National Character Area profile:

56. Lancashire Coal Measures

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Introduction

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

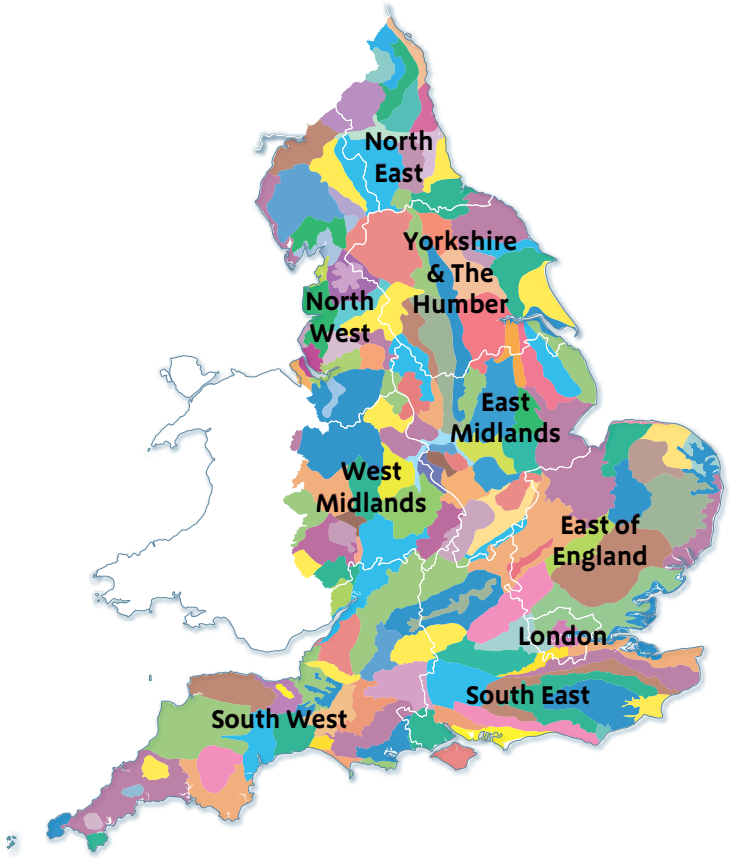
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and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

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

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

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

National Character Areas map



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

[2] Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services, Defra (2011; URL: www.defra.gov.uk/publications/files/pb13583-biodiversity-strategy-2020-111111.pdf)

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

Summary

The Lancashire Coal Measures National Character Area (NCA) surrounds the towns of St Helens and Wigan, and extends from the Mersey Valley NCA in the south to the Lancashire and Amounderness Plain NCA in the north-west. Rocks from the Carboniferous Coal Measures underlie most of the area, giving rise to a varied topography of gentle hills and valleys, with patchy layers of glacial deposits.

This fragmented landscape rises to 179 m at the summit of Billinge Hill on the western boundary, and then falls abruptly to the Lancashire and Amounderness Plain and Merseyside Conurbation to the west, and the Mersey Valley to the south. Views of the foothills of the southern Pennines can be seen to the east.

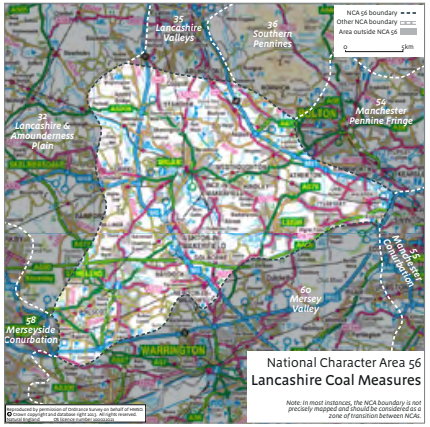
The area is dominated by its industrial heritage, long associated with mining activity. The resulting landscape is a complex mosaic of farmland, scattered urban centres, industry, active mineral sites and derelict or reclaimed workings, giving this area a strong and distinctive identity.

Within the urban fabric there are some large tracts of agricultural land and isolated pockets of former farmland. Agricultural land use is predominantly split between arable farming and permanent grassland for livestock.

Across most of the area woodland cover is very limited, although in recent years significant areas of community woodland have been created. Some small, isolated pockets of semi-natural habitat remain within this NCA, such as relict ancient woodlands and small areas of lowland raised bog. There are several country parks and Local Nature Reserves, giving opportunities for people to enjoy the natural environment. Subsidence flashes resulting from past mining activity have developed as valuable wildlife habitats. The flashes, waterbodies and significant areas of reclaimed mineral workings all contribute to the open countryside.

This is an area of urban and industrial development. The settlement pattern is based around the historical development of mines and industry centred on Wigan and St Helens, leading to a scattered layout and close intermingling of housing and industry.

Future challenges for the area include continued pressure to accommodate the development of both housing and industry. This may provide opportunities for incorporating environmental and social benefits, such as accessible green space and recreational provision, as well as improving habitat quality, distribution and connectivity through linking urban areas with more open areas of countryside. Other benefits could include providing better water quality and storage, minimising soil erosion and increasing carbon storage. All of these factors can strengthen landscape resilience and adaptation to climate change.



Click map to enlarge; click again to reduce.

Flashes have developed, for example at Abram Flashes, from subsidence due to deep mining activities. Their gradual colonisation has resulted in the development of a mosaic of wetland habitats.

Statements of Environmental Opportunity

- **SEO 1**: Safeguard, manage and expand the mosaic of wetland habitats, including lowland raised bogs, reedbeds, wet pastures, watercourses, subsidence flashes and ponds – to protect and enhance their ecological value, to increase their contribution to the landscape, to manage flood risk, to improve water quality, and to increase the resilience to climate change of these habitats and associated species.

- **SEO 2**: Conserve and manage the Lancashire Coal Measures' geological features and historic environment, to safeguard the strong cultural identity and mining heritage of the area, with its distinctive sense of place and history. Engage local communities with their past through the restoration and enhancement of key features and sites, and by improving understanding, interpretation and access.

- **SEO 3**: Manage and support the agricultural landscape through conserving, enhancing, linking and expanding the habitat network (including grasslands, woodlands, ponds, hedges and field margins) – to increase connectivity and resilience to climate change, and reduce soil erosion and diffuse pollution, while conserving the qualities of the farmed landscape and improving opportunities for enjoyment of the open countryside.

- **SEO 4**: Expand and link green infrastructure through restoring and enhancing post-industrial sites and creating new habitat mosaics that raise the overall quality, design and location of new development, bringing multiple environmental benefits including functioning networks for wildlife and access and recreational amenities for people to enjoy.

Description

Physical and functional links to other National Character Areas

The Lancashire Coal Measures NCA extends from the low-lying undulating farmland and peatland of the Mersey Valley NCA in the south, to the Lancashire and Amounderness Plain NCA in the north-west. To the east, this NCA merges with the metropolitan areas of the Manchester Conurbation NCA and Manchester Pennine Fringe NCA, and to the south-west with the Merseyside Conurbation NCA.

With an elevation of 150 m, the Upholland Ridge forms the western boundary of this area and presents a vantage point across both this NCA and the Lancashire and Amounderness Plain. From the summit of Billinge Hill (179 m), the landform falls abruptly to the lowlands of the Merseyside Conurbation and Mersey Valley, providing extensive views to the coast and the Irish Sea. The foothills of the Southern Pennines at Horwich and Rivington, to the north-east of this area, provide a backdrop of upland views.

In the north, the principal river is the Douglas, which flows around Wigan and then generally north–north-west, through the Lancashire and Amounderness Plain and into the Ribble Estuary. It also connects to the Leeds and Liverpool Canal, which passes through the NCA. In the southern part of the NCA a number of tributaries flow into Sankey Brook, which in turn drains into the River Mersey near Warrington, in the adjacent Mersey Valley NCA. Remnant sections of the St Helens Canal run through the centre of St Helens and follow the course of Sankey Brook. Hey Brook joins the River Glaze, which flows south into the River Mersey and the Manchester Ship Canal, in the Mersey Valley NCA.

The Lancashire Coal Measures NCA forms a busy communications hub, with a number of strategically important transport routes passing through it. The M6 and M61 motorways, as well as the West Coast Main Line railway, are important arterial routes running north to south. East to west, the M58, A580 and regional rail network link the Merseyside and Manchester conurbations.

The foothills of the southern Pennines at Horwich and Rivington to the north-east of this area, provide a backdrop of upland views.

Key characteristics

- Fragmented landscape created by a complex pattern of mining and industrial activity intermixed with housing; this is a densely populated area with a scattered settlement pattern.
- Gentle hills and valleys run from the north-west to the south-east, creating a soft but varied topography.
- The area is underlain by Coal Measures, which are buried under a patchy layer of glacial deposits, subsequently affected by a long history of mineral working.
- Woodland cover is limited across most of the area (covering 9 per cent), except to the north-west of Wigan. Community woodlands have been established on many post-industrial sites, and bring multiple benefits, including for public access and nature conservation.
- Some large tracts and isolated pockets of agricultural land remain within the urban fabric, principally used for permanent grassland or cereal production, although horse grazing and stabling are also common.
- Field patterns are predominantly medium to large and rectangular, mostly resulting from 18th-century and later change, with field boundaries defined by poorly managed hedges or post-and-wire fencing.
- Widespread ground subsidence, caused by coal mining activities, has resulted in the formation of subsidence flashes. These have created many areas of open water and wetlands, while scattered ponds and fragmented pockets of semi-natural habitat remain elsewhere.
- The area has an increasingly recognised strong cultural and industrial heritage, associated with heavy industry and mineral extraction – particularly south of Wigan – while the majority of the pits, spoil heaps and open cast sites have now been reclaimed and landscaped.
- The area is significantly influenced by transport and utilities infrastructure, with motorways, major roads and rail lines criss-crossing the landscape.

Landscape within the Lancashire Coal Measures is a complex mosaic of farmland, scattered urban centres, industry, active mineral sites and derelict or reclaimed workings.

Lancashire Coal Measures today

The Lancashire Coal Measures NCA surrounds the towns of St Helens and Wigan. The industrial heritage of the area is based on its long coal mining history, heavy industry, restored mineral workings and subsidence flashes, interspersed with a complex mosaic of farmland and urban centres. This all gives the area a strong and distinctive cultural identity.

Important grasslands include Stanley Bank Meadow Site of Special Scientific Interest. The meadow is species-rich with many plants which are typical of damp unimproved neutral grassland.

The land rises to 179 m at the summit of Billinge Hill, on the western boundary, falling abruptly to the Lancashire and Amounderness Plain NCA in the north-west, Merseyside Conurbation NCA to the west and the Mersey Valley NCA in the south. Gentle hills and valleys run from north-west to south-east. To the north-east of the area there are views to the foothills of the Southern Pennines NCA, while to the east and south-east is the heavily populated Manchester Conurbation NCA.

The area is crossed by a number of rivers, of which the River Douglas is the largest. Past industrial activity and mining subsidence have severely altered the drainage and landform of the area, creating a disrupted drainage pattern characterised by low-lying waterbodies, subsidence flashes and peatlands. The Leeds and Liverpool Canal and Bridgewater Canal both pass through the area.

Woodland is limited across the Lancashire Coal Measures, covering less than 9 per cent of the area. The principal exception is the area to the north-west of Wigan, where a higher incidence of trees and woodland – along with a more complex, undulating landform – creates a more enclosed and small-scale landscape. The Red Rose Community Forest covers the north-east of the area, while the Mersey Community Forest is in the south-west. The establishment of these community woodlands has provided the framework for a new landscape and has created habitats for nature conservation, public access, enjoyment and improved quality of life.

The Upholland Ridge and Billinge Hill, to the north-west and west of the NCA respectively, provide extensive views over the Lancashire and Amounderness Plain, Merseyside and the Mersey Valley. The foothills of the Southern Pennines provide a backdrop of upland views to the north-east.

Pockets of farmland are interspersed within the urban fabric. There are several large tracts of Grade 3 agricultural land, with smaller areas of Grade 2 land towards the west, and some patches of Grade 4 land – mainly in the north-east. Agricultural land use is predominantly split between cereal production and permanent grassland for either dairy farming or cattle and sheep rearing. There are also small areas of oilseed, stock feed and vegetable cropping. The drainage has been severely disrupted by colliery subsidence on many occasions, and the land is often used for recreational open space or for keeping horses.

Large parts of the area have been affected by industry and development, and field patterns have often been lost, mostly resulting from 18th-century and later change. Where it survives, the field pattern is predominantly rectangular, and is defined by poorly managed hedges or post-and-wire fencing.

Agricultural land provides a year-round habitat for brown hares and farmland birds such as tree sparrow, corn bunting, skylark and grey partridge. The large number of field ponds, found scattered across the clay soils, are important as breeding sites for amphibians (such as great crested newt) and sustain a wide range of aquatic invertebrates.

Some isolated pockets of semi-natural habitat remain within this NCA, such as relict ancient woodlands and small areas of lowland raised bog. Red Moss and Highfield Moss Sites of Special Scientific Interest (SSSI) host a range of mixed-mire communities. Important grasslands include Stanley Bank Meadow SSSI and Wrightington Bar Pasture SSSI.

Pockets of farmland are interspersed within the urban fabric, with agricultural land use predominantly split between arable farming and permanent grassland for livestock.

Extensive habitats have formed on many former industrial sites, particularly where undermining has resulted in the formation of subsidence flashes and ponds. A series of flashes between Wigan and Leigh now contribute to the area's sense of place and offer an extensive mosaic of wildlife habitats. The flashes are particularly significant for their variety and quality of habitats, including open water, fen, swamp, woodland and grassland. These habitats are important for overwintering wildfowl, bittern, gadwall, breeding birds including willow tit, and several species of dragonfly. Water vole populations are found at many of the wetland sites, such as at Red Moss and the Wigan Flashes.

This is a heavily settled area based on mining and industry, with a scattered settlement pattern and close intermingling of housing and industry. Extensive urban centres have formed around the towns of Wigan, St Helens and Leigh. A series of smaller settlements has also developed – mainly situated within the lower-lying areas, including Hindley, Atherton, Tyldesley, Golborne, Ashton-in-Makerfield, Haydock and Newton-le-Willows. Important villages on the higher land to the west include Billinge and Orrell, with Standish to the north and Aspull to the east. Part of the new town of Skelmersdale lies within this area. Communications are busy, with a number of strategically important transport routes passing through, including the M6, M61, M58, A580 and mainline railways. Levels of tranquillity are generally low, reflecting the extensive mosaic of urban housing, industry and infrastructure.

Only 6 per cent of the Lancashire Coal Measures area is classified as being publicly accessible, and the public rights of way network covers 805 km. A series of cycle routes also pass through, providing access to and beyond the countryside within the NCA. This is supported significantly by both the Mersey Forest and Red Rose Forest. The whole NCA is targeted as a priority site for new woodland access. There are five Registered Parks and Gardens, and seven country parks that lie either wholly or partly within the NCA. These areas are complemented by a series of Local Nature Reserves (LNRs), which provide an important resource for wildlife, local access and recreation. The subsidence flashes, waterbodies and significant areas of reclaimed mineral workings are providing a new and emerging complex of open space. The canal network is used for activities such as coarse fishing and recreational boating, while the towpath is used for walking, cycling and – on some sections of the Leeds and Liverpool Canal – horse riding.

The landscape through time

Carboniferous-age rocks are present throughout most of the Lancashire Coal Measures area. The Upholland Ridge forms the western boundary: differential erosion has created a notable, upstanding, narrow-faulted ridge of resistant Millstone Grit. Coal Measures rocks underlie the majority of the area. These were laid down between 318 and 303 million years ago (during the Westphalian). The sediments forming these rocks were deposited on an extensive series of low-lying, swampy river deltas, which built out into shallow marine waters. Periodic flooding and building of these deltas resulted in the deposition of a series of coals (formed from the compressed remains of the luxuriant swamp vegetation) interspersed with thicker layers of shale, clay, sandstone and mudstone.

Fossils and the sequence of rocks in different strata indicate periods of deposition in both marine and freshwater conditions, showing repeated advances and retreats of the shallow sea over the deltas throughout the Upper Carboniferous period. Ravenhead Brickworks SSSI, for example, is an important site for Carboniferous stratigraphy, as well as both marine and non-marine bivalve fossils. Triassic-age sandstones underlie the south of the NCA, where it borders the Mersey Valley. The Coal Measures are mostly covered by glacial till, sands and gravels, with wind-blown sand deposits near St Helens.

The warmer, post-glacial climate led to wetter conditions, with increasing vegetation accompanied by localised waterlogging. Bog vegetation (in particular, sphagnum mosses) expanded and large deposits of peat accumulated on the lower and flatter areas within boulder clay-lined depressions and basins. Remnant examples of this can still be found in the area, for example at Red Moss SSSI near Horwich.

Remnant examples of lowland raised bog can still be found in the area, such at Red Moss Site of Special Scientific Interest near Horwich.

The large areas of peatland supplied important resources, such as peat and rough grazing, utilised by local communities. Between the 12th and 14th centuries, population pressure instigated the construction of small-scale drainage works to bring the drier edges of the peat into cultivation. This process was resumed on a far larger scale from the late 17th century. The low-lying peatlands were frequently drained for cultivation during the 18th century, leaving black peaty soils and a network of drainage ditches and drains.

Ravenhead Brickworks Site of Special Scientific Interest is an important geological site for Carboniferous stratigraphy and both non-marine and marine bivalve fossils.

Some ancient (pre-1600) enclosure survives, mainly to the north of Wigan, but most field patterns date from the 18th century or later, with numerous subsequent alterations. The area is now densely populated, following the rapid expansion of a few small villages during the industrial revolution. Earlier settlement patterns are mainly obscured by later developments, although some evidence remains in old village cores and the distribution of churches, moated sites and place names containing 'green' (such as Hindley Green and Collins Green). The older farming regimes are characterised by dispersed and loose courtyard farmsteads, typically dating from the 18th and 19th centuries, with two-storey combination barns.

The density of scattered settlement, and the expansion of the towns and villages in the Lancashire Coal Measures, reflects the development of industry between the 17th and 19th centuries. This began with the mining of shallow coal seams to power the Lancashire cotton industry, which has suffered almost complete extinction since the 1950s, and continued with the development of glass and copper production, and diverse manufacturing.

The introduction of the railways to the area in the 19th century massively increased the exploitation of the South Lancashire Coalfield, which continued to develop with fewer but deeper mines. This period saw expansion in industrial manufacturing and a major extension of the urban fabric, with large numbers of terraced properties and larger houses being built. Industrial changes created a concentration of colliers in towns such as Wigan and Worsley, and colliery villages such as Billinge and Tyldesley emerged. The siting of glass and copper industries on the Coal Measures steadily transformed a crossroads, chapel and inn into the centre of modern-day St Helens.

Traditional building materials are Lower and Middle Coal Measures sandstones, timber-frame (up to the 17th century) and brick (from the 18th century), with stone flag or Welsh slate roofs. However, very few examples of traditional vernacular architecture remain today. The densely populated towns and villages are dominated by rows of 19th-century red-brick terraces and 20th-century housing estates.

Deep coal mining continued until the end of the 20th century, with the last deep mine at Parkside closing in 1993. Substantial areas have been affected by mining, especially where mining subsidence has altered the pattern of drainage. The flashes and the waste heaps are today's reminders of the previously significant Lancashire coalfields industrial history, which has so importantly contributed to its distinct cultural identity.

The loss of coal mining has left a legacy of dereliction, but has also created opportunities for restoration and the planned development of new green spaces for recreation and wildlife. Since the 1970s, work has been ongoing to reclaim much of the derelict land in the Lancashire Coal Measures area, left behind by the industrial past. New housing developments are being built on spoil heaps, replacing building stock that is nearing the end of its life. The current landscape is heavily influenced by motorways, major roads, new industrial and commercial buildings, and recent residential developments. The new town of Skelmersdale is located on the western boundary, partly within this NCA.

As a result of reclamation and environmental regeneration, an extensive network of community parks, open spaces, recreational facilities and green infrastructure is developing. In addition, the flashes formed by mining subsidence are establishing themselves as nationally important wetland habitats.

Ecosystem services

The Lancashire Coal Measures 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 Lancashire Coal Measures NCA is contained in the 'Analysis' section of this document

Provisioning services (food, fibre and water supply)

- **Biomass energy**: Although existing woodland provides only limited scope for wood fuel biomass, there is potential from urban tree management and new woodlands for local, small-scale wood fuel heat. There are opportunities for miscanthus and short rotation coppice to be accommodated – particularly on parcels of land that are not suitable for agriculture, such as spoil heaps. Nearby urban settlements mean that there is potential for high local demand.

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

- **Regulating soil quality**: Soil types that are easily damaged when wet cover 81 per cent of the area. Adjusting the management of these soils will improve the overall soil structure and aid water infiltration. There are some areas of restored soils – mostly from quarry and open cast spoil.

- **Regulating water quality**: The ecological quality of surface waters is moderate across most of the NCA's rivers, while the Leeds and Liverpool Canal is of good quality. The chemical status of surface waters within the

NCA, where assessed, is good – with the exception of the River Douglas, downstream of Wigan, which fails to achieve good status. Due to the large urban and industrial areas, water runoff can contain pollutants and chemicals that enter the waterways.

- **Regulating water flow**: The original drainage has been disturbed in many areas by mining subsidence and urban development, and watercourses are heavily modified – with flood risks downstream both within and beyond the NCA. The River Douglas rises in the higher-rainfall area of the West Pennines, where reservoirs and water management affect flow, but levels can rise quickly. There is much potential for increasing water storage and regulating flows in flood plains and farmland, but action is also needed in upland areas outside the NCA.

Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration**: The complex pattern of dense settlement and past land uses, notably mining, has created a very fragmented landscape that is strongly linked to its mining and industrial heritage. There is a strong cultural association with the past mining history, and local identity is often related to individual pits and workings.

- **Sense of history**: The history of the landscape is evident from the area's strong cultural identity, linked to heavy industry as well as coal mining. Earlier settlement patterns are mainly obscured by later developments, but can be spotted in old village cores. The older farming regimes are characterised by dispersed and loose courtyard farmsteads. Areas of peat are of potentially high interest, from an archaeological point of view.

- **Recreation**: While the extent of open access land is limited, the large population within the Lancashire Coal Measures has access to many public rights of way, as well as community forest areas, country parks, LNRs and urban green spaces. These are being linked to the developing recreational potential of the flashes; waterbodies and significant areas of reclaimed mineral workings are providing a new and emerging network of open space.

- **Biodiversity**: There are some isolated pockets of semi-natural habitat and ancient woodland, and extensive habitats have developed on many former industrial sites – particularly where undermining has resulted in the formation of subsidence flashes and ponds. The urban fringe location of many habitats and species enables people to experience and enjoy biodiversity close to home.

- **Geodiversity**: The Lancashire Coal Measures NCA contains coal seams used in local industries – once economically important for this area. There are significant sites for Carboniferous stratigraphy and fossils. Geological sites provide valuable – and often publicly accessible – rock sections, allowing the interpretation of, understanding of and continued research into the geodiversity of the area.

Statements of Environmental Opportunity

SEO 1: Safeguard, manage and expand the mosaic of wetland habitats, including lowland raised bogs, reedbeds, wet pastures, watercourses, subsidence flashes and ponds – to protect and enhance their ecological value, to increase their contribution to the landscape, to manage flood risk, to improve water quality, and to increase the resilience to climate change of these habitats and associated species.

For example, by:

- Managing and restoring the remnant pockets of lowland raised bog to ensure that they are actively sequestering and storing carbon, and seeking opportunities to manage land adjacent to the bogs to buffer these important habitats.
- Maintaining and restoring wetland habitats (including areas of lowland raised bog and peat deposits with high archaeological potential) through sympathetic management, to prevent degradation of the archaeological resource and to encourage people's appreciation of the historic environment.
- Maintaining and restoring wetland habitats (including reedbeds and fens) – particularly on the subsidence flashes – by conserving their wildlife and historical interest. Providing opportunities for people to learn about and enjoy the natural and historic environment.
- Seeking opportunities to extend, link and buffer areas of wetland (such as reedbeds and wet pastures), to provide habitats for species such as breeding and overwintering waders and wildfowl, to enhance the landscape and to contribute to improved water quality.
- Managing and enhancing the network of wetland Sites of Special Scientific Interest (SSSI) and local sites, to provide benefits to wildlife and to enable people to learn about and understand the natural environment.
- Managing and creating linear routes – especially river corridors and networks linking the many different waterbodies and wetland habitats – to improve ecological connectivity. Managing bankside vegetation and wetland habitats for species including water vole.
- Improving the quality of water within rivers and standing waterbodies: reducing nutrient and sediment runoff from agricultural land by establishing permanent grassland buffer strips along watercourses.
- Reducing contaminated runoff and discharges from roads, and from both past and present industrial processes, by establishing permanent vegetation (such as woodland) to trap sediments and nutrients, and encouraging the restoration of mineral spoil heaps to reduce runoff and pollution sources.
- Promoting the sustainable management of water, and investigating opportunities for the provision of alternative sustainable flood risk management measures (such as sustainable urban drainage systems).

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- Seeking opportunities to increase water storage through the expansion of flood plains and flood storage, and using this opportunity to create wetland habitats such as wet grassland, wet woodlands and reedbeds.
- Seeking opportunities to naturalise watercourses, avoiding further development on flood plains and restoring these to more natural states where possible, enabling the creation and restoration of a range of wetland habitats. Buffering watercourses with habitats such as grasslands and woodlands, to improve infiltration and reduce the risk of soil erosion.
- Promoting sustainable recreational and educational opportunities that encourage appropriate access to water, as well as fostering an understanding of the importance of water to the fabric of the area, and the need for its sustainable management.

Bryn Marsh and Ince Moss form an integral part of the Wigan Flashes complex of wetlands running between Wigan and Leigh. This now contributes to the area's sense of place and offers an extensive mosaic of wildlife habitats.

SEO 2: Conserve and manage the Lancashire Coal Measures' geological features and historic environment, to safeguard the strong cultural identity and mining heritage of the area, with its distinctive sense of place and history. Engage local communities with their past through the restoration and enhancement of key features and sites, and by improving understanding, interpretation and access.

For example, by:

- Protecting the area's sense of place, and historical and cultural identity, by conserving the many mining heritage features and providing interpretations of the landscape, its history and its features.
- Conserving the geological and coal mining heritage of the area, including geological exposures and sites, and enhancing their value for interpretation possibilities, educational opportunities and visual amenity.
- Conserving, managing and interpreting the area's historical and cultural identity – and in particular the town parks and green space, historic village cores, traditional buildings and farmsteads, and industrial housing and other features – to ensure a better understanding of the area's past uses and to reinforce the historic character of the landscape.
- Seeking opportunities to raise awareness of and increase understanding of the local history and heritage of the area.
- Identifying key characteristic geological features – both within and outside designated sites – and keeping important geological exposures such as quarry faces visible and, where appropriate, accessible.
- Restoring and managing former industrial and mineral sites to provide opportunities to enhance biodiversity and the landscape, while ensuring that the legacy of the industrial heritage and geological significance of the Lancashire Coal Measures remains legible within the landscape.
- Seeking ways of improving the integration of restored industrial sites into the wider landscape, such as through tree and hedge planting that links with local hedgerow and woodland patterns.
- Restoring traditional farm buildings, field patterns, listed buildings, features associated with the area's industrial past, and other buildings or artefacts of historical importance, as well as interpreting the area's historical and cultural identity.
- Using the public rights of way and access network to allow communities to gain access to the area's rich heritage and provide suitable interpretation to enhance their understanding and enjoyment.
- Supporting the development of the cultural heritage of the area – such as the 'Dream' sculpture in Bold Forest Park, and features like Billinge Hill – to benefit local communities.
- In all management activities, taking into account the archaeological potential of the area, and conserving and enhancing the historic structures and buildings.

SEO 3: Manage and support the agricultural landscape through conserving, enhancing, linking and expanding the habitat network (including grasslands, woodlands, ponds, hedges and field margins) – to increase connectivity and resilience to climate change, and reduce soil erosion and diffuse pollution, while conserving the qualities of the farmed landscape and improving opportunities for enjoyment of the open countryside.

For example, by:

- Retaining open countryside between the industrial towns and villages to enhance the landscape, improve the connectivity of habitats between urban areas, and build a strong and resilient ecological network.
- Managing farmland to provide a mixed landscape of open fields, hedgerows, uncut grass and small woodland to benefit species such as farmland birds and brown hare, and to strengthen the landscape structure.
- Providing a year-round habitat for arable and farmland birds, consisting of mosaics of overwintered stubbles, spring-sown cereals, grass margins and extensively managed grasslands.
- Maintaining, restoring and expanding the patchwork of grassland habitats, SSSI and local sites (including lowland acid grassland and lowland meadows) to provide benefits for wildlife, and for people to learn about and understand the natural environment.
- Managing field ponds as stepping stones for wildlife and as habitats for species such as amphibians.
- Managing and strengthening the field patterns in agricultural areas by improving the condition of hedgerows, restoring their structure and species to provide habitats and corridors for wildlife, and to enhance local landscapes. Reinstating hedges to restore historic field patterns.
- Seeking opportunities to introduce species-rich grassland, pollen and nectar strips, and margins alongside arable field edges and watercourses within the agricultural landscape – to encourage and support pollinating insects, as well as to promote carbon sequestration and to address water quality issues.
- Working with the local farming community to encourage sustainable agricultural practices. Considering how food production can be managed sustainably – particularly in urban fringe and marginal areas – while enhancing agricultural land.
- Providing new educational access to allow interpretation of environmental gains, promoting an understanding of the relationships between farming, food and the public.
- Providing permissive access, upgrades to existing routes or educational access through for example, agri-environment schemes – to link areas of open access land, and improve opportunities for the enjoyment and understanding of the countryside.
- Managing and expanding the mosaic of woodland habitats (including ancient woodland) for multiple benefits, including wildlife and landscape value, climate change adaptation, improving water quality, providing links between urban areas and the countryside, increasing the sense of tranquillity and improving quality of life. Undertaking appropriate management for each woodland type to restore the diversity of the structure and species, to enhance biodiversity value and to improve carbon sequestration.
- Managing important linear routes that connect many different habitats (especially corridors provided by tracks and road verges, and also routes such as the Leeds and Liverpool Canal), strengthening the area's biodiversity by enabling the movement of species, and providing improved opportunities for visitors to access, engage with and enjoy contact with their natural environment.

SEO 4: Expand and link green infrastructure through restoring and enhancing post-industrial sites and creating new habitat mosaics that raise the overall quality, design and location of new development, bringing multiple environmental benefits including functioning networks for wildlife and access and recreational amenities for people to enjoy.

For example, by:

- Conserving and enhancing community woodlands, and planning to create new community woodlands within both the Mersey Forest and the Red Rose Forest, to increase the carbon storage potential of the area, enhance the landscape, strengthen biodiversity and improve water quality.
- Providing new access opportunities, where appropriate, and offering interpretation and educational experiences to increase visitors' understanding and enjoyment of this environment, and to enhance quality of life.
- Taking opportunities to increase woodland cover, ensuring that these sites are chosen to enhance the local landscape character (in terms of typical scale, type and location), and that the legacy of the area's industrial past remains legible within the landscape.
- Protecting the small but important remnants of ancient woodland.
- Including green infrastructure and biodiversity habitat (suited to the landscape type and site characteristics) within any new sustainable residential and commercial development. This will enhance the sense of place, assist with assimilating new development into the landscape and provide recreational opportunities.
- Incorporating sustainable urban drainage systems into new developments, to improve infiltration and manage surface water.
- Conserving and enhancing the network of Local Nature Reserves (LNRs) and country parks, to provide accessible local green space, as well as to provide opportunities for people to experience and learn about the natural environment. Encouraging people to volunteer to take an active role in the current and future management of these LNRs and country parks.
- Improving the management of small greens and parks within villages and towns.
- Conserving and restoring parks, and providing access to them, with interpretation.
- Seeking opportunities to provide more and better access to green spaces, especially within urban areas, so that communities can connect with their local environment. This has benefits for recreation, health, education and quality of life, as well as engaging people with culture, heritage and the arts.
- Improving access routes, and paths around villages and towns, to allow access to horse riders, cyclists and people with disabilities. This will improve opportunities for the enjoyment and understanding of the landscape. Managing suitable walking and cycling routes to include commuters and creating sustainable transport routes to link settlements.
- Ensuring that paths are maintained and well signposted, and that, at key locations, some surfaced paths are provided for use by all levels of ability and interest.

Supporting document 1: Key facts and data

Area of Lancashire Coal Measures National Character Area (NCA): 40,584 ha

1. Landscape and nature conservation designations

There are no National Parks, Areas of Outstanding Natural Beauty, international or other landscape conservation designations within this NCA.

Source: Natural England (2011)

1.1 Designated nature conservation sites

The NCA includes the following statutory nature conservation designations:

Tier	Designation	Name	Area (ha)	% of NCA
International	n/a	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)	n/a	0	0
	Site of Special Scientific Interest (SSSI)	A total of 7 sites wholly or partly within the NCA	202	<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 256 local sites in the Lancashire Coal Measures NCA covering 2,673 ha which is 7 per cent of the NCA.

Source: Natural England (2011)

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

1.1.1 Condition of designated sites

SSSI condition category	Area (ha)	Percentage of NCA SSSI resource
Unfavourable declining	5	2
Favourable	86	43
Unfavourable no change	64	32
Unfavourable recovering	47	23

Source: Natural England (March 2011)

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

2. Landform, geology and soils

2.1 Elevation

Elevation ranges from 11 m above sea level to a maximum of 179 m above sea level. The average elevation of the landscape is 66 m above sea level.

Source: Natural England 2010

2.2 Landform and process

This is an elevated landscape rising to 179 m at Billinge Hill and falling abruptly to the Lancashire Plain, Merseyside and the Mersey Valley. The Lancashire Coal Measures are mantled by a patchy layer of glacial drift deposits. The Upholland Ridge forms the western boundary of this NCA. It is only to the east of this ridge that the underlying bedrock geology becomes apparent. The Ridge is the result of differential erosion leaving an upstanding faulted slice of resistant Millstone Grit within the Coal Measures, rising some 150 metres and providing a vantage point between the Lancashire and Amounderness Plain and the Lancashire Coal Measures.

Source: Lancashire Coal Measures Countryside Character Area Description

2.3 Bedrock geology

The oldest rocks in the NCA belong to the Carboniferous age Millstone Grit Group, which form a faulted sandstone ridge that borders the north-west of the area. Most of the area is underlain by Coal Measures rocks; a mixture of sandstones, mudstones and coals. The Coal Measures are part of the Carboniferous Westphalian sequence of rocks which are important for their fossil assemblages which characterise particular events, for example Ravenhead Brickworks SSSI is an important site for Carboniferous stratigraphy and both non-marine and marine bivalve fossils. Triassic age sandstones underlie the south of the NCA where it borders the Mersey Valley.

Source: Lancashire Coal Measures Countryside Character Area Description

2.4 Superficial deposits

The Lancashire Coal Measures NCA is covered by mixture of glacial till, sands and gravels with wind-blown sand deposits near St Helens. Although the Coal Measures extend further west, out of the area towards Ormskirk and Huyton, they are buried there beneath a thick and continuous covering of glacial drift.

Source: Lancashire Coal Measures Countryside Character Area Description

2.5 Designated geological sites

Tier	Designation	Number
National	Geological Site of Special Scientific Interest (SSSI)	1
National	Mixed Interest SSSIs	0
Local	Local Geological Sites	45

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

This is mainly an area of urban and industrial development with several large tracts of Grade 3 agricultural land, smaller areas of Grade 1, 2, 4 and 5 land, and isolated pockets of former farmland within the urban fabric. There are some areas of arable farming but frequently the drainage has been severely disrupted by colliery subsidence and, in many instances the land is put over to equestrian use.

Source: Lancashire Coal Measures Countryside Character Area Description, Natural England (2010)

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

Grade	Area (ha)	% of NCA
Grade 1	336	<1
Grade 2	1,864	5
Grade 3	23,077	57
Grade 4	1,036	3
Grade 5	118	<1
Non-agricultural	648	2
Urban	13,504	33

Source: Natural England (2010)

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

3. Key water bodies and catchments

3.1 Major rivers/canals

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

- River Douglas 7 km
- Leeds and Liverpool Canal 38 km

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 River Douglas is a tributary of the River Ribble and originates at Winter Hill in the West Pennine Moors. It runs for 56 km through the town of Wigan and north-west onto the Ribble estuary past Tarleton.

Source: Urban Mersey Basin Natural Area Profile

3.2 Water quality

The total area of Nitrate Vulnerable Zone is 38,044 ha, or 94 per cent of the NCA.

Source: Natural England (2010)

3.3 Water Framework Directive

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

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

4. Trees and woodlands

4.1 Total woodland cover

The NCA contains 3,498 ha of woodlands over 2 ha, 9 per cent of the total area, of which 174 ha, less than 1 per cent is ancient woodland. Parts of the Red Rose and The Mersey Forest Community Forests, two of the 12 Community Forests in England, fall within this NCA. These Community Forests were established to demonstrate the contribution of environmental improvement to economic and social regeneration, and cover 35,479 ha or 87 per cent of this NCA.

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

4.2 Distribution and size of woodland and trees in the landscape

Across most of the area woodland cover is very limited. The landscape to the north and west of Wigan has a more complex, undulating landform than the area to the east and south. There is a greater incidence of trees and woodland in this area, which reduces the scale of the landscape and creates visual enclosure.

Source: Lancashire Coal Measures 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)	% of NCA
Broadleaved	2,810	7
Coniferous	93	<1
Mixed	198	<1
Other	397	1

Source: Forestry Commission (2011)

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

Type	Area (ha)	% of NCA
Ancient semi-natural woodland	168	<1
Planted Ancient Woodland (PAWS)	7	<1

Source: Natural England (2004)

5. Boundary features and patterns

5.1 Boundary features

Boundaries are commonly defined by poorly managed hedgerows or post and wire fencing. The Lancashire Coal Measures NCA has a total of 110 km (March 2011) of boundaries entered into Environmental Stewardship boundary options.

Source: Lancashire Coal Measures Countryside Character Area description; Countryside Quality Counts (2003), Natural England (2011)

5.2 Field patterns

Large parts of the area have been affected by mineral extraction and field patterns have often been lost. Where it survives, the pattern is predominantly rectangular and is defined by degraded hedgerows or post and wire fencing.

Source: Lancashire Coal Measures Countryside Character Area description; Countryside Quality Counts (2003)

In recent years significant areas of community woodlands have been established on many post-industrial sites, with multiple benefits including public access and nature conservation.

6. Agriculture

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

6.1 Farm type

The farming character of this landscape is shown in the breakdown of main farm types with 89 cereals holdings (26 per cent), 70 lowland grazing livestock holdings (20 per cent), 23 dairy holdings (7 per cent), 21 mixed holdings (6 per cent), 20 general cropping holdings (6 per cent), 12 specialist poultry holdings (3 per cent) and 10 horticulture holdings (3 per cent). Farms classified as other (revised agricultural data suggests that these are holdings with only horses, or only grass, fodder or fallow land) are also numerous and account for 101 holdings (29 per cent). Survey data from 2000 to 2009 shows a 48 per cent decrease in the number of general cropping holdings, a 28 per cent decrease in horticulture holdings, a 36 per cent decrease in dairy holdings and a 34 per cent decrease in mixed holdings. The data also shows that the holdings classified as 'other' have increased from less than 5 holdings to 101 holdings during this time.

Source: Agricultural Census, Defra (2010)

6.2 Farm size

Farms of between 5 and 20 hectares in size are the most numerous, accounting for 125 holdings (36 per cent), followed by 96 holdings of between 20 and 50 hectares in size which account for 28 per cent of the total number of holdings. Fifty-seven (16 per cent) holdings are between 50 and 100 hectares in size, 35 (10 per cent) are less than 5 hectares and 36 (10 per cent) are over 100 hectares in size. Trends show a 16 per cent reduction in the number of overall holdings between 2000 and 2009.

Source: Agricultural Census, Defra (2010)

6.3 Farm ownership

2009: Total farm area = 14,186 ha; owned land = 8,072 ha

2000: Total farm area = 16,484 ha; owned land = 9,676 ha

Source: Agricultural Census, Defra (2010)

6.4 Land use

The land use is predominantly split between cereal production (38 per cent) and permanent grassland for dairy or cattle and sheep rearing (52 per cent). There are also small areas of oilseed, stock feed and vegetable cropping.

Source: Agricultural Census, Defra (2010)

6.5 Livestock numbers

Livestock numbers have decreased since 2000. In 2009 there were 11,100 cattle (down from 14,000 in 2000), 7,600 sheep (down from 10,400) and 3,000 pigs (down from 5,500).

Source: Agricultural Census, Defra (2010)

6.6 Farm labour

The figures suggest that there are almost twice as many principal farmers (522 in 2009) as there are other types of farm labour. However, this figure decreased by 13 per cent (from 597) between 2000 and 2009. The next most numerous type of farm labour is full time workers (114), followed by part-time workers (88), casual/gang workers (59) and salaried managers (11). The number of salaried managers and part-time workers increased between 2000 and 2009 (by 22 per cent and 10 per cent respectively), but the number of full time workers and casual workers decreased during this time (by 23 per cent and 25 per cent respectively).

Source: Agricultural Census, Defra (2010)

Please note: (i) Some of the Census data is estimated by Defra so will not be accurate for every holding (ii) Data refers to Commercial Holdings only (iii) Data includes land outside of the NCA belonging to holdings whose centre point is within the NCA listed.

7. Key habitats and species

7.1 Habitat distribution/coverage

The Lancashire Coal Measures NCA has a fragmented landscape created by mining and industrial activity as well as extensive urban centres. This industrial influence has created a number of flashes which are a result of the subsidence of former mine workings. This is particularly evident around Wigan (The Wigan Flashes) and there are now a number of important wetland habitats in these areas, including open water, fen, swamp and grasslands. These habitats are important for breeding, wintering and passage migrant birds, as well as plant and invertebrate communities. There are areas of remnant lowland raised mire within this NCA, including Red Moss and Highfield Moss SSSI. These SSSI host a range of mixed mire communities and are locally important for a variety of species. The Lancashire Coal Measures also includes some fragmented areas of woodland, although these are generally limited to the area around Garswood, Billinge Hill and north-west of Wigan. In addition the NCA supports nationally important assemblages of arable birds.

Source: Urban Mersey Basin Natural Area Profile

7.2 Biodiversity Action Plan (BAP) priority habitats

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

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.

Habitat	Area (ha)	% of NCA
Broadleaved mixed and yew woodland (broad habitat)	1,090	3
Lowland raised bog	126	<1
Purple moor grass and rush pasture	77	<1
Lowland meadows	49	<1
Reedbeds	32	<1
Lowland dry acid grassland	19	<1
Lowland heathland	3	<1
Coastal and flood plain grazing marsh	2	<1

Source: Natural England (2011)

- Maps showing locations of UK BAP priority habitats are available at: http://magic.Defra.gov.uk/website/magic/ select 'Habitat Inventories'

7.3 Key species and assemblages of species

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

8. Settlement and development patterns

8.1 Settlement pattern

The settlement pattern of the Lancashire Coal Measures is based around the development of mines and industry, leading to a scattered pattern and close intermingling of housing and industry.

Source: Lancashire Coal Measures Countryside Character Area description; Countryside Quality Counts (2003)

8.2 Main settlements

The main settlements in the Lancashire Coal Measures NCA are: St Helens, Wigan, Leigh, Walkden, Ashton-in-Makerfield, Haydock, Orrell, Newton le Willows, Hindley, Golborne and Westhoughton. The total estimated population for this NCA (derived from ONS 2001 census data) is: 616,458.

Source: Lancashire Coal Measures Countryside Character Area description; Countryside Quality Counts (2003), Natural England (2012)

8.3 Local vernacular and building materials

There are very few examples of traditional vernacular architecture that remain, though the area has an increasingly recognised legacy of industrial archaeology. Traditional buildings materials are sandstone grit, timber frame (to 17th century), brick (from 18th century) and stone flag and Welsh slate roofs, although the area is now dominated by brick-built 19th and 20th century housing estates.

Source: Lancashire Coal Measures Countryside Character Area description; Countryside Quality Counts (2003)

9. Key historic sites and features

9.1 Origin of historic features

The density of dispersed settlement and the expansion of the towns and villages reflect the development of industry between the 17th and 19th centuries, beginning with the mining of coal seams for the Lancashire cotton industry and continuing into the development of glass and copper production and diverse manufacturing.

Earlier settlements patterns are quite obscured by later developments, but may be spotted in the patterns of old village cores visible in the distribution of churches, moated sites and place names with the element 'green'. The siting of glass and copper industries on the Coal Measures steadily transformed a crossroads, chapel and inn into the centre of modern St Helens and later railway transport made possible the building of Widnes on what was a virtually virgin site.

The 'flashes' and the waste heaps on the Coal Measures are today's reminders of 19th century extraction methods which replaced the hundreds of separate, shallow coal-pits with fewer, larger mines tapping the richer deep seams. This industrial change caused a concentration of colliers in towns such as Wigan and Worsley and colliery villages such as Billinge and Tyldesley. Large areas are affected by mining and restoration of mining landscapes - especially the Wigan flashes where mining subsidence has altered the pattern of drainage.

The coal seams in this area were principally mined to provide power for the local cotton industry which has suffered complete extinction since the 1950s. The Lancashire coalfields, in common with the rest of the country, have experienced the demise of deep coal-mining and its replacement by open-cast operations.

This loss of deep coal mining has left a legacy of dereliction. However, subsidence hollows are now being filled, colliery waste tips levelled and new housing estates are spreading.

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

9.2 Designated historic assets

This NCA has the following historic designations:

- 5 Registered Parks and Gardens covering 271 ha
- 0 Registered Battlefields
- 29 Scheduled Monuments
- 743 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

- 6 per cent of the NCA 2,506 ha is classified as being publically accessible.
- There are 805 km of public rights of way at a density of 2 km per km^2.
- There are no national trails with the Lancashire Coal Measures NCA.

Sources: Natural England (2010)

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

Access designation	Area (ha)	% of NCA
National Trust (Accessible all year)	0	0
Common Land	77	<1
Country Parks	513	1
CROW Access Land (Section 4 and 16)	385	<1
CROW Section 15	165	<1
Village Greens	<1	<1
Doorstep Greens	5	<1
Forestry Commission Walkers Welcome Grants	485	1
Local Nature Reserves (LNRs)	382	1
Millennium Greens	6	<1
Accessible National Nature Reserves (NNRs)	0	0
Agri-environment Scheme Access	6	<1
Woods for People	1,713	4

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 area of greatest tranquillity is around Appley Bridge and Harrock Hill where the settlement pattern is less dense. Other areas within this NCA have much lower levels of tranquillity due to the high density of industry, housing, and transport routes.

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

Category of tranquillity	Score
Highest value within NCA	15
Lowest value within NCA	-121
Mean value within NCA	-45

Sources: CPRE (2006)

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

11.2 Intrusion

The 2007 Intrusion Map (CPRE) shows the extent to which rural landscapes are 'intruded on' from urban development, noise (primarily traffic noise), and other sources of visual and auditory intrusion. This shows that most of the Lancashire Coal Measures is now affected by intrusion from industry, urban development and transport routes. The level of urban intrusion more than doubled between the 1960s and 2007.

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

Category of intrusion	1960s (%)	1990s (%)	2007 (%)	% change (1960s-2007)
Disturbed	68	80	64	-4
Undisturbed	15	3	<1	-14
Urban	17	17	36	+19

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are the increase in the percentage of urban intrusion and the decrease in the percentage of land considered as undisturbed. It is also noticeable that during the 1990s, the area of disturbed land increased to 80 per cent where as the urban area remained the same as during the 1960s, hinting that this was a time of major development within the Lancashire Coal Measures.

- 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)
- BAP Priority Habitats GIS data, Natural England (March 2011)
- Special Areas of Conservation data, Natural England (data accessed in March 2011)
- Special Protection Areas data, Natural England (data accessed in March 2011)
- Ramsar sites data, Natural England (data accessed in March 2011)
- Sites of Special Scientific Interest, Natural England (data accessed in March 2011)
- Detailed River Network, Environment Agency (2008)
- Source protection zones, Environment Agency (2005)
- Registered Common Land GIS data, Natural England (2004)
- Open Country GIS data, Natural England (2004)
- Public Rights of Way Density, Defra (2011)
- National Trails, Natural England (2006)
- National Tranquillity Mapping data, CPRE (2007)
- Intrusion map data, CPRE (2007)
- Registered Battlefields, English Heritage (2005)
- Record of Scheduled Monuments, English Heritage (2006)
- Registered Parks and Gardens, English Heritage (2006)
- World Heritage Sites, English Heritage (2006)
- Incorporates Historic Landscape Characterisation and work for preliminary Historic Farmstead Character Statements (English Heritage/Countryside Agency 2006)

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

Supporting document 2: Landscape change

Recent changes

Trees and woodlands

- Although the proportion of established woodlands is low, there has been significant new broadleaf woodland planting that has important multiple benefits locally such as within the Mersey and Red Rose Community Forest areas, including 446 ha on the Public Forest Estate within the NCA.

- Between 1999 and 2003 an area equivalent to 5 per cent of the 1999 total stock was approved for new planting under a Woodland Grant Scheme agreement (73 ha).

Boundary features

- There has been a lack of boundary management, especially in the farmlands to the north and west of Wigan. Boundaries are commonly defined by poorly managed hedgerows or post and wire fencing.

- The estimated boundary length for the NCA is about 2,234 km. Between 1999 and 2003 countryside stewardship agreements for linear features included fencing (10 km), hedge management (15 km), hedge planting and restoration (6 km) and restored boundary protection (2 km). In March 2011 the Lancashire Coal Measures NCA had a total of 110 km of boundaries entered into environmental stewardship boundary options.

Agriculture

- Survey data from 2000 to 2009 shows a 48 per cent decrease in the number of general cropping holdings, a 28 per cent decrease in horticulture holdings, a 36 per cent decrease in dairy holdings and a 34 per cent decrease in mixed holdings. The data also shows that the holdings classified as 'other' have increased from less than 5 holdings to 101 holdings during this time.

- Livestock numbers decreased between 2000 and 2009; the total numbers of cattle reduced by 20 per cent, the total numbers of sheep reduced by 27 per cent and the total numbers of pigs reduced by 45 per cent.

- Urban fringe pressures on farmland, such as demand for land for horse stabling, golf courses, recreation and access, appear to be resulting in a change to the total farm area. In 2000 total farm area (commercial holdings) was 16,484 ha, by 2009 this decreased to 14,186 ha, a 14 per cent reduction in area.

Settlement and development

- There are high rates of conversion of sites to urban. About 73 per cent (29,611 ha) of the area is covered by green belt designation. Pressure for expansion is mainly at the urban fringe around all the large settlements.

- Many of the areas of derelict land and land affected by contamination from former industries have been restored and used for new development.

Semi-natural habitat

- Semi-natural habitats are limited in extent within this NCA. Only 202 ha (less than 1 per cent) is designated Site of Special Scientific Interest for nature conservation and of this approximately 43 per cent is in favourable condition, 32 per cent is unfavourable no change, 23 per cent is unfavourable recovering and 2 per cent is unfavourable declining (March 2011).

- There is only a very limited uptake of agri-environment scheme management agreements for semi-natural habitats. In 2003 the most extensive countryside stewardship agreements included lowland meadows (53 ha) and managing reedbed (36 ha).

- Initiatives such as the Mersey Forest and Red Rose Forest Community Forests have secured increases to accessible green space, such as from former derelict land, whilst Forestry Commission projects such as Viridor Woods have provided additional local resources. Much of this is now developing into woodland and grassland habitats, as well as providing opportunities for access and recreation. Habitats are developing on many former industrial sites, particularly where undermining has resulted in the formation of subsidence flashes such as at Wigan Flashes.

Historic features

- In 2003, only about 61 per cent of historic farm buildings remained unconverted and only about 82 per cent were intact structurally.

- In 1918 about 2 per cent of the area was historic parkland. By 1995 it was estimated that 65 per cent of the 1918 area had been lost. By 2003, about 39 per cent of the remaining parkland was covered by a Historic Parkland Grant.

- There are few surviving examples of traditional vernacular development, though the area has an increasingly recognised legacy of industrial archaeology, such as the Wigan Pier complex and Trencherfield Mill. The area includes many towns that developed during industrialisation in the 19th century. Allied to these settlements are pits, spoil tips and open cast sites. Many of these have now been reclaimed and landscaped.

Coast and rivers

- The Douglas catchment was once a recognised salmon fishery, but poor water quality had left this river incapable of supporting fish. Point source pollution and diffuse pollution have both affected water quality, while industrial canalisation, agricultural improvement and flood defence also have had an impact on river life. Recent years have seen improvements in water quality coinciding with improved fish populations.

- The Coal Measures have been extensively worked, resulting in complex artificial underground drainage systems, which modify the natural hydrogeology. Recent mine closures pose a risk to the surface waters because of problems associated with rising poor quality groundwater. There are some issues with minewater rebound and there are currently selected treatment schemes in operation.

Minerals

- The NCA is mainly formed on the Coal Measures of the Lancashire coalfield which has seen extensive exploitation in the past. Coal mining has declined with only limited open-cast production recently, for example at Crock Hey in St Helens and Cutacre in Bolton. The last deep mine, Parkside, in St Helens, west of Newton-Le-Willows was closed in 1993. The ex-colliery waste spoil heaps and open-cast sites are now being reclaimed and restored, often to landscapes of recreational and biodiversity value. The potential for future opencast working is reduced by extensive urban development.

Drivers of change

Climate change

- The North West Landscape Framework Climate Change Assessment 2010/11 briefly covers the urban landscapes in Merseyside and Greater Manchester. Urban areas are identified as having a higher vulnerability to climate change due to their lack of habitats and for generally being located on the flattest areas of land. These two factors restrict species movement and ecosystem functionality. Urban suburbs with extensive gardens can act as a substitute in some areas. Green roofs and walls, multiple-use urban green space and street trees are possible climate change adaptation actions.

- The North West Landscape Framework Climate Change Assessment 2010/11 also briefly covers the coalfield farmland landscapes between St Helens and Wigan. These areas are identified as having a medium vulnerability to climate change due to the reasonable variation in land use and habitats. Changes to waterbodies and habitats will be localised and variable, particularly on the previously mined areas.

- Original drainage is disturbed in many areas, and watercourses are heavily modified with flood risks downstream both within and beyond the NCA. Periods of heavy rain within and outside of this NCA may result in flash flooding and erosion of river banks which may affect urban areas and infrastructure as well as agricultural land. Flash flooding and subsequent run off can be exacerbated by the extensive hard surfaces of urban and industrial areas.

- Over-abstraction of water is already an issue in some parts of the Lancashire Coal Measures.

- Prolonged periods of drought are likely to have an adverse effect on soils which may become more vulnerable to damage such as increased erosion, along with nutrient loss and decreased soil microbial activity.

- A longer growing season may create potential for new crops and tree growth rates will improve.

Other key drivers

- Pressure for development of housing and industry within this NCA is likely to continue. Increases in urban development may provide green infrastructure opportunities for incorporating accessible green space, sustainable drainage systems and new habitats, forming corridors linking urban areas with more open areas of countryside.

- Agri-environment schemes and other funding mechanisms provide opportunities to work with land managers to maintain, restore or create farmland habitats, develop ecological networks, enhance the character of the landscape and provide educational access.

- Restoration of former industrial sites will provide opportunities to enhance biodiversity (for example subsidence flashes), geodiversity (such as preserving key geological features and outcrops), and conserve the area's strong cultural landscape, but will need to ensure that the legacy of the industrial heritage and geodiversity is retained and remains legible within the landscape. Derelict land remains a key challenge, as while this is a resource for positive re-use, much of it is affected by contamination, necessitating remediation.

- Green infrastructure approaches to the integration of built and undeveloped land uses provide an opportunity to link potentially fragmented elements of land use into a more cohesive whole and to provide a framework for development. These approaches provide multiple benefits including reconnecting fragmented habitats, increasing resilience and improving water quality, managing flood risk, improving air quality and quality of life.

- The Red Rose and the Mersey Community Forest initiatives have provided accessible woodlands and green space for people to enjoy. Woodlands have multiple benefits including wildlife and landscape value, climate change adaptation, improving water quality, providing links between urban areas and the countryside, increasing the sense of tranquillity and improving quality of life. There is potential for more habitat creation within the community forests, particularly on reclaimed or derelict land which could be unsuitable for other agricultural or housing uses.

- The recreational demand for walking, cycling and horse riding in the urban fringe needs to be sensitively managed to avoid erosion and potential damage to archaeological and geological sites, loss of habitats, and diminished visitor experience, while balancing the positive benefits of increasing opportunities for visitors to reconnect with the local environment. The close proximity of large populations provides opportunities for sustainable recreation and tourism in the open countryside.

- There are continuing pressures and opportunities associated with providing renewable energy, and possible additional new pressures such as providing wood, short rotation coppice and miscanthus for biomass energy.

- There are increasing pressures from new tree pests and diseases.

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.

The large population within the Lancashire Coal Measures has access to many public rights of way, as well as community forest areas, country parks, Local Nature Reserves, and urban green spaces.

Statement of Environmental Opportunity	Ecosystem Service																		
	Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place/inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
SEO 1: Safeguard, manage and expand the mosaic of wetland habitats, including lowland raised bogs, reedbeds, wet pastures, watercourses, subsidence flashes and ponds – to protect and enhance their ecological value, to increase their contribution to the landscape, to manage flood risk, to improve water quality, and to increase the resilience to climate change of these habitats and associated species.	↔ **	↔ **	↗ **	***	↔ **	↑ **	↗ **	↗ **	↗ **	↗ **	↗ **	***	***	↗ **	↗ ***	↗ **	↗ **	↑ **	↗ **
SEO 2: Conserve and manage the Lancashire Coal Measures' geological features and historic environment, to safeguard the strong cultural identity and mining heritage of the area, with its distinctive sense of place and history. Engage local communities with their past through the restoration and enhancement of key features and sites, and by improving understanding, interpretation and access.	↔ **	↔ **	↔ **	***	↔ **	↔ **	↔ **	↔ **	↔ **	↔ **	↔ *	***	***	↗ ***	↑ ***	↗ **	↗ **	↔ **	↑ ***

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

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

Statement of Environmental Opportunity	Ecosystem Service																		
	Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place/inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
SEO 3: Manage and support the agricultural landscape through conserving, enhancing, linking and expanding the habitat network (including grasslands, woodlands, ponds, hedges and field margins) – to increase connectivity and resilience to climate change, and reduce soil erosion and diffuse pollution, while conserving the qualities of the farmed landscape and improving opportunities for enjoyment of the open countryside.	↗ **	↗ ***	↗ **	***	↔ *	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	***	***	↗ ***	↗ **	↗ **	↗ ***	↗ ***	↔ **
SEO 4: Expand and link green infrastructure through restoring and enhancing post-industrial sites and creating new habitat mosaics that raise the overall quality, design and location of new development, bringing multiple environmental benefits including functioning networks for wildlife and access and recreational amenities for people to enjoy.	↔ **	↗ **	↔ **	***	↗ *	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	***	***	↗ ***	↔ **	↗ **	↗ **	↗ **	↔ **

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

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

Landscape attribute	Justification for selection
Fragmented landscape created by complex pattern of mining and industrial activity intermixed with housing; this is a densely populated area with a scattered settlement pattern.	■ The area includes many towns that developed during industrialisation in the 19th century. ■ Both St Helens and Wigan are large towns but there are other sizeable settlements too, including Leigh, Hindley, Atherton, Tyldesley, Golborne, Ashton-in-Makerfield, Haydock and Newton-le-Willows, and villages include Billinge, Orrell, Standish and Aspull. ■ Strong cultural identity amongst former mining communities. ■ Settlements with areas of densely built red-brick terraces, and in some areas buildings using local stone including Lower and Middle Coal Measure sandstones.
A landscape of gentle hills and valleys run from north-west to south-east, creating a soft, but varied topography.	■ The landscape rises to 179 m at the summit of Billinge Hill giving views over the Lancashire and Amounderness Plain, Merseyside and the Mersey Valley. ■ To the north-west the NCA is bounded by the Billinge and Upholland ridge. ■ The foothills of the southern Pennines at Horwich and Rivington to the north-east of this area provide a backdrop of upland views. ■ The area is crossed by a number of river valleys, of which the River Douglas is the largest.
The area is underlain by Coal Measures which are buried under a patchy layer of glacial deposits, subsequently affected by a long history of mineral working.	■ Pre-glacial drainage patterns have been altered by mining subsidence and extraction of minerals particularly coal, contributing to the indeterminate drainage and formation of low-lying water bodies and peatlands in some areas. ■ Past industrial activity has created a number of spoil heaps and subsidence flashes, whilst some areas of land have been left derelict.
Woodland cover is limited across most of the area except to the north-west of Wigan, although community woodlands have been established on many post-industrial sites, and have multiple benefits including for public access as well as for nature conservation.	■ Woodland covers 9 per cent of this NCA. ■ There has been significant new planting within both the Red Rose and Mersey Community Forest areas, in large blocks that will have important impacts locally. ■ The whole NCA is targeted as a priority place for new woodland access. ■ Woodlands have multiple benefits including wildlife and landscape value, climate change adaptation, improving water quality, providing links between urban areas and the countryside, increasing the sense of tranquillity and improving quality of life.

Landscape attribute	Justification for selection
Some large tracts and isolated pockets of agricultural land remain within the urban fabric, used for permanent grassland or cereal production, though horse grazing and stabling is frequent.	■ There are several large tracts of Grade 3 agricultural land, much smaller areas of Grade 2 and 4 land, and isolated pockets of former farmland within the urban fabric. ■ Agricultural land use is split between cereal production and permanent grassland for dairy or cattle and sheep rearing. There are also small areas of oilseed, stock feed and vegetable cropping. ■ Frequently the drainage has been severely disrupted by subsidence and the land is often used for recreational open space or for horsiculture.
Field patterns are predominantly medium to large and rectangular, with field boundaries defined by poorly managed hedges or post and wire fencing.	■ Large parts of the area have been affected by industry and development, and field patterns have often been lost, mostly resulting from 18th century and later change. ■ Where it survives, the field pattern is predominantly rectangular and is defined by poorly managed hedges or post and wire fencing.
Widespread ground subsidence caused by coal mining activities has resulted in the formation of flashes, creating many areas of open water and wetlands, while scattered ponds and fragmented pockets of semi-natural habitat remain elsewhere.	■ Past industrial activity has created a number of flashes which are a result of the subsidence of former mine workings. This is particularly evident around Wigan (The Wigan Flashes) and there are now a number of important wetland habitats in these areas, including open water, fen, swamp and grasslands. These habitats are important for many species including wintering wildfowl and breeding birds. ■ There are areas of remnant lowland raised bog within this NCA, including Red Moss and Highfield Moss SSSI. These SSSI host a range of mixed mire communities.

Landscape attribute	Justification for selection
The area has an increasingly recognised strong cultural and industrial heritage associated with heavy industry and mineral extraction particularly south of Wigan, whilst the majority of the pits, spoil heaps and open cast sites have been reclaimed and landscaped.	■ The 'flashes' and the waste heaps on the Coal Measures are reminders of 19th century extraction methods. ■ Many of the pits, spoil heaps and open-cast sites are now being reclaimed and landscaped. ■ The Leeds and Liverpool and Bridgewater Canals have developed as result of the area's industrial past.
The area is significantly influenced by transport and utilities infrastructure, with motorways, major roads and rail lines crossing the landscape.	■ The M6, M61, M58 and A580 East Lancashire Road cross this NCA. ■ The West Coast mainline railway is an important arterial route between the north and south. ■ The Leeds–Liverpool Canal passes through from north to south-east and a small section of the Bridgwater Canal lies within this NCA. ■ Increasing pressure of communications and transport on area.

Landscape opportunities

- Conserve the geological heritage of the area, including geological exposures and sites. Enhance their value for interpretation, access, education and visual amenity.

- Manage and protect existing woodlands and plan to extend woodland planting in appropriate locations, particularly in urban fringe and former industrial areas, and where opportunities exist to expand, link, or improve connectivity with existing woodland areas. Ensure that new woodlands are located to enhance the local landscape character in terms of typical scale, type and location, avoiding impacting on other sites of biodiversity value or features of historic or geological interest, and provide multiple benefits such as access and recreational opportunities where appropriate.

- Plant individual trees, groups of trees and small woodlands in appropriate urban and industrial areas and settlements, such as school playing fields, open spaces, streets, highway verges, institutional grounds, derelict land, and development sites. Target planting to meet identified green infrastructure needs and to assist with assimilating new development into the landscape.

- Restore and manage field boundaries and hedgerow trees in agricultural areas, particularly in urban fringe areas. Bring hedgerows into improved management to restore historic field patterns, provide habitats and corridors for wildlife and enhance local landscapes.

- Retain and manage open countryside and farmland between settlements maintaining the complex pattern of farmed land, housing and industry/ development.

- Protect and enhance the mixed farmland habitats, including permanent grassland and arable cropping, through agri-environment schemes which will provide opportunities to work with land managers to develop ecological networks and enhance the character of the landscape.

- Encourage good agricultural practice to reduce soil erosion and storm water runoff, increase carbon storage capacity, and improve soil structure and fertility.

- Manage and expand woodland and grassland on former industrial sites. These developing habitats form an important component of the landscape character and are of wildlife and recreational value.

- Protect and enhance the remaining pockets of semi-natural habitats, such as lowland raised bogs, grasslands and woodlands.

- Manage and expand wetland habitats, particularly around the subsidence “flashes” and mires, conserving their wildlife and historical interest as well as providing opportunities for people to learn about and enjoy the natural environment.

Continued on next page...

Landscape opportunities continued...

- Plan to restore and manage former industrial and mineral sites to provide opportunities to enhance biodiversity and the landscape, whilst ensuring that the legacy of the industrial heritage and the geological significance of the Lancashire Coal Measures remain legible within the landscape.

- Seek ways of improving the integration of restored industrial sites into the wider landscape, for example through tree and hedge planting that links with local patterns of hedgerows and woodlands.

- Plan for significant new green infrastructure provision in association with areas of new urban development to expand the existing ecological networks. Manage future developments so that green infrastructure incorporates accessible green space, sustainable drainage systems and new habitats, forming corridors linking urban areas with more open areas of countryside.

- Manage the existing access network of public rights of way, cycle routes and towpaths and plan new links, particularly within and between the urban areas and the wider countryside. There are many opportunities to use the network of paths to gain access to, and reveal and interpret the area's history, especially historic features such as boundary stones, tracks, farms and subsidence flashes.

- Improve access by ensuring that paths are maintained and well signposted, and that some surfaced paths are provided for use by all levels of ability and interest at key locations.

Past industrial activity left a number of waste spoil heaps, many of which are now being reclaimed and restored, often to landscapes of recreational and biodiversity value.

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	Mixed arable, lowland grazing livestock and dairy Specialist poultry Horticulture Soils	The predominant grades of agricultural land are Grade 2 (5 per cent), Grade 3 (57 per cent), and Grade 4 (3 per cent). Main farm types are cereals holdings (26 per cent), lowland grazing livestock holdings (20 per cent), dairy holdings (7 per cent), mixed holdings (6 per cent), general cropping holdings (6 per cent), specialist poultry holdings (3 per cent) and horticulture holdings (3 per cent). **Continued on next page...**	Local	Food production remains an important service to the area. However, 33 per cent of the NCA is developed and development pressure is continuing, which is reducing land available for food production, particularly around the towns, villages and urban fringe. Mining subsidence has impacted on drainage of agricultural land and many areas are not fully utilised for food production but are developing as valuable wildlife habitats. Numbers of cattle, sheep and dairy have declined in recent years. On mixed farms there has been some diversification of crop/cereal production and specialised poultry units have been introduced.	Encourage good agricultural management of remaining farmland for food production and grazing to improve its long term viability. Work with the local farming community to seek opportunities and consider how food production can be managed sustainably in urban fringe and marginal areas. Explore and promote the marketing of quality local produce to nearby extensive urban populations.	**Food provision** **Biodiversity** **Sense of place / inspiration** **Regulating soil erosion** **Regulating soil quality** **Regulating water flow**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Food provision cont.		**... continued from previous page** Nearly a third of holdings (29 per cent) are classed as 'other' which includes holdings with only horses, with only grass, or fodder crops or with only fallow land or buildings, and holdings with unknown activity.		Remaining farmland is often fragmented, and in small pockets between settlements and industry. There may be opportunities to bring sustainable food production back into some areas, improving sense of place and the quality of the landscape. Good farm management and animal husbandry practices can help to reduce soil erosion and regulate run-off, and improve soil quality.		

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Timber provision	Broadleaved woodland	3,498 ha (9 per cent) of the total area is woodland. 2,810 ha (80 per cent) of the woodlands are broadleaved, 93 ha (3 per cent) are conifer and 198 ha (6 per cent) are mixed. There are 174 ha of ancient semi-natural woodland and 7 ha of plantations on ancient woodland sites (PAWS). The Red Rose and the Mersey Community Forests cover 87 per cent of the NCA.	Local	Across most of the area, woodland cover is very limited except to the north and west of Wigan (where the undulating land form and small scattered woodlands and hedgerow trees provide a greater sense of enclosure). There are opportunities for woodland creation. Increasing woodland cover in suitable locations and improving management of existing woodlands would provide opportunities to create innovative woodfuel, timber and forest industries. This is beneficial for mitigating climate change as well as providing improved sense of place and more habitats for wildlife and recreational use, and can also assist with assimilating new development into the landscape.	Encourage the appropriate management of existing woodlands and create new woodlands for multi-purpose use as part of the Community Forest initiative including innovative woodfuel, timber and forest industries, and enhancement of recreation, landscape and biodiversity interests, benefits for water quality, soil quality and flood risk management. Ensure that new woodlands and hedgerow trees are planted to enhance the local landscape character in terms of typical scale, type and location and avoid impacting on existing features of historic interest or isolated semi-natural habitats.	**Timber provision** **Sense of place / inspiration** **Biodiversity** **Recreation** **Biomass energy**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability	Rivers Flashes	In the north, the Douglas catchment has 'water available' with the exception of the upper reaches of the Douglas north of Wigan and west of Horwich which have 'no water available'. The Wigan Flashes which are a series of wetland sites important for their biodiversity and amenity value are not thought to be adversely affected by abstraction. In the south, tributary streams of the Mersey have 'water available' with the exception of the West Sankey unit in the area of St Helens and Prescot, which has 'no water available'.	Local	Across the NCA, abstracted water is used for industry, agriculture and public water supply although in the south this is abstracted from groundwater due to water quality issues with surface waters[4]. Establishing land management practices that improve infiltration and storing surface water run-off should be encouraged. Urban and developed areas contribute to these problems. It is important to minimise compaction and / or capping risk on wet soils, which can arise from over-grazing, trafficking or other mechanised activities. These will tend to exacerbate run-off problems as well as damaging soil structure. Increasing water availability and improving the management of abstraction in areas such as the Wigan Flashes is likely to increase wetland biodiversity and improve habitat quality in these and other areas.	Plan to manage over-abstraction from groundwater and rivers through careful and efficient use of water. Encourage opportunities to work with land owners and managers to sustainably manage pastures to improve water infiltration and slow down water run-off, as well as ensure water quality is protected. Encourage opportunities to work with land owners and managers to sustainably manage arable field and field margins, to improve infiltration and reduce soil erosion. Encourage and promote opportunities to ensure grassland and wetland habitats, especially those within developed areas are under good environmental management, increasing their capacity to retain water, reduce run-off and improve water infiltration.	**Water availability** **Regulating water quality** **Regulating soil erosion** **Biodiversity**
Genetic diversity	N/A	N/A	N/A	N/A	N/A	**Genetic diversity**

[4] *The Lower Mersey and Alt Catchment Abstraction Management Strategy*, Environment Agency (March 2008) (accessed March 2013; URL: www.environment-agency.gov.uk/business/topics/water/119927.aspx

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biomass energy	Broadleaved woodland Red Rose and Mersey Community Forest Initiatives	Existing woodland cover (9 per cent). There are 15 woodfuel boilers and 1 woodfuel supplier. For information on the potential landscape impacts of biomass plantings within the NCA, refer to the tables on the Natural England website[5].	Regional	The potential yield for short rotation coppice (SRC) is high across the north of the NCA, medium in the south and low in the middle. The potential for miscanthus yield is high. Increased provision of SRC and miscanthus as a source of renewable energy could contribute towards addressing climate regulation, but could also decrease provision of food if grown on farmland. There may be degraded and scattered parcels of land that are not suitable for agriculture such as spoil heaps and closed landfill sites, which would be suitable for planting. Major expansion could also affect the sense of place if SRC and miscanthus became a major component of the landscape because the use of existing land is dominated by housing, industrial development and farming. Although existing woodland provides only limited scope for woodfuel biomass, there is potential from urban tree management and new woodlands for local small scale woodfuel heat. The use of locally grown woodfuel for heating provides a resource efficient way of reducing reliance on fossil fuels. Appropriately managed woodlands within the Community Forests offer a significant resource for woodfuel. Adjacent urban settlements and industry provide a potentially high local demand for biomass energy such as for wood-fired boilers.	Seek opportunities for new short rotation coppice and miscanthus planting and biomass production in appropriate locations, including small parcels of land isolated by development that are not suitable for agriculture such as spoil heaps and closed landfill sites. Seek opportunities to encourage sustainable management of existing woodlands in appropriate locations to produce surplus timber and biomass for local use, for example for wood fired boilers. Promote opportunities to establish new woodlands where appropriate, especially on reclaimed or restored land to supply locally grown woodfuel.	**Biomass energy** **Biodiversity**

[5] *Potential landscape impacts of energy crops,* Natural England (accessed March 2013; URL: 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	Existing woodland Existing wetland Soils	Carbon storage is also provided by the woodland within the NCA (9 per cent of the NCA). Lowland raised bog (126 ha). In this NCA, soil carbon levels are generally low (mainly 0–5 per cent carbon with areas of 5–10 per cent), reflecting the 93 per cent coverage of the NCA's area with mineral soils, which can be low in organic content. A few very small areas of higher carbon content occur in the north-east (20–50 per cent), likely to be associated with the NCA's naturally wet very acid sandy and loamy soils (3 per cent of NCA) and its loamy and clayey floodplain soils with naturally high groundwater (1 per cent of NCA). These soils can provide a rich store of carbon.	Local	Carbon storage within this NCA is provided by woodland, small areas of soils with higher carbon content, and pockets of lowland raised bog habitat. These habitats should be protected, managed and enhanced and expanded where possible. Areas of other wetland habitats could also be expanded where possible and appropriate. The slowly permeable, seasonally wet, slightly acid but base-rich loamy and clayey soils and the slowly permeable, seasonally wet, acid loamy and clayey soils may both have potential for improved carbon sequestration by increasing organic matter content, introducing low input grassland management systems and converting to grassland or woodland. Soils can be managed through sustainable agricultural practices to protect and bind the soil (such as the management of hedgerows, good grazing regimes and minimal tillage where soils are suitable) to help them retain their soil carbon levels.	Encourage the management and enhancement of areas of lowland raised bog to increase their ability to actively store and sequester carbon. Seek opportunities to extend areas of wetland and wet grassland along rivers and in valley bottoms. Seek opportunities to increase the carbon storage potential of the area through the management of woodlands and the planting of new woodland where appropriate. Encourage the introduction and adoption of low input grassland management to promote carbon sequestration, such as the creation of grassland buffer strips in arable areas and restoration of permanent grassland through reclamation works.	**Climate regulation** **Regulating water flow** **Regulating water quality** **Regulating soil quality** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality	Rivers and canals Semi-natural habitats	Ecological quality of surface waters is moderate across most of the NCA's rivers although a tributary stream of the Mersey is of poor quality. The Leeds and Liverpool Canal is of good quality. The chemical status of surface waters within the NCA, where assessed, is good with the exception of the River Douglas downstream of Wigan which fails to achieve good status. The chemical status of groundwater underlying the NCA is poor[6]. The NCA does not fall within a priority catchment designated under Defra's ECSFDI[7].	Regional	Improvements could be made to water quality through selective reduction in inputs from point source pollution and diffuse pollution. On agricultural land this might be achieved through the introduction of improved land management practices, such as the buffering of water courses to address specific pollutant issues, altering the timing of fertiliser and manure applications to grassland and restricting livestock access to streams and rivers. Due to the large urban and industrial areas of the NCA, water runoff can contain pollutants and chemicals which enter into the waterways. Sustainable urban drainage systems, which can include swales and porous surfaces, can be introduced in urban areas to improve water quality. Woodland cover can stabilise contaminated brownfield land. There are some issues with minewater rebound and there are currently treatment schemes in operation at Hindley Deep Pit and Quakerhouse Colliery. Other specific pollutants in the area include waste calcium sulphate from the glass industry, leachate from landfill sites, and other contaminants from the heavy industrialised areas.	Promote and work with farmers to encourage adoption of improved land management to address water quality issues across river catchments, in particular through the creation of grassland buffer strips alongside watercourses and restricting livestock access to watercourses. Seek opportunities to manage and expand wetland habitats adjacent to watercourses, such as reedbeds that help to filter water. Promote opportunities to develop sustainable urban drainage systems (SUDS) in new development to improving infiltration and water quality. Encourage restoration of mineral spoil heaps to reduce run off and pollution sources.	**Regulating water quality** **Biodiversity** **Regulating water flow** **Regulating soil erosion** **Regulating soil quality**

[6] *River Basin Management Plan: North West River Basin District,* Environment Agency (December 2009) (accessed March 2013; URL: www.environment-agency.gov.uk/research/planning/33106.aspx)

[7] Catchment Sensitive Farming Funding Priority Statements 2010/11, Defra (accessed March 2013; URL: http://archive.defra.gov.uk/foodfarm/landmanage/water/csf/grants/capital-grants-scheme.htm

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow	Woodland Wetlands Other semi natural habitats Rivers Canals	The principal river within the NCA is a section of the River Douglas, which flows on to the Lancashire and Amounderness Plain NCA. The River Douglas also serves to connect the Leeds and Liverpool Canal, which passes through the NCA, to the sea. The main area of fluvial flood risk within the NCA is in Wigan (on the River Douglas), with Horwich and Appley Bridge also at risk from upper sections of the Douglas. There is also flood risk from the Leeds and Liverpool Canal in some places where it is above the level of the surrounding properties. The Environment Agency's preferred approach to managing these risks includes investigating alternative sustainable flood risk measures for Appley Bridge (such as the extension of a current temporary scheme to divert a brook to a local quarry for storage) and encouraging the use of **Continued on next page...**	Regional	Original drainage is disturbed in many areas from mining subsidence and urban development, and watercourses are heavily modified with flood risks downstream both within and beyond the NCA. Land management which increases vegetation cover can slow flood flows, due to increased roughness, infiltration and evapo-transpiration. The River Douglas rises in the higher rainfall area of the west Pennines where reservoirs and water management affect flow, but levels can rise quickly. There is some potential for increasing water storage and regulating flows in floodplains and farmland, but action is also needed in upland areas outside the NCA. The slowly permeable, seasonally wet, slightly acid but base-rich loamy and clayey soils and the slowly permeable, seasonally wet, acid loamy and clayey soils will tend to have poor water infiltration with potential for rapid water run-off, especially on sloping land, due to clay subsurface layers.	Promote opportunities to increase water storage and alleviate speed of run-off through the expansion of wetlands and other habitats such as reedbeds and wet woodland in floodplains. Seek opportunities to extend and manage areas of floodplain, introducing permanent grassland, woodland and wet pastures to improve soil quality and water retention, especially on reclaimed land. Investigate opportunities for alternative sustainable flood risk measures, such as SUDS. Seek opportunities to increase urban greenspace to aid interception and infiltration of rainfall and slow run-off into the rivers.	**Regulating water flow** **Regulating water quality** **Water availability** **Regulating soil quality** **Regulating soil erosion** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow cont.		**... continued from previous page** appropriately designed sustainable urban drainage systems (SUDS) to control run-off at source. In the southern part of the NCA, fluvial flood risk also exists from tributaries of the River Mersey. The principal settlements affected are St Helens and Ashton-in-Makerfield (from Sankey Brook) and Leigh, Hindley Atherton and Westhoughton (from Glaze Brook)[8,9].		Flash flooding and subsequent run off can be exacerbated by the extensive hard surfaces of urban and industrial areas. Use of SUDS in development can increase water infiltration, to slow surface water run-off.		

[8] *River Douglas Catchment Flood Management Plan Summary Report,* Environment Agency (December 2009) (accessed March 2013; URL: www.environment-agency.gov.uk/research/planning/33586.aspx)
[9] *Mersey Estuary Catchment Flood Management Plan Summary Report,* Environment Agency (December 2009) (accessed March 2013; URL: www.environment-agency.gov.uk/research/planning/33586.aspx)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil quality	Soils Geology	This NCA has 8 main soilscape types. 2 key soil types cover 81 per cent of the NCA. The slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (45 per cent) and the slowly permeable seasonally wet acid loamy and clayey soils (36 per cent).	Regional	Soils may suffer compaction and/or capping as they are easily damaged when wet. In turn this may lead to increasingly poor water infiltration and diffuse pollution as a result of surface water run-off. Adjusting management of the slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils to encourage the build up of organic matter will improve overall soil structure and aid water infiltration. Slowly permeable, seasonally wet, acid loamy and clayey soils are easily damaged when wet or after heavy rain. It is important to minimise compaction and/or capping risk on wet soils, which can arise from over-grazing, trafficking or other mechanised activities. Management measures that increase organic matter levels and maintain good vegetation cover will help to alleviate problems such as poor water infiltration and diffuse pollution. There are some areas of restored soils mostly from quarry and opencast spoil (4 per cent).	Encourage sound land management practices which minimise/reduce negative impacts of soil structural deterioration for example careful planning of cultivations, minimum tillage techniques on arable land, appropriate stocking densities and extensive grazing, and recreational management techniques to avoid compaction, poaching or puddling of soils. Encourage management practices to build up organic matter levels where low in soils under arable cultivation and permanent grassland. Encourage restoration of permanent grassland or pasture where appropriate. Avoid carrying out mechanised activities such as trafficking that will cause compaction of soils, especially in wet conditions. Seek opportunities to manage reclaimed and restored mineral soils in appropriate areas.	**Regulating soil quality** **Regulating water quality** **Regulating water flow** **Regulating soil erosion**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion	Semi-natural vegetation cover Woodland Slowly permeable soil types (82 per cent)	The soils covering 82 per cent of this NCA, notably slowly permeable soil types, are not susceptible to erosion. Soils in this NCA at risk from erosion issues include: freely draining slightly acid loamy soils (1 per cent); freely draining slightly acid sandy soils (5 per cent); naturally wet very acid sandy and loamy soils (3 per cent); restored soils mostly from quarry and opencast spoil (4 per cent); slightly acid loamy and clayey soils with impeded drainage (2 per cent).	Local	The freely draining, slightly acid, loamy soils and the freely draining, slightly acid, sandy soils are prone to erosion especially where vegetation is removed or where organic matter levels are low after continuous cultivation. The naturally wet very acid sandy and loamy soils can also be prone to erosion if heavily trafficked or after heavy rain. All of these soil types are light and at risk of wind erosion, especially where coarse textured (freely draining slightly acid loamy soils), cultivated or left bare. The slightly acid loamy and clayey soils with impeded drainage are easily compacted by machinery or livestock if accessed when wet and are prone to capping or slaking, increasing the risks of soil erosion by surface water run-off, especially on steeper slopes. It is important to minimise compaction and /or capping risk on wet soils, which can arise from over-grazing, trafficking or other mechanised activities. This will reduce soil erosion as well as improve soil structure and run-off problems. **Continued on next page...**	Seek opportunities to manage, protect and increase areas of woodland and permanent grassland especially on steeper slopes and on reclaimed mineral soils in appropriate areas. Encourage opportunities to manage pastures in ways that build up organic matter and avoid compaction, for example by reducing grazing pressures, thus slowing down run-off. Manage and enhance riparian habitats to reduce soil erosion rates and trap soils before they enter into the streams. Encourage restoration and management of 'gappy' hedgerows in poor condition to act as a wind break and bind/filter out the soil in times of flood.	**Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Regulating water flow** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion cont.				**... continued from previous page** Management of the freely draining soils to encourage the build up of organic matter will not only reduce erosion problems, but will also improve soil structure and aid water infiltration. Appropriately managing woodland and grassland, particularly on steeper slopes and near watercourses, will also reduce the risk of soil erosion. The restored soils mostly from quarry and opencast spoil are highly variable and often compacted with an absence of top soil and organic matter which can make them difficult to manage. Rainfall cannot infiltrate, and they are often subject to drought in summer and very wet in winter. They are susceptible to erosion from surface run-off especially on steeper slopes.	Promote and encourage the introduction of field margins, grass buffer strips and winter stubble alongside watercourses to trap sediment.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pollination	Areas of semi-natural habitats General cropping holdings (7 per cent), horticulture holdings (3 per cent) of farmland	Some holdings are farmed for general crops and horticulture. Arable field margins are a valuable habitat for a range of wild flower species. Uncultivated field margins form a linear habitat particularly valuable for both food and wildlife cover.	Local	Natural pollination is beneficial to some crops including horticulture. Semi-natural habitats are scattered and dispersed across the landscape. Increases in semi-natural habitats would provide corridors and habitats for pollinators. Arable field margins are fragmented but important for pollination. Better management, expansion of margins and the introduction of buffer strips in cropped areas would benefit pollination and wildlife. Improvements to grass margins, hedgerow management, road verges, river corridors and other suitable locations could provide improved nectar sources.	Seek opportunities to introduce pollen and nectar strips, margins and buffer strips alongside watercourses and within the agricultural landscape, to encourage and support pollinating insects. Encourage and promote opportunities to expand permanent grassland and/or improve areas of species-rich grassland. Manage and enhance the diversity and extent of hedgerows and their margins. Seek and manage opportunities to improve road verge, parks and urban greenspace management so that they provide greater nectar sources. Seek opportunities to link areas of scattered semi-natural habitats and provide wildlife corridors through introduction of green infrastructure projects within new development.	**Pollination** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pest regulation	N/A	N/A	N/A	N/A	N/A	N/A
A sense of place/ inspiration	Varied topography of gentle hills and valleys Densely populated scattered settlement pattern Long history and legacy of mining and heavy industry Wetlands Open arable farmland to the north of St Helens More wooded character to the north-west of Wigan	A fragmented landscape created by a complex pattern of mining and industrial activity intermixed with housing and urban areas set within a gentle but varied topography. Although much of the NCA is still agricultural, its character is strongly influenced by past mining activity, industry, urban/housing areas, and the significant transport infrastructure, leading to an interesting urban and semi-rural mix. The area is dominated by a legacy of mineral extraction; derelict and reclaimed mineral workings, particularly around Wigan and St Helens. **Continued on next page...**	Regional	The complex pattern of dense settlement and past land uses, notably mining, has created a very fragmented landscape strongly linked to its mining and industrial heritage. There has been development of a significant transport infrastructure (road and rail). Sites of nature conservation interest have formed on many former industrial sites and are bringing nature back into the urban fabric. Sites such as the Wigan Flashes are popular with nearby residents for recreation and relaxation. There is strong cultural association with the past mining history and local identity is often related to individual pits and workings. Land reclamation and restoration needs to strengthen and enhance landscape character, still retaining some evidence of the industrial heritage. The mix of urban and rural is important to help retain local identity of developments and to help maintain access to open space.	Seek opportunities to protect, increase awareness of and interpret the industrial heritage and features of the NCA. Encourage farmers and land owners to conserve and enhance the patchwork of landscape features and, habitats and heritage features within the NCA. For example, manage and restore hedgerows to enhance farmed landscape, link habitats and improve green infrastructure for visual and recreational benefit. Seek opportunities to encourage urban communities to engage with the natural environment.	**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** Past mining activity has created a number of subsidence flashes which now provide important wetland habitats including open water, fen, swamp and grasslands.		There are examples where cultural heritage of the area is promoted, such as in Bold Forest Park, where the Sutton Manor Colliery closed in 1991 but has been transformed into community woodland, including the landmark sculpture "Dream". Whilst most of the colliery waste sites have been transformed for example into community woodlands or country parks, they are not integrated into the surrounding landscape and can appear to be imposed upon it. Community woodlands can form a setting for communities to engage with culture, heritage and the arts. Billinge Hill is a dominant landscape feature between St Helens and Wigan and has great cultural, recreational and heritage significance to the community.	Improve the urban-rural fringe through careful design and integration of green infrastructure with housing and industry, linking new developments with the wider countryside and assisting with assimilating new development into the landscape. Consider how restored colliery waste sites might be better integrated into the wider landscape, for example through tree and hedge planting that links with local patterns of hedgerows and woodlands. Maintain visibility and views from the summit of Billinge Hill, as well as conserving and promoting the heritage of this important feature.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history	Historic industrial/mining infrastructure including derelict colliery buildings, spoil heaps Peat deposits 5 Registered Parks and Gardens 29 Scheduled Monuments 743 Listed Buildings Traditional churches and red-brick terraces	The history of the landscape is evident from the area's strong cultural identity and links to heavy industry as well as coal mining. Little evidence of the pre-18th century landscape remains. Earlier settlement patterns are obscured by later developments but may be spotted in the old village cores visible in the distribution of churches, moated sites and place names with the element 'green'. The older farming regimes are characterised by dispersed and loose courtyard farmsteads, typically dating from 18th and 19th centuries and with 2-storey combination barns. Coal mining, glass and copper production combined with diverse manufacturing has led to a densely settled landscape of traditional red-brick terraces, and in some areas local sandstones. Historic buildings and sites evident to the general public include the Hulton, Taylor and Mesnes Parks, Knowsley Hall and Borough Cemetery, St Helens, as well as the area's traditional buildings such as its churches and red-brick terraces.	Regional	There is a strong connection between geology and the industrial heritage, linking coal mining and the underlying Coal Measures. There are examples of historic industrial buildings such as at the Wigan Pier complex and Trencherfield Mill. Increasing the sense of history has the potential to increase the sense of place. This could in turn lead to an increase in biodiversity and create recreational opportunities by reinforcing the historic character of the landscape. Areas of peat, including lowland raised bog, have the potential to preserve organic remains including pollen. As peat dries out, the organic resource will deteriorate, leading to degradation in the archaeological resource. Sympathetic management of areas with surviving peat should prevent this.	Seek ways to protect, conserve, manage and interpret the area's historic and cultural identity, in particular the town parks and greenspace, historic village cores, traditional buildings and farmsteads, industrial features, and the area's coal mining heritage to ensure a better understanding of past land use and retain evidence of the relationships between features for the future. Encourage opportunities to use the public rights of way and access network to allow communities to gain access to, reveal, interpret and enjoy the area's rich history. Raise awareness and increase understanding of the local history of the area and the importance of this at a national level. Sympathetically manage areas with potentially high archaeological resource.	**Sense of history** **Sense of place / inspiration** **Recreation** **Geodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Tranquillity	Woodlands Wigan 'flashes' Rivers Agricultural land Parks, gardens and urban greenspace	The amount of the NCA classified as 'undisturbed' has decreased from just over 15 per cent in the 1960s to 0.5 per cent in 2007. The area of greatest tranquillity is associated with the pockets of woodland and smaller settlements to the north-west of Wigan around Appley Bridge and Horrock Hill. The NCA has high levels of intrusion from urban / housing development, industry and noise, in particular it being a communications hub (M6, M61, M58, A580, mainline railways) and part of the new town of Skelmersdale.	Local	This NCA has experienced a significant reduction in tranquillity and undisturbed areas. Despite the overall low levels of tranquillity within this NCA, the parks, woodlands, urban green space, subsidence flashes and new reclaimed landscapes of mineral workings are an important source of perceived tranquillity in the local area and are highly valued for the relative tranquillity they provide. Providing increased opportunities and access to a tranquil environment through management, enhancement and expansion of existing and new woodlands and habitats will help to ease the pressure and reduce numbers at current key sites to ensure that they can remain tranquil and contribute to biodiversity, sense of place and recreation and improve local health and wellbeing.	Seek opportunities to protect and enhance remaining areas of undisturbed or less disturbed land from inappropriate development. Encourage opportunities to improve, maintain and expand habitats such as woodlands and wetlands which may increase the sense of tranquillity in the urban fringes, for example, by planting woodlands and shelter belts and ensuring any new developments are sensitively designed to reduce visual and infrastructure impacts. The Red Rose and the Mersey Community Forests provide opportunities to increase woodland and other habitats, to create tranquil areas for people to enjoy. There are opportunities for regeneration and mineral reclamation projects and new housing or industrial developments to provide quiet enjoyment through additional managed green spaces for people.	**Tranquillity** **Sense of place / inspiration** **Recreation** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation	Network of footpaths Open access land Mersey and Red Rose Community Forests Flashes and water bodies Country parks Local Nature Reserves Registered Parks and Gardens	805 km public rights of way (density of nearly 2 km per km^2), cycle routes, together with open access land (550 ha), public forest estate (446 ha), country parks (513 ha), Local Nature Reserves (382 ha) and 5 Registered Parks and Gardens provides recreational access and facilities for quiet enjoyment. This is supported significantly by the initiatives of the Mersey and Red Rose Forests, both Community Forests which cover just less than 88 per cent of the NCA.	Local	Only 6 per cent of the Lancashire Coal Measures is classified as being publically accessible. There are large populations locally both within the many towns of the Lancashire Coal Measures and the two adjacent conurbations. Communities value their local greenspaces as places of local distinctiveness that provide opportunities to engage with nature close to where they live and work to improve physical and mental health and encourage a sense of community. While the extent of open access land is limited, the large population within the Lancashire Coal Measures has access to many public rights of way, as well as Community Forest areas, country parks, Local Nature Reserves, and urban greenspaces. These are being linked to the developing recreational potential of the flashes, water bodies and significant areas of reclaimed mineral workings and old railway lines which are providing a new and emerging network of open space. Similarly, the canal network is used for coarse fishing as well as recreational boating, while the towpath is used for walking, cycling and horse riding on some sections of the Leeds and Liverpool Canal. New recreational opportunities could be developed in some areas enabling people to enjoy the natural environment sustainably without significant effects on other services. Local woodlands and the two community forests have generated local interest to increase woodland habitats, create wildlife corridors and access for people.	Seek opportunities to improve access by ensuring that paths are maintained and well signposted, creating new/circular routes, and some surfaced paths suitable for all levels of ability and interest at key locations. Seek opportunities to provide increased access to green spaces, especially within urban areas, new developments and urban fringe so communities can connect with their local green spaces. Seek opportunities to increase recreation provision through access to and interpretation of historical mineral and industrial sites and their restoration. Provide interpretation of the landscape, its history and its features.	**Recreation** **Sense of place / inspiration** **Sense of history** **Biodiversity** **Geodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity	Semi-natural habitats Sites of Special Scientific Interest (SSSI) and Local Wildlife Sites Flashes, wetlands and ponds Rivers Species	The NCA has a limited extent of biodiversity priority habitats, the most significant being; small areas of lowland raised bog, purple moor grass and rush pasture, lowland meadows, reedbeds, lowland dry acid grassland and broadleaved, mixed and yew woodland (broad habitat). It contains no internationally designated sites and only 200 ha are nationally designated as SSSI. There are 256 Local sites covering 2,673 ha (7 per cent of NCA).	Regional	Designated sites make up only a small percentage of the NCA, however, conservation, management and enhancement of priority habitats outside of these areas is very important for biodiversity and nature conservation in the countryside and urban fringe. Many habitats and species are of local conservation importance and require action in order to conserve them. Conserving and enhancing the network of local wildlife sites, improving their biological condition through land management activities will also help species to adapt to climate change, link habitats and allow species movement to strengthen populations. Highfield Moss SSSI is significant for its wet heath/mire and is the only site for marsh gentians in Lancashire, Greater Manchester, Cheshire, and Merseyside. Populations of water vole are found at many wetland sites such as Red Moss and the Wigan flashes. Management and enhancement of the subsidence wetlands is important for overwintering wildfowl, breeding birds including willow tit, bittern, gadwall and several species of dragonfly. **Continued on next page...**	Encourage improved management to bring and maintain priority habitats, into favourable condition. Encourage opportunities to expand and extend habitats such as woodlands, wetlands and ponds. Seek ways to manage land adjacent to the isolated pockets and linear habitats to ensure that they are protected, expanded, buffered and linked, to increase habitat connectivity and allow species movement especially along rivers, water bodies, road verges and ponds. Encourage and seek local/ community opportunities to promote sustainable recreation, public understanding and enjoyment and educational opportunities linked to biodiversity.	**Biodiversity** **Sense of place / inspiration** **Regulating water quality** **Regulating water flow** **Recreation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity cont.				**... continued from previous page** Conservation of field ponds is important to maintain breeding sites for amphibians, such as great crested newt. Ponds may also serve as habitat "stepping stones" assisting local wildlife migrations and increasing the variety of species on farmland and in urban areas. There is a small, but important, ancient woodland resource. Pockets of habitats are often fragmented by housing and industrial land use. Post-industrial sites are developing into important habitats for wildlife. Consideration should be given to surrounding areas to promote linking of habitats and populations to provide a more integrated approach, for example, managing and restoring field margins; providing buffers along watercourses; planting new woodlands; creating linear wildlife corridors along rivers, railways and roads; managing and extending green spaces within urban areas to improve connectivity. **Continued on next page...**	Encourage improved management of arable farmland and grassland through increased uptake of environmental incentive schemes to provide a mixed landscape of open fields, well-managed hedgerows, mosaics of uncut grass, stubbles and margins and small woodlands to benefit species such as arable and farmland birds and brown hare. Seek to protect the ancient woodland resource. Seek to improve restoration of mineral sites and subsidence flashes, maintaining their water flow and quality to maximise their value to wildlife and biodiversity.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity cont.				**... continued from previous page** Connectivity is important, particularly north-south as the area lies in a corridor between two major conurbations. The urban fringe location of many species and habitats enables people to experience and enjoy biodiversity close to home at country parks, Local Nature Reserves and other local green spaces. The improved management of arable farmland and grassland with its open fields, hedgerows, uncut grass and small woodlands would benefit brown hares and also provide year-round habitat for many arable and farmland birds.	Encourage opportunities to incorporate green infrastructure projects into new developments especially on the urban fringe to enhance sense of place, recreational and biodiversity value and to make a positive contribution to health and well being. Seek to restore hedges and hedgerow trees, establish woodland where appropriate and expand riparian planting along water courses. Diversifying the landscape will support hare populations.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Geodiversity	Ravenhead Brickworks SSSI 45 Local Geological Sites	The Lancashire Coal Measures are mantled by a patchy layer of glacial deposits. The Upholland Ridge forms the western boundary to this area and is formed from an upstanding faulted slice of resistant Millstone Grit within the Coal Measures. There is currently 1 nationally designated geological SSSI within the NCA and 45 Local Geological Sites.	Regional	This NCA includes important sites for Carboniferous stratigraphy and fossils. The Lancashire Coal Measures contains once economically important coal seams used in local industries. Geological sites provide important and often publicly accessible rock sections allowing the interpretation, understanding and continued research into the geodiversity of the NCA. The successions at Ravenhead Brickworks SSSI are of vital importance to improve our understanding of the environment and the deposition of the Productive Coal Formation, not only within the Pennine Basin, but also within the UK as a whole. The reclamation of mineral workings and restoration of extraction sites, spoil heaps and subsidence flashes, provides opportunities to link human activities with a sense of place and history while increasing habitats for wildlife.	Encourage and seek opportunities to maintain the diversity and integrity of geological and geomorphological features within the NCA link them to the history of the area and enhance their value for interpretation, education, recreation and visual amenity. Encourage initiatives to improve public access to and understanding and enjoyment of the area's geology.	**Geodiversity** **Biodiversity** **Sense of place / inspiration** **Sense of history** **Recreation**

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Front cover: This is an area with close intermingling of agriculture, housing and industry centred on Wigan and St Helens, based around the historical development of coal mining. © Natural England/Jon Hickling

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