National Character Area profile:

64. Potteries and Churnet Valley

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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.

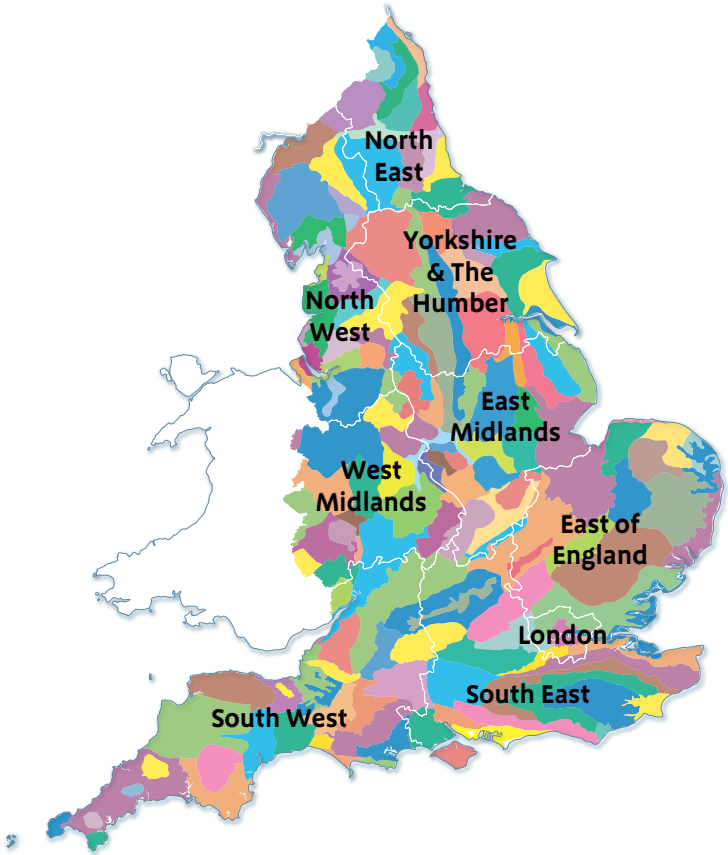
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and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

Located in North Staffordshire, the landscape of Potteries and Churnet Valley National Character Area (NCA) exhibits a strong contrast between the industrialised landscape of the Potteries and the pastoral, strongly dissected hills and small plateaux that flank the Churnet and Dove valleys. Natural resources associated with the Coal Measures enabled industrial development leading to the settlement patterns of the Potteries, which form a large conurbation. There is a rich industrial heritage associated with manufacturing, particularly of pottery and the mining of coal, clay, minerals and metal ores, which contributes strongly to the sense of place.

The north and eastern boundary of the NCA rises to meet the limestone landscape of the White Peak and South West Peak NCAs with panoramic vistas of a transitional landscape from lowland to upland.

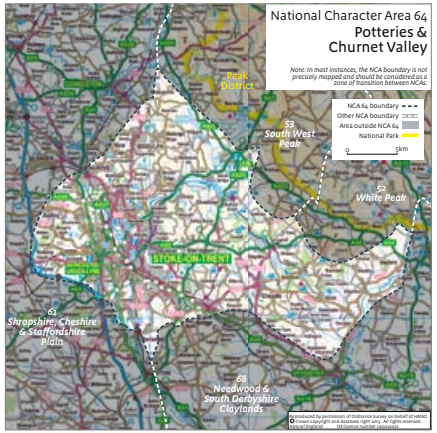
Several country parks and Registered Parks and Gardens such as Alton Towers and Trentham Gardens are popular tourist destinations and the gorge-like character around Alton earned it the local name 'little Switzerland'. In contrast, quieter recreation can be found along the canals, in the many wooded stream valleys or cloughs, and along the extensive footpath network.

The NCA has a diversity of running and still water habitats, ranging from deep, fast-flowing rivers and their tributaries, to riffles and scour ponds, subsidence pools and numerous small ponds. Rudyard Lake reservoir and Westport Lake are the largest open waterbodies. The River Trent rises within the Potteries before flowing out into the Trent Valley Washlands NCA, while the Churnet flows south-east to join the Dove which then joins the Trent to finally discharge into the Humber Estuary.

Exemplifying the wooded character of the NCA, the Churnet Valley and Coombes Valley Sites of Special Scientific Interest (SSSI) represent the largest remaining concentration of high quality semi-natural ancient woodland in Staffordshire. The woods are especially rich in invertebrate species – over 30 species of beetle – and an assemblage of priority woodland bird species, including tree pipit, redstart, wood warbler and pied flycatcher, with dippers frequently seen along the watercourses. On the steep slopes of the valleys, woodland often encloses small, ancient wood pastures, rich in flora. Hedgerow banks, sunken lanes and squatter enclosures add to the sense of enclosure, while parklands with their designed landscapes offer views across the wider area.

Visitor pressure at tourist destinations is likely to increase, exacerbating traffic congestion and increasing pollution, placing further pressure on the built and natural environments. The demand for land to accommodate development growth, mineral extraction and tourism is also likely to continue, further fragmenting habitats, but also providing opportunities for greenspace within urban areas.

There are opportunities to use the extensive network of historic transport routes for recreation and as a sustainable transport solution.



Click map to enlarge; click again to reduce.

Statements of Environmental Opportunity

- **SEO 1**: Manage, expand, link and buffer the characteristic semi-natural woodland and protect the ancient woodland, for example in the Churnet Valley, reducing habitat fragmentation to benefit landscape character, biodiversity, resource protection and regulation; and enhancing the recreational and experiential qualities of the NCA.

- **SEO 2**: Protect and manage the rivers, streams and springs to enhance the riverine character of the many valleys and cloughs to protect the quality of water from diffuse pollution to benefit biodiversity; and expand riparian habitats to mitigate flood events and to improve the experiential qualities of the NCA.

- **SEO 3**: Manage and expand areas of characteristic unimproved grassland pastures in the Churnet Valley and heathland and moorland of the Staffordshire Moorlands, reducing habitat fragmentation and restoring traditional boundary features to benefit landscape character, sense of place, biodiversity and resource protection while enhancing the recreational and experiential qualities of the NCA.

- **SEO 4**: Protect and manage historic landscape character and associated heritage assets that include the historic transport network and industrial heritage and improve the understanding of its intrinsic links with geodiversity; and find sustainable solutions to manage visitor pressure at popular attractions, for example Alton Towers and Trentham Gardens, thus supporting the tourist economy and maintaining a high level of public access to enjoy the wealth of recreational experience that the NCA offers.

Exemplifying the wooded character of the NCA, the Churnet Valley hosts part of the largest remaining concentrations of semi-natural ancient woodland in Staffordshire.

Description

Physical and functional links to other National Character Areas

In the east, the landform rises to meet the limestone uplands of the Peak District affording panoramic vistas of a transitional landscape from lowland to upland. In the north, the land rises to the Staffordshire Moorlands, with prominent ridges of Millstone Grit at Mow Cop and Congleton Edge forming a watershed between the River Trent and the River Mersey catchments. These ridges afford unrestricted views westwards across the Shropshire, Cheshire and Staffordshire Plain NCA. To the south-east, there is a less abrupt transition where the wide Dove Valley forms an approximate boundary with the Needwood and South Derbyshire Claylands NCA.

Significant rivers run through this area, with a diverse range of running and still water habitats providing ecological connectivity. The River Trent rises north of Stoke and flows south through the urban area before being joined by the River Dove and flowing on into the Trent Valley Washlands NCA, finally discharging to the North Sea via the Humber Estuary. The River Churnet flows south and east through the area before joining the River Dove, which rises within the limestone of the White Peak NCA. Rudyard Lake reservoir is the largest open water body, supplying water to the Caldon Canal and Trent and Mersey Canal. Minor sandstone aquifers occur around Leek and Alton.

A section of the M6 skirts part of the western boundary, while the A34, A50 and A52 cross the NCA providing access to popular tourist destinations, for example Alton Towers and the neighbouring Peak District. The railway links Stoke-on-Trent to London and Manchester and recreational links include the Trent and Mersey Canal and the Caldon Canal, the Sabrina Way National Bridleway, sections of the National Cycle Network and the Staffordshire Way.

An outcrop of Millstone Grit at Mow Cop affords unrestricted views westwards across the Shropshire, Cheshire and Staffordshire Plain NCA.

Key characteristics

Dissected hills and small plateaux cut by river valleys and steep ravines are a characteristic of the Churnet Valley.

- Dissected hills and small plateaux, cut by river valleys and steep ravines, contrast with the industrial and densely settled conurbation of the Potteries.
- Sandstones from the Millstone Grit Group and Coal Measures produce prominent, roughly north–south ridges. Softer mudstones with poorly drained and seasonally waterlogged soils and peaty soils form the intervening moorland plateaux, and mudstones and siltstones from the Triassic Mercia Mudstone Group underlie the generally lower-lying ground on the margins of the Needwood Basin.
- The well-wooded character throughout the Churnet Valley contrasts strongly with the urban, sparsely wooded landscapes of the Potteries. Many of the woodlands in the south consist of conifer plantations managed for commercial forestry.
- Deep, fast-flowing rivers Churnet, Trent, Dove and their tributaries drain the area. Riffles, scour ponds, subsidence pools and numerous small ponds provide ecological connectivity.
- Hedgerow banks with hedgerow oaks confine small pastures in the Churnet Valley; in the north, hedgerows are gappy and hedgerow trees are few. At higher elevations, drystone walls replace hedgerows and fields are larger and rectilinear.

Continued on next page...

Key characteristics continued...

- Agriculture is predominantly permanent pasture for grazing and stock rearing with some dairying; flatter areas are used for silage production and some arable cropping in the south, mainly cereals.
- Ancient semi-natural woodland occurs predominantly in the valleys with grasslands and grazing marsh within valley bottoms, especially the lower reaches of the Churnet and in the Dove Valley; there is heathland on higher ground and significant areas of open mosaic habitat on restored industrial land within urban areas.
- There is a rich heritage associated with iron production, coal mining, silk production and, most notably, pottery; the area is characterised by industrial and residential development in the Potteries and water-powered flint mills and foundries in the Churnet Valley, linked by historic trade routes.
- Historic heathland habitats remain with their smallholdings – rare surviving examples of rural–industrial landscapes.
- Historic parklands are characterised by woodland belts enclosing grassland with parkland trees and avenues with vistas. Some ancient wood pastures and squatter enclosures occur – once a common feature of the landscape, they provided shelter, pasture and fodder for livestock.
- Red brick manufactured from the local Etruria Marl and sandstone from the Coal Measures are predominantly used as building materials in lowland areas; Millstone Grit is used in upland areas in farmhouses and drystone walls. Plain clay and large numbers of Staffordshire blue tiles or Welsh slate are used for roofing.
- There is a contrast between the settlement pattern of valley-bottom villages with scattered farmsteads and hamlets on the valley slopes in the east and the sprawling conurbation of the Potteries in the west.
- Major transport infrastructure includes several A roads (A34, A50 and A52) and the Stoke-on-Trent to London railway. The Caldon Canal and Trent and Mersey Canal link the conurbation with the Churnet Valley.
- The Sabrina Way, a section of the National Cycle Network and the Staffordshire Way pass through the area. Alton Towers is the most popular tourist destination in the NCA, together with a number of parks and gardens and pottery visitor centres.

Potteries and Churnet Valley today

The Potteries and Churnet Valley NCA is a diverse and contrasting landscape of ridges, hills and intervening well-wooded valleys. The topography rises from approximately 100 metres to an elevation of approximately 350 metres in the north and at its eastern edge, where a well-drained limestone plateau with isolated hills meets the remote limestone landscape of the Peak District. This variation results in a transition from a lowland landscape of heathland and grassland to remote upland moorland and grasslands. In the Churnet Valley, frequent dispersed hamlets, individual cottages, farms and clusters of houses along a dense network of sunken lanes evoke an enclosed feel to the NCA that contrasts strongly with the sprawling towns of the Potteries in the west.

The relatively high plateaux and ridges of the Staffordshire Moorlands at Biddulph Moor and Mow Cop are underlain by Millstone Grit. They have given rise to a deeply dissected moorland plateau with poor soils that support permanent pasture, with few woods and gappy hedgerows that gradually give way to drystone walls. The fields are large and take on the regular rectilinear pattern of 18th- and 19th-century enclosure. On the highest ground, towards the boundary with the South West Peak NCA, acidic pasture gives way to open moorland. The Millstone Grit has been used extensively as walling material in both drystone walls and farm buildings. The major agricultural land uses are sheep and beef farming with some dairying and limited arable farming in the south, mostly of cereals.

The Churnet Valley runs through a smoothly undulating upland pasture landscape linked by short, steeply wooded stream valleys or 'cloughs'. The area has retained its wooded character and has the highest concentration of ancient semi-natural woodland in Staffordshire, occurring in both the Churnet Valley and Coombes Valley Sites of Special Scientific Interest (SSSI). Woodland types vary from alder in the valley bottoms and flushes; ash and wych elm on base-rich soils; and a mixture of sessile and pedunculate oak and silver birch

A dense network of sunken lanes evoke an enclosed feel to the Churnet Valley.

on drier soils. The woods are especially rich in invertebrate species: over 30 species of beetle, including two nationally rare species that are dependent on the continuous presence of deadwood and over-mature trees. There is an assemblage of priority woodland bird species, including tree pipit, redstart, wood warbler and pied flycatcher, with dippers frequently seen along the watercourses. Along the lower reaches of the Churnet Valley, there are several blocks of conifer plantations that are managed for commercial forestry.
The unimproved grasslands in the NCA include a number of traditional hay meadows and pastures; some support breeding curlew and snipe and some are of great botanical diversity, forming part of the mosaic of semi-natural habitats within the Churnet Valley. Small fields, ancient wood pasture and squatter enclosures, surrounded by frequent, well-formed hedges with hedgerow trees, evoke a sense of remoteness and provide areas of tranquillity. The many historic parks and gardens and remnant parkland of the NCA add to the sense of history by providing a setting for grand country houses and their designed landscapes, often with long vistas. These include Trentham Gardens in the Potteries and Alton Towers in the Churnet Valley, best known for its theme park.

Left: Woodland supports an assemblage of priority woodland bird species, including pied flycatcher. Right: Riparian woodland along the River Churnet at Froghall.

The area has a diverse range of running and still water habitats, from deep, fast-flowing rivers and their tributaries, to riffles and scour ponds, subsidence pools and numerous small ponds. The River Trent rises north of Stoke and flows through a wide, natural, flood plain until it reaches the city, where the flood plain is restricted by development and the channel is modified. The River Dove flows through a wide, lush flood plain in the south-west. In contrast, the deep, fast-flowing River Churnet flows through a steep-sided, gorge-like valley.

Riparian woodland is particularly important and is responsible for the influx of large, or coarse, woody debris into rivers and streams, providing a habitat for rare invertebrate species, for example the logjammer hoverfly, caddisfly and soldier fly. Woody debris also provides habitat conditions for salmonids, as evidenced in the Dove river catchment. Brown trout and the native white-clawed crayfish can be found in the main watercourses; the populations are monitored and are used as an indicator of water quality.

Newcastle-under-Lyme and the Potteries combine to form a large conurbation comprising an intimate mix of residential, retail and industrial developments, roads, canals and watercourses. However, a large percentage is green space, providing open mosaic habitats and public access in an otherwise urban landscape. Landscape-scale reclamation of former mines, spoil heaps, pottery tips and industrial sites has created Apedale Community Country Park, Lyme Valley Park, Central Forest Park, Westport Lake, Chatterley Whitfield Heritage Country Park and the garden festival site at Etruria, providing a sense of tranquillity at the heart of the urban area. Formal public parks, for example

Fenton and Hanley, also provide high-quality open spaces in the urban landscape. In contrast, in the rural east, there is a settlement pattern of valley-bottom villages with scattered farmsteads and hamlets on the valley slopes. Local sandstone from the Coal Measures and red brick manufactured from the local Etruria Marl are the predominant building materials in lowland areas; Millstone Grit is used in upland areas in farmhouses and drystone walls. Plain clay and large numbers of Staffordshire blue tiles or Welsh slate are used for roofing. Many old quarries provide an insight into the geology and now provide an important habitat and contribute to the green infrastructure. Current extractive sites occur along the Coal Measures, in the Millstone Grit, providing a tangible link with historic extraction.

Park Hall NNR and Country Park including Hulme Quarry SSSI.

The NCA has an extensive network of public rights of way and local trails, many a legacy of past trade and industry, for example the Trent and Mersey Canal and Caldon Canal and the many railway lines. The Stafford Greenway cycle route, Sabrina Way (part of the National Bridleroute Network) and a section of the Staffordshire Way run through the NCA. Stoke is a Cycling City that promotes and develops a cycling culture in the city and the National Cycle Network routes 5 and 55 pass through the urban area. Areas of open water, the many country parks and local nature reserves provide access to nature, recreational opportunities and benefits for health and wellbeing, as well as biodiversity and some historic interest.

The landscape through time

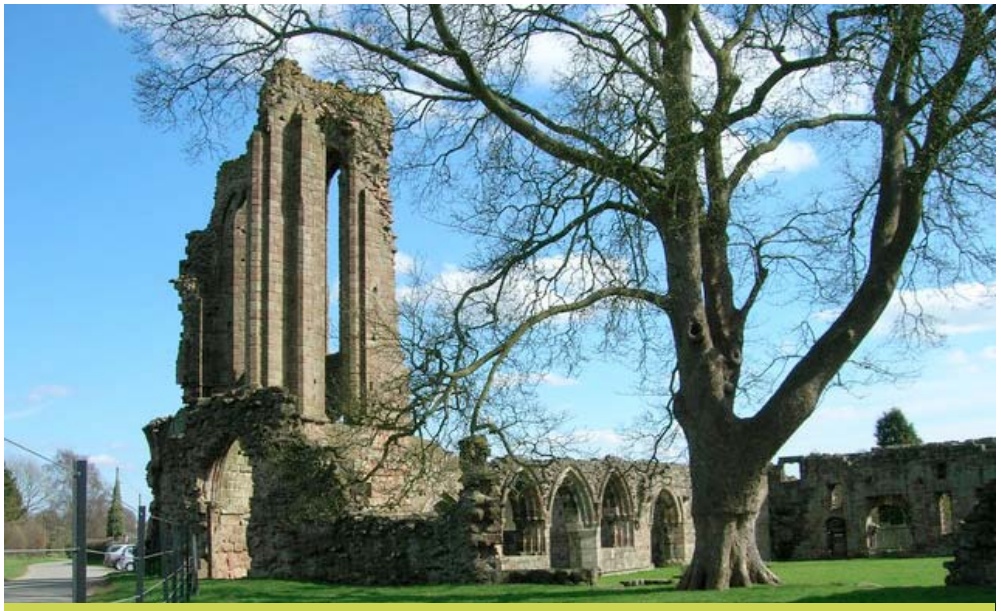
The oldest rocks in the NCA are the limestones from the Peak Limestone Group that occur marginally, in the east of the area. These were deposited during the Lower Carboniferous Period, circa 343–336 million years ago, in a warm tropical sea. The limestones form a well-drained plateau with steep-sided wooded valleys and reef knolls forming isolated hills, for example Ellis Hill. The limestones give rise to limestone streams.

During the Middle Carboniferous Period, interbedded sandstones and mudstones were deposited in a muddy delta with periodic influxes of coarser material belonging to the Millstone Grit Group, which underlies the upland moorland of the Staffordshire Moorlands. The sandstones and gritstones form prominent ridges and have been quarried for building stone, aggregates and glass manufacture. The tropical swamp delta deposits from the Upper Carboniferous Period are dominated by mudstones and coals that comprise the Potteries coalfield. Five of the six towns comprising Stoke-on-Trent and Newcastle-under-Lyme occur along the outcrop of the Upper Coal Measures, which provided the raw materials of clay and coal for the early pottery industry together with ironstones for iron and steel. Mudstones and siltstones from the Triassic Mercia Mudstone Group underlie the generally lower-lying ground on the margins of the Needwood Basin.

Triassic sandstones and conglomerate of the Sherwood Sandstone Group underlie the area around Leek and Alton in the Churnet Valley and form the minor aquifer. These conglomerates are extensively quarried.

Glacial meltwater, circa 10,000 to 13,000 years ago, was responsible for cutting the Churnet Valley. Its gorge-like character around Alton, where it is up to 80 metres deep, earned it the local name 'little Switzerland'. Deposition of sediments within the River Trent during this period provides economically important deposits of sand and gravel.

Evidence of early human activity includes artefacts and barrows from the early Bronze Age on the prominent hill-top site at Wootton Hill and a concentration of barrows around Mayfield and to the north-east of Ellastone. The remains of an Iron Age hill fort lie on Bunbury Hill within the parkland of Alton Towers, where the discovery of a stone axe hammer, in 1834 during the construction of Alton Towers, indicates occupation of the area as far back as 3,000 BC.



The impressive remains of Croxden Abbey built by the Cistercians and consecrated in the 13th century.

A Roman road, from Little Chester to Chesterton, passed through the NCA and there is evidence of a Roman settlement and fort at Rocester guarding the crossing point of the River Churnet.

After the Norman conquest, part of the area became a Royal Forest. There were a few significant settlements, such as Leek and Newcastle-under-Lyme, and the area was dominated by a sheep-based pastoral economy, with arable farming close to settlements and unenclosed common grazing on the higher and more open land to the north.

By the late 12th century, iron was already being produced in the Churnet Valley from the Froghall Ironstone, exposed by the river. The extensive woodlands that still survive today were used for charcoal production to fuel the furnaces, and river water powered the machinery of the mills.

From the 13th century, the influence of the Cistercian monasteries on the medieval landscape is likely to have been significant. The abbeys of Croxden, Hulton and Dieulacres, the latter north of Leek, had a sheep-based pastoral economy together with coppicing, probably for charcoal production for ironworking. The impressive remains of the abbey at Croxden can still be seen.

By the end of the Middle Ages, the medieval towns of Leek, Cheadle and Alton were well established along with the six towns comprising Stoke-on-Trent: Tunstall, Burslem, Hanley, Stoke, Fenton and Longton. Originally a series of small upland settlements, they relied on subsistence agriculture but in the late 16th and early 17th centuries pot-making and coal mining increased and led to the rapid expansion of urban areas. By the 18th century, famous potters, for example Wedgwood and Spode, gained an international reputation and five of the towns

gained the epithet of 'the potteries', typified by the terrace houses of the workers and bottle kilns, for example the Grade II listed kiln at Moorcroft and the distinctive pottery estates such as Etruria.

With the construction of the Caldon Canal and Trent and Mersey Canal, the Potteries expanded rapidly. Brickworks and tileries also flourished. Ironworking and coal mining expanded greatly and the land between Biddulph and Blythe became a mosaic of redbrick towns. However, they have retained their own historic centres comprising civic buildings and large Victorian churches that are still prominent features in the landscape. Many of the parks and gardens, once owned by rich industrialists, are now tourist attractions, such as those at Alton Towers and Biddulph Grange (the latter is now owned by the National Trust).

By the 19th century, the silk and textile industry in Leek and Cheadle became increasingly concentrated in factories in the towns and Alton Towers first opened as a tourist attraction. Along the River Churnet water-powered flint mills and foundries flourished, producing iron and processing copper from the copper mines in Ecton, in the neighbouring NCA. The Thomas Bolton Copperworks at Froghall is credited with producing copper wire for the first transatlantic cable and more recently the same firm provided the generator for the Olympic Games in Beijing. The brick chimney of the Froghall works is a prominent feature in the landscape.

Local evidence indicates a recent decline in the number of agricultural holdings, particularly small-scale dairying, in favour of equestrian holdings and increased use of fencing in preference to traditional boundary features. A growing number of agricultural buildings are being converted for accommodation. Persistent pressure for land for development and improvements to infrastructure, combined with a lack of positive management of semi-natural sites, is resulting in the increasing fragmentation of habitats. However, landscape-scale partnerships are starting to address these issues and several country parks and Local Wildlife Sites have been established.

There is a rising trend in the prevalence of diseases and invasive non-native species: for example diseases such as Phytophthora and invasive plants such as Japanese knotweed and Himalayan balsam in terrestrial environments, and the signal crayfish and the crayfish plague in waterbodies. However, water quality is improving but this will require continued management.

The historic centre of Leek. The town prospered in the 19th century built around the silk and textile industry.

Ecosystem services

The Potteries and Churnet Valley 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 Potteries and Churnet Valley NCA is contained in the 'Analysis' section of this document.

Provisioning services (food, fibre and water supply)

- **Food provision**: The NCA is regionally important for food provision, although the majority of the NCA has poor-quality soil. Over half the area of the NCA has an Agricultural Land Classification of Grade 4 and over one-quarter is Grade 3. This is reflected in the land use: predominantly lowland mixed livestock and dairy farming, including beef and sheep production, with limited cropping of cereals at lower elevations on the southern fringe of the NCA.

- **Timber provision**: The NCA is locally important for timber production from commercial conifer plantations, particularly in the Churnet Valley. Arisings from woodland and arboricultural management could be used for wood fuel.

- **Water availability**: The catchment supports limited abstraction for public water supply, spray irrigation and industrial purposes. The status of the Churnet and Dove rivers is 'over abstracted'[4] while the River Trent, which rises on Biddulph Moor, has 'no water available'.[5] Minor sandstone aquifers occur around Leek and Alton although abstraction licences 'will not be granted'.[6] The minor Foresbrook sandstone aquifer in Stoke is 'over abstracted'.[7]

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

- **Climate regulation**: Woodland covers seven per cent of the NCA. Significant areas include Churnet Valley and Coombes Valley nature reserve. Woodland is likely to be the most significant contributor to carbon storage and sequestration in this NCA. There is remnant heathland in the NCA, for example Cheddleton Heath. Carbon-rich peat soils occur in the uplands and moorlands in the NCA, for example Biddulph Moor and around Mow Cop.

- **Regulating soil erosion**: Over one-quarter of the NCA has a free-draining, light, sandy soil. Free-draining soils in upland areas or in areas of steeply sloping land where bare earth is exposed are most at risk from wind erosion. The more fertile soils in the valleys and cloughs are at risk from flood events. Permanent cover of vegetation stabilises exposed upland and steeply sloping areas. Wetland habitats stabilise soils in valleys and cloughs and slow the water flow.

- **Regulating water quality**: Over-abstraction from rivers is an issue. The chemical quality of the Churnet and Dove rivers is good, but the chemical quality of the River Trent is poor. Surface water safeguard zones around the area of Leek extend along the eastern Trent Valley from Stoke to Rugeley in the neighbouring NCA. The Churnet Valley lies within the Peak District Dales priority catchment for catchment sensitive farming. The ecological status of the Lyme Brook is 'bad'. River and landscape partnerships in Newcastle-under-Lyme, Stoke-on-Trent and the Churnet Valley are taking an innovative approach to sustainable landscape management to benefit water quality. In the headwaters of the NCA, the water quality of the springs and streams is particularly high and the water chemistry is influenced by limestone, making them base-rich. Limestone springs and tufa deposits can be seen at Stanton Pastures SSSI. The legacy of coal mining, particularly around Stoke-on-Trent, has led to issues with contamination of groundwater and surface water due to rising mine water.

[4] *Dove Catchment Abstraction Management Strategy*, Environment Agency (2006) [5] *Staffordshire Trent Valley Catchment Abstraction Management Strategy*, Environment Agency (July 2007)
[6] *River Basin Management Plan: Humber River Basin District*, Environment Agency [7] The Catchment Sensitive Farming Programme is a joint venture between the Environment Agency and Natural England, funded by Defra and the Rural Development Programme for England.

- **Regulating water flow**: According to the Environment Agency's flood risk map,[8] the risk of flooding in the peaks and moorlands area is low, although there are a number of locations elsewhere in the NCA where the risk is significant and moderate. These areas are along the Lyme Valley in Newcastle and at various locations in Stoke and throughout the Churnet Valley.

Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration**: There is a variable and contrasting transitional landscape from the lowlands to the moorland fringe of the Peak District in the east. Deeply incised valleys, for example the Coombes and Churnet valleys are separated by flat-topped ridges. The Churnet Valley, which is renowned for its gorge-like character around Alton where it is up to 80 metres deep, is known locally as 'little Switzerland'. There are several historic parklands that provide a setting for grand country houses and their designed landscapes create local distinctiveness, for example Alton Towers and Biddulph Grange. The NCA has inspired authors, for example George Eliot and Arnold Bennett (the latter immortalised the area of Stoke with his 'Five Towns' novels).

- **Sense of history**: Famous potters, for example Wedgwood and Spode, gained an international reputation and five of the six towns comprising Stoke gained the epithet of 'the potteries', typified by bottle kilns and the terrace houses of the workers, many of which remain. Canals, wharfages, disused railway lines and derelict land add to the sense of industrial history. By the end of the 19th century, in Leek the silk industry became increasingly concentrated in factories in the town. Along the River Churnet, water mills powered flint mills and foundries. Metal ores and minerals were historically important; at Froghall, Bolton Copperworks dominates the landscape.

- **Recreation**: Popular tourist destinations, for example Alton Towers and Trentham Gardens, make a significant contribution to the visitor economy of the region and provide employment in the service industries. This is both a benefit and a challenge. In the past, the wealth generated by industry funded the creation of a number of grand mansions set in historic parklands and gardens. Rights of way, canals, railways and trade routes were essential to traders who brought in materials and foodstuffs and exported finished goods and produce. Today, these routes provide access to the heritage features and wildlife of the NCA, providing physical and mental health-related benefits for local residents. Some, such as the Churnet Valley (heritage) Railway and the Potteries, have become visitor destinations.

[8] http://maps.environment-agency.gov.uk/wiyby/wiybyController?value=churnet+valley&lang=_e&ep=map&topic=floodmap&layerGroups=default&scale=9&textonly=off&submit.x=13&submit.y=8#x=383416&y=346670&lg=1,&scale=9

Lock 28 on the Trent and Mersey Canal. The iconic bottle kilns of the Potteries contrast with new residential development, providing a reminder of the area's long industrial heritage, local distinctiveness and evoking a sense of place.

The NCA has a number of traditional hay meadows and pastures. Some have great botanical diversity with regionally rare greater butterfly orchids.

- **Biodiversity**: Exemplifying the wooded character of the NCA, the Churnet Valley SSSI and Coombes Valley SSSI represent the highest-quality areas of the largest remaining concentration of semi-natural ancient woodland in Staffordshire. The woods are especially rich in invertebrates and breeding birds. Outcrops of sandstone, for example at Dimmings Dale, support important communities of mosses and liverworts, including the nationally scarce species of liverwort: Meylan's/Nees' pouchwort. Riparian woodland is responsible for the influx of large, or coarse, woody debris into rivers and streams, which provides a habitat for rare invertebrate species, for example the logjammer hoverfly, caddisfly and soldier fly, and also provides habitat conditions for salmonids. Brown trout and the native white-clawed crayfish can be found in the main watercourses. There is a mixture of lowland heath and upland moorland characteristics. Some heathland occurs at higher elevations while there are many fragments of heath to the north of Stoke, leading up to the more extensive areas of heathland/moorland on the Millstone Grit outcrops of Mow Cop and Biddulph Moor. There are important concentrations of unimproved grassland within river valleys that support breeding curlew and snipe, and enclosed fields on higher ground. The NCA has a number of traditional hay meadows and pastures; some are of great botanical diversity – for example, Bath Pasture SSSI and Froghall Meadow and Pastures SSSI have regionally rare, greater butterfly orchids.

- **Geodiversity**: Past and present quarrying, canal and railway cuttings provide a valuable opportunity for understanding the geological history of the area and demonstrating the link between geodiversity and the development of landscape, settlements and industry. For example, Hulme Quarry SSSI and National Nature Reserve (NNR) has excellent exposures of the Triassic river-lain red conglomerates and sandstones. The effects of glacial meltwater can be studied around Rudyard Lake and Horse Bridge and present-day geomorphic activity includes tufa deposits associated with the base-rich valley springs and landslide activity within valley sides, already over-steepened by glacial meltwater erosion, for example at Walton's Wood. In addition, the River Trent and River Churnet are both associated with ongoing fluvial activity in the form of channel migration and flood plain deposition.

Statements of Environmental Opportunity

SEO 1: Manage, expand, link and buffer the characteristic semi-natural woodland and protect the ancient woodland, for example in the Churnet Valley, reducing habitat fragmentation to benefit landscape character, biodiversity, resource protection and regulation; and enhancing the recreational and experiential qualities of the NCA.

For example, by:

- Restoring typical zones of woodland types from willow carr and wet alder woodland on valley floors, ash woodland on the richer soils, to oak/birch woodland on upper slopes, in order to reduce fragmentation of woodland habitat and strengthen the historic character of the area.
- Encouraging the maintenance of semi-natural woodland enclosing characteristic ancient woodland pasture where it does not compromise other habitats; and encouraging new planting of native woodland that will link blocks of woodland, thus reducing habitat fragmentation and reinforcing a sense of history.
- Managing existing native woodland to ensure that it is in good ecological condition with appropriate species, diverse structure and habitat features for woodland biodiversity.
- Creating new areas of native woodland, where it will not compromise other habitats, by natural regeneration or through planting, expanding and linking the existing woodland, ensuring populations of key species to optimise species composition and woodland structure.
- Increasing access to woodland as part of woodland management, thus increasing the opportunities for quiet recreation and to experience tranquillity, ensuring that this does not compromise sensitive habitats and biosecurity.
- Developing and managing transitional scrub communities between woodland and adjoining habitats to buffer and soften the transition between woodland and grassland/heathland in order to create a coherent, robust habitat network.
- Managing the removal of non-native species, for example sycamore and rhododendron, and managing native species of scrub.
- Reinstating native woodland on plantations on ancient woodland sites.
- Seeking an economic return on wood products in order to sustain the management of native woodlands by stimulating a demand for wood products and wood fuel in urban areas and encouraging the installation of wood-fuel boilers in local amenity buildings.
- Maintaining historic parklands, restoring their key historic features and providing access where appropriate
- In urban areas, planting blocks of trees and street trees to provide shade, thus mitigating the effect of the urban heat island, increasing water infiltration rates and purifying the air.
- Maintaining ancient trees, ensuring that there is no further avoidable loss through development pressure, mismanagement or poor practice.
- Supporting volunteers to assist with the surveillance of the distribution of priority habitats and the distribution and the numbers of priority species as indicators of habitat continuity and quality, and supporting community woodland management generally.

SEO 2: Protect and manage the rivers, streams and springs to enhance the riverine character of the many valleys and cloughs to protect the quality of water from diffuse pollution to benefit biodiversity; and expand riparian habitats to mitigate flood events and to improve the experiential qualities of the NCA.

Rudyard Reservoir; built as a feeder reservoir for the Caldon, Trent and Mersey canals became a local pleasure resort from 1849 and remains a popular visitor destination. The writer, Rudyard Kipling, was named after the lake.

For example, by:

- Seeking more sustainable water supply usage and encouraging water harvesting and overwintering storage of water to reduce abstraction during peak demand.
- Identifying natural areas for floodwater storage to reduce the reliance on hard engineering solutions, widening where possible and ensuring that flood plains are not inappropriately developed; reinstating flood meadows where possible throughout the riparian environs; and ensuring dual use of riparian open spaces in urban areas, for example flood-compatible playing fields and parks.
- In collaboration with the Environment Agency, investigating the possibility of using water supply reservoirs upstream of the NCA for floodwater storage; and investigating the water management requirements throughout the Dove, Churnet and Trent valleys to determine optimum depth, duration and frequency of flood events for riparian habitats.
- Encouraging the removal of weirs and culverts that constrict water flow and present a barrier to the migration of fish and invertebrates.
- In the Churnet Valley, protecting the integrity of limestone springs and tufa deposits from pollution and disturbance.
- Protecting native woodlands and wetlands along stream and river corridors by buffering to maintain the integrity of wetland habitats, planting new riparian woodland, maintaining areas of shade in the wooded cloughs and extending permanent grassland along the wider valleys, for example the Dove Valley.

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SEO 2: Protect and manage the rivers, streams and springs to enhance the riverine character of the many valleys and cloughs to protect the quality of water from diffuse pollution to benefit biodiversity; and expand riparian habitats to mitigate flood events and to improve the experiential qualities of the NCA.

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- Encouraging farmers to join the Catchment Sensitive Farming Programme, with the objective to improve water quality by reducing incidences of: foul run-off from outdoor feeding areas, silage clamps, yards and cattle tracks; stock entering streams; stock poaching stream banks; and poaching of fields by cattle movement.
- Minimising fertiliser inputs and the use of pesticides to prevent groundwater pollution in areas of freely draining soils and close to watercourses.
- Managing wet woodland to ensure a supply of large, or coarse, woody debris to rivers and streams to slow the water flow and trap sediment for the benefits to water regulation and biodiversity.
- Avoiding the uniform pollarding of willow to allow a higher percentage to become over-mature, split and collapse, in order to maintain a supply of deadwood to watercourses, and in appropriate locations allow log-jams to build naturally.
- Managing and controlling invasive non-native species, for example Himalayan balsam and Japanese knotweed in the terrestrial environment and signal crayfish in the aquatic environment.
- Supporting re-introduction projects, for example Atlantic salmon and native crayfish.
- Incorporating the principles of sustainable urban drainage systems (SUDs) in urban areas – for example, incorporating greenspace and unsealed soil into urban development for water infiltration.
- Increasing the length of open water corridors and increasing areas of connected greenspace through the urban areas by de-culverting the River Trent and streams, where appropriate reinstating flood plains and creating riparian semi-natural habitats, for example reedbeds that can slow the current and filter water.
- Creating priority habitats along sections of canals to benefit priority species – for example, floating water plantain on bodies of still water, water vole in modified canal banks, and bats in canal tunnels.
- Supporting partners to develop projects to prevent rising mine waters from entering watercourses.
- Supporting projects that identify point-source and diffuse pollution in urban areas through misconnection of domestic waste, illegal discharges from industry and diffuse run-off.
- Supporting and encouraging volunteers to assist with the surveillance of the distribution of priority habitats and the distribution and numbers of priority species as indicators of habitat continuity and quality.

SEO 3: Manage and expand areas of characteristic unimproved grassland pastures in the Churnet Valley and heathland and moorland of the Staffordshire Moorlands, reducing habitat fragmentation and restoring traditional boundary features to benefit landscape character, sense of place, biodiversity and resource protection while enhancing the recreational and experiential qualities of the NCA.

For example, by:

- Reversing the fragmentation of heathland and moorland habitats by restoring gaps in their distribution through the creation of semi-natural habitats, natural regeneration and transitional communities between habitats.
- Recognising the importance of the heathland habitats and protecting them for their historic smallholdings – rare surviving examples of rural–industrial landscapes; and halting the loss and degradation of heathland by reinstating grazing regimes with appropriate stocking levels.
- Buffering grasslands and heathlands from surrounding land uses and managing unimproved grassland for breeding waders.
- Supporting landowners and landscape partnerships to manage the number of unimproved grassland sites in order to preserve biodiversity and retain the knowledge of traditional management techniques.
- Encouraging the restoration of hedgerows in valleys and on lower-lying land with typical species, by gapping up and planting accompanying hedgerow trees, adopting appropriate cutting regimes and tagging to extend the age range and species diversity.
- Maintaining drystone walls in upland areas in preference to stock-proof fencing.
- In urban and urban fringe areas, managing existing biodiversity resources and reversing fragmentation by improving habitat connectivity through re-connecting areas of 'trapped countryside' to the rural areas.
- Encouraging equestrian landowners to lay mixed-species grassland and replace ranch-style and stock-proof fences with native species hedgerows.
- Encouraging sustainable farming practices and promoting suitable management of arable land to deliver habitats for farmland birds.

SEO 4: Protect and manage historic landscape character and associated heritage assets that include the historic transport network and industrial heritage and improve the understanding of its intrinsic links with geodiversity; and find sustainable solutions to manage visitor pressure at popular attractions, for example Alton Towers and Trentham Gardens, thus supporting the tourist economy and maintaining a high level of public access to enjoy the wealth of recreational experience that the NCA offers.

For example, by:

- Providing sustainable transport solutions for visitors, to alleviate traffic congestion in the villages of Alton, Farley and Oakamoor and the narrow lanes of the Churnet Valley, by encouraging an integrated transport network between visitor attractions, linking with public rights of way and cycle routes.
- Encouraging more people to visit the open countryside for quiet enjoyment, meeting the needs of diverse audiences and improving health and wellbeing while reducing the number of visitors to traffic-congested sites; and supporting and promoting community engagement and participation, to provide local people and visitors with the range of benefits offered by contact with the natural environment.
- Protecting and providing interpretation on sites that exemplify the influence that geodiversity and industrial heritage have had on shaping development and settlement patterns.
- Protecting and maintaining the natural geomorphological features and exposures in the river valleys and cloughs to maintain ecological status; and providing opportunities for research and education to study past environmental change and enhance recreational experience.
- Improving access to and interpretation of present-day geomorphological activity, including tufa deposits associated with the many valley springs and ongoing fluvial activity in the form of channel migration and flood plain deposition associated with the Trent, Churnet and Dove rivers.
- Ensuring that the restoration proposals for former mineral extraction sites include provision of geological exposures for research; and where appropriate improving access to cuttings, quarries and other geological features by improving footpaths and providing signage and interpretation.
- Working with the appropriate organisations to maintain the integrity of road, rail and canal cuttings, to ensure that geological exposures are not obscured by hard engineering solutions – of particular relevance in the Churnet Valley, where landslips are occurring more frequently.
- Considering small-scale extraction of stone from quarries that could provide material for repairing traditional buildings and drystone walls, thus maintaining the vernacular.
- Seeking ways to sustainably manage the demand for water and energy resources and providing recycling facilities at tourist destinations, to minimise the impact on the environment and to raise awareness.
- Where appropriate in the landscape, supporting farm diversification of short-stay and long-stay accommodation; and developing sites for camping and tourist caravans, especially along rights of way, for example the Sabrina Way Bridleway and in proximity to Alton Towers and the neighbouring Peak District National Park.
- Restoring the historic canal and rail networks as an alternative sustainable transport solution to improve tourist access and access to the rural countryside from population centres.

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SEO 4: Protect and manage historic landscape character and associated heritage assets that include the historic transport network and industrial heritage and improve the understanding of its intrinsic links with geodiversity; and find sustainable solutions to manage visitor pressure at popular attractions, for example Alton Towers and Trentham Gardens, thus supporting the tourist economy and maintaining a high level of public access to enjoy the wealth of recreational experience that the NCA offers.

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- Supporting the objectives of the Staffordshire County Council Rights of Way Improvement Plan: by creating new circular routes and easy access walks; and ensuring that paths are surfaced, maintained and signposted, while diverting public access away from eroded areas and sensitive habitats.
- Supporting the objectives of the English Heritage conservation areas that enhance the sense of history and sense of place.
- Maintaining and managing historic parklands, restoring key historic features, for example vistas, and providing access and interpretation where possible.
- Resisting the introduction of urban features into the rural/village landscape, for example unnecessary lighting and signage and the use of inappropriate building materials, to maintain the sense of history.
- In collaboration with English Heritage, considering the sensitive redevelopment of historic sites, for example the redevelopment of the Bolton Copperworks site at Froghall, to include interpretation and visitor access.
- Providing interpretation of the former mines and industrial sites that have led to the creation of the Lyme Valley Park, Central Forest Park, Westport Lake, Chatterley Whitfield Heritage Country Park and the garden festival site at Etruria, which contribute to the historical, experiential and biodiversity qualities of the NCA.

Additional opportunity

1. Identify and protect a stock of open mosaic habitats on previously developed land, to conserve these sites that often provide habitat that cannot be recreated and for the sense of history they provide.

For example, by:

- Raising awareness, through the Local Biodiversity and Geodiversity Action Plans and the planning system, of the increasing importance of post-industrial and extractive sites to our understanding of industrial heritage and to the unique habitats they provide.
- Working in partnership with the construction industry and quarry operators to develop schemes and restoration proposals for working sites that deliver a high-quality and diverse environment and, where appropriate ecological conditions and opportunities exist, provide for areas of successional colonisation by flora.
- Considering new technological solutions to interpret habitats, artefacts and historic buildings, describing the role each has had on the heritage and development of the landscape over time.
- Working in partnership with sand and gravel quarry operators to develop restoration proposals incorporating wetland habitats that could also provide floodwater storage areas.
- Working with the Local Geodiversity and Biodiversity Partnerships to designate further Local Sites to assist with the understanding of soils and geodiversity and their influence on landscape character and biodiversity, and to provide opportunities for recreation and volunteering.
- Through partnerships and friends' groups, encouraging volunteers to train in surveying techniques to monitor the quality of Local Sites and to retain the knowledge and skills required for their future management.

Supporting document 1: Key facts and data

Total area: 53,136 ha

1. Landscape and nature conservation designations

There are no National Parks or Areas of Outstanding Natural Beauty (AONB) within this NCA.

Source: Natural England (2011)

1.1 Designated nature conservation sites

The NCA includes the following statutory nature conservation designations:

Tier	Designation	Name	Area (ha)	Percentage of NCA
International	Ramsar	n/a	0	0
European	Special Protection Area (SPA)	n/a	0	0
	Special Area of Conservation (SAC)	n/a	0	0
National	National Nature Reserve (NNR)	Hulme Quarry NNR	41	<1
	Site of Special Scientific Interest (SSSI)	A total of 14 sites wholly or partly within the NCA	603	1

Source: Natural England (2011)

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

There are 224 local sites in Potteries and Churnet Valley covering 2,681 ha, which is 5 per cent of the NCA.

Source: Natural England (2011)

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

1.2 Condition of designated sites

SSSI condition category	Area (ha)	Percentage of SSSI in category condition
Unfavourable declining	1	<1
Favourable	168	28
Unfavourable no change	6	<1
Unfavourable recovering	423	71

Source: Natural England (March 2011)

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

2. Landform, geology and soils

2.1 Elevation

The lowest elevation in this NCA is 80 m and the highest point is 380 m. The mean elevation across the NCA is 178 m.

Source: Potteries and Churnet Valley Natural Area Profile, Potteries and Churnet Countryside Character Area description.

2.2 Landform and process

The landform is a transitional one, between lowland and upland areas, and is a feature highly characteristic of the Potteries and Churnet Valley NCA. To the north-west, towards Biddulph Moor and Mow Cop, outlying, relatively high gritstone outcrops have given rise to a deeply dissected moorland plateau. The high ground of Mow Cop and Congleton Edge forms a major watershed between the dynamic river systems of the River Trent and the River Mersey. The River Trent and River Churnet are both associated with ongoing fluvial activity in the form of channel migration and flood plain deposition. Human activity associated with mining has had a significant impact on local landscapes with the formation of spoil tips associated with deep mining and large voids related to the opencast mining of marl and coal.

Source: Potteries and Churnet Natural Area Profile, Potteries and Churnet Countryside Character Area description, Geological Narrative; West Midlands Geodiversity Partnership

2.3 Bedrock geology

Gritstones, sandstones and shales of the Carboniferous Coal Measures dominate the underlying geology. Carboniferous rocks, folded during a mountain-building event in the Late Palaeozoic (Variscan) form a series of southerly plunging folds in the north of the NCA. Alternating resistant sandstones and softer mudstones produce roughly north-south trending ridges and valleys. Glacial meltwater, draining from the ice sheet in the Cheshire Basin during the last ice age, incised valleys through the national drainage divide. The geology has a direct bearing on the location of settlements and industrial development, including the pottery and steel industries. The sandstones of the region have been extensively used for building stone and glass sand.

Source: Potteries and Churnet Natural Area Profile, Potteries and Churnet Countryside Character Area description, Geological Narrative; West Midlands Geodiversity Partnership.

2.4 Designated geological sites

To the south and west, the Carboniferous Coal Measures in the wide irregular valley around the headwaters of the River Trent are covered with glacial drift. Deposition of sediments within the River Trent during this period led to the development of sand and gravel deposits that provide an important aggregate resource. Triassic conglomerates and Quaternary gravels are a source of aggregates.

Source: Geological Narrative; West Midlands Geodiversity Partnership

2.5 Designated geological sites

Tier	Designation	Number
National	Geological Site of Special Scientific Interest (SSSI)	2
National	Mixed Interest SSSI	0
Local	Local Geological Sites	19

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

Within the Churnet Valley, brownearths and podzols overlie the bedrock. To the north-west, towards Biddulph Moor and Mow Cop, stagnogley and peaty soils give rise to deeply dissected moorland plateaux. To the south and west, the bedrock is overlain by glacial drift which gives rise to stagnogley soils.

Source: Natural Area Profile, Countryside Character description

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

Agricultural Land Classification	Area (ha)	Percentage of NCA
Grade 1	0	0
Grade 2	112	<1
Grade 3	13,648	26
Grade 4	27,888	53
Grade 5	817	2
Non-agricultural	380	1
Urban	10,290	19

Source: Natural England (2010)

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

3. Key waterbodies 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 Churnet	22
River Dove	13
Head of Trent	11
River Trent	4

Source: Natural England (2010)

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

The NCA has a full range of still and running water habitats, including the rivers Trent and Churnet along with their many tributary streams, Dane-in-Shaw Brook, a tributary of the River Dane, the Trent and Mersey, and Caldon Canals, and a number of still, open waters ranging from the substantial Rudyard Reservoir in the north, through smaller reservoirs and subsidence pools, to small ponds.

3.2 Water quality

The total area of Nitrate Vulnerable Zone is 53,136 ha, which is the whole of the NCA.

Source: Natural England (2010)

3.3 Water Framework Directive

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

4. Trees and woodlands

4.1 Total woodland cover

The NCA contains 5,327 ha of woodland (10 per cent of the total area), of which 1,760 ha is ancient woodland.

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

4.2 Distribution and size of woodland and trees in the landscape

Woodland is a significant feature of the Potteries and Churnet Valley NCA with the steep slopes of the valley and its tributaries such as Dimmings Dale and Combes Valley supporting the largest remaining concentration of ancient semi-natural woodland in Staffordshire. These are known locally as "cloughs". Elsewhere, woodland is less prominent, but some ancient woods do occupy flatter sites where the soils are impoverished. Important blocks of woodland occur on the boundary with Cheshire; Roe Park Woods is the most extensive area of semi-natural woodland in Cheshire. Oak woods are the dominant woodland type, with varying amounts of birch, particularly on the upper slopes. Ash is found in the lower reaches of the Churnet Valley where it forms a band of woodland over an understory of hazel coppice. In wet areas, fine examples of alder woodland can be found, of particular importance in this NCA. Some woods in the Churnet Valley have been felled and replanted with conifers. Although conifer plantations are usually regarded as being detrimental to wildlife interests, here they have had a positive influence on the local biodiversity.

Source: Potteries and Churnet Natural Area Profile, Potteries and Churnet Countryside Character Area description.

4.3 Woodland types

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

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

Woodland type	Area (ha)	Percentage of NCA
Broadleaved	4,264	8
Coniferous	722	1
Mixed	161	<1
Other	180	<1

Source: Forestry Commission (2011)

Area and proportion of ancient woodland and planted ancient woodland sites (PAWS) within the NCA.

Woodland type	Area (ha)	Percentage of NCA
Ancient semi-natural woodland	1,144	2
Planted ancient woodland sites (PAWS)	616	1

Source: Natural England (2004)

5. Boundary features and patterns

5.1 Boundary features

Within the main valley are substantial hedgerows with hedgerow trees. Above the valley, hedgerows gradually give way to drystone walls.

Source: Potteries and Churnet Valley Countryside Character Area description; Countryside Quality Counts (2003); Geological Narrative; West Midlands Geodiversity Partnership

5.2 Field patterns

As the land rises within the Churnet Valley the fields become larger and take on the regular rectilinear pattern of 18th and 19th century enclosure. In the north of this NCA hedgerow and hedgerow tree cover is variable. In the south of the NCA the fields are medium sized with well trimmed hedgerows and many large hedgerow oaks.

Source: Potteries and Churnet Valley Countryside Character Area description; Countryside Quality Counts (2003); Geological Narrative; West Midlands Geodiversity Partnership

6. Agriculture

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

6.1 Farm type

The predominant farm type is of farms primarily rearing grazing livestock, both in lowland systems and in the Less Favourable Area (LFA), together accounting for 39 per cent of farms. Dairy farms also represent a significant proportion (18 per cent) although this has declined by 27 per cent since 2009.

Source: Agricultural Census, Defra (2010)

6.2 Farm size

Eighty per cent of farms are smaller than 50 ha, covering 43 per cent of the agricultural area. These proportions have decreased since 2000 (84 per cent of farms covering 48 per cent of area). Farms larger than 50 hectares have increased comparatively, with a 7 per cent decline in the number of holdings but a 4 per cent increase in the total area in commercial agriculture.

Source: Agricultural Census, Defra (2010)

6.3 Farm ownership

2009: Total farm area = 29,233 ha; owned land = 20,346 ha
2000: Total farm area = 28,065 ha; owned land = 21,980 ha

Source: Agricultural Census, Defra (2010)

6.4 Land use

The majority (89 per cent) of agricultural land is under grass or uncropped. The most common arable crop is cereals (5 per cent). These proportions are similar to those in 2000.

Source: Agricultural Census, Defra (2010)

6.5 Livestock numbers

In 2009 there were 47,100 cattle, 38,200 sheep and 9,900 pigs farmed in this area. Cattle numbers are 13 per cent less than in 2000.

Source: Agricultural Census, Defra (2010)

6.6 Farm labour

The overall agricultural workforce is 1,644, 13 per cent less than in 2000. This comprises 78 per cent principal farmers, 9 per cent full time workers, 8 per cent part time workers, 5 per cent casual / gang workers and 1 per cent salaried managers.

Source: Agricultural Census, Defra (2010)

Please note: (i) Some of the Census data are estimated by Defra so may not present a precise assessment of agriculture within this area (ii) Data refers to commercial holdings only (iii) Data includes land outside of the NCA where it belongs to holdings whose centre point is recorded as being within the NCA.

7. Key habitats and species

7.1 Habitat distribution/coverage

Some important concentrations of unimproved grassland occur within the river valleys or enclosed fields on higher grounds. Some unimproved acidic and neutral grassland persist as isolated fragments. Good lowland grassland diversity, ranging from acidic to neutral, is found around the Churnet Valley. Wet, marshy grassland forms extensive patches in parts of the Churnet Valley where the valley floor is at its widest. Heathland occurs on the millstone grit outcrops, Mow Cop and Biddulph Moor being examples.

Source: Potteries and Churnet Valley Natural Area Profile; Geological Narrative; West Midlands Geodiversity Partnership

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)	Percentage of NCA
Broadleaved mixed & yew woodland (Broad Habitat)	2,485	5
Coastal & floodplain grazing marsh	502	1
Lowland heathland	116	<1
Lowland meadows	98	<1
Upland heathland	43	<1
Fens	43	<1
Purple moor grass and rush pasture	3	<1
Lowland dry acid grassland	35	<1
Lowland calcareous grassland	21	<1
Reedbeds	7	<1
Upland calcareous grassland	3	<1

Source: Natural England (2011)

- Maps showing locations of priority habitats are available at: http://magic.defra.gov.uk – Select 'Habitats and Species/Habitats'

7.3 Key species and assemblages of species

- Maps showing locations of some key species are available at: http://magic.defra.gov.uk – Select 'Habitats and Species/Habitats'
- Maps showing locations of S41 species are available at http://data.nbn.org.uk/

8. Settlement and development patterns

8.1 Settlement pattern

The Potteries settlement patterns were built around the pottery, coal and iron industries. The Potteries, although effectively a conurbation, still retain the identity of individual town centres, like Burslem, Hanley and Stoke-upon-Trent, while the older parts of Newcastle-under-Lyme still have a little of the character of a country town. At the edges of the towns and straggling along main roads, there are scattered settlements and a maze of narrow lanes typical of old industrial and mining areas. Leek and Cheadle, separated from the Potteries, are settlements of medieval origin which developed 18th century industries. The characteristic settlements away from the towns are the small hamlets, isolated farms or groups of red brick cottages built to serve long-forgotten industry.

Source: Potteries and Churnet Valley Countryside Character Area description; Countryside Quality Counts (2003)

8.2 Main settlements

The main settlements within the NCA are; Stoke-upon-Trent, Newcastle-under-Lyme, Biddulph, Kidsgrove, Leek, and Cheadle. The total estimated population for this NCA (derived from ONS 2001 census data) is: 443,669.

Source: Potteries and Churnet Valley Countryside Character Area description; Countryside Quality Counts (2003); Geological Narrative; West Midlands Geodiversity Partnership

8.3 Local vernacular and building materials

The older vernacular buildings are predominantly red brick, but the churches, civic buildings and larger Victorian houses were built of purple sandstone. Sandstones are also to be found in the older rural buildings in the east and west.

Source: Potteries and Churnet Valley Countryside Character Area description; Countryside Quality Counts (2003); Geological Narrative; West Midlands Geodiversity Partnership

9. Key historic sites and features

9.1 Origin of historic features

Bronze-age barrows are to be seen on prominent hilltop sites. Another principle prehistoric feature in this NCA is the iron-age hill fort within the grounds of Alton Towers. Roman influence appears to have been slight, with the permanent Angle-Saxon settlements confined to the 'tons' of the valley floors. The extensive woodlands that survive today in the Churnet Valley are the remnants of the woodland used for charcoal production used during metal production. Large works such as Copelands Spode pottery at Stoke still preserves the arrangement of buildings placed around a hollow square; a 16th and 17th century practise. Canals and turnpikes developed in the 18th century. The historic parks of Biddulph and Alton Towers were created during the wealthy period of pottery, coal and iron production.

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

9.2 Designated historic assets

This NCA contains the following numbers of designated heritage assets:

- 9 Registered Parks and Gardens covering 529 ha.
- 0 Registered Battlefields.
- 51 Scheduled Monuments.
- 1,403 Listed Buildings.

Source: Natural England (2010)

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

10. Recreation and access

10.1 Public access

- Three per cent of the NCA, 1,852 ha, is classified as being publically accessible.
- There are 975 km of public rights of way at a density of 2 km per km^2.
- There are no National Trails within the NCA.

Sources: Natural England (2010)

Landscape-scale reclamation of the former Chatterley Whitfield Colliery site contributes to green infrastructure, providing opportunities for exercise and recreation in an otherwise densely populated area.

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

Access designation	Area (ha)	Percentage of NCA
National Trust (Accessible all year)	65	<1
Common Land	160	<1
Country Parks	549	<1
CROW Access Land (Section 4 and 16)	530	<1
CROW Section 15	54	<1
Village Greens	5	<1
Doorstep Greens	3	<1
Forestry Commission Walkers Welcome Grants	78	<1
Local Nature Reserves (LNRs)	418	<1
Millennium Greens	5	0
Accessible National Nature Reserves (NNRs)	41	2
Agri-environment Scheme Access	0	0
Woods for People	919	2

Sources: Natural England (2011)

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

11. Experiential qualities

11.1 Tranquillity

Based on the CPRE map of tranquillity (2006) the lowest scores for tranquillity are around the settlements especially around Stoke-upon-Trent. The highest scores are to the east of the NCA in the Staffordshire Moorlands area.

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

Tranquillity	Score
Highest value within NCA	35
Lowest value within NCA	-103
Mean value within NCA	-19

Sources: CPRE (2006)

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

11.2 Intrusion

The 2007 Intrusion Map (CPRE) shows the extent to which rural landscapes are 'intruded on' from urban development, noise (primarily traffic noise), and other sources of visual and auditory intrusion. This shows that disturbed land is found in the west of the NCA around the Potteries conurbation and the road network in and around Stoke-upon-Trent, for example the A34, A50, and A52. The largest area of undisturbed land is in the east of the NCA, east of Cheadle and associated with the Churnet Valley.

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

Intrusion category	1960s (%)	1990s (%)	2007 (%)	Percentage change (1960s-2007)
Disturbed	45	53	54	9
Undisturbed	37	29	26	-11
Urban	17	17	20	3

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are an increase in the area of disturbed/intruded land of 9 per cent, matched by a decrease in the areas of undisturbed/un-intruded land by 11 per cent. The levels of urban land increased slightly by 3 per cent.

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

12. Data sources

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

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

Supporting document 2: Landscape change

Recent changes and trends

Trees and woodlands

- In 1999 about 6 per cent of the established eligible National Inventory of Woodland and Trees woodland stock was covered by a Woodland Grant Scheme management agreement. In 2003 the proportion was unchanged. About 48 per cent of the woodland cover is on an ancient woodland site. The proportion of these sites covered by a Woodland Grant Scheme agreement has changed since 1999 from 9 per cent to 6 per cent.

- Between 1999 and 2003, 113 ha were approved for new planting under a Woodland Grant Scheme agreement. There has therefore been limited expansion up to 2003. Local evidence suggests that overall; there is a lack of woodland management, notwithstanding the initiatives to plant new woodland in the Churnet Valley and in the Potteries.

Boundary features

- Countryside Stewardship capital agreements for linear features between 1999 and 2003 included fencing (50 km), hedge management (14 km), hedge planting and restoration (24 km) and restored boundary protection (32 km). Extent is limited and so resource probably remains at risk. The estimated boundary length for the NCA is about 3162 km. Total length of agreements between 1999 and 2003 is equivalent to about 5 per cent of this total. The resource has probably only just been maintained.

- Boundary options under Environmental Stewardship to the end of March 2011 indicate that over 23 km of hedgerows and 47 km of drystone walls are under management.

- Local evidence indicates an increasing trend in the use of stock-proof fencing and ranch-style fencing, favoured by equestrian holdings, especially in urban and urban fringe landscapes.

Agriculture

- Most extensive annual agreements in 2003 were for lowland pastures on neutral/acid soils (218 ha) and upland in-bye pasture (192 ha).

- Grassland areas have remained stable, but there has been a shift in emphasis from dairy to lowland cattle and sheep.

Settlement and development

- There is evidence of expansion of urban development between Stoke-on-Trent and Kidsgrove, along the southern fringe of Stoke, and around Biddulph. Also scattered development and redevelopment at the eastern end of the NCA. Parts of the area are subject to intense development pressures. There is also pressure from the aggregates industry for sand and gravel extraction, especially in the Potteries and coalfield.

- Evidence of development in villages that does not reflect the vernacular for example, signage and inappropriate street furniture and urban style highway improvements.

- There is an increasing trend of modern urban expansion with electricity pylons, busy roads, golf courses and sewage works.

Semi-natural habitat

- Countryside Stewardship uptake for annual area features is consistently below the national average. The most extensive annual agreements in 2003 were for lowland pastures on neutral/acid soils (218 ha) and upland in-bye pasture (192 ha).

- In 2003 Countryside Stewardship annual agreements included enhancing existing lowland heath (131 ha), and regeneration of grassland/semi-natural vegetation (41 ha).

- Local evidence suggests an increasing trend of degradation of semi-natural habitats and increasing fragmentation. In the urban areas, some areas are not managed at all but are used for recreation by local residents.

Historic features

- Approximately 79 per cent of historic farm buildings remain unconverted, but 92 per cent are intact structurally. In 1918 about 4 per cent of the NCA was historic parkland. In terms of its share of the resource the NCA was ranked 61. By 1995 it is estimated that 47 per cent of the 1918 area had been lost. About 13 per cent of the remaining parkland is covered by a Historic Parkland Grant, and 39 per cent is included in an agri-environmental scheme.

Coast and rivers

- The biological water quality in 1995 was predominantly good and it has been enhanced. The chemical water quality in 1995 was predominantly average and it has been maintained. The area ranks 32 in terms of its pond density, and there have been significant Countryside Stewardship agreements for pond creation since 1999.

- The most notable trend has been the increased demand for water compounded by periods of drought. The catchment supports limited abstraction for public water supply, for spray irrigation and industrial purposes. This is likely to lead to a further degradation in the ecological status of the rivers and their tributaries.

- In contrast, extreme and persistent weather events, have led to increased incidences of localised flooding in towns like Cheddleton in the Churnet Valley.

- There has been an increasing trend in the prevalence of invasive non-native species entering water habitats, for example the signal crayfish and the killer shrimp have had a significant impact on the native species, which are now restricted mainly to isolated waterbodies. Japanese knotweed and Himalayan balsam are examples of invasive non-native species of flora in riparian habitats.

Minerals

- There are a number of operational and non-operational extraction sites in the NCA. Located along the outcrop of the Coal Measures, there are a number of clay and shale quarries centred on Newcastle-under-Lyme and Stoke-on-Trent for brick and tile manufacture[9].

- On the Millstone Grit, around Leek and Hollington, there are a number of operational sandstone quarries producing building stone. Sand and gravel are quarried around Cheadle.

[9] Source: *Operational Mineral Sites in Staffordshire* (March 1999)

Drivers of change

Climate change

- Projected climate change trends suggest increased rainfall, periods of drought and more frequent storm events. There is strong evidence that climate change is already affecting UK biodiversity. Impacts are expected to increase as the magnitude of climate change increases.

- Climate change exacerbates the risk that many non-native species, insect pests and pathogens may establish and spread, for example, ash die-back; a disease, caused by the fungus Chalara fraxinea; red band needle blight, that affects over 60 species of pine. Phytophthora, is becoming prevalent in rhododendrons; itself an invasive species, within the Churnet Valley. Acute oak decline poses a threat to the oaks throughout the parklands and valleys. If unchecked, these and other diseases and pests, for example the oak processionary moth (have the potential to fundamentally change the landscape. In the aquatic environment, crayfish plague, a fungal disease, is a particular threat to native white-clawed crayfish in the River Churnet and its headwaters. The plague is carried by the signal crayfish; itself an invasive species.

- Increased rainfall, more intense rainfall and more storm events can all destabilise the river valleys thus increasing the risk of landslips of valley sides, already over-steepened by glacial meltwater erosion.

- The predicted alterations in rainfall pattern, and related issues of soil erosion and pollution, are likely to have an impact on the rivers Churnet, Trent and their tributaries, impacting adversely on the water level and associated ecosystems.

- Projected climate change trends suggest increased rainfall, increasing the incidences of contamination from rising mine waters particularly around Stoke-on-Trent.

- Projected climate change trends suggest an increase in summer temperatures leading to warmer water temperatures and greater incidences of algal bloom on waterbodies, for example Westport Lake and Rudyard Lake reservoir. Levels of pesticides and phosphates in the water may increase during dry periods. Wood pasture and heathland may become more vulnerable to bracken incursion and fire.

- The Environment Agency flood risk map indicates that localised flooding occurs along most of the river valleys. The frequency of these events is likely to increase and flood damage to buildings and infrastructure may increase.

- Extended periods of drought may change the suitability of current agricultural crops and/or methods of cultivation.

- The protected area network, which includes Sites of Special Scientific Interest and National Nature Reserves, will continue to have a valuable role in conservation although there will be changes in populations, communities and ecosystems at individual sites.

- Climate change can affect the timing of seasonal events and modify migration routes that can result in changes between the inter-relationships between species, for example predator–prey and beneficial host relationships.

- Air pollution[10] has impacted on the area, evidenced by the blackening of buildings and rock outcrops, acidification of soils and impoverishment of vegetation.

[10] Countryside Quality Counts survey

Other key drivers

- The need for food security will likely result in increased agricultural production, increased stocking rates, along with changing farming practices which, may adversely impact on ecological habitats, networks and species, as well as landscape character. Agri-environment scheme options provide opportunities to work with land managers, to incorporate farmland habitats; develop networks of linked habitats, reuse redundant farm buildings and enhance the rural character of the landscape.

- Local evidence indicates that economic pressure on the dairy sector is resulting in a decline in small-scale dairy units, with a shift towards larger scale units as economies of scale prevail. This has led to some fragmentation of holdings, as smaller dairy farms are broken-up and the land put to other uses, for example equestrian activities.

- Local evidence shows that along the urban fringes of the NCA, farm economics, development pressure and the demand for recreational and equestrian use are leading to a decline in urban fringe agriculture, with some holdings being abandoned. Some farms have diversified by offering on-farm sales of produce and providing short and long-stay accommodation establishments.

- Increasing numbers of visitors to open countryside and areas close to popular tourist destinations present both a benefit and a challenge. Areas are at increasing risk from erosion, for example along sections of the Caldon Canal tow path; these pressures will have to be managed sustainably.

- Local evidence shows that some villages in the Churnet Valley are losing boundary walls and front gardens to car parking, traditional boundary features are being replaced by modern materials; the absence of traditional materials for kerbs and pavements; areas of hard standing made of unattractive materials and injudicious use of conifers, hedging and fencing are becoming more prevalent in the landscape. Ensuring green infrastructure is included in local plans can alleviate some of these issues.

- In the historic parks and gardens, many of the features require traditional management techniques to maintain their integrity. Designed vistas are being compromised with specimen trees and shrubs outgrowing their sites, raising difficult conservation issues.

- In some upland/moorland areas, pasture is potentially at risk from over-stocking of livestock.

- Increased agricultural production in the south of the NCA will adversely affect the quality of the mineral soils and will need careful management, in particular, the incorporation of organic matter with cultivated soils.

- Pressures from the expansion of agriculture and housing developments, present challenges to the landscape and the semi-natural habitats within it. Recreational pressure on urban fringe semi-natural habitat is also likely to continue; presenting both a benefit and a challenge for biosecurity with erosion and increased risk of fire during dry periods.

- The increasing number of visitors to tourist destinations, for example Alton Towers, is likely to continue and affords opportunities for environmental education and understanding local heritage; this is both a challenge and an opportunity. The development of the long-distance cycle routes and circular, all-access footpaths could provide alternative visitor attractions.

- Development pressures on the urban fringe and commuter villages are likely to continue. Through the National Planning Policy Framework, opportunities exist to ensure that new developments contribute to a high quality built and natural environment, respect the local vernacular and contribute to green infrastructure.

- Large landscape partnership projects, such as exist in the Churnet Valley and Staffordshire, can effect a step change in the conservation of semi-natural habitats within the urban areas. By improving the quality, connectivity and diversity of core sites, for example SSSI, Local Sites and Local Nature Reserves, and increasing the wildlife value of gardens, local authority-owned open spaces, canals, railway and road verges and managing blocks of woodland, connectivity can be achieved, both through and between the urban and rural areas.

- Good management of existing woodland can ensure their role in sequestering and storing carbon is optimised.

- The drive towards achieving the target set for generating renewable energy, presents opportunities in the NCA to increase the production of biomass, on a scale, and in appropriate areas, that will not be detrimental to the landscape character. For example, short rotation coppice and miscanthus could be planted on woodland fringes and within the urban fringe and in association with new development. The widespread management of woodland, both in the rural and urban areas could support the wood fuel market.

- As the demand for housing and infrastructure increases, so will the demand for raw materials, resulting in a likely increase to productivity from existing extraction sites, resulting in increased lorry movements. Prolonged demand may lead to an increase in planning applications for extensions to existing quarries and the development of new or 'non-operational' quarries.

- Local Development Frameworks, area masterplans and ecosystem service assessments can identify opportunities and measures to help regenerate the area based around sustainable tourism and industry.

The brick chimney of Thomas Bolton's copper works at Froghall, provides a stark contrast in the wooded Churnet Valley.

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.

Tufa deposit from a mineral-rich spring beside the Caldon Canal at Consall.

Statement of Environmental Opportunity	Ecosystem service																		
	Food provision	Timber provision	Water availability	Genetic diversity	Biomass energy	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place/inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
SEO 1: Manage, expand, link and buffer the characteristic semi-natural woodland and protect the ancient woodland, for example in the Churnet Valley, reducing habitat fragmentation to benefit landscape character, biodiversity, resource protection and regulation; and enhancing the recreational and experiential qualities of the NCA.	↘ ***	↑ **	↗ **	↔ ***	↔ ***	↑ ***	↗ ***	↗ ***	↗ ***	↑ ***	↗ ***	↗ ***	n/a	↑ ***	↑ ***	↑ ***	↑ ***	↑ ***	↔ ***
SEO 2: Protect and manage the rivers, streams and springs to enhance the riverine character of the many valleys and cloughs to protect the quality of water from diffuse pollution to benefit biodiversity; and expand riparian habitats to mitigate flood events and to improve the experiential qualities of the NCA.	↗ *	↔ ***	↑ ***	↔ ***	↔ ***	↗ **	↑ ***	↑ ***	↗ **	↑ ***	↗ *	↗ *	n/a	↗ *	↗ **	↔ ***	↗ **	↑ ***	↔ ***

Note: Arrows shown in the table above indicate anticipated effect 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 effect is available.

Dark plum = national importance; mid plum = regional importance; light plum = local importance

Statement of Environmental Opportunity	Ecosystem service: Food provision	Timber provision	Water availability	Genetic diversity	Biomass energy	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place/inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
SEO 3: Manage and expand areas of characteristic unimproved grassland pastures in the Churnet Valley and heathland and moorland of the Staffordshire Moorlands, reducing habitat fragmentation and restoring traditional boundary features to benefit landscape character, sense of place, biodiversity and resource protection while enhancing the recreational and experiential qualities of the NCA.	↘ ***	↑ **	↗ **	↔ ***	↔ ***	↑ ***	↗ ***	↗ ***	↗ ***	↑ ***	↗ ***	↗ ***	n/a	↑ ***	↑ ***	↑ ***	↑ ***	↑ ***	↔ ***
SEO 4: Protect and manage historic landscape character and associated heritage assets that include the historic transport network and industrial heritage and improve the understanding of its intrinsic links with geodiversity; and find sustainable solutions to manage visitor pressure at popular attractions, for example Alton Towers and Trentham Gardens, thus supporting the tourist economy and maintaining a high level of public access to enjoy the wealth of recreational experience that the NCA offers.	↔ ***	↔ ***	↗ **	↔ ***	↔ ***	↔ ***	↗ *	↗ *	↔ ***	↗ **	↔ ***	↔ ***	n/a	↑ ***	↑ ***	↘ ***	↑ ***	↗ **	↑ ***

Note: Arrows shown in the table above indicate anticipated effect 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 effect is available.

Dark plum = national importance; mid plum = regional importance; light plum = local importance

Landscape attributes

Landscape attribute	Justification for selection
A complex and varied geology and topography that results in a transition from lowland to upland landscape.	■ Variations within the underlying geology and the influence of a range of past and present-day geomorphic processes have produced a diverse landscape with an elevation of 100 m in the south of the NCA, rising to 350 m in the north and east of the NCA, where it meets the margin of the Peak District. ■ Gritstones, sandstones and shales of the Carboniferous and Triassic periods dominate the underlying geology; limestone outcrops in the extreme east marks the rise to the limestone uplands of the White Peak NCA. ■ The gorge-like character around Alton, up to 80 m deep, was cut by glacial meltwater and is known locally as 'little Switzerland'. ■ Coal seams and ironstone have been worked resulting in spoil tips that are base-rich even where the soils are acid-rich. ■ In the Churnet Valley, the juxtaposition of Millstone Grit (base-poor) and limestone (base-rich) have produced varying soil types on the valley sides influencing the water chemistry of the numerous streams.
Upland moorland of the Staffordshire Moorlands with prominent ridges.	■ Prominent ridges underlain by Middle Carboniferous deposits of the Millstone Grit Group on the Staffordshire Moorlands in the north, at Mow Cop and Congleton Edge form part of the watershed between the Rivers Trent and Mersey. ■ The ridges provide unrestricted views westwards across the lowlands of the Shropshire, Cheshire and Staffordshire Plain NCA. ■ Deeply dissected moorland plateaux underlain by softer mud rocks of the Millstone Grit Group form poorly drained and seasonally waterlogged soils and peaty soils.
Well drained limestone plateau with isolated hills.	■ In the extreme east, the area is underlain by the oldest rocks of the NCA from the Lower Carboniferous Period. The topography rises to meet the limestone uplands of the neighbouring White Peak NCA in the Peak District. ■ Panoramic views down the head of the Churnet Valley from the area around Leek. ■ A well-drained limestone plateau with steep-sided wooded valleys and underlain by reef limestones. Reef knolls form isolated hills rising up from the plateau, for example Ellis Hill.

Landscape attribute	Justification for selection
Woodland and the wooded valley of the River Churnet and the numerous steep-sided wooded ravines and ancient wood pasture.	■ Extensive woodland in the valleys in the Churnet Valley and generally sparse elsewhere except for isolated blocks of woodland. ■ The Churnet Valley runs through a smoothly undulating pasture landscape linked by short, steep-sided wooded stream valleys, known as 'cloughs' and provide areas of tranquillity. ■ The Churnet Valley SSSI and Coombes Valley SSSI represent the highest-quality areas of the largest remaining concentration of semi-natural ancient woodland in Staffordshire. Oak woods are the dominant woodland type, with birch on the upper slopes. ■ Riparian woodland is important along the valleys and cloughs of the NCA as a source of coarse woody debris to watercourses that provide valuable habitat for invertebrates and aquatic species. ■ Large Forest Enterprise leaseholds and other commercial coniferous woodlands in the south, mostly comprising Corsican pine that supplies the paper and pulp industries outside the NCA. ■ Parkland landscapes create local distinctiveness with exotic species of trees that include conifers and evergreens that are particularly visually significant during the winter. ■ Blocks of woodland often surround ancient wood pastures which, as well as being historic landscapes of cultural importance, provide a habitat for specialised wildlife that depends on deadwood and over-mature trees. ■ Isolated blocks of broad-leaved semi-natural woodland, many including ancient woodland remnants occur on the western edge of the city of Stoke, contiguous with Newcastle-under-Lyme.
Hedgerows with hedgerow trees at lower elevations, giving way to dry stone walls at higher elevations.	■ Substantial hedgerow banks with frequent hedgerow oaks confine views and create a sense of enclosure in the Churnet Valley. Parkland and remnant parkland woods surround ancient lowland pastures and there are very small scale field patterns epitomised by historic squatter enclosures[11], for example at Toothill. ■ Dry stone walls at higher elevations, around Leek and bordering the Peak District. Large, rectilinear fields in the style of 18th- and 19th-century enclosures. ■ Well-trimmed hedgerows with many large hedgerow oaks surrounding medium-sized fields in the south and east. ■ Areas of 'trapped countryside' in Stoke, retaining old field patterns and hedgerows.

[11] Squatter settlements were created by newly arrived workers drawn to the area by expanding industry and mining. They were usually laid out with tacit approval of the landowner as they are likely to be gaining some financial benefit from the new industry.

Landscape attribute	Justification for selection
Large areas of permanent pasture grazed by sheep, dairy and beef cattle with coalfield farmlands close to the conurbation. Limited cropping of cereals.	■ In terms of productivity, the majority of the NCA has poor-quality soil and this is reflected in the land use, with 89 per cent of the farmed area being improved pasture for grazing and stock rearing with some dairying. ■ The flatter areas are used for more intensive silage production and some arable cropping, mainly of cereals in the south of the NCA with limited horticultural production of hardy stock. ■ Sparsely wooded landscapes with medium-sized fields on restored agricultural land surrounding former mining villages. ■ Isolated areas of 'trapped countryside' in Stoke, with some land unmanaged or in equestrian use.
Limited and fragmented areas of unimproved grassland and heathland on higher land.	■ Juxtaposition of differing communities of plants on the slopes of the Churnet Valley SSSI arising from the variation in geology, for example Carboniferous Millstone Grit (base-poor) and Carboniferous Limestone (base-rich). ■ Unimproved grassy pastures and hillsides on limestone, particularly around the Coombes and Churnet valleys support numbers of orchids, including the greater butterfly orchid, while around the fringe areas of the Weaver Hills, frog orchid can be found. ■ Parkland and remnant parkland woods often surround species-rich, ancient lowland pastures. ■ Unimproved neutral and acid grasslands are evident in the species-rich farmland of the urban area. ■ Neutral grassland in the north-west of the NCA, straddles the border with the neighbouring NCA, for example Dane-in-Shaw pasture. ■ Lowland heathland and upland moorland characteristics. Extensive areas of heathland and moorland on the Millstone Grit outcrops. Lowland heathland at Wetley Moor SSSI is a remnant of a much larger area. Fragmented heathland also occurs around the Potteries and to the south of Stoke.

Landscape attribute	Justification for selection
The rivers Trent, Dove and Churnet, numerous streams and their associated headwaters; canals, feeder reservoirs, subsidence pools and ponds.	■ The River Trent rises due north of Stoke-on-Trent at Biddulph Moor. The Trent and a number of tributaries flow through the urban catchment before its confluence with the River Tame near Alrewas in the Trent Valley Washlands NCA. ■ Poor water quality in the River Trent downstream of Stoke-on-Trent has impacted adversely on aquatic ecosystems. ■ The River Churnet rises in the neighbouring South West Peak NCA, flowing into Tittesworth reservoir, just outside the NCA, before flowing through Leek and finally south east through the Churnet Valley before its confluence with the River Dove at Rocester. ■ A short stretch of the River Dove flows parallel to the south eastern boundary of the NCA flowing through a broad flood plain with few trees. ■ Tufa springs occur in the Churnet Valley, for example at Booths Wood, and are a major contributor to species diversity providing breeding sites for many scarce invertebrates, including nationally scarce soldierflies and two species of craneflies. ■ Limestone streams, riffles and scour ponds are important habitats for fish and aquatic species. ■ Woody streams, where wood and debris fall into the watercourse host sites for the nationally scarce hoverfly, *Chalcosyrphus eunotus*. ■ Freshwater pearl mussels and metapopulations of native crayfish are among a range of species that are used as indicators of high water quality. ■ Rudyard Lake reservoir, the Caldon Canal and Trent and Mersey Canal are well used for recreation and tourism. ■ Other large open waterbodies include Westport Lake, a former subsidence pool and there are a number of ponds throughout Stoke created by mining subsidence.
Historic Parks and Gardens, country houses, remnant parkland.	■ Large number of country houses and parklands established by wealthy industrialists in 19th century. ■ The most notable parkland in the NCA is Alton Towers, known for its theme park that makes a significant contribution to the visitor economy of the region and provides employment. ■ Trentham Gardens and Biddulph Grange are also popular visitor destinations. ■ Woodland avenues and drives further strengthen the parkland structure in the landscape. The countryside directly surrounding the parklands was often managed to create designed views out across the countryside, for example at Farley Hall. ■ In the urban areas, formal parks offer quiet recreation, for example Fenton and Hanley.

Landscape attribute	Justification for selection
Six towns of the Potteries forming a major conurbation contrasting with a rural settlement pattern of scattered farmsteads and sheltered villages.	■ Sprawling industrial towns representing 19 per cent of the NCA. ■ Historic centres of the six towns – Tunstall, Burslem, Hanley, Stoke, Fenton and Longton – comprising civic buildings and large Victorian churches which are now prominent features in the landscape. ■ Extensive areas of reclaimed land between the older urban areas which are now in residential, industrial, commercial and amenity use. ■ Large housing estates with significant urbanisation to the west of Newcastle-under-Lyme. ■ A landscape rich in industrial heritage; derelict extractive and industrial sites with occasional buildings, subsidence pools, canals and disused railway lines with fragmented areas of naturally regenerated vegetation. ■ Frequent dispersed hamlets, individual cottages, farms and clusters of houses along a dense network of lanes in rural areas. In the Churnet Valley, many of these lanes are sunken, evoking an enclosed feel to the character area.
Brick and sandstone older buildings with tile and slate roofs.	■ Red brick and sandstone are the prominent building materials of the NCA, although Millstone grit is extensively used in upland areas as a material for farmhouses and drystone walls. ■ Plain clay and large numbers of Staffordshire blue tiles or Welsh slate used for roofing. Occasional occurrence of Westmorland slate or stone slates.
Extensive footpath and rights of way network linking population centres with rural areas, parks and open spaces.	■ The Caldon Canal and Trent and Mersey Canal provide good access for recreation and tourism and link the population centres of the Potteries with the rural Churnet Valley. ■ In the urban area, landscape-scale reclamation of former mines and industrial sites has led to the creation of the Lyme Valley Park, Central Forest Park, Westport Lake, Chatterley Whitfield Heritage Country Park and the garden festival site at Etruria, providing a sense of tranquillity in the heart of the urban area.

Landscape opportunities

- Protect and enhance the many Local Geological Sites in the NCA by promoting sustainable management of sites that provide opportunities for volunteering, education and community involvement.
- Identify a stock of open mosaic habitats on previously developed land, to conserve these sites that often provide habitat that cannot be recreated and for their value to the sense of history they provide.
- Manage and protect the important river valley landscapes by maintaining the mosaic of riparian pasture and woodlands.
- Enhance the interpretation of post-industrial sites and conservation areas.
- Protect watercourses to reduce incidences of diffuse pollution entering surface water and groundwater.
- Protect from further loss and degradation of heathland and moorland habitats and reduce fragmentation of semi-natural habitats.
- Create new or extend areas of semi-natural habitats to reverse fragmentation and link them together to create a coherent habitat network.
- Manage core sites, for example SSSI, NNRs, LNRs and Local Sites network, to improve their connectivity and condition.
- Maintain and restore the pattern of small pastures and hedgerows with hedgerow oaks in the area, particularly around the Churnet Valley.
- Protect and enhance the historic landscape character comprising parkland and industrial heritage in and around the urban area and throughout the Churnet Valley.
- Conserve and enhance historic assets in the wider landscape; above and below ground archaeology and historic buildings.
- Maintain and buffer the areas of semi-natural woodland by creating and managing transitional scrub communities between woodland and adjoining habitats. Manage estate mixed woodland, parklands with veteran trees, throughout the NCA. Encourage successional planting of native mixed species to maintain the structural diversity and landscape character.
- Conserve and restore drystone walls in upland areas and restore traditional hedgerows in preference to stock-proof and ranch-style fencing where equestrian land use prevails.
- Manage public access sensitively throughout the river valleys and manage adjoining land to maintain the current levels of tranquillity.
- Restore traditional buildings and historic parklands and the surrounding hamlets and preserve features of remnant parklands and squatter enclosures.

Continued on next page...

Landscape opportunities continued...

- Conserve and enhance the canal network that provides valuable wildlife and recreational corridors linking urban with rural areas.
- Conserve and enhance the heritage rail network in the Churnet Valley as a sustainable transport solution to link the valley with the urban centres.
- Ensure that the grouping and design of new developments should reflect the juxtaposition, scale and materials of traditional local buildings characteristic of the area; manage small-scale extraction of local building stone to this end.
- Create new or extend public rights of way and permissive access to improve the connectivity between population centres and rural areas and core sites, for example SSSI, NNRs, Local Nature Reserves and Local Sites.
- Create new or extend public rights of way, permissive access and circular routes and cycle routes through green spaces in urban areas to improve the connectivity between residential areas and places of work and between tourist attractions to encourage physical activity.

The folly at Mow Top is built on a prominent ridge of Millstone Grit in the Staffordshire Moorlands and the ridge forms part of the water-shed between the rivers Trent and Mersey.

Ecosystem service analysis

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

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

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Food provision	Soils Sheep and cattle rearing Dairying Cereals Water availability	The majority of the NCA has poor-quality soil in terms of productivity. More than half of the NCA has Agricultural Land Classification Grade 4 and over one-quarter is Grade 3 and this is reflected in the land use. Restored former industrial and extractive sites are generally poorly drained and support rough grazing. Predominantly lowland mixed livestock and dairy farming, including beef and sheep production ranging from small-scale to larger holdings. Small areas of cereal farming at lower elevations on the southern fringe of the NCA.	Regional	Over three-quarters of the NCA is permanent pasture. Brown earth and podzol soils dominate the central area. To the north, towards Biddulph Moor and Mow Cop, outcrops of grit stone produce free-draining mineral soils with areas of poorly drained and seasonally waterlogged soils and peat soils which support rough grazing. Mixed livestock production is the dominant agricultural system in the NCA. Over-stocking and incidences of cattle directly accessing watercourses and woodland can be an issue in some moorland areas. Farm economics and the demand for land for development, recreational and equestrian use on the urban fringe, have led to a decline in the number of dairy farms.	Safeguard food provision and promote sustainable land management techniques in moorland and arable areas that will protect the water and soil resources of the NCA. Encouraging sustainable farming practices and promoting suitable management of arable land in the south of the NCA, to deliver habitat for farmland birds.	**Food provision** **Regulating soil erosion** **Regulating soil quality** **Water availability** **Regulating water quality** **Biodiversity** **Sense of history** **Sense of place / inspiration**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Timber provision	Conifer plantations Native woodlands	Some timber production from commercial conifer plantations, particularly in the southern Churnet Valley. Native woodland is a significant feature of the NCA, representing seven per cent of the total area. Of this area, approximately 2 per cent is ancient semi-natural woodland. Significant areas of woodland include the Churnet Valley and Coombes Valley Nature Reserve.	Regional	The greatest concentration of woodland is in the Churnet Valley where there are large Forest Enterprise leaseholds and other coniferous woodlands, mostly comprising Corsican pine. The majority of commercial timber is processed outside the NCA for chip and wood pulp. Conifer plantations effectively increase fragmentation of semi-natural woodland. Many characteristic species of native woodland are unable to move through coniferous woodland, therefore the location of new conifer plantations needs to take this into account. The management of native woodland throughout the NCA is variable. However, landscape partnerships, non-government organisations and voluntary sector organisations are bringing more hectares of woodland into positive management, resulting in more timber available for forest products. The impetus towards restoring native species on plantation on ancient woodland sites (PAWS) currently populated by commercial softwood plantations will have a detrimental effect on the wood chip and pulp supply.	Opportunities to stimulate wood products and the wood fuel market in urban areas in order to sustain the management of native woodlands. Managing more woodland for timber will benefit other services. 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 quality** **Recreation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability	River Trent River Churnet River Dove Minor aquifers Rudyard Reservoir and canals Mining subsidence pools and small ponds	The catchment supports limited abstraction for public water supply, spray irrigation and industrial purposes. The status of the rivers Churnet and Dove is 'over abstracted'[12] while the River Trent which, rises on Biddulph Moor has 'no water available.'[13] Minor sandstone aquifers occur around Leek and Alton although abstraction licences 'will not be granted'.[12] The minor Foresbrook sandstone aquifer in Stoke is 'over abstracted'.[13] Rudyard Reservoir was constructed as a feeder reservoir for the Caldon Canal. The Trent and Mersey Canal also passes through the NCA. In the Churnet Valley, there are ponds associated with the many issues, field drains and ex-quarrying, as well as historic fish ponds.	Regional	During the summer months the volume of water in the River Churnet is insufficient to meet abstraction demands and the need to protect the river ecosystems and experiential qualities of the NCA. Therefore additional water is supplied from Tittesworth reservoir, located outside the NCA, to maintain flow levels in the Churnet. Limited abstraction for public water supply takes place from the minor sandstone aquifers within the NCA and Tittesworth and Blithfield reservoirs in the neighbouring NCA. Rudyard Reservoir is fed by a system of sluices and channels from the River Dane outside the NCA. Supplying canals with water and surface water transfers increases the demand for abstraction. The Caldon Canal and the River Churnet share the same channel along a section of the valley and separate with a series of weirs at Consall Forge. Mining subsidence ultimately resulted in forming what is now known as Westport Lake; the largest waterbody in the city of Stoke and a Local Nature Reserve managed by the Staffordshire Wildlife Trust.	Promote the sustainable use of water in domestic, industrial and agricultural sectors to reduce demand. Where appropriate, encourage rainwater harvesting and the construction of winter water storage reservoirs in agricultural areas. Identify and enhance areas for natural water storage, for example lowland wetlands. Slow the flow of surface water for example, by planting reedbeds, expanding flood meadows, creating ponds and scrapes. These measures have multiple benefits. Maintain and extend riparian woodland along the Churnet Valley to increase interception rates and slow the flow of surface water. More semi-natural habitats and permanent grassland along the Dove Valley will improve infiltration rates.	**Water availability** **Regulating water quality** **Biodiversity** **Sense of history** **Sense of place / inspiration** **Recreation**

[12] *Dove Catchment Abstraction Management Strategy, Environment Agency (2006)*

[13] *Staffordshire Trent Valley Catchment Abstraction Management Strategy*, Environment Agency (July 2007)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Genetic diversity	Agri-diversity -rare breeds Native species of fruit	In situ conservation of livestock in farming systems is the main conservation strategy to maintaining numbers of native and rare breeds. There are a small number of rare breed stock rearing farms in the NCA, thus maintaining populations on farms. There are many hedgerows beside footpaths, old packhorse trails, tramways, canal towpaths and plateways, and old railway lines that criss-cross the NCA.	Local	Stock rearing has a long heritage in the NCA, mainly due to permanent pasture on the poor-quality soil. Breeding of native and rare breed livestock helps conserve the native genetic diversity; breeds include, short-horn and brown Swiss cattle. Native breeds of livestock can also provide quality, local, niche, food products. Hedgerows along old trade routes often contain uncultivated and feral species of fruit – for example in the Churnet Valley, apples, pears, damsons, plums, gooseberries and blackcurrants can be found along the many paths and were once harvested. The genetic diversity that livestock, fruit and crops provide can make an important contribution to food security by retaining genes that are important for future livestock or crop breeding.	Native or rare breed livestock are can be used in a grazing regime associated with traditional land management required to conserve semi-natural habitats. Protect and manage hedgerows beside the many trails and lanes that criss-cross the NCA to ensure that these provide linear connections for biodiversity and strengthen the sense of place.	**Genetic diversity** **Biodiversity** **Sense of place / inspiration** **Sense of history** **Recreation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biomass energy	Existing woodland Energy crops Forestry by-product	Nearly 10 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; arisings from arboricultural activities associated with woodland management, for example coppicing and pollarding. There is a high potential yield for miscanthus and short-rotation-coppice (SRC) in the NCA except for the north west where potential miscanthus yield is medium and low for SRC.[14]	Local	The use of arisings from woodland and arboricultural management not suitable for timber provision could be used for biomass production. The steep-sided valleys in the upper reaches of the Churnet make it unviable for commercial biomass production however the lower reaches of the Churnet and Dove valley could support SRC and or miscanthus.	Opportunities for landscape scale collection of arisings and timber waste in hubs, for supply to residential wood fuel market 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. Opportunities to grow energy crops in the lower reaches of the Churnet and Dove valley where it is not detrimental to habitat or landscape character. Bring more woodland in to positive management to provide wood fuel.	**Biomass energy** **Biodiversity** **Climate regulation** **Sense of place / inspiration** **Sense of history**

[14] http://www.naturalengland.org.uk/ourwork/farming/funding/ecs/sitings/areas/default.aspx

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation	Woodland Heathland Other semi-natural habitats Carbon-rich peat soils Wetland habitats	Woodland is likely to be the most significant contributor to carbon storage and sequestration in this NCA. Nearly 10 per cent of the NCA is covered by woodland. Significant areas include Churnet Valley and Coombes Valley nature reserve. There is remnant Heathland in the NCA, for example Cheddleton Heath. Carbon-rich peat soils occur in the uplands and moorlands in the NCA, for example Biddulph Moor.	Local	Good management of existing woodland can ensure their role in sequestering and storing carbon is optimised. Trees planted in urban areas provide multiple benefits; shade, mitigation of the effects of the urban heat island, increased water infiltration rates and purifying the air. Heathlands are characterised by a cover of 25 per cent of ericaceous dwarf shrubs. Woody shrub species play an important role in carbon sequestration in grassland ecosystems. Peat soils are important because of their role in storing carbon and other greenhouse gases.	Maintain existing woodland and expand areas of woodland on suitable sites to increase carbon sequestration and storage. For example, encourage existing initiatives in the Churnet Valley and in the Potteries. Maintain and enhance the existing areas of heath by arresting further losses or degradation; where appropriate, create secondary heathland on post-industrial sites. On permanent pasture, encourage sustainable grazing regimes with appropriate stocking levels and adopting low input fertiliser systems. Prioritise the restoration of bare, eroded peatland habitats.	**Climate regulation** **Biodiversity** **Regulating soil erosion** **Regulating water quality** **Recreation** **Sense of place / inspiration** **Sense of history**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality	Rivers Streams and brooks Mine waters Groundwater Aquifers	Over-abstraction from rivers, modification of watercourses, point- source and diffuse pollution are issues in this NCA. The chemical quality [15] of the rivers Churnet and Dove within the NCA is good. The chemical quality of the River Trent within the NCA is poor. There are surface water safeguard zones around the area of Leek and extending along the eastern Trent valley from Stoke to Rugeley in the neighbouring NCA. The Churnet Valley lies within the Peak District Dales priority catchment for Catchment Sensitive Farming (CSF). [16] The ecological status of the Lyme Brook is 'bad'. The chemical status of the River Trent within the NCA is poor, reflecting widespread diffuse pollution in groundwater associated with the conurbation. **Continued on next page...**	Regional	Climate change may result in falling water levels which would have a detrimental effect on water quality; affecting Biological Oxygen Demand; reducing flow rate; increasing the concentration and potency of pollutants and thus placing significant stress on the ecology. Safeguard zones are a joint initiative between the Environment Agency and water companies contributing towards the objectives of the Water Framework Directive, while CSF delivers practical solutions to enable farmers and land managers to reduce diffuse water pollution. The Lyme Brook is a tributary of the River Trent and has bad water quality and little aquatic life, due mainly to its misuse as a waste disposal route by industry and through domestic plumbing misconnections. Landscape partnerships are beginning to address these issues.	Support partners and communities to identify point-source and diffuse pollution, misconnections and discharges in urban areas, particularly around the Lyme Brook. In agricultural areas, reduce foul runoff from outdoor feeding areas, silage clamps, yards and cattle tracks; prevent stock from entering streams and poaching stream banks and manage livestock to avoid poaching of fields by cattle movement. Buffering watercourses from nutrient run-off, improved soil stabilisation and protection. Ensuring that moorland habitats are well vegetated and under good environmental management to reduce areas of bare earth at risk of erosion leading to sedimentation of watercourses. Rising mine water will need careful management involving a range of measures that will require an integrated approach from partners to minimise the impact on water quality. In areas of freely draining soils, measures should be taken to minimise fertiliser inputs and the use of pesticides to prevent groundwater pollution.	**Regulating water quality** **Regulating water flow** **Regulating soil erosion** **Recreation** **Biodiversity** **Sense of place / inspiration**

[15] *River Basin Management Plan: Humber River Basin District,* Environment Agency

[16] Catchment Sensitive Farming is a joint venture between the Environment Agency and Natural England, funded by Defra and the Rural Development Programme for England.

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality cont.		**... continued from previous page** In the headwaters of the NCA, the water quality of the springs and streams is particularly high. The legacy of coal mining particularly around Stoke-on-Trent, has led to issues with contamination of ground and surface water due to rising mine water. Mine waters are usually acidic and contain metal contaminants which can have significant ecological impacts. North of Stoke, the water in a length of the Trent and Mersey canal is an ochrous colour probably due to ferric oxide from mine water.				

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow	Rivers and watercourses Bridges and weirs Semi-natural vegetation Riparian woodland Sustainable urban drainage schemes (SUDS)	The Environment Agency's flood risk map indicates the risk of flooding in the Peaks and Moorlands area is 'low' although there are a number of locations where the risk is significant and moderate. These areas are along the Lyme Valley in Newcastle and at various locations in Stoke and throughout the Churnet and Dove Valleys. Leek and Cheddleton are identified as being at significant risk of flooding.	Regional	Narrow valleys mean that settlements tend to be concentrated near rivers. Rapid run-off from the neighbouring Peak District and the Staffordshire Moorlands results in flooding in downstream towns and villages. Bridges and weirs constrict the flow and tend to make the flooding worse. Although flooding damages infrastructure, the Churnet Valley SSSI includes wetland habitats; mire, marsh and carr that benefit from flood events. Riparian woodland is important along the valleys and cloughs of the NCA by providing an effective filter and buffer, helping to trap sediment and slowing the flow of surface water. In urban areas, intense or prolonged rainfall can overwhelm drainage systems. Open areas with unsealed soil, as part of SUDS, can reduce the magnitude of flood events by allowing rainfall and run-off to infiltrate. The inclusion of greenspace in new developments can help alleviate flood risk.	Identify natural areas for floodwater storage to reduce the reliance on hard engineering solutions; widening where possible and ensuring flood plains are not inappropriately developed, reinstating flood meadows throughout the riparian environs and ensuring dual use of riparian open spaces in urban areas, for example flood-compatible playing fields and parks. Using water supply reservoirs upstream of the NCA for floodwater storage. Removing constrictions to flow, such as weirs. This will also benefit migratory fish. Increase the length of open water corridors through the urban areas by de-culverting rivers and streams and creating riparian habitat, for example reedbeds that can reduce the rate of run-off and filter water. Ensuring that new developments take into account the principles of SUDS by including green spaces and areas of land with unsealed surfaces.	**Regulating water flow** **Regulating water quality** **Regulating soil erosion** **Recreation** **Biodiversity** **Sense of place / inspiration** **Sense of history**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil quality	Soils Unimproved pastures and areas of semi-natural vegetation Sustainable management of livestock Sustainable systems of arable cultivation Former industrial and extractives sites	The majority of the NCA has poor-quality soil. According to the Agricultural Land Classification system, over half the area of the NCA is Grade 4 and over one-quarter is Grade 3 and this is reflected in the land use; over three-quarters of the area being permanent pasture for grazing and stock rearing with some dairying and a small area of arable cropping in the south of the NCA. Soils on spoil heaps and on former extractive sites are prone to compaction because of poor structure and drainage.	Local	Soils are a multi-functional resource that provides a range of ecosystem goods and services. The slowly permeable, seasonally wet acid loamy and clayey soils (covering 43 per cent of the NCA) are at risk of diffuse pollution and flooding as a result of poor water infiltration. Soils are easily damaged when wet and therefore it is important to minimise compaction and/or capping risk which will tend to exacerbate run-off problems. In contrast, the freely draining slightly acid loamy soils (17 per cent) are valuable for aquifer recharge around Leek, requiring the maintenance of good soil structure to aid water infiltration. Unimproved pastures and areas of semi-natural vegetation help to stabilise the soil and improve infiltration of rainwater. Well-managed agricultural systems can alleviate the risk of damaging soil structure and can improve soil quality. Mines and quarries disturb the natural soil profile and local hydrology. On colliery spoil, the loamy and clayey soils are prone to capping and compaction however well designed restoration schemes can avoid these conditions.	Well-managed livestock systems; appropriate stocking levels and preventing stock from entering wetland areas can alleviate the risk of poaching and compaction of the loamy and clayey soils. In arable areas, ensure that organic matter is incorporated into cultivated soils to increase soil organic matter and use minimum tillage on areas where loamy soil occurs. Improving soil structure by introducing recycled organic matter sourced from local recycling centres and installing appropriate drainage during the restoration of mineral extraction sites, can deliver benefits to ecosystem services.	**Regulating soil quality** **Regulating soil erosion** **Water availability** **Sense of place / inspiration** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion	Soils Permanent grassland Wetland vegetation Field boundary features Old spoil heaps and tips	Over one-quarter of the NCA has a free-draining light, sandy, soil. Free-draining soils in upland areas or in areas of steeply sloping land where bare earth is exposed are most at risk from wind erosion. The more fertile soils in the valleys and cloughs are at risk from flood events. Permanent cover of vegetation stabilises exposed upland and steeply sloping areas. Wetland habitats stabilise soils in valleys and cloughs and slow water flow. Hedgerows are prevalent at lower elevations, giving way to drystone walls at higher elevations and woodland encloses ancient woodland pasture in the Churnet Valley; all of which protect the soil resource from wind erosion. Soils on spoil heaps and on former extraction sites are prone to capping, compaction, and erosion from rainfall.	Local	Well-managed livestock and arable systems can prevent soil erosion. For example, appropriate stocking levels and the incorporation of organic matter in arable fields. Permanent pastures and leys predominate and measures that ensure minimal disturbance to the vegetation will reduce the risk of bare earth and thus soil erosion. In the valleys and cloughs, measures to protect the wetland vegetation should be adopted. Stabilisation of soils reduces the rate of siltation of watercourses. Hedgerows and drystone walls offer resource protection to soils and maintain historic field patterns, but also provide wildlife corridors and strengthen the landscape character. Fragments of naturally regenerated vegetation have developed around former spoil heaps, tips and industrial sites stabilising the soil and increasing infiltration rates. These areas are seed donor sites for colonising other former industrial areas.	Agri-environment schemes and Catchment Sensitive Farming schemes provide incentives to adopt sustainable farming practises that can prevent soil erosion. Where appropriate in the landscape encourage the expansion of areas of semi-natural vegetation. Protect the integrity of traditional field boundaries in preference to stock-proof fencing, to benefit resource protection, biodiversity and sense of place.	**Regulating soil erosion** **Regulation soil quality** **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	Species-rich grassland (lowland heath and meadow) Registered Parks and Gardens Formal public parks, residential gardens and allotments of the urban areas Open mosaic habitat on previously developed land Flower-rich roadside verges	The NCA contains areas of lowland heath, meadow and grassland. The NCA contains nine Registered Parks and Gardens, covering over 500 ha. In the urban areas, there are a number of public parks together with residential gardens and allotments. Open mosaic habitats within Newcastle-under-Lyme and Stoke-on-Trent conurbation provided niche habitats for a range of vegetation that is important to invertebrates. Flower-rich roadside verges also support this service and link together habitats both visually and naturally by providing wildlife corridors.	Local	Areas of lowland heath, meadow 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. An increase in the populations of pollinators may facilitate an increase in the 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. Registered Parks and Gardens often have a diverse range of flowering plants in formal gardens that provide a diverse source of nectar. Residential gardens, allotment sites and open mosaic habitat on previously developed land provide important sources of nectar in the urban areas and often have more diverse sources of nectar than agricultural monocultures.	Manage areas of heathland and increase the area and connectivity of flower-rich lowland meadow and encourage the use of nectar and forage mixes in arable systems. In urban areas, raise awareness of the benefits that open mosaic habitat, gardens and allotments can deliver. Encourage the spread of flower-rich roadside verges. Increasing the areas that support sources of nectar would also result in a significant increase in biodiversity.	**Pollination** **Biodiversity** **Sense of place / inspiration** **Sense of history** **Food provision**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pest regulation	Areas of semi-natural habitat Hedgerows Headwaters	Flower-rich meadows and unimproved pastures. The network of hedgerows at lower elevations. The native white clawed crayfish is present in the high quality waters of the springs feeding the River Churnet. There are increased incidences of crayfish plague and invasive non-native species of signal crayfish.	Local	The contribution to pest regulation services is limited. 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. The headwaters of the River Churnet are of particularly high quality and support metapopulations of native crayfish. It is important to protect the integrity of these headwaters from crayfish plague, a fungal disease, carried by the signal crayfish; itself an invasive species.	Introducing semi-natural habitats, in arable systems, in the south of the NCA, for example beetle banks, headlands and reinstatement of hedgerows. This would provide a mosaic of habitats in areas of monoculture, thus providing a more robust ecosystem. Support measures to halt the spread of the signal crayfish into the headwaters. Encourage increased surveillance and re-introduction projects.	**Pest regulation** **Biodiversity** **Food provision** **Sense of place/ inspiration**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
A sense of place/ inspiration	Varied topography with woodland, river valleys and wooded cloughs Historic buildings and parklands including Registered Parks and Gardens boundary features and squatter enclosures Industrial buildings and streamside mills Rudyard Reservoir Historic transport routes Heritage-rich industrial townscapes	Contrasting sense of place is evoked by the pastoral, strongly dissected hills, cloughs and small plateaux which flank the Churnet valley and the heritage-rich, urban and industrialised landscape of the Potteries. The grandeur of the scenery overlooking the Churnet Valley has inspired historians and authors to write about the landscape. The lush, rural landscape of the lower reaches of the Churnet Valley inspired the author George Eliot to christen the area 'Loamshire' in her novel *Adam Bede*. In contrast, the author Arnold Bennett immortalised the area of Stoke with his 'Five Towns' novels by describing the heavily industrialised towns. Burslem is 'Bursley' in the novels and many of the buildings mentioned are still standing. The historic centres of the towns of Cheadle and Leek have been heavily influenced by the textile trade. **Continued on next page...**	National	Historic parklands provide the settings for grand mansions, for example Biddulph Grange and Alton Towers, that evoke a strong sense of place, with the village of Alton having a distinct Italian style. Often, the surrounding countryside was managed to provide vistas; a characteristic of the Churnet Valley. In the Churnet Valley, hedgerows with hedgerow trees and hedgerow banks aside sunken lanes evoke a sense of enclosure, epitomised by small-scale squatter enclosures. The Potteries are characterised by the bottle kilns that were once widespread, for example the Grade II listed bottle kiln at Moorcroft. Canals, wharfages, disused railway lines and derelict land add to the sense of industry that once prevailed. Along the River Churnet, water mills once powered flint mills for the pottery industry. Metal ores and minerals were processed at Froghall. The brick chimney of Bolton Copperworks still dominates the landscape.	Protect the historic parklands and country mansions and maintain the designed vistas associated with these estates. Support the objectives of Conservation Areas. Encourage collaboration between landscape partnerships and English Heritage. Restore hedgerows with typical species, by gapping up and planting their accompanying hedgerow trees; adopting appropriate cutting regimes and tagging to extend the age range and species diversity. Maintain drystone walls in upland areas in preference to using stock-proof fencing thus optimising their value to resource protection and sense of place and history. Protect and manage the squatter enclosures, a distinctive indicator of historic land use that are directly associated with industrial expansion of the towns. Protect and manage the historic buildings of the historic centres, seek alternative sustainable recreational uses for derelict sites.	**Sense of place / inspiration** **Sense of history** **Recreation** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
A sense of place/ inspiration cont.		**... continued from previous page** Historic parklands including Registered Parks and Gardens provide a setting for grand country houses and their designed landscapes with vistas create local distinctiveness, for example Farley Hall, Alton Towers and Biddulph Grange. Rudyard Reservoir; a feeder reservoir for the local Caldon Canal and Trent and Mersey Canal became a popular local pleasure resort from 1849 onwards. The writer Rudyard Kipling was named after the lake.		The reservoir is still a popular tourist destination and continues to inspire artists and photographers with its Victorian properties, many with boathouses onto the reservoir. A legacy of industrialisation is the network of transport routes that cross the NCA. A legacy of early industrialisation in the Churnet Valley survives as earthworks and buried archaeology that needs protection and management.	Protect buried archaeological assets from disturbance.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history	Industrial heritage Historic buildings and parklands including Registered Parks and Gardens Churches, industrial buildings and streamside mills Historic transport routes Boundary features and squatter enclosures Pre-industrial landscapes Historic heathland habitats with their smallholdings	Industry has had a significant impact on the landscape, providing a rich sense of history. During the 18th century, famous potters, for example Wedgwood and Spode, gained international reputation and the towns of Stoke gained the epithet of 'the potteries' typified by bottle kilns and terrace houses of the workers. Some of the potteries remain. Canals, wharfs, disused railway lines and derelict land add to the sense of history of the industry that once prevailed. By the end of the 19th century in Leek, the silk industry became increasingly concentrated in factories in the town. Along the River Churnet, water mills powered flint mills and foundries. Metal ores and minerals were historically important; at Froghall, Bolton Copperworks dominates the landscape. The most prominent feature is the brick chimney which can be viewed from the surrounding landscape. **Continued on next page...**	National	The relatively recent expansion of the six towns – Tunstall, Burslem, Hanley, Stoke, Fenton, and Longton – has obscured the evidence that they were once a series of upland settlements, however, they have retained their own historic centres comprising civic buildings and large Victorian churches which are now prominent features in the landscape and are an important component of the historic character of area. Landed-wealth and industry-generated wealth led to the development of a number of country mansions set in their landscaped parks and gardens, the most notable being Alton Towers. This and other parks and gardens have now become popular tourist destinations, close to population centres and provide recreation as well as employment. The NCA has a long association with agriculture as evidenced by small areas of ridge and furrow in the south of the NCA.	Protect and manage the heritage assets of the NCA so that the legacy remains legible in the landscape. Maintain the historic buildings and infrastructure of past industry, trade and semi-natural woodland, once managed for charcoal. Support the objectives of conservation areas in the built environment and measures to protect areas of ridge and furrow and buried artefacts in the agricultural environment. Protect heathland habitats with their smallholdings; rare surviving examples of rural–industrial landscapes. Investigate sustainable transport solutions to alleviate traffic congestion in the villages of Alton and Farley and in the narrow lanes of the NCA. Create new cycle routes and footpaths utilising disused railway lines and trails. In collaboration with English Heritage, consider the sensitive redevelopment of derelict historic buildings with interpretation and visitor access.	**Sense of history** **Sense of place / inspiration** **Recreation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history cont.		**... continued from previous page** Pre-industrial assets still legible in the landscape include areas of remnant ridge and furrow and burial mounds from prehistoric occupation. Historic heathland habitats with their smallholdings are rare surviving examples of rural–industrial landscapes.		The influence of the Cistercian monasteries on the medieval landscape is likely to have been significant with a sheep-based economy and later charcoal and iron; squatter enclosures, granted to settlers during the industrial expansion and the abundance of holly in some woods, retained for its value as fodder for cattle. All of which contribute to the sense of history. Historic assets such as remnant ridge and furrow, and burial mounds need protection from modern land uses.	Encourage collaboration between landscape partnerships and English Heritage to reinstate traditional land management of parklands and estate grounds with appropriate visitor access and interpretation.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Tranquillity	River valleys woodland and cloughs Parklands and gardens and country parks Rudyard Reservoir Biddulph and Wetley moors Interlocking network of green spaces in the Potteries including public parks and open spaces	Referring to the CPRE intrusion map, 2007, tranquillity has declined since the 1960s. Undisturbed areas have decreased by 11 per cent reflecting the urban expansion of Stoke-on-Trent and Newcastle-under-Lyme and the increasing amount of traffic. Tranquillity can be found in the river valleys of the Dove and wooded areas of the Churnet Valley and the many cloughs, which provide an intimate, enclosed sense of tranquillity. Open moorlands also evoke a sense of tranquillity and solitude. Parklands and gardens and local nature reserves offer opportunities for quiet reflection, for example Trentham Gardens, Biddulph Grange and Hem Heath Wood Local Nature Reserve. Rudyard Reservoir also offers opportunities for quiet reflection. In contrast to the densely populated areas of the Potteries, there exists a network of green spaces, developed on former industrial and extractive sites that evoke a sense of tranquillity in the heart of the urban area.	Local	Managed woodland should include plans to improve access to tranquil locations while ensuring it does not compromise sensitive habitats and species. Much of the eastern NCA remains relatively free from urban development and in the Churnet Valley, historic parklands and their settings offer views out across a largely unspoiled landscape. In the urban area, landscape-scale reclamation of former mines and industrial sites has led to the creation of the Lyme Valley Park, Apedale Country Park, Central Forest Park, Westport Lake, Chatterley Whitfield Heritage Country Park and the garden festival site at Etruria, providing a sense of tranquillity in the heart of the urban area. Public parks, for example Fenton and Hanley, also provide high-quality open spaces in otherwise densely populated areas.	Encourage the provision of improved access to woodland as part of woodland management to increase opportunities to experience tranquillity. Maintain historic parklands, the landscape and villages that surround them. Resist the introduction of urban features in to the rural/ village landscape, for example unnecessary lighting and signage. Encourage the connectivity of greenspace in urban areas and improve access. Support initiatives that raise the quality of urban green spaces and public parks, for example the Green Flag Award. Support objectives of conservation areas, for example Rudyard Reservoir and Trent and Mersey.	**Tranquillity** **Sense of place / inspiration** **Sense of history** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation	Alton Towers leisure resort Historic Parks and Gardens and Country Parks Network of public rights of way and local trails including canals Churnet Valley heritage railway Open heathlands of the Staffordshire Moorlands	The Alton Towers resort attracts approximately 2.5 million visitors per year. During peak times, access can exceed 20,000 visitors per day, placing pressure on infrastructure and the environment. There are a number of Historic Parks and Gardens, for example Trentham Gardens and Biddulph Grange. Park Hall NNR and Apedale Country Park are all located close to population centres providing recreational facilities. An extensive network of public rights of way and local trails, many a legacy of past trade and industry. The Greenway Cycleway, Sabrina Way; a National Bridle route and a section of the Staffordshire Way run through the NCA linking the many country parks and nature reserves. Stoke is one of 12 Cycling Cities promoting and developing a cycling culture in the city. National Cycle Network routes 5 and 55 pass through the urban area. The Churnet Valley Railway offers a round trip through the Staffordshire Moorlands.	National	Tourist destinations, for example Alton Towers and Trentham Gardens, make a significant contribution to the visitor economy of the region and provide employment in the service industries. This is both a benefit and a challenge. The impact of visitors to Alton Towers is heavy traffic flow through the centres of Alton and Farley villages which, is both hazardous and disruptive for the local residents and boundary walls. Traffic impacting on buildings and boundary walls is a serious problem and both pollution and vibration are damaging. Pollution blackens buildings, rock-outcrops, and acidifies soil. The Caldon Canal and the Trent and Mersey Canal were built for the transport of goods and materials. Today, they are used by pleasure craft and the towpaths are heavily used for recreation. Some stretches of the Caldon Canal are suffering from erosion. Rights of way, canals and railway lines were essential to traders who brought in materials and foodstuffs and exported finished goods and produce. Today these routes provide recreational access to open spaces, country parks and Local Nature Reserves; the heritage features and wildlife of the NCA, providing physical and mental health related benefits for local residents. **Continued on next page...**	Support appropriate measures to improve the principal access routes to Alton Towers. Investigate sustainable transport solutions to alleviate traffic congestion in the villages of Alton and Farley and in the narrow lanes of the NCA. Encouraging the development of an integrated transport network between visitor attractions that links with public rights of way and cycle routes. Opportunities exist for farm diversification; short stay and long stay accommodation; sites for camping and tourist caravans, especially along rights of way, for example the Sabrina Way Bridleway and proximal to the Peak National Park. Encouraging more people to visit the open countryside for quiet enjoyment to meet the needs of diverse audiences, improve health and well being while reducing the number of visitors to traffic-congested sites.	**Recreation** **Sense of history** **Sense of place / inspiration**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation cont.				**... continued from previous page** The Churnet Valley (heritage) Railway has aspirations to re-open lines and extend the network into Stoke and Leek, connecting the Staffordshire Moorlands with the main line at Stoke. The proposed route will pass through Alton Towers theme park. The proposal also includes options to carry passengers as well as freight. The proposed extension to the Churnet Valley Railway line could offer a sustainable solution to traffic congestion in the villages and narrow lanes of the Churnet Valley and reduce lorry movements associated with Cauldon Quarry and cement works, in the neighbouring NCA.	Support and promote community engagement and participation, to provide local people and visitors with the range of benefits offered by contact with the natural environment. Manage sustainably, the demand for water and energy resources and providing recycling facilities at tourist destinations, to minimise the impact on the environment and to raise awareness. Encourage the use of Public Rights of Way and The Staffordshire Way, through improved access, circular walks, and appropriate signage and interpretation. Support the objectives of the Staffordshire County Council Rights of Way Improvement Plan. Consider new technological solutions to interpret habitats, artefacts and historic buildings, describing the role each have had in the heritage and development of the landscape over time. Restored canals and disused railway lines can offer sustainable transport solutions; offer recreational opportunities; increase access to the industrial heritage of the NCA; inspire volunteer activities; public art and sculpture; education trails and skills development events.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity	SSSI Ancient semi-natural broadleaf woodland Running and still water habitats including riparian habitat Grassland, heathland and lowland meadows Urban habitats including open mosaic habitat on previously developed land, Country Parks, Local Nature Reserves and Local Sites	Twelve SSSI designated for biodiversity within the NCA. Over 3,700 ha, representing 7 per cent of the NCA, host priority woodland, of which, 3 per cent is ancient woodland. The Trent, Churnet and Dove rivers and their many headwater streams. Some of the streams of the NCA rise or flow on limestone producing base-rich water, which partially affect the species composition, for example Hudford Brook. The presence of both lowland heath (116 ha) and upland heath (43 ha) reflects the transition from lowland to upland vegetation. The largest remnant of lowland heathland and wet heath with mire occurs at Wetley Moor SSSI, to the east of Stoke. Grasslands comprise; lowland dry acid grassland; lowland calcareous grassland. Purple moor grass is also evident and a small component of upland calcareous grassland. **Continued on next page...**	National	Churnet Valley SSSI and Coombes Valley SSSI are especially rich in invertebrate species; over 30 species of beetle including two nationally rare species which are dependent on the continuous presence of deadwood and over-mature trees. An assemblage of priority woodland bird species, including, tree pipit, redstart, wood warbler and pied flycatcher, with dippers frequently seen along the watercourses. Stream sections also support communities of mosses and liverworts including the nationally scarce species of liverwort Meylan's/ Nees' pouchwort. Riparian woodland slows flow rates and provides a source of large, woody debris that provides habitat for the rare logjammer hoverfly, caddis and soldier flies. Woody debris also provides habitat for salmonids. Brown trout and the native white-clawed crayfish can all be found in the main watercourses. There is a transition from lowland to upland moorland characteristics. Some heathland occurs at higher elevations above the Churnet Valley; there are fragments of heath to the north of Stoke and extensive areas of heathland/moorland on the millstone grit outcrops of Mow Cop and Biddulph Moor. Important concentrations of unimproved grassland and enclosed fields on higher ground including traditional hay meadows; some support breeding curlew and snipe and some are of great botanical diversity, where regionally rare greater butterfly orchids are present, for example Bath Pasture SSSI and Froghall Meadow and Pastures SSSI.	Seek opportunities to improve the quality, connectivity and diversity of core sites, for example SSSI, Local Sites and Local Nature Reserves and increasing the wildlife value of buildings, gardens, local authority-owned open spaces, canals, railway lines, road verges and managing blocks of woodland. Encourage connectivity of biodiversity both through and between the urban and rural areas. Reverse habitat fragmentation by expanding areas of heathland and restoring typical zones of woodland. Buffer core sites by developing transitional scrub communities between woodland and adjoining habitats.	**Biodiversity** **Sense of place / inspiration** **Sense of history** **Regulating soil erosion** **Regulating water flow** **Regulating water quality** **Regulating soil quality**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity cont.		**... continued from previous page** Landscape-scale reclamation of former mines, spoil heaps, pottery tips and industrial sites has created Apedale Community Country Park, Lyme Valley Park, Central Forest Park, Westport Lake, Chatterley Whitfield Heritage Country Park and the garden festival site at Etruria, providing a sense of tranquillity at the heart of the urban area.		In the Potteries, areas of 'trapped countryside' and open mosaic habitat on previously developed land provide 'stepping stones' of habitat through the conurbation and together with country parks, Local Nature Reserves and Local Wildlife Sites, provide physical and mental health related benefits for local residents.	Manage riparian woodland ensuring a supply of deadwood and over-mature trees. Manage wood pasture and parklands in keeping with their design and reinstate native woodland on PAWS. Halt the loss and degradation of heathland by appropriate management and sustainable stocking levels. Reinstating grazing regimes on traditional hay meadows and protecting and managing unimproved grassland for breeding waders. Encourage equestrian landowners to lay mixed species grassland and plant native species hedgerows. Increase the surveillance of key habitats and species by surveying to monitor the distribution and population sizes of species as an indicator of habitat quality and providing opportunities for volunteering and training. Protecting the historic heathland habitats for their biodiversity and contribution to sense of history through smallholdings.	

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 Glacial and present-day geomorphological processes Local stone used as a building material Minerals and ores Mines and quarries Designated sites	The NCA is rich in minerals and geodiversity assets. Natural outcrops occur at Mow Cop, Congleton Edge, Cloud Side, and Wetley Rocks. Man-made cuttings provide important cross-sections through strata, for example Caldon Canal and the many railway cuttings. Past geomorphological processes cut the Churnet Valley and present day processes occur in the valley streams and dynamic river systems. Sandstone from the Millstone Grit Group has been used widely in the NCA as a walling material in both farm buildings and drystone walls. There are a number of operational and non-operational extraction sites in the NCA.	Regional	Past and present quarrying, canal and railway cuttings provide a valuable opportunity for understanding the geological history of the area and demonstrating the link between geodiversity and the development of landscape, settlements and industry. For example, Hulme Quarry SSSI and NNR provides excellent exposures of the Triassic river-lain red conglomerates and sandstones. Glacial meltwater caused the 'derangement' of the pre-existing drainage systems, for example three-way valley intersections around Rudyard Lake and Horse Bridge. Present-day geomorphic activity includes tufa deposits of the valley springs and landslide activity within valley sides, for example at Walton's Wood. The rivers Trent and Churnet both illustrate fluvial activity in the form of channel migration and flood plain deposition. There are a number of clay and shale quarries centred on Newcastle-under-Lyme and Stoke-on-Trent for brick and tile manufacture. **Continued on next page...**	Raise the profile of geodiversity, through increased education and interpretation to show how geology influences settlement patterns, human activity and innovation, from source rock to product and relate this to the landscape. Work with highway and local authorities to maintain the integrity of road cuttings while not obscuring geological exposures with hard engineering solutions. Improve access to and interpretation of present-day geomorphic activity associated with the rivers Trent, Churnet and Dove. Appropriate, small-scale extraction from quarries could provide building stone to repair historic buildings, thus maintaining the vernacular. Work in partnership to further the objectives and aspirations of the Local Geodiversity Action Plan and to develop restorative management of Local Geological Sites offering opportunities for volunteering and learning.	**Geodiversity** **Sense of history** **Sense of place / inspiration** **Biodiversity** **Recreation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Geodiversity cont.				**... continued from previous page** On the Millstone Grit, around Leek and Hollington, there are a number of operational sandstone quarries producing building stone.	Negotiate long-term conservation of exposures with mineral companies and site owners at key geological sites. Restoration of sand and gravel pits for biodiversity, also providing access and interpretation where possible.	

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