National Character Area profile:

78. Central North Norfolk

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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.

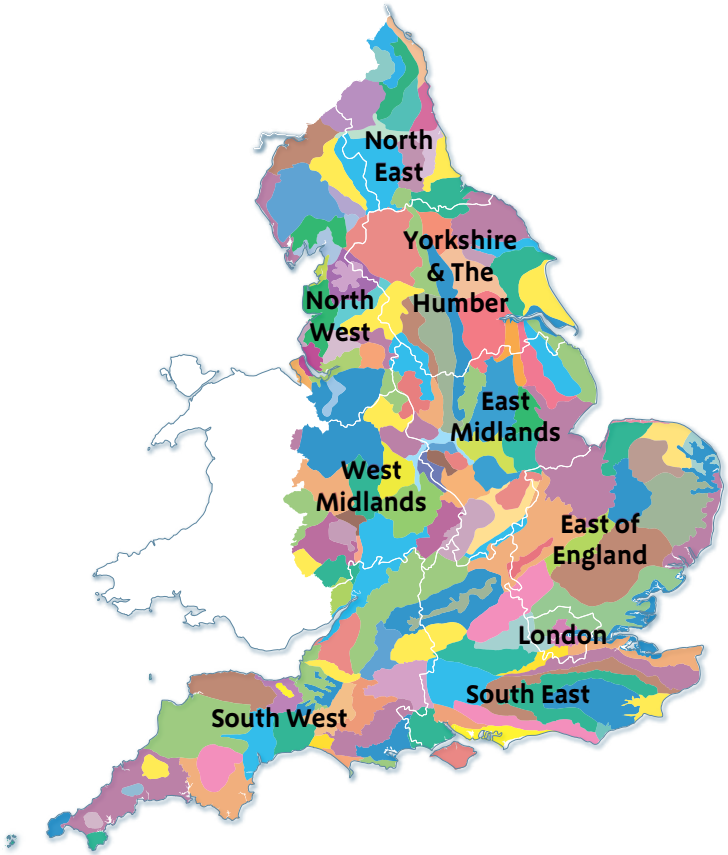
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and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

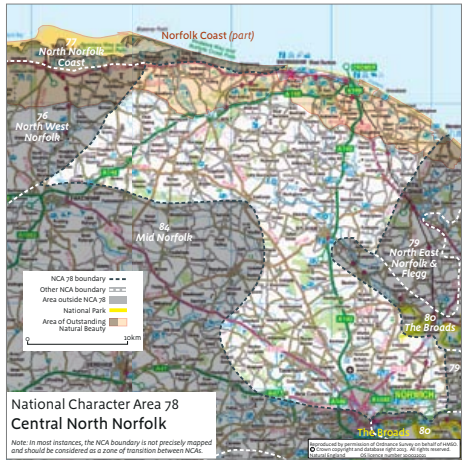
The gently undulating rural landscape of the Central North Norfolk National Character Area (NCA) stretches from the slightly flatter, more open land of Mid Norfolk NCA, to the prominent glacial landform of the Cromer Ridge and the dynamic exposed coastline of coastal cliffs, where large storm events dramatically shape its character. This is ancient countryside with a long-settled agricultural character, where arable land is enclosed by winding lanes and hedgerows, interspersed with woodland and remnant heath and dissected by lush pastoral river valleys. A patchwork of cultivated land, numerous church spires, distant wooded horizons and big skies dominates the landscape.

This is a predominately tranquil place, with isolated market towns and scattered villages and farmhouses, their red brick, flint walls and pantile roofs an intrinsic and important component of Norfolk's built character, reflecting the underlying geology. The area is rich in 18th-century estates and medieval churches, and the historic city of Norwich provides a cultural and economic centre. The coastal flint and red brick towns of Cromer and Sheringham provide focal points in an otherwise dynamic coastal landscape, and their beaches and seaside recreation facilities provide a draw for tourists.

The area is well wooded for Norfolk and important for its remnant heathland, which was once much more extensive. Much of the coastline is part of the Norfolk Coast Area of Outstanding Natural Beauty with the cliffs at Overstrand designated as a Special Area of Conservation (SAC) for their maritime cliff habitats and slopes. The eroding coastal cliffs, especially at West Runton, are an internationally important site for their geodiversity and fossil remains. The Norfolk Valley Fens SAC supports rare lowland alkaline fen communities and Norfolk's river valleys contain an important mosaic of habitats and species, with the entire length of the chalk-fed River Wensum designated as an SAC. The NCA contains small areas of the adjacent North Norfolk Coast and Broads Ramsar sites/Special Protection Areas.

The main pressures for change to the area are posed by growth and a need to accommodate increased development, especially around Norwich. Other key challenges include the potential for further agricultural intensification, a need for sustainable approaches to commercial farming practices and managing ongoing visitor pressures in coastal areas. Maintaining the traditional farmed landscape of the Central North Norfolk NCA through sustainable land management practices – to help protect its important natural processes and resources, its areas of high tranquillity, accessibility to important coastal features and geodiversity – and enhancing the landscape for recreational and biodiversity opportunity will present further challenges into the future.

Coastal erosion has a large impact in this NCA, especially east of Cromer. The character of the 'natural' coastline itself should be maintained but communities/ settlements and infrastructures are subject to change.



Click map to enlarge; click again to reduce.

River Stiffkey and valley fen - internationally important habitat.

Statements of Environmental Opportunity

- **SEO 1:** Work with the local farming community to safeguard future food production, while maintaining the traditional landscape character with its patchwork field system, mixed hedges and pastoral river valleys; enhancing biodiversity, especially in arable margins and hedgerows, geodiversity, water quality and availability, pollination, soil quality, and managing soil erosion; and addressing the impacts of climate change.

- **SEO 2:** Maintain, enhance and restore priority habitats, including woodlands, areas of remnant heathland, and the nationally and internationally important Norfolk Valley Fens, chalk river systems (including the River Wensum) and maritime cliff habitats. Seek opportunities to connect fragmented habitats, improving the area for biodiversity and recreation, and enhancing landscape character and resilience to climate change.

- **SEO 3:** Conserve and enhance the historic character of the area while affording protection to heritage assets, biodiversity, geodiversity and water resources, and encouraging sustainable tourism and recreational use and also a sympathetic approach to development in coastal areas, around market towns and towards Norwich.

- **SEO 4:** Ensure the sustainable development of the coastline and its coastal towns and villages, while protecting and enhancing its important geodiversity, encouraging natural coastal processes where possible, improving access and interpretation, and encouraging sustainable recreational use and visitor enjoyment while conserving sites with high biodiversity value including maritime cliff habitats.

Description

Physical and functional links to other National Character Areas

A curving line across the Wensum Valley marks a transition from the Central North Norfolk National Character Area (NCA) to the slightly flatter, more open land of the Mid Norfolk NCA towards the south-west. The two NCAs share many landscape characteristics and features and are closely linked physically and ecologically.

Late Cretaceous Chalk, which also lies beneath the adjoining Mid Norfolk NCA and the other NCAs of the East Anglian Plain, underlies almost half of the area. The eastern half of the NCA is underlain by late Tertiary and Quaternary shallow marine sediments known as crag, which continues south and east into North East Norfolk and Flegg NCA, The Broads NCA and a small section of both Suffolk Coast and Heaths NCA and South Norfolk and High Suffolk Claylands NCA. The underlying Chalk bedrock forms a principal aquifer serving a much wider area. Away from the river valleys, above the chalk and crag, the landscape we see is almost entirely formed of glacial deposits, either glacial till or sand and gravel, which give the landscape its gently undulating character. The exception is the river valleys which contain alluvium. The most impressive glacial landform is the Cromer Ridge, and the glacial sediments are exposed in the cliffs at the coast.

There are extensive hydrological links between rivers in the NCA and surrounding areas. The Wensum and Tud, whose upstream sections drain large areas of the adjacent Mid Norfolk NCA, supply the major wetland systems of The Broads NCA. The Glaven begins in the Central North Norfolk NCA before it joins the North Sea in the North Norfolk Coast NCA. The Bure and Stiffkey both have their source in the area where the Mid Norfolk and Central North Norfolk NCAs meet – the Bure then flowing east to The Broads, and the Stiffkey flowing into North West Norfolk and then on to the North Norfolk Coast.

Coastal processes of erosion, transportation and deposition form a functional link along the Norfolk coastline, with an east–west long-shore drift 'divide' off Cromer, transporting sediment eroded from the soft cliffs of the NCA, and incoming sediment from as far north as the Holderness NCA, to coastal areas of The Broads NCA to the south-east and the North Norfolk Coast NCA to the west.

The coastal areas of the NCA form part of the Norfolk Coast Area of Outstanding Natural Beauty (AONB), which covers the entirety of the adjacent North Norfolk Coast NCA. A small section of the North Norfolk Coast Ramsar site and Special Protection Area (SPA) lies within the NCA.

The Cromer Ridge is a prominent feature in an otherwise gently undulating landscape and can be seen from neighbouring NCAs to the west. Long views of the North Norfolk Coast NCA are possible from the ridge, especially from High Kelling and Upper Sheringham. Views are limited from the coastal cliffs due to the geography of the coastline, although it is possible to see a considerable distance along the North East Norfolk and Flegg NCA coastline from Mundesley, and parts of the North Norfolk Coast NCA can be seen from Sheringham. The Sheringham Shoal offshore wind farm is a prominent feature in the seascape and is visible from the entire coastline of the NCA. Coastal areas, especially Cromer and Sheringham, provide recreational opportunities for visitors and are a major tourist destination for people from all over the UK.

An A road network links Cromer and Aylsham with Norwich and the market towns of Fakenham and East Dereham in the Mid Norfolk NCA. The A149 coastal road runs the length of the Norfolk coast between King's Lynn in the North West Norfolk NCA and Great Yarmouth in the North East Norfolk and Flegg NCA. Further links are provided by the public rights of way network, including the Peddars Way and Norfolk Coast Path National Trail, which stretches from The Brecks NCA through Mid Norfolk to the coast and Hunstanton in the North West Norfolk NCA, and then along the north Norfolk coast to Cromer. The rail network provides links from Norwich north to the coast and Cromer and Sheringham via The Broads and North East Norfolk and Flegg NCAs, and south and west via the South Norfolk and High Suffolk Claylands NCA.

Key characteristics

- A gently undulating, sometimes flat, landscape dissected by river valleys, with the glacial landform of the Cromer Ridge and dramatic coastal cliffs providing distinctive features to the north.
- Gravels, sands, chalk erratics and glacial till left behind by the retreating ice of Pleistocene glaciations, and the resulting complexity of soils, determine natural vegetation patterns.
- Physically dynamic coastline of geomorphological importance, providing a main source of sediment recharge elsewhere along the coast, with internationally important Pleistocene sediment and fossil deposits exposed in eroding coastal cliffs.
- Underlying chalk aquifer, small fast-flowing chalk rivers and biodiversity-rich, wide, lush river valleys with wooded valley slopes, including the internationally important chalk-fed River Wensum.
- Tranquil agricultural landscape with extensive areas of arable land, dominated by cereals with break-cropping of sugar beet and oilseed rape, and some pastures along valley floors.
- Ancient countryside, much of it enclosed by the 16th century, with a sporadically rationalised patchwork field system, sinuous lanes and mixed hedges with hedgerow oaks.
- Relatively well-wooded landscape, with ancient oak and beech woodland and areas of conifer plantation.
- Important species, maritime cliff habitats and slopes, alkaline valley fen communities and areas of remnant heathland.
- Large number of 18th-century estates with their associated parkland, and a great density and stylistic variety of churches, which are often prominent features of the skyline.
- Coherent vernacular architecture – marked by distinctive red brick and flint buildings with pantiled roofs, much dating from the 17th and 18th centuries with some earlier timber frame – is an inherent component of the area's character.
- A mix of villages and many farmhouses within a complex minor road network, with a traditional pattern of market towns connected by main roads, the coastal holiday resorts of Cromer and Sheringham, and the city of Norwich providing a centre for cultural and economic activity.
- Dense network of public rights of way including the Peddars Way and Norfolk Coast Path National Trail, with main recreational activity centred on coastal areas.

Central North Norfolk today

Central North Norfolk NCA is a rural area, with a long-settled agricultural character, and gently undulating arable land enclosed by winding lanes and hedgerows, interspersed with woodland and heath and dissected by river valleys. It is a terrain of gentle variation which is more dramatic to the north, where the land undulates considerably as it rises to the top of the Cromer Ridge, and becomes more rolling within the Wensum Valley close to Norwich. Elsewhere it is relatively flat to gently undulating, so that the land cover becomes more or less dominant as the relief changes, with distant wooded horizons and prominent church spires giving way to spectacular big skies.

Chalk bedrock underlies the western section of the NCA with crag to the east. The Chalk forms an extensive principal aquifer which stretches far to the south under the East Anglian Plain. Gravels, sands, chalk erratics and boulder clays left behind by the retreating ice of Pleistocene glaciations have resulted in a complexity of soils and varying land cover and the distinctive landform of the Cromer Ridge. This eight-kilometre-wide ridge formed of glacial deposits extends from Holt to Mundesley, at Beacon Hill (the highest point in Norfolk at 103 m), with a steep north slope and gentle slope to the south, and is a highly prominent feature in the landscape. River terrace sediments provide an important archive of post-Anglian glaciation information.

The coastline is formed of dramatic eroding coastal cliffs, with the towns of Cromer and Sheringham providing areas of permanence in the otherwise dynamic coastal landscape. Foreshore exposures of chalk between Sheringham and Cromer provide the only chalk rocky shore between Flamborough Head and the north Kent coast. The coastline between Cromer and Mundesley is of geomorphological importance for its coastal processes, with the unstable, eroding 60-metre-high cliffs providing a main source of sediment recharge in adjacent NCAs. Important Pleistocene sediments and fossils are exposed in the eroding coastline.

Recreational users on Overstrand beach, also showing the Cromer ridge along the coastline.

Sea defences have an impact on the character of the coast, especially in front of main towns. Erosion has removed villages in the past and threatens current settlements, especially east of Cromer. Continued erosion is important to the character of the coast and maintenance of beaches but is causing the loss of dwellings and other structures – including archaeology and infrastructure, such as roads – and makes maintaining beach access difficult, and so has an impact on other aspects of character. This leads to a sense of dereliction and abandonment in some locations ('coastal blight').

The area is drained by the rivers Wensum and Bure, which flow south-east into the Broads, and the upper reaches of two small chalk rivers, the Glaven and Stiffkey, which flow north to the north Norfolk coast. The chalk-fed River Wensum, which is recognised as one of the most important chalk rivers in the country and designated as a Special Area of Conservation (SAC), dissects the southern part of the NCA as it flows south-east towards Norwich; and the River Bure begins in the NCA before it flows south-east into the Broads at Aylsham. The river valleys of the Wensum and Bure create a wide, lush, pastoral landscape, which is partly enclosed by woodland on the valley slopes. Water meadows divided by reed-filled dykes and poplar plantations are common on valley floors. The extraction of sand and gravels has produced lakes with reeded margins in places on the River Wensum. The Wensum is especially rich in biodiversity with over 100 plant species and a diverse invertebrate fauna, including the bullhead, brook lamprey, white-clawed crayfish, Desmoulin's whorl snail, water crowfoot and water starwort. The Stiffkey and Glaven in the north of the NCA are small, fast-flowing, scenic chalk rivers with meanders, deep pools, shallow gravel riffles and crystal clear water which support a rich variety of wildlife. As well as native brown trout, they contain less well-known fish such as stone loach, bullhead and brook lamprey and support otters, water voles and kingfishers. All of the rivers in the area have been modified and straightened over the centuries and contain numerous mills, weirs and sluices. The mosaic of wetland, woodland and grassland habitats found in the NCA's river valleys provides a tranquil haven for biodiversity.

The NCA is relatively well wooded within the East Anglian context, with a variety of woodland types: mixed deciduous or pasture woodlands (oak and beech) on the heavier soils and conifers on the lighter sands, especially to the north and west. Woods are variable in size but extensive, and reflect the development of the area in the 18th century into small-to-medium-sized estates, especially north of the Wensum. Notable concentrations of woodland occur to the north of Norwich, in the areas around Thursford and Swanton Novers and along the Holt–Cromer Ridge. Swanton Novers is the second largest ancient woodland in Norfolk and the neighbouring Thursford Wood contains some of the oldest oak trees in the county. Felbrigg Great Wood is notable for its ancient acid beech stands and numerous lichen species.

Land cover is predominately agricultural with extensive areas of arable land and some pastures along the valley floors. Cereals dominate, with break-cropping of sugar beet and oilseed rape. This is 'ancient countryside' with a long-settled agricultural character. Much of the land was enclosed by the 16th century, and only 20th-century agricultural rationalisation has changed it. Fields are variable in size and the small scale and irregularity of early enclosure has given way, in many areas, to a larger, more regular pattern as a result of later rationalisation and enclosure of heathland. The change is also seen in the contrast between mixed hedgerows with frequent hedgerow oaks in areas with less rationalisation and areas of poor or remnant hedgerow in the more intensively farmed areas. Cereal field margins and hedgerows are important refuges for wildlife with key species found in farmland areas including the barbastelle bat, brown hare, corn bunting, grey partridge, skylark, tree sparrow and turtle dove. Rare arable wild flowers, including the cornflower, are also an important feature. Sporting interests in the NCA are reflected in the large number of pheasant in fields and along road verges.

The NCA contains small areas of the adjacent North Norfolk Coast and Broads (Ramsar site and SPA) and part of the North Norfolk Coast AONB. The Overstrand Cliffs SAC is one of the best examples of unprotected vegetated soft cliffs on the

North Sea coast, with succession habitats (including ruderal communities and grasslands) and flushes supporting wet fen communities and perched reedbeds. The diverse range of habitats supports an outstanding range of invertebrates. The NCA has three sites designated as part of the wider Norfolk Valley Fens SAC: Buxton Heath, Holt Lowes and Beeston Regis Common. These sites are designated for their alkaline valley fen habitat which supports an exceptionally diverse plant and invertebrate community, including rare bryophytes, a number of uncommon mosses and liverworts, and rare damselfly and dragonfly species including the scarce emerald, common hawker, black darter and hairy dragonfly. The fens are often associated with areas of lowland heathland, which is a distinguishing feature of the NCA, and is concentrated along the Cromer Ridge and to the north of Norwich. Heathland within the NCA is important for its bird species including nightjar, whitethroat, nightingale and linnet, and reptiles including common lizard and adder.

A large number of 17th- and 18th-century country house estates of various sizes can be found throughout the area, with a particularly rich abundance of minor country houses, notably the major estates of Sheringham, Blickling and Felbrigg. These estates are frequently accompanied by parkland and their own church and village. The NCA is also unusually rich in medieval churches, with Cawston a particularly fine example. These churches dominate the landscape, especially on the flatter land, and in areas of closely located villages two or three spires can often be seen simultaneously.

Central North Norfolk NCA looks to Norwich for cultural and economic activity. The city has an interesting mix of medieval, Georgian and modern architecture, a large market square and intriguing alleyways and streets: the impressive Norman castle and cathedral look out over a city of surprising topographical variety, which is caused by the Wensum Valley. Remnant heathland at Mousehold Heath is an additional attribute of the city. The other centres of population comprise medieval market towns such as Aylsham. Villages are intermixed with isolated farmsteads, generally of the 17th and 18th centuries, and 18th-century estates and country houses. Flint, red brick and frequently black-glazed pantiles are an inherent component of the area's vernacular character. Innate conservatism has ensured that the local vernacular style has been preserved into the 20th century, so there are few examples of later periods. There are some rare survivals of earlier timber frame.

Norwich Cathedral and buildings showing the use of local building materials.

On the coast, the resort towns of Cromer and Sheringham were both 19th-century developments made popular due to the arrival of the railway in Norfolk. Cromer sits in a dell between the coast and the ridge and is a busy flint town with a sandy beach and a pier, full of little lanes and holm oak. Sheringham is less urban, again built of flint and red brick but quieter than its neighbour. The coast is now a popular holiday area and has numerous caravan and camping sites, and 20th-century bungalows can be found throughout, especially on the periphery of the coastal towns and villages.

The agricultural landscape is extremely tranquil away from main roads and settlements and along river valleys. Less tranquil areas are mainly around the coastal towns of Cromer and Sheringham and close to Norwich, especially along the A47 and A1067, where urbanisation creeps westwards with a string of commuter villages of 19th- and 20th-century origin.

The recreational use of the area is centred upon the resources of the north Norfolk coast with historic Felbrigg and Sheringham parks and Blickling Hall further to the south providing the chief 'honeypot' sites. The North Norfolk Railway (or 'Poppy Line') provides an additional draw. The area is well served by the public rights of way network which includes the Norfolk Coast National Trail and the section of England Coast Path to be opened in 2014/15.

John Crome and John Sell Cotman are perhaps the best-known exponents of the Norwich School of artists. Humphry Repton, the landscape gardener, is buried in Aylsham churchyard and his legacy can be seen in Sheringham Park, while in 1883 the journalist Clement Scotta popularised this area in poems and articles, calling it 'Poppyland'.

The landscape through time

This NCA contains several internationally and nationally important Sites of Special Scientific Interest (SSSI). The chalk bedrock which underlies the western section of the NCA was deposited during the late Cretaceous Period, some 80 million years ago. Key sites include St James' Pit SSSI (Britain's best-known Upper Chalk reptilian fossil site) and Catton Grove Chalk Pit SSSI (the type locality for the Catton Sponge Bed as well as many important ammonites and many undescribed sponges).

Bedrock to the east of the NCA is formed of much younger (2 to 1.8 million years ago) Plio-Pleistocene marine sands and gravels known as the Norwich Crag and Wroxham Crag formations. Seas and ice sheets came and went over Norfolk many times during the Pleistocene, leaving a complex sequence of marine and terrestrial sediments. The internationally important West Runton Freshwater Bed and the Cromer Forest Bed (the type site for which is at West Runton SSSI) were laid down during the Early–Middle Pleistocene and provide internationally important palaeo-environmental records of the period.

The Anglian glaciation, which began around 450,000 years ago, caused the deposition of a series of sheets of glacial till (boulder clay) across the area as well as sands, gravels and silts washed out as the ice sheets melted and retreated. The core of the Cromer Ridge was formed by glacial sediments deposited at the terminal edge of ice sheets. As the glaciers of the Anglian period retreated, they left huge quantities of outwash deposits (as can be seen at Briton's Lane Gravel Pit SSSI) which formed the summit of Cromer Ridge and features such as Kelling Heath. The mix of till, sands and gravels provide the complexity of soils that characterise this area and give rise to the great variation in land cover.

Norwich Castle keep, now Norwich Castle Museum.

Subsequent glaciations left their mark on the landscape, sculpting meltwater valleys (including the Bure) and adding river terrace sediments to the archive of glacial information contained in the Wensum Valley. The present coastline of north Norfolk was established when sea levels rose around 6,000 years ago.

The first evidence of humans in Norfolk is provided by flint tools dated at around 400,000 BC. Prehistoric cropmarks and burial mounds, as near Sheringham, testify to a long history of settlement in the area.

The whole area consisted of heathland and wood pasture during this time. Venta Icenorum, situated just outside what is now Norwich (in the neighbouring Mid Norfolk NCA), was laid out in around 70 AD-. The Cromer Ridge was intensively settled by the Anglo-Saxon period, at which time colonisation imparted a large number of 'ingham' place names. Norwich was founded at the confluence of the Yare and the Wensum during Saxon times and was well settled by the time of William the Conqueror. The large flocks of sheep noted throughout the county in the Domesday Book suggest it was a prosperous farming and wool-producing area during this time.

By the 13th century Norwich was one of the largest cities in England, together with London, Bristol and York. The cloth industry sustained its exports and wealth right up to the 19th century. Medieval and later settlement is mixed, with a generally very high degree of dispersal, including numerous well-separated market towns and large villages and their associated numerous churches. Surrounding these settlements- and still a dominant element of the settlement pattern today, is a pattern of dispersed hamlets, farmsteads and manorial complexes.

Much of the early medieval landscape of heaths and wood pasture was enclosed between the 14th and 17th centuries, creating a pattern of small-scale, irregular fields with areas of open field and common land, farmed by a range of holdings, settlements and estates. The resulting small-scale, irregular

field patterns, high hedges and a meandering road network are still in evidence today. Medieval deer parks were largely converted to farmland in the 16th and 17th centuries. It appears to have been an area of mixed farming on relatively small landholdings which became fairly wealthy during the 17th century, as shown by the large number of fine flint and pantile farmhouses of the period. Major improvements in crop rotation from the late 17th century used winter feed crops (notably turnips) and artificial grasses. The economy was arable-based but access to meadow and grass enabled the stocking of large numbers of bullocks and milking cattle. Rationalisation and further enclosure of fields and boundary patterns in the later 18th century added another layer of historic interest by subdividing areas of common land and heath. Woodland plantations were commonplace, but rarely of great size, and usually the product of 18th-century estate management and later sporting interests.

Medieval manors, associated with deer parks, formed the basis of the 17th- and 18th-century country house estates of various sizes, frequently accompanied by parkland. Melton Constable is an example of a park that had already been in one family's ownership for a long time when it was decided, in 1664, to build a third family house within the grounds. This was then added to substantially in the 19th century, when the nearby 'railway' village was constructed to house workers on the important junction of the Midland and Great Northern lines. Architecturally, the red-brick and slate-roofed terraced housing had more in common with the east Midlands.

The arrival of the railway in Norfolk in the late 1800s signalled the beginning of mass tourism, and Sheringham and Cromer consequently developed as popular holiday resorts. The coast now thrives as a retirement and holiday area, with a plethora of 20th-century bungalows to emphasise the point. By the end of the 19th century Norfolk was no longer famous for its wool and cloth, but for its tourist attractions. Almost a third of historic parkland has been converted to arable use since the First World War. Extensive remains of Second World War anti-invasion defences (such as pillboxes, gun emplacements and defensive ditches) can be found at Weybourne Hope, Kelling and Sheringham. A number of railways closed due to economic restructuring and the Beeching axe in the 1950s and 60s, including the main line of the Midland and Great Northern Joint Railway which connected Aylsham with King's Lynn via Melton Constable. These defunct lines have subsequently been turned into long-distance footpaths, which include the Marriott's Way.

A string of commuter villages were built close to Norwich in the 19th and 20th centuries, especially along the A47 and A1067. Twentieth-century rationalisation has changed the agricultural landscape with larger fields and the removal of hedgerows, and Norfolk is now England's most important producer of wheat, barley, sugar beet and many vegetables. Pressure to accommodate growth and development continues, with increasing urbanisation of areas around Norwich, the market towns and the coastal resorts of Cromer and Sheringham.

Ecosystem services

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

Provisioning services (food, fibre and water supply)

- **Food provision**: This is an important food-producing landscape with extensive areas of high-quality arable farmland and over 74 per cent per cent of the NCA under agricultural management. Agriculture is predominately for arable cultivation although there is some grazing along the river valleys. Cereal crops dominate, with some cash root crops and oilseed production.

- **Timber provision**: Commercial coniferous plantations along the Cromer–Holt Ridge.

- **Water availability**: There is extensive abstraction for public water supply and agriculture (spray irrigation) from rivers and the underlying principal chalk aquifer, with some water available for licensing at high flows. There are numerous potable water boreholes to the north and west of Norwich which are used to draw water from the aquifer. Over the last 30 years, there have been increasing demands for water abstraction for public water supply and agriculture. Demand for public water supply is set to increase due to new development near Norwich.

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

- **Climate regulation**: There are a number of areas in the NCA with soils with a high carbon content. In particular, wet peaty and alluvial soils- that may be associated with areas of remnant wetland habitat are found in the numerous small tributary valleys of the Bure and Wensum.

- **Regulating soil erosion**: 97 per cent per cent of soils are at risk of erosion. Priority catchments under the England Catchment Sensitive Farming Delivery Initiative (ECSFDI) all identify soil erosion as a particular issue. The re-establishment of hedges and provision of uncropped wildlife strips, conservation headlands, targeted arable reversion to grassland and winter stubble through agri-environment schemes has limited soil erosion.

- **Regulating soil quality**: Freely draining soils covering 73 per cent per cent of the NCA may be valuable for aquifer recharge requiring the maintenance of good structure. Soils with impeded drainage are easily poached and compacted when wet. However, the addition of chemical fertilisers combined with the irrigation of these easily worked soils has enabled highly productive agriculture to prevail across the NCA.

- **Regulating water quality**: Water quality is generally poor due to diffuse pollution from agriculture (resulting in high nitrate and phosphate levels), sedimentation, over-abstraction, invasive species and physical modification of river systems. There is also some localised diffuse pollution from pesticides, sewage treatment works and industry – Environmental Stewardship and catchment sensitive farming measures help to reduce polluting factors and improve water quality.

- **Pollination**: The extensive semi-natural habitat mosaic of heathland, forest edge and acid grassland in the river valley pastures and wetlands across the area provide important nectar sources for pollinating insects. Where arable cropping dominates, interstitial habitats such as the edges of farm tracks become the key sources of both pollen and nectar. These habitats are particularly important as they support the insects that pollinate commercial arable crops including oilseed rape.

- **Regulating coastal flooding and erosion**: This is a dynamic coastline of geomorphological importance, providing the main source of sediment recharge elsewhere along the coast. Protecting coastal towns of Cromer and Sheringham while allowing natural coastal processes to take place along the remaining coastline ensures a continuing supply of sediment to recharge other areas and protect them from coastal erosion.

Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration**: The area includes a traditional gently undulating agricultural landscape with winding lanes and hedgerows, prominent medieval churches, 18th-century country house estates and parklands, ancient woodlands and remnant heathlands, rolling river valleys, undeveloped stretches of coastline with dramatic eroding cliffs and the city of Norwich in the south. A sense of place is created by a long-settled agricultural character, dominated by arable land and a traditional settlement pattern based around small market towns, isolated villages and scattered farmhouses built with Norfolk red brick and flint with pantile roofs.

- **Sense of history**: The area's fine churches testify to a well-settled and prosperous medieval landscape, a sense of prosperity which is enhanced by the fine vernacular architecture, medieval manors and country house estates with their associated parkland. Such estates often had their own church and village. Norwich provides an imposing cathedral, prominent castle and a historic mix of architecture.

- **Tranquillity**: High levels of tranquillity in the NCA are predominantly in evidence due to the large areas of agricultural land, where it is rare to see other people, but which are also related to the areas of semi-natural habitat. In contrast, this NCA also encompasses some of the less tranquil areas in Norfolk, notably around Norwich, as well as along the north coast between and including Cromer and Sheringham and the road network linking these settlements with Norwich and Fakenham.

- **Recreation**: Recreational use of the area is centred upon the resources of the north Norfolk coast, especially the towns of Cromer and Sheringham, the 'honeypot' sites of the National Trust-owned properties of Felbrigg and Sheringham parks and Blickling Hall, and the dense network of public rights of way including the Peddars Way and Norfolk Coast Path National Trail.

- **Biodiversity**: The NCA includes small areas of the adjacent North Norfolk Coast and Broads (Ramsar site and SPA). SAC include the Norfolk Valley Fens, designated for their lowland alkaline fen communities; the River Wensum, which is a nationally important chalk river; and the Overstrand Cliffs, which are is of the best examples of unprotected vegetated soft cliffs on the North Sea coast. Other notable priority habitats include deciduous woodland, heathland and a mosaic of wetland and grassland habitats in river valley flood plains.

- **Geodiversity**: The north of the NCA is considered to be outstanding in a national context for both its geology and its landforms. It has one of the most complete sequences of Late Jurassic to Late Cretaceous marine strata in Britain which are capped by an extremely important series of Pleistocene glacial and interglacial deposits that are critical to our understanding of Early to Late Pleistocene stratigraphy. The coastal cliff sections and the inland landforms, including the Cromer–Holt Ridge, are some of the finest of their kind in the British Isles. The exposed eroding coastal cliffs as well as the 12 geological SSSI allow opportunities for ongoing research as well as geological interpretation by the public.

Blickling Hall, a Jacobean house with extensive parkland, now owned by the National Trust and a popular visitor attraction.

Statements of Environmental Opportunity

SEO 1: Work with the local farming community to safeguard future food production, while maintaining the traditional landscape character with its patchwork field system, mixed hedges and pastoral river valleys; enhancing biodiversity, especially in arable margins and hedgerows, geodiversity, water quality and availability, pollination, soil quality, and managing soil erosion; and addressing the impacts of climate change.

For example, by:

- Managing the agricultural landscape in a sustainable way to improve the long-term viability of agriculture and yields, while protecting the natural assets of the area.
- Working with farmers through agricultural stewardship schemes to reduce the loss of sediment and associated phosphates from agricultural land through appropriate changes in land management, including the use of buffer strips adjacent to watercourses.
- Reducing soil compaction by encouraging the careful timing of land management activities, including reducing unnecessary machinery use in wet conditions.
- Using stewardship schemes to promote an increase of organic matter in soils through management interventions, including the use of grass leys, introducing fallow into rotations and over-winter stubbles.
- Working with farmers to reduce sources of nitrate leaching to groundwater and run-off to surface waters by promoting the adoption of best practice measures, including the more efficient use of organic manures and fertilisers.
- Maintaining water availability by using integrated water and land management practices to slow run-off and increase infiltration to the underlying chalk aquifer by reducing soil compaction and increasing soil organic matter on agricultural land.
- Strengthening the characteristic hedgerow network by protecting, managing and reinstating hedgerows and hedgerow trees, thereby connecting fragmented habitats, improving biodiversity and reducing wind erosion.
- Seeking opportunities to increase field margins, species-rich hedgerows and beetle banks to encourage a network of habitats for pest-regulating species close to areas of agricultural production.
- Encouraging sympathetic management for pollinator species by enhancing the floristic diversity of hedgerow banks and increasing the areas of pollen and nectar margins on arable farms.

SEO 2: Maintain, enhance and restore priority habitats including woodlands, areas of remnant heathland, and the nationally and internationally important Norfolk Valley Fens, chalk river systems (including the River Wensum) and maritime cliff habitats. Seek opportunities to connect fragmented habitats, improving the area for biodiversity and recreation, and enhancing landscape character and resilience to climate change.

For example, by:

- Maintaining the protected sites network – including the Norfolk Valley Fens, Overstrand Cliffs and River Wensum SAC – ensuring continued protection of priority habitats and species.
- Maintaining and enhancing areas of ancient semi-natural woodland and planting new areas of broadleaved woodland to address fragmentation.
- Bringing local woodlands into traditional coppice management- to improve structural diversity and species composition.
- Increasing the biodiversity of conifer plantations by reintroducing native broadleaved trees.
- Maintaining and enhancing existing areas of heathland on the Cromer Ridge and to the north of Norwich, and restoring heathland habitat where possible.
- Maintaining and enhancing maritime cliff habitats, encouraging the natural succession of plant communities through the natural erosion of the soft cliffs, and protecting the spring-fed, species-rich characteristic flushes.
- Increasing the biodiversity of river valleys by restocking poplar plantations with native wet woodland.
- Investigating opportunities to re-naturalise river systems by removing structures and reconnecting rivers to their natural flood plains, especially on the important chalk rivers of the Wensum, Glaven and Stiffkey.
- Restoring wet grassland, fen and carr habitats in the Wensum River corridor.
- Modifying or removing barriers on river systems, where possible, to allow migrating fish passage, including brown trout.
- Conserving areas with high organic content in soils, including wetlands, heathland and woodland.
- Seeking opportunities to link fragmented habitats with other semi-natural habitats to enable species to move in response to climate change.
- Restoring and creating new areas of wetland habitats, including wet grassland, fen and carr, to aid aquifer recharge.
- Maintaining and enhancing the floristic diversity of lowland meadow and lowland heathland, and other semi-natural habitats, to increase the area of habitat suitable for pollinators.
- Raising awareness of the problem of invasive species and adopting appropriate management for their control.

SEO 3: Conserve and enhance the historic character of the area while affording protection to heritage assets, biodiversity, geodiversity and water resources, and encouraging sustainable tourism and recreational use and also a sympathetic approach to development in coastal areas, around market towns and towards Norwich.

For example, by:

- Ensuring that development plans are sensitive to preserving the historic character of the landscape, promote the use of traditional building materials and enhance traditional settlement patterns.
- Conserving country houses and parkland estates and encouraging their use as recreational and tourist attractions, while maintaining their biodiversity value.
- Protecting existing areas of parkland and woodland associated with country estates.
- Ensuring the protection of heritage assets, including medieval churches and the historic features of Norwich, while seeking opportunities to enhance interpretation and, where appropriate, improve access.
- Minimising the effects of new development by avoiding areas with high tranquillity, incorporating green infrastructure and woodland buffers, and minimising new sources of light pollution.
- Improving and promoting the use of sustainable transport, including the bus network, cycling and footpath routes.
- Promoting the Quiet Lanes Project and investigating opportunities to expand the network and improve its effectiveness.
- Managing public access to avoid adverse impacts on agricultural management, landscape, habitats and wildlife.
- Ensuring that 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 urban drainage systems, sewage treatment options and reducing nutrients from diffuse pollution.
- Creating and enhancing green infrastructure and opportunities for public access by creating additional linkages between existing public footpaths, settlements, amenities and transport links.
- Creating new areas of greenspace in conjunction with new developments and identifying locations for new recreational sites such as country parks.
- Ensuring that the freshwater resource for internationally important river and wetland habitats is protected through the management of water abstraction levels, from rivers and the underlying aquifer, and through sustainable land and water management.

Continued on next page...

SEO 3: Conserve and enhance the historic character of the area while affording protection to heritage assets, biodiversity, geodiversity and water resources, and encouraging sustainable tourism and recreational use and also a sympathetic approach to development in coastal areas, around market towns and towards Norwich.

... continued from previous page

- Maintaining water availability by using integrated water and land management practices to slow run-off and increase infiltration to aquifers by reducing soil compaction and increasing soil organic matter on agricultural land.
- Protecting aquifer water quality by adopting land management practices and integrated water management policies to minimise risks through pollution, contamination and run-off.
- Maintaining and enhancing the geological resource by identifying and improving opportunities for enhanced access to sites and improving understanding of geodiversity through interpretation and education.
- Conserving and interpreting archaeological earthworks and sub-surface archaeology, while recognising the potential for undiscovered remains.

SEO 4: Ensure the sustainable development of the coastline and its coastal towns and villages, while protecting and enhancing its important geodiversity, encouraging natural coastal processes where possible, improving access and interpretation, and encouraging sustainable recreational use and visitor enjoyment while conserving sites with high biodiversity value including maritime cliff habitats.

For example, by:

- Continuing to research, monitor and record coastal geomorphological processes that shape the coastline, and the geology itself, to improve our understanding and inform future management of the area.
- Implementing sustainable management plans, preventing coastal erosion in the economically important towns of Cromer and Sheringham, and allowing natural coastal processes to take place elsewhere over the long term.
- Exploring options for allowing natural coastal processes to take place unimpeded, while involving and taking the needs of the local community into account.
- Continuing to research important Pleistocene sediment and fossil deposits, and improving access to and interpretation of these features to help connect visitors and locals to their historic environment.
- Maintaining and enhancing maritime cliff habitats and slopes, encouraging the natural succession of plant communities through the natural erosion of the soft cliffs, and protecting the spring-fed species-rich characteristic flushes.
- Improving and promoting the use of sustainable transport, including the bus network, cycling and footpath routes.

Supporting document 1: Key facts and data

Area of Central North Norfolk National Character Area (NCA): 72,035 ha

1. Landscape and nature conservation designations

Central North Norfolk contains parts of The Broads National Park (32 ha), Norfolk Coast Area of Outstanding Natural Beauty (AONB) (10,862 ha) and North Norfolk Heritage Coast (29 ha).

Management plans for the protected landscape can be found at:

- www.broads-authority.gov.uk/
- www.norfolkcoastaonb.org.uk/

Source: Natural England (2011)

1.1 Designated nature conservation sites

The NCA includes the following statutory nature conservation designations:

Tier	Designation	Name	Area (ha)	% of NCA
International	Ramsar	Broadland; North Norfolk Coast	13	<1
European	Special Protection Area (SPA)	Broadland SPA; North Norfolk Coast SPA	13	<1
	Special Area of Conservation (SAC)	Norfolk Valley Fens SAC, River Wensum SAC; Overstrand Cliffs SAC; The Broads SAC; North Norfolk Coast SAC; The Wash and North Norfolk Coast SAC	246	<1
National	National Nature Reserve (NNR)	Swanton Novers NNR; Woods, Blakeney NNR	83	<1
	Site of Special Scientific Interest (SSSI)	A total of 30 sites wholly or partly within the NCA	947	1

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.

- In summary, land covered by international nature conservation designations totals 246 ha (0.3 per cent of the total land area). The Broadland and North Norfolk Coast sites are designated as both SPAs and Ramsar sites.
- In total, 947 ha of the NCA are nationally designated. Both NNRs are also designated as SSSI.
- There are 229 local sites in Central North Norfolk covering 3,597 ha, which is 5 per cent of the NCA.

Source: Natural England (2011)

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

1.1.1 Condition of designated sites

SSSI condition category	Area (ha)	Percentage of NCA SSSI resource
Unfavourable declining	96	10
Favourable	402	42
Unfavourable no change	46	4
Unfavourable recovering	403	43

Source: Natural England (March 2011)

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

2. Landform, geology and soils

2.1 Elevation

The lowest point of the NCA is 0.3 m below sea level. The highest point is 101 m above sea level on the Cromer Ridge. The Cromer Ridge forms a significant feature in the landscape contrasting with the generally low lying topography of the area.

Source: Natural England 2010; Central North Norfolk JCA description

2.2 Landform and process

Central North Norfolk is bounded to the north by coastal cliffs and the Cromer Ridge. The Ridge has an average width of 8 km and has a steep north slope and a gentle south slope. It extends from Holt to Mundesley but is most pronounced in the vicinity of Sheringham, where it reaches 100 m in height. It is not, in national terms, a major landscape feature but an unusual one in East Anglia and is of great interest geologically. This vestige of a former glaciation, with its mix of till (silty clays), sands and gravels, has created complexity to the soils in the area, giving rise to great variation in land cover. On the coast between Sheringham and Cromer there are foreshore exposures of Chalk, especially at West Runton where the presence of large paramoudra flints in the Chalk provide the only chalk rocky shore between Flamborough Head and the north Kent coast. East of Cromer the cliffs become higher and reach 60 m between Overstrand and Mundesley. They also become more unstable and are subject to major landslides caused by water draining through the cliffs and erosion by the sea from the toe of the cliffs. The cliffs are composed of glacial till which varies from sand to chalk marl and this is often contorted into sand basins and ridges. The Overstrand cliffs are generally well vegetated. Flushes caused by springs issuing from the cliffs are a feature.

Source: Central North Norfolk NCA description, North Norfolk Natural Area Profile

2.3 Bedrock geology

Late Cretaceous Chalk underlies almost half of the NCA. During the Anglian glaciations four hundred and fifty thousand years ago, ice sheets moving across the area eroded the ground. The eroded material was deposited at the base of the ice to form sheets of till (boulder clay) up to tens of metres thick over the chalk bedrock. As the climate warmed and the ice melted, fast-flowing streams of melt water carried sands and gravels, depositing them in valleys where they can be found today. The landscape to the north around Cromer and Sheringham is defined by the presence of Late Tertiary bedrock, generally know as Crag. This includes the Cromer Forest Bed which consists of a variety of mudstones and sandstones, often carbonate-rich and full of fossil remains. The fossils represent temperate climatic conditions and are overlain by the distinctive glacial deposits. Here the bedrock is divided between sand and gravel (61 per cent) and Chalk (40 per cent).

Source: North Norfolk Natural Area Profile

2.4 Superficial deposits

Superficial deposits of gravels, sand and mixed soft clayey sediments resulting from glaciations are found throughout the NCA.

Source: North Norfolk Natural Area Profile

2.5 Designated geological sites

Tier	Designation	Number
National	Geological Site of Special Scientific Interest (SSSI)	15
National	Mixed Interest SSSI	3
Local	Local Geological Sites	1

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

'Soilscapes' maps identify the soils of Central North Norfolk to be highly varied. A combination of slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils and slightly acid loamy and clayey soils with impeded drainage, in the south and west, contrasts with shallow lime-rich soils over chalk or limestone and freely draining loamy soils and freely draining slightly acid sandy soils in the north and east.

Source: National Soil Resources Institute

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

Grade	Area (ha)	% of NCA
Grade 1	973	1
Grade 2	18,169	25
Grade 3	41,178	57
Grade 4	1,888	3
Grade 5	0	0
Non-agricultural	6,547	9
Urban	3,280	5

Source: Natural England (2010)

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

3. Key water bodies and catchments

3.1 Major rivers/canals

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

- River Wensum 26 km
- River Bure 23 km
- River Glaven 18 km
- River Stiffkey 10 km
- River Tudd 9km

Source: Natural England (2010)

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

The general geology of gravels and other drift deposits overlying chalk results in the rivers flowing through the area deriving their water from both calcareous and more acid sources; however, generally the water is calcium-rich. The rivers have mostly slow to moderate flows because of the low lying topography.

The area is drained by the rivers Wensum and Bure which flow south-eastwards into Broadland and by two smaller rivers flowing northwards – the Glaven and Stiffkey.

The River Bure is one of Norfolk's largest rivers. It is navigable through the neighbouring Broads NCA although not within this character area.

The River Glaven initially flows south-west from its source at Bodham before turning sharply at Hunworth to flow north into the neighbouring North Norfolk Coast NCA at Cley-next-the-Sea. The river valley is particularly scenic and in parts of the lower valley the river runs over chalk beds.

The River Stiffkey is also a chalk river flowing into the North Norfolk Coast NCA. The Tud is a tributary of the Wensum. It is fast flowing, crystal clear and is a rich aquatic habitat of lush weed beds full of life. Its source is in the Mid Norfolk NCA and it joins the Wensum on the western outskirts of Norwich at Hellesdon.

The Wensum is a chalk fed river designated as a SSSI and SAC due to its rich aquatic life. It is a tributary of the River Yare although it is the larger of these two rivers. Its source is in the North West Norfolk NCA and it also flows through the Mid Norfolk NCA before entering Central North Norfolk just east of the village of Lenwade. The Wensum becomes tidal and navigable by boat in Norwich where its course forms a broad arc.

3.2 Water quality

The total area of Nitrate Vulnerable Zone is 68,489 ha, or 95 per cent of the NCA.

Source: Natural England (2010)

3.3 Water Framework Directive

Maps are available from the Environment Agency showing current and projected future status of water bodies at:

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

4. Trees and woodlands

4.1 Total woodland cover

Woodlands over 2 ha cover a total of 9,628 ha, 13 per cent of the Central North Norfolk NCA. Ancient woodlands and ancient replanted woodland cover less than 1 per cent of the area.

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

4.2 Distribution and size of woodland and trees in the landscape

The area is relatively well-wooded in the East Anglian context, with a variety of woodland types scattered throughout the landscape; mixed deciduous or pasture woodlands (oak and beech) on the heavier soils and conifers on the lighter sands, especially to the north and west. Woods are variable in size but extensive with larger expanses occurring north of Norwich and along the Cromer Ridge. Elsewhere aggregations of woodland are often situated around river valley slopes, with poplar plantations on the valley floor, particularly along the rivers Bure and Wensum. Ancient woodland, which is managed as coppice with standards, is largely restricted to the vicinity of Swanton Novers and the adjacent boundary with Mid Norfolk, though there is also some former coppiced oak woodland close to Holt. These ancient woodlands have been supplemented by plantations of broadleaved trees and conifers and secondary woodland, particularly in the 19th and 20th centuries.

Source: North Norfolk Natural Area Profile

4.3 Woodland types

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

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

Woodland type	Area (ha)	% of NCA
Broadleaved	5,913	8
Coniferous	3,329	5
Mixed	106	<1
Other	280	<1

Source: Forestry Commission (2011)

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

Type	Area (ha)	% of NCA
Ancient semi-natural woodland	211	<1
Planted Ancient Woodland (PAWS)	615	<1

Source: Natural England (2004)

5. Boundary features and patterns

5.1 Boundary features

There is a mosaic of areas of mixed hedgerow with frequent hedgerow oaks and areas of poor or remnant hedgerow with no hedgerow trees that is dependent on different landownership and consequent farming practices. In the river valleys water meadows are divided by reed-filled dykes. Along much of the coast, boundary features include timber revetments with seawalls on short stretches. In a few places additional protection has included cliff drainage and stabilisation schemes. Such coastal protection works lead to a degradation or loss of exposure in the cliff section. They also lead to the loss of a major sediment source for areas down drift in the sediment cell.

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

5.2 Field patterns

Fields in general are variable in size and the 14th century small-scale and irregular enclosure has given way, in many areas, to a large, more regular pattern of 20th century rationalisation. The river valleys which have not been planted with poplars display a wide, lush pastoral landscape with water meadows.

Source: Central North Norfolk 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

Arable farming represents almost 60 per cent of farm types in the area, with general cropping (193 farms, 36 per cent of the total) and cereals (105, 20 per cent) the predominant farm types. In the last decade, the number of cereal farms has almost doubled.

Source: Agricultural Census, Defra (2010)

6.2 Farm size

Eighty-one per cent of the farmed area is in farms of over 100 ha in size. A further 11 per cent is in farms of between 50 and 100 ha. This distribution remained stable in the period between 2000 and 2009. However, farm size is fairly evenly distributed with just over half of all farms (283) under 50 ha. The number of farms decreased by 22 in the decade between 2000 and 2009; almost all of this reduction was from the smaller farms.

Source: Agricultural Census, Defra (2010)

6.3 Farm ownership

2009: Total farm area = 53,380 ha; owned land = 38,446ha
2000: Total farm area = 52,505 ha; owned land = 40,532 ha.

Source: Agricultural Census, Defra (2010)

6.4 Land use

In 2009 land use was typically arable with 78 per cent in arable or horticultural use (predominantly cereal production, 44 per cent). Twenty-two per cent of land was recorded as grass and uncropped and 16 per cent as cash roots. These patterns of land use remain relatively unchanged since 2000.

Source: Agricultural Census, Defra (2010)

6.5 Livestock numbers

Pigs are the most numerous livestock within the NCA, of which there were 60,900 recorded in 2009. There were 13,800 cattle and 19,000 sheep recorded in 2009. Unlike in other NCAs numbers of livestock has remained relatively unchanged since 2000. Pig farming has though seen a decrease of almost 10 per cent over the period 2000 to 2009.

Source: Agricultural Census, Defra (2010)

6.6 Farm labour

Half of the agricultural workforce is principal farmers; 708 in 2009 down from 801 in 2000. Salaried farm managers account for only 5 per cent of farm labour, full-time workers 22 per cent, part-time workers 9 per cent and casual / gang workers 13 per cent. In the period 2000 to 2009 the total agricultural workforce dropped by 25 per cent. Full-time farm workers halved over this period while numbers of part-time and tenanted and casual labour remained relatively unchanged, only experiencing small decreases.

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

The Holt-Cromer ridge contains several large and extensive blocks of heathland, some of which have developed secondary deciduous woodland and pasture woodlands mostly with oak but also two small areas with beech.

The largest heaths and most significant are at Holt Lowes, Sheringham and Beeston Regis Commons, Salthouse Heath and Kelling Heath with smaller areas at Spout Hills and West Runton Roman Camp. The area also contains numerous other small pockets of heathland within the extensive areas of conifer plantation. There are also a number of valley mire systems associated with small streams and springs issuing from the Holt-Cromer ridge. Those at Holt Lowes, Sheringham and Beeston Regis Common, Bryants Heath and Southrepps Common are mixed calcareous and acidic mires. Between the rivers Wensum and Bure important heaths and mires survive in the area north-west of Norwich, and within the city's boundary at Mousehold Heath. These are a remnant of a once far more extensive area. The largest and most significant are Cawston Heath, Marsham Heath and Swannington Upgate Common. Significant areas of heathland also survive in the Horsford Woods - Felthorpe Woods complex associated with rides, clearings and remnant pastures.

Ancient woodland with a wide range of woodland stand types is largely restricted to the north-west of the area close to Holt. Pasture woodland appears to be concentrated along the Holt-Cromer ridge. A feature of most of these woodlands is the abundance of bluebells and the occurrence of lily-of-the-valley. The woodland butterflies – white admiral, purple hairstreak and speckled wood – are relatively common. The middle and lower reaches of the rivers have generally improved or semi-improved grassland with some wet woods and parkland. Semi-natural habitats are relatively rare but occur on the River Glaven with a number of tall fen communities. The Glaven is known to have significant populations of brook lamprey and supports a breeding brown trout population. Otters are also present.

Along the coast there are cliffs from Weybourne to Mundsley in the east. These soft cliffs have internationally important geological exposures and also a range of important soft cliff habitats, ranging from un-colonised mud flows through to relatively mature unimproved grassland and scrub communities. Flushes caused by springs issuing from the cliffs are a feature and support perched reed beds and bryophyte and rush communities. The very attractive red form of the early marsh orchid is a feature of these situations. The flushes are also of particular importance for breeding Diptera and a number of rare or notable species of soldier-flies.

Maritime cliff grassland is present along this section of the coast with the most significant sites at Beeston Cliffs, Overstrand, Sidestrand, Trimingham and Mundsley. The grasslands have some affinities with sand dune communities. Purple broomrape has its main centre of distribution in the British Isles in cliff-top grasslands. Other nationally scarce species include sand catchfly and bulbous meadow-grass. At the base of the cliffs on the shore line chalk platforms and associated flints represent one of the few areas of intertidal rock in East Anglia. The presence of irregularly shaped flints (paramoudras) on the chalk platform considerably enhances the number of macro invertebrates that the shore is able to sustain.

Source: North Norfolk Natural Area Profile

7.2 Priority habitats

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

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

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

Priority habitat	Area (ha)	% of NCA
Broadleaved mixed and yew woodland (broad habitat)	1,753	2
Coastal flood plain and grazing marsh	17	<1
Lowland dry acid grassland	7	<1
Lowland Meadows	205	<1
Purple moor grass and rush pasture	59	<1
Fens	396	1
Lowland heathland	870	1
Maritime cliff and slope	137	<1
Reedbeds	298	<1

Source: Natural England (2011)

Maps showing locations of priority habitats are available at

- http://magic.Defra.gov.uk/website/magic/ select 'Habitat Inventories'

7.3 Key species and assemblages of species

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

8. Settlement and development patterns

8.1 Settlement pattern

The area has very few towns. The main town, Aylsham, forms an active centre with its own identity. Large villages also contain more facilities than usual because of their relative isolation. This nucleated pattern is seen most clearly north of the Wensum. There is a rich abundance of minor country houses between the major estates of Sheringham, Blickling and Felbrigg and the dispersed villages scattered among the dense network of minor roads. The coast became a fashionable resort area and Lutyens designed holiday homes at Overstrand and Sidestrand for London magnates. This part of the area now thrives through the retirement and holiday market. Closer to Norwich, especially along the A1067 and A47, urbanisation creeps westwards, with a string of 19th and 20th century commuter villages.

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

8.2 Main settlements

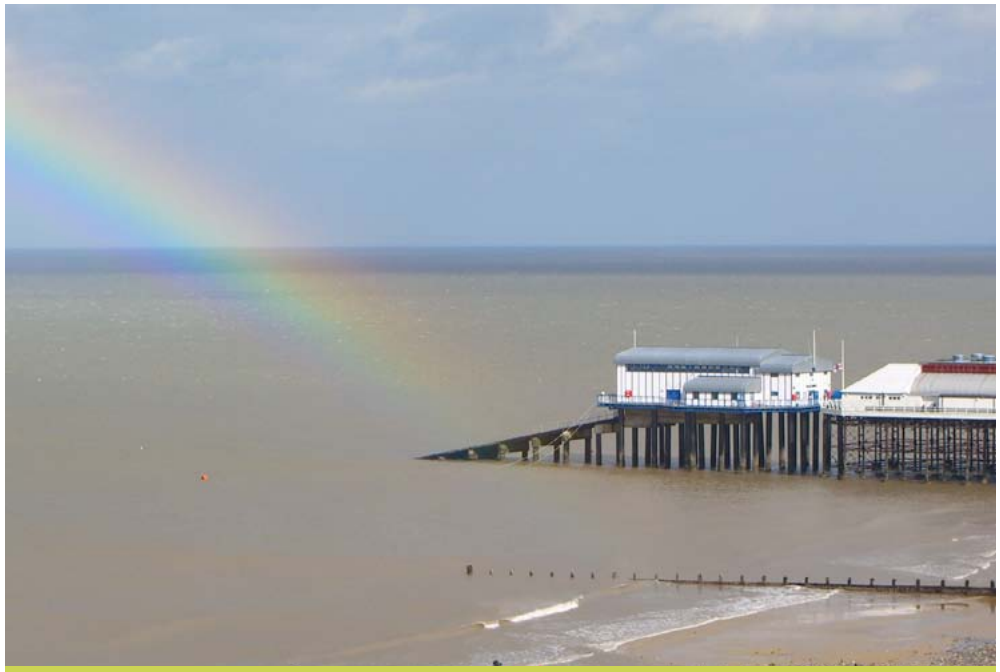
The main settlements within the Central North Norfolk NCA are; the city of Norwich (northern half) and the town of Alysham. The coastal towns of Sheringham and Cromer developed as holiday resorts in the early 19th century. The total estimated population for this NCA (derived from ONS 2001 census data) is: 216,087.

Source: Central North Norfolk Countryside Character Area description; Countryside Quality Counts (2003), Natural England (2012)

8.3 Local vernacular and building materials

The city of Norwich contains a mix of medieval, Georgian and modern architecture styles. The red brick and frequently black-glazed pantiled farmhouse of the early 18th century is an inherent component of the Norfolk character which is expressed most clearly within this character area. There are also a large proportion of 17th century houses, with flint walls dressed with brick and steeply-pitched thatched or pantiled roofs, although the area generally has a small-scale 18th century character. There are some estate villages of unified style. The coast has a plethora of 20th century bungalows.

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



Cromer Pier, coastal scene with rainbows just after a thunderstorm.

9. Key historic sites and features

9.1 Origin of historic features

There are concentrations of prehistoric burial mounds near Sheringham which indicate early settlement by man. West Runton is famous for the discovery of an elephant (woolly mammoth) which was found in exposed glacial deposits in 1990.

The morainic gravels associated with the Cromer ridge have left poor soils which were nonetheless intensively settled in the Anglo-Saxon period. This is denoted partly by the large number of 'ingham' place names. Much of the early medieval landscape of heaths and wood pasture was enclosed between the 14th and 17th centuries, creating a pattern of small-scale irregular fields and a twisting road network. It appears to have been an area of mixed farming on relatively small landholdings which became fairly wealthy during the 17th century, as shown by the large number of flint and pantile farmhouses of the period. This was followed in the 18th and 19th centuries by the establishment of a large number of medium-sized estates and the construction of correspondingly sized country houses.

The parkland landscape in many ways reflects the earlier medieval parks of the area. Today, many of them are again farmland with the vestiges of parks around the houses. Such estates frequently have their own church and village, as at Heydon, which lends a paternalistic, not to say feudal, character to the landscape. The great landscape designer Humphrey Repton is buried in Aylsham church yard and his legacy can be seen at Sheringham Park. There are extensive remains of the Second World War anti-invasion defences at Kelling, Weybourne Hope and Sheringham with pill boxes, gun emplacements and defensive ditches cut into the landscape.

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

9.2 Designated historic assets

This NCA has the following historic designations:

- 17 Registered Parks and Gardens covering 2,110 ha
- 0 Registered Battlefields
- 70 Scheduled Monuments
- 1,722 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

- One per cent of the NCA, 804 ha, is classified as being publically accessible.
- There are 520 km of public rights of way at a density of 0.7 km per km^2.
- There is 1 National Trail (Peddars Way and Norfolk Coast) extending over 9 km

Source: Natural England (2010)

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

Access designation	Area (ha)	% of NCA
National Trust (Accessible all year)	589	<1
Common Land	357	<1
Country Parks	40	<1
CROW Access Land (Section 4 and 16)	806	1
CROW Section 15	149	<1
Village Greens	18	<1
Doorstep Greens	0	0
Forestry Commission Walkers Welcome Grants	836	1
Local Nature Reserves (LNRs)	103	<1
Millennium Greens	0	0
Accessible National Nature Reserves (NNRs)	83	<1
Agri-environment Scheme Access	100	<1
Woods for People	1,642	2

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 lowest scores for tranquillity are associated with the city of Norwich, the market town of Aylsham and the coastal towns of Sheringham and Cromer. Disturbance can also be seen to be associated with the main transport routes linking these centres; the A140, A148 and A47. The highest scores for tranquillity are within the agricultural land to the west of Aylsham and the A140.

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

Category of tranquillity	Score
Highest value within NCA	41
Lowest value within NCA	-91
Mean value within NCA	1

Sources: CPRE (2006)

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

11.2 Intrusion

The 2007 Intrusion Map (CPRE) shows the extent to which rural landscapes are 'intruded on' from urban development, noise (primarily traffic noise), and other sources of visual and auditory intrusion. This shows that disturbance is associated with the 'A' roads that run through the area including the A140, A148 and A47. Intrusion also occurs in and around the city of Norwich and the towns of Aylsham, Holt, Sheringham and Cromer.

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

Category of intrusion	1960s (%)	1990s (%)	2007 (%)	% change (1960s-2007)
Disturbed	10	21	34	24
Undisturbed	87	75	60	-27
Urban	3	3	n/a	n/a

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are an increase in disturbed or intruded land by nearly 24 per cent which is matched by a reduction of around -27 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

Cromer.

12. Data sources

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

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

Supporting document 2: Landscape change

Recent changes

Trees and woodlands

- Countryside Quality Counts (CQC) data suggests that woodland resource was enhanced between 1999 and 2003 with an area equivalent to 5 per cent of the 1999 total stock approved for new planting under a Woodland Grant Scheme (WGS) agreement (166 ha), and the proportion of ancient woodland sites covered by a WGS increasing from 18 per cent to 39 per cent.

- Overgrazing of woodland through expansion of deer populations, invasion of ancient woodlands by non-native species (especially rhododendron), the cessation of traditional management practices and the loss of oak through Sudden Oak Death are all thought to have led to a recent reduction in structural diversity in Norfolk woodlands[4].

- The NCA has nearly 3,500 ha (5 per cent) of coniferous woodland, with commercial timber production at sites along the Cromer Ridge and the area around Buxton/Cawston/Marsham. Replacement of native trees with planted conifers occurred extensively in the 1960s and 1970s. While this threat has receded, large-scale felling and modification of the composition of woodland by intensive replanting, even of native broadleaved species, may still be contributing to the impoverishment of diversity in woods.

[4] *Norfolk Biodiversity Action Plan – Lowland Mixed Deciduous Woodland*, Norfolk County Council (2006; URL: **www.norfolkbiodiversity.org/actionplans/habitatactionplans/lowlandmixed.aspx**)

Boundary features

- Hedgerow and hedgerow tree loss was locally severe in the late-20th century but this trend now appears to have stabilised, although further positive management to address the continuing hedgerow removal would bring additional benefits.

- Elm disease in the 1970s and, more recently, premature die-back of other tree species have caused significant losses of mature trees in boundary features.

- Between 1999 and 2003 Countryside Stewardship capital agreements for linear features included fencing (56 km), hedge management (29 km), hedge planting and restoration (84 km), and restored boundary protection (12 km). The total length of agreements between 1999 and 2003 is equivalent to about 7 per cent of this estimated boundary length.

- There are currently approximately 116 km of ditch, 2.5 km of earth bank, 1,300 km of hedgerow and 18 km of woodland boundary features in the NCA.

Agriculture

- Patterns of land use remained relatively unchanged between 2000 and 2009 with 78 per cent of land remaining in arable or horticultural use. Cereal production accounts for 44 per cent of land use. Oilseeds have increased by 342 per cent since 2000 and now account for 4 per cent of land use while cash root crops have reduced from 20 per cent of land use to 16 per cent.

- Numbers of cattle in the NCA remained unchanged between 2000 and 2009 and there was a slight reduction in pigs (-9 per cent) and sheep (-8 per cent).

- Countryside Stewardship uptake for annual area features is consistently above the national average, and the most extensive annual agreements in 2003 were for lowland pastures on neutral/acid soils (951 ha) and regeneration of grassland/semi-natural vegetation (526 ha).

- In 2003 Countryside Stewardship annual agreements for farming practices that support bird populations and increase biodiversity included overwintered stubble followed by a spring crop (96 ha), and overwintered stubble followed by a spring/summer fallow (77 ha).

Settlement and development

- There have been moderately high rates of change to urban areas and new development constructed outside urban and fringe areas. Development is concentrated around larger settlements, especially towards Norwich in Taverham and Horsford, in the coastal towns of Sheringham, Cromer and Overstrand, and along the major route corridors of the A148 and A1067.

- Norwich is the major focus of growth for Norfolk and there is likely to be significant development in this area. Development would be associated with the infrastructure provided by main roads and are likely to have considerable impact on the NCA, both directly through actual housing development, and indirectly through increases in traffic and demands on resources, especially water. New roads and improvements to the road and rail network are planned to meet the demands of new development.

- There have been a significant number of barn conversions in the NCA although 85 per cent of traditional farm buildings remain unconverted.

Semi-natural habitat

- The loss of heathland to arable cultivation and coniferisation in the early-to mid-20th century has been significant particularly along the Cromer Ridge. There are opportunities to manage remnant heathland and to investigate the potential for its re-creation. In 2003 Countryside Stewardship annual agreements included enhancing existing lowland heath (175 ha), re-creation of heathland (26 ha), and base payment to sustain existing heath (26 ha).

- A project is currently underway at Holt Lowes (SAC, SSSI) valley fen site, aiming to restore open heathland.

- Countryside Quality Counts (CQC) data suggests that the status of semi-natural habitat has been maintained. The most extensive annual Countryside Stewardship agreements in 2003 were for lowland pastures on neutral/acid soils (951 ha) and regeneration of grassland/semi-natural vegetation (526 ha).

- A whole river restoration project is currently underway in the Wensum (see 'Coasts and rivers' below), and a chalk river restoration project, through the Catchment Restoration Fund, is taking place in the Glaven and is at the planning stage for the River Stiffkey.

Historic features

- Countryside Quality Counts (CQC) data suggests that the recent status of historic parkland has been maintained. There were around 110 ha of Countryside Stewardship agreements for management of historic landscapes in 2003. About 43 per cent of parkland is covered by a Historic Parkland Grant, and about 34 per cent is included within an agri-environmental scheme.

- About 85 per cent of historic farm buildings remain unconverted and most are intact structurally.

- Historic features need to be recorded and assessed. Coastal erosion and lack of conservation work currently threatens historic Second World War anti-invasion features. Loss of historic features is seen as a natural occurrence on coastlines.

Coast and rivers

- The characteristic sandstone cliffs between Cromer and Mundesley are part of the most physically active length of the Norfolk coastline in terms of sea erosion, and are the main provider of sediment for beaches further along the coast.

- There has been a loss of traditional, historic contrast between uplands and river valleys due to poplar plantations on valley floors and loss of wet woodland habitat due to restocking with poplar trees, both of which have impacted on valley character particularly in the Stiffkey and Glaven valleys.

- The ecological condition of the River Wensum (SAC, SSSI) declined at four out of five survey sites between 1980 and 2002, and the river was assessed as being in unfavourable condition due to water quality, siltation and physical modification issues. A whole river restoration strategy is currently underway to restore a more natural measure of hydrological functioning so that it can sustain characteristic wildlife and fisheries[5].

Minerals

- The NCA is an important producer of minerals, with safeguarded sites protected from other development, and new proposals to quarry sand and gravel from glacial deposits to the south of Holt and to the north and northwest of Norwich.

- The distribution of new mineral extraction facilities in Norfolk will be aligned with growth and regeneration areas, due to the increased need to supply local aggregates for growth-related infrastructure.

- All mineral workings will be covered by progressive restoration schemes; the enhancement of Norfolk's biodiversity and the creation of new, high-quality, distinctive landscapes will be strongly supported[6].

- Currently active mineral sites have restoration plans for varying uses including nature conservation, such as heathland and bare rock, at Beeston Regis (18.62 ha), agriculture and heathland at Holt (13 ha), and agriculture at Spixworth (32 ha)[7].

[5] *River Wensum Restoration Strategy,* Natural England (2009)

[6] *Norfolk Minerals and Waste Local Development Framework. Core Strategy and Minerals and Waste Development Management Policies Development Plan Document 2010–2026,* Norfolk County Council (2011)

[7] Nature After Minerals website (URL: **http://afterminerals.com/index.aspx**)

Drivers of change

Climate change

- Climate change is predicted to result in warmer, wetter winters and hotter, drier summers in the east of England. This could increase the length of the growing season but also cause increased drought stress which may necessitate changes to agricultural crops.
- Increased droughts during summer months would impact on water availability, affecting spray irrigation of crops, public water supplies and wetland habitats. Reduced flows in the NCA's important river systems would adversely affect their biodiversity.
- Increasing storm events may impact on river and wetland systems in the NCA with greater flood risk in areas of Norwich and along river corridors.
- Agricultural land is 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.
- Climate change may result in changes in the species composition of semi-natural habitats with a general northward movement of species. It will therefore be important to ensure connectivity between fragmented habitats to facilitate this northern migration.
- Heathland habitats and valley mire systems would be susceptible to increasing periods of drought with possible change in species composition as a consequence.
- A change in species composition may occur in woodlands as drought-tolerant trees from southern Europe, such as the Holm oak, out-compete native species. In addition climate change may make trees more vulnerable to disease such as ash die-back and sudden oak death.
- Projected rises in sea level are predicted to have significant impact- on the coastline.

Other key drivers

- New developments and their associated infrastructure are likely to have considerable impact on the NCA, both directly through actual housing development and indirectly through increases in traffic and demands on resources, especially water and minerals.
- New mineral sites will be needed to meet the demands of development. The restoration of mineral and waste sites offers opportunities to enhance biodiversity and the character of the landscape.
- The creation of greenspace and planting broadleaved woodland as part of new developments may help to reduce their impact while providing new sites for recreation, improvements to biodiversity and linkages for fragmented habitats.
- Greater demands on agriculture to produce higher yields could put pressure on the remaining areas of semi-natural grassland and other semi-natural habitats. It may also lead to deterioration in water quality, through the run-off of soil nutrients and increased use of herbicides and pesticides.
- An increase of visitor numbers to the north Norfolk coast puts pressure on the landscape through increased traffic, reduced tranquillity and potential damage to habitats and species.

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.

Soft cliffs along the coast from Overstrand to Mundesley.

Statement of Environmental Opportunity	Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place/inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
	Ecosystem Service																		
SEO 1: Work with the local farming community to safeguard future food production, while maintaining the traditional landscape character with its patchwork field system, mixed hedges and pastoral river valleys; enhancing biodiversity, especially in arable margins and hedgerows, geodiversity, water quality and availability, pollination, soil quality, and managing soil erosion; and addressing the impacts of climate change.	↗ **	↑ **	↗ **	n/a	↗ *	↗ **	↑ ***	↗ *	↑ ***	↑ ***	↑ ***	↑ **	↔ **	↗ **	↔ **	↗ *	↔ **	↗ **	↗ **
SEO 2: Maintain, enhance and restore priority habitats including woodlands, areas of remnant heathland, and the nationally and internationally important Norfolk Valley Fens, chalk river systems (including the River Wensum) and maritime cliff habitats. Seek opportunities to connect fragmented habitats, improving the area for biodiversity and recreation, and enhancing landscape character and resilience to climate change.	↔ **	↘ *	↔ **	n/a	↘ **	↗ ***	↗ ***	↗ **	↔ *	↗ **	↑ ***	↑ **	↗ **	↗ ***	↔ **	↑ **	↗ **	↑ ***	↔ **

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

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

Statement of Environmental Opportunity	Ecosystem Service																		
	Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place/inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
SEO 3: Conserve and enhance the historic character of the area while affording protection to heritage assets, biodiversity, geodiversity and water resources, and encouraging sustainable tourism and recreational use and also a sympathetic approach to development in coastal areas, around market towns and towards Norwich.	↔ **	↗ **	↔ *	n/a	↗ *	↗ *	↗ **	↗ *	↔ **	↔ **	↔ **	↔ **	↗ **	↗ **	↗ **	↗ *	↑ ***	↗ **	↔ *
SEO 4: Ensure the sustainable development of the coastline and its coastal towns and villages, while protecting and enhancing its important geodiversity, encouraging natural coastal processes where possible, improving access and interpretation, and encouraging sustainable recreational use and visitor enjoyment while conserving sites with high biodiversity value including maritime cliff habitats.	↔ ***	↔ ***	↔ ***	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
Gently undulating to flat terrain with variable glacial soils, dissected by rolling wide river valleys.	■ Wide open views with wooded horizons and big skies. ■ Gravels, sands, chalk and boulder clay were deposited by the retreating ice of Pleistocene glaciations. ■ Varied land cover is a reflection of mixed glacial soils, which determine natural vegetation patterns. ■ Sediment deposits provide an archive of information on the geological history of the area. ■ Mineral extraction of glacial deposits mainly occurs to the south of Holt and towards Norwich. ■ Underlying Chalk bedrock forms a principal Chalk aquifer.
The Cromer Ridge.	■ Glacial outwash deposits from the retreating ice sheets of the Anglian glaciations form this distinctive Cromer Ridge. ■ The ridge is more densely wooded than surrounding areas and contains important remnant heathlands and mires.
Coastal cliffs.	■ The eroding cliffs and natural coastal processes are of great geomorphological importance, providing the main source of sediment recharge elsewhere along the coast. ■ Internationally important Pleistocene sediment and fossil deposits are exposed in eroding coastal cliffs. ■ Important maritime cliff habitats and species.
Ancient tranquil countryside with a long-settled agricultural character.	■ A sporadically rationalised patchwork field system, sinuous lanes and mixed hedges with hedgerow oaks. ■ Predominately arable land use. ■ Land use patterns have remained relatively unchanged from the 14th century until 20th-century rationalisation resulted in larger fields and the removal of hedgerows in some areas. ■ High levels of tranquillity are found away from main roads. ■ Hedgerows and set aside in arable land provide important refuges for wildlife and link fragmented semi-natural habitats.

Landscape attribute	Justification for selection
Relatively well-wooded landscape.	■ Relatively well-wooded landscape with a variety of woodland types with ancient woodland largely confined to isolated small pockets. ■ The loss of traditional coppice management has reduced structural diversity of woodlands. ■ Areas of ancient woodland have been supplemented with plantations of broadleaved and conifers. ■ Poplar plantations have altered the traditional landscape on river valley floors. ■ Cromer Ridge is more densely wooded than surrounding areas.
Important areas of remnant heathland.	■ Heathland was historically more extensive but important remnant habitat still remains. ■ Species-rich valley mire systems are associated with heathland areas. ■ Heathland is particularly extensive on the light sandy soils of Cromer Ridge.
Important chalk rivers and tranquil river valleys.	■ The River Wensum SAC is one of the most important chalk rivers in Britain. ■ River valleys support an important mosaic of wetland, woodland and grassland habitats and species. ■ Tranquillity is generally high in river valleys.
Historic settlement pattern with traditional building vernacular and materials and numerous prominent churches.	■ A historic pattern of interspersed villages and isolated farmhouses within a complex minor road network, with a traditional pattern of market towns, still persists. ■ A cohesive 17th- and 18th-century vernacular architecture has preserved into the 20th century. ■ Distinctive red brick and flint buildings with pantiled roofs are an inherent component of the Norfolk character. ■ Unusually rich density of medieval churches which are prominent features of the flat landscape.
Large number of 18th-century estates with their associated parkland.	■ Medieval manors formed the basis of 17th- and 18th-century country house estates of various sizes. ■ Many estates have accompanying parkland and frequently have their own church and village. ■ Major country estates include Sheringham, Blickling and Felbrigg.

Landscape opportunities

- Allow natural coastal geomorphological processes to take place unimpeded.
- Protect internationally important Pleistocene sediment, fossil deposits and maritime cliff habitats and species along the coastline.
- Protect the important landscape feature of the Cromer Ridge and its woodland, heathland and fen habitats.
- Protect the historic settlement pattern by ensuring that new development maintains intrinsic character, building vernacular and materials.
- Protect the historic enclosed field pattern, with its characteristic winding lanes and boundary hedges.
- Protect the numerous, prominent churches that form distinctive landmarks in the landscape.
- Protect 18th-century estates and parkland from development and enhance their landscape character, biodiversity, wildlife and recreational value.
- Manage and enhance woodlands by replacing conifer and poplar plantations with native tree species, re-introducing traditional coppice management, creating new woodlands and connecting fragmented habitats.
- Manage and enhance heathland habitats, restoring remnant areas and connecting fragmented habitats.
- Manage chalk rivers to improve biodiversity by restoring a naturally-functioning system where possible, removing obstructions and barriers and re-connecting rivers to their flood plain.
- Manage and enhance existing arable farmland for wildlife by working with landowners to reinstate hedgerows, increase areas of set aside and arable margins, and adopt wildlife-friendly land management practices through stewardship schemes.
- Plan green infrastructure, including areas of broadleaved woodland to screen new developments, to enhance landscape character, improve biodiversity and recreational opportunities, and to make a positive contribution to climate change.
- Plan strategic and local networks of sustainable transport and public access linkages to improve recreational opportunities and mitigate for increased visitor pressure.

Ecosystem service analysis

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

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

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Food provision	Extensive arable farmland Fertile soils	Extensive areas of high quality arable farmland. Over 74 per cent (53,380 ha) of the NCA is under agricultural management, predominately for arable cultivation. Cereal crops dominate, with some cash root crops and oilseed production. Grass and uncropped land represent 22 per cent of the farmed area. The remainder is largely used for horticulture. Pigs are the most common livestock in the NCA with nearly 60,900 animals, compared to 13,800 cattle and 19,000 sheep.	National	The NCA is a rich and productive agricultural area that is a major producer of arable crops, including wheat, potatoes and sugar beet, which are sown on rotation with break crops of barley and oilseed rape. The high quality of the arable land has tended to restrict animal husbandry. There are increasing pressures in the agricultural landscape on water availability, water quality, soil quality and erosion. Sustainable land management practices will help to address these issues while maintaining, and potentially enhancing, yield.	Work with the local farming community to safeguard future food production while enhancing key ecosystem services such as biodiversity, water quality, water availability, soil erosion and quality and pollination services, and addressing climate change. Manage the agricultural landscape in a sustainable way to improve long-term viability of agriculture and yields, while protecting the natural assets of the area.	**Food provision** **Biodiversity** **Geodiversity** **Sense of place/ inspiration** **Regulating soil erosion** **Regulating water quality** **Pollination**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Timber provision	Existing woodland Commercial timber production Hedgerows	The existing woodland cover (11 per cent) consists of some deciduous woodland, coniferous plantations, ancient woodland (especially in the north and west of the NCA) of which some are SSSIs and ancient replanted woodland. There is commercial timber production at sites along the Cromer–Holt Ridge and the afforested area around Buxton/ Cawston/Marsham. Poplar plantations are a feature of river valley floors. Some areas of the NCA are densely planted with hedgerows and hedgerow oaks.	Local	The NCA is relatively well- wooded for East Anglia and has a variety of woodland types: Mixed woodland or pasture woodland (oak and beech) on heavier soils and conifers on the lighter sands. Semi-natural ancient woodland within the NCA is generally confined to isolated small pockets. Planting additional areas of broadleaved woodland linking these areas could address this habitat fragmentation, improve biodiversity and increase carbon storage, and if sustainably managed could provide a source of timber. There may be scope to reinstate hedgerows and hedgerow trees, including boundary oaks, which would help to strengthen landscape character. Management of hedgerows could provide a source of local wood fuel. Areas of poplar plantation in river valleys could be restocked with native wet woodland to improve the biodiversity value of river flood plains. There is also some scope for mixed deciduous planting on valley sides. This would provide limited scope for timber production.	Manage existing timber plantations to provide a sustainable source of timber. Maintain and enhance areas of ancient semi-natural woodland and plant new areas of broadleaved woodland to address fragmentation. Strengthen the characteristic hedgerow network by protecting, managing and reinstating hedgerows and hedgerow trees. Increase the biodiversity of river valleys by restocking poplar plantations with native wet woodland. Seek opportunities to buffer isolated ancient woodland sites.	**Timber provision** **Biomass energy** **Tranquillity** **Sense of place/ inspiration** **Biodiversity** **Climate regulation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability	Rivers Chalk aquifer	The main rivers in the NCA are the Tud, Wensum, Bure, Stiffkey, Glaven and Mun. There is a principal Chalk aquifer underlying the NCA. Abstraction is mainly for public water supply and agriculture (including spray irrigation). There are numerous potable water boreholes to the north and west of Norwich which are used to draw water from the aquifer. The rivers Wensum and Tud have no water available for licensing at low flows but some available at medium to high flows. The Bure has restricted water available at low flows and some available at medium to high flows[8]. The rivers Stiffkey and Glaven have water available for abstraction at medium to high flows, and the River Mun only has water available at high flows[9]. **Continued on next page...**	Regional	Water within the NCA is extensively abstracted for public water supply and agriculture. Over the last thirty years there have been increasing demands for water abstraction and this is set to increase due to new development, especially in the area towards Norwich. Integrated management of the water resource, including rivers and the underlying aquifer, as well as the adoption of measures to improve aquifer recharge and targeted drainage management to increase water availability in periods of low rainfall, would ensure future water supplies for public use and agriculture. Restoring and creating new areas of wetland habitats, including wet grassland, fen and carr habitats, would aid recharge of the underlying aquifer contributing to the amount of water available for use. The Stiffkey, Glaven and Mun provide a supply of freshwater to a number of protected sites including the North Norfolk Coast (Ramsar, SAC, SPA, and SSSI), the Norfolk Valley Fens (SAC) and the Overstrand Cliffs (SPA). The Tud and Wensum, which is itself a SPA, provide a main source of freshwater for the Broads (Ramsar, SPA, and SAC). Sustainable management of water in the NCA would ensure that river flows and aquifer levels are maintained at levels necessary to sustain the geomorphological and ecological interest of river systems and associated wetland habitats.	Seek, where possible, to increase the water retention ability of soil, and reduce the rate of water loss from the area through the establishment of rough vegetation and targeted drainage management to increase water availability in periods of low rainfall. Work with abstraction licence holders to develop options to improve sustainability of the water resource. Restore and create new areas of wetland habitats, including wet grassland, fen and carr, to aid aquifer recharge. Promote integrated water management to slow run-off and increase infiltration	**Water availability** **Geodiversity** **Regulating water quality** **Regulating soil quality** **Biodiversity** **Sense of place/ inspiration** **Regulating soil erosion**

[8] *The Broadland Abstraction Licensing Strategy (2013),* Environment Agency
[9] *The North Norfolk Abstraction Licensing Strategy (2013),* Environment Agency

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability cont.	Rivers Chalk aquifer	**... continued from previous page** The status of the surface water body also applies to the groundwater (aquifer) status throughout the NCA. The principal Chalk aquifer underlies a large area of the East Anglian Plain and therefore also supplies water to adjoining NCAs.			to aquifers (reduce soil compaction, increase soil organic matter, create semi-natural habitats adjacent to watercourses on agricultural land) and targeted drainage management wherepossible to increase water availability in periods of low rainfall. Ensure that the freshwater resource for internationallyimportant river and wetland habitatsis protected through the management of water abstraction levels, andthrough sustainable land and water management.	
Genetic diversity	N/A	N/A	N/A	N/A	N/A	N/A

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biomass energy	Woodland Commercial timber production	The NCA has an existing woodland cover of 11 per cent and has some commercial timber production at sites along the Cromer–Holt Ridge and the afforested area around Buxton-Cawston-Marsham. The potential short rotation coppice (SRC) yield in the NCA is generally medium, although there is a small area with low potential to the north of Norwich. The potential miscanthus yield in the NCA is high.	Local	The existing woodland cover offers considerable potential for the provision of biomass, both through bringing unmanaged woodland under management and as a by-product of commercial timber production. The NCA offers opportunity for SRC and miscanthus in most areas apart from river valley floors. Care should be taken to avoid adverse impacts on the existing landscape, including obscuring characteristic hedgerow and field patterns. SRC may offer opportunity to extend and connect existing woodlands and soften the boundaries of new settlements.	Bring local woodlands into traditional coppice management, generating a local supply of biomass. Similarly the arisings from hedge bank management could supply a local demand for biomass. Opportunities to plant SRC, in association with existing woodland and new development, and miscanthus should be investigated, taking care to ensure no adverse impacts on existing landscape character.	**Biomass energy** **Climate regulation** **Tranquillity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation	Peaty and alluvial soils River valleys Wetland, heathland and woodland habitats	The minerals soils over much of the NCA have a low carbon content (between 0 per cent and 5 per cent) associated with the lighter loamy soils under agricultural management. There are a number of areas in the NCA with soils with a higher carbon content. In particular wet peaty and alluvial soils, that may be associated with areas of remnant wetland habitat, are found in the numerous small tributary valleys of the Bure and Wensum. Organic-rich soils are likely to be found beneath areas of woodland cover (11 per cent of the NCA) and the some 700 ha of remnant lowland heathland overlaying the light sandy soils of the NCA.	Local	Carbon sequestration and storage can be increased in soils with low carbon content by increasing organic matter content and by reducing the frequency and area of cultivation. Organic topsoils, found in wetland habitat and areas of lowland heathland and woodland, are important to conserve due to their high levels of carbon storage and sequestration. Reinstating and creating new wetland habitat in areas such as the Wensum Valley could enhance the organic content of associated soils. Sustainable management of the freshwater resource across the NCA is needed to ensure the future of its wetland and river habitats in the face of increasing pressure. There may be the potential for increasing carbon sequestration by planting new broadleaved woodland, by reinstating and creating hedgerows, and by restoring areas of heathland. **Continued on next page...**	Work with land managers to increase organic matter in soils through management interventions including the use of grass leys and introducing fallow into rotations/overwinter stubbles, through stewardship schemes. Conserve areas with high organic content in soils, including wetlands, heathland and woodland. Maintain, enhance and create new areas of freshwater wetland habitat, and sustainably manage the freshwater resource to ensure its future sustainability. Plant sustainably- managed broadleaved woodland and reinstate and create new hedgerows where feasible. Maintain and enhance existing areas of heathland, and restore heathland habitat where possible.	**Climate regulation** **Biodiversity** **Regulating soil quality** **Regulating soil erosion** **Regulating water quality** **Timber provision** **Sense of place/ inspiration** **Geodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation cont.				**...continued from previous page** Creating new areas of semi-natural habit within the NCA, including hedgerows and field margins, and re-naturalising river valleys, would link fragmented habitats and provide wildlife corridors enabling species to move in response to climate change.	Seek opportunities to link fragmented habitats with other semi-natural habitats to enable species to move in response to climate change.	
Regulating water quality	Rivers Chalk aquifer Semi-natural habitats	Water quality is generally poor within this NCA. The ecological potential status of the River Wensum is 'bad', that of the rivers Bure and Stiffkey is 'poor', and that of the rivers Tud and Glaven is 'moderate', while the surface water chemical status of the River Wensum is 'failing to achieve good quality'. None of the other rivers in the NCA have been subject to surface water chemical testing but the groundwater chemical status in the NCA is 'poor.' [10] **Continued on next page...**	Regional	Catchment Sensitive Farming schemes are working with farmers to adopt land management practices to improve water quality by reducing pollution from agricultural sources and reducing sedimentation of rivers from soil erosion. Enhancing semi-natural habitats adjacent to watercourses, including woodland on valley slopes, hedgerows in arable land, and grassland and riparian habitats on valley floors, would improve water quality through capturing sediment run-off before it reaches river systems.	Work with farmers to reduce sources of nitrate leaching to groundwater and run-off to surface waters by promoting the adoption of best practice measures, including the more efficient use of organic manures and fertilisers. Work with farmers to reduce the loss of sediment and associated phosphates from agricultural land through appropriate changes in land management, including the use of buffer strips adjacent to watercourses.	**Regulating water quality** **Regulating water flow** **Biodiversity** **Regulating soil erosion**

[10] *River Basin Management Plan: Anglian River Basin District,* Environment Agency (2009)

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality cont.		**... continued from previous page** There are four priority catchments under the England Catchment Sensitive Farming Delivery Initiative (ECSFDI) within this NCA: the North Norfolk Rivers, the Bure, Ant and Muckfleet, the River Wensum and a small area of the Yare. The main causes of the poor status of many of the NCA's rivers have been identified as: diffuse pollution from agriculture (resulting in high nitrate and phosphate levels); sedimentation; point source pollution from sewage treatment works and industry; over abstraction; invasive species and physical modification of river systems.		There is some point source pollution from sewage treatment works and industry and diffuse pollution through run-off in urban areas. Encouraging the adoption of best practice measures to reduce pollution incidents, and the use of sustainable urban drainage systems (SUDS), would reduce risks of contamination of the water resource. Development within the NCA is likely to increase pressures on the water environment, and increase potential sources of pollution, especially in more urban areas towards Norwich, but there is potential to mitigate for this by including measures to ensure the sustainable management of water resources. Invasive species, including signal crayfish and pennywort, are present in a number of the NCA's rivers. Measures should be adopted to avoid the spread of invasives to areas where they are not present, and to remove them from the river environment where possible. Physical modifications to rivers contribute to the poor ecological status or potential in the NCA, for example, by acting as barriers to fish passage for breeding brown trout and eels, on rivers including the Glaven, Stiffkey and Nar. Removing or modifying these barriers to allow fish passage would contribute to the ecological health of the NCA's river systems.	Maintain and enhance semi-natural habitats adjacent to watercourses and along river valley slopes to reduce sediment run-off. Ensure local developmentplans 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 urban drainage systems, sewage treatment options and reducing nutrients from diffuse pollution. Raise awareness of the problem of invasive species and adopt appropriate management for their control. Modify or remove barriers on river systems, where possible, to allow migrating fish passage.	

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow	Rivers and river flood plains Wetland habitats including wet grassland, fen and carr	There is a long history of river flooding associated with the River Wensum in Norwich (see also NCA 84). In the past many thousands of properties have been flooded, with notable events in 1878, 1912 and 1992. In addition, the inability of the River Wensum to flow freely to the sea at high tide (tide locking) increases the risk of flooding at Norwich. High concentrations of impermeable surfaces within the city also increase the risk of surface water flooding. Currently flood protection in Norwich is offered by flood walls which are in good condition and which will continue to be maintained[11]. Flood risk is generally low to moderate in the other main rivers in the NCA, including the rivers Tud, Bure, Stiffkey and Glaven. In Mundelsey in the far north-east of the NCA, however, there is a risk of severe flooding from the relatively minor River Mun[12].	Regional	The main approach to managing future flood risk in Norwich will be to investigate opportunities for increasing flood storage upstream of the city along the River Wensum corridor by maximising the potential of the flood plain to retain water and re-naturalising the river course and its habitats. This will provide considerable potential to reinstate the wet grassland, fen and carr habitats (which would also aid recharge of the underlying aquifer). Where flood risk is generally low to moderate, the proposed approach is to investigate options to cease or reduce current maintenance of channels, banks and flood defences so as to increase the natural flow of water between the rivers and their flood plains, again offering the potential for the re-creation of valuable wetland habitats as part of wider flood alleviation proposals. For the River Mun, flood volumes are expected to increase in the future and therefore a flood risk management strategy will investigate how flood risk can be reduced, with particular attention paid to the removal of river obstruction.	Investigate the most appropriate options and locations for flood plain storage in the River Wensum flood plain. Restore wet grassland, fen and carr habitats in the Wensum river corridor (SAC, SSSI). Re-create wetland habitats to reduce flood risk, where appropriate, as part of flood alleviation proposals and enabling aquifer recharge. Investigate opportunities to re-naturalise river systems by removing structures and re-connecting rivers to their natural flood plains.	**Regulating water flow** **Biodiversity** **Sense of place/ inspiration** **Climate regulation** **Geodiversity**

[11] *Broadland Rivers Catchment Flood Management Plan. Summary Report,* Environment Agency (2009)
[12] *North Norfolk Catchment Flood Management Plan. Summary Report,* Environment Agency (2009)

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil quality	Freely draining soils Soils with impeded drainage	The NCA has highly varied soils. There are eight main soilscape types in this NCA: ■ Freely draining slightly acid loamy soils, covering (50 per cent of the NCA). ■ Freely draining slightly acid sandy soils (23 per cent). ■ Loamy and sandy soils with naturally high groundwater and a peaty surface (9 per cent). ■ Slightly acid loamy and clayey soils with impeded drainage (9 per cent). ■ Shallow lime-rich soils over chalk (3 per cent). ■ Naturally wet very acid sandy and loamy soils (3 per cent). ■ Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (3 per cent). ■ Fen peat soils (1 per cent).	Regional	The freely draining slightly acid loamy soils and the freely draining slightly acid sandy soils, which together cover 73 per cent of the NCA, may be valuable for aquifer recharge requiring the maintenance of good structural conditions to aid water infiltration. Increasing organic matter levels through management interventions, including the use of grass leys, would improve soil structure. The slightly acid loamy and clayey soils with impeded drainage are easily poached by livestock and compacted by machinery when the soil is wet. Careful timing of activities is required to reduce the likelihood of soil compaction. Changing management practices to reduce damage to soil quality could provide increases in food production in the long term. Increases in soil quality will reduce negative impacts from farming on the natural environment through reduction in run-off pollution. This will improve water quality and biodiversity.	Work with the farmingcommunity to ensure best practice in soil management to improve structure and quality of soils. Increase organic matter in soils through management interventions including the use of grass leys and introducing fallow into rotations and overwinter stubbles. Reduce soil compaction by careful timing of activities, including reducing unnecessary machinery use in wet conditions.	**Regulating soil quality** **Regulating soil erosion** **Food provision** **Biodiversity** **Geodiversity** **Regulating water quality** **Sense of place/ inspiration**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion	Light soils under agricultural management Semi-natural vegetation cover	The soils in the NCA are generally light and most (97 per cent) are at risk of erosion. The freely draining slightly acid soils and the shallow lime-rich soils over chalk (together covering 76 per cent of the NCA) are also prone to pluvial erosion where cultivated or bare soil is exposed, especially on moderately or steeply-sloping land. The slightly acid loamy and clayey soils with impeded drainage (covering 9 per cent of the NCA) are prone to compaction and capping/ slaking, leading to increased risk of erosion by surface water run-off, especially on steeper slopes. The naturally wet very acid sandy and loamy soils are also easily eroded if heavily-trafficked or after heavy rain. **Continued on next page...**	Regional	There are parts of four priority catchments under the ECSFDI covering this NCA which all identify soil erosion as a particular issue. Soil erosion is particularly associated with run-off on steep slopes and with vulnerable soils under agricultural management, and is exacerbated where organic matter levels are low after continuous arable cultivation or where soils are compacted. There is a high risk of erosion in soils where the timing of operations results in land being left bare during periods of high rainfall, for example, high risk crops including spring sown cereals, field vegetables, sugar beet, maize and potatoes, and outdoor pig rearing. Buffer strips along watercourses and the re-creation of natural flood-plain habitats would help reduce erosion by capturing sediment run-off. Cattle poaching on the banks of rivers is a particular problem in some areas, including the River Stiffkey. Wind erosion of soils can be reduced by planting hedgerows in areas at high risk.	Work with farmers to increase organic matter in soils through promoting management interventions including the use of grass leys and introducing fallow into rotations and overwinter stubbles. Reduce soil compaction by encouraging the careful timing of land management activities, including reducing unnecessary machinery use in wet conditions. Create buffer strips adjacent to watercourses and, where possible, re-create natural flood-plain habitat. Plant hedgerow boundaries where appropriate to protect soils against wind erosion. Seek opportunities to create semi-naturalhabitats and ecological networks within the farmed landscape which will protect soils and water and enhance biodiversity.	**Regulating soil erosion** **Regulating water quality** **Food provision** **Biodiversity** **Geodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion cont.		**...continued from previous page** Around 80 per cent of the soil cover of the NCA is at risk of wind erosion including the coarse-textured cultivated variants of the freely draining slightly acid loamy soils; the freely draining slightly acid sandy soils; the sandy variants of the shallow lime-rich soils over chalk; the naturally wet very acid sandy and loamy soils; and the fen peat soils.				
Pollination	Heathland, grassland and meadow habitats Field margins Hedgerow banks	The NCA contains heathland, grassland and meadow habitats which support a variety of nectar sources. Field margins and hedgerow banks in agricultural land provide important foraging sources for pollinator species.	Local	The NCA contains large areas of agricultural land with some food crops which are dependent on insect pollination, and its semi-natural habitats provide an important refuge for pollinator species. Pollen and nectar margins on arable farms (through agri-environment schemes) can provide important foraging habitat for pollinators. These should be increased where possible. Hedgerow banks can be managed to provide important nectar sources and may act as wildlife corridors between semi-natural habitats.	Maintain and enhance the floristic diversity of lowland meadow, lowland heathland and other semi-natural habitats to increase the area of habitat suitable for pollinators. Work with the farming community to encourage sympathetic management for pollinator species and to increase the areas of pollen and nectar margins on arable farms. Maintain and enhance the floristic diversity of hedgerow banks, where possible, to increase nectar sources and provide corridors between semi-natural habitats	**Pollination** **Biodiversity** **Food provision** **Sense of place/ inspiration**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pest regulation	Semi-natural habitats Field margins	Semi-natural habitats adjacent to arable farmland support populations of pest- regulating invertebrate, bird and mammal species.	Local	Increasing diversity in species and structure of field margins will increase the ability for these areas to support populations of pest-regulating species. There may be opportunities to improve the network of semi-natural habitats across the NCA through appropriate management of existing habitats and creation of new habitat.	Seek opportunities to increase field margins, species-rich hedgerows and beetle banks to encourage a network of habitats for pest-regulating species close to areas of agricultural production. Manage semi-natural habitats to increase diversity of structure and composition and increase populations of pest-regulating species.	**Pest regulation** **Pollination** **Biodiversity** **Food provision** **Sense of place/ inspiration**
Regulating coastal erosion and flooding	Sea defences Coastline, coastal cliffs and beaches Maritime cliffs and slopes Lowland heathland Geomorphological processes	The coastal strip between Kelling and Cromer is characterised by low rates of sediment transport and relative stability when compared to much of the rest of the coastline in this area. There are policies in the Kelling to Lowestoft Ness Shoreline Management Plan (SMP) for managing coastal erosion by pursuing a policy of 'hold the line' immediately in front of Sheringham and Cromer. **Continued on next page...**	Regional	The Kelling to Lowestoft Ness SMP has identified that sustainable shoreline management needs to consider the functioning of the coastline as a whole, and preventing erosion in certain areas of the NCA (Cromer to Mundesley) will have an overall negative effect on coastal processes. Both Overstrand and Mundesley will continue to develop as promontories if their present positions are defended. This would result in as much as 70 per cent of the sediment supply	Implement sustainable shoreline management plans, preventing coastal erosion in the economically important towns of Cromer and Sheringham, and allowing the re-establishment of a more naturally- functioning coastline elsewhere over the long term. Explore options for re-establishment of a naturally-functioning coastline, taking into account the dynamics of the geomorphological processes, climate change and the appropriateness and efficacy of hard, soft and natural sea defences, while working in partnership and involving and taking the needs of the local community into account.	**Regulating coastal erosion and flooding** **Sense of place/ inspiration** **Sense of history** **Biodiversity** **Geodiversity** **Recreation**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating coastal erosion and flooding cont.		**... continued from previous page** At other more rural locations, the policy is to 'hold the line' in the short term, but with an intention to withdraw maintenance and allow natural processes to be established once existing sea defences reach the end of their effective lives, in areas where there is no economic justification to defend the coastline. This should work in tandem with policies that allow rural communities to adapt to change and 'roll-back'. The coastline between Cromer and Mundesley is part of the most physically active length of coast within the area. It is the main provider of sediment for beaches, with erosion of this section of coast necessary to allow beaches to build, helping avoid accelerated erosion of the shoreline elsewhere, providing better protection to towns and villages and wildlife habitats at the same time. The policy options for this area identified in partnership include allowing for managed change and continuing to provide defences where justifiable for the immediate future, but with a long-term plan to gradually retreat and relocate, thus enabling a naturally functioning sustainable system to re-establish[13]. The eroding cliffs in the NCA are important for their geodiversity and biodiversity.		to beaches throughout the SMP area being isolated or lost offshore. Consequently, the most sustainable approach for the SMP as a whole is to manage a retreat at these locations in the medium-to-long-term. This would require the relocation of a large number of people, property and services within these settlements. The Plan will therefore seek to maintain present defences for a period of time to allow the important social mitigation measures and mechanisms required to facilitate such changes to be put in place. Projected rises in sea level will have significant impacts by accelerating the natural erosion of the coast and potentially changing natural geomorphological processes.		

[13] *Kelling to Lowestoft Ness Shoreline Management Plan First Review Non Technical Summary,* North Norfolk District Council (2010)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
A sense of place/ inspiration	Strong intrinsic rural character Historic settlement patterns, local vernacular and traditional building materials North Norfolk Coast AONB includes dramatic coastline and Cromer Ridge landform Gently undulating arable land Woodland, heathland and river valleys Prominent medieval churches Country estates and parklands	Senses of inspiration and escapism are found throughout the NCA, associated with its rural views, winding lanes and hedgerows and medieval churches, as well as its parklands, ancient woodlands and remnant heathlands, its undeveloped stretches of coastline with dramatic eroding cliffs, and the city of Norwich, home of the Norwich School of artists. Humphry Repton is buried in Aylsham churchyard and his legacy can be seen in Sheringham Park. Clement Scott popularised this area in poems and articles, calling it 'Poppyland'. Central North Norfolk is a predominately rural area, with a terrain of gentle variation which is more dramatic to the north as it rises to the top of the striking landform created by the Cromer–Holt Ridge, and more rolling further south towards Norwich. A sense of place is created by a long-settled agricultural character, dominated by arable land and a traditional settlement pattern based around small market towns such as Aylsham and Holt. Narrow, twisting lanes link the many villages and scattered farmhouses, built of traditional Norfolk red brick, flint and pantile roofs. **Continued on next page...**	Regional	The overriding character of the landscape is provided by its traditional agricultural landscape and settlement pattern. Intensification of farming activities and increasing pressures from development, including increases in traffic, may adversely affect the agricultural landscape. Restoring and enhancing semi-natural habitats within the NCA, especially woodlands, heathland and river valley systems, would strengthen character. Conserving country houses and their parkland estates will retain their contribution to sense of place and inspiration while providing recreational and tourism opportunities.	Ensure development plans are sensitive to preserving the traditional character of the landscape and promote the use of traditional vernacular and building materials. Restore and enhance semi-natural habitats. Conserve country houses and parkland estates, and encourage their use as a recreational and tourist attraction, while maintaining their biodiversity value.	**Sense of place/ inspiration** **Tranquillity** **Sense of history** **Biodiversity** **Recreation** **Geodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
A sense of place/ inspiration cont.		**... continued from previous page** Areas of woodland and heath are a characteristic feature along with broad, shallow river valleys such as the Wensum, with their riverside pasture and wooded slopes. Medieval church spires are prominent in the landscape. The area has a rich abundance of country house estates and their associated parklands, including the three major estates of Sheringham, Blickling and Felbrigg. Many of these estates have their own church and even village, as at Heydon, which lends a cohesive character to the landscape.				

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history	Anglo-Saxon and mixed-medieval settlement pattern Medieval churches Traditional vernacular and building materials Farmsteads and traditional farm buildings 17th- and 18th-century estates and parklands Historic city of Norwich	A sense of history is evident in the extensive Anglo-Saxon settlement along the Cromer Ridge, resulting in a large number of 'ingham' place names, as well as the mixed medieval settlement pattern throughout the remaining NCA, including numerous well-separated market towns and large villages, and medieval manors with associated warrens and deer parks that later formed the basis of 17th-and 18th-century country house estates. Aspects of history likely to be most evident to the general public include the high density of medieval churches clearly visible within the flatter areas, the villages exhibiting a cohesive 17th- and 18th-century vernacular, the ancient narrow twisting lanes, the farmhouses of traditional Norfolk red brick, flint and pantile roofs, and the 17th- and 18th-century estates and their country houses, including the larger parklands of Sheringham, Blickling and Felbrigg. Most evident of all is the history of Norwich with its cathedral, castle, walls and towers, parish churches and mix of medieval, Georgian and modern architecture.	Regional	Development throughout the NCA could negatively impact on the sense of history through altering the settlement pattern. Development is likely to occur close to existing centres of population and expanding market towns, resulting in the loss of some of their historic character. The use of traditional building materials in new buildings may help to retain landscape character. The conversion of traditional farm buildings to housing is occurring in the NCA. Conserving country houses and their parkland estates will retain historic character while providing recreational and tourism opportunities.	Ensure development plans consider the conservation of historic character of the landscape and promote the use of traditional vernacular and building materials. Conserve country houses and parkland estates, and encourage their use as recreational and tourist attractions, while maintaining their biodiversity value. Ensure the protection of heritage assets, including medieval churches and the historic features of Norwich, while seeking opportunities to enhance interpretation and, where appropriate, improve access.	**Sense of history** **Sense of place/ inspiration** **Geodiversity** **Recreation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Tranquillity	Rural agricultural areas Semi-natural habitats including heathland and woodland River valleys and corridors	This NCA encompasses some of the less tranquil areas in Norfolk, notably around Norwich in the south and the surrounding dormitory settlements, as well as along the north coast between, and including, Cromer and Sheringham and the road network linking these settlements with Norwich and Fakenham (A140 and A148). However, around 60 per cent of the NCA is still classified as 'undisturbed' (despite a decline from 87 per cent in the 1960s), [14] with an extremely tranquil, predominately agricultural, landscape away from main roads and settlements and along areas of river corridors.	Local	High levels of tranquillity in the NCA are predominantly in evidence due to the large areas of agricultural land, but are also particularly related to the substantial areas of semi-natural habitat, including heathland and woodland. These habitats should be maintained and, where appropriate, enhanced and extended to increase tranquillity levels. Long term, the tranquillity of the NCA may be compromised by increases in road traffic (traffic levels are projected to increase by 30 per cent by 2015) and development, particularly close to the main centres of Norwich, Cromer and Aylsham. Incorporating green infrastructure and using semi-natural habitats, for example broadleaved woodland, to buffer new developments may help to retain tranquillity levels. Increases in road traffic, particularly in coastal areas during the peak holiday season, will have a significant impact on tranquillity. Improving sustainable transport and promoting its use, for example the Coasthopper Bus, may help to reduce these impacts. An area in north Norfolk between Cromer, North Walsham and Bacton is part of a 'Quiet Lanes' project, with the aim of managing the minor road network by widening transport choice and making minor rural roads better for all road users in response to rising traffic levels. The project encourages motorists to use the most suitable routes and to be considerate to each other. It also provides links to the public footpath and bridleway networks.	Protect, enhance and where feasible, extend tranquil areas of semi-natural habitat, including heathland and woodland. Minimise the effects of new development by avoiding areas with high tranquillity, incorporating green infrastructure and woodland buffers, and minimising new sources of light pollution. Improve and promote the use of sustainable transport, including the bus network, cycling and footpath routes. Promote the 'Quiet Lanes' project and investigate opportunities to expand the network and improve its effectiveness.	**Tranquillity** **Biodiversity** **Sense of place/ inspiration** **Recreation**

[14] *CPRE Intrusion Map (2007)*

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation	Coastal areas Public rights of way, National Trail and long-distance paths Country houses, parklands North Norfolk Railway Angling North Norfolk Coast AONB	The recreational use of the area is centred upon the resources of the north Norfolk coast, including the resort town of Cromer, the associated centre at East/West Runton and the holiday camps between Cromer and Mundesley. The area created by the boundary of the NCA with the north Norfolk coast (the main A149 coastal road) between Cley and Weybourne, and southwards to Holt in the west and Felbrigg in the east, is also extremely popular with tourists. Sheringham Park, Felbrigg and Blickling Hall further to the south provide the chief 'honeypot' sites. The North Norfolk Railway (or 'Poppyline') provides an additional draw. There are a number of long distance paths, cycle routes and one National Trail within the NCA, with a total of 520 km of rights of way (at a density of 0.72 km per km2). Around 9 km of the Peddars Way and Norfolk Coast National Trail run through the north of the NCA eastwards to Cromer, while several regional routes run through the area: the Paston Way, Weavers Way, Marriotts Way and the Bure Valley Walk. **Continued on next page...**	National	The coast is a popular tourist destination and is under increasing pressure from visitors. It is important to maintain the area as a tourist attraction while protecting coastal habitats that are the main draw for visitors. An integrated visitor management plan for the AONB and remaining coastline which restricts access to vulnerable habitats may help to reduce impacts. Promoting and improving sustainable transport such as the Coasthopper Bus, National Trail, cycle paths etc, may help to reduce the impacts from increasing traffic levels. There is the potential to increase areas of greenspace for recreational use in association with new developments towards Norwich. Encouraging local communities to connect with their natural environment by visiting natural greenspaces is important for mental health. Both physical activity and exposure to nature have separately been demonstrated to benefit mental wellbeing. [15]	Manage public access to avoid adverse impacts on agricultural management, landscape, habitats and wildlife. Create and enhance green infrastructure and opportunities for public access by creating additional linkages between existing public footpaths, settlements, amenities and transport links. Create new areas of greenspace in conjunction with new developments and identify locations for new recreational sites such as county parks. The National Trust, as a key player in visitor attractions, should be encouraged to look at wider integration of visitor management and not only at individual properties. Plus as a landowner of important habitats, The National Trust should further enhance the biodiversity value of their landholdings.	**Recreation** **Sense of place/ inspiration** **Biodiversity** **Sense of history** **Tranquillity**

[15] Pretty, J. and others. 2005. The mental and physical health outcomes of green exercise. *International Journal of Environmental Health Research,* 15(5): 319–337.; Ryan, R.M. and others. 2010. Vitalizing effects of being outdoors and in nature. *Journal of Environmental Psychology, 30: 159–168.*

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation cont.		**... continued from previous page** The Norfolk Coast Cycleway (Sustrans Regional Route 30) runs through the area from Langham to Mundesley. Some of these routes are also bridleways and the area is generally well- provided with bridle paths. The River Wensum is of regional and national importance for its angling and a large number of clubs have fisheries' interests on the river. 15 per cent of the NCA lies within the North Norfolk AONB while Norwich provides a gateway to the Broads.		The National Trust owns three 'honeypot' sites which are all very popular tourist attractions; Sherringham Park, Blickling Hall and Felbrigg Hall.		

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity	Designated nature conservation sites Woodlands Heathland River valleys Maritime cliffs and slopes Agricultural land	The NCA contains two SPAs, six SAC and two Ramsar sites. 952 ha (just over 1 per cent of the NCA area) is nationally designated as SSSI. Just under 11 per cent of the NCA (7,658 ha) is covered by priority habitats. The most extensive priority habitat in the NCA is deciduous woodland (5,256 ha), including small areas of wet woodland and lowland beech/yew woodland. Ancient woodland is largely restricted to the north west and pasture woodland is mostly concentrated along the Cromer–Holt Ridge. Bluebells, lily-of-the-valley and woodland butterflies, including the white admiral, purple hairstreak and speckled wood, are characteristic features. The NCA contains 545 ha of lowland heathland, and associated mire systems, mainly situated on the Cromer–Holt Ridge, where several extensive large blocks remain to the north- west of Norwich and Mousehold Heath in Norwich itself. Other habitats within the NCA include coastal flood-plain grazing marsh, good quality semi-improved grassland, lowland meadow, fen, maritime cliffs and slope, reedbed, lowland dry acid grassland, traditional orchards and rush pastures. River valleys support important concentrations of priority habitats. **Continued on next page...**	National	The NCA contains a very small amount of two Ramsar and SPA designated sites: an area of the Broads on the River Bure and the north Norfolk coast. The NCA supplies water to both areas so integrated management of the resource quality and availability through land management practices and improvements to river systems within the NCA is important to maintain the biodiversity value of these adjacent sites. The River Wensum SAC is one of the most important chalk rivers in the country, and a comprehensive river restoration project is currently underway to restore a more naturally functioning system and improve biodiversity. River restoration projects are also taking place in the Stiffkey and Glaven. The Norfolk Valley Fens SAC sites require continuing management to maintain variation in their structure and floral diversity. The NCA is relatively well- wooded for East Anglia with a variety of woodland types. Ancient woodlands have been supplemented with plantations of broadleaved and conifers, and the cessation of traditional management practices has changed species composition.	Ensure integrated management of the water resource to maintain quality of habitats both within the NCA and in adjacent protected sites. Manage, enhance and restore priority habitats, including heathland, woodland, fens, rivers and river valley habitats to increase connectivity, improve biodiversity and increase resilience to climate change. Encourage the adoption of wildlife- friendly land management practices in agricultural areas to improve biodiversity, including enhancing the hedgerow network and increasing areas and species composition of set aside.	**Biodiversity** **Pollination** **Climate regulation** **Sense of place/ inspiration** **Sense of history** **Recreation** **Tranquillity** **Regulating coastal flooding and erosion**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity cont.		**... continued from previous page** The Norfolk Valley Fens SAC contain concentrations of lowland alkaline fens, which vary in structure according to the intensity of their management and contain a rich flora including grass-of-Parnassus, common butterwort, marsh helleborine and narrow-leaved marsh orchid. Maritime cliffs and slopes are an important feature of the NCA. Flushes caused by springs in the cliffs support reedbeds, bryophyte and rush communities, including the red form of early marsh orchid, and are of importance for breeding Diptera and soldier flies. Maritime grassland is important for purple broomrape and nationally scarce species including sand catchfly and bulbous meadow grass. Agricultural land, especially hedgerows and field margins, provides important refuges for species.		Poplar plantations altering the traditional landscape and reducing biodiversity on river valley floors are a particular problem. Improvements to management, restoring woodland habitat, connecting fragmented sites and replacing conifer and poplar plantations with native trees would improve biodiversity. Heathland in the NCA was historically far more extensive and is now fragmented and enclosed by deciduous woodland or conifer plantations. There are opportunities to improve management of existing heathland sites and to recreate areas of heath. A project to restore open heathland through the removal of scrub is currently underway at Holt Lowes (SAC). The NCA is largely covered by agricultural land and so adopting wildlife-friendly land management practices within these areas, including restoring and enhancing hedgerows and increasing species composition of field margins, could have a significant impact on biodiversity. Habitats within the NCA are largely fragmented and improving connectivity through habitat creation and restoration would improve their resilience for biodiversity, especially in the face of climate change.		

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Geodiversity	Coastal cliffs Landforms Fossil beds Coastal geomorphological processes Glacial deposits River terrace sediments	The NCA contains ten geological SSSI and two mixed- interest SSSI. The north of the NCA is considered to be outstanding in a national context for both its geology and its landforms. It has one of the most complete sequences of Late-Jurassic-to Late-Cretaceous marine strata in Britain. These chalk deposits are capped by an extremely important series of Pleistocene glacial and interglacial deposits. The coastal cliff sections and the inland landforms, including the Cromer–Holt Ridge, are some of the finest of their kind in the British Isles. The Pleistocene deposits in north-east Norfolk are of international importance and include the type-locality for the Cromerian interglacial (West Runton Cliffs SSSI) and the Beestonian interglacial (Beeston Cliffs SSSI). The cliff and foreshore section at West Runton is one of the most important Pleistocene localities, both nationally and internationally. The sediments exposed in the eroding cliffs provide evidence for the repeated climatic fluctuations during the Pleistocene and records several major advances and retreats of the sea and of glaciers. The site also has by far the richest Pleistocene vertebrate fauna known from the British Isles. This information has potential implications for our understanding of future climatic change. **Continued on next page...**	International	The coastal cliffs between Cromer and Mundesley are an inspiring feature of the landscape and make a positive contribution towards a sense of place and history. They provide a wealth of geological information and important access to geodiversity, enabling interpretation, understanding and continued research. There is an opportunity to improve access and interpretation in these areas as well as to help connect the local community and visitors to their geological history. The legacy of the Anglian glaciations still dominates the landscapethroughout the NCA. The gravels, sands, chalk erratics and boulder clays left behind by the retreating ice still determine the natural vegetation patterns. Coastal erosion is likely to increase through climate change and as natural coastal processes are reinstated as suggested in Shoreline Management Plans. This would provide further opportunities to study the geology of the area as new sediments are exposed and natural processes are permitted to operate unimpeded.	Maintain and enhance the geological resource by identifying and improving opportunities for enhanced access to sites and improving understanding of geodiversity through interpretation and education. Continue to research, monitor and record coastal geomorphological processes that shape the coastline, and the geology itself, to improve our understanding and inform future management of the area.	**Geodiversity** **Regulating coastal erosion and flooding** **Recreation** **Sense of place/ inspiration** **Sense of history** **Biodiversity** **Tranquillity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Geodiversity cont.		**... continued from previous page** The West Runton Freshwater Bed and Cromer Forest Beds contain internationally important fossil remains including a diverse range of mammals and embedded tree stumps. The Wensum Valley contains important river terrace sediments which provide a geological archive of post-Anglian glaciation information.				

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