natural processes that would otherwise help to maintain and improve water quality. The loss of morphology and increased pollution impacts on the numbers of fish and invertebrates. Efforts are being made to reduce the levels of agricultural fertilisers, pesticides and herbicides and the introduction of new technology, such as precision farming, will further help to reduce levels of chemicals entering the water system. Semi-natural habitats play an important role in filtering surface water run-off before it enters watercourses. Reed beds and wetlands are good examples but tree lines, woodlands, hedgerows and grass verges will also play a part in reducing the levels of chemicals that can enter water systems. Many of these habitats are only found in small fragments across the area and are absent from many locations where they would have the most value.	**...continued from previous** Work with land managers to continue to use new technologies and techniques in farming that reduce the levels of fertilisers, herbicides and pesticides used on land which will not only reduce the levels of contaminated run-off entering water systems, including the principal aquifer, but also improve the productivity of farming.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow (flooding)	Flood plains Wetlands Woodlands Grasslands Rivers Reservoirs	Much of the Essex area of the NCA is at low risk from flooding, however there are some parts that are at higher risk. The rivers Colne, Chelmer and Crouch present the greatest flood risk in the area and will mainly affect Colchester, Maldon, Basildon and Wickford. There is also the possibility that the two large reservoirs in the area (Abberton Reservoir and Hanningfield Reservoir) could have future flood risk potential and could affect surrounding areas. In the London and Hertfordshire areas of the NCA the main risk of flooding arises from the River Lee. The levels of development on the flood plain are very high in the North London area, which will increase the risk of flooding of properties in the area. This risk reduces in the Hertfordshire area but some risk still exists. The urban areas in the NCA face increased surface water flooding risk. The areas most likely affected are London and its suburbs, Southend and Thurrock. There is also potential for coastal flooding in some areas as sea levels rise; the places most likely to be affected are Harwich, Rayleigh and Southend.	Regional	The rivers in the area that are most likely to present flood risk are the rivers Lee, Colne, Chelmer and Crouch. Areas close to these rivers have an increased risk of flood damage to land and property and this problem is increased in urban areas especially when the flood plain has been heavily developed. London areas are most effected by flood plain development and it has been accepted that previous measures to reduce risk of flooding (straightening of rivers) is no longer suitable and cannot mitigate the effects of climate change. Upper reaches of the Lee in Hertfordshire also have an increased risk of flooding as the flood plains here are wide and flat so properties nearby face increased flood risk. There are many reservoirs in the area and these may help to alleviate some pressure by storing water during high rainfall events. There is only a small area of the NCA which is near the coast. Parts of Harwich, Rayleigh and Southend are near enough to put them in potential danger of increased flooding if sea levels continue to rise.	Opportunities to reinstate areas of active flood plain through development designed to adapt to and deal with current and future flood risk, should be secured when developments occur in or close to flood plain areas. Secure opportunities to expand or create areas of semi-natural habitats such as woodlands (particularly wet woodlands), flood plain grazing marshes, reed beds and grasslands to increase soil infiltration helping to alleviate flood risk. Consider the use of existing and newly created semi natural habitat to act as buffer zones to protect existing development and important arable land from flooding. Flood storage schemes may need to be put in place where flood defences will be difficult to implement and opportunities to incorporate constructed storage (reservoirs) with natural storage (semi-natural habitats) should be explored and secured.	**Regulating water flow** **Water availability** **Regulating water quality** **Pollination** **Pest regulation** **Sense of place / inspiration** **Sense of history** **Tranquillity** **Biodiversity** **Geodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil quality	Agricultural land Semi-natural habitats	There are 7 main soilscape types and these are; slowly permeable seasonally wet, slightly acidic but base rich loamy and clayey soils (48 per cent of NCA); slightly acidic loamy and clayey soils with impeded drainage (19 per cent); freely draining slightly acidic loamy soils (14 per cent); loamy soils with naturally high groundwater (7 per cent); slowly permeable seasonally wet acid loamy and clayey soils (4 per cent); lime rich loamy and clayey soils with impeded drainage (2 per cent); and loamy and clayey flood plain soils with naturally high groundwater (2 per cent). The most common soil type that makes up 48 per cent of soils in the area could suffer from compaction and capping as it is more prone to damage when wet. The second most common soil type that makes up 19 per cent of soil is at risk from poaching from livestock and compaction from heavy machinery and top soil of weak structure can easily be damaged so activities should be carefully timed to prevent compaction within the soil. The soil type that makes up 14 per cent of the NCA has the potential to increase its organic matter content with the correct management.	Local	The main soils in this area are affected by compaction in wet conditions that can result in poor water infiltration into the soil and increased overland run-off, which is likely to increase diffuse pollution into associated water courses. The acid loamy and clayey soils (19 per cent) are easily poached by animals and compacted by machinery so careful management of these soils is required to prevent damage. Slightly acidic loamy soils (14 per cent) are an important resource as there is potential to increase organic matter levels which can help with the recharge of the underlying chalk aquifer helping to improve water availability in this NCA and beyond. Reduced organic matter is the main risk to all soil types. Increasing organic matter in soils will afford an increased ability to store nutrients and water and will increase storage of carbon. Reducing the effects of compaction of soil will help to solve many problems faced by land management at present and in the future. Careful management of soils is needed to prevent compaction, which not only damages the structure of the soil, but also prevents water infiltrating the soil, resulting in increased rates of overland run-off entering water courses. Management practices could be adapted to help improve soil quality, which could help to increase agricultural yields in the long term.	There are opportunities to change practices and manage the soil in a way that increases organic matter. Seek to reduce compaction of soil, by using agricultural equipment with a low ground pressure during periods of wet weather and managing livestock to reduce the risk of poaching. Consider establishing continuous vegetation cover where high risk crops are currently cultivated in high risk locations where these are associated with high rates of diffuse pollution.	**Regulating soil quality** **Food provision** **Regulating soil erosion** **Regulating water quality** **Water availability** **Climate regulation** **Geodiversity** **Biodiversity** **Sense of place / inspiration**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion	Semi-natural habitats Hedgerows and trees Woodlands	Most soils in this area are at low risk of erosion but some soil types (21 per cent) are affected by compaction in wet conditions that can damage the soils structure, reducing the amount of water that can be absorbed by the soil. This can lead to increased overland run-off that can lead to erosion of the soils surface. The soils found in the Essex heathlands and Essex hills and ridges are at risk or erosion on sloping land, especially when left exposed, and this risk increases in soils with low organic matter.	Local	In general, the soils in the area are at low risk of erosion. Where they are at risk is where the soil is of the best quality and of value for food production. Exposed soils are at risk of water and wind erosion and reduced organic matter content. Poaching can be an issue in some areas resulting in direct erosion and compaction which damages the soils structure and subsequent erosion. Heavy machinery could also be an issue in this instance requiring effective management to reduce damage. Wind erosion may have an effect in some instances where the soil is comprised of fine material and unsheltered by trees and hedgerows.	Water erosion can be reduced by increasing organic matter in the soil and ensuring that bare soils are kept to a minimum. Areas affected by wind erosion will benefit from the introduction of hedgerows and tree lines to act as wind breaks. This can also help with water erosion by reducing the effects of overland run-off. Careful management decisions should be made, especially during wet conditions, to reduce the effects of compaction from livestock and heavy machinery.	**Regulating soil erosion** **Food provision** **Regulating soil quality** **Regulating water quality**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pollination	Semi-natural habitats especially hedgerows and grasslands/field margins Orchards	At present this area has the required habitats to aid pollinators but the areas are very small and fragmented so this limits the numbers of pollinators that can be supported. Pollination is needed for oilseed rape and this is one of the main crop types grown in the area so pollination is a big part of the NCA as more than 50 per cent of the area is agricultural land and a large percentage of this is arable.	Local	The semi-natural habitats required for pollinators are small and fragmented throughout the landscape but pollinators could help to improve the yield of some crops grown here. It is likely that land managers have compensated for this by importing bumblebees commercially; however, stricter regulation on the introduction of species from outside the UK is likely to make this practice more difficult in the future. Practices that encourage pollinators have been adopted by many and with the help of agri-environmental schemes many landowners have been able to put aside land and manage it in a way that benefits wildlife in general. If the level of pollinators is to increase these steps need to go further by encouraging more landowners to set less valuable land aside to be given over to field margins and hedgerow planting and connecting habitats to expand the species range. This could possibly help to reduce the cost of food production by reducing or eliminating the need to import pollinators and could also help to expand the success of orchards. The extent of semi-natural habitat within the urban areas of the NCA is likely to have a limiting effect on the range and number of pollinating insectsalthough domestic gardens will support larger numbers.	Improvements could be made to semi-natural habitats by expanding their range where possible and connecting habitats by creating corridors that allow pollinators to expand their numbers and range. To engage more with landowners and give help and advice on the agri-environmental schemes available which can help to compensate for land lost to the creation of field margins and hedgerows. Help inform the wider community of the benefits that pollinators can offer in terms of food provision. Promote the importance of creating better habitats in urban areas by encouraging local authorities to adapt how they manage public land such as roadside verges, parks and other green areas, too allow areas to develop into grassland and wildflower areas, increasing the wildlife value of parklands while benefiting many pollinating invertebrates.	**Pollination** **Food provision** **Biodiversity** **Pest regulation** **Sense of place / inspiration**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pest regulation	Semi-natural habitats	As with pollinators this area has the required habitats to support the necessary invertebrate species but the habitats are small and fragmented limiting the density of the species that can live in the NCA as a whole.	Local	There are a variety of predatory invertebrate species that are found throughout the area which could help to limit the need for chemical control measures if found in greater numbers. As with the pollinators there are opportunities for landowners to adopt more sensitive management of land to encourage predatory invertebrates to expand their range and increase their populations. Measures could include putting aside less productive land to become grasslands/wildflower meadows and creating more field margins and hedgerows as boundary features. Many landowners already do this throughout the area but there is potential to expand this practice. The urban environment could also play its part in the creation of suitable habitats such as changing management regimes of roadside verges, parks and other green areas to provide for the needs of invertebrates and other wildlife, allowing them to use the urban environment to disperse throughout the landscape.	Secure opportunities to expand or create suitable semi-natural habitats and effectively manage to ensure they remain viable to support the species required, such as maintaining effective grasslands using suitable levels of grazing. Engage with local landowners and promote the benefits of agri-environmental schemes. Encourage local authorities in urban areas to adapt the management plans for public green areas, such as parks and grass verges, to be less intensive so suitable habitats for predator species can be available in these areas so their range and numbers can increase.	**Pest regulation** **Food provision** **Biodiversity** **Pollination** **Sense of place / inspiration**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of place / inspiration	Mixtures of urban area surrounded by an open undeveloped landscape Ancient woodland throughout the Hertfordshire plateaux and Essex wooded hills and ridges Grasslands, heathlands and fens Inspirational landscape of natural beauty, such as Dedham Vale	This area has a diverse appeal as it has a strong mixture of urban and rural. North and North West London forms part of this NCA which is much urbanised and heavily populated. Further north from London into Hertfordshire and Essex, the area becomes increasingly rural with development much more dispersed and patchy intersected by agricultural land, woodlands and hedgerows. The area has some large woodlands and important ancient woodland, with woodland a key feature of ridgelines and hills in parts, giving a strongly wooded character.	Regional	The mix or urban and rural is a key part of the character of this area and is a balance which needs to be managed as pressure for increased settlement and infrastructure development is high. Appropriately managing the woodland for its contribution to the landscape, but also for the habitats it provides and the recreation resource it offers the large surrounding population is important in this area. Woodland can be used to screen urban edges and offer green infrastructure links to the surrounding countryside. Ensuring the quality of the large areas of ancient woodland is maintained while accommodating recreation use will help protect this resource for the future. This landscape is highly valued by the surrounding urban populations for the opportunity to escape the hustle and bustle of London. Residents enjoy the ability to escape to the countryside or the coast, while not having to travel far from home. The diversity and quality of the rural landscape in close proximity to London, is strongly desired and needs to be retained if the area is to keep its character.	Maintain and enhance the balance of the urban and rural landscapes ensuring the character of the area's settlements is maintained in the rural areas and urban encroachment kept to a minimum. Conserve and enhance the rural urban fringe through the spatial planning process and through good design in new development. Protect and enhance the wooded character of the area, creating new woodland as appropriate on the urban fringes to screen settlement edges and provide habitat and green infrastructure benefits. Provide good recreational infrastructure while also protecting and managing habitats in the areas of ancient woodland to ensure the local community can enjoy the areas without detriment to the important wildlife.	**Sense of place / inspiration** **Recreation** **Tranquillity** **Sense of history** **Biodiversity** **Geodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history	Long settlement history including many Roman connections Traditional orchards and ancient woodland Archaeology	This area has a rich heritage and has historical evidence of settlement in the Hertfordshire, Essex heathlands and London areas dating back to the prehistoric along with palaeoenvironmental, Palaeolithic and archaeological evidence. There is a long settlement history in this NCA, being close to the City of London towns such as St Albans and Welwyn in Hertfordshire can trace their origins to the Roman occupation of the area and the NCA includes Colchester, the Roman capital city of Britain. The area has a strong natural history, evident within the remnants of traditional orchards and local fruit varieties and the ancient woodlands, such as Broxbourne Wood and Epping Forest, with their beautiful displays of bluebells and other wildflowers.	National	The presence of the City of London in close proximity to the NCA has helped shape the area as it is today. From the development of parklands and large country houses in Hertfordshire, that were developed by rich London merchants , to the criss-cross of roads, rail and waterways that have been created to connect London to surrounding areas and the country as a whole. The strong Roman history of the area is evidenced by the presence of Colchester and its castle which started out as a Roman temple and was rebuilt as the Norman castle seen today. The historical settlement pattern of the area remains in some places, which consist of dispersed hamlets and villages surrounded by farmland and farmsteads. Traditional 18th century hedgerow boundary markers still exist but have diminished extensively since the Second World War. There are more recent Second World War landmarks such as the many pillboxes scattered around the areas near the coast. Historical features are important visitor attractions and could help improve the local economy. Care should be taken that the attractions that bring people to the area are not destroyed in expansion projects to accommodate the influx of new residents and visitors.	Protect and promote the strong Roman history in the area, offering education and interpretation to highlight the importance of the area in Roman Britain. Promote the recreation and tourism potential available in the area which allows the local community and visitors to interact with centuries of local history. Use this resource to improve the local economy without damaging the character of the area. Manage the orchards and ancient woodland in good condition to ensure this resource, which has provided many generations with food and fuel, is maintained into the future.	**Sense of history** **Sense of place / inspiration** **Biodiversity** **Tranquillity** **Recreation** **Geodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Tranquillity	Semi-natural habitats Well-wooded areas Dispersed settlement patterns Agricultural landscape	According to the CPRE intrusion map (2007) this area is 32 per cent urban and 55 per cent disturbed leaving only 13 per cent of the area undisturbed. Owing to this, areas around large settlements have low levels of tranquillity but surrounding areas where agricultural land, woodlands and other semi-natural habitats dominate the tranquillity levels increase.	Local	Inward migration to the area has increased housing, infrastructure and in urban sprawl supported by improved transport links to London. This in turn has reduced the tranquillity of the area over time. Remote areas remain and the presence of woodland, especially the wooded hills and areas of ancient woodland, along with wider areas of agricultural use, has retained some degree of tranquillity.	Ensure the dispersed settlement character in some parts of the NCA is retained through careful design and location of new development. Promote the creation of woodland, hedgerows and other semi-natural habitats to help integrate future developments and infrastructure into the surrounding landscape.	**Tranquillity** **Biodiversity** **Sense of place / inspiration** **Sense of history**
Recreation	Country parks Historical sites Nature reserves Open access areas Strategic green infrastructure and walk networks Public parks Woodlands – Woods for People	This area has 3,084 km of public rights of way (at a density of 1.2 km per km^2) but only 5 per cent of the NCA is classified as publically accessible. The largest areas of publicly accessible land are Woods for People (3 per cent of the NCA), land within the Forestry Commission Walkers Welcome Grants (2 per cent), Countryside Right of Way Act Section 15 land (1 per cent-3,368 ha), country parks (1 per cent-3,261 ha) and Local Nature Reserves (1 per cent-1,907 ha). The designated sites allow people access to rare wildlife such as bats, water voles, otters, bluebells and various orchids as well other wildlife such as badgers, foxes and various types of birds, butterflies and invertebrate to enhance the visitor experience of wildlife and the natural environment. The reservoirs, canals and rivers are well-used for recreation and provide good green infrastructure links from urban to rural areas.	Regional	With such a large adjacent urban population, the access and recreation assets of this NCA are highly valued and highly used. There is a need to manage the resources so they do not become degraded, at the same time as promoting the opportunities to ensure they bring maximum benefit to a large number of people. The presence of many nature reserves and country parks offers the chance for urban populations to easily access open green space, bringing health and recreation benefits. Footpaths and trails are limited and dispersed but are found throughout the area. The All London Green Grid initiative contains a series of frameworks designed to deliver and improve strategic and local green infrastructure.	Improve access to the rural environment through new green infrastructure links, ensuring this is considered in the planning process and in any large scale conservation projects. Implement measure that engage adults and children in the design and use of local greenspace improve understanding of the natural environment and provide volunteering opportunities to increase experience with the natural world. Maximise opportunities through development and regeneration to help implement the All London Green Grid Frameworks.	**Recreation** **Biodiversity** **Geodiversity** **Tranquillity** **Sense of place / inspiration** **Pollination** **Pest regulation** **Climate regulation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity	Semi-natural habitats / BAP priority habitats Orchards Hedgerows Agricultural land	There are 14,593 ha of BAP priority habitats within the NCA which equates to almost 6 per cent of the land area. There are also 6 Ramsar sites, 6 Special Protection Areas, 3 Special Areas of Conservation, 2 National Nature Reserves and 72 SSSI (please note that some sites have more than 1 designation so there is some double counting within these figures). Many of the BAP habitats in the NCA are wetland sites so water is a necessity for these sites to remain viable.	National	There is a range of habitat types supporting a modest number of species. A significant barrier to increasing biodiversity is that the semi-natural habitats are small in extent, fragmented and under continuous threat of being destroyed through inappropriate management or the continued need to accommodate new development in the area. Appropriate active management of remaining semi-natural habitats should be accompanied by measures to increase the extent of key habitats and their overall connectivity within the landscape. This could enable healthy populations of important wildlife including dormice, bats, water voles and great crested newts to be retained within the landscape Some work is currently underway to apply a landscape scale approach to habitat connectivity and protection from outside pressures, such as development, pollution and water resources , connecting sites and enabling greater species dispersal. In some agricultural settings farmers are helping to improve biodiversity by managing land to create semi-natural habitats and allowing hedgerows and margins along field edges to remain uncultivated. These efforts are usually possible through the establishment of agri-environmental schemes that can compensate landowners for the loss of income associated with more intensive farming techniques. These measures provide a vital role in supporting biodiversity on a landscape scale.	Enhance, connect and expand semi-natural habitats to help improve biodiversity and make it more resililient to pressures for change. Continue to engage farmers in agri-environmental schemes, which will allow landowners to receive funding to continue to manage their land in an environmentally sensitive way.	**Biodiversity** **Sense of place / inspiration** **Sense of history** **Pollination** **Pest regulation** **Food provision** **Climate regulation** **Genetic diversity** **Tranquillity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Geodiversity	Geological SSSI Local Geological Sites Quaternary sediments allowing study into the formation of the Thames	There are 20 Geological SSSI with just over half in favourable condition and 3 Local geological Sites. These sites have been selected for their importance to the study of the formation of the local area and in some cases they contain rare examples of geological formation of regional and national importance. Many of these sites are in unfavourable condition but none are declining.	National	There is high demand for minerals nationally and some sites are still usebeing extracted. Many are now disused. Much of the evidence found relates to the formation of the local area, particularly the movement of the Thames south to its current location; some of the stratographical evidence has not only regional but national significance too. Much of the evidence relates to the Pleistocene period. Continuous pollen records have been found that give insight into periods of formation history as well as mammal, invertebrate and plant remains some of which are now extinct and others that are no longer native to Britain. This gives an insight into changes over time and how the local area and country as a whole has evolved. The most important sites in the area are now protected but many are listed as being in unfavourable condition. Many of these sites are still involved in ongoing research so it is important that they are preserved.	Ensure sensitive practices are employed in the ongoing extraction of mineral resources from the area. work to retain the value of the areas geological resource, promoting access and interpretation of important geological sites to increase understanding of the local history and geology of the area.	**Geodiversity.** **Recreation** **Sense of place / inspiration** **Sense of history**

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