National Character Area profile:

62. Cheshire Sandstone Ridge

Supporting documents

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Introduction

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

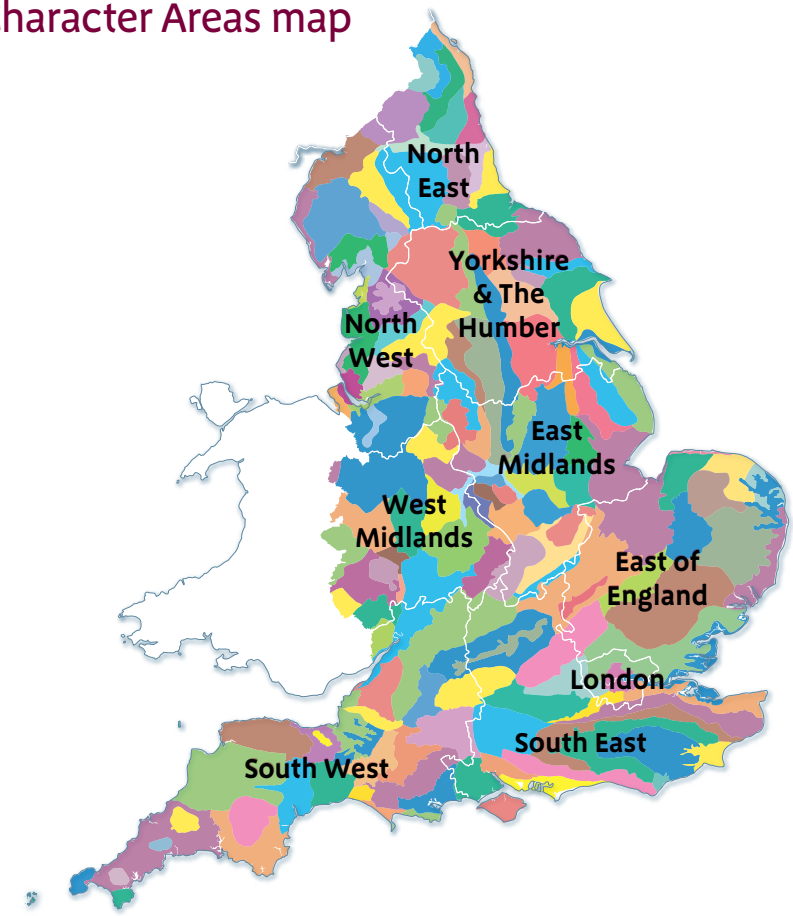
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and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

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

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

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

National Character Areas map



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

Summary

The Cheshire Sandstone Ridge National Character Area (NCA) is situated between Malpas and Frodsham and is surrounded on all sides by the Shropshire, Cheshire and Staffordshire Plain NCA, except to the north, where the ridge drops into the Mersey Valley NCA. It is a discontinuous ridge, but is very prominent, rising sharply from the gently rolling topography of the surrounding NCAs.

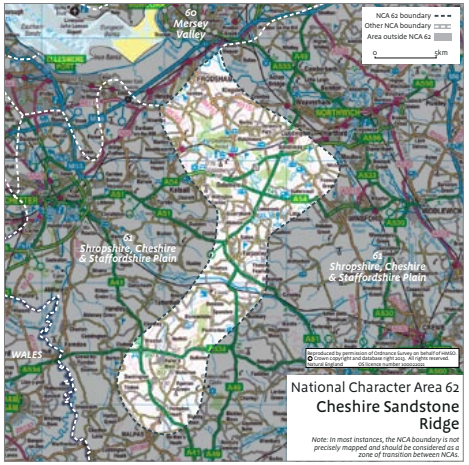
The topography provided by the reddish-pink Triassic sandstone ridge has been exploited for centuries, as evidenced by the remains of defensive fortifications and artefacts from the Bronze and Iron Ages, and the Saxon and Roman periods. The fortifications were linked by a track which now forms part of the Sandstone Trail along the ridge, offering expansive views to walkers. A number of communication masts are prominently located on the highest ground and are visible over a wide area, and a war memorial stands at the northern tip of the NCA, providing a distinctive local landmark.

Compared with the surrounding plain, the NCA has a strong mosaic of broadleaved mixed woodland comprising ancient woodland and some post-medieval conifer plantations, with large blocks of commercially managed conifers to the east. Remnants of a Royal Hunting Forest survive at Delamere and placenames such as Old Pale and New Pale indicate the locations of medieval deer parks.

A thick layer of glacial till covers the lower slopes of the ridge and the surrounding plain 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 of which are considered to be of international importance.

Lowland heathland was once more widespread, but now exists only in discrete areas, for example Bickerton Hill SSSI and Little Budworth Common SSSI. There are also fragmented remnants of lowland meadow dispersed throughout the NCA.

Good links to the road network and its proximity to the M56 and M6 mean that the demand for land for housing, agriculture and mineral extraction is likely to increase. This has 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.



Click map to enlarge; click again to reduce

Statements of Environmental Opportunities:

- **SEO 1:** Manage and enhance the rivers, streams and wetland habitats, including flood plain grazing marsh and wet woodland, protecting them from diffuse pollution and maintaining the integrity and unique conditions for the preservation of the lakes and standing waters of internationally important sites such as Oak Mere and Abbots Moss to benefit water availability, water quality, landscape character, biodiversity and climate regulation.

- **SEO 2:** Manage and expand areas of semi-natural woodland, restore and reinstate hedgerows and hedgerow trees, protect and restore ancient woodland, for example in the Delamere Forest Park and throughout the Mersey Forest, thus reducing habitat fragmentation to benefit landscape character, biodiversity, resource protection and climate regulation while enhancing the recreational, educational and experiential qualities of the NCA.

- **SEO 3:** Protect and manage the geological sites, with an emphasis on demonstrating the strong link between geology and its influence on landscape and industrial development, and promoting greater understanding of the link between wildlife and geodiversity, particularly in the distribution of habitats and species, recognising the importance of former extraction sites for both geodiversity and biodiversity.

- **SEO 4:** Manage and, where appropriate, expand areas of characteristic heathland and other priority habitats, including lowland meadows and lowland grassland, thus reducing habitat fragmentation to benefit landscape character, sense of place, biodiversity and resource protection while enhancing the recreational and experiential qualities of the NCA.

Oak Mere, a shallow lake formed where three kettle holes coalesced, is unique among the Midland meres. The water is acidic, but compared with other acidic lakes is slightly nutrient-rich. It contains an outstanding assemblage of aquatic plants and animals. The rarely found qualities of the lake water, its associated shoreweed-dominated, aquatic plant community and its invertebrate assemblages are reasons for its Ramsar and SAC designations.

Description

Physical and functional links to other National Character Areas

The Cheshire Sandstone Ridge National Character Area (NCA) extends from the Mersey Valley NCA that forms its north-western boundary and trends south into the surrounding Shropshire, Cheshire and Staffordshire Plain NCA. It is a discontinuous ridge that reappears as groups of small hills within the latter NCA – at Nesscliffe, Grinshill and Hawkstone Park – but is very prominent, rising sharply from the gently rolling topography of the plain, reaching heights of 123 m at Helsby and 227 m at Raw Head in the Peckforton Hills.

The ridge affords expansive, long-distance views out of the NCA to the hills of the Clwydian Range in Wales to the west and to the peaks of the South West Peak NCA to the east. Locations at the northern and southern ends of the ridge afford views of the Mersey Valley and the Shropshire Hills NCAs respectively. The views provide a wider appreciation of the strong contrast in landscape character and topography between the ridge and the surrounding plain.

The lower slopes of the ridge and surrounding areas have been modified by ice sheets that have left a considerable thickness of glacial till punctuated by ponds, meres and mosses. The majority lie in Cheshire and north Shropshire, with a small number of outlying sites in adjacent parts of Staffordshire and Clwyd.

The rivers Weaver and Gowy rise in the Peckforton Hills and, with their tributaries, contribute to the Weaver/Gowy catchment for public, agricultural and industrial water supply outside the NCA. An area extending from Tarporley to Frodsham is underlain by sediments of the Sherwood Sandstone Group that forms the Weaver aquifer. Water is abstracted from the aquifer outside the NCA but outcrops of sandstone within the NCA provide limited recharge areas to the aquifer.

The NCA is crossed by the Shropshire Union Canal which runs west to east linking Ellesmere in the Mersey Valley NCA to Wolverhampton in the Mid Severn Sandstone Plateau NCA. The area has good connections to the road network and is crossed by a number of A roads that link the city of Chester with Nantwich and Northwich in the neighbouring NCA. The M56 and M6 pass close to the NCA. The Sandstone Trail – a long-distance footpath – stretches for 55 km and offers elevated views across the NCA before crossing into the Shropshire, Cheshire and Staffordshire Plain NCA. The National Cycle Network route 70 also crosses the NCA.

The ridge affords expansive, long-distance views out of the NCA. Locations at the northern end of the ridge afford views of the Mersey Valley. The views provide a wider appreciation of the strong contrast in landscape character and topography between the ridge and the surrounding plain.

Key characteristics

- Sandstone ridge with outcrops and bluffs over 100 m high which rise above the surrounding plain, comprising Triassic sandstone and conglomerate, exemplified by Beeston Crag.
- Thin, sandy and gravelly soils in the east with scattered peatlands. Free-draining, thin and generally infertile soils along the ridge.
- Strong mosaic of wet woodland, broadleaved mixed woodland comprising ancient woodland and some post-medieval conifer plantations, which contribute to the wooded character along with large blocks of commercially managed conifers on gravelly soils to the east. The medieval Royal Forest of Delamere, in the north of the area, once covered a vast area of Cheshire.
- Fragmented orchards throughout Cheshire which were once more widespread.
- Regular pattern of fields surrounded by generally well maintained hawthorn hedgerows with scattered mature hedgerow trees surrounded by sunken lanes. Hedgerows give way to drystone walls on the ridge.
- Low-density dispersed livestock farms, with some dairy and arable on gentler slopes.
- Large areas of lowland heathland survive on Bickerton Hill and at Little Budworth Common with fragmented areas of lowland meadow throughout the area, particularly along the Pettypool Brook Valley and along the line of the Shropshire Union Canal.
- Diverse range of woodland and wetland habitats, such as Pettypool Brook Valley SSSI, that supports nationally important species of invertebrates.
- Numerous field ponds, scattered areas of glacial meres and mosses in varying stages of succession, exemplified by internationally important Oak Mere and Abbots Moss.
- The meandering rivers Gowy and Weaver rise in the Peckforton Hills that form a local watershed.
- Remains of iron-age hill forts, burial mounds, ring ditches and castles, and finds of stone tools, occur along the ridgetop. A Roman road crosses the area en route to Manchester from Chester.
- Large historic halls include Peckforton and Utkinton (both listed Grade I), and Tirley Garth to the south-west of Kelsall, a Grade II* Listed Building surrounded by a Grade II* Registered Park and Garden. Beeston and Maiden castles are also popular visitor destinations.
- Sparsely populated with a dispersed settlement pattern of scattered farms and small villages, mostly of medieval origin. Red brick is the dominant building material, together with some local sandstone and timber-frame buildings.
- Former sand pits around Delamere provide a mosaic of wetland and woodland that is now important for biodiversity and recreation.
- The Shropshire Union Canal, the A54 and A51 cross the area and the Sandstone Trail, a long-distance footpath, offers elevated views across the NCA and beyond.
- Communication masts on the ridgetop and the war memorial at the northern end of the ridge are prominent local landmarks.

Cheshire Sandstone Ridge today

Rising up from the surrounding Shropshire, Cheshire and Staffordshire Plain NCA are a number of small sandstone ridges and scarps, the most prominent being the Cheshire Sandstone Ridge which is visually one of the most distinctive landmarks in Cheshire. The ridge provides expansive views and a wider appreciation of the strong contrast in landscape character between the ridge and the plain, due largely to the difference in topography. The ridge also provides the locally rare sight of exposed solid rock comprising striking bluffs of reddish-pink sandstones and conglomerate of the Triassic Period that contrast with the relatively lush pastures devoted to mixed farming and dairy on the surrounding plain.

The sediments of the Sherwood Sandstone Group erode to form free-draining soils that are suitable for arable cultivation where access permits on the lower slopes of the ridge. The steeper slopes are covered with deciduous and mixed woodland, the trees growing to large sizes. Permanent pastures of poor quality extend over the ridge. Gently undulating elevated areas occur to the east of the ridge, with thin and infertile soils supporting important heathland that was once widespread but now survives only in discrete areas, for example at Little Budworth Common Site of Special Scientific Interest (SSSI) and Bickerton Hill SSSI. The latter is the largest area of surviving lowland heath in Cheshire.

The lower slopes of the ridge and surrounding area 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 designated as SSSI and Special Areas of Conservation (SAC). The best examples are considered to be of international importance (Ramsar sites). The suite of sites supports an outstanding assemblage of plants and animals; the finest sites have developed a mature schwingmoor comprising floating bog moss with common cotton grass and cranberry. The mosaic of open water and peatland areas, together with fringing heathland and woodland, provides habitats for locally and nationally rare species of aquatic plants, for example planktonic algae, stands of shoreweed and narrow small-reed, as well as for a host of invertebrates, including damselflies and dragonflies such as the nationally rare white-faced dragonfly, and a diversity of beetles and spiders also including a number of nationally rare species. Drier areas of the sites typically support heathland relics, areas of purple moor grass and open semi-natural woodland.

There are extensive tracts of woodland, such as the remains of the medieval Royal Forest of Delamere, in the north of the area that once covered a vast area of Cheshire; these comprise mostly oak and pine with some birch as well as conifer plantations. Peckforton Woods still retains the largest tract of sessile oak in Cheshire. The work of the Mersey Forest includes planting new community woodlands, further strengthening the wooded character of the NCA. The regular pattern of fields with generally well maintained hawthorn hedgerows and scattered mature hedgerow trees surrounded by sunken lanes evoke an enclosed feel that contrasts markedly with the open spaces and wide vistas experienced on the ridgetop. The hedgerows of the lower slopes give way to drystone walls of sandstone on the ridge and there are areas where traditional Cheshire-style curved-topped iron railings are evident.

The area is drained by the rivers Gowy and Weaver that rise in the Peckforton Hills, flowing gently out of the NCA to meander across the adjacent plain. Long stretches of the River Weaver on the northern boundary have been canalised (the Weaver Navigation) to make them navigable, but this has left the original line of the river as a quiet backwater of a once actively meandering river that now provides valuable habitat. Further south, the Shropshire Union Canal crosses the area, providing opportunities for recreation and tourism.

The ridgeline is punctuated by a number of locally distinctive landmarks that are prominent along the skyline. These include modern communication masts; large historic halls and castles such as Peckforton, Beeston and Maiden castles; and the remains of iron-age hill forts, burial mounds and ring ditches. The iron-age hill forts were connected by a trackway following the higher land that now forms the Sandstone Trail, a long-distance footpath that stretches from Frodsham in the north to Whitchurch in the neighbouring NCA in the south, providing walkers with elevated views across and beyond the NCA. A war memorial stands at the northern tip of the NCA, and is another distinctive landmark.

Bickerton Hill SSSI is one of the largest areas of lowland heathland in Cheshire.

There are a number of high-status residences on the ridge, for example the Grade I listed 17th-century Utkinton Hall and the Grade I listed 19th-century hall at Peckforton, which is built in the style of a castle. Tirley Garth to the south-west of Kelsall, constructed in the 20th century, is a Grade II* Listed Building surrounded by a Grade II* Registered Park and Garden which is open to the public through the National Gardens Scheme.

The area is sparsely populated and has a dispersed settlement pattern of mostly medieval origin, comprising individual farms and houses and a series of villages and hamlets, the largest being Frodsham, Cuddington, Tarporley and Kelsall. Red brick and plain clay tiles or Welsh slate are the dominant building materials for farmhouses and farm buildings. Red sandstone rubble walling is often used in boundary walls on the ridge. Traditional timber-frame is regularly seen in farmhouses and cottages.

Quarrying for sandstone and the extraction of silica sand have resulted in large water-filled pits which now provide extensive areas of wetland habitat valuable for biodiversity and offering recreation opportunities.

The area has good connections to the road network and is crossed by a number of A roads that link the city of Chester with Nantwich and Northwich that lie outside the NCA. The M56 and M6 pass close to the boundaries of the NCA.

In addition to the Sandstone Trail there are open access areas such as the National Trust-owned Maiden Castle, a popular destination for walkers. Route 70 of the National Cycle Network passes through the area and there are a number of regional cycle ways.

The landscape through time

The oldest rocks of the area are the sandstones and conglomerate of the Lower Triassic Sherwood Sandstone Group. These rocks were deposited under arid, desert conditions about 250 million years ago and now form the prominent Cheshire Sandstone Ridge that rises above the surrounding plain. The underlying rocks of the plain are almost entirely composed of red to brown sandstones, silts and mudstones of the Mercia Mudstone Formation.

The lower slopes of the ridge and surrounding plain are covered by a thick deposit of glacial till (sands and boulder clays) from the last glacial advance about 18,000 years ago and are 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 infilling of the depressions. Eventually the vegetation growing on the peat surface became raised above the surrounding ground water 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.

Dense woodland of oak, elm and alder colonised the heavy glacially-derived clay soils of the plain. Clearance of the woodlands began in the late Bronze Age and settlements were concentrated on the drier lands of the ridge.

Evidence of early human occupation can be found on the ridgetop, where the topography has been exploited for centuries, as evidenced by the remains of defensive fortifications and artefacts ranging from the Bronze Age and Iron Age, through to the Saxon and Roman periods. Many below-ground structures such as burial mounds, still legible in the landscape, have revealed finds of stone tools. The fortifications along the ridgetop were linked by an ancient track which today has become the long-distance Sandstone Trail.

During the medieval period it became increasingly common for hunting to take place in deer parks and there are two former sites on the ridge identified by the placenames Old Pale and New Pale. The medieval Royal Forest of Delamere, in the north of the area, covered a vast area of Cheshire and was used for hunting, especially deer. The late medieval period was the most important period for the management of hunting and commercial forests in this area, establishing the settlement patterns of dispersed farmsteads, hamlets and villages we see today.

The NCA has a long heritage of agriculture and is still predominantly grassland with pockets of arable production. Traditionally, since the 14th century, cattle rearing and fattening have taken place with dairying. By the early 19th century, the forest and surrounding agricultural land were enclosed, creating the pattern of small to medium regular fields with straight hawthorn hedgerows we see today. These areas were also subject to significant change by the activities of the local estates to improve their agricultural land. One legacy of this is the high density of infield ponds – the result of the extraction of marl which was used to neutralise the acidic soils.

Evidence of former extractive industries remains visible in the landscape, with numerous small sandstone quarries. The remains of an engine house chimney at Bickerton Hill marks the former copper mine that worked intermittently from around 1690 to the1920s. Quarried sandstone from the ridge has been used extensively in the construction of local buildings and boundary walls, adding a distinctive architecture and colour to the area. The extraction of silica sand from the Delamere sand sheet continues; former sand pits have filled with water and now provide a mosaic of wetland and woodland important for biodiversity and recreation.

Ongoing modern-day development pressure has seen an increase in urban fringe and ribbon development which has suburbanised areas of the countryside, for example the area around Frodsham. However, the Mersey Forest is creating a network of community woodlands and green spaces across Cheshire. The elevated ridges may also become target areas for wind turbines and additional communication masts.

Agricultural holdings have expanded in size in response to the demand for food production but this is eroding semi-natural sites, resulting in increased fragmentation of heathland and unimproved grassland. Local evidence indicates a decline in the overall number of agricultural holdings, particularly small-scale dairying, in favour of mixed farms, equestrian holdings and hobby farms.

Demand for water supply and a decline in water quality pose a threat to the internationally important meres and mosses. Landscape-scale partnerships are working collaboratively to help manage such threats.

View from the Sandstone Ridge looking over the Mersey Valley NCA towards the Mersey Estuary in the distance.

Ecosystem services

The Cheshire Sandstone Ridge 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 Cheshire Sandstone Ridge NCA is contained in the 'Analysis' section of this document.

Provisioning services (food, fibre and water supply)

- **Timber provision:** Over 12 per cent of the area is woodland, including both broadleaved and conifer plantations, for example Primrose Hill and Nettleford Wood. Delamere Forest and Peckforton Woods are the largest wooded areas; the latter contains the largest tract of sessile oak in Cheshire. The Forestry Commission has also established extensive community woodland of mixed planting with open spaces on the northern slopes of the Old Pale, within the Delamere Forest, in the north of the area. Private woodlands include Peckforton and Bolesworth. Approximately half of the area is within the Mersey Forest which has as an objective the creation of sustainably managed community woodlands that include timber provision to local communities through wood allotments.

- **Water availability:** Groundwater availability in the Weaver/Gowy catchment is good. The rivers Gowy and Weaver rise in the Peckforton Hills towards the south of the area. A secondary aquifer extends from Tarporley in the central area to Frodsham in the north.

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

- **Regulating water quality:** The ecological status of the watercourses in the area, according to the Water Framework Directive assessment, is 'moderate' with the exception of Darley Brook ('poor') and the River Gowy from source to Milton Brook ('poor'). A secondary aquifer extends from Tarporley to Frodsham forming part of the Sherwood Sandstone aquifer. According to the Water Framework Directive assessment, the reasons for the failing ecological status of the watercourses include sedimentation, channel modifications and diffuse pollution from fertilisers, pesticides and discharges from septic tanks.

- **Regulating water flow:** Data from the Environment Agency's flood map for rivers indicates that the risk of flooding is restricted to the river valleys and watercourses, both within the NCA and in the neighbouring NCAs. The management of water is critical to the internationally important areas of meres and mosses and other nationally important wetland habitats. Periods of drought can degrade peat soils that can liberate greenhouse gases and lead to catastrophic loss of habitat.

Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration:** A strong sense of place is evoked by the prominent ridge with its outcrops and bluffs over 100 m high comprised of Triassic sandstone and conglomerate – especially Beeston Crag and Raw Head geological SSSI – contrasting with the surrounding plain. At many locations solid blocks of woodland (including conifers) and high hedgerows combine to evoke a strong sense of enclosure and a wooded feel in stark contrast to the unrestricted panoramic views afforded by the ridge. Heathland was once a common sight in Cheshire, but has become increasingly fragmented and degraded. The most extensive heathland survives at Bickerton Hill SSSI and is the largest area of surviving lowland heath in Cheshire, providing a glimpse of a historical landscape.

- **Tranquillity:** Statistics obtained from the Intrusion Map (2007) provided by the Campaign to Protect Rural England (CPRE) indicate a 51 per cent increase in 'disturbed' areas from the 1960s to 2007. However, almost half the total NCA area is still considered to be 'undisturbed'. Also notable is the emergence of 'urban' as a feature in the 2007 statistics. Traffic noise is cited as the main disturbance to tranquillity. Despite the reduction in 'undisturbed' areas, the NCA is important in providing the population of the nearby conurbations with the opportunity to experience the contrast between the wide-open, unenclosed landscape on the ridge and the enclosed feel in the valleys, woodland and sunken lanes.

- **Recreation:** For its area, the NCA has an extensive rights-of-way network totalling 362 km. The most notable of these is the Sandstone Trail which stretches for 55 km and links the sites of the iron-age forts on the ridgetop. National Cycle Network routes 70 (the Cheshire Cycleway) and 71 cross the NCA. The former provides a circular route. There are also regional cycle

View looking south-west with Flaxmere Moss SSSI in the foreground, Hatch Mere SSSI in the centre and Blakemere Moss in the distance, set in the expanse of the Delamere Forest.

paths such as the Whitegate Way cycle path. Little Budworth Country Park and Delamere Forest, with the largest area of woodland in Cheshire and its visitor centre, are also popular visitor destinations.

- **Biodiversity:** The NCA contains a strong mosaic of broadleaved mixed woodland, including pine, particularly around the area of Delamere Forest Park. Peckforton Woods SSSI has the largest tract of sessile oak in Cheshire. Half of the ancient woodland is designated Plantations on Ancient Woodland Sites. Ponds are a characteristic feature of the Cheshire landscape and contain a diversity of important wetland species, including great crested newts.

  The meres and mosses of the north-west Midlands form a geographically discrete series of nationally and internationally important lowland open water and peatland sites designated as SSSI, SAC and Ramsar sites. The suite of sites support an outstanding assemblage of plants and animals, and some sites have developed a mature schwingmoor comprising floating bog moss with common cotton grass and cranberry. The drier areas of these sites typically support heathland relics, areas of purple moor grass and open semi-natural woodland which is important for Lepidoptera.

  Large areas of lowland heathland survive on Bickerton Hill SSSI and at Little Budworth Common with fragmented areas of lowland meadow throughout, particularly along the Pettypool Brook Valley and along the line of the Shropshire Union Canal. The wetland communities along the course of Pettypool Brook Valley SSSI comprise Cheshire's most extensive and diverse valley mire system. The mature woodland, with its abundant dead wood, and the extensive peatland habitats support populations of a number of national and county rarities, making it one of Cheshire's foremost invertebrate sites.

- **Geodiversity:** The prominent sandstone ridge with outcrops and bluffs over 100 m high comprising Triassic sandstone and conglomerate, for example Beeston Crag and Raw Head geological SSSI, provides expansive views. In contrast to the surrounding plain, the ridge provides the locally rare sight of solid rock, evoking a sense of place and providing important sites for education and scientific research.

  The escarpment between Tower Wood and Droppingstone Well, known as Raw Head SSSI, is a nationally important geological site for the study of Triassic and glacial geo-morphology. The rivers Weaver and Gowy both illustrate fluvial activity in the form of channel migration and flood plain deposition, representing present-day geo-morphological processes.

  Cheshire possesses mineral resources of national importance in the form of silica sand and building sand. A major extraction area is located around Delamere from the Delamere sand sheet.

  The peatlands and mosses have built up over many thousands of years, thus providing an invaluable record of the detail of this process preserved in the layers of peat and mineral sediments.

Statements of Environmental Opportunity

SEO 1: Manage and enhance the rivers, streams and wetland habitats, including flood plain grazing marsh and wet woodland, protecting them from diffuse pollution and maintaining the integrity and unique conditions for the preservation of the lakes and standing waters of internationally important sites such as Oak Mere and Abbots Moss to benefit water availability, water quality, landscape character, biodiversity and climate regulation.

For example, by:

- Encouraging the uptake of the Catchment Sensitive Farming Programme to benefit water quality and availability by encouraging rainwater harvesting and over-wintering storage of water; to reduce incidences of foul run-off from outdoor feeding areas, silage clamps, yards and cattle tracks; to prevent stock from entering streams or poaching stream banks; and to prevent the poaching of fields by cattle movement.
- Addressing the reasons for the poor ecological condition of rivers in the Weaver/Gowy catchment, as identified by the Water Framework Directive assessment, by preventing the deterioration of water quality caused by high nutrient levels and sedimentation, naturalising channel modifications, removing obstacles to aquatic species and introducing buffer strips.
- Increasing the area of wet woodland and priority wetland sites to improve the connectivity of wetland habitats and rivers to their flood plains to benefit water flow, biodiversity and climate regulation, for example along the Pettypool Brook Valley.
- Raising public awareness of the importance and fragility of meres, mosses and other wetland habitats and the benefits they provide to climate regulation through better interpretation and increased access where possible.
- Encouraging the retention of infield ponds, a characteristic of the Cheshire landscape, especially in arable areas where the threat of infilling is greatest, through the uptake of agri-environment scheme options to benefit biodiversity, sense of place and history.
- 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 wetland habitat creation and recreation.
- Increasing areas of riparian woodland to benefit the regulation of water flow, availability and biodiversity.
- Avoiding uniform pollarding to conserve and manage mature and over-mature trees within riparian environments, thus ensuring a supply of coarse woody debris, important for aquatic and invertebrate species and to help regulate water flow.
- Judiciously managing riparian woodland 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.
- Managing the Shropshire Union Canal and its associated assets to maximise landscape, cultural heritage and recreational value.
- Encouraging landscape-scale partnerships whose objectives contribute to the management and enhancement of the landscape in a holistic way for the benefit of riverine and wetland character biodiversity, climate regulation and recreation.
- Training volunteers to assist with the surveillance of priority habitats and species by surveying to monitor the spread of invasive non-native species and the distribution and population sizes of priority species as evidence of habitat quality.

SEO 2: Manage and expand areas of semi-natural woodland, restore and reinstate hedgerows and hedgerow trees, protect and restore ancient woodland, for example in the Delamere Forest Park and throughout the Mersey Forest, thus reducing habitat fragmentation to benefit landscape character, biodiversity, resource protection and climate regulation while enhancing the recreational, educational and experiential qualities of the NCA.

For example, by:

- Encouraging the management of woodland and, where it does not compromise other habitats and is appropriate to landscape character, encouraging new planting that will link blocks of existing woodland, thus reducing habitat fragmentation and reinforcing the wooded character of the National Character Area (NCA) and sense of history.
- Expanding woodland around Delamere Forest, along the Cheshire Sandstone Ridge and the long-distance trail, avoiding the escarpment ridgeline, with a diversity of species to increase resilience to pests, diseases and climate change.
- Encouraging landscape-scale partnerships in creating and maintaining woodland, for example community woodlands in the Mersey Forest, to provide opportunities for volunteering, education and recreation that also benefit biodiversity, climate regulation and the local economy.
- Finding a financially sustainable solution to woodland management by seeking an economic return on the by-products of woodland management – encouraging woodland allotment schemes, developing supply chains and encouraging demand for wood fuel in urban areas and encouraging the installation of wood fuel boilers in local amenity buildings.
- Increasing access to woodland as part of woodland management, thus increasing the opportunities for quiet recreation and to experience tranquillity, while ensuring that this does not compromise sensitive habitats and bio-security.
- Increasing access to woodland, providing circular routes and all-ability paths to provide opportunities for all sections of the community to experience the benefits of nature for physical activity, health and wellbeing.
- Restoring native woodland in plantations on ancient woodland sites.
- Encouraging the restoration of hedgerows with typical species, by gapping-up and planting their accompanying hedgerow trees; and adopting appropriate cutting regimes and tagging to extend the age range and species diversity to benefit biodiversity and sense of place.
- Encouraging the restoration of hedgerows and boundary sandstone walls to protect the soil resource, particularly on elevated sites and in areas of lighter soils.
- In urban areas, planting blocks of trees and street trees to provide shade, thus mitigating the effects of the urban heat island, increasing water infiltration rates and purifying the air.
- Planting trees around settlements and major highways to screen the visually intrusive urban areas from the surrounding landscape.

SEO 3: Protect and manage the geological sites, with an emphasis on demonstrating the strong link between geology and its influence on landscape and industrial development, and promoting greater understanding of the link between wildlife and geodiversity, particularly in the distribution of habitats and species, recognising the importance of former extraction sites for both geodiversity and biodiversity.

For example, by:

- Protecting and enhancing rock outcrops and the core designated sites, for example Raw Head geological Site of Special Scientific Interest (SSSI) and the suite of Local Geological Sites, and managing them to improve their condition.
- Improving access to and the interpretation of past geo-morphological activity preserved at Local Geological Sites and the present-day geo-morphological activity associated with the rivers Gowy and Weaver.
- Increasing the provision of information and interpretation of sites, thus helping landowners and land managers to understand and appreciate more the assets in their care and to enable visitors to value and enjoy them.
- Providing teaching materials and aids that assist local schools and other educational groups to use the sites for environmental and heritage education that includes industrial development and settlement patterns.
- Raising awareness through Local Geodiversity Action Plans and the planning system of the increasing importance of extractive sites to our understanding of industrial heritage and to the unique habitats they provide, for example the sand pits on the Delamere sand sheet.
- In partnership with geodiversity groups and site owners, enhancing the condition of former extraction sites and natural exposures for a range of mutually beneficial interests including geodiversity, biodiversity, volunteering and educational and scientific purposes.
- Encouraging people to volunteer and become involved in geo-conservation and surveying to assist with the surveillance and ongoing management of sites.
- Raising awareness of other geological assets, for example mineral collections at local museums and the use of local stone in buildings.

The red sandstone crags of Raw Head are more visible in the winter months. This view is from the Sandstone Trail. The area is a SSSI for geological interest for the exposed Triassic sandstones.

SEO 4: Manage and, where appropriate, expand areas of characteristic heathland and other priority habitats, including lowland meadows and lowland grassland, thus reducing habitat fragmentation to benefit landscape character, sense of place, biodiversity and resource protection while enhancing the recreational and experiential qualities of the NCA.

For example, by:

- Expanding and buffering core sites, for example Little Budworth Common and Bickerton Hill SSSI. Restoring degraded heathland through the removal of bracken and the thinning out of young trees to benefit sense of place.
- Seeking opportunities to expand the remaining lowland heathland and lowland acid grassland on the poorer arable land of the northern sandstone ridge. Seeking opportunities for the reversion from improved grassland to acid grassland and or lowland heathland.
- Seeking opportunities in areas under arable cultivation to provide habitats for farmland birds and invertebrates, planting flower-rich field margins to provide sources of nectar to benefit pollinators and support species of predators that can regulate populations of pests that adversely affect crop yields.
- Encouraging local authorities, highways and road maintenance to diversify the species mix of roadside verges to provide wildlife corridors that link areas of high biodiversity, thus providing a more robust ecological network.
- Reducing fertiliser and pesticide inputs, especially along the field margins and adjacent to semi-natural habitats.
- Monitoring the spread of and controlling invasive non-native species, for example Himalayan balsam and Japanese knotweed, and invasive arable weeds, for example broad-leaved dock and creeping thistle, and removing gorse and bracken and controlling brambles.
- Protecting and managing the priority habitat of lowland meadow, for example along the Pettypool Brook Valley and Shropshire Union Canal, and where appropriate seeking opportunities to expand these areas to reverse the fragmentation of this habitat.
- Supporting and encouraging volunteers to assist with the surveillance of priority habitats and recording the distribution and numbers of priority species as indicators of habitat quality.

View across the plain from Bickerton Hill SSSI, the largest area of lowland heathland remaining in Cheshire. The vegetation varies from open heathland to dense developing birch woodland. The site supports several species of reptile including, the adder, common lizard and slow-worm.

Additional opportunity

1: Protect and manage historic landscape character and associated heritage assets that include iron-age hill forts, canals, castles and country houses, traditional orchards and drystone walls. Find sustainable solutions to manage visitor pressure at popular attractions, for example Delamere Forest Park and the Sandstone Trail, while maintaining a high level of public access to enjoy the wealth of recreational experiences on offer.

For example, by:

- Encouraging the uptake of agri-environment scheme options that protect buried artefacts in the agricultural environment.
- Increasing the protection of archaeological sites, increasing the provision of information and interpretation of sites, thus helping landowners and land managers to understand and appreciate more the assets in their care.
- Increasing and improving the interpretation of the Cheshire Sandstone Ridge and its habitats and hill forts to aid visitors' understanding, appreciation and enjoyment of its ecological and historical interest.
- Finding sustainable solutions to manage visitor pressure at popular locations, for example the Sandstone Trail, while maintaining a high level of public access to enjoy the wealth of recreational experiences the NCA offers.
- Protecting and reinstating drystone walls, gate posts and stiles of local sandstone and traditional Cheshire-style painted iron railings throughout the area.
- Increasing visitors' contact with nature by providing better access, circular routes and all-ability trails, 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.
- Developing educational experiences and resources, promoting the use of the local heritage resources for schools in the area.
- 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.

Supporting document 1: Key facts and data

Cheshire Sandstone Ridge
National Character Area (NCA): 22,042 ha

1. Landscape and nature conservation designations

There are no landscape designations within this NCA.

Source: Natural England (2011)

1.1 Designated nature conservation sites

The NCA includes the following statutory nature conservation designations:

Tier	Designation	Designated site(s)	Area (ha)	% of NCA
International	Ramsar	Midlands Meres and Mosses (Phase 1/2)	129	<1
European	Special Protection Area (SPA)	n/a	0	0
	Special Area of Conservation (SAC)	Oak Mere SAC, West Midlands Mosses SAC	107	<1
National	National Nature Reserve (NNR)	n/a	0	0
National	Site of Special Scientific Interest (SSSI)	A total of 13 sites wholly or partly within the NCA	406	<2

Source: Natural England (2011)

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

There are 77 local sites in the Cheshire Sandstone Ridge NCA, covering 1,377 ha which is 6 per cent of the NCA.

Source: Natural England (2011)

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

1.1.1 Condition of designated sites

Condition category	Area (ha)	% of SSSI land in category condition
Unfavourable declining	1	<1
Favourable	132	33
Unfavourable no change	86	21
Unfavourable recovering	187	46

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 highest point within the NCA is 216 m above sea level. The lowest point is 4 m above sea level. The mean elevation in this NCA is 82 m.

Source: Natural England (2010)

2.2 Landform and process

This area forms a prominent, steep-sided sandstone ridge rising from the Cheshire plain. To the east, the lower slopes of the ridge are cloaked in deposits of glacial sand and gravel.

Source: Cheshire Sandstone Ridge Countryside Character Area Description, Meres and Mosses Natural Area Profile

2.3 Bedrock geology

The underlying geology of the area is mostly reddish-pink Triassic sandstone.

Source: Cheshire Sandstone Ridge Countryside Character Area Description, Meres and Mosses Natural Area Profile

2.4 Superficial deposits

Fluvioglacial deposits of sands and gravels and boulder clays and marls flank the northern part of the ridge.

Source: Cheshire Sandstone Ridge Countryside Character Area Description, Meres and Mosses Natural Area Profile

2.5 Designated geological sites

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

There are 11 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

To the east soils are generally thin, sandy and gravelly and peppered with peatlands. Along the ridge the soils are free draining, thin and generally infertile.

Source: Cheshire Sandstone Ridge Countryside Character Area Description, Meres and Mosses Natural Area Profile

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	0	0
Grade 2	3,815	17
Grade 3	15,899	72
Grade 4	1,415	6
Grade 5	140	1
Non-agricultural	773	4
Urban	n/a	0

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 in NCA (km)
River Weaver	<1
Shropshire Union Canal	6
Weaver Navigation	2

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.

3.2 Water quality

All of the area is identified as a Nitrate Vulnerable Zone.

Source: Natural England (2010)

3.3 Water Framework Directive

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

Delamere Forest is the largest woodland in Cheshire. The flooded area is Blakemere Moss.

4. Trees and woodlands

4.1 Total woodland cover

The NCA contains 2,807 ha of woodland (13 per cent of the NCA), of which 343 ha is ancient woodland.

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

4.2 Distribution and size of woodland and trees in the landscape

Woodland cover at over 13 per cent is relatively high compared with adjacent areas. At Delamere Forest in particular there is more extensive broadleaved and mixed woodlands on the slopes and large blocks of commercially managed conifers on gravelly soils to the east. Pines commonly occur in the woods, plantations and along hedgerows and roadsides.

Source: Cheshire Sandstone Ridge Countryside Character Area Description, Meres and Mosses Natural Area Profile

4.3 Woodland types

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

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

Woodland type	Area (ha)	% of NCA
Broadleaved	1451	7
Coniferous	829	4
Mixed	211	1
Other	316	1

Source: Forestry Commission (2011)

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

Type	Area (ha)	% of NCA
Ancient semi-natural woodland	171	<1
Ancient re-planted woodland (PAWS)	172	<1

Source: Natural England (2004)

5. Boundary features and patterns

5.1 Boundary features

There is a regular pattern of hedged fields, with scattered mature hedgerow trees.

Source: Cheshire Sandstone Ridge 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, well-maintained hedgerows.

Source: Natural Area Profile, Countryside Character Area Description

6. Agriculture

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

6.1 Farm type

In 2009 there were 332 registered commercial holdings within the Cheshire Sandstone Ridge NCA (down from 349 in 2000). Livestock farms dominated the NCA covering 45 per cent of holdings in 2009, (down from 51 per cent in 2000). Livestock farms are mainly recorded as grazed livestock (95 farms) with some dairy (49 farms). Census returns suggested that the number of dairy farms had declined significantly since 2000. Over this period mixed farming had also increased with mixed farms increasing from 6 per cent in 2000 to 9 per cent of holdings in 2009.

Source: Agricultural Census, Defra (2010)

6.2 Farm size

The majority of farms within this NCA are small to medium in size (with 72 per cent under 50 ha). Notably, 46 per cent are small; under 20 ha. Only 14 per cent of farms in 2009 were over 100 ha. Census returns appear to suggest that the proportion of large farms (over 100 ha) is increasing, although there was relatively little change in farm size over the decade between 2000 and 2009.

Source: Agricultural Census, Defra (2010)

6.3 Farm ownership

2009: Total farm area = 14,302 ha; owned land = 8,554 ha
2000: Total farm area = 14,514 ha; owned land = 9,322 ha

Patterns of farm ownership changed little between 2000 and 2009, with 60 per cent of land 'owned' and 40 per cent 'tenanted' in 2009.

Source: Agricultural Census, Defra (2010)

6.4 Land use

The majority of land in the Cheshire Sandstone Ridge was uncropped (67 per cent of the farmed area) in 2009. Cereals made up an additional 16 per cent, with the remainder made up of other arable crops, cash roots, stock feed and vegetables. The proportion of uncropped land remained stable between 2000 and 2009.

Source: Agricultural Census, Defra (2010)

6.5 Livestock numbers

Cattle numbers decreased by 9 per cent from 2000 to 2009 with sheep numbers decreasing by 16 per cent over the same period. Pig numbers decreased more significantly, reducing by an estimated 33 per cent between 2000 and 2009.

Source: Agricultural Census, Defra (2010)

6.6 Farm labour

Farm labour in this NCA was mainly provided by principal farmers (making up 70 per cent of recorded labour, up from 66 per cent in 2000). The number of salaried managers decreased by 38 per cent between 2000 and 2009. Full-time workers and casual/gang worker numbers also decreased significantly, falling by 30 per cent and 34 per cent respectively over this period.

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

In the north-east of the NCA on the Delamere sandsheet is an important cluster of wetlands associated with the presence of peatlands and water filled glacial hollows. Locally they are known as meres and mosses and are of international conservation significance. A diverse range of wetland habitats occur, scattered across this area including lowland raised bog, fen, wet woodland, reedbed, and eutrophic or mesotrophic standing waters. The sandstone ridge and its slopes support a strong mosaic of broadleaved mixed woodland habitat, sometimes ancient in origins having been continuously wooded. Other wooded areas are much younger, having developed naturally from neglected heathland or grassland. Significant areas have been 'coniferised'. Blocks of sizeable lowland heathland survive on Bickerton Hill and at Little Budworth Common. Remnant areas of lowland meadow are thinly scattered across the area.

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; 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)	860	4
Lowland heathland	451	2
Lowland meadows	103	<1
Coastal and flood plain grazing marsh	70	<1
Lowland dry acid grassland	15	<1
Purple moor grass and rush pasture	6	<1
Reedbeds	2	<1

Source: Natural England (2011)

Omitted from the above table is habitat data on fen, eutrophic standing waters and mesotrophic standing waters.

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

There is a dispersed settlement pattern of scattered farms and small villages.

Source: Cheshire Sandstone Ridge Countryside Character Area Description; Countryside Quality Counts (2003)

8.2 Main settlements

The NCA is located between the major centres at Chester and Northwich and supports a series of villages and hamlets, the largest of which are Frodsham, Cuddington, Tarporley and Kelsall. The total estimated population for this NCA (derived from ONS 2001 census data) is 25,053.

Source: Cheshire Sandstone Ridge Countryside Character Area description; Countryside Quality Counts (2003), Natural England (2012)

8.3 Local vernacular and building materials

Red brick is the dominant building material, together with some local sandstone. A few older half-timbered distinctive black and white buildings occur.

Source: Cheshire Sandstone Ridge Countryside Character Area description; Countryside Quality Counts (2003)

9. Key historic sites and features

9.1 Origin of historic features

Several iron-age forts punctuate the sandstone ridge providing evidence of prehistoric settlement. Delamere Forest was a Royal Hunting Forest and colonisation of this area increased from the 15th century. In 1919 the remaining Crown woodlands at Delamere were passed to the Forestry Commission to be managed for timber production. Estates and parklands developed from the 16th century and parts of the area have distinctive 19th and early 20th century estate architecture of cottages, farmsteads, and other buildings such as the Tollemarche Estate.

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

9.2 Designated historic assets

This NCA has the following historic designations:

- 1 Registered Parks and Gardens covering 16 ha.
- 0 Registered Battlefields.
- 42 Scheduled Monuments.
- 410 Listed Buildings.

Source: Natural England (2010)

- More information is available at the following address: www.english-heritage.org.uk/caring/heritage-at-risk/
- www.english-heritage.org.uk/professional/protection/process/national-heritage-list-for-england/

10. Recreation and access

10.1 Public access

- 7 per cent of the NCA 1,500 ha is classified as being publically accessible.
- There are 368 km of public rights of way at a density of 1.7 km per km2.
- There are no National Trails within the NCA.

Source: Natural England (2010)

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

Access designation	Area (ha)	% of NCA
National Trust (accessible all year)	0	0
Common Land	17	<1
Country Parks	64	<1
CROW Access Land (OC and RCL)	36	<1
CROW Section 15	20	<1
CROW Access Land (Section 16 Dedicated)	775	4
Village Greens	1	<1
Doorstep Greens	0	0
FC Walkers Welcome Grants	101	<1
LNRs	0	0
Millennium Greens	<1	<1
Accessible NNRs	0	0
Agri-environment Scheme Access	12	<1
Woods for People	1,417	6

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.

A war memorial stands at the northern tip of the NCA, prominently located on the highest ground and is a distinctive local landmark.

11. Experiential qualities

11.1 Tranquillity

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

Category of tranquillity	Score
Highest	23
Lowest	-78
Mean	18

Sources: CPRE (2006)

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

11.2 Intrusion

The 2007 Intrusion Map (CPRE) shows the extent to which rural landscapes are 'intruded on' from urban development, noise (primarily traffic noise), and other sources of visual and auditory intrusion. A breakdown of intrusion values for this NCA is detailed in the following table.

Intrusion category	1960s (%)	1990s (%)	2007 (%)	Percentage change (1960s-2007)
Disturbed	9	41	50	51
Undisturbed	91	59	49	-42
Urban	0	0	1	1

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are the increases in the areas classified as 'disturbed' since the 1960s. However, almost half the total NCA area is still considered as 'undisturbed'. Also notable is the emergence of 'urban' as a feature on the 2007 return.

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

View east from Beeston Castle

12. Data sources

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

Please note all figures contained within the report have been rounded to the nearest unit. For this reason proportion figures will not (in all) cases add up to 100 per cent. 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

- In 1999 about 7 per cent of the established eligible National Inventory of woodland stock was covered by a Woodland Grant Scheme management agreement. In 2003 this had reduced to 6 per cent.
- Approximately 172 ha or 6 per cent of the ancient woodland cover is on an ancient woodland site. The proportion of these sites covered by a Woodland Grant Scheme agreement has remained around 10 per cent since 1999.
- At the end of 1998 young trees approved for planting under a Woodland Grant Scheme agreement accounted for about 4 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 (69 ha).
- Traditional orchards were once an important part of the Cheshire landscape. Some older farms, smallholdings and cottages still have remnant orchard trees either in the gardens, hedgerows or grassy paddocks set close to houses. Only a few survive, for example in the area around Kingsley and at Edge Grange.
- The Mersey Forest is planting new community woodlands delivering a wide range of associated environmental, economic, health and social benefits through sustainable landscape improvements.
- In recent years, new markets have created demand for wood-fuel biomass which is stimulating woodland management and creation.

Boundary features

- Between 1999 and 2003 Countryside Stewardship agreements for linear features included fencing (29 km), hedge management (8 km), hedge planting and restoration (16 km), and restored boundary protection (25 km).
- By 2011, boundary options under agri-environment schemes totalled 340 km of hedgerow management and over 900 m of stone wall management.
- Local evidence indicates that arable production is increasing, leading to a decline in the condition of hedgerows and in some cases fields have been enlarged, resulting in the loss of some hedgerows.

Agriculture

- Countryside Stewardship uptake for annual area features was above the national average from 1999. Most extensive annual agreements in 2003 were for lowland pastures on neutral/acid soils (124 ha) and regeneration of grassland/semi-natural vegetation (100 ha).

- Loss of grass observed up to 1998/9 has not been reversed although further losses have not been seen. Mix of farm type has remained stable since 1999, but since the early 1990s emphasis has shifted from dairy to lowland cattle and sheep.

- In 2003 Countryside Stewardship annual agreements included overwintered stubble followed by a spring crop (23 ha), overwintered stubble followed by spring / summer fallow (10 ha), and over-wintered stubble followed by a low input spring cereal crop (10 ha).

- Pond density is high; there was a significant uptake of Countryside Stewardship agreements for creation of larger ponds from 1999 and some restoration.

- Recent evidence indicates the uptake of agri-environment scheme options that include infield trees, very low-input grassland, and low input spring cereal and over-wintered stubbles, with historic environment options to protect the hill forts found on the ridge.

- Recent, local evidence suggests that the pastoral character of the lower slopes has been reduced through the introduction of fodder crops such as maize to provide winter feed. Associated with this is improved drainage, which, along with infill and encroachment, has resulted in the loss of field ponds, bogs, and mosses.

- Local evidence indicates a number of holdings converting to equestrian activities.

Settlement and development

- Rates of development outside urban and fringe areas are low.

- Urban fringe and ribbon development pressures and suburbanisation of the countryside have affected some areas, for example the area around Frodsham.

- Local evidence shows that there are areas of modern development which have changed the traditional settlement pattern, such as at Utkinton and Quarry Bank, and the modern village of Kelsall in the west, which grew from a dispersed pattern into a nucleated centre in the 20th century.

- A number of communication masts are prominently located on the highest ground and are visible over a wide area.

View looking west from Bickerton Hill towards Brown Knowl. Mature hedgerow trees give the apperance of a well-wooded landscape.

Semi-natural habitat

- Countryside Stewardship uptake for annual area features tracked above national average from 1999. Most extensive annual agreements in 2003 were for lowland pastures on neutral/acid soils (124 ha) and regeneration of grassland/semi-natural vegetation (100 ha).
- Countryside Stewardship agreements in 2003 included management of ancient water meadows (12 ha).
- Recent, local evidence indicates that the vast majority of the grassland found along the ridge is now species poor/improved grassland which has been modified by extensive fertiliser use and reseeding.
- Ancient woodland represents approximately 12 per cent of the total woodland. Approximately half of this woodland requires restoration.
- Recent evidence indicates the uptake of agri-environment scheme options for wild bird seed plots, with some species-rich grassland and at Bickerton Hill there is a large heathland restoration project.
- The Mersey Forest is planting new community woodlands delivering a wide range of benefits to habitats and biodiversity.

Historic features

- 75 per cent of historic farm buildings remain unconverted. Most are structurally intact.
- Only a limited area of historic parkland is covered by an agri-environment management agreement. In 1918 about 3 per cent of the area was historic parkland. By 1995 it is estimated that 58 per cent of the 1918 area had been lost. Little is now covered by a Historic Parkland Grant, and only 6 per cent is included in an agri-environment scheme.
- More recently, in the south, the former landscape park of Arderne Hall on the northern edge of Tarporley, has been converted to a golfing complex, reflecting the pressure from the nearby large urban conurbation, for recreational land use.

Coast and rivers

- Data obtained from the Environment Agency indicates that the ecological quality, in terms of Water Framework Directive assessment, is 'moderate' with the exception of Darley Brook and the River Gowy from its source to Milton Brook, which is 'poor'.
- Data obtained from the Environment Agency indicates that the chemical water quality of the rivers 'does not require assessment'.
- Countryside Stewardship agreements in 2003 included management of ancient water meadows (12 ha).

Minerals

- The legacy of mineral and ore extraction has led to a diversity of habitats important to biodiversity and recreation.
- The extraction of minerals and ores has taken place over centuries, for example, Copper was mined along the eastern edge of the Bickerton Hills from the 17th century onwards. A Grade II listed engine house chimney is all that remains of the original mine buildings, which were demolished in the 1930s.
- Clear evidence of bronze-age metal-working has been found on Beeston Crag.
- Although there are no working copper mines today, silica sand is extracted from the nationally important reserves of the Delamere sand sheet and the mosaic of worked-out extraction sites has led to the creation of wetland habitats important to biodiversity and recreation.
- Sandstone has been quarried throughout the NCA and continues to be extracted on a small-scale.
- The high density of infield ponds is partly a result of the historic extraction of marl as an agricultural soil improver.
- As the demand for housing and infrastructure increases, so will the demand for raw materials, potentially requiring an increase in productivity from existing extraction sites, resulting in increased lorry movements. Prolonged demand may lead to an increase in the number of planning applications for extensions to existing quarries and the development of new or 'non-operational' quarries.

View towards Burwardsley.

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 and acute oak decline pose a threat to the trees throughout the NCA. If unchecked, these and other diseases and pests have the potential to fundamentally change the landscape.

- Projected climate change trends suggest an increase to summer temperatures leading to warmer water temperatures and greater incidences of algal blooms on waterbodies such as the meres and ponds found throughout the NCA.

- The Environment Agency flood risk map indicates that localised flooding occurs along the river valleys. The frequency of these events is likely to increase leading to increased scour and soil erosion and mobilisation of pollutants.

- 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

- The demand for land for housing and with associated road improvements is likely to increase. Opportunities exist through the National Planning Policy Framework to ensure that new developments contribute to a high-quality built and natural environment that respects the local vernacular and contributes to green infrastructure.

- The need for food security may result in increased agricultural production, with changing farming practices which may adversely impact on field sizes and patterns, ecological habitats, networks and species, and landscape character. For example, if areas of grassland and meadows along river valleys are agriculturally improved for silage and grass leys, a feature of the landscape will be lost.

- A change in the pattern of land ownership with a move towards larger land holdings is likely, with a demand for more centralised and larger buildings with increased visual intrusion and associated changes to landscape character.

- Visitor numbers are likely to increase, thus contributing to the visitor economy and providing opportunities for 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.

- With its elevated topography and higher wind speeds, there is likely to be increasing pressure for additional communication masts and wind turbines along the ridge.

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.

Maiden Castle, one of the largest and most complex iron-age hill forts in Europe.

Statement of Environmental Opportunity	Ecosystem Service																		
	Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place / Inspiration	Sense of history	Tranquillity	Recreation	Biodiversity	Geodiversity
SEO 1: Manage and enhance the rivers, streams and wetland habitats, including flood plain grazing marsh and wet woodland, protecting them from diffuse pollution and maintaining the integrity and unique conditions for the preservation of the lakes and standing waters of internationally important sites such as Oak Mere and Abbots Moss to benefit water availability, water quality, landscape character, biodiversity and climate regulation.	↗ *	↔ ***	↑ ***	↗ *	↔ ***	↗ **	↑ ***	↑ ***	↗ **	↑ ***	↗ *	↗ *	N/A	↗ *	↗ **	↔ ***	↗ **	↑ ***	↔ ***
SEO 2: Manage and expand areas of semi-natural woodland, restore and reinstate hedgerows and hedgerow trees, protect and restore ancient woodland, for example in the Delamere Forest Park and throughout the Mersey Forest, thus reducing habitat fragmentation to benefit landscape character, biodiversity, resource protection and climate regulation while enhancing the recreational, educational and experiential qualities of the NCA.	↘ ***	↑ **	↗ **	↑ **	↗ ***	↑ ***	↗ ***	↗ ***	↗ ***	↑ ***	↗ ***	↗ ***	N/A	↑ ***	↑ ***	↑ ***	↑ ***	↑ ***	↔ ***
SEO 3: Protect and manage the geological sites, with an emphasis on demonstrating the strong link between geology and its influence on landscape and industrial development, and promoting greater understanding of the link between wildlife and geodiversity, particularly in the distribution of habitats and species, recognising the importance of former extraction sites for both geodiversity and biodiversity.	↔ **	↔ ***	↔ **	↔ **	↔ ***	↔ ***	↔ *	↗ *	↔ ***	↔ **	↔ *	↔ *	N/A	↗ ***	↗ ***	↗ ***	↑ ***	↑ ***	↑ ***
SEO 4: Manage and, where appropriate, expand areas of characteristic heathland and other priority habitats, including lowland meadows and lowland grassland, thus reducing habitat fragmentation to benefit landscape character, sense of place, biodiversity and resource protection while enhancing the recreational and experiential qualities of the NCA.	↘ **	↔ **	↗ ***	↑ ***	↔ **	↑ ***	↗ **	↗ ***	↑ ***	↗ **	↗ ***	↗ *	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.

National Importance; Regional Importance; Local Importance

Landscape attributes

Landscape attribute	Justification for selection
Prominent sandstone ridge.	■ The prominent sandstone ridge with outcrops and bluffs over 100 m high comprising Triassic sandstone and conglomerate, exemplified by Beeston Crag and Raw Head geological SSSI, provides expansive views. ■ In contrast to the surrounding plain, the ridge provides a locally rare sight of solid rock, evoking a sense of place and providing important sites for education and scientific research. ■ Outcrops of sandstone are the source of local building stone and historically, copper was mined in the Bickerton Hills. ■ The sandstones erode to form sandy, gravelly, free-draining soils that support heathland and woodland.
Strong mosaic of broadleaved mixed woodland.	■ A strong mosaic of broadleaved mixed woodland with ancient woodland contributes to a sense of place and tranquillity, particularly around the areas of Frodsham and Kelsall in the north, Delamere in the centre and the Peckforton Woods in the south, with blocks of ancient semi-natural woodland such as at Alvanley Cliff Wood, Warburton's Wood and Well Wood SSSI. ■ The Mersey Forest is planting new community woodlands, strengthening the wooded character of the NCA and contributing to the recreational and experiential qualities of the area. ■ Some post-medieval conifer plantations and pines are common in the woods, plantations and along hedgerows and roadsides. ■ Large blocks of commercially managed conifers occur on gravelly soils to the south-east.
A regular pattern of hedgerows and walled field boundaries.	■ A regular pattern of hedged fields, with scattered mature hedgerow trees and sunken lanes. ■ Hedgerows give way to drystone walls on the ridge and there are examples of traditional Cheshire-style painted iron railings with curved tops throughout the area. Mainly pastoral on higher ground with some areas of arable. ■ A regular pattern of enclosure with straight boundaries dates predominantly from reorganisation in the 18th and19th centuries but this is set within a broad framework inherited from earlier phases of enclosure including some ancient irregular fields.
Dispersed livestock farms on steeper slopes with arable farming predominating lower down.	■ Low density dispersed livestock farms with some dairy. ■ Arable use on the less-steep, lower slopes. ■ Permanent pastures of poor quality extend over the ridge. Gently undulating, elevated areas occur to the east of the sandstone, with thin and infertile soils.
Meres, mosses and field ponds.	■ Meres and mosses occur at the lower elevations and extend into the surrounding NCA. Collectively, they comprise the largest group of lowland lakes in England and are known as the West Midlands Meres and Mosses – designated SSSI, SAC and Ramsar sites for their internationally important assemblages of flora and fauna, and deposits of peat. ■ There is a high density of infield ponds, a characteristic shared with the neighbouring NCA that owes its existence to both glacial activity and the historic extraction of marl as an agricultural soil improver.

Landscape attribute	Justification for selection
Remnants of once widespread lowland heathland.	■ Thin and infertile soils support important areas of heathland, for example at Little Budworth Common and Bickerton Hill SSSI, the latter being the largest area of surviving lowland heath in Cheshire.
Rivers, streams and canals	■ The NCA is drained by the rivers Gowy and Weaver that rise in the Peckforton Hills which are a local watershed. The rivers contribute to the Weaver/Gowy catchment that supplies water for public, industrial and agricultural uses. ■ The Shropshire Union Canal crosses east–west. Once an important trade route, the canal is now a recreational asset. ■ The River Weaver has been straightened (canalised) in places to improve navigation (the Weaver Navigation Canal), leaving the original line of the river as a quiet backwater that now hosts valuable habitats.
Castles, follies and the remains of iron-age forts.	■ Historic features punctuate the ridgeline. These include castles such as Peckforton, Beeston and Maiden Castle, the remains of early iron-age hill forts, burial mounds and ring ditches. ■ Iron-age hill forts were connected by a trackway following the higher land that now forms a long-distance footpath, the Sandstone Trail.
Dispersed settlement pattern – buildings built of distinctive brick and local building stone with some timber-framed.	■ Basic settlement pattern of dispersed farmsteads, hamlets and small villages dating predominantly from the medieval period. ■ Red brick and plain clay tiles or Welsh slate are the dominant building materials for farmhouses and farm buildings. ■ Farmhouses and cottages are often timber-framed. ■ Hedgerows give way to drystone walls of red sandstone, particularly on the ridge, where the geology has been exploited.
Rights-of-way network that links the population centres with rural areas, offering relative tranquillity.	■ The Shropshire Union Canal was once an important trade route linking Birmingham and the Black Country with the Mersey and is now a popular recreational resource for pleasure craft and walkers along the towpath. ■ The Sandstone Trail – a long-distance footpath along the top of the ridge, stretching for 55 km and offering elevated views across and out of the NCA. ■ The Weaver Navigation Canal was built for the transportation of salt from the mines in Cheshire and is now used widely by pleasure craft. ■ Route 70 of the National Cycle Network also crosses the area.

Landscape opportunities

- Manage core nature conservation sites such as SAC, Ramsar sites, SSSI, NNRs, LNRs and the Local Sites network, to improve their condition and connectivity within the landscape, to enhance character, and to create a coherent, 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 geo-morphological 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.
- Increase the diversity of tree species in new plantations to help increase the resilience of woodland to the effects of pests, diseases and climate change.
- Manage historic parkland and ancient woodland, with veteran trees, throughout the NCA. Encourage successional planting of native mixed species to maintain the structural diversity and strengthen landscape and historic character.
- Create areas of semi-natural habitats in arable agricultural systems by planting species-rich field margins and providing habitat for farmland birds.

The site of Kelsborrow iron-age hill fort. The remains of iron-age hill forts, burial mounds, ring ditches and castles, and finds of stone tools, occur along the ridgetop.

- Conserve existing orchards and encourage the reinstatement of traditional orchards for the benefits to biodiversity and genetic diversity through the cultivation of traditional varieties.

- Conserve and restore drystone boundary walls and appropriately manage and restore traditional hedgerows with typical species, to benefit soil protection, biodiversity and sense of place.

- Protect and restore the wetlands of the meres and mosses for the benefit of landscape character, people, wildlife and the historic environment.

- Create new or extend wetland landscapes and habitats to increase connectivity and reconnect rivers to their flood plains to benefit water flow and biodiversity.

- 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 woody debris and shade for wildlife and people.

- Protect further loss and degradation of heathland and, where appropriate, create new, 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, including circular routes, to improve the connectivity between settlements and core sites, encouraging physical activity and improving health and well-being for all abilities and user-groups.

- Create new access to woodlands as part of woodland management, increasing the opportunities for quiet recreation and to experience tranquillity, while ensuring this does not compromise sensitive habitats and bio-security, and encouraging visitors away from over-popular sites.

- Create new woodland in urban areas, contributing to green infrastructure; planting blocks of trees to screen settlements and roads from the surrounding landscape and planting street trees to provide shade, mitigating the effect of the urban heat island, increasing water infiltration rates and purifying the air.

Ecosystem service analysis

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Food provision	Livestock farms with some dairy and arable Grass leys, improved and permanent pasture Traditional orchards	The predominant land cover is grass, particularly in the north of the area. Improved grassland and permanent pasture produce grass for grazing, silage or hay. There is some dairying, based on the fertile and productive clay soils. Arable predominates on some of the gentle, more freely-draining side slopes of the sandstone ridges. Traditional orchards were once an important part of the Cheshire landscape. Some older farms, smallholdings and cottages still have remnant orchard trees either in the gardens, hedgerows or grassy paddocks set close to the house. Only a few survive, for example in the area around Kingsley and at Edge Grange.	Local	The increasing demand for food production is likely to continue, leading to a high demand for improved grassland that could result in the loss of semi-natural habitats. In addition, pastoral character could be reduced through the introduction of fodder crops such as maize to provide winter feed. This could lead to larger field sizes and improved drainage which could threaten field ponds and characteristic meres and mosses. However, opportunities exist to incorporate measures to mitigate such consequences. In addition to being a characteristic of the area, orchards are hotspots for biodiversity, supporting a wide range of wildlife and containing priority habitats and species.	Work in collaboration with farmers to safeguard food production while incorporating measures that maintain and enhance habitat networks and enhance the landscape character. For example, incorporating species-rich field margins, managing hedgerows and managing for farmland birds. Encourage the adoption of management techniques advocated by the Catchment Sensitive Farming Programme, such as buffering watercourses and safeguarding wetland habitats and infield ponds, to benefit biodiversity and water quality. 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.[4]	**Food provision** **Biodiversity** **Regulating water quality** **Sense of history** **Sense of place/ inspiration**

[4] www.merseyforest.org.uk/plan/

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Timber provision	Conifer plantations Native woodland Community woodlands	Over 13 per cent of the area is woodland with blocks of woodland, both broadleaved and conifer plantations, including private woodlands and those managed by the Forestry Commission, for example Primrose hill and Nettleford Wood. The Forestry Commission has established extensive community woodland of mixed planting with open spaces on the northern slopes of the Old Pale, within the Delamere Forest, in the north of the area. Approximately half of the area is within the Mersey Forest which has as an objective the creation of sustainably managed community woodlands that include timber provision to local communities.	Regional	The greatest concentration of woodland is in the north of the area around Delamere Forest, which was a vast hunting forest. Approximately half of the area is within the Mersey Forest, which has objectives to plant more community forests that benefit the education, health and well-being of communities, and provide benefits to the local economy through the sale of woodland products.	Seek opportunities to stimulate the wood-products and wood-fuel market in nearby urban areas in order to sustain the management of native woodlands. Managing more woodland for timber will benefit a number of services. Through community woodlands such as those in the Mersey Forest, opportunities exist for woodland allotments, education, training and volunteering. Community woodlands also provide opportunities for research into the benefits of woodland for health and well-being. Ensure that new conifer plantations do not fragment areas of semi-natural woodland.	**Timber provision** **Biodiversity** **Sense of place/ inspiration** **Sense of history** **Climate regulation** **Water availability** **Regulating water flow** **Recreation**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability	River Gowy River Weaver Aquifer	Data from the Environment Agency[5] indicates that groundwater availability in the Weaver/Gowy catchment is good. The rivers Gowy and Weaver rise in the Peckforton Hills towards the south of the area. Data from the Environment Agency [6] indicates the location of a secondary aquifer extending from Tarporley in the central area to Frodsham in the north of the area.	Regional	Although there are no reservoirs in the area, the rivers Gowy and Weaver and their tributaries contribute to Weaver/ Gowy catchment which provides water for public, agricultural and industrial water supply outside the area, for example to Northwich, and Frodsham. Expansion of these settlements will result in increased abstraction. Climate predictions indicate prolonged periods of drought leading to an increased demand for water for crop irrigation, potentially resulting in low flow levels that negatively impact on biodiversity and water quality. Sediments of the Sherwood Sandstone Group form the Weaver aquifer and water is abstracted from the aquifer outside the NCA. Outcrops within the area offer limited recharge areas to the aquifer. In addition to providing water for public, agricultural and industrial use, there are large numbers of designated conservation areas in the catchment, with SSSI, Ramsar site and SAC designations, such as Oak Mere, that are reliant on consistent water availability.	Promote the sustainable use of water in domestic, industrial and agricultural sectors to reduce demand. Where appropriate in the landscape, encourage rainwater harvesting and the construction of winter water-storage reservoirs in agricultural areas and ensure they benefit landscape character and biodiversity. Identify and enhance areas for natural water storage, for example lowland meadows along the River Gowy, expanding flood meadows and creating ponds and scrapes. These measures have multiple benefits. Maintain and extend riparian woodland along the river valleys to increase interception rates and slow the flow of surface water. The freely-draining soils may be valuable for aquifer recharge. This will be enhanced by the maintenance of good structural conditions and increasing organic matter levels through management interventions, to aid water infiltration and protection from pollution.	**Water availability** **Sense of place/ inspiration** **Recreation** **Biodiversity** **Climate regulation** **Regulating water flow**

[5] http://maps.environment-agency.gov.uk/wiyby/wiybyController?topic=wfd_groundwaters&layerGroups=default&lang=_e&ep=map&scale=6&x=365500&y=373500#x=368516&y=365086&lg=1,7,9,&scale=5
[6] http://maps.environment-agency.gov.uk/wiyby/wiybyController?topic=groundwater&layerGroups=default&lang=_e&ep=map&scale=5&x=368516&y=365086#x=354963&y=376582&lg=3,&scale=6

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Genetic diversity	Traditional orchards	Traditional orchards were once an important part of the landscape. Some older farms, estates, small-holdings and cottages still have remnant orchard trees either in the gardens, hedgerows or grassy paddocks set close to the house. A number of fragmented orchards survive, for example in the area around Kingsley and at Edge Grange.	Local	Local evidence shows that there are over 30 varieties of apple 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. 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.	Through agri-environment schemes, landscape-scale partnerships and community woodland partnerships encourage the expansion of existing orchards and the re-instatement of old orchards to preserve heritage varieties and fruit tree suppliers.	**Genetic diversity** **Food provision** **Biodiversity** **Pollination** **Sense of place/ inspiration** **Sense of history** **Recreation**
Biomass energy	Existing woodland Forestry by-products Woodland allotments	Over 13 per cent of the NCA is woodland, providing a resource for biomass in the form of timber from forestry that is unsuitable for its intended purpose, including arisings from arboricultural activities associated with woodland management, such as coppicing and pollarding. The Mersey Forest is establishing woodland allotments, encouraging communities to thin trees to benefit the woodland structure in return for timber for fuel.	Local	The use of arisings from woodland and arboricultural management not suitable for timber provision could be used for biomass production. The steep-sided slopes make the area unviable for commercial biomass production; however, the peripheral lower slopes and flatter lower valleys could support SRC and/ or Miscanthus but have a low potential yield. Siting of biomass crops would need to consider impacts on landscape character; with its mosaic of woodland and farmland, the landscape is valued for its scenic contrast with the surrounding plains. Community woodland partnerships, such as the Mersey Forest, identify potential areas for new woodland and are beginning to establish sustainable supply of and demand for biomass.	Seek opportunities for landscape-scale collection of arisings and timber waste in hubs, for example at Delamere, for supply to residential wood-fuel markets close to population centres and supply to biomass boilers in local amenity and civic buildings. Encourage the installation of small-scale wood-fuel boilers in local buildings. Encourage community woodland projects, such as the Mersey Forest Plan, that can provide biomass to local markets and in return secure benefits of woodland management, employment and supporting the transition to a low carbon economy. .	**Biomass energy** **Biodiversity** **Climate regulation** **Sense of place/ inspiration** **Sense of history**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation	Soils Woodland Meres and mosses Wetland habitats Heathland	The majority of the NCA has a low soil carbon content of 0–5 per cent[7] reflecting the dominance of mineral soils with a low carbon content, especially where under continuous arable cultivation. Over 13 per cent of the area is covered by woodland and this will be a significant contributor to carbon storage and sequestration. The fen peat soils associated with the meres and mosses have deep peat soils that have large stores of carbon. The significant wetland areas as well as woodland, heathland and grassland including over 1,500 ha of priority habitats will also provide an important carbon storage function in this NCA. In urban areas, planting blocks of trees and street trees will provide shade, thus mitigating the effect of the urban heat island, increasing water infiltration rates and purifying the air.	Local	By increasing organic matter input and by reducing the frequency/area of cultivation in areas where mineral soils occur, carbon sequestration and storage of mineral soils can be increased. Good management of existing woodland can ensure their role in sequestering and storing carbon is optimised and will benefit other services, for example biodiversity. Peat soils, associated with the meres and mosses are very important because of their role in the storage of carbon and other greenhouse gases. Unfortunately historic peat extraction and the lowering of the water table have reduced the effectiveness with which these peatlands 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. 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.	Where arable systems prevail, work in collaboration with farmers to ensure appropriate management techniques are employed to enhance organic inputs and reduce fertiliser inputs for the benefits to climate regulation and increased crop yields. Work in landscape-scale partnerships to ensure that woodland is managed for the benefits of climate regulation and biodiversity, for example at Delamere. Work in landscape-scale partnerships on the restoration of meres and mosses and other wetland habitats, to benefit a number of provisioning and regulating services. Create new or extend wetland habitats along the valley of the River Gowy and reverse the fragmentation of the area's heathland to increase connectivity, benefitting biodiversity and climate regulation.	**Climate regulation** **Biodiversity** **Regulating soil erosion** **Regulation of water quality** **Recreation** **Sense of place/ inspiration** **Sense of history**

[7] NSRI National Soils Map for England and Wales, Environment Agency (January 2009)

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality	Rivers and their tributaries Aquifer	Data obtained from the Environment Agency[8] indicates that the ecological status of the watercourses in the area is 'moderate' with the exception of Darley Brook (poor) and the River Gowy, from source to Milton Brook (poor). Several sites are within the West Midlands Meres Priority Catchment, of the Catchment Sensitive Farming Programme[9] emphasising the importance of water quality to the NCA's habitats, particularly the meres and mosses that are sensitive to sedimentation and diffuse pollution. A secondary aquifer extends from Tarporley to Frodsham forming part of the Sherwood Sandstone aquifer.	Regional	Reasons for the failing ecological status[10] of the watercourses according to the Water Framework Directive assessment include sedimentation, channel modifications, and diffuse pollution from fertiliser, pesticides and discharges from septic tanks. In addition, the aquatic ecology suffers from current and past industrial discharges compounded by river modifications including weirs and locks that act as barriers to fish migration. The ridge and outcrops of Triassic sandstone can contribute to aquifer recharge, requiring the careful management of fertilisers and pesticides to prevent pollution of groundwater.	Seek opportunities through the Catchment Sensitive Farming Programme and agri-environment schemes to reduce foul run-off from outdoor feeding areas, silage clamps, yards and cattle tracks; prevent stock from entering streams and poaching stream banks, and managing livestock to avoid poaching of fields by cattle movement; buffer watercourses from nutrient run-off. These measures can have a positive effect on ground and surface waters benefiting biodiversity. Physical barriers around arable fields, such as permanent grassland margins, well-maintained hedgerows and boundary walls, can alleviate wind erosion of soil, reducing the risk of sedimentation.	**Regulating water quality** **Regulating water flow** **Regulating soil erosion** **Recreation** **Biodiversity**

[8] http://maps.environment-agency.gov.uk/wiyby/wiybyController?topic=wfd_rivers&layerGroups=default&lang=_e&ep=map&scale=6&x=378140.46875&y=361547.44791666674#x=350888&y=368427&lg=1,7,8,9,5,6,&scale=6

[9] www.naturalengland.org.uk/ourwork/farming/csf/default.aspx

[10] River Basin Management Plan, North West River Basin District, Environment Agency (December 2009).

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow	Flood plains, rivers and watercourses Semi-natural vegetation Riparian woodland	Data from the Environment Agency's flood map[11] for rivers indicates that the risk of flooding is restricted to the river valleys and watercourses, both within the NCA and in the neighbouring NCAs. The management of water is critical to the internationally important areas of meres and mosses and other nationally important wetland habitats. Periods of drought can degrade peat soils, liberating greenhouse gases and leading to catastrophic loss of habitat.	Regional	The Environment Agency flood risk map indicates that localised flooding occurs along the river valleys. The frequency of these events is likely to increase with climate change, leading to increased scour, soil erosion and mobilisation of pollutants. In urban areas there is an increased risk of damage to buildings and infrastructure. Riparian woodland and lowland meadow, particularly along the Pettypool Brook Valley provide an effective filter and buffer, helping to trap sediment and slowing the flow of surface water. Identifying additional flood storage areas and reconnecting wetland habitats and rivers with their flood plains can help sustain water levels, thus maintaining the integrity of the meres, mosses and wetland habitats.	Seek opportunities to expand semi-natural habitats including riparian woodland and flood plain grazing marsh along river valleys and watercourses to help reduce flow rates during peak flows. This will also benefit biodiversity and reduce diffuse pollution via surface run-off. Support landscape-scale partnerships in the restoration of the meres and mosses and where possible, reconnect rivers to their flood plains to provide flood storage areas that will also benefit biodiversity. Removing constrictions to flow, such as weirs, will also benefit migratory fish and re-naturalising banks can help slow flow rates. Identify natural areas for flood water storage to reduce the reliance on hard-engineering solutions to flooding in settlements. Widen flood plains and ensure they are not inappropriately developed, and ensure that new developments take into account the principles of sustainable urban drainage systems (SUDS) by including green spaces and areas of unsealed surfaces.	**Regulating water flow** **Regulating water quality** **Regulating soil erosion** **Regulating soil quality** **Sense of place/ inspiration** **Biodiversity**

[11] http://maps.environment-agency.gov.uk/wiyby/wiybyController?topic=floodmap&layerGroups=default&lang=_e&ep=map&scale=9&x=365500&y=373500#x=355894&y=363688&lg=1,&scale=8

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil quality	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 ridge, which can damage the soil structure over a prolonged period of cultivation. 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 further damaged where organic matter levels are low after continuous arable cultivation or where soils are compacted. This may be improved by adding organic matter. The soils are also valuable for aquifer recharge where overlying the aquifer, requiring the maintenance of good soil structure to aid water infiltration and the control of fertiliser and pesticide inputs to prevent pollution of groundwater. 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 organic matter levels can help reduce these problems. Where peaty soils predominate and where appropriate, retain water levels to increase water retention and maintain the soil structure.	Encourage the adoption of Catchment Sensitive Farming techniques to manage arable and livestock systems sustainably, protecting the soil structure, for example by preventing poaching, adopting sustainable stocking levels and avoiding mechanised activities that will compact the soil, especially in wet conditions. Ensure the management of pastures and meadows encourages the build-up of organic matter and encourage management of arable land such as use of green manure and winter stubbles to replace nutrients and improve soil structure. In partnership, continue the restoration of degraded areas of peat and manage wetland habitats to safeguard the carbon-rich soil and re-introduce peat forming vegetation.	**Regulating soil quality** **Food provision** **Water availability** **Climate regulation** **Regulating soil erosion** **Regulating water quality** **Regulating water flow** **Biodiversity** **Sense of place/ inspiration**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion	Soils Field boundary features Semi-natural habitat	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.	Local	Food production, water quality and the integrity of the meres and mosses are important to the area, therefore the regulation of soil erosion. It is essential to maintain the soil resource for food production and also to reduce sedimentation in the watercourses, meres and mosses. Permanent vegetation cover, for example, pasture alongside river valleys and watercourses, stabilises exposed areas, trapping sediment and slowing water flow. Physical barriers in arable fields can alleviate wind erosion of soil, for example, permanent grassland around field boundaries, well-maintained hedgerows and boundary walls. Riparian woodland and lowland meadow along watercourses offer resource protection against run-off. Conversely, invasive non-native species, for example, stands of Himalayan balsam, can lead to bare earth in the winter months which is when soils 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 prevent soil loss causing sedimentation. Periods of drought may exacerbate soil erosion by wind on the slopes of the ridge, thus reinforcing the importance of hedgerows in soil protection.	Encourage the adoption of Catchment Sensitive Farming techniques to manage arable and livestock systems sustainably and protect the soil resource, for example, buffering watercourses. Encourage the uptake of agri-environment options to establish field margins with permanent grassland or conservation margins. Buffer watercourses to reduce sediment run-off and reduce incidences of bare earth in arable systems for the multiple benefits to resource protection, and biodiversity.	**Regulating soil erosion** **Regulating water quality** **Regulating soil quality** **Food provision** **Regulating water quality** **Biodiversity** **Sense of place/ inspiration**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pollination	Lowland heathland Lowland meadows Traditional orchards Hedgerows and field margins Road verges	Crops grown within the NCA are not reliant on populations of pollinators, however the traditional orchards in this NCA and orchards and fruit farms in the neighbouring Plain benefit from this service. Areas of lowland heath, meadow, hedgerows and grassland habitats provide sources of nectar for pollinating insects. Late-flowering nectar sources, such as heather, are important in providing supply of nectar over an extended period of time. Residential gardens provide important sources of nectar in settlements and often have more diverse sources of nectar than occurs in agricultural monocultures.	Local	Food crops that are currently grown in the NCA do not rely on pollinators therefore their value is to biodiversity and the few traditional orchards and fruit farms in the neighbouring Plain. This could be a limiting factor should cropping regimes change. An increase to the populations of pollinators may facilitate an increase in the number of orchards 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. Collectively, lowland heathland and lowland meadow represent three per cent of the NCA, currently limiting the provision of this service. However, expanding areas of lowland 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.	Seek opportunities to increase nectar provision within the agricultural landscape through promotion of agri-environment scheme options. This would also provide habitat and food source for potential pest regulators, for example, birds. Encourage local authorities, highways and road maintenance contractors to diversify the species mix of roadside verges to provide wildlife corridors that link areas of high biodiversity thus providing a more robust ecological network for pollinators.	**Pollination** **Food production** **Climate regulation** **Regulating soil erosion** **Regulating water quality** **Biodiversity** **Sense of place/ inspiration** **Pest regulation**
Pest regulation	Semi-natural habitat Hedgerows Arable margins Road verges	The contribution to pest regulation services is limited to semi-natural habitat, hedgerows, field margins and road verges.	Local	Semi-natural habitats and hedges proximal to areas of commercial arable agriculture may support species of predators that can regulate populations of pests that adversely affect crop yields, hence food provision. Climate change exacerbates the risk that many non-native species, insect pests and pathogens may establish and spread. For example, ash die-back and acute oak decline pose a threat to the trees throughout the NCA. If unchecked, these and other diseases and pests have the potential to fundamentally change the landscape.	In agricultural areas, expand existing areas or create new semi-natural habitat, for example, beetle banks, headlands and re-instate hedgerows, to provide a mosaic of habitats in areas of monoculture, thus providing a more robust ecosystem that will benefit food production and biodiversity. Monitor occurrence of diseases such as ash dieback and work with landowners and managers to limit spread and introduce bio-security measures where appropriate.	**Pest regulation** **Pollination** **Biodiversity** **Food production** **Sense of place/ inspiration**.

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of place/ inspiration	Sandstone ridge Woodland and boundary features Historic assets Lowland heathland Meres and mosses Rivers, streams and canals and field ponds Hedgerows and stone boundary walls Local vernacular Parklands	A strong sense of place is evoked by the prominent sandstone ridge with outcrops and bluffs over 100 m high comprising Triassic sandstone and conglomerate, exemplified by Beeston Crag and Raw Head geological SSSI, contrasting with the surrounding plain. At many locations solid blocks of woodland (including conifers) and high hedgerows combine to evoke a strong sense of enclosure and wooded feel, a complete contrast to the unrestricted panoramic views afforded by the ridge. Heathland was once a common sight in Cheshire, but has become increasingly fragmented and degraded. The most extensive heathland in Cheshire survives at Bickerton Hill SSSI and provides a glimpse of a past landscape.	Regional	The geology of the NCA provides a distinctive character, which should be maintained and enhanced through careful management. Woodland occurs on the slopes of the ridge and there are extensive blocks in the north of the NCA, for example, Delamere, the former Royal Forest of Mara. The sense of enclosure by lush, dense vegetation is further reinforced by sunken lanes between high hedges or valley bottoms below wooded ridgelines. Heathland, meres and mosses provide a tangible link with past landscapes and environments inspiring research and reflection.	There are opportunities to increase interpretation and understanding of the historic assets, geology and land forms 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. Seek to reverse the fragmentation of lowland heathland and conserve and protect the meres and mosses for future generations and for the benefits to biodiversity and climate regulation.	**Sense of place/ inspiration** **Sense of history** **Recreation** **Biodiversity** **Climate regulation**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history	Bronze-age artefacts Iron-age hill forts Roman settlements Country houses and castles Royal Forest Sandstone quarries and former copper mines Historic parkland Traditional orchards Settlement pattern	Prehistoric flint scatters and barrows indicate prehistoric activity (Bronze Age and earlier). Early iron-age hill forts were constructed along the ridge and connected by a trackway following the higher land. The Roman villa at Eaton by Tarporley is so far the only known villa in north-west England and an earlier timber building and a farmstead has been excavated at Birch Heath, near Tarporley. A Roman road crosses through the area en route to Manchester from Chester. Large historic halls include Peckforton Castle and Utkinton (listed Grade I), constructed in the 17th century and Tirley Garth to the south-west of Kelsall constructed in the 20th century is a Grade II* Listed Building and is surrounded by a Grade II* Registered Park and Garden. A basic settlement pattern, of dispersed farmsteads, hamlets and small villages dating predominantly from the medieval period. Agricultural improvement partly led to the origin of numerous field ponds. At Bickerton, near Gallantry Bank, there is a sandstone engine house chimney, which is all that remains of a former copper mine, worked intermittently from approximately 1690 to the 1920s.	Local	The strong landscape character of the NCA generated by the imposing geology is heightened by the clear evidence of past human land use. From the construction of defensive forts on the ridge, to field ponds, a consequence of agricultural improvement, to settlements and grand country houses. During the medieval period it became increasingly common for hunting to take place in deer parks and there are two former sites on the ridge which are identified by the placenames Old Pale and New Pale. The area's industrial heritage of sandstone quarrying is still evident in the landscape and the former quarries provide valuable habitats. Evidence of former copper mines is less obvious, restricted to rare glimpses of infrastructure.	Retain the well-preserved historic assets, above and below ground, by ensuring appropriate land management regimes. Manage the impacts of recreation, providing alternative paths away from eroded sites and sensitive habitats. Manage forestry and historic parkland to provide access and recreation while maintaining the historic characteristics of the woodland and areas of tranquillity. Encourage the reinstatement of traditional orchards. Opportunities exist to improve the interpretation of the area's former mining heritage, woodland and historic parkland, allowing visitors to understand, value and enjoy these features.	**Sense of history** **Sense of place/ inspiration** **Geodiversity** **Recreation** **Tranquillity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Tranquillity	Woodland River valleys	Statistics obtained from the 'Intrusion Map 2007' provided by the Campaign for the Protection of Rural England (CPRE) indicates a 51 per cent increase to 'disturbed' areas during the period from the 1960s to 2007. However, almost half the total NCA area is still considered as 'undisturbed'. Also notable is the emergence of 'urban' as a feature on the 2007 statistics. Traffic noise is cited as the main disturbance to tranquillity.	Regional	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 the wide-open, unenclosed landscape on the ridge to an enclosed feel in the valleys, woodland and sunken lanes. Extensive mosses, for example, Fenn's, Whixall, Bettisfield, Wem and Cadney mosses offer wide-open desolate landscapes.	Retain areas of open landscape, resisting urban development into undisturbed areas. Buffer the areas of the NCA where intrusion is low and sensitively plan any expansion to settlements and roads by planting woodland belts reducing visual impact, noise and light pollution. Encourage the provision of improved access to woodland as part of woodland management to increase the opportunities for people to experience tranquillity, for the calming and restorative effects on people's health and wellbeing. Resist the introduction of urban features in to the rural/ village landscape, for example, unnecessary lighting and signage.	**Tranquillity** **Sense of place/ inspiration** **Sense of history** **Biodiversity** **Recreation**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation	Public rights of way and heritage trails Iron-age hill forts National Cycle Network Little Budworth Country Park Shropshire Union Canal Forests	For its area, the NCA has an extensive rights of way network totalling 362 km. The most notable being the Sandstone Trail that stretches for 55 km and links the sites of the iron-age forts on the ridgetop. National Cycle Network routes 70 (the Cheshire Cycleway) and 71 cross the NCA. The former provides a circular route that extends in to the neighbouring NCA. There are also regional cycle paths, for example, Whitegate Way cycle path. Little Budworth Country Park and Delamere Forest with its large forest and visitor centre are also popular visitor destinations. The Shropshire Union Canal crosses east–west. Once an important trade route, the canal is now a recreational asset.	Regional	The NCA offers a host of recreational sites and trails that are close to large conurbations. Little Budworth Country Park and Delamere Forest provide opportunities for visitors to understand and enjoy the history, biodiversity and geology 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. Projected climate change trends suggest an increase to summer temperatures leading to an increased risk of forest and heathland fires and increased erosion to footpaths.	Encourage responsible use of the area by visitors and 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 Sustainably manage 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. Support initiatives by the Forestry Commission to increase the recreational resource at Delamere and the Mersey Forest in its aims to create more community woodlands. Increase the number of circular, well-surfaced, routes suitable for all age ranges, abilities and interests. 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. Provide imaginative interpretation of the landscape and its many features (geological, historical, species and habitats) to increase the understanding and enjoyment for all.	**Recreation** **Sense of history** **Sense of place/ inspiration** **Geodiversity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity	Woodland Meres and Mosses Hedgerows Priority habitats – lowland heathland, lowland meadow and flood plain grazing marsh Ponds Designated sites Historic parkland	A strong mosaic of broadleaved mixed woodland, including pine, particularly around the area of Delamere Forest Park. Peckforton Woods SSSI has the largest tract of sessile oak in Cheshire. Half of the ancient woodland is plantations on ancient woodland sites. Ponds are a characteristic feature of the Cheshire landscape and contain a diversity of important wetland species, including great crested newt. The meres and mosses of the north-west Midlands form 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 sites). This suite of sites support an outstanding assemblage of plants and animals, the finest have developed a mature schwingmoor comprising floating bog moss with common cotton grass and cranberry. 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. The sites also contain the drier areas which typically support heathland relics, areas of purple moor grass and open semi-natural woodland which is important for Lepidoptera. Large areas of lowland heathland survive on Bickerton Hill SSSI and at Little Budworth Common with fragmented areas of lowland meadow throughout the area, particularly along the Pettypool Brook Valley and along the line of the Shropshire Union Canal. The wetland communities along the course of Pettypool Brook Valley SSSI comprise Cheshire's most extensive and diverse valley mire system. The mature woodland with its abundant dead wood, and the extensive peatland habitats, support populations of a number of national and county rarities, making it one of Cheshire's foremost invertebrate sites.	National/ International	The NCA contains nationally and internationally important habitats. Ancient woodland and broadleaved mixed woodland requires management to maintain their structural integrity and species diversity as do hedgerows. Priority lowland heathland and lowland meadows require management to maintain their condition and require protection from further fragmentation. Internationally important wetland sites, for example, at Abbots Moss (SAC and Ramsar site), are lakes associated with schwingmoor development. Schwingmoor is an advancing floating raft of bog moss Sphagnum spp., often containing common cottongrass and the scarce narrow small-reed. These and other wetland sites, for example, Pettypool Brook Valley SSSI have specific water chemistry that requires careful management and protection from diffuse pollution and falling water levels. Warmer summers and wetter winters combined with an increase in demand for food provision in the future is likely to see greater pressure to plough out areas for arable cultivation. Climate change is also likely to result in changes in species composition with a shift from heather to grassland, and drying of peatlands and other wetlands, increasing the risk of erosion and wildfires.	Partnership working at a landscape-scale can begin to manage the threats to the diverse habitats of the NCA. Catchment Sensitive Farming options can help maintain the natural soil profile and protect the local hydrology. This can include working with landowners, water companies and agencies to reduce the abstraction of water, working with farmers to reduce sedimentation caused by surface run-off and reducing diffuse pollution caused by high nutrient levels and pesticides to benefit biodiversity and improve water quality to protect the integrity of the meres and mosses and aquifer recharge areas. Increase the surveillance of key habitats and species by monitoring the distribution and recording of species population sizes as an indicator of habitat quality and providing opportunities for volunteering and training. 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 historic parkland and ancient woodland, with veteran trees, throughout the NCA. Encourage successional planting of native mixed species to maintain the structural diversity and strengthen landscape and historic character.	**Biodiversity** **Sense of place/ inspiration** **Sense of history** **Regulating soil erosion** **Regulating water flow** **Regulating water quality** **Regulating soil quality** **Geodiversity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Geodiversity	Natural rock outcrops Road, rail and canal cuttings Traditional local stone vernacular Glacial and present-day geo-morphological processes Minerals and ores Mines and quarries Peatlands and mosses	The prominent sandstone ridge with outcrops and bluffs over 100 m high comprising Triassic sandstone and conglomerate, exemplified by Beeston Crag and Raw Head geological SSSI provides expansive views. In contrast to the surrounding plain, the ridge provides a locally rare sight of solid rock, evoking a sense of place and provides important sites for education and scientific research. The escarpment between Tower Wood and Droppingstone Well, known as Raw Head geological SSSI, is a nationally important geological site. The rivers Weaver and Gowy both illustrate fluvial activity in the form of channel migration and flood plain deposition representing present-day geo-morphological processes. Cheshire possesses mineral resources of national importance in the form of silica sand and building sand. A major extraction area is located around Delamere from the Delamere sand sheet. The peatlands and mosses have built up over many thousands of years, thus providing an invaluable record of the detail of this process that is preserved in the layers of peat and mineral sediments.	Regional	The sediments at Raw Head geological SSSI are mainly fluvial, fine-grained, red sandstones but conglomerate beds are prominent in the upper parts of the section and record the transition to a higher energy depositional environment. There are a number of Local Geological Sites in the NCA, for example, Urchin's Kitchen at Primrose Hill – a meandering dry gorge created by glacial melt water. These sites are important for the study of Triassic geology, palaeo-environments and glacial geo-morphology and require management to maintain the exposures free from scrub encroachment. Large extractive sites can result in the loss of agricultural land with the loss of historic landscapes with their ancient field patterns, traditional features such as hedgerows and ponds, and associated habitats. The restoration of mineral extraction sites can provide an opportunity for the creation of new habitats and landscapes. Small-scale extraction of stone can provide building stone for the repair of vernacular buildings and drystone walls. Preservation of areas of peat and mosses is essential to preserve the record of the palaeo-environment of the last glaciation.	In partnership with geodiversity groups and site owners, 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. Conserve and protect rock outcrops for their contribution to landscape character and educational value in studying past climate and geo-morphological processes and for their cultural and historical significance. Work in partnership to further the objectives and aspirations of the Local Geodiversity Action Plan that offer opportunities for volunteering and community engagement. Improve access and interpretation of past geo-morphic activity at Local Sites and present-day geo-morphic activity associated with rivers Gowy and Weaver. Sensitive planning and design of quarries can replicate some of the features lost in their development and reinforce the character of the surrounding landscape. Such sites may provide new opportunities for public access and enjoyment. Working with landowners, water companies and agencies to reduce the abstraction of water to prevent the deterioration of peatlands by maintaining the natural soil profile and protecting the local hydrology to benefit geodiversity and biodiversity.	**Geodiversity** **Biodiversity** **Regulating soil quality** **Recreation** **Sense of history** **Sense of place/ inspiration**

Photo credits

Cover photo: Rising up from the surrounding Shropshire, Cheshire and Staffordshire Plain NCA are a number of small sandstone ridges and scarps, the most prominent being the Cheshire Sandstone Ridge which is visually one of the most distinctive landmarks in Cheshire. The view looking north from Bickerton Hill SSSI towards Raw Head SSSI © E.Morris by kind permission of Cheshire West and Chester Council.
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