



## Introduction

As part of Natural England's responsibilities as set out in the Natural Environment White Paper<sup>1</sup>, Biodiversity 2020<sup>2</sup> and the European Landscape Convention<sup>3</sup>, 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.

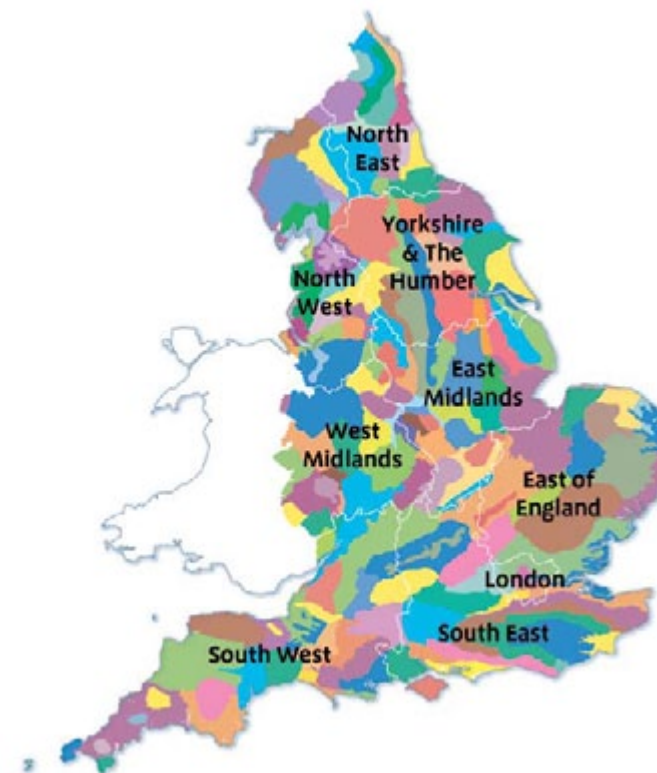
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and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

## National Character Areas map



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

<sup>2</sup> 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](http://www.defra.gov.uk/publications/files/pb13583-biodiversity-strategy-2020-111111.pdf))

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

## Summary

The Shropshire, Cheshire and Staffordshire Plain National Character Area (NCA) comprises most of the county of Cheshire, the northern half of Shropshire and a large part of north-west Staffordshire. This is an expanse of flat or gently undulating, lush, pastoral farmland, which is bounded by the Mersey Valley NCA in the north, with its urban and industrial development, and extending to the rural Shropshire Hills NCA in the south. To the west, it is bounded by the hills of the Welsh borders and to the east and south-east by the urban areas within the Potteries and Churnet Valley, Needwood and South Derbyshire Claylands, and Cannock Chase and Cank Wood NCAs.

A series of small sandstone ridges cut across the plain and are very prominent features within this open landscape. The Mid-Cheshire Ridge, the Maer and the Hanchurch Hills are the most significant. They are characterised by steep sides and woodland is often ancient semi-natural woodland which is notably absent from the plain, except around Northwich.

The landscape character of the plain owes much to its glacial origins. A thick layer of glacial till covers the lower slopes of the ridge and the surrounding plain and is punctuated by numerous ponds and meres. Subsequent colonisation by vegetation has resulted in the establishment of large areas of bog, known as mosses. Some are associated with the development of schwingmoor which is an advancing, floating raft of bog moss. The meres and mosses of the north-west Midlands form a geographically discrete series of nationally important, lowland open water and peatland sites; the finest examples are considered to be of international importance.

The NCA is important for food production. Throughout the plain, the water retention and fertility of the clay soils support lush pastures for grazing dairy cattle. There are a number of dairy processors making a range of dairy products that include ice cream and Cheshire cheese. The lighter soils in Staffordshire and parts of Shropshire support more mixed farms, combinable crops and potatoes in rotation.

[Click map to enlarge; click again to reduce.](#)



The NCA contains several significant flood plains. Its flat, low-lying basins carry meandering stages of ten main rivers, a number of which have sections notified as Sites of Special Scientific Interest for their nationally important geomorphological features or clough woodland and wetland habitats important to birds and insects. A section of the River Dee that flows north along the western boundary of the area is designated as a Special Area of Conservation for its vegetation communities and populations of Atlantic salmon, lamprey species, bullhead and otter.

The presence of large conurbations and the dense network of roads mean that development pressures are likely to continue. Road improvements risk the urbanisation of rural villages. The demand for mineral extraction sites and in-fill sites for waste disposal from the conurbations is likely to increase and, as the population increases, the demand for food will increase. Development will also increase water demand which, together with the effects of climate change, potentially threatens the internationally important peat wetland habitats of the NCA in terms of water availability and water quality, compounding the effects of climate change. These pressures have the potential to further fragment habitats and change settlement patterns and the vernacular, but can also provide opportunities to create a high-quality built environment with multifunctional greenspace with links to the rural area.



One of the finest examples in the country of a 'schwingmoor'. The central floating raft of sphagnum and diverse bog communities are surrounded by fen and mixed woodland. The range of habitats present at Wybunbury Moss is part of the suite of Midland Meres and Mosses Ramsar sites and is a Special Area of Conservation supporting many nationally and locally rare invertebrate species.

## Statements of Environmental Opportunity

**SEO 1:** Restore, manage and protect from diffuse pollution the rivers, streams, lakes, ponds and wetland habitats (including flood plain grazing marsh and wet woodland) and support partnerships to maintain the integrity and unique conditions for the preservation of the internationally important meres and mosses and River Dee, to benefit water availability, water quality, landscape character, biodiversity and climate regulation.

**SEO 2:** Protect the landscape of the plain, recognising its importance to food production and incorporating well-maintained hedgerows, ponds and lowland grassland margins within agricultural systems, to secure resource protection and maintain productivity, while reducing fragmentation of semi-natural habitats to benefit a wide range of services, such as landscape character, sense of place, water quality and biodiversity.

**SEO 3:** Manage and restore lowland heathland and ancient and plantation woodland, support partnerships to plan appropriately scaled new woodland cover, particularly where this will link and extend existing woodlands, restore and reinstate traditional orchards and increase biomass provision to mitigate the impact of climate change, where this will benefit biodiversity, landscape character and enhance the experiential qualities of the area.

**SEO 4:** Protect and manage the nationally important geological sites and heritage features demonstrating how the interaction of natural and historical factors influenced the distinctive character of its landscape and settlement patterns, and help to promote greater understanding of the link between wildlife, heritage and geodiversity, particularly the importance of former extraction sites for both geodiversity and biodiversity.



There are significant areas of lowland raised bog, for example, Fenn's and Whixall Mosses offers wide-open landscapes. Historically, these were exploited for peat, which was drained and allowed to dry before being harvested. Since being secured for conservation purposes, careful management of water has raised water levels and the sites once again support an outstanding assemblage of plants and animals and provide an important carbon sink.



## Description

### Physical and functional links to other National Character Areas

The extensive Shropshire, Cheshire and Staffordshire Plain National Character Area (NCA) extends from the broad Mersey Valley NCA in the north, to the Shropshire Hills and Mid Severn Sandstone Plateau NCAs in the south. In the west, it is bounded by the hills of the Welsh borders and Wirral and Oswestry Uplands NCAs. The eastern boundary is shared with South West Peak, Potteries and Churnet Valley, Needwood and South Derbyshire Claylands, and Cannock Chase and Cank Wood NCAs. The NCA almost surrounds the small Cheshire Sandstone Ridge NCA except for its northern boundary.

The plain is visually constrained by the higher land around it. In the south, there are long views from the plain to the prominent hills of the Shropshire Hills NCA, notably the Wrekin and Wenlock Edge. The foothills of the Welsh mountains can be seen from areas in the west. In the east, the peaks of the Pennines and Peak District can be seen.

Although relatively flat, this NCA is a watershed for several major river systems. The River Severn and its tributaries, such as the rivers Perry, Roden and Tern, meander south through wide valleys of the plain and on through the neighbouring NCAs before discharging to sea via the Severn Estuary. The rivers Dane, Weaver and Gowy and their tributaries, such as the Duckow, meander north, flowing through the Mersey Valley NCA before discharging to Liverpool Bay via the River Mersey. The River Dee meanders northwards along the western boundary, through Chester, then north-westwards, through Wirral



**A marina on the Macclesfield Canal, just one of the many canals that cross the Plain. Once important trade routes, canals now provide an important recreational asset for pleasure craft and walkers alike. The towpath forms part of the Cheshire Ring Canal Walk.**

NCA before discharging to sea via the Dee Estuary. The rivers Penk and Sow rise in Staffordshire and flow eastwards joining the River Trent before discharging to the North Sea. These rivers contribute to their relative catchments to provide water for domestic, agriculture and industrial uses to the city of Chester and large towns within this and the neighbouring NCAs.

There are a number of reservoirs throughout the area. Almost all are canal-feeder reservoirs that maintain water levels in the many kilometres of canals that flow through the NCA. Areas of the south and west of the NCA are underlain by the Sherwood Sandstone aquifer that provides an essential source of base-flow to maintain river levels, and supplements supplies of drinking water to Warrington, in the Mersey Valley NCA. In the north, surrounding Northwich, there are numerous small lakes (meres), for example Rostherne Mere and Tatton Mere. There are several lakes directly east of Ellesmere, including The Mere which is the largest lake in Shropshire. Collectively, the meres and mosses form part of the Midland Meres and Mosses – a characteristic shared with the Mid Cheshire Sandstone Ridge NCA.

Woodland is virtually absent from the plain, being confined to the area around Northwich and to estates, cloughs and wind-swept ridges that extend into the Cheshire Sandstone Ridge NCA. The Mersey Forest Partnership is developing a network of community woodlands and green spaces that extends across Cheshire and Merseyside and covers a significant area of the NCA in the north, extending from Chester in the west, across the Cheshire Sandstone Ridge NCA, to Middlewich in the east.


An extensive transport network crosses the plain: the M6, M54 and M56, and a web of railway lines which emanate from Crewe, an important node in the national rail network. A number of National Cycle Routes cross the plain and there are nearly 5,000 km of public rights of way including the Sandstone Trail, a long-distance footpath stretching for 55 km from Whitchurch in the south, across the Cheshire Sandstone Ridge NCA, offering elevated views across the plain, before ending in Frodsham in the Mersey Valley. An extensive canal network includes the Shropshire Union Canal, the longest watercourse in the NCA which runs for 150 km through the NCA before cutting across the Mid Severn Sandstone Plateau NCA.



Species-rich fen vegetation including tufted sedge, marsh cinquefoil, marsh bedstraw, yellow iris around the edge of Shomere Pool, a dystrophic waterbody which is surrounded by bog and alder carr communities.



## Key characteristics

- Extensive, gently undulating plain, dominated by thick glacial till from the late Pleistocene Period, producing productive, clay soils and exemplifying characteristic glacial landforms including eskers, glacial fans, kettle holes, moraines and a landscape of meres and mosses.
  - Prominent discontinuous sandstone ridges of Triassic age, characterised by steep sides and freely draining, generally infertile soil that supports broadleaved and mixed woodland.
  - Few woodlands, confined to the area around Northwich and to estates, cloughs and deciduous and mixed woods on the steeper slopes of the wind-swept sandstone ridges. Locally extensive tracts of coniferous woodland and locally distinctive orchards scattered throughout.
  - Strong field patterns with generally well-maintained boundaries, predominantly hedgerows, with dense, mature hedgerow trees. Sandstone walls occur on the ridges and estate walls and Cheshire-style (curved topped) metal railing fences occur locally on estates in Cheshire.
  - Dairy farming dominates on the plain, with patches of mixed farming and arable in the north and large areas in the south-east.
  - Diversity of wetland habitats includes internationally important meres and mosses comprising lowland raised bog, fen, wet woodland, reedbed and standing water, supporting populations of a host of rare wildlife, including some species of national and international importance.
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- Kettleholes at Aqualate Mere, known as 'the spectacles'. The plain is covered by thick glacial till from the late Pleistocene Period, producing productive, clay soils and exemplifying characteristic glacial landforms including, eskers, glacial fans, kettleholes and moraines.**
- Extensive peat flood plains where flood plain grazing marsh habitats support regionally important populations of breeding waders in areas such as Baggy Moor, Weald Moor and Doxey Marshes.



- Many main rivers and their flood plains lie in this area, including the Dee, Dane, Severn, Penk and Sow. Significant areas of grazing marsh, alluvial flood meadows and hay meadows associated with the rivers Dee, Sow, Gowy and Severn. The area has the highest density of field ponds in western Europe.



Eastgate Street, Chester. The original entrance to the Roman settlement and forms part of the city wall. The main part of the gateway is constructed from Triassic sandstone from the Helsby Sandstone Formation, which was also used to face the city wall.

- Rich archaeological evidence of iron-age hill forts concentrated on the sandstone ridges and the Weald Moors. Remnant ridge and furrow and moated houses are features of the plain. The Roman road, Watling Street, crosses the plain linking London to Wales via Wroxeter. Chester was an important Roman settlement.
- Regularly spaced, large farmsteads, dispersed hamlets, market towns and many other settlements including Macclesfield and Telford. Timber-frame buildings are a distinctive feature of the plain, often highly decorated in Cheshire, for example, the moated Little Moreton Hall. The historic towns including Stafford, Shrewsbury and the city of Chester have a wealth of 17th- and 18th-century half-timber, brick and red sandstone buildings.
- Parklands and gardens associated with estates such as Chillington, Trentham, Tatton and Attingham; country houses such as Gawsworth Hall, Arley Hall and Adlington Hall; and fortified manor houses and castles such as at Shrewsbury, Stafford, Beeston, Acton Burnell and Cholmondeley.
- Nationally important reserves of silica sand and salt. Active extraction of salt has developed a locally distinctive landscape of subsidence flashes, particularly around the area of Sandbach. Adjacent to these saline flashes are areas of salt marsh rarely found at inland sites.
- The numerous canals are important for recreation as well as habitat. Several National Cycle Routes and nearly 5,000 km of public rights of way cross the plain. Six National Nature Reserves (NNRs) are scattered throughout, close to large population centres and well used for recreation.

## Shropshire, Cheshire and Staffordshire Plain today

Much of the plain is gently rolling, with only minor changes in elevation between 20 and 50 m. The series of small sandstone ridges, while only reaching elevations of between 150 and 230 m, are very prominent features within this open landscape and provide a locally rare sight of exposed solid rock comprising striking bluffs of reddish-pink Triassic sandstone. They are characterised by having steep slopes which are generally wooded although there are a low number of dry heathlands and some fine examples of unimproved grassland. In the south, Precambrian sedimentary rocks of hard shales and greywacke give rise to a ridge and series of small hills around Shrewsbury. The lower slopes of the ridges and the plain are covered by a considerable thickness of glacial till and provide insights into Quaternary environments, for example the nationally rare group of landforms associated with esker systems and related fan and kettle holes, found at Aqualate Mere, are important for research into glacial geomorphology.

Woodland is virtually absent from the plain, where agriculture dominates. Where it occurs, woodland is confined to the north around Northwich and to clusters of ancient woodland associated with estates, cloughs and wind-swept ridges. The woodland on the ridges is frequently ancient in origin and predominantly oak with some birch and rowan. The clough woodlands comprise oak on the valley tops with ash, sycamore, wild cherry and elm on the lower slopes. In a few woods, the uncommon small-leaved lime and wild service tree occur. Hazel is sometimes abundant as derelict coppice in the understorey, while in the valley bottoms and associated with the meres and mosses, willow, crack willow, birch and alder are prevalent. The cloughs, which sit below the level of the plain, evoke a sense of enclosure and tranquillity in contrast to the wind-swept sandstone ridges. In the north, the Mersey



**Sandstone ridges formed by a series of small hills, for example at Hawkstone, provide a strong contrast in landscape character and topography between the ridges and the surrounding plain. The ridges provide expansive views across the plain and a locally rare sight of exposed solid rock comprising striking bluffs of sandstones and conglomerate of the Triassic Period.**

Forest Partnership is developing a network of community woodlands that is strengthening the woodland character close to population centres.

Field sizes vary in scale as a result of historical farming practice, with large fields reorganised from the enclosure of medieval strip fields in some areas (particularly in the south), in contrast to the 17th- to 19th-century fields reorganised from medieval irregular enclosures across much of Cheshire.



Generally well-maintained boundaries, predominantly hedgerows, surround pastures with large, usually over-mature, specimen trees. The hedgerows are generally dense, with large, mature, hedgerow trees, mainly oak with occasional ash and sycamore, particularly in Cheshire, giving the appearance of a well-wooded landscape, even though woodland is relatively scarce on the plain. Hedgerows give way to sandstone walls on the ridges and around estates. There are historic parkland estates scattered throughout the plain, often bounded by Cheshire-style (curved topped) painted, metal railing fences that give the appearance of a well-ordered and maintained landscape.



A well-camouflaged brimstone butterfly on its larval food-plant, alder buckthorn, which is a plant of wet fen woodlands.

Throughout, the water retention and fertility of the clay soils support lush pastures for grazing dairy cattle or for growing silage or hay. There are a number of dairy processors in the NCA that produce a range of dairy products, including ice cream and a range of Cheshire cheeses. Traditional orchards were once an important component of the landscape, but are now local features. Some older farms, estates, smallholdings and cottages still have remains of orchard trees either in the garden hedgerow or in grassy paddocks set close to the house. A number of fragmented orchards survive, for example in the area around Attingham Park in Shropshire and notably the pear orchards at Acton Bridge, Cheshire.

In contrast to the plain, the soils on some of the gentle, free-draining side slopes of the sandstone ridges are used to grow fodder crops such as maize, with potatoes grown in rotation on some of the lighter, sandier soils in Shropshire. In Staffordshire, livestock rearing is combined with dairying and significant areas of arable on the lighter soils, presenting a less pastoral landscape.

The lower slopes of the ridges and surrounding plain have been modified by ice sheets that have left a considerable thickness of glacial till (sands and boulder clays) which is punctuated by numerous field ponds, meres and mosses. The meres and mosses of the north-west Midlands form a geographically discrete series of nationally important lowland open water and peatland sites; some are designated as Sites of Special Scientific Interest (SSSI) and Special Areas of Conservation (SAC). The finest examples have developed a mature schwingmoor comprising floating bog moss, often with common cotton grass and cranberry, and are considered to be of international importance (Ramsar). There are significant areas of lowland raised bog – for example, Fenn's, Whixall, Bettisfield, Wem and Cadney mosses offer wide-open landscapes and the suite of sites support an outstanding assemblage of plants and animals.

The mosaic of open water and peatland habitats, together with fringing heathland and woodland, provide habitats for locally and nationally rare species of aquatic plants and invertebrates, for example planktonic algae, stands of shoreweed and narrow small-reed, a host of invertebrates (including damselflies and dragonflies, for example the nationally rare white-faced dragonfly), and a diversity of beetles and spiders (including a number of nationally rare species). Drier areas typically support heathland relics; areas of purple moor-grass and open semi-natural woodland are important for *Lepidoptera*, for example the argent and sable moth and small pearl-bordered fritillary. Lowland heathland at Prees Heath SSSI hosts the nationally scarce silver-studded blue butterfly.

Wet woodland, reedbed and eutrophic or mesotrophic standing waters are significant and there are areas of grazing marsh on the flood plains of the rivers; for example, Baggy Moor and Weald Moor hold regionally important populations of wet grassland breeding waders.

Open water includes a group of seven large meres – some fringed with woodland and contained within the hummocky hills of the moraine – which create a distinctive local landscape known as the ‘Shropshire Lakeland’. Some meres support a diverse fish population, in particular pike and bream, and large numbers of wintering and breeding wildfowl; for example, Aqualate Mere hosts up to 3,000 overwintering ducks, including mallard, teal, wigeon, pochard, tufted duck, goldeneye, gadwall and wintering shoveler. The reedbeds support a large heronry and also support reed warbler, sedge warbler and reed bunting with visiting marsh harrier and osprey. The site also sees large murmurations of starlings at dusk in the winter months.

Abundant small ponds are scattered throughout the plain but some are rarely seen. A number are generally indicated by clumps of trees, sometimes with

scrub and rushes, which punctuate the pattern of hedged pastures. There are some fine examples of traditional hay meadows and pastures; some are of great botanical diversity, for example Motte Meadows.

The NCA contains several significant flood plains. Its flat, low-lying basins carry meandering stages of ten main rivers including the Dee, Dane, Severn and Sow. The first three have sections notified as SSSI for their geomorphological features, while the marshes on the flood plain of the River Sow provide wetland habitats for birds and insects in particular. A section of the River Dee SAC is



Open water transition fen, with bog bean and slender sedge, characteristic of low nutrient (mesotrophic) pools which, are now very uncommon in England.



protected for its vegetation communities and populations of Atlantic salmon, lamprey species, bullhead and otter, and meanders northwards along the western boundary before flowing through Chester.

There are a number of reservoirs throughout the NCA; almost all are canal-feeder reservoirs that retain water levels in the area's many canals, the longest being the Shropshire Union Canal that is well used by pleasure craft. Areas in the south and west of the NCA are underlain by the Sherwood Sandstone aquifer that provides an essential source of base-flow to maintain river levels and also supplements supplies of high-quality drinking water. Subsidence



On the flat plain, the 76 meter diameter Lovell radio telescope at Jodrell Bank can be clearly seen and is a distinctive feature in the local landscape, viewed from the surrounding higher ground of Mow Cop in the Potteries and Churnet Valley National Character Area.

flashes in the north-east, around Sandbach, Northwich and Middlewich, form a mosaic of wetland habitat important for biodiversity and recreation.

The NCA has a rich history. Hill forts, associated with the Iron Age, were constructed on the ridges, and connected by a trackway following the higher land; today, sections of this form part of the Sandstone Trail. There are fine examples of historic land use on the plain, where remnants of ridge and furrow, indicating former infield and outfield systems, are still legible and often associated with the historic field pattern. A medieval dispersed settlement pattern characterises most of the plain, including moated houses, reflecting status and developed in relationship to an inherited network of Roman roads.

There is ample evidence for Roman activity within the plain. Watling Street crosses the plain leading to Wroxeter and on into Wales. A number of forts and associated settlements were located along the road at intervals, notably the site known as Pennocrucium, located at the end of a sandstone ridge on the eastern bank of the River Penk, upon which the modern town of Penkridge now lies. The former hunting chases of the forests of Macclesfield and Delamere and fine country houses, historic parks and gardens, such as Tatton Park and Attingham Park, designed by eminent landscape designers are now important recreational assets close to population centres.

Large farmsteads, typically a brick or sandstone farmhouse surrounded by several large barns for storing fodder and overwintering stock, are frequent and are spread throughout the area. Market towns are widely spread across the NCA; other settlements, small villages and hamlets are few and dispersed. The hamlets tend to be loosely clustered, with houses spread out along the network of hedged lanes in the open countryside. Occurring throughout the plain, in open countryside as well as in towns and villages, are occasional

older, distinctive, timber-frame houses. Building materials are predominantly brick ranging in colour from orange and red in the south, to reds, browns and purples in the north and east. The latter produces an attractive mottled-effect brick. Sandstone churches and occasional very distinctive black-and-white half-timbered buildings, most notably in Chester, are also seen.

The NCA has nationally important reserves of silica sand around the areas of Congleton, Chelford and Eaton Hall in Macclesfield, extending into the neighbouring Cheshire Sandstone Ridge NCA around Delamere. Other minerals extracted include building sand, aggregates and hard rock for road stone and in the east there are widespread deposits of halite (salt) that have been exploited since Roman times. Associated with these deposits, the flow of low temperature brines through the sandstone has precipitated minerals such as copper, lead, cobalt and vanadium, for example at Alderley Edge SSSI. Brick clay extracted from the glacial till has also been exploited since Roman times and red Triassic sandstones have been used widely as a building stone – for example, for Chester Cathedral, which was built in 1093 from red sandstone, also used by the Romans to face the city wall. Active extraction of sandstone continues, for example, at Grinshill.

The pastoral landscape and historic towns have inspired a number of authors. Izaak Walton's *The Compleat Angler*, first published in 1653, is one of the earliest works to be inspired by country life and a love for the natural world and is also an influential piece of pastoral writing. Lewis Carroll was born in Daresbury, Cheshire, and used the 'Cheshire Cat' in his novel *Alice's Adventures in Wonderland*. In folklore, the term 'grinning like a Cheshire cat' is thought to be derived from the fact that Cheshire has an abundance of milk and cream.



The globally threatened floating water-plantain. The floating water-plantain has been lost from the majority of its recorded sites in England and only a small number of sites are not in canals and are in what may be considered natural habitats, shown here at Bomere.



## The landscape through time

The oldest rocks in the area are the sediments from the Precambrian Period that underlie a series of hills, such as Bayston Hill and Haughmond Hill near Shrewsbury. They were originally deposited circa 550 million years ago as mudstones, sandstones and conglomerates in a shallow sea. The sediments have been deformed by pressure and heat over millions of years, resulting in the hard shales and greywacke stone that are now valued for use as road stone.



From the 16th century the wool and cloth trades brought increasing prosperity to the area. The distinctive black and white merchants' and farmers' dwellings date from this time and moated sites were further developed and enhanced during the medieval period. Little Moreton Hall is a fine example.

Active quarries in the hills are well hidden in the landscape because they follow the strike of the almost vertically dipping rocks through the crests of the hills.

The solid geology that underlies the majority of the area comprises red mudstones and sandstones of the Triassic Period. These rocks were deposited under arid, desert conditions circa 248–205 million years ago. The Lower Triassic sandstones of the Sherwood Sandstone Group emerge as a series of ridges from beneath the thick glacial deposits of North Shropshire and Cheshire and form an important aquifer and recharge areas. In the east, mudstones of the overlying Triassic Mercia Mudstone Group comprise beds of halite, or rock salt. Their origin is likely wind-blown dust that settled in shallow salt lakes and sun-baked mudflats on the extensive desert plain. The arid conditions led to the occurrence of numerous layers of halite, which have been exploited since Roman times and remain a nationally important reserve to the chemical industry and for use as rock salt.

The lower slopes of the ridges and surrounding plain are covered by a thick deposit of glacial till (sands and boulder clays) that was deposited during the last glacial advance about 18,000 years ago and is punctuated by numerous ponds and meres. Meres have developed in natural depressions in the glacial till caused by moraines as the ice sheet waned about 15,000 years ago. The subsequent development of swamp and carr caused the accumulation of peat which, in some cases, has led to the complete in-filling of the depressions. Eventually the vegetation growing on the peat surface became raised above the surrounding groundwater and, supplied only by rainwater, became nutrient poor (oligotrophic) and acidic, thus allowing species such as the bog mosses *Sphagnum* spp. to colonise it. Hence, over many thousands of years, some meres have developed into mosses, and an invaluable record of the detail of this process is preserved in the layers of peat and mineral sediments. In a

few unusual cases, where the water surface becomes directly colonised by floating vegetation and then sphagnum mosses, a quaking bog known as a 'schwingmoor' is formed.

Glacial deposits also occur widely in the major river valleys. Glacial outwash channels formed the Congleton and Chelford sands, a nationally important reserve of silica sand. One of the best examples of an esker system in England occurs at Aqualate Mere, which provides a rare example in the Midlands of an esker system formed by glacial meltwaters during the late Devensian glaciation. The site is also significant in demonstrating the close association of the esker with fan deposits formed in a proglacial lake, a nationally rare group of landforms. Glaciation also led to a fundamental change in the drainage of the area. The ice sheet extended across the plain and blocked the upper reaches of the River Severn that originally flowed north to the developing Dee Estuary. Melting resulted in the catastrophic release of water that cut a subglacial meltwater channel that we see today in the neighbouring NCA as the Ironbridge Gorge, allowing the River Severn to drain to the Bristol Channel.

There is currently little evidence for early prehistoric activity and the archaeological evidence suggests that woodland clearance began in earnest from the late Neolithic onwards. Settlements were concentrated on the drier sandstone ridges where iron-age hill forts were constructed and connected by a trackway following the higher land. There is also evidence of small settlements of a similar date on the higher, drier ground of the Weald Moors. Evidence of the area's prehistory, including mammoth bones and preserved human bodies, are occasionally uncovered by extractive industries. A number of artefacts have been found, including several dug-out canoes and items of jewellery from the peats around the meres, indicating the human value of such lakes through the ages.



Where appropriate, meres offer opportunities for water sports.

Chester was the most significant Roman settlement and the clearance of woodlands for agriculture continued during the period of Roman occupation. The influence of the Romans can also be seen through the notable roads built to cross the plain, particularly Watling Street which linked London to mid-Wales via the site of Viroconium Cornoviorum (Wroxeter in modern-day Shropshire). Wroxeter probably began as a temporary marching camp; however, in 58 ad the Emperor Nero ordered the invasion of Wales and the site became a permanent fortress. A line of forts were constructed along Watling Street, which encouraged the development of adjacent roadside settlements such as Pennocrucium (Water Eaton in modern-day Staffordshire).



By the time of the Domesday survey, much of the Shropshire part of the plain was cleared of woodland except for isolated patches. Settlements were generally dispersed as indicated by the high number of moated sites. The increase in wealth from the 12th century onwards led to the growth of markets, including around the salt towns of Nantwich, Middlewich and Northwich in Cheshire and the establishment of many small towns across the plain, as well as the construction of churches and monasteries.

From the 16th century, the wool and cloth trades brought increasing prosperity to the area. The distinctive black-and-white merchants' and farmers' dwellings date from this time and moated sites were further developed and enhanced during the medieval period. Little Moreton Hall is a fine example. This prosperity continued into the 18th century when the towns were enlarged with elegant brick Georgian buildings.

Many of these settlements are located on slight elevations of sandstone. Two of the largest settlements of the plain, Chester and Shrewsbury, are strikingly located in defensive positions on sandstone bluffs above tight meanders on the rivers Dee and Severn respectively. Stafford, while low-lying, is similarly located in a defensive position within a tight bend of the River Sow.

Chester and Shrewsbury, as major market centres, continued to develop and expand but still retain the tight-knit narrow streets in their centres. These are lined with buildings, notably from the 17th and 18th centuries, an intricate and attractive mix of half-timbered, brick and red sandstone. The centres of small market towns such as Market Drayton and Wem comprise narrow lanes lined by brick-built buildings from the 18th century.

The county town of Stafford has 18th-century housing and fine 19th-century municipal buildings dominating the town centre. In the countryside, too, Staffordshire has mostly Georgian and Victorian farm and country houses which had replaced less substantial dwellings. A number of estates were established or expanded on the plain. Some of these originate from the medieval period, for example Chillington. Some have extensive parklands and eminent landscape and garden designers – including Lancelot 'Capability' Brown, William Shenstone and Humphry Repton – were involved in their layout. Brown had a major influence at Chillington, while Repton was responsible for the park at Aqualate in 1800.

The towns of the north expanded through industrial activity, from salt around Northwich, to silk in Macclesfield and tend to be larger, sprawling settlements. Crewe is an important junction in the rail network and the town developed as a result of the expanding network of railways. On the flat plain, infrastructure tends to be prominent. For example, the 87-metre diameter radio telescope at Jodrell Bank constructed in 1957 is a locally distinctive, prominent feature in the landscape.

More recent development has resulted in the expansion of towns such as Winsford, and Telford on the edge of the area which was planned in the mid-1960s and built as a new town in the early 1970s.

## Ecosystem services

The Shropshire, Cheshire and Staffordshire Plain 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 Shropshire, Cheshire and Staffordshire Plain NCA is contained in the 'Analysis' section of this document.

### Provisioning services (food, fibre and water supply)

■ **Food provision:** Food production is important to the region. Seventy per cent of the soils are classified as Grade 3 and 17 per cent Grade 2 in terms of their production, and this is reflected in their use. Throughout the plain, the water retention and fertility of the clay soils support lush pastures for grazing dairy cattle or for growing silage or hay. Significant numbers of dairy herds supply milk to dairy processors in the NCA that produce a range of dairy products, including ice cream and a range of Cheshire cheeses.

In contrast to the plain, the soils on some of the gentle, freer-draining side slopes of the sandstone ridges are used to grow fodder crops such as maize for winter feed. Potatoes are grown in rotation on some of the lighter, sandier soils in Shropshire. In Staffordshire, there are mixed farms and significant areas of arable, including potatoes and combinable crops.

There are degraded traditional orchards throughout the NCA, particularly in Cheshire.

■ **Timber provision:** The greatest concentration of woodland is in the north and north-east where commercial forest plantations and community

woodlands are grown on the thin gravelly soils. Community woodland initiatives, for example the Mersey Forest Partnership, are planting sustainably managed community woodlands that include timber provision.

■ **Water availability:** The NCA has ten main rivers: the River Severn and its tributaries (Perry, Roden and Tern), the River Weaver and River Dane, the River Bollin and its tributary the River Dean in the north-east of the area, and the River Sow and River Penk. There are several reservoirs throughout including the Knighton Reservoir (near Eccleshall) and the Hurleston Reservoir (near Nantwich) which store water for public, agricultural and industrial uses. Other canal-feeder reservoirs are at various locations. There is 'water available' along the River Severn; however, its tributaries (the Perry, Roden and Tern) are 'over-licensed'. In the north of the NCA, the River Weaver and River Dane have 'water available' for further abstraction. The River Bollin has 'no water available' where it flows north of Macclesfield.

Where it is accessible, water is abstracted from the Sherwood Sandstone aquifer via boreholes that supplement surface water supplies. This major sandstone aquifer extends north from Shrewsbury and west around Oswestry and Chester. Groundwater resources, located in the south and west of the NCA, are 'over-licensed' according to data obtained from the Environment Agency.

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

■ **Climate regulation:** The majority of this NCA has low soil carbon content. However, significant wetland areas and extensive areas of peat soils provide an important carbon storage function in this NCA. Extensive woodland is restricted to the east where there are commercial woodland plantations, and fragmented areas of heathland exist on the poorer soils associated with the sandstone ridges.



- **Regulating soil erosion:** The West Midlands Meres' Priority Catchment has identified that soil loss is causing sedimentation in a number of meres and watercourses across the NCA. The lighter, freely draining soils have an enhanced risk of soil erosion on sloping land where cultivated or bare soil is exposed, exacerbated where organic matter levels are low after continuous arable cultivation or where soils are compacted. These soils are also at risk of wind erosion, particularly where left bare, as are the fen peat soils. They are also susceptible to rapid run-off during storm events.
- **Regulating water quality:** Extensive areas fall within priority catchments of the Catchment Sensitive Farming Programme<sup>4</sup> including several sites within the West Midlands meres, emphasising the importance of water quality to the NCA's habitats.

According to the Water Framework Directive assessment, the ecological status of rivers in the NCA is generally 'poor' or 'moderate'. The chemical status of the majority of rivers and lakes in the NCA 'does not require assessment'; however, two river lengths in the north of the NCA are 'failing to achieve good' chemical status, and two tributaries in the same area are of 'good' chemical status. The chemical status of groundwater throughout the NCA is 'poor'.<sup>5,6</sup>

Outcrops of Triassic sandstone provide recharge areas to the underlying aquifer; it is vital that land management over these areas maintains good soil structure to maximise water infiltration and that measures are taken to prevent diffuse pollution from entering groundwater.

<sup>4</sup> [www.naturalengland.org.uk/ourwork/farming/csf/default.aspx](http://www.naturalengland.org.uk/ourwork/farming/csf/default.aspx)

<sup>5</sup> *River Basin Management Plan: Severn River Basin District, Annex A: Current state of waters*, Environment Agency (December 2009)

<sup>6</sup> *River Basin Management Plan: North West River Basin District, Annex A: Current state of waters*, Environment Agency (December 2009)

## Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration:** In the north, a sense of place is provided by an extensive, rolling lowland landscape of lush pastures dominated by dairy farming, interrupted by sandstone ridges with rivers and tributaries with wooded cloughs. Sense of place is further supported by the area's numerous estates, estate buildings and historic parklands and black-and-white moated houses. Feelings of inspiration and escapism are likely to be associated with the ridges that rise above the plain with long-distance views of prominent hills outside the NCA, such as the Wrekin and Wenlock Edge, the foothills of the Welsh mountains in the west and the Pennines and Peak District to the east. Numerous meres and extensive mosses – for example, Fenn's, Whixall, Bettisfield, Wem and Cadney mosses – are distinctive wide open landscapes.
- **Sense of history:** The history of the landscape is evident in the iron-age hill forts, linked by sections of the Sandstone Trail and Wat's Dyke – an Anglo-Saxon boundary earthwork. The former hunting chases of the forests of Macclesfield and Delamere are still evident in the landscape. Moated manor houses still exist, for example at Little Moreton Hall. Roman roads such as Watling Street linking London to mid-Wales via Wroxeter are still evident today. Areas of ridge and furrow on the plain indicate former infield and outfield systems. The historic character is further reinforced by a settlement pattern of dispersed market towns and large farmsteads, typically of brick or sandstone spread throughout. Other settlements, small villages and hamlets are few and dispersed. The hamlets tend to be loosely clustered, with houses spread out along the network of hedged lanes, in the open countryside.
- **Tranquillity:** Statistics from the Campaign to Protect Rural England show that the NCA has experienced a substantial decline in tranquillity. Undisturbed areas have decreased from 69 per cent in the 1960s to 44 per cent in 2007 with loss of tranquillity associated with increased traffic levels on the major

roads of the NCA including the M6, M54 and extensive network of major roads. Nevertheless, the NCA offers the experience of wide open spaces and enclosed woodland to visitors from the nearby conurbations.

- **Recreation:** The NCA offers a wealth of recreational assets. There is an extensive network of rights of way including the Sandstone Trail and short sections of the Wat's Dyke Heritage Trail that are of iron-age origin.

There are 35 Registered Parks and Gardens, some owned and run by the National Trust, and six NNRs; all but one, Motte Meadows, are related to the Midland Meres and Mosses Ramsar sites. Additional sites include seven Country Parks and fourteen Local Nature Reserves. There is public access along the Shropshire Union, Llangollen and Trent and Mersey canals as well as access to some of the large meres such as Ellesmere and Cole mere and mosses throughout the NCA. Jodrell Bank is the location of the Lovell radio telescope which dominates the open landscape near Goostrey in Cheshire. It is also the location of an arboretum and popular visitor centre.

- **Biodiversity:** There are 83 SSSI either wholly or partly within the NCA, totalling 1 per cent of the NCA's area. There are numerous lakes ('meres') throughout the NCA and Europe's greatest concentration of ponds. Three per cent of the NCA is priority habitat, including significant areas of wet woodland, flood plain grazing marsh and fens. Extensive flood plain grazing marsh habitats support regionally important populations of breeding waders, for example lapwing, snipe and curlew in areas such as Baggy Moor, Weald Moor and Doxey Marshes.

Other priority habitats include raised bog, lowland grassland and lowland mixed beech and yew woodland. There are eight internationally designated sites in the NCA – five SAC and three Ramsar sites totalling approximately 0.4 per cent of the

area. The meres and mosses form the largest and most ecologically diverse cluster of natural wetlands in lowland England comprising a geographically discrete series of nationally important lowland open water and peatland sites designated as SSSI and SAC. The finest examples are considered to be of international importance (Ramsar). These include one of the largest and most southerly raised bogs in the UK – Fenn's, Whixall, Bettisfield, Wem and Cadney mosses – which support over 1,700 invertebrate species<sup>7</sup> and 29 nationally rare species, for example Desmoulin's



Jodrell Bank visitor centre offers visitors a different and relatively rare experience of the study of astronomy and astrophysics.

<sup>7</sup> [www.jncc.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0012912](http://www.jncc.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0012912)



whorl snail. The finest sites have developed a mature schwingmoor comprising floating bog mosses *Sphagnum* spp. often with common cotton-grass and cranberry. Open water provides habitats for locally and nationally rare species of aquatic plants – for example, planktonic algae, stands of shoreweed and narrow small-reed – and Cole Mere is the only English site for least water lily. Some meres support a diverse fish population, in particular pike and bream, and large numbers of wintering and breeding wildfowl; for example, Aqualate Mere SSSI hosts up to 3,000 overwintering ducks, including mallard, teal, wigeon, pochard, tufted duck, goldeneye, gadwall and wintering shoveler.

The mosaic of open water and peatland habitats, together with fringing heathland and woodland, host an outstanding diversity of invertebrates including damselflies and dragonflies, for example the nationally rare white-faced dragonfly, and a diversity of beetles and spiders including a number of nationally rare species.

Drier areas which typically support heathland relics, areas of purple moor-grass and open semi-natural woodland are important for *Lepidoptera*, for example, the argent and sable moth and small pearl-bordered fritillary. Lowland heathland at Prees Heath SSSI hosts the nationally scarce silver-studded blue butterfly.

- **Geodiversity:** There are a significant number of geological SSSIs (15) and 97 Local Geological Sites. The Triassic outcrops of the ridges and hills provide a rare glimpse of exposed solid rock, enabling the depositional environment to be interpreted, thus contributing to the understanding of climate during the Triassic Period.

The interpretation of glacial deposits has contributed to our understanding of climate circa 20,000 years ago and present-day landscapes; for example, the formation of peat mosses provides a well-documented pollen record and opportunities for radiocarbon dating.

One of the best examples of an esker system in England occurs at Aqualate Mere SSSI, which provides a rare example in the Midlands of an esker system formed by glacial meltwaters during the late Devensian glaciation. The site is also significant in demonstrating the close association of the esker with fan deposits formed in a proglacial lake, a nationally rare group of landforms. The present-day complex geomorphology of the rivers Dane, Dee, and Severn is also contributing to our understanding of modern fluvial processes – erosion and deposition.

Road, rail and canal cuttings also provide valuable exposures, for example Tyrley Canal Cutting SSSI.

Silica sand is extracted from the nationally important reserves in the areas around Congleton, Chelford and Eaton Hall in Macclesfield. Nationally important halite (salt) deposits occur around the areas of Middlewich, Winsford, Northwich and Sandbach. Active extraction of salt has led to a series of subsidence flashes and salt karst features are also visible – depressions associated with dissolution and collapse of underlying salt. The flow of low temperature brines through the sandstone has precipitated minerals such as copper, lead, cobalt and vanadium, for example at Alderley Edge SSSI.

Greywacke stone is extracted from the Precambrian hills around Shrewsbury for use as a road stone. Sand and gravel is extracted throughout the NCA.

Brick clay extracted from the glacial till has also been exploited since Roman times and red Triassic sandstones have been used widely as a building stone – for example, for Chester Cathedral, which built in 1093 from red sandstone, also used by the Romans to face the city wall.

## Statements of Environmental Opportunity

**SEO 1: Restore, manage and protect from diffuse pollution the rivers, streams, lakes, ponds and wetland habitats (including flood plain grazing marsh and wet woodland) and support partnerships to maintain the integrity and unique conditions for the preservation of the internationally important meres and mosses and River Dee, to benefit water availability, water quality, landscape character, biodiversity and climate regulation.**

**For example by:**

- Working at catchment scale, supporting landscape-scale partnerships with the management and enhancement of the landscape in a holistic way for the benefit of riverine and wetland character, biodiversity, climate regulation and recreation.
- Addressing the reasons for the unfavourable status of the meres and mosses Special Areas of Conservation (SAC) and Ramsar sites, ensuring that these are effectively and sustainably managed to achieve favourable status within an appropriately managed wider landscape.
- Encouraging the adoption of management techniques supported by the Catchment Sensitive Farming Programme, to benefit water quality and water availability, for example by encouraging rainwater harvesting and overwintering storage of water and reducing the incidence of: foul run-off from outdoor feeding areas, silage clamps, yards and cattle tracks; stock entering streams; stock poaching stream banks; and poaching of fields by cattle movement.
- Addressing the reasons for poor ecological condition, as identified by the Water Framework Directive assessment of rivers and other waterbodies in the catchments: by preventing deterioration of water quality caused by high nutrient levels and siltation caused by soil erosion.
- Naturalising channel modifications, removing obstacles to aquatic species and buffering from adjoining land uses to reduce pollution.
- Restoring degraded peatland and fen habitats and protecting peat substrates for benefits to biodiversity and climate change.
- Protecting soils, especially on elevated sites, by encouraging appropriate cropping regimes and the restoration of hedgerows with typical species, by gapping up and planting their accompanying hedgerow trees, adopting appropriate cutting regimes and tagging to extend the age range and species diversity to benefit biodiversity and sense of place.
- Managing and restoring wetland sites, including regulating water levels and managing transitional habitats, for example in the meres and mosses, and improving the coherence of wetland habitats to benefit water flow, biodiversity and climate regulation.
- Encouraging the retention of in-field glacial ponds and marl pits and where possible creating more ponds through the uptake of agri-environment scheme options, to provide greater ecological connectivity to benefit biodiversity, sense of place and history, especially in arable areas where the threat of in-filling is greatest.
- Avoiding uniform pollarding to conserve and manage mature and over-mature trees within clough woodland and riparian environments, where it does not increase the risk of flooding, thus ensuring a supply of coarse woody debris to watercourses, important for aquatic and invertebrate species.

**Continued over...**



## SEO 1 continued.

- Carefully managing clough woodland and riparian woodland, for example along sections of the River Dee SAC, to provide adequate shade which can significantly reduce peak summer temperatures, thus maintaining water temperatures within a favourable range for fish and other sensitive freshwater fauna.
- Maximising water infiltration where outcrops of Triassic sandstone provide recharge areas to the underlying aquifer, by maintaining good soil structure and preventing diffuse pollution from entering groundwater.
- Incorporating the principles of sustainable urban drainage schemes (SUDS), for example encouraging rainwater harvesting, incorporating green space and areas of unsealed soil into urban and rural development to allow water infiltration. Supporting projects that identify and address point and diffuse pollution caused by misconnection of domestic waste, illegal discharges from industry and diffuse run-off from the road network.
- Training volunteers to assist with the surveillance of key habitats and species, carrying out monitoring programmes to gauge any further degradation or improvement in the distribution and population sizes of species as an indication of habitat quality.



Wet woodland virtually surrounds the pool at Shomere, part of a group of pools that include Bomere and Betton pools that are particularly important for their differing water chemistry, and hence flora and fauna, which they support. It is for these reasons that they form part of the suite of Midland Meres and Mosses Ramsar sites. Shown here is tufted sedge under alder carr.

**SEO 2: Protect the landscape of the plain, recognising its importance to food production and incorporating well-maintained hedgerows, ponds and lowland grassland margins within agricultural systems, to secure resource protection and maintain productivity, while reducing fragmentation of semi-natural habitats to benefit a wide range of services, such as landscape character, sense of place, water quality and biodiversity.**

**For example by:**

- Encouraging the retention of pasture on the plain to preserve the pastoral character, particularly in east Cheshire, parts of Staffordshire and Shropshire where arable areas are increasing, by promoting local dairy produce.
- Encouraging the restoration of hedgerows with typical species, by gapping up and planting their accompanying hedgerow trees, adopting appropriate cutting regimes and tagging to extend the age range and species diversity to benefit biodiversity and soil resource protection, thus maintaining soil productivity.
- Integrating semi-natural habitats into arable systems, through field margins and buffer strips adjacent to watercourses, and providing habitat for farmland birds, retaining in-field ponds and riparian woodland to benefit pest regulation, biodiversity, water availability and water quality.
- Reducing fertiliser and pesticide inputs by better targeting, especially along the field margins and adjacent to semi-natural habitats.
- Encouraging appropriate farm diversification where it sustains traditional agricultural systems, for example the conversion of redundant buildings to other uses.
- Ensuring that new development is informed by and sympathetic to landscape character and quality and contributes, as appropriate, to the conservation of the landscape, having regard to visual impact and local vernacular.



Food production is important to the region and the Plain supports lush pasture for dairying. Remnant fen, including, greater-tussock sedge, yellow iris, water violet and common valerian survive in a number of drainage ditches that cross a series of damp, peaty, pasture fields which support species-rich rushy grassland at Norbury Meres SSSI.

**SEO 3: Manage and restore lowland heathland and ancient and plantation woodland, support partnerships to plan appropriately scaled new woodland cover, particularly where this will link and extend existing woodlands, restore and reinstate traditional orchards and increase biomass provision to mitigate the impact of climate change, where this will benefit biodiversity, landscape character and enhance the experiential qualities of the area.**

**For example by:**

- Supporting landscape-scale partnerships to increase tree cover, for example community forest initiatives such as the Mersey Forest Partnership, which are enhancing woodlands to benefit landscape character, biodiversity and recreation.
- Managing existing woodland to benefit woodland flora and retaining ancient and veteran trees to ensure a supply of deadwood to benefit woodland fauna and invertebrates.
- Creating new small-scale, field-sized coverts, following existing patterns to strengthen landscape character and benefit biodiversity. In urban areas, planting blocks of trees and street trees to contribute to green infrastructure and provide shade, thus mitigating the effect of the urban heat island, increasing water infiltration rates and purifying the air.
- Reversing fragmentation of woodland by restoring typical zones of woodland types from alder, crack willow, hazel and grey willow in valleys, to oak birch woodland on higher slopes; developing and managing transitional scrub communities between woodland and adjoining habitats to create a coherent, robust habitat network.
- Reinstating native woodland on Plantations on Ancient Woodland Sites, for example in east Cheshire and Staffordshire, and removing coniferous woodland from wetland sites.
- Restoring lowland heathland from conifer plantations and expanding and buffering isolated patches of heathland, for example Trentham Park and Maer Hills in Staffordshire, Whorton in Cheshire, and Prees Heath and Haughmond Hill in Shropshire.
- Restoring degraded heathland throughout, through the removal of bracken and the thinning out of young trees to benefit sense of place and biodiversity and to protect the late source of nectar.
- Supporting partnerships to retain and reinstate traditional orchards throughout the NCA, creating community orchards to promote greater awareness of their benefits to biodiversity, landscape character and genetic diversity, through the conservation of local, heritage varieties.
- Where appropriate in the landscape, increase plantations of poplar, willow and miscanthus as biomass, developing supply chains and encouraging demand.
- Finding a financially sustainable solution to woodland management by seeking an economic return on the by-products of woodland management; developing supply chains and encouraging demand for wood fuel in urban areas and encouraging the installation of wood fuel boilers in local amenity buildings.
- Planting trees around settlements, along motorways and major highway corridors to screen the visually intrusive urban areas from the surrounding landscape.



**SEO 4: Protect and manage the nationally important geological sites and heritage features demonstrating how the interaction of natural and historical factors influenced the distinctive character of its landscape and settlement patterns, and help to promote greater understanding of the link between wildlife, heritage and geodiversity, particularly the importance of former extraction sites for both geodiversity and biodiversity.**

**For example by:**

- Working in partnership to protect and interpret the core designated sites, for example Alderley Edge Site of Special Scientific Interest (SSSI) and River Dane SSSI and the suite of Local Geological Sites, managing them to improve their accessibility and condition.
- Support partnerships in their endeavours to reconnect people with the environment, demonstrating how the natural and historical features contribute to the wider landscape character and ensuring long-term sustainability through a vibrant network of community groups.
- Increasing the provision of information and interpretation of geological and historic sites, thus helping landowners and land managers to understand and appreciate more the assets in their care.
- Conserving, managing and interpreting historic parklands, including establishment of new generations of trees that are sensitive to their historic character.
- Resisting the introduction of urban features into the rural/village landscape, for example unnecessary lighting and signage and the use of inappropriate building materials, to maintain the sense of history.
- Providing teaching materials and aids that assist local schools and other educational groups to use geological and historic sites for environmental and heritage education that includes industrial development and settlement patterns.
- Raising awareness, through the Geodiversity Action Plans and the planning system, of the increasing importance of post-industrial and extractive sites to our understanding of industrial heritage and to the unique habitats they provide, for example subsidence flashes around Sandbach.
- Encouraging people to volunteer and get involved in geoconservation and assisting with the surveillance and ongoing management of sites.
- Raise awareness of other geological and historic assets, for example collections at local museums and the use of local stone in buildings.
- Increasing the protection of buried archaeological sites, earthworks and areas of ridge and furrow from pasture improvement and drainage to benefit sense of history and biodiversity.
- Planning and managing sympathetically the restoration of mineral extraction sites to ensure their integration into the pastoral landscape to maintain the sense of place and to provide opportunities for semi-natural habitats, for example the significant subsidence flashes around Sandbach, to benefit biodiversity, recreation and sense of history.
- Using understanding of the traditional and historic architecture and its distinct patterns of settlement to inform appropriate conservation and use of historic buildings and to plan for and inspire any environmentally beneficial new development which makes a positive contribution to local character.

## Additional opportunity

**1: Find sustainable solutions to manage visitor pressure at popular attractions, for example the Sandstone Trail, woodlands, canals and National Nature Reserves, while encouraging a high level of public access to enjoy the wealth of recreational experience on offer.**

### For example by:

- Supporting landscape-scale partnerships in developing opportunities for agriculture, woodland creation, biodiversity, public access, sport, recreation and tourism development.
- Managing the impact of visitors on popular sites by ensuring that paths are adequately signposted and surfaced to prevent erosion and to divert public access away from sensitive habitats, and providing sustainable transport solutions to alleviate potential traffic congestion; developing an integrated transport network between visitor attractions, which link with public rights of way, canal towpaths and cycle routes.
- Increasing visitors' contact with nature by providing better access, circular routes and all-ability trails, away from sensitive and over-used sites, thus improving understanding and changing attitudes, as well as improving health and wellbeing.
- Encouraging a wide variety of individual and group participation, promoting health and wellbeing and lifelong learning through volunteering in specific conservation, access and interpretation initiatives.
- Providing opportunities for heritage and rural skills training to meet rural skills shortages.
- Capturing and sharing skills and good practice in heritage and access management, interpretation and community engagement.
- Managing the extensive canal network and its associated assets that include feeder reservoirs, hedgerows and towpaths, to maximise the benefits to biodiversity, landscape character, sense of history and recreational value that will support the visitor economy.



**Interpretation and clear signage for public access at Fenn's and Whixall Mosses. Signage is crucial in ensuring visitors' safety, providing safe routes away from hazards and sensitive habitats and can help in the control of erosion, as well as being informative and raising awareness of the importance of such sites.**

## Supporting document 1: Key facts and data

Total area: 366,247 ha

### 1. Landscape and nature conservation designations

At its southern edge near Pontesbury a very small part of the Shropshire Hills Area of Outstanding Natural Beauty (AONB) falls within the Shropshire, Cheshire and Staffordshire Plain NCA.

Source: Natural England (2011)

#### 1.1 Designated nature conservation sites

The NCA includes the following statutory nature conservation designations:

Tier	Designation	Name	Area (ha)	% of NCA
International	Ramsar	Midlands Meres and Mosses Phase 1, Midlands Meres and Mosses Phase 2, Rostherne Mere	1,153	<1
European	Special Protection Area (SPA)	n/a	0	0
	Special Area of Conservation (SAC)	Fenn's, Whixall, Bettisfield, Wem and Cadney Mosses SAC, River Dee and Bala Lake SAC, Motte Meadows SAC, West Midlands Mosses SAC, Brown Moss SAC	517	<1

Tier	Designation	Name	Area (ha)	% of NCA
National	National Nature Reserve (NNR)	Aqualate Mere NNR, Rostherne Mere NNR, Fenn's, Whixall and Bettisfield Mosses NNR, Motte Meadows NNR, Wem Moss NNR, Wybunbury Moss NNR	586	<1
National	Site of Special Scientific Interest (SSSI)	A total of 83 sites wholly or partly within the NCA	3,411	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.**

The Midlands Meres and Mosses Ramsar Phase 1 and Phase 2 sites encompass a high proportion of SSSI in the meres and mosses series, and these overlap with all the National Nature Reserves and SAC except Motte Meadows NNR and River Dee and Bala SAC respectively.

Source: Natural England (2011)

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



### 1.1.1 Condition of designated sites

SSSI condition category	Area (ha)	% of SSSI land in category condition
Unfavourable declining	97	3
Favourable	1,639	48
Unfavourable no change	688	20
Unfavourable recovering	975	29

Source: Natural England (March 2011)

Details of SSSI condition can be searched at:

<http://www.sssi.naturalengland.org.uk/Special/sssi/reportIndex.cfm>

## 2. Landform, geology and soils

### 2.1 Elevation

The NCA is lowland in character with the lowest point at around 20 m. The highest elevation at 324 m is located at one of the small sandstone ridges.

Source: Meres and Mosses Natural Area Profile; Shropshire, Cheshire and Staffordshire Countryside Character Area Description

### 2.2 Landform and process

The landform owes much to its glacial origins and for the most part comprises of a gently rolling plain with only gentle changes in elevation of between 20 m and 50 m. Glacial landform features include eskers, moraines and the apparent clustered distribution of mere and moss basins. The larger rivers, such as the Severn, meander through wide valleys of flatter and lower land than the surrounding plain. A prominent feature of the area is a series of small sandstone ridges which reach elevations 150 m to 230 m. Subsidence of the glacial sediments has occurred locally caused by the solution of the underlying salt deposits.

Source: Meres and Mosses Natural Area Profile; Shropshire, Cheshire and Staffordshire Countryside Character Area Description

### 2.3 Bedrock geology

The underlying bedrock geology is almost entirely formed of red and brown Triassic sandstones, silts and muds, from the influx of a major river system from the south. Upper Triassic siltstones and mudstones accumulated in a lagoon or shallow gulf and evaporation of this lagoon lead to the extensive salt deposits found today. A series of sandstone ridges occur at Nesscliffe, Grinshill and Hawkstone. Less abrupt ridges occur north and west of Macclesfield, such as at Alderley Edge and at Ashley to Gnosall and Albrighton. The Triassic sandstones of Alderley Edge are particularly important for copper ore mineralisation caused by the flow of low temperature brines through the sandstone and precipitation of associated minerals. Sandstones of the Carboniferous Coal Measures run south-west from Newcastle towards Shrewsbury and give rise to small scale ridges and valleys at Maer. There are three Precambrian outcrops around Shrewsbury at Haughmond Hill, Lyth Hill and Sharpstones Hill.

Source: Meres and Mosses Natural Area Profile; Shropshire, Cheshire and Staffordshire Countryside Character Area Description

### 2.4 Superficial deposits

Glacial activity has affected the whole plain by rounding off hard outcrops of sandstone, creating meltwater channels and lake beds and depositing a variety of materials from boulder clay to marls, sands and gravels. These deposits have in places caused the formation of a number of shallow meres and some peat-filled mosses.

Source: Meres and Mosses Natural Area Profile; Shropshire, Cheshire and Staffordshire Countryside Character Area Description

## 2.5 Designated geological sites

Designation	Number of sites
Geological Site of Special Scientific Interest (SSSI)	9
Mixed interest SSSI	6

There are 97 Local Geological Sites within the NCA.

Source: Natural England (2011)

- Details of individual Sites of Special Scientific Interest can be searched at:  
<http://www.sssi.naturalengland.org.uk/Special/sssi/search.cfm>

## 2.6 Soils and Agricultural Land Classification

Widespread fertile and productive clay soils are generally characteristic; however, in places the soils are thin, sandy and gravelly. In addition peat covers 3 per cent of the area.

Source: Shropshire, Cheshire and Staffordshire Plain Character Area Description

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

Agricultural Land Classification	Area (ha)	% of NCA
Grade 1	490	<1
Grade 2	62,282	17
Grade 3	257,007	70
Grade 4	28,482	7
Grade 5	399	<1
Non-agricultural	2,078	<1
Urban	15,505	4

Source: Natural England (2010)

Maps showing locations of Statutory sites can be found at:

<http://magic.defra.gov.uk/website/magic/> – select 'Landscape' (shows ALC and 27 types of soils).

## 3. Key water bodies and catchments

### 3.1 Major rivers/canals

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

Name	Length (km)
River Weaver	56
River Dane	46
River Dee	34
River Bollin	22
River Severn	54
River Tern	39
River Roden	29
River Perry	13
River Sow	12
River Penk	23

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.

Although relatively low-lying, the NCA forms a watershed for several major river systems. The Whitchurch Moraine creates a sub-division between north and south of the plain. The area's significant river floodplains are the Weaver, Dane, and Dee which drain north to the Mersey Valley and the Tern, Roden, and Perry which drain into the Severn to the south. On the east side the rivers Sow and Penk flow towards Stafford and are part of the Trent catchment to the south-east.

The rivers Weaver, Dane, Dee and Bollin flow north to the Mersey and Dee Estuaries. The rivers Severn, Tern, Roden and Perry flow south to the River Severn. The rivers Penk and Sow flow to the east to the River Trent.

Canals are prominent with a 157 km stretch of the Shropshire Union Canal crossing south-east to north to provide a link between the West Midlands canal network and the River Mersey. A 51 km stretch of the Trent and Mersey Canal which links the two named river systems extends southwards from Nantwich on the eastern side of the NCA.

### 3.2 Water quality

The total area of Nitrate Vulnerable Zone is 322,926 ha, which is 88 per cent of the NCA.

Source: Source: Natural England (2010)

### 3.3 Water Framework Directive

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

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

## 4. Trees and woodlands

### 4.1 Total woodland cover

The NCA contains 20,743 ha of woodland (6 per cent of the total area), of which 4,006 ha is ancient woodland. The Mersey Forest, Forest of Mercia and Red Rose Community Forests, represent three of twelve Community Forests established to demonstrate the contribution of environmental improvement to economic and social regeneration. They cover 18,258 ha of this NCA, which is 5 per cent of the NCA.

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

### 4.2 Distribution and size of woodland and trees in the landscape

Woodland cover is generally low, only about 6 per cent and is restricted to small broadleaved or mixed woodlands on the steeper slopes of the sandstone

ridges or along the sides of watercourses. Steep stream and river valley sides support areas of clough woodlands which are often ancient in origin. The rivers Bollin, Dane and Weaver and their tributaries are notable for this feature. Small copses and clumps of trees, mainly oak, ash, willow, alder and scrub occur around meres and ponds. Oak, sycamore and beech are commonly found within the estates and parklands. Strong field patterns are defined by hedgerows, often with dense, mature hedgerow trees.

Source: Meres and Mosses Natural Area Profile, Shropshire, Cheshire and Staffordshire Character Area Description

### 4.3 Woodland types

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

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

Woodland type	Area (ha)	% of NCA
Broadleaved	14,271	4
Coniferous	3,097	1
Mixed	1,960	1
Other	1,415	<1

Source: Forestry Commission (2011)

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

Woodland type	Area (ha)	% of NCA
Ancient semi-natural woodland	1,980	<1
Ancient re-planted woodland (PAWS)	2,025	<1

Source: Natural England (2004)



## 5. Boundary features and patterns

### 5.1 Boundary features

Field boundaries are predominantly defined by full well-maintained hedgerows. The hedges are predominately of hawthorn. Blackthorn and other shrubby species are less frequently found. Hedgerow trees are mainly oak, generally mature or over-mature with some ash and sycamore as well as willow in damper conditions.

**Source: Shropshire, Cheshire and Staffordshire Countryside Character Area Description; Countryside Quality Counts (2003)**

### 5.2 Field patterns

Field sizes range from small to medium, in irregular field patterns and are bounded by full maintained hedges. Hedgerow trees are plentiful and mature.

**Source: Shropshire, Cheshire and Staffordshire 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

Farm holdings were predominantly based on livestock (51 per cent of holdings in 2009). There was a substantial move away from dairying (20 per cent of holdings in 2009) over the 10 years between 2000 and 2009, with increases in arable and other types of holdings over the same period.

**Source: Agricultural Census, Defra (2010)**

### 6.2 Farm size

Farms of size 5 to 20 ha were the most common, accounting for 26 per cent of holdings in 2009; followed by farms of size 20 to 50 ha and 50 to 100 ha, each accounting for 20 per cent of holdings. Trends between 2000 and 2009 showed a small decrease in the numbers of all farm sizes except for holdings over 100 ha. This category totals 924 and made up 19 per cent of the total, up from 15 per cent in 2000.

**Source: Agricultural Census, Defra (2010)**

### 6.3 Farm ownership

Owned farm holdings accounted for 65 per cent of the total with the remainder being tenanted.

2009: Total farm area = 293,255 ha; owned land = 190,034 ha

2000: Total farm area = 279,711 ha; owned land = 193,951 ha

**Source: Agricultural Census, Defra (2010)**

### 6.4 Land use

The dominant land use was grassland, accounting for 180,272 ha (61 per cent of farmed area) in 2009. This was followed by cereals (64,194 ha or 22 per cent) and other arable crops (19,140 ha or 7 per cent). Between 2000 and 2009 there was a slight increase in the area of oilseeds and other arable crops and a slight decrease in the area of cereals and cash root crops.

**Source: Agricultural Census, Defra (2010)**

### 6.5 Livestock numbers

Numbers of livestock remained relatively high although they had dropped significantly since 2000. In 2009 there were 390,100 cattle (422,000 in 2000), 252,300 sheep (313,500 in 2000) and 89,500 pigs (123,400 in 2000). Cattle were the most numerous livestock type followed by sheep and pigs.

**Source: Agricultural Census, Defra (2010)**

### 6.6 Farm labour

The majority of holdings were run by dedicated farmers. These comprised some 60 per cent of the total work force. The overall total workforce had decreased by 12 per cent between 2000 (13,758) and 2009 (12,073). This decrease was accounted for by a reduction in the number of full-time workers and, to a lesser degree, casual/gang workers, by 27 per cent and 15 per cent respectively. Other numbers remained similar, but there were also fewer farmers and managers.

**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

Widespread across this landscape is a series of hundreds of wetlands associated with the peatland and water filled glacial hollows. Locally they are known as meres and mosses and are of international conservation significance. A diverse range of wetlands habitats occur at these sites including lowland raised bog, fen, wet woodland, reedbed, and eutrophic or mesotrophic standing waters. Important wetland clusters are found between Ellesmere and Whitchurch, the Delamere sandsheet and on the eastern fringes of the NCA between Stafford and Macclesfield.

Significant areas of grazing marsh habitat are found in the floodplains of the rivers Dee, Sow, Gowy and Severn. Nearly 10 to 15 per cent of all ponds in England and Wales are found in this NCA.

A low number of small lowland heathlands are present, but some fine examples of unimproved grassland survive such as at Motte Meadows and at Molverley.

Ancient woodland is almost entirely restricted to steep valley sides and streams and the best examples are found in the north including along the River Dane and River Weaver.

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

**Source: Meres and Mosses Natural Area Profile**

### 7.2 Priority habitats

The Government's new strategy for biodiversity in England, Biodiversity 2020, replaces the previous Biodiversity Action Plan (BAP) led approach. Priority habitats and species are identified in Biodiversity 2020, but references to

BAP priority habitats and species, and previous national targets have been removed. Biodiversity Action Plans remain a useful source of guidance and information. More information about Biodiversity 2020 can be found at; [www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/englandsbiodiversitystrategy2011.aspx](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)	7,486	2
Coastal and flood plain grazing marsh	1,842	1
Lowland raised bog	717	<1
Lowland meadows	315	<1
Purple moor grass and rush pasture	165	<1
Lowland calcareous grassland	88	<1
Lowland dry acid grassland	57	<1
Upland heathland	14	<1
Fens	5	<1
Reedbeds	3	<1

**Source: Natural England (2011)**

The table does not include information on eutrophic standing water or wet woodland habitat and is considered to under represent some habitats including fen and lowland heathland

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

Large farmsteads surrounded by large barns for storing fodder and overwintering stock are frequent and spread throughout the area. Market towns are scattered across the plain. Other settlements, small villages and hamlets are few and dispersed. The hamlets tend to be loosely clustered with houses spread out along the network of hedged lanes in the open countryside.

**Source: Shropshire, Staffordshire and Cheshire Countryside Character Area Description; Countryside Quality Counts (2003)**

### 8.2 Main settlements

The county towns of Stafford, Chester and Shrewsbury and railway town at Crewe form the largest urban areas in the NCA. A series of smaller market towns occur dispersed across the area including at Northwich, Middlewich, Nantwich, Macclesfield, Market Drayton, Congleton, Whitchurch, Wem and Ellesmere. The total estimated population for this NCA (derived from ONS 2001 census data) is 908,921.

**Source: Shropshire, Cheshire and Staffordshire Countryside Character Area Description; Countryside Quality Counts (2003), Natural England (2012)**

### 8.3 Local vernacular and building materials

Buildings are predominantly red brick, with sandstone churches and occasionally very distinctive black and white half-timbered buildings.

**Source: Shropshire, Cheshire and Staffordshire Countryside Character Area Description; Countryside Quality Counts (2003)**

## 9. Key historic sites and features

### 9.1 Origin of historic features

There are a number of iron-age hillforts concentrated on the drier lands of the Pennine Fringe, the Sandstone Ridges and the Weald Moors. Trackways and settlements extended further into the plain, where salt was being extracted and exported during the late Iron Age and the Roman period (notably at Nantwich and Middlewich).

Of the major Roman settlements at Chester and Wroxeter (south-east of Shrewsbury), the latter was abandoned and Chester was reoccupied as a monastic site and developed as a port from the 10th century.

Colonisation of hunting chases (Forests of Delamere and Macclesfield) increased from the 15th century.

The survival today of extensive areas of ridge and furrow indicates the former widespread occurrence of strip farming.

Around the 15th century saw the concerted drainage and colonisation of some wetlands areas, however, most were left for large-scale and estate driven enclosure from the late 18th century onwards, for example, Whixall Mosses, Weald Moors. Around the same time thousands of marl pits began to be created to win clay for land improvement and today they now form the widespread network of ponds.

Prosperity from the production of cheese, which became a major aspect of the rural economy by the late 16th century, gave rise to many of the distinctive decorated farmhouses of that period.



Estates and parklands are common across the area developed in the main from the 16th century onwards, such as Tatton, Grosvenor and Attingham Park. Many are located beside scenic meres.

The Shropshire Union, Llangollen and Trent and Mersey canals, including the extraordinary Anderton Boat Lift, were opened in the 18th and 19th centuries.

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

### 9.2 Designated historic assets

This NCA has the following historic designations:

- 35 Registered Parks and Gardens covering 5,739 ha.
- 4 Registered Battlefields covering 487 ha.
- 360 Scheduled Monuments.
- 8,551 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

- 1 per cent of the NCA 3,766 ha is classified as being publically accessible.
- There are 4,985 km of public rights of way at a density of 1.4 km per km<sup>2</sup>.

- There are no National Trails within the NCA.

Sources: Natural England (2010)

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

Access designation	Area (ha)	% of NCA
National Trust (accessible all year)	1	<1
Common Land	461	<1
Country Parks	1,011	<1
CROW Access Land (Section 4 and 16)	1,165	<1
CROW Section 15	454	<1
Village Greens	24	<1
Doorstep Greens	2	<1
Forestry Commission Walkers Welcome Grants	605	<1
Local Nature Reserves (LNR)	228	<1
Millennium Greens	10	<1
Accessible National Nature Reserves (NNR)	435	<1
Agri-environment Scheme Access	13	<1
Woods for People	1,766	<1

Sources: Natural England (2011)

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

## 11. Experiential qualities

### 11.1 Tranquillity

Based on the CPRE map of tranquillity (2006) the highest tranquillity values are associated with south-west Cheshire and north-west Shropshire, whilst the lowest values occurred in north and east Cheshire and west Staffordshire.

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

Tranquillity	Tranquillity Score
Highest value within NCA	43
Lowest value within NCA	-103
Mean value within NCA	-12

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>

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 approximately 44 per cent of the area is considered to remain 'undisturbed' provided by large areas of rural landscape. However, about half of the area, mainly urban in nature, in north and east Cheshire and west Staffordshire are considered disturbed. A breakdown of intrusion values for this NCA is detailed in the following table.

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

Intrusion category	1960s (%)	1990s (%)	2007 (%)	Percentage change (1960s-2007)
Disturbed	27	44	49	22
Undisturbed	69	52	44	-25
Urban	3	3	6	3

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are an approximate doubling in the area considered 'disturbed' and a doubling of the area classified as 'urban'.

More information is available at the following address:

<http://www.cpre.org.uk/resources/countryside/tranquil-places>

## 12 Data sources

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

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



## Supporting document 2: Landscape change

### Recent changes and trends

#### Trees and woodlands

- At the end of 1998 young trees approved for planting under a Woodland Grant Scheme agreement accounted for about 2 per cent of the mature woodland stock. Between 1999 and 2003 an area equivalent to 3 per cent of the 1999 total stock was approved for new planting under a Woodland Grant Scheme agreement (458 ha). Much of the new planting is in the form of small, scattered blocks which suggests that it is in keeping with the overall character of the area.
- The Community Forest has made an impact in the north. In 1999 about 9 per cent of the established eligible National Inventory of Woodland and Trees woodland stock was covered by a Woodland Grant Scheme management agreement. In 2003 the proportion of established, eligible National Inventory of Woodland and Trees woodland stock was about 14 per cent. About 29 per cent of the woodland cover is on an ancient woodland site. The proportion of these sites covered by a Woodland Grant Scheme agreement has changed since 1999 from 10 per cent to 18 per cent.
- Many woodlands and the majority of hedgerow trees, are mature or over-mature.

#### Boundary features

- Between 1999 and 2003 Countryside Stewardship agreements for linear features included fencing (350 km), hedge management (89 km), hedge planting and restoration (240 km) and restored boundary protection (241 km). The estimated boundary length for the NCA is about 27,916 km,

which reflects the size of the NCA. Total length of field boundaries under management agreements between 1999 and 2003 is equivalent to about 4 per cent of this total.

- Statistics from the end of March 2011 show the following boundary features have been restored under environmental stewardship: hedgerow (7,392 km), stone wall (10 km) and stone-faced hedge bank (1 km).

#### Agriculture

- The mix of farm type has remained stable and since the mid-1990s there has been a shift in emphasis from dairy to lowland cattle and sheep. There is some evidence of farm amalgamation with the number of larger holdings increasing. The pastoral character, particularly that of the Cheshire plain and the Staffs lowlands, has been reduced through the introduction of fodder crops such as maize to provide winter feed. Associated with this is improved drainage and encroachment has resulted in the loss of some field ponds, bogs, and mosses.
- Throughout the NCA an increase in farm size, and diversification of farm activities, are leading to conversion of farmsteads to non-farming uses, and a significant number of redundant farm buildings converted to non-agricultural uses.

#### Settlement and development

- The NCA has a large share of the national build outside urban and fringe areas, as might be expected given the size of the area. However, the spread of development is not evenly distributed – most occurs in the north-east.

- There has been a significant increase in the number of barn conversions since 1999 (339 in the period 1990–2003, compared with 174 between 1990 and 1998). The concentration of conversions is again mainly in the north-east. There is some evidence of expansion of urban fringe around Market Drayton, Hadley and Crewe.
- Apart from Telford, on the fringe of the area, development has largely been confined to the few major towns and there have been a number of developments in the open countryside in response to the increase in tourism and the demand for recreational facilities.

## Semi-natural habitat

- Over recent decades, there has been a steady process of grassland improvement, resulting in the loss of herb-rich hay meadows and pastures and wet grassland. Heathlands, once widely distributed, particularly in the south, are now limited to a few isolated fragments.
- There has been significant uptake of Countryside Stewardship agreements for managing habitats associated with the farmed landscape and since 2000 rate of uptake has been above the national average.
- The largest areas of semi-natural habitat managed under Countryside Stewardship in 2003 were lowland pastures on neutral/acid soils (2,736 ha) and restoration of grassland/semi-natural vegetation (1,433 ha).
- In 2003 Countryside Stewardship agreements in the NCA included 30 ha of heathland recreation and 60 ha of heathland maintenance.
- In 2003 Countryside Stewardship management agreements included 4 ha

of managed reedbed, 9 ha of managed old orchard and the creation and restoration of ponds.

- Local evidence indicates that between 2008 and 2012 the Cheshire County Council worked in partnership to deliver a wide range of outputs including: 40 ha of new/restored habitats; restore 1,300 m of hedgerows and 700 m of sandstone walls.

## Historic features

- In 1918 about 4 per cent of the NCA was historic parkland. By 1995 it is estimated that 44 per cent of the 1918 area had been lost. About 38 per cent of the remaining parkland is covered by a Historic Parkland Grant, and 35 per cent is included in an agri-environment scheme.
- About 65 per cent of historic farm buildings remain unconverted, but about 91 per cent are intact structurally.

## Rivers

- According to the Water Framework Directive assessment, the ecological status of rivers in the NCA is generally 'poor' or 'moderate'.
- The chemical status of the majority of rivers and lakes in the NCA 'does not require assessment'; however, two river lengths in the north of the NCA are 'failing to achieve good' chemical status, and two tributaries in the same area are of 'good' chemical status.
- The chemical status of groundwater throughout the NCA is 'poor'.<sup>8,9</sup>

<sup>8</sup> River Basin Management Plan: Severn River Basin District, Annex A: Current state of waters, Environment Agency (December 2009)

<sup>9</sup> River Basin Management Plan: North West River Basin District, Annex A: Current state of waters, Environment Agency (December 2009)

## Minerals

- Cheshire possesses mineral resources of regional and national importance in the form of silica sand and building sand. The major extraction areas are located in the centre of the county towards the eastern margins in the vicinity of Congleton and Macclesfield.
- There are few locations in the UK where silica sand occurs in enough quantities to be economically viable to extract. As reserves are used, ways of preserving the supply of silica sand are becoming increasingly important. One way is to increase the amount of recycled glass.
- Cheshire also possesses nationally important reserves of halite (salt) that are mined underground by solution pumping. The major extraction areas are in the central NCA around Northwich and Sandbach.
- Associated with the deposits of halite, the flow of low temperature saline solution through the sandstone has precipitated Copper, Lead, Cobalt and Vanadium that can be seen at Alderley Edge SSSI.
- The hills around Shrewsbury are formed of Precambrian greywacke stone which, is in much in demand for road stone, with large quarries in the Sharpstones ridge (Bayston Hill) and Haughmond Hill.
- Glacial deposits of sand and gravel are widely distributed over the area, resulting in a number of extractions sites.
- The high density of in-field ponds is a result of glacial processes and the historical extraction of marl as a soil improver.

- The active extraction of sandstone for use as a building stone continues, for example, at Grinshill.

## Drivers of change

### Climate change

- Projected climate change trends suggest increased rainfall, periods of drought and more frequent storm events. Impacts are expected to increase as the magnitude of climate change increases.
- Climate change exacerbates the risk that many non-native species, insect pests and pathogens may establish and spread. For example, ash die-back, a disease caused by the fungus *Chalara fraxinea*, and acute oak decline (AOD) which poses a threat to the oaks throughout the NCA. If unchecked, these and other diseases and pests, for example, the oak processionary moth, have the potential to fundamentally change the landscape. In the aquatic environment, crayfish plague, a fungal disease, is a particular threat to native white-clawed crayfish in the wider Weaver/Gowy catchment. The plague is carried by the signal crayfish, itself an invasive species.
- Projected climate change trends suggest an increase to summer temperatures leading to warmer water temperatures and greater incidences of algal bloom on waterbodies, for example, the lakes, reservoirs, meres and ponds throughout the NCA. Increased summer temperatures further emphasises the importance of riparian woodland in providing shade for aquatic species, such as populations of salmonid in the River Dee.
- Veteran trees, already stressed from weather extremes will be more susceptible to wind damage on the wind-swept ridges.



- Data from the Environment Agency's flood risk map<sup>10</sup> indicate that there is a high risk of fluvial flooding to a number of settlements, including, the historic bridging town of Shrewsbury, around the north of Telford, Congleton and Northwich. Critical infrastructure including, electrical sub-stations are also at risk and inundation of a sewage treatment works threatens properties at Winsford and Middlewich. Flooding also occurs along the river valleys, inundating agricultural land and rural properties. There is a high risk of flooding as a result of surface water, particularly in locations proximal to meres, such as Ellesmere and Oswestry. The frequency of these events is likely to increase leading to increased damage to vernacular buildings, infrastructure and agricultural soils may be subject to scour and soil erosion. In addition, higher water tables may mobilise pollutants and nutrients that could threaten sensitive habitats.
- In contrast, extended periods of drought may change the suitability of current agricultural crops and/or methods of cultivation, particularly on the free-draining soils of the NCA.

## Other key drivers

- Apart from the expansion of towns such as Winsford and Telford, on the fringe of the area, development has largely been confined to the few major towns and there have been a number of developments in the open countryside in response to the increase in tourism and the demand for recreational facilities.
- The presence of large conurbations and the dense network of roads mean that development pressures are likely to continue. Road improvements risk the urbanisation of rural villages. The demand for mineral extraction sites and in-fill sites for waste disposal from the conurbations is likely to increase and as the population increases, the demand for food will increase. These pressures have the potential to further fragment habitats and change settlement patterns and

the vernacular, but can also provide opportunities to create a high quality built environment with multifunctional green space with links to the rural area.

- With their elevated topography and higher wind speeds, the ridges may become preferred areas for communication masts and wind turbines respectively.
- As the demand for housing and infrastructure increases, so will the demand for raw materials, and a likely increase to productivity from existing extraction sites, resulting in increased lorry movements. Prolonged demand may lead to an increase to planning applications for extensions to existing quarries and the development of new or 'non-operational' quarries.
- The drive towards achieving the target set for generating renewable energy presents opportunities for farmers working in collaboration with landscape-scale partnerships to increase the production of biomass, on a scale, and in appropriate areas, that will not be detrimental to the landscape character.
- Visitor numbers are likely to increase. This is both a challenge and an opportunity for developing the visitor economy, increasing environmental education and understanding of the local heritage. The challenge will be to manage the impact of visitors on sites by ensuring that paths are adequately signposted and surfaced to prevent erosion and to divert public access away from sensitive habitats and areas of high tranquillity.
- Increased visitor numbers may provide opportunities for farm diversification – redundant agricultural buildings converted for short stay and long stay accommodation and where appropriate in the landscape, sites for camping and tourist caravans, especially adjacent to the Sandstone Trail, thus sustaining historic farm buildings and increasing farm income.

<sup>10</sup> <http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?topic=floodmap#x=364799&y=349833&scale=8>

## 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.



A continuous fringe of lesser reedmace with white water-lily around Bomere Pool (Shropshire). Encroaching trees have been cleared to allow aquatic vegetation to re-establish in shallow water. The pool is one of the most oligotrophic (infertile) meres and has an extensive area of white and yellow water-lilies.

Statement of Environmental Opportunity	Ecosystem service																		
	Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place / Inspiration	Sense of history	Tranquillity	Recreation	Biodiversity	Geodiversity
SEO 1: Restore, manage and protect from diffuse pollution the rivers, streams, lakes, ponds and wetland habitats (including flood plain grazing marsh and wet woodland) and support partnerships to maintain the integrity and unique conditions for the preservation of the internationally important meres and mosses and River Dee, to benefit water availability, water quality, landscape character, biodiversity and climate regulation.	↗ *	↔ ***	↑ ***	↔ ***	↔ ***	↗ **	↑ ***	↑ ***	↗ **	↑ ***	↗ *	↗ *	N/A	↗ *	↗ **	↔ ***	↗ **	↑ ***	↔ ***
SEO 2: Protect the landscape of the plain, recognising its importance to food production and incorporating well-maintained hedgerows, ponds and lowland grassland margins within agricultural systems, to secure resource protection and maintain productivity, while reducing fragmentation of semi-natural habitats to benefit a wide range of services, such as landscape character, sense of place, water quality and biodiversity.	↑ ***	↔ ***	↗ ***	↔ ***	↔ ***	↗ *	↑ ***	↗ **	↗ ***	↑ ***	↗ **	↗ *	N/A	↑ ***	↑ ***	↗ *	↔ *	↑ ***	↔ ***
SEO 3: Manage and restore lowland heathland and ancient and plantation woodland, support partnerships to plan appropriately scaled new woodland cover, particularly where this will link and extend existing woodlands, restore and reinstate traditional orchards and increase biomass provision to mitigate the impact of climate change, where this will benefit biodiversity, landscape character and enhance the experiential qualities of the area.	↘ **	↑ **	↗ **	↑ ***	↑ ***	↑ ***	↗ ***	↗ ***	↗ ***	↑ ***	↗ ***	↗ ***	N/A	↑ ***	↑ ***	↑ ***	↑ ***	↑ ***	↔ ***
SEO 4: Protect and manage the nationally important geological sites and heritage features demonstrating how the interaction of natural and historical factors influenced the distinctive character of its landscape and settlement patterns, and help to promote greater understanding of the link between wildlife, heritage and geodiversity, particularly the importance of former extraction sites for both geodiversity and biodiversity.	↔ **	↗ ***	↗ **	↔ ***	↗ ***	↗ ***	↗ *	↗ *	↗ ***	↗ **	↗ *	↗ *	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
Prominent Triassic sandstone ridges rise above an expansive plain covered with glacial till.	<ul style="list-style-type: none"> <li>■ Sandstone ridges formed by a series of small hills, such as Maer Hills, Nesscliffe, Grinshill and Hawkestone provide a strong contrast in landscape character and topography between the ridges and the surrounding plain. The ridges provide expansive views across the plain and a locally rare sight of exposed solid rock comprising striking bluffs of reddish-pink sandstones and conglomerate of the Triassic Period.</li> <li>■ Where exposed at the surface, the Triassic sandstone provides recharge areas to the Sherwood Sandstone Aquifer that extends under the majority of the area and supplements surface water supplies to public, agriculture and industry both within and outside the area.</li> <li>■ One of the best examples of an esker system in England occurs at Aqualate Mere, which provides a rare example in the Midlands of an esker system formed by glacial meltwaters during the late Devensian Glaciation. The site is also significant in demonstrating the close association of the esker with fan deposits formed in a proglacial lake, a nationally rare group of landforms.</li> </ul>
A drained landscape of rivers, flood plains, field ponds, subsidence flashes, canals and reservoirs.	<ul style="list-style-type: none"> <li>■ The NCA contains several significant flood plains. Its flat, low-lying basins carry meandering stages of ten main rivers including the Dee, Dane, Severn and Sow. The first three have sections notified as SSSI for their geomorphological features while the marshes, on the flood plain of the River Sow provides many wetland habitats to birds and insects in particular.</li> <li>■ The highest density of field ponds in Western Europe, most are of glacial origin, others to the historic extraction of marl for use as an agricultural soil improver.</li> <li>■ Underground solution pumping to extract halite (salt) has resulted in subsidence flashes in the north east, around Sandbach, Northwich and Middlewich.</li> <li>■ A section of the River Dee SAC flows north along the western boundary of the area. The designation is shared with Lake Bala in Wales for its important habitats that support vegetation communities and populations of Atlantic salmon, lamprey species, bullhead and otter Atlantic salmon.</li> </ul> <p><b>Continued over...</b></p>

Landscape attribute	Justification for selection
	<p><b>...continued from previous.</b></p> <ul style="list-style-type: none"> <li>■ A number of canals cross the NCA. Disused branches can become important in developing a succession from open water to reedswamp and fen and have important assemblages of aquatic plants. There are three sections of canal with SSSI status within the south of the NCA – parts of the Montgomery Canal, Newport Canal and Prees Branch Canal.</li> <li>■ A number of canal-feeder reservoirs through-out the NCA, provide nationally important habitats, for example, Belvide reservoir SSSI, supports nationally significant populations of overwintering shoveler. Chasewater reservoir SSSI is nationally important for its wet and dry lowland heath, fens and oligotrophic (nutrient-poor) standing open water habitats, and for its populations of scarce floating water-plantain and round-leaved wintergreen.</li> </ul>
Wooded ridges, conifer plantations, small copses in wetland areas and scattered traditional orchards.	<ul style="list-style-type: none"> <li>■ Woodlands are few on the plain where agriculture dominates. Here, woodlands are restricted to some of the wetter areas.</li> <li>■ Thin, sandy, free-draining and generally infertile soils over the top and sides of the ridges support a mosaic of broadleaved mixed woodland often comprise ancient woodland, with areas of heathland, in contrast with the tree-less, relatively lush pastures devoted to mixed farming and dairy on the surrounding plain.</li> <li>■ There are locally extensive tracts of coniferous woodland on the thin gravelly soils in the east of the area.</li> <li>■ Abundant, mature hedgerow trees, particularly in Cheshire, give the appearance of a well-wooded landscape.</li> <li>■ Once a characteristic of the landscape, remnant orchards are now local features. Some older farms, estates, smallholdings and cottages still have remains of orchard trees. A significant number survive, for example, in the area around Attingham Park in Shropshire, Moston in Cheshire and the pear orchards of Acton Bridge, also Cheshire.</li> </ul>
Predominantly pastoral land use: dairy herds with some mixed farming and arable fields.	<ul style="list-style-type: none"> <li>■ Throughout the plain, the water retention and fertility of the clay soils support lush pastures for grazing dairy cattle or for growing silage or hay.</li> <li>■ In contrast to the plain, the soils on some of the gentle, freer draining side slopes of the sandstone ridges are used to grow fodder crops such as maize. Potatoes are grown on some of the lighter, sandier soils in Shropshire. In Staffordshire, livestock rearing combines with dairying and significant areas of arable on the lighter soils present a less-pastoral landscape.</li> </ul>

Landscape attribute	Justification for selection
Strong field patterns, with generally well-maintained boundary features.	<ul style="list-style-type: none"> <li>Field sizes range from small to medium, in irregular, but strong field patterns, with generally well-maintained boundaries – predominantly hedgerows surrounding pastures</li> <li>The hedgerows are generally dense, particularly in Cheshire, with large, mature, hedgerow trees, mainly oak with occasional ash and sycamore, giving the appearance of a well-wooded landscape.</li> <li>Hedgerows give way to sandstone walls on the ridges. There are historic parkland estates scattered throughout the plain, often bounded by Cheshire-style (curved topped) painted, metal railing fences that give the appearance of a well ordered and maintained landscape.</li> </ul>
Dairy herds with some mixed farming and arable fields.	<ul style="list-style-type: none"> <li>Throughout, the plain, the water retention and fertility of the clay soils support lush pastures for grazing dairy cattle or for growing silage or hay.</li> <li>In contrast to the plain, the soils on some of the gentle, freer draining side slopes of the sandstone ridges are used to grow fodder crops such as maize. Potatoes are grown on some of the lighter, sandier soils in Shropshire. In Staffordshire, livestock rearing combines with dairying and significant areas of arable on the lighter soils present a less-pastoral landscape.</li> </ul>
Internationally important meres and mosses.	<ul style="list-style-type: none"> <li>Collectively the meres and mosses in this and the neighbouring NCA have been designated SAC and Ramsar sites. Fenn's, Whixall, Bettisfield, Wem and Cadney mosses extend into neighbouring Wales.</li> <li>Meres illustrate natural progressions of habitats from open water through swamp and fen habitats, to wet willow or alder woodland. Many types of insect and water fowl are associated with these diverse wetland habitats and examples are scattered across the plain.</li> <li>A group of seven large meres, some fringed with woodland and contained within the hummocky hills of the moraine, create a distinctive local landscape known as the 'Shropshire Lakeland'.</li> <li>Mosses develop where peat forms, producing very acidic conditions. A number of 'moss' types have developed, over extensive areas, as a shallow dome, or in smaller basins. Their relationship with the meres can be seen where a floating raft of mosses covers a remnant lens of water. Such 'schwingmoors' are rare internationally, but several fine examples occur in the area, for example, Oak Mere.</li> <li>The Weald Moors are characterised by a network of rush-filled drainage dykes between damp pastures and wet woodland.</li> </ul>

Landscape attribute	Justification for selection
Historic sites, settlements and tracks/roads.	<ul style="list-style-type: none"> <li>■ The topography of the ridges has been exploited for defence over centuries, evidenced by the remains of defensive fortifications, for example, Wat's Dyke, an Anglo Saxon boundary earthworks and artefacts from the Iron Age, Saxon and Roman periods.</li> <li>■ The fortifications along the ridge top were linked by an ancient track. The Sandstone Trail, long distance footpath now follows this line. There is evidence of small settlements of Iron Age on the higher, drier ground of the Weald Moors, for example, at Wall Camp, where a rare, low-lying iron-age hill fort survives.</li> <li>■ Ancient trackways extended further into the plain, where salt was being extracted and exported during the late Iron Age and the Roman period, notably at Nantwich and Middlewich.</li> <li>■ Areas of ridge and furrow on the plain indicate the former widespread occurrence of strip farming.</li> <li>■ A number of Roman roads, the most notable being Watling Street, which linked London to mid-Wales via the site of, Viroconium Cornoviorum – Wroxeter in modern-day Shropshire. The walled city of Chester was the most significant Roman settlement and the clearance of woodlands for agriculture continued during the period of Roman occupation.</li> <li>■ Moated houses, timber-frame buildings and very distinctive black and white half-timbered buildings, most notably in Chester.</li> <li>■ Parklands and gardens associated with estates such as, Chillington, Trentham, Tatton and Attingham; Country houses such as Gawsworth, Arley and Adlington Halls; fortified manor houses and castles such as at Shrewsbury, Stafford, Beeston, Acton Burnell and Cholmondeley.</li> </ul>
Mineral extraction sites.	<ul style="list-style-type: none"> <li>■ The extraction of silica sand has produced a complex of wetlands around Delamere, while the underground extraction of salt particularly around the area of Sandbach has led to a series of subsidence flashes that provide important saline habitats, which are relatively rare inland.</li> <li>■ Sand and gravel extraction is widespread exploiting the deposits of glacial till.</li> <li>■ Precambrian greywacke stone is extracted from the hills around Shrewsbury for road stone although the quarries are hidden from view as they follow the dip of the strata.</li> </ul>
Extensive road and rail network, communication masts and locally distinctive features.	<ul style="list-style-type: none"> <li>■ Extensive transport network. The M6 runs north to south through the area, the M54 crosses east to west and the M56 skirts the northern boundary before crossing north of Chester, while the M53 starts its journey north at Chester. There is also a dense network of major roads.</li> <li>■ A web of railway lines cross the area emanating from Crewe in the centre of the plain.</li> <li>■ Communication masts are visible on the tops of some hills. On the flat plain, locally distinct features are prominent, for example, the radio telescope at Jodrell Bank.</li> </ul>



## Landscape opportunities

- Create new woodland, in urban areas in accordance with local plans, for example, The Mersey Forest Plan, contributing to green infrastructure; planting blocks of trees to screen settlements and roads from the surrounding landscape and plant street trees to provide shade, thus mitigating the effect of the urban heat island, increasing water infiltration rates and purifying the air.
- Manage core nature conservation sites, for example, SAC, Ramsar, SSSI, NNRs, LNRs and Local Sites network to improve their condition and connectivity to enhance landscape character and create a more coherent and more resilient habitat network, while providing opportunities for volunteering, education and community involvement.
- Conserve and protect rock outcrops for their contribution to landscape character and educational value in studying past climate and geomorphological processes and for their cultural and historical significance.
- Maintain and buffer the areas of ancient semi-natural woodland by creating and managing transitional scrub communities between woodland and adjoining habitats to benefit biodiversity and landscape connectivity to help increase resilience to climate change.
- Manage ancient woodland and historic parkland with veteran trees, throughout the NCA. Encourage successional planting of a range of species to maintain the structural diversity, increase resilience to the effects of climate change while strengthening landscape and historic character.
- Manage and extend traditional orchards for their contribution to local landscape character, biodiversity, their heritage value and contribution to the local economy.
- Conserve and restore dry-stone boundary walls, Cheshire-style fences and appropriately manage and restore traditional hedgerows, planting with typical species and associated hedgerow trees.
- Protect the field ponds and where possible, create more, to increase the permeability of the landscape for aquatic species.
- Restore areas of degraded peat and the wetlands of the Meres and Mosses for the benefit of climate change, landscape character, people, wildlife and the historic environment.
- Enhance the visual and ecological continuity and character of river corridors and their tributaries through positive management, for example, facilitating natural regeneration and where appropriate, planting of riparian trees and vegetation that can provide water-regulating woody debris, and shade for wildlife and people.
- Protect from further loss and degradation the remaining fragments of heathland, where appropriate creating new heath habitat, thus reducing fragmentation and enhancing the habitat mosaic within the landscape to benefit biodiversity and climate regulation.
- Conserve, enhance and improve interpretation of historic assets in the wider landscape including, above and below ground archaeology and historic sites and buildings, for their educational, cultural and historic significance.

- Create new or extend public rights of way and permissive access and circular routes to improve the connectivity between settlements and core sites, to encourage physical activity and wellbeing and enhance semi-natural habitats along rights of way and towpaths thus creating corridors for wildlife.
- Create new access to woodland as part of woodland management, thus increasing the opportunities for quiet recreation and to experience tranquillity, ensuring this does not compromise sensitive habitats and bio-security and encouraging visitors away from over-popular sites.
- Protect the vernacular by ensuring that the grouping and design of new developments reflect the juxtaposition, scale and materials of traditional local buildings characteristic of the area; manage small-scale extraction of local building stone to this end.



Active sand and gravel extraction at Wood Lane, just south of Ellesmere. As well as extracting economically important deposits of sand and gravel, the site also has landfill and waste recycling facilities. Working closely with Shropshire Wildlife Trust, the operator has also established part of the area as a nature reserve.

## Ecosystem service analysis

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

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

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Food provision</b>	Dairying	Food production is important to the region. Seventy per cent of the soils are classified as Grade 3 and 17 per cent Grade 2 in terms of their production and this is reflected in their use.	Regional	The area is important for food production and food distribution, being proximal to roads and large urban settlements, markets and processing plants.	Work in collaboration with farmers to safeguard food production while incorporating measures that support the essential natural services that underpin this production. For example, protecting soils, water and biodiversity by incorporating species-rich field margins, buffering watercourses, managing hedgerows and incorporating habitats in arable areas for farmland birds.	<b>Food provision</b>
	Sheep and cattle rearing					<b>Regulating water quality</b>
	Some arable	Throughout the plain, the water retention and fertility of the clay soils support lush pastures for grazing dairy cattle or for growing silage or hay. Significant numbers of dairy-herds supply milk to dairy processors in the NCA that produce a range of dairy products including cheese producers making a range of Cheshire cheese and ice cream.		The increasing demand for food is likely to continue leading to a high demand for improved grassland that could result in the loss of semi-natural habitats and erosion of the pastoral character through the introduction of fodder crops such as maize to provide winter feed. These could lead to larger field sizes, increased fertiliser and pesticide inputs and improved drainage which could threaten field ponds and characteristic meres and mosses. However, opportunities exist to incorporate measures to mitigate such consequences, such as the incorporation of semi-natural habitats in to agricultural systems that can protect habitats and the soil resource.		<b>Regulating soil erosion</b>
	Traditional orchards	In contrast to the plain, the soils on some of the gentle, freer draining side slopes of the sandstone ridges are used to grow fodder crops such as maize for winter feed.  Potatoes are grown on some of the lighter, sandier soils in Shropshire. In Staffordshire, there are mixed farms and significant areas of arable, including potatoes and combinable crops.  There is a number of degraded traditional orchards through-out the NCA, particularly in Cheshire.		As well as providing a local supply of fruit for local markets, orchards are hotspots for biodiversity, supporting a wide range of heritage crops and wildlife	Encourage the management and planting of traditional orchards for the benefits to biodiversity, heritage and local markets. For example, orchard planting with communities through The Mersey Forest Plan. <sup>11</sup>	<b>Regulating soil quality</b>  <b>Sense of history</b>  <b>Sense of place/inspiration</b>  <b>Genetic diversity</b>

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Timber provision	Conifer plantations	The greatest concentration of woodland is in the north and north-east where commercial forest plantations and community woodlands are grown on the thin gravelly soils.	Regional	<p>Timber was historically an essential product of the area. It was used for charcoal in the salt industry and for iron smelting in the south-east before the widespread use of coal. Timber was also the prime construction material and Shropshire oak, in particular, was sought after for shipbuilding. Delamere Forest was a Royal Forest until 1812 and in 1919 the remaining Crown woodlands were passed to the (then) Forestry Commission to be managed for timber production.</p> <p>Woodland is virtually absent from the plain, except in the north around Northwich, being restricted to the poorer soils on the crests and slopes of ridges and in clumps in wetland areas and as clough woodland on valley sides.</p> <p>Timber provision could be increased, as a by-product of woodland management through coppicing and pollarding.</p>	Support partnerships in Seeking opportunities to stimulate the wood product and wood fuel markets in nearby urban areas in order to sustain the management of native woodlands, for example, The Mersey Forest Partnership.	Timber provision
	Native woodland					Biodiversity
	community woodland	Community woodland initiatives, for example, The Mersey Forest Partnership <sup>12</sup> are planting sustainably managed community woodlands that include timber provision.			Sense of place/ inspiration	
	Valley or ‘clough’ woodland					Sense of history
						Climate regulation
						Water availability
						Regulating water flow
						Recreation

<sup>12</sup> [www.merseyforest.org.uk/](http://www.merseyforest.org.uk/)



Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Water availability</b>	Rivers	The NCA has ten main rivers. River Severn and its tributaries (Perry, Roden and Tern), the River Weaver, River Dane, and the River Bollin and its tributary the River Dean in the north east of the NCA, and the River Sow and River Penk.	Regional	Major rivers and their tributaries are important sources of water for domestic, agricultural and industrial use. In addition, there are large numbers of designated conservation areas in the catchment, with SSSI, Ramsar and SAC designations, for example, the Midland Meres and Mosses and River Dee that are reliant on consistent water availability. Greater demand for water, associated with expansion to the settlements that rely on these catchments, will lead to increased abstraction and a potential fall in water levels.	Promote the sustainable use of water in domestic, industrial and agricultural sectors to reduce demand.  Where appropriate, encourage rainwater harvesting and the adoption of sustainable urban drainage schemes in urban areas to improve rates of water infiltration.  Encourage the construction of winter water storage reservoirs in agricultural areas (as part of the Catchment Sensitive Farming Priority Catchment), particularly where these can also make a positive contribution to wetland habitat networks and local landscape character.  Identify and enhance areas for natural water storage, for example, expanding areas of flood plain grazing marshes and lowland meadows along the river valleys, and creating ponds and scrapes.  Maintain and extend riparian woodland along the river valleys to increase interception rates and slow the flow of surface water.  Using support available through initiatives such as CSF and agri-environment scheme options, encourage good soils management, particularly in aquifer recharge areas.	<b>Water availability</b>  <b>Regulating soil quality</b>  <b>Regulating water flow</b>  <b>Sense of place/ inspiration</b>  <b>Recreation</b>  <b>Biodiversity</b>  <b>Climate regulation</b>
	Aquifer					
	Reservoirs	There are several reservoirs throughout the NCA, including the Knighton Reservoir (near Eccleshall) and the Hurleston Reservoir (near Nantwich) that store water for public, agricultural and industrial uses. Other canal-feeder reservoirs are at various locations.				
	<sup>13</sup> <i>Severn Corridor Catchment Abstraction Management Strategy</i> , Environment Agency (March 2003)	There is 'water available' along the River Severn; <sup>13</sup> however, its tributaries Perry, Roden, and Tern are over licensed <sup>14</sup> . In the north of the NCA, the River Weaver and River Dane have 'water available' for further abstraction. <sup>15</sup> The River Bollin has 'no water available' within the NCA as it runs north of Macclesfield. <sup>16</sup> Where it is accessible, water is abstracted from the aquifer via boreholes that supplement surface water supplies.				
	<sup>14</sup> <i>Shropshire Middle Severn Catchment Abstraction Management Strategy</i> , Environment Agency (September 2007)	An area of the NCA overlays a major sandstone aquifer extending north from Shrewsbury and west around Oswestry and Chester. Groundwater resources, located in the south and west of the NCA are over licensed. <sup>17</sup>				

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Genetic diversity</b>	Traditional orchards	Traditional orchards were once an important part of the landscape. Some older farms, estates, smallholdings and cottages still have remains of orchard trees either in the garden hedgerow or in grassy paddocks set close to the house. A number of fragmented orchards survive, for example, in the area around Attingham Park in Shropshire and notably, the pear orchards at Acton Bridge in Cheshire.	Local	<p>Local evidence shows that there are over 30 varieties of apples specific to Cheshire. A number were developed in the 18th century, for example, Ecclestone Pippin, Lord Derby and Gooseberry Pippin. The genetic diversity preserved in old fruit varieties may be important to future food security by retaining genes for future crop propagation.</p> <p>In addition to being a heritage asset to the area, orchards are hotspots for biodiversity, supporting a wide range of wildlife and containing priority habitats and species including populations of pollinators.</p>	Using support available through agri-environment schemes and landscape partnerships, encourage the expansion of existing orchards and the re-instatement of old orchards to preserve heritage varieties and fruit tree suppliers.	<b>Genetic diversity</b>  <b>Food provision</b>  <b>Biodiversity</b>  <b>Pollination</b>  <b>Sense of place/inspiration</b>  <b>Sense of history</b>  <b>Recreation</b>
<b>Biomass energy</b>	<p>Miscanthus</p> <p>Existing woodland cover</p> <p>Community woodland</p>	<p>Miscanthus is grown in Shropshire. The main cluster of sites are south of Market Drayton and around the area of Newport and around Eccleshall in Staffordshire.</p> <p>There is a high potential yield<sup>18</sup> for miscanthus in the north and west of NCA, with a medium potential yield in the south (between Shrewsbury and Stoke-on-Trent). For short rotation coppice there is considerable variability between medium and high potential yield throughout the NCA.</p> <p>The Mersey Forest Partnership are planting sustainably managed community woodlands that include timber provision to local communities who harvest logs from identified trees and in return the woodland is thinned to improve its structure and biodiversity.</p>	Local	<p>A biomass plant at Eccleshall utilises miscanthus to provide electricity to 2,600 properties in Eccleshall, making the town virtually carbon-neutral. The plant has stimulated the local growing of miscanthus and developed a supply chain local to the plant.</p> <p>Existing woodland cover offers some potential for the provision of biomass, by bringing unmanaged woodland under management and as a by-product of commercial timber production.</p> <p>Away from the lush pastures of the plain, the gently undulating landscape may provide opportunities for planting miscanthus without detriment to landscape character.</p> <p>Strong field patterns, defined by hedgerows, often with dense, mature hedgerow trees are unlikely to be adversely impacted by miscanthus. This may provide opportunities for farm diversification and stimulate more markets and supply chains for more biomass plants.</p>	<p>Seek opportunities to expand miscanthus in appropriate locations where this can be accommodated within local landscapes and contribute to local biodiversity.</p> <p>Seek opportunities to bring existing woodland into active management where this can make a positive contribution to woodland biodiversity and support provision of other services such as regulating soil erosion, water flow and recreational provision.</p> <p>Support community woodland partnerships, for example, The Mersey Forest, in managing existing woodland, developing supply chains and establishing markets for wood fuel.</p>	<b>Biomass energy</b>  <b>Climate regulation</b>  <b>Regulating water flow</b>  <b>Regulating soil erosion</b>  <b>Sense of place/inspiration</b>  <b>Biodiversity</b>

<sup>18</sup> [www.naturalengland.org.uk/ourwork/farming/funding/ecs/sitings/areas/o61.asp](http://www.naturalengland.org.uk/ourwork/farming/funding/ecs/sitings/areas/o61.asp)

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Climate regulation</b>	Peat/fen soils/ mosses	The majority of this NCA has low soil carbon content. However, significant wetland areas and extensive areas of peat soils and permanent grasslands provide an important carbon storage function in this NCA.	Regional	Peat soils are likely to be the most significant contributor to climate regulation. However, historic peat extraction and the lowering of the water table have reduced the effectiveness with which peatlands in this NCA contribute to carbon storage. Therefore, the conservation and management of meres and mosses is extremely important for climate regulation in addition to benefits to biodiversity and sense of place.	Working in partnership with the Environment Agency, Landowners and landscape-scale partnerships, seek opportunities to reverse the degradation of peat mosses, for example, by careful water management, blocking drainage ditches and damming to raise the water level as used effectively on Fenn's, Whixall and Bettisfield Mosses.	<b>Climate regulation</b>
	Wetland habitats					
	Heathland and woodland					
	Permanent grasslands					
	Biomass – fuel and generation					
		Extensive woodland is restricted to the east, where there are commercial woodland plantations and fragmented areas of heathland exist on the poorer soils associated with the sandstone ridges. The NCA has significant areas of miscanthus and a biomass plant.		Good management of existing woodland can ensure their role in sequestering and storing carbon is optimised and will benefit other services, for example, biodiversity. Heathlands are characterised by a cover of 25 per cent dwarf shrubs of the botanical family Ericaceae. Woody shrub species play an important role in carbon sequestration in grassland ecosystems. Retaining soils under permanent pasture also contributes to the carbon storage within the NCA.	Create new or extend areas of heathland to halt further fragmentation and to increase their connectivity to benefit biodiversity and climate regulation.	<b>Biodiversity</b>
					Protect permanent grassland from ploughing or conversion to arable.	<b>Regulating soil erosion</b>
					Encouraging the installation of small-scale biomass plants in local civic buildings.	<b>Regulating water quality</b>
						<b>Recreation</b>
						<b>Sense of place/ inspiration</b>
						<b>Sense of history</b>

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Regulating water quality</b>	Rivers and their tributaries	Extensive areas fall within Priority Catchments, of the Catchment Sensitive Farming (CSF) Programme <sup>19</sup> including several sites within the West Midlands Meres emphasising the importance of water quality to the NCA's habitats.	Regional	The key problems in this Priority Catchment are nutrient enrichment from agricultural run-off and soil loss causing sedimentation <sup>22</sup> which is a particular threat to the Meres and Mosses SAC and Ramsar and the River Dee and Aqualate Mere SAC.  The reasons for failing ecological status <sup>23</sup> of the watercourses are diffuse pollution from pesticides and discharges from septic tanks. The aquatic ecology suffers from current and past industrial discharges. Higher salinities are found in areas adjacent to the Mersey Estuary at Stanlow, Ellesmere Port, Runcorn and the Wirral, largely attributed to saline intrusion following unsustainable abstraction of salt.  Outcrops of Triassic sandstone provide recharge areas to the underlying aquifer, requiring the careful management of fertilisers and pesticides to prevent pollution from entering groundwaters.  Although the aquifer is protected by glacial drift on the plain, in areas where the drift is absent, nitrate concentrations are increasing in water supply boreholes. This has led to the designation of a groundwater nitrate vulnerable zone across the NCA, for example, around the areas of Newport, Market Drayton and to the east of Chester. In addition, there are areas of eutrophic nitrate vulnerable zones around the meres of Ellesmere and Whitchurch.	In partnership with farmers and landowners, pursue measures, supported through the CSF scheme and other initiatives, to reduce nutrient and sediment input to watercourses: reduce foul run-off from outdoor feeding areas, silage clamps, yards and cattle tracks; prevent stock from entering streams and poaching stream banks and manage cattle movements to avoid poaching of fields; restore semi-natural buffer water courses from nutrient run- off.  Physical barriers around arable fields, for example, permanent grassland margins, well- maintained hedgerows and boundary walls can reduce wind erosion of soil, a source of sedimentation.  These measures support the Environment Agency's protection zones and can have a positive effect on ground and surface waters benefiting biodiversity.	<b>Regulating water quality</b>  <b>Regulating water flow</b>  <b>Regulating soil erosion</b>  <b>Biodiversity</b>  <b>Sense of place/ inspiration</b>
	Meres/lakes					
	Aquifer					
	Sustainable land management	According to the Water Framework Directive assessment, the ecological status of rivers in the NCA is generally 'poor' or 'moderate'. The chemical status of the majority of rivers and lakes in the NCA 'does not require assessment'; however, two river lengths in the north of the NCA are 'failing to achieve good' chemical status, and two tributaries in the same area are of 'good' chemical status. The chemical status of groundwater throughout the NCA is 'poor' <sup>20,21</sup>  Outcrops of Triassic sandstone provide recharge areas to the underlying aquifer; it is vital that land management over these areas maintains good soil structure to maximise water infiltration and that measures are taken to prevent diffuse pollution from entering groundwaters.				

<sup>19</sup> [www.naturalengland.org.uk/ourwork/farming/csf/default.aspx](http://www.naturalengland.org.uk/ourwork/farming/csf/default.aspx)

<sup>20</sup> *River Basin Management Plan: Severn River Basin District, Annex A: Current state of waters*, Environment Agency (December 2009)

<sup>21</sup> *River Basin Management Plan: North West River Basin District, Annex A: Current state of waters*, Environment Agency (December 2009)

<sup>22</sup> *Catchment Priorities*, Defra (June 2007)

<sup>23</sup> *River Basin Management Plan: North West River Basin District*, Environment Agency



Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Regulating water flow</b>	<p>Flood plains, rivers and watercourses</p> <p>Semi-natural vegetation</p> <p>Riparian woodland</p>	<p>Data from the Environment Agency's flood risk map<sup>24</sup> indicate that there is a high risk of fluvial flooding to a number of settlements, including, the historic bridging town of Shrewsbury, and properties around the north of Telford, Congleton and Northwich. Critical infrastructures including electrical sub-stations are also at risk, including a sewage treatment works near properties at Winsford and Middlewich.</p> <p>There is a greater risk of flooding associated with surface water, particularly in locations proximal to meres such as Ellesmere and Oswestry.</p>	Local	<p>Flooding in Shrewsbury is potentially exacerbated by the loss of flood plain in the area of the Severn–Vyrnwy confluence on the western boundary of the NCA. The flood plain of the River Weaver is relatively small, resulting in rural properties and agricultural land flooding quickly with little warning.</p> <p>In rural areas in the middle and north of the NCA, there are few properties at fluvial flood risk. However, the River Dane and Wheelock catchments are sensitive to land management change and poor maintenance of watercourses can increase the risk of localised flooding to agricultural land. River maintenance pilot initiatives are allowing farmers to maintain their own watercourses, without the need for prior consent, for example, the River Duckow, pilot area in Market Drayton. This can be a benefit to water management and a challenge to maintain the integrity of habitats both within the pilot area and downstream.</p>	<p>Identify and create natural areas for flood water storage to reduce the reliance upon hard engineering solutions to flooding in settlements. Reinstating flood plain grazing marsh and other wetland habitats within the flood plain, ensuring that the flood plain function is not reduced by inappropriate development.</p> <p>Remove constrictions to river flow, such as weirs, which will also benefit migratory fish.</p> <p>Create and manage riparian habitat, for example, wet woodland and reedbeds that can reduce the rate of run-off and filter water.</p> <p>In urban areas promote multiple use riparian open spaces, for example flood compatible playing fields and parks. Ensure that new developments take into account the principles of SUDS by including greenspaces and areas of unsealed surfaces.</p> <p>Work with farmers and Environment Agency to monitor the outcomes of the river maintenance pilot, assessing methods and feasibility of expanding to other areas without damaging habitats.</p>	<p><b>Regulating water flow</b></p> <p><b>Regulating soil erosion</b></p> <p><b>Regulating soil quality</b></p> <p><b>Sense of place/ inspiration</b></p> <p><b>Biodiversity</b></p>

<sup>24</sup> <http://watermaps.environment-agency.gov.uk/wiyby/wiyby.aspx?topic=floodmap#x=364799&y=349833&scale=8>

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<b>Regulating soil quality</b>	Mineral soils derived from the Triassic sandstone  Soils derived from glacial till  Fen peat soils	Arable systems predominate on the freely draining soils on the lower, less steep slopes of the ridges and areas of Shropshire and Staffordshire. Over a prolonged period of cultivation, this can damage the soil structure.  The slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils and the fen peat soils may suffer compaction and/or capping as they are easily damaged when wet.	Local	The soil structure of the freely draining sandy soils can be easily damaged where organic matter levels are low after continuous arable cultivation or where soils are compacted. This may be improved by careful addition of organic matter. Soils over the aquifer are valuable for aquifer recharge; this requires maintenance of good soil structure to aid water infiltration.  Compaction and/or capping of slowly permeable soils may reduce water infiltration and increase diffuse pollution as a result of surface water run-off, increasing siltation in water courses and meres. Carefully increasing organic matter content of soils can help reduce these problems.  Where peaty soils and wetland habitats predominate, retaining water levels will maintain the soil structure.	Encourage the adoption of techniques promoted through the CSF and other initiatives, to manage arable and livestock systems sustainably to protect the soil structure, for example adopting sustainable stocking levels and preventing poaching, and carefully managing vehicle movements in wet conditions to avoid soil compaction  Continue to work in partnership to restore degraded areas of peat and manage wetland habitats to safeguard the carbon-rich soil and reintroduce peat forming vegetation.	<b>Regulating soil quality</b>  <b>Food provision</b>  <b>Water availability</b>  <b>Climate regulation</b>  <b>Regulating soil erosion</b>  <b>Regulating water quality</b>  <b>Regulating water flow</b>  <b>Biodiversity</b>  <b>Sense of place/inspiration</b>

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<b>Regulating soil erosion</b>	Soils	The West Midlands Meres' Priority Catchment, has identified that soil loss is causing sedimentation in a number of meres and watercourses across the NCA.	Regional	Regulating soil erosion is an important service in this NCA as it supports food production, water quality and the integrity of the meres and mosses. Maintaining organic matter levels in cultivated soils will reduce their susceptibility to erosion.	Encourage the adoption of techniques promoted through CSF and other initiatives, to manage arable and livestock systems sustainably to protect the soil resource, for example by buffering watercourses and encouraging the uptake of agri-environment options to establish permanent grassland or conservation field margins and maintaining hedgerows and dry-stone walls on the ridges.	<b>Regulating soil erosion</b>
	Semi-natural habitat					<b>Regulating water quality</b>
	Field boundary features	The lighter freely draining soils have an enhanced risk of soil erosion on sloping land where cultivated or bare soil is exposed, exacerbated where organic matter levels are low after continuous arable cultivation or where soils are compacted. These soils are also at risk of wind erosion, particularly where left bare, as are the fen peat soils. They are also susceptible to rapid run-off during storm events.		Permanent vegetation cover, for example, pasture alongside river valleys and watercourses, stabilises soils and traps sediment, helping to slow water flow. In arable fields, permanent grassland around field boundaries, well-maintained hedgerows and boundary walls can help to alleviate wind erosion of soil.  Riparian woodland and lowland meadow along watercourses offer protection against run-off. Conversely, invasive non-native species, for example stands of Himalayan balsam, create denuded river banks in the winter months, which are markedly more prone to soil erosion.  The restoration of hedgerows may constrain food productivity, but in the longer-term maintain the productivity of the land by protecting the soil resource and is likely to lead to an improvement to water quality and a reduction in soil loss.	Encourage the planting of trees and areas of transitional scrub on areas at risk of erosion, for example on slopes.	<b>Regulating soil quality</b>  <b>Food provision</b>  <b>Regulating water quality</b>  <b>Biodiversity</b>  <b>Sense of place/ inspiration.</b>

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Pollination</b>	Upland heathland	With arable crops limited to specific areas and few, scattered, traditional orchards, this service is of very localised importance to food production in the NCA. Areas of upland heath, lowland meadow, hedgerows and grassland habitats provide sources of nectar for pollinating insects, but collectively represent less than 0.2 per cent of the NCA. Late flowering nectar sources, such as heather, are important in providing supply of nectar over an extended period of time.	Local	Crops that are currently grown in the NCA do not rely on pollinators therefore their value is to biodiversity and the scattered orchards that remain. This could be a limiting factor to future changes in cropping regimes.	Seek opportunities to increase nectar provision within the agricultural landscape, using mechanisms such as agri-environment scheme options, to expand semi-natural habitat, particularly in proximity to orchards or pollinated crops.	<b>Pollination</b>
	Lowland meadows					<b>Food production</b>
	Lowland grassland			An increase to the populations of pollinators may facilitate an increase to the number of orchards, fruit farms and types of crops that could be grown in the future thus expanding the range of food provision and increasing the resilience to the effects of climate change.	Expanded heathland in particular will provide late sources of nectar, benefitting a number of services and strengthen historic landscape character. This would also provide habitat and food source for potential pest regulators, for example, birds.	<b>Climate regulation</b>
	Traditional orchards					<b>Regulating soil erosion</b>
	Hedgerows	Residential gardens provide important sources of nectar in settlements and often have more diverse sources of nectar than occurs in agricultural monocultures.		Expanding areas of upland heath and meadow, planting a network of species-rich hedgerows, creating flower-rich field margins in agricultural areas and species rich roadside verges would all reduce habitat fragmentation thus providing a more robust ecological network for pollinators.	Encourage local authorities, highways and road maintenance contractors to diversify the species mix of roadside verges.	<b>Regulating water quality</b>
<b>Pest regulation</b>	Semi-natural habitat	The contribution to pest regulation services is limited to semi-natural habitat and hedgerows.	Local	Semi-natural habitats and hedges proximal to areas of commercial arable agriculture may support species of beneficial predators that can regulate populations of pests that adversely affect crop yields, hence food provision.	In agricultural areas, expand or create new areas of semi-natural habitat, for example beetle banks, headlands and hedgerows, to provide a mosaic of supporting habitat for beneficial pollinators in areas of arable monoculture, supporting a more robust ecosystem that will benefit food production and biodiversity.	<b>Biodiversity</b>
	Hedgerows					<b>Sense of place/inspiration</b>
	Arable margins					<b>Pest regulation</b>
						<b>Sense of history</b>



Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Sense of place/ inspiration</b>	Sandstone ridge	In the north, a sense of place is provided by an extensive, rolling lowland landscape of lush pastures dominated by dairy farming, interrupted by sandstone ridges with rivers and tributaries with wooded cloughs. Sense of place is further supported by the area's numerous estates, estate buildings and historic parklands and black and white moated houses.	Regional	The area comprises a number of contrasting landscapes owing their origin to the underlying geology. The most notable contrast is in topography between the wind-swept sandstone ridges which rise steeply up from the relatively flat rolling plain. The geology and pastoral character of the NCA should be maintained and enhanced through careful management.	There are opportunities to increase interpretation and understanding of the historic assets, geology and landforms illustrating how geology influences settlement patterns, human activity and innovation and relate this to the landscape for visitors to the ridge and those walking the Sandstone Trail.	<b>Sense of place/ inspiration</b>
	Extensive lush pastures					<b>Sense of history</b>
	Meres and Mosses					<b>Recreation</b>
	Rivers, streams and canals and field ponds					<b>Biodiversity</b>
	Woodland and boundary features	Feelings of inspiration and escapism are likely to be associated with the ridges that rise above the plain with long distance views of prominent hills outside the NCA, such as, the Wrekin and Wenlock Edge, the foothills of the Welsh mountains in the west and the Pennines and Peak District to the east.		Woodland occurs on the slopes of the ridges and in valley cloughs. There are extensive blocks in the north and east of the NCA, for example, fragments of, the former Royal Forest of Mara.	Work with farmers to maintain food production while maintaining the pastoral character of the plain. Growing arable crops in appropriate areas, restoring hedgerows with typical species, by gapping-up and planting their accompanying hedgerow trees; adopting appropriate cutting regimes and tagging to extend the age range and species diversity. Maintaining dry-stone walls on the ridge in preference to using stock-proof fencing thus optimising their value to resource protection and sense of place and history.	<b>Climate regulation</b>
	Historic features			A sense of enclosure is evoked by lush, dense vegetation is further reinforced by country lanes between high hedges or valley bottoms below wooded ridge lines.		
	Lowland heathland	In the north, a sense of place is provided by an extensive, rolling lowland landscape of lush pastures dominated by dairy farming, interrupted by sandstone ridges with rivers and tributaries with wooded cloughs. .		The NCA has inspired many authors: the early 17th-century Izaak Walton's The Compleat Angler is an important work for both literary and environmental reasons. It is one of the earliest works to be inspired by country life and a love for the natural world and also an influential piece of pastoral writing.	Through landscape partnerships, support projects that seek to reverse the fragmentation of upland heathland, lowland grassland and conserve and protect the Meres and Mosses for future generations and for the benefits to biodiversity and climate regulation.	
	Local vernacular building style	Numerous meres and extensive mosses, for example, Fenn's, Whixall, Bettisfield, Wem and Cadney mosses create distinctive wide-open landscapes.				
	Local landmark of Jodrell Bank			P.G. Wodehouse described Shropshire as "the nearest earthly place to paradise". Most famously, Lewis Carroll, was born and raised in Daresbury, Cheshire and included the Cheshire Cat in his novel Alice's Adventures in Wonderland – "grinning like a Cheshire cat". Folklore draws the conclusion that a Cheshire cat grins because of the abundance of milk and cream.	Encourage the inclusion of greenspace in new developments to provide opportunities for engaging with nature and fostering community spirit.	
	Local greenspace	Communities value their local greenspace as places of local distinctiveness that provides opportunities to engage with nature close to where they live and work and encourages a sense of community.				

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Sense of history	Iron-age hill forts	The history of the landscape is evident in the iron-age hill forts, linked by sections of The Sandstone Trail, and Wat’s Dyke – an Anglo Saxon boundary earthwork.	Regional	A number of historic sites in this NCA are popular visitor destinations: the extensive parklands and gardens including Tatton and Attingham that are owned and run by the National Trust; Country houses such as Gawsworth, Arley and Adlington Halls; fortified manor houses and castles reflecting cross border tensions such as at Beeston, Acton Burnell and Cholmondeley Castle.	Restore historic assets above ground. Protect assets below ground, by ensuring appropriate land management regimes, for example, protecting under permanent pasture.	Sense of history	
	Roman roads and settlements					Sense of place/inspiration	
	Country houses moated houses and castles	The former hunting chases of the Forests of Macclesfield and Delamere are still evident in the landscape. Moated manor houses still exist, for example at Little Moreton Hall.		Crewe was founded on the growth of the railways, and the historic towns of Shrewsbury and city of Chester have a wealth of 17th- and 18th-century half-timber, brick and red sandstone buildings.	Encourage collaboration between landscape partnerships and English Heritage to reinstate traditional land management of parklands and estate grounds, maintain vistas, manage woodland in keeping with their designed use ensuring a supply of dead wood and over-mature trees and reinstate native woodland on plantation ancient woodland sites.	Recreation	
	Market towns	Roman roads such as Watling Street linking London to mid-Wales, via Wroxeter are still evident today.				Tranquillity	
	Settlement patterns	Areas of ridge and furrow on the plain indicate former infield and outfield systems and often relate to historic field pattern which will in many cases, be of post medieval origin.		The influence of the Romans can be seen through the notable roads built to cross the plain particularly Watling Street which linked London to mid-Wales.	Manage the impacts of recreation, providing alternative paths, appropriate for a range of abilities, away from eroded sites and sensitive habitats.	Sense of history	
	Historic parkland					Geodiversity	
	Traditional orchards	The historic character is further reinforced by a settlement pattern of dispersed market towns and large farmsteads, typically of brick or sandstone spread throughout.		The Sandstone Trail, a long-distance footpath stretching for 55 km from Whitchurch in the south, across the Cheshire Sandstone Ridge NCA, offering elevated views across the plain, before ending in Frodsham in the Mersey Valley.	Manage appropriate, small-scale extraction of traditional building materials for the repair of vernacular buildings.		
	Areas of ridge and furrow						
	Local vernacular building style	Other settlements, small villages and hamlets are few and dispersed. The hamlets tend to be loosely clustered, with houses spread out along the network of hedged lanes, in the open countryside.					
		Railways and canals				Manage forestry to provide access and recreation while maintaining the historic characteristics of the woodland and areas of tranquillity.	
				Opportunities exist to improve the interpretation of the area's former and present day extractive sites, allowing visitors to understand and value these features.			

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<b>Tranquillity</b>	<p>Distinctive wetland landscape of meres and mosses</p> <p>River valleys</p> <p>Woodland</p>	<p>Statistics from CPRE show that the NCA has experienced a significant decline in tranquillity.</p> <p>Undisturbed areas have decreased from 69 per cent in the 1960s to 44 per cent in 2007 with loss of tranquillity associated with increased traffic levels on the major roads of the NCA, including the M6, M54 and extensive network of A roads.</p> <p>Nevertheless, the NCA offers the experience of wide-open spaces and enclosed woodland to visitors from the nearby conurbations.</p>	Regional	<p>Despite the reduction to 'undisturbed' areas, the NCA is important in providing to the populations of the nearby conurbations the opportunity to experience the contrast between wind-swept landscape on the ridge tops to an enclosed feel in some of the valleys and sunken lanes and the wide, lush pastoral plain.</p> <p>Extensive mosses, for example, Fenn's, Whixall, Bettisfield, Wem and Cadney mosses offer wide-open wind-swept landscapes.</p>	<p>Retain areas of open landscape, resisting urban development in to undisturbed areas.</p> <p>Promote the calming effect that contact with tranquil and sensory environments have on people's health and wellbeing by protecting areas of the NCA where intrusion is low; sensitively plan any expansion to settlements and transport routes, taking into account visual impact, noise and light pollution, and using multifunctional green infrastructure to mitigate impacts while contributing positively to sustainable urban drainage systems, habitat networks and local landscape character.</p> <p>Encourage the provision of improved access to woodland as part of woodland management to increase the opportunities to experience tranquillity.</p> <p>Carefully assess plans to introduce urban features into urban fringe and rural villages and hamlets for example, unnecessary lighting, road improvements and signage thus protecting where possible, the tranquil character and dark night skies.</p>	<p><b>Tranquillity</b></p> <p><b>Sense of place/inspiration</b></p> <p><b>Sense of history</b></p> <p><b>Biodiversity</b></p> <p><b>Recreation</b></p>

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<b>Recreation</b>	Public rights of way and heritage trails	The NCA contains a wealth of recreational assets.	Regional	The NCA offers a host of recreational sites and trails that are close to large conurbations.	Seek to manage the impact of increased visitor numbers on sites by ensuring that paths are adequately signposted and surfaced to prevent erosion and protect sensitive habitats.	<b>Recreation</b>  <b>Sense of history</b>  <b>Sense of place/inspiration</b>  <b>Geodiversity</b>
	Iron-age hill forts connected by the Sandstone Trail	There is an extensive network of rights of way including the Sandstone Trail and short sections of Wat's Dyke Heritage Trail that have an iron-age origin.		National Nature Reserves, Country Parks, Local Nature Reserves and visitor centres provide opportunities for visitors to experience the history and biodiversity that the NCA has to offer. This is both an opportunity – to educate and increase physical activity – and a challenge to manage visitor numbers and the impact they have on the environment, local infrastructure and tranquility.	Manage sustainably, the demand for water and energy resources and provide recycling facilities at visitor centres, to minimise the impact on the environment and to raise awareness.	
	National Cycle Network	There 35 Registered Parks and Gardens, some owned and run by the National Trust.		Jodrell Bank offers a different and relatively rare visitor experience of the study of astronomy and astrophysics. The 76-metre diameter radio telescope is located on the plain and is a local feature that can be seen from a considerable distance.	Support initiatives by the Forestry Commission to increase the recreational resource at Delamere.	
	National Nature Reserves	There are six National Nature Reserves; all but one, Motte Meadows are related to the Meres and Mosses Ramsar and SAC sites. Additional sites include, Seven Country Parks and fourteen Local Nature Reserves.				
	Country parks					
	Local Nature Reserves	There is public access along the Shropshire Union, Llangollen and Trent and Mersey canals as well as access to some of the large meres such as Ellesmere and Cole mere and mosses throughout the NCA.				
	Historic parks and gardens			There are opportunities to provide opportunities for recreation and outdoor education close to where people live allowing local communities to enjoy their environment, take action to improve it and to benefit from the health and social rewards it affords them.	Increase the number of circular, well-surfaced, routes suitable for all age ranges and physical abilities. Promote the use of the existing network of rights of way within the NCA and its links with the National Cycle Network and Sandstone Trail.	
	Canals	Jodrell Bank, the location of the Lovell radio telescope, dominates the open landscape near Goostrey in Cheshire. It is also the location of an arboretum and popular visitor centre.			Support farms to diversify into sustainable short and long stay accommodation especially adjacent to public rights of way.	
	Jodrell Bank				The maturing woodland resource of The Mersey Forest provides significant opportunities for access and recreation.	



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<b>Biodiversity</b>	Designated sites: SAC, Ramsar, SSSI, local sites	There are 83 SSSI either wholly or partly within the NCA, totalling one per-cent of the NCA area. Numerous lakes ('meres') throughout the NCA and Europe's greatest concentration of ponds.	International	Persistent degradation of water quality, increased drainage and inappropriate management has degraded a number of meres and mosses. Alternative land uses have isolated core sites and mature trees shade-out marginal vegetation. 81 per cent of recorded rare plants have become extinct across 13 key sites and public awareness and understanding of their value is low.	Restore and manage core nature conservation sites. For example, SAC, Ramsar, SSSI, NNRs, LNRs and Local Sites network to improve their condition and connectivity; enhance landscape character and create a more coherent and more resilient habitat network, while providing opportunities for volunteering, education and community involvement.	<b>Biodiversity</b>  <b>Sense of place/ inspiration</b>  <b>Sense of history</b>  <b>Regulating soil erosion</b>  <b>Regulating water flow</b>  <b>Regulating water quality</b>  <b>Regulating soil quality</b>  <b>Geodiversity</b>
	Priority habitats and species:	Three per cent of the NCA area is priority habitat, including significant areas of wet woodland, flood plain grazing marsh and fens. Extensive flood plain grazing marsh habitats support regionally important populations of breeding waders, for example, lapwing, snipe and curlew in areas such as Baggy Moor, Weald Moor and Doxey Marshes. Other priority habitats include raised bog, lowland grassland, and lowland mixed beech and yew woodland.		The NCA has ten main rivers that support riparian and wetland habitats that have specific water chemistry that requires careful management and protection from diffuse pollution and falling water levels. The River Dee SAC is designated for its vegetation communities and populations of Atlantic salmon, lamprey species, bullhead and otter.	With landscape-scale partnerships, restore and manage core nature conservation sites by working in collaboration to improve the quality of water, by finding solutions to reduce the rate of sedimentation that also protects the soil resource. Seek ways to reduce the levels of nutrients and pesticides entering watercourses and groundwater.	
	Meres and Mosses			Ancient woodland and broadleaved mixed woodland requires management to maintain their structural integrity and species diversity.		
	Wetland habitat			Priority upland heathland and lowland meadows require management to maintain their condition and require protection from further fragmentation.		
	Rivers			Landscape-scale partnerships are beginning to target and co-ordinate action for the preservation of priority habitats and protection of priority species of the meres and mosses.		
	Upland heathland			Partnership working at a landscape scale can begin to find sustainable solutions to the management of the NCA's biodiversity.		
	Lowland meadow	There are eight internationally designated sites in the NCA - five SAC and three Ramsar sites totalling approximately 0.4 per cent of the NCA area.				
	Flood plain grazing marsh	The meres and mosses form the largest and most ecologically diverse cluster of natural wetlands in lowland England comprising a geographically discrete series of nationally important lowland open water and peatland sites designated as SSSI and SAC. The finest examples are considered to be of international importance (Ramsar). These include one of the largest and most southerly raised bogs in the UK – Fenn's, Whixall, Bettisfield, Wem & Cadney Mosses, which supports over 1,700 invertebrate species <sup>25</sup> and 29 nationally rare species, for example, Desmoulin's whorl snail.				
	Lowland grassland					
	Woodland					
	Ponds					
	Country parks, Local Nature Reserves and local greenspace					
	Hedgerows					
		Continued over...			Continued over...	

<sup>25</sup> [www.jncc.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0012912](http://www.jncc.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0012912)

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Biodiversity continued</b>		<p><b>...continued from previous.</b></p> <p>The finest sites have developed a mature schwingmoor comprising floating bog mosses Sphagnum spp often with common cotton grass and cranberry.</p> <p>Open water provides habitats for locally and nationally rare species of aquatic plants, for example, planktonic algae, stands of shoreweed, narrow small-reed and Cole Mere is the only English site for least water lily. Some meres support a diverse fish population, in particular pike and bream, and large numbers of wintering and breeding wildfowl for example, Aqualate Mere hosts up to 3,000 overwintering ducks, including mallard, teal, wigeon, pochard, tufted duck, goldeneye, gadwall and wintering shoveler.</p> <p>The mosaic of open water and peatland habitats together with fringing heathland and woodland host an outstanding diversity of invertebrates including damselflies and dragonflies, for example, the nationally rare white-faced dragonfly and a diversity of beetles and spiders including a number of nationally rare species.</p> <p>Drier areas which typically support heathland relics, areas of purple moor-grass and open semi-natural woodland are important for Lepidoptera, for example the argent and sable moth and small pearl-bordered fritillary. Lowland heathland at Prees Heath SSSI hosts the nationally scarce silver-studded blue butterfly.</p>			<p><b>...continued from previous.</b></p> <p>Encourage the retention of in-field ponds and where practicable, create more to improve the permeability of the landscape for aquatic species.</p> <p>Encourage the uptake of techniques promoted through CSF and other initiatives, to maintain the natural soil profile and protect the local hydrology. Address issues of water abstraction and diffuse pollution to benefit biodiversity and water quality, especially where there are sensitive habitats.</p> <p>Use country parks, Local Nature Reserves and local green spaces for opportunities for volunteering and training to increase the surveillance of key habitats and species by surveying to monitor the distribution and population sizes of species as an indicator of habitat quality.</p> <p>Encourage local communities to take part in site based conservation activities and in the future be involved in the planning and management of these sites.</p> <p>Encourage the inclusion of greenspace in new developments to provide opportunities for local communities to engage with nature and foster community spirit, while benefiting biodiversity.</p>	

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Geodiversity</b>	Designated sites: SSSI and local geological sites	There are a significant number of geological SSSI (15) and 97 Local Geological Sites.	National	The NCA contains nationally important geological SSSI, both natural outcrops and man-made cuttings that require the regular removal of scrub and woodland management to maintain the access, visibility and integrity of the sites.	Work in partnerships to enhance the condition of designated sites and manage former extraction sites and natural exposures, for the range of mutually beneficial interests including geodiversity, biodiversity, volunteering and educational purposes.	<b>Geodiversity</b>  <b>Biodiversity</b>  <b>Regulating soil quality</b>  <b>Recreation</b>  <b>Sense of history</b>  <b>Sense of place/inspiration</b>
	Natural rock outcrops	The Triassic outcrops of the ridges and hills provide a rare glimpse of exposed solid rock, enabling the depositional environment to be interpreted, thus contributing to the understanding of climate during the Triassic Period.		Improved and increased interpretation can raise awareness and promote a better understanding of the riverine environments and geomorphology. For example, The River Dane SSSI is designated for its meander belt. The river is known to have reverted to former routes over a 70-year cycle. The course of the River Severn was modified by the last ice sheet, diverting its courses from the developing Dee Estuary to its present course draining to the Bristol Channel. A better understanding of natural processes can assist with land use planning.	Work in partnership to further the objectives and aspirations of the Local Geodiversity Action Plan that offer opportunities for volunteering and community engagement.	
	Glacial and present-day geomorphological processes	The interpretation of glacial deposits has contributed to our understanding of climate circa 20,000 years ago and present-day landscapes, for example, the formation of peat mosses provides a well-documented pollen record and opportunities for radiocarbon dating.		The NCA has a long history of extractive industries and exemplifies the link between geology, the development of industries and biodiversity. For example, the extraction of salt can be traced back to the Roman period. Continued extraction by underground solution pumping has led to subsidence flashes that now support valuable habitats. Some are saline supporting coastal communities. The legacy of surface extraction of silica sand has left a mosaic of wetland habitats and areas for recreation.	Improve access and interpretation of past geomorphic activity at Local Sites and present-day geomorphic activity associated with the rivers Dane and Severn.	
	Geological exposures created by road, rail and canal cuttings	One of the best examples of an esker system in England occurs at Aqualate Mere, which provides a rare example in the Midlands of an esker system formed by glacial meltwaters during the late Devensian glaciation. The site is also significant in demonstrating the close association of the esker with fan deposits formed in a proglacial lake, a nationally rare group of landforms.		Active sandstone quarries, for example, Grinshill have yielded fossil reptiles from the Lower Triassic Period, contributing to our knowledge of Triassic environments.	Promote sensitive planning and design of quarries to replicate some of the features lost to the development and reinforce the character of the surrounding landscape. Such sites may provide new opportunities for public access and enjoyment.	
	Traditional local building stone	The present day complex geomorphology of the rivers Dane, Dee, and Severn are also contributing to our understanding of modern fluvial processes – erosion and deposition.				
	Minerals and extractive industries	Road, rail and canal cuttings also provide valuable exposures, for example, Tyrley Canal Cutting SSSI.				
		<b>Continued over...</b>				

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Geodiversity continued		<p><b>...continued from previous</b></p> <p>Silica sand is extracted from the nationally important reserves in the areas around Congleton, Chelford and Eaton Hall in Macclesfield. Nationally important halite (salt) deposits occur around the areas of Middlewich, Winsford, Northwich and Sandbach. Active extraction of salt has led to a series of subsidence flashes and salt karst features are also visible – depressions associated with dissolution and collapse of underlying salt.</p> <p>The flow of low temperature brines through the sandstone has precipitated minerals such as copper, lead, cobalt and vanadium, for example, at Alderley Edge SSSI.</p> <p>Greywacke stone is extracted from the Precambrian hills around Shrewsbury for use as a road stone.</p> <p>Sand and gravel is extracted throughout the NCA.</p> <p>Brick clay extracted from the glacial till has also been exploited since Roman times and red Triassic sandstones have been used widely as a building stone, for example, Chester Cathedral, built in 1093 from red sandstone, which was also used by the Romans to face the city wall.</p>				



## Photo credits

Front cover: The National Character Area comprises most of the county of Cheshire, the northern half of Shropshire and a large part of north-west Staffordshire. This is an expanse of flat or gently undulating lush pastoral farmland punctuated by numerous meres and ponds. © B. Osborne with kind permission of Shropshire Wildlife Trust

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