



## Introduction

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

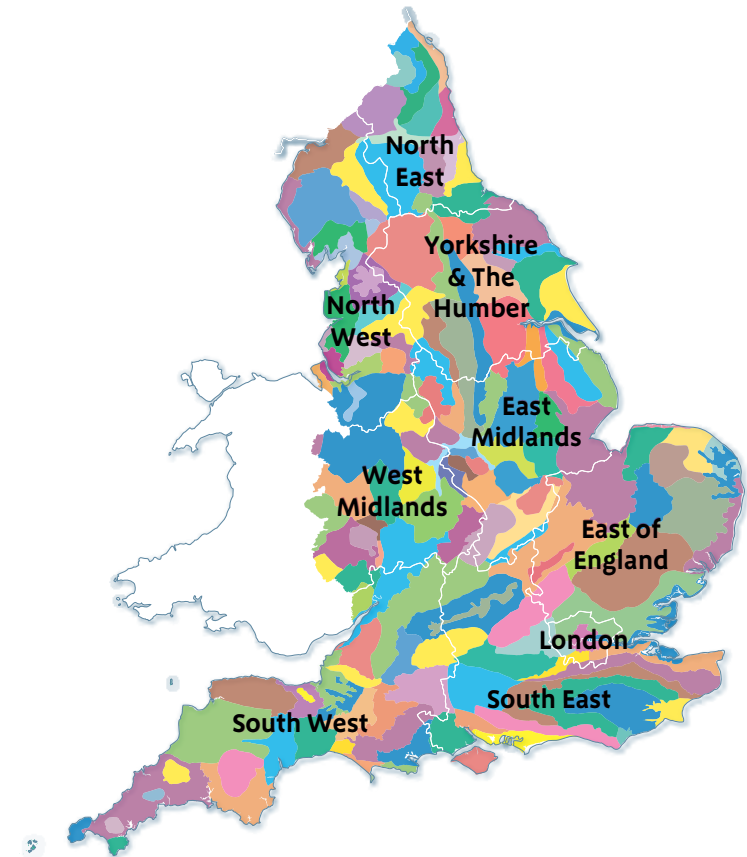
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and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

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

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

We would like to hear how useful the NCA profiles are to you. You can contact the NCA team by emailing [ncaprofiles@naturalengland.org.uk](mailto:ncaprofiles@naturalengland.org.uk)

## National Character Areas map



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

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

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

## Summary

The Mersey Valley National Character Area (NCA) consists of a wide, low-lying river valley landscape focusing on the River Mersey, its estuary, associated tributaries and waterways. It is a varied landscape that extends from the mosslands near the Manchester Conurbation NCA in the east, to the Merseyside Conurbation NCA and the wide estuary with intertidal mudflats/sand flats and salt marsh in the west. The River Mersey is tidal from Howley Weir in Warrington. The area encompasses a complex mix of extensive industrial development and urban areas, with high-quality farmland in between.

Farmland in the north of the Mersey Valley NCA is predominantly arable, while in the south there is a mix of arable and pasture. Field pattern is regular and large scale, often defined by degraded hedgerows with isolated hedgerow trees. In the east, open, flat farmland is found on the rich, dark peaty soils of the former mosses, with a complex network of drainage ditches.

Urban and industrial developments line the banks of the River Mersey. Industrial infrastructure is often prominent, with large-scale, highly visible development including chemical works and oil refineries. The Manchester Ship Canal links the estuary to the heart of Manchester, perpetuating the industrial development of the area. There is a dense communication network of major roads, railways, canals and transmission lines. The urban and suburban areas provide housing for those working in neighbouring conurbations, as well as in the industries of the Mersey Valley.

The Mersey Estuary's extensive intertidal mudflats/sand flats and fringing salt marshes sustain internationally significant bird populations. There are remnant pockets of lowland raised bog, including the Manchester Mosses Special Area of Conservation, centring on a once extensive area of mossland. Rixton Clay Pits are a mosaic of pools and other habitats, with an internationally designated population of great crested newts.

The habitats around the rivers and the estuary provide a natural defence against flooding. Positive management of the area's organic soils and wetlands such as lowland raised bogs could result in significant gains in carbon sequestration. Local Nature Reserves and country parks offer opportunities for people to enjoy the natural environment.

Key challenges include integrating the development pressures associated with the towns, industry and transport, with the protection and enhancement of the landscape and the internationally significant habitats. Understanding, planning for and adapting to climate change, particularly in the dynamic estuary and river environment, is a further challenge. There are opportunities for providing accessible greenspace and recreational provision, as well as improving habitat quality and distribution. Other benefits could include providing better water quality and storage, minimising soil erosion and increasing carbon storage. All these can strengthen landscape resilience and adaptation to climate change.

Click map to enlarge; click again to reduce.



Part of a relict mossland on a farm in Glazebury, which has been restored under environmental stewardship.

## Statements of Environmental Opportunity

- **SEO 1:** Conserve and enhance the Mersey Valley's rivers, tributaries and estuary, improving the ability of the fluvial and estuarine systems to adapt to climate change and mitigate flood risk while also enhancing habitats for wildlife and for people's enjoyment of the landscape.
- **SEO 2:** Promote the Mersey Valley's historic environment and landscape character and positively integrate the environmental resource with industry and development, providing greenspace within existing and new development, to further the benefits provided by a healthy natural environment, as a framework for habitat restoration and for public amenity.
- **SEO 3:** Manage the arable and mixed farmland along the broad linear Mersey Valley, and create semi-natural habitats, woodlands and ecological networks, to protect soils and water, enhance biodiversity, increase connectivity and improve the character of the landscape, while enabling sustainable food production.
- **SEO 4:** Manage and enhance the mossland landscape in the east, safeguarding wetlands including the internationally important lowland raised bogs, to conserve peat soils, protect and enhance biodiversity, conserve archaeological deposits, contribute to landscape character and store carbon.

## Description

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

The Mersey Valley and Merseyside Conurbation National Character Areas (NCAs) lie within the same river basin and share a similar ecological character. The River Mersey forms a central, low-lying area and a corridor of movement for wildlife. The Mersey Estuary, an area of transition from marine to freshwater habitats, supports marine, subtidal and terrestrial maritime species. The significant mosaic of remnant mosses to the west of Manchester forms an important corridor of wetland habitats, linking with the Lancashire Coal Measures NCA in the north.

The River Mersey starts at the confluence of the River Tame and the River Goyt in the Manchester Conurbation NCA. It flows west, passing through Warrington where the river becomes tidal. It widens to form the upper Mersey Estuary between Warrington and Runcorn. The Mersey Estuary continues towards the Merseyside Conurbation NCA, and flows into Liverpool Bay in the Irish Sea. The Mersey Estuary Special Protection Area (SPA) and Ramsar site crosses both the Mersey Valley and the Merseyside Conurbation NCAs.

There are expansive views available from open and elevated land and the Mersey Estuary. In the west of the NCA, the Mersey is estuarine in character with intertidal mudflats/sand flats, salt marsh and low exposed cliffs. This creates an almost flat landscape with broad panoramic views. The vast industrial developments at Runcorn dominate views from across the Shropshire, Cheshire and Staffordshire Plain and the Cheshire Sandstone Ridge NCAs and from the M56 motorway. To the west of Runcorn, the valley widens out and intertidal areas, along with neighbouring NCAs, become more evident. In contrast, views from urban areas are typically limited by the relative flatness of the flood plain.

The Mersey Valley and Merseyside Conurbation NCAs share a number of major communication routes, with roads, rail and electricity power lines crossing the area. Motorway and mainline railway networks are dominant features of the landscape as major east–west and north–south infrastructure routes cross, for example the M6, M56 and M62. There are a number of significant waterways, including the Manchester Ship Canal. Many of the settlements provide housing for those working in the Merseyside and Manchester conurbations, as well as in the industries of the Mersey Valley.



**Expansive views from open and elevated land, including intertidal mud/sand flats and saltmarsh in the Mersey Estuary. The vast industrial developments at Runcorn dominate many views.**

## Key characteristics

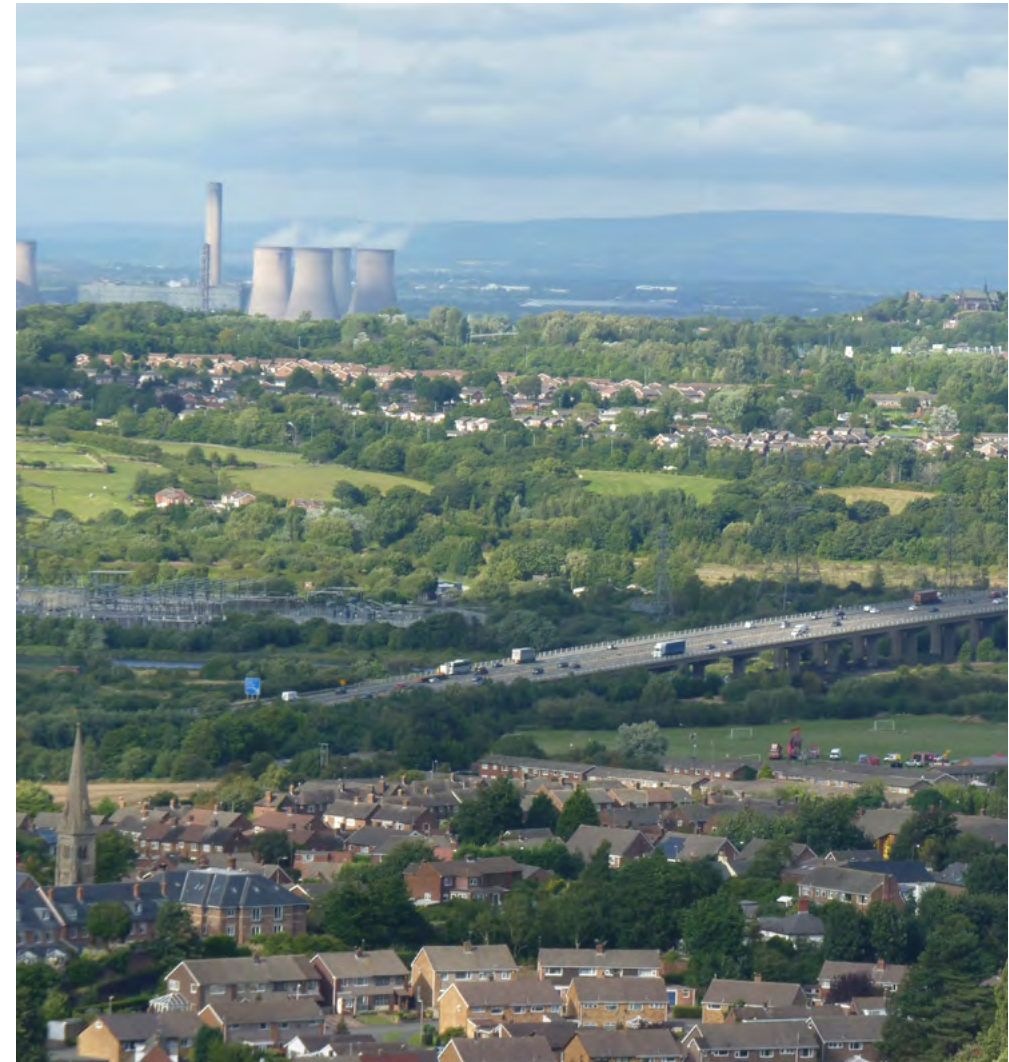
- The landscape is low-lying, focusing on the broad linear valley of the River Mersey; it is estuarine in the west and has extensive areas of reclaimed mossland in the east.
- Underlain by Triassic sandstone, the surface geology is principally drift material: marine and river alluvium in the valley bottom, extensive areas of till, pockets of glacial sands and gravels, with peat in some drainage hollows.
- The Mersey Estuary is a defining element in the landscape, with expansive intertidal mudflats/sand flats and low exposed cliffs.
- The River Mersey flows from east to west, joined by associated tributaries, although the Mersey itself is often obscured from view.
- Trees and woodland are mainly associated with settlements, occasional parkland and isolated woodland blocks; and in recent years new community woodlands have been planted.
- Large-scale, open, predominantly flat, high-quality farmland occurs between developments, with primarily arable farming to the north of the valley and a mixture of arable and dairying to the south.
- The field pattern is regular and large scale, often defined by hedgerows with isolated hedgerow trees; many hedgerows are intermittent and have been replaced by post-and-wire fencing, while field boundaries on the mosses are marked by ditches.
- A range of important wetland habitats remain, including estuarine mudflats/sand flats and fringing salt marshes in the west, remnants of semi-natural mosslands and pockets of basin peats in the east, with the broad river valley in between.
- The predominant building material is red brick though some sandstone construction remains, and some survival of earlier timber frame.
- There are densely populated urban and suburban areas, with major towns particularly at the river crossings, including Runcorn, Widnes and Warrington.
- There is large-scale, highly visible industrial development, with docks, chemical works and oil refineries.
- The river valley has a dense communication network with motorways, roads, railways and canals running east-west, and power lines are also prominent.

## The Mersey Valley today

The Mersey Valley NCA consists of a wide, low-lying river valley landscape focusing on the River Mersey, its estuary, associated tributaries and waterways, although the Mersey itself is often obscured from view. It is a varied landscape that extends from the Merseyside Conurbation NCA and the wide Mersey Estuary in the west, to the flat mosslands near the Manchester Conurbation NCA in the east. The area encompasses a complex mix of extensive industrial development and urban areas, with high-quality farmland in between.

This is an area defined largely by its generally low-relief topography, with an average elevation of just 23 m, rising locally to 144 m towards the Cheshire Sandstone Ridge NCA. The south side of the valley slopes more steeply than the north. The River Mersey flows from east to west, forming a central, low-lying area.

The River Mersey is a defining element in the landscape, having created the valley landform and contributed to the area's industrial and settlement history. Throughout the area the river is heavily controlled with high levee banks and course straightening. Downstream of Howley Weir in Warrington, the Mersey is tidally influenced, flowing into a large sheltered estuary on the Irish Sea coast. The Mersey Estuary has extensive intertidal mudflats and sand flats, which are exposed at low tide, and fringing salt marshes. The rising and falling of the tide make this a dynamic landscape, as the nature of views is constantly changing. The River Mersey itself, however, is often obscured, inaccessible, and blocked from view by industry. In Ellesmere Port, for example, it is barely obvious at all that the town is situated on the Mersey.



The Mersey Valley has a dense communication network, crossed by roads, motorways and power lines.

Areas of generally high-quality agricultural land are intermixed between urban and industrial development. Two substantial bands of farmland follow the slopes of the Mersey Valley, though these are often fragmented at the periphery of urban and industrial developments. To the north of the Mersey, the farmland has a large-scale, open character dominated by arable fields. To the south, the area is a mix of arable and dairying. In the east of the Mersey Valley, open, flat farmland occurs on the rich, dark peaty soils of the former mosses. A few small remnants of semi-natural mossland vegetation remain, but in general this is a highly cultivated landscape dissected by a complex network of drainage ditches. The diversity of farmland provides a significant habitat for farmland birds.



Large-scale, open, predominantly flat farmland is interspersed between development and densely populated urban and suburban areas.

The field pattern is generally regular and large-scale, but within an inherited framework of earlier irregular boundaries. Fields are often defined by hedges with isolated hedgerow trees. Many of the hedgerows are intermittent and have been replaced by post-and-wire fencing. Ditches form the field boundaries on the mosses.

Trees and woodland are mainly associated with settlements. There are some trees along field boundaries and watercourses, and isolated woodland blocks particularly in the east. In recent years new community woodlands have been created, adding to the greenspace resource for local people and improving the image of the area. The area is covered by Mersey Forest and Red Rose Forest community forests, together providing a network of green spaces, woodlands and street trees and creating high-quality environments.

The Mersey Valley NCA is particularly important for the concentration of lowland fens and lowland raised bogs. While most mossland has been converted to agriculture or lost to development, several examples have survived as degraded raised bog on the Mersey flood plain. This centres on the once extensive area of mossland known as Chat Moss. Risley Moss, Astley and Bedford Mosses and Holcroft Moss form the internationally recognised Manchester Mosses Special Area of Conservation (SAC). The intertidal mudflats/sand flats, salt marshes and rocky shores of the Mersey Estuary provide feeding and roosting sites for internationally significant bird populations, with extensive areas designated as a Ramsar site and an SPA. The Atlantic salmon has begun to return to the River Mersey and its tributaries. There are large areas of flood plain grazing marsh habitat in the area, notably at Frodsham, Helsby, Ince Marshes and Goway Meadows, providing habitats for wading birds, amphibians and mammals.



Rixton Clay Pits are parts of an extensive disused brickwork quarry excavated in glacially derived clay deposits. Extraction of clay has left a mosaic of pools surrounded by diverse habitats including species-rich grassland, scrub and woodland. Here, among the amphibians common frog, common toad and smooth newt, is an internationally important breeding population of great crested newts, and the area has been designated as an SAC. Other wetland sites include Woolston Eyes Site of Special Scientific Interest (SSSI), where lagoons set aside to receive dredging from the Manchester Ship Canal form large areas of open water, reedbed and scrub vegetation. The site is nationally important for wintering wildfowl and supports a diverse breeding bird assemblage.

The character of this landscape has been highly influenced by the urban and industrial developments lining the banks of the River Mersey. The high density of urban areas has led to landfill developments appearing in the landscape. Artificial deposit grounds are also visible, such as ash lagoons at Fiddlers Ferry. Industrial infrastructure is often prominent, with large-scale, highly visible development including docks, chemical works and oil refineries. Notable landmarks are typically represented by infrastructure such as Runcorn Bridge, the Manchester Ship Canal, expansive industrial sites and Fiddlers Ferry Power Station. The cumulative effect is a complex mix of industrial and urban areas, intermingled with high-quality farmland and the estuary.

The area is densely populated with the towns of Warrington, Widnes, Runcorn, Ellesmere Port, Frodsham and Irlam, as well as some extensive villages such as Culcheth and Lymm, often providing housing for commuters to Liverpool and Manchester. Urban areas are often interspersed with greenbelt. The predominant building material is brick, although traditional red sandstone construction survives in limited areas, as well as extremely rare examples of timber-framed construction. Welsh slate and clay tile roofs can be found. While the older housing stock is characterised by red brick building materials, with some earlier timber frame, the proliferation of materials in more recent

development has created an overall disjointed character associated with a mix of building styles.

The majority of the NCA has low levels of tranquillity, with the comparatively highest tranquillity levels being found in the Mersey Estuary, and around the mosslands towards Manchester.

The Mersey Valley has a dense communication network running both east to west and north to south, with major motorways, roads, railways and canals. The Manchester Ship Canal runs roughly parallel with the Mersey from Eastham, on the southern shore of the Mersey Estuary, almost to the centre of Manchester. The Bridgewater Canal crosses the Mersey Valley, creating a recreational link with the neighbouring urban areas of Manchester to the east and Leigh to the north, and meets with the Manchester Ship Canal at Runcorn Dock. The Shropshire Union Canal and Leeds and Liverpool Canal also pass through this NCA, while the route of the former Sankey Canal runs through Warrington to the Mersey Estuary at Runcorn. The River Weaver is navigable in its lower reaches. The area is crossed by transmission lines such as those radiating out from Fiddlers Ferry Power Station. A number of major roads cross the area, including the M6, M56 and M62 motorways. The West Coast Main Line crosses this NCA, while a large part of this area is occupied by Liverpool Airport. Recreational trails also serve to connect people, including the long-distance footpaths of the Trans Pennine Trail, Sandstone Trail and Mersey Way.

Recreation is supported by the area's rights-of-way network. The large populations locally, both within the towns of the Mersey Valley and the two adjacent conurbations, have access to the canal network, local nature reserves and country parks, as well as more formal facilities such as golf courses. There are also parklands such as Dunham Massey Park, Castle Park (Frodsham) and Walton Hall Gardens.

## The landscape through time

The solid geology of the Mersey Valley is dominated by red sandstones and mudstones of Triassic age (248–205 million years old) that underlie virtually the entire area. To the south of the River Mersey, the landform is a series of low, but prominent, sandstone ridges. These harder, coarse, red sandstones outcrop along the Mersey Valley between Lymm and Runcorn. They also form prominent cuesta features that overlook the towns of Frodsham and Helsby. Pebbles are scattered through the sequence and include the well-known Chester Pebble Beds. Mudstones of the Triassic Mercia Mudstone Group underlie much of the land to the north of the Mersey Estuary and east to Warrington. The Permo-Triassic sandstone forms an important aquifer, providing public and private water supplies to towns, farms and industry.

Surface outcrops of the underlying geology are rare and the majority of the Mersey Valley is mantled by thick deposits of till and pockets of Quaternary-age sand and gravel that formed in and beneath glaciers and ice sheets. During the last glacial advance, ice deposited till, sands and gravels over much of the Mersey area. Also associated with the glacial advance are deposits of fine, wind-transported silt known as loess. Brick earth deposits are a notable feature near Rixton. An important feature in the east of the Mersey Valley is the occurrence of peat where mosslands developed in drainage hollows in the early post-glacial period. They are most common on the western fringe of Manchester and include areas such as Chat Moss.

The Mersey Valley has historically formed a natural frontier zone with the Mersey channel providing a natural barrier of water, tidal flats and marshland. The valley may also have formed a provincial boundary during the Roman period and possibly a tribal frontier even earlier. This frontier land once contained many fortifications, most of which have been lost to modern industrial development.



Frodsham Road and Railway Cuttings Site of Special Scientific Interest; a sequence of sandstones representing the upper part of the Triassic Helsby Sandstone Formation.

Prehistoric settlement appears to have been located close to the River Mersey, or its tributaries, on minor promontories, which in the east avoided the areas of mossland. A Roman industrial settlement was established at Wilderspool, Warrington, at a convenient crossing point across the Mersey, and a Roman road running between Northwich and Wigan crossed the Mersey Valley at this point.

During the medieval period, the route of the Roman road continued to be used and the area contained several medieval moated sites, while medieval towns were established at Warrington, Halton, Hale and Widnes.

Ancient enclosures are poorly represented, with scattered examples most notable to the east, between Warrington and Urmston. For the most part, the area is characterised by successive changes to the underlying pattern of ancient fields – improvements and modifications in the 18th, 19th and 20th centuries matched to urban demands. The resulting pattern is predominantly arable to the north of the River Mersey and mixed with dairying to the south. In the late 18th century and 19th century, the regular pattern of enclosed fields, found to the south of the Bridgewater Canal and extending south into the Cheshire Plain, resulted from estate improvements and the intensification of the cheese industry – a defining feature of the Cheshire Plain. Agricultural expansion to feed the growing population in Manchester started to have an impact on the mosses in the late 18th century.

The River Mersey was first made navigable between Manchester and Warrington in the early 18th century. Sections of the River Weaver were also made navigable in the 18th century. The earliest canals in the area were constructed from the mid-18th century. The Bridgewater Canal was constructed to enable coal from a mine at Worsley, along with other goods, to be transported efficiently and cheaply to the rapidly expanding towns and cities.

In the 19th century, ports connected to the canal system were established at Runcorn, Widnes and Ellesmere Port. The railway network linking Manchester and Liverpool opened in 1830. The Manchester Ship Canal, built between 1887 and 1894, allowed seagoing vessels to navigate from Ellesmere Port to the newly constructed docks at Salford.

Also in the 19th century, the industrial development of ship-building, engineering, tanning and the manufacture of soap and alkali were established at Runcorn; and chemical factories at Widnes. The proximity of the Lancashire coalfields to the north and the salt and ore deposits of the Cheshire Plain to the south allowed the areas around Runcorn, Widnes and Warrington to become the focus for major chemical industries, steel and wire works, textiles, tanning and breweries.



There are a number of significant waterways including the Manchester Ship Canal.

Many of the mosslands were reclaimed for arable land in the 20th century. When it became technically feasible to drain the bogs, peat cutting was carried out on a larger scale and, with the addition of manure or fertiliser, conversion to arable farmland also became a viable option. By the early part of the 20th century, very little peat bog remained unaltered. Elsewhere, hedgerows have suffered through field expansion, neglect, and replacement with post-and-wire fencing.

During the 20th century, the manufacture of chemicals remained a significant industry. The focus of the chemical industry became Runcorn, while at Widnes many former chemical plants were redeveloped for new industrial uses. New industries in light manufacturing, new technology and oil refining were also established in the Mersey Valley. There is evidence of anti-aircraft gun sites defending the Mersey Valley and the conurbations during the Second World War. The ordnance works at Risley formed a large military establishment. Cold War sites include nuclear bunkers and the vast US Army depot at Burtonwood.

In the 20th century, residential development saw significant expansion. The populations of Runcorn and Warrington doubled in the latter part of the 20th century following the construction of new towns in both of these settlements. The rapid expansion and industrial background of many of the towns have limited the potential for historic character to influence the appearance of urban areas. A network of motorways and large roads has been constructed to serve the major towns and industrial areas and link the neighbouring conurbations. Heavy industry declined in the 1970s and 1980s but the growth of the new towns led to a great increase in employment in light industry, distribution and technology.

In the 21st century, the area continues to be a focus for industrial and housing development, as well as new and upgraded transport routes. Liverpool Airport has expanded, with the completion of a new passenger terminal in 2002. Construction on the new 2 km-long Mersey Gateway crossing between Runcorn and Widnes starts in 2014. The loss and decline of mosslands have largely halted and there have been significant areas brought into conservation management.



Industrial infrastructure is often prominent, with large-scale, highly visible, development including chemical works and oil refineries lining the banks of the Mersey.

## Ecosystem services

The Mersey Valley NCA provides a wide range of benefits to society. Each is derived from the attributes and processes (both natural and cultural features) within the area. These benefits are known collectively as 'ecosystem services'. The predominant services are summarised below. Further information on ecosystem services provided in the Mersey Valley NCA is contained in the 'Analysis' section of this document.

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

- **Food provision:** To the north of the River Mersey, agriculture is dominated by arable cultivation and to the south pasture becomes more frequent, with mixed farming (arable and dairying) predominating. On the dark, rich peaty soils of the former mosses, farming is mixed. Over 30 per cent of this NCA is Grade 1 or Grade 2 agricultural land. Sustainable agricultural practices can contribute to the production of high-quality food.
- **Biomass energy:** There may be some opportunities within the Mersey Valley NCA for both short rotation coppice (SRC) and miscanthus to be accommodated without significant landscape effects, due to the low-lying valley character, the complex land use pattern including arable and mixed farmland, and the existing urban influence on the landscape. Power stations locally are exploring ways of achieving more energy production through use of renewable biomass sources, and their decisions may have an impact on the crops grown in close proximity. Provision of SRC and miscanthus as a source of renewable energy could contribute towards addressing climate regulation. There are opportunities from arboricultural arisings and waste wood as well as small amounts from existing woodland including the newer community woodlands.

- **Water availability:** Surface water abstraction within the NCA is heavily dominated by industrial abstraction, and to a lesser extent, agriculture. There are no surface water abstractions for public water supply primarily due to water quality issues. In contrast, the main abstraction from groundwater is for domestic water supply. The Triassic sandstone forms an important aquifer.

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

- **Climate regulation:** Large areas of soils with a high carbon content occur, reflecting the NCA's soil types which contain organic-rich or peaty layers. The peaty and organic soils of the NCA have an important role in carbon sequestration and storage. Adopting management options that reduce the soil disturbance, erosion and oxidation is likely to result in retaining carbon stores. Carbon storage and sequestration are provided by the NCA's woodland, mudflats, salt marsh and marine sediments. Positive management of wetland, woodland and estuarine habitats could result in carbon sequestration, and woodland creation in suitable locations could further increase this.
- **Regulating water quality:** Water quality is variable, reflecting pollution from the industrial heritage of the NCA, as well as other sources of pollution. Significant improvements in water quality have occurred in the catchment area over recent years. In urban areas, the waterside is now seen as a positive focus for regeneration. Improvements to water quality mean that salmon and sea trout have returned to the River Mersey. However, there is still much to be done to address water quality issues. Habitats such as woodlands, wetlands and grasslands can help to capture sediments and contaminants before they enter watercourses.

- **Regulating water flow:** The River Mersey flows west through the NCA and enters the Irish Sea at Liverpool Bay. The Mersey is tidally influenced downstream from Howley Weir (Warrington). The catchment is largely low-lying with a few steeper areas. The catchment has been heavily modified for industrial purposes, and this has affected the natural response of river flows. The Manchester Ship Canal, which was built for navigation, reduces fluvial flood risk through Warrington. The response to rainfall is generally slow but is much faster for some of the smaller tributaries flowing through urbanised areas. Some properties are at risk of fluvial flooding, including in Warrington. Where rivers discharge into an estuary, such as the River Weaver at Runcorn, there can potentially be either a fluvial or tidal flood event or both at the same time. Wetlands, woodlands and other habitats can alleviate speed of run-off.



The Silver Jubilee Bridge crosses the River Mersey and the Manchester Ship Canal at Runcorn Gap between Runcorn and Widnes.

- **Regulating coastal flooding and erosion:** Intertidal mudflats/sand flats and salt marsh vegetation in the Mersey Estuary are subject to tidal flooding. Intertidal habitats such as mudflats/sand flats and salt marsh effectively absorb the energy of waves, and thus provide a natural defence against sea level rise and flooding. These habitats are valuable for control of sea flooding but are under threat due to sea level rise, and the consequent coastal squeeze. The process of erosion and accretion on mudflats/sand flats and salt marshes is necessary to maintain a succession of diverse habitats.

#### Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration:** Senses of inspiration and escapism may be provided by the broad panoramic views to the west across the Mersey Estuary. The many views of the extensive industrial complexes and docks, lit up at night, can also be dramatic and inspirational. The natural heritage of the river valley is important, being close to where people live as well as providing valuable wildlife corridors, and contributes to providing a sense of place and inspiration. Communities also value their local green spaces as places of local distinctiveness that provide opportunities to engage with nature close to where they live and work, and that helps to encourage a sense of community.
- **Sense of history:** The history of the landscape is largely associated with the River Mersey and Estuary, including evidence of strategic crossing points in the form of ancient fortifications at Warrington. Areas of peat have the potential to preserve organic remains, such as pollen. There is extensive industrial heritage, particularly linking to the development of the ports, trade, industry, canals and railways. There is evidence of sites defending the Mersey Valley during the Second World War as well as Cold War sites. Other aspects of history likely to be particularly evident to the public are the reclaimed mosslands and the Registered Parks and Gardens of Dunham Massey and Castle Park (Frodsham).

- **Recreation:** There are large populations locally, both within the towns of the Mersey Valley and the two adjacent conurbations. Local woodlands and the two Community Forests have generated local interest to increase woodland and other habitats, create wildlife corridors and provide access for people. Local Nature Reserves and country parks also provide opportunities for people to enjoy the natural environment. Communities value their local green spaces 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.
- **Biodiversity:** The Mersey Estuary is of international significance, with large areas designated as a Ramsar site and as an SPA for its extensive intertidal habitats such as mudflats and internationally important bird populations. Examples of degraded raised bog habitat have survived on the Mersey flood plain, including the Manchester Mosses SAC. The ponds at Rixton Clay Pits SAC provide breeding sites for an important population of great crested newts. Other wetland sites include Woolston Eyes SSSI, where lagoons set aside to receive dredging from the Manchester Ship Canal form large areas of open water, reedbed and scrub vegetation.
- **Geodiversity:** Peat-forming bogs and the dynamic intertidal environments are both examples of active geomorphological processes. Geological exposures, for example of sandstone sequences, make an important contribution to understanding of the origin and geological development of the NCA.



Rixton Clay Pits are a mosaic of pools and other habitats, with an internationally designated population of great crested newts. The site is also a Local Nature Reserve, providing opportunities for people to enjoy and learn about the natural environment.

## Statements of Environmental Opportunity

**SEO 1: Conserve and enhance the Mersey Valley's rivers, tributaries and estuary, improving the ability of the fluvial and estuarine systems to adapt to climate change and mitigate flood risk while also enhancing habitats for wildlife and for people's enjoyment of the landscape.**

**For example, by:**

- Maintaining and enhancing the Mersey Estuary Special Protection Area (SPA) and Ramsar site; bringing habitats into and maintaining favourable condition, such as the intertidal sediments and salt marshes to support the internationally important populations of migratory bird species and assemblage of waterfowl.
- Maintaining and enhancing the biodiversity of the Mersey Estuary, its tributaries and its wider flood plain, including adjacent farmland and wetland that provide habitats supporting wildlife.
- Conserving the open and exposed character of the mudflats/sand flats and salt marshes along the Mersey Estuary, with its expansive estuary views, and enhancing the estuarine habitats that contribute to landscape character and support the wide range of wildlife.
- Improving understanding of the many features and functions of the Mersey Estuary, including its active geomorphological processes and wildlife value, making provision for it to adapt to coastal change.
- Ensuring the retention of mudflats and salt marshes where possible, and allowing space for the continuing dynamic estuarine processes, to retain biodiversity and geomorphological interest and provide a cost-effective defence against erosion/flooding.
- Promoting opportunities to improve the natural functioning of the Mersey Estuary and potentially reduce flood risks through providing space for intertidal habitats to develop and move in response to coastal change, to enhance estuarine habitats and create additional habitats by managed realignment at strategic locations.
- Working with key partners and landowners to identify suitable sites for flood storage, as well as optimising design and implementation of future flood storage areas to create new wetland habitats, such as flood plain grazing marsh, and creating links with existing semi-natural habitats.
- Identifying river stretches for restoration (for example, re-connecting rivers to their flood plains) and taking opportunities to de-culvert and re-naturalise rivers and remove redundant weirs and other obstacles, to provide space for water storage and alleviate speed of run-off, as well as providing connectivity and habitats for wildlife.
- Maintaining and enhancing semi-natural grassland, flood meadows and wet grasslands associated with river flood plains as feeding and breeding sites for wetland birds and for their botanical interest; maintaining and enhancing the coastal and flood plain grazing marshes bordering the River Mersey and its tributaries, to attract wetland birds and as refuges for estuarine species at times of severe weather.

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**SEO 1: Conserve and enhance the Mersey Valley's rivers, tributaries and estuary, improving the ability of the fluvial and estuarine systems to adapt to climate change and mitigate flood risk while also enhancing habitats for wildlife and for people's enjoyment of the landscape.**

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- Managing and enhancing habitats such as wetlands and grasslands to capture sediments and contaminants before they enter watercourses; and establishing buffers such as permanent grassland along watercourses.
- Enabling sustainable recreational and educational access for people to sensitively enjoy access to the River Mersey and Estuary where appropriate, for the benefits that contact with the natural environment brings.
- Supporting management to ensure that the River Mersey continues to improve as a clean and ecologically diverse river; seeking to re-connect people, both physically and visually, with the River Mersey, and protecting and enhancing these connections where they do exist.
- Promoting the multiple benefits of a healthy waterside environment.



Remnant pockets of lowland raised bog, such as at Astley Moss, where the habitat supports common cotton grasses and hairs tail cotton grass with occasional sphagnum mosses, as well as birds and invertebrates.

**SEO 2: Promote the Mersey Valley's historic environment and landscape character and positively integrate the environmental resource with industry and development, providing greenspace within existing and new development, to further the benefits provided by a healthy natural environment, as a framework for habitat restoration and for public amenity.**

**For example, by:**

- Capitalising on the strengths of the location, through conserving and enhancing the Mersey River valley, parks and urban green spaces and enabling people to access and enjoy them.
- Carefully designing and integrating green infrastructure within housing, business, transport and industrial development, linking new developments with the wider countryside; looking for opportunities to provide access and outdoor recreation, to retain and enhance landscapes, visual amenity and biodiversity, or to improve damaged and derelict land.
- Developing networks of linear habitats, corridors and stepping stones within housing and industrial development, linking developments with the wider countryside, making a more permeable landscape to enable species movement and to enable urban populations to engage with the natural environment through better access provision.
- Creating new woodlands and planting individual trees in appropriate urban and industrial areas and settlements, such as school playing fields, open spaces, streets, highway verges, institutional grounds, derelict land, on tipped and industrial land and development sites for multi-purpose use as part of the community forest initiative, including innovative wood fuel, timber and forest industries, enhancement of recreation, landscape and biodiversity interests, helping to assimilate new infrastructure, and providing benefits for water quality, soil quality and flood risk management.
- Creating tranquil areas of woodland and other habitats for people to enjoy and increasing opportunities for users to access, and to benefit from, the health and social rewards that their local environment affords them.
- Seeking ways to protect the sense of place and interpret the National Character Area's (NCA's) historic and cultural identity to ensure a better understanding of past land use and retain evidence of the relationships between features for the future.
- Conserving open and expansive views of the landscape, such as views from the top of Runcorn Hill.
- Developing sustainable urban drainage systems (SUDS) in new and existing development to improve infiltration and manage surface water.
- Planning to manage over-abstraction from groundwater and rivers through careful and efficient use of water.
- Conserving the NCA's heritage assets, including archaeological sites, historic buildings and the character of the parkland and villages and ensuring high-quality design.
- Maintaining the wood-pasture management system at Dunham Park, and other parklands, making provision for eventual replacement of trees, while retaining moribund and dead standing timber.

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**SEO 2: Promote the Mersey Valley's historic environment and landscape character and positively integrate the environmental resource with industry and development, providing greenspace within existing and new development, to further the benefits provided by a healthy natural environment, as a framework for habitat restoration and for public amenity.**

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- Promoting sustainable recreation and education opportunities linked to biodiversity, for example at local nature reserves and country parks, and providing interpretation for people to understand and enjoy wildlife and the benefits of the natural environment.
- Providing opportunities for users to access the natural environment sustainably through conserving and enhancing recreational routes, including long-distance footpaths and strategic green links, ensuring that paths are maintained and that some surfaced paths are provided for use by all levels of ability, to enable people to benefit from the health and social rewards that their local environment affords them.
- Deepening appreciation among landowners, industry and the public of the links between geology, landscape and wildlife habitat and their relevance to conserving biodiversity and to sustainable development; providing improved interpretation and educational facilities to increase visitors' understanding and enjoyment of the NCA's natural and historic features.
- Maintaining and where possible enhancing all the existing rock exposures and natural landforms, including Sites of Special Scientific Interest (SSSI), which make important contributions to an understanding of the origin and geological development of the Mersey Valley NCA.



**At Dunham Park a large number of the oak and beech trees are ancient, with some dating back to the 17th century. The associated dead wood beetle fauna is exceptionally rich and includes a number of rare species.**

**SEO 3: Manage the arable and mixed farmland along the broad linear Mersey Valley, and create semi-natural habitats, woodlands and ecological networks, to protect soils and water, enhance biodiversity, increase connectivity and improve the character of the landscape, while enabling sustainable food production.**

**For example, by:**

- Conserving the character and wildlife habitats associated with the arable and mixed farming systems, and seeking opportunities to manage and create semi-natural habitats and ecological networks within the farmed environment, which will protect soils and water and enhance biodiversity and the landscape.
- Providing significant year-round habitats that will benefit farmland birds, such as over-wintered stubbles, conservation headlands and buffer strips in arable fields.
- Planning to link and connect fragmented habitats into a more cohesive whole, providing corridors and stepping stones for wildlife, enabling movement of species, and enhancing the landscape.
- Seeking opportunities to restore and enhance hedgerows, field boundary trees and field margins to encourage a network of habitats to link fragmented habitats, to act as a windbreak and bind/filter out the soil in times of flood.
- Protecting historic parklands to enhance the landscape, and creating succession plans to increase the age range of trees in parkland settings.
- Improving water quality, through carefully managing nutrient inputs and providing buffer strips adjacent to watercourses such as in the River Mersey, River Weaver and their tributaries.
- Providing new educational access with interpretation of environmental gains that promote the re-connection between farming, food and the public.
- Exploring and promoting the marketing of quality local produce to nearby extensive urban populations.
- Protecting woodlands, including ancient woodlands, and encouraging the appropriate management of existing woodlands through measures such as diversifying the age structure of tree populations and retaining veteran trees and fallen timber; increasing the extent and continuity of semi-natural woodland in appropriate locations, particularly through enlarging and linking existing woodland sites; and ensuring that any planting complements open habitats for ground-nesting birds.
- Protecting and enhancing the quality of ponds, including those at the internationally designated Rixton Clay Pits Special Area of Conservation (SAC), buffering infield ponds and wetlands and seeking to create new wetland habitats, thus creating strong habitat networks, improving water quality, and establishing stepping stones of wetland habitat.
- Encouraging opportunities to improve, maintain and expand habitats, such as woodlands, grasslands and wetlands, which may increase the sense of tranquillity.

**SEO 4: Manage and enhance the mossland landscape in the east, safeguarding wetlands including the internationally important lowland raised bogs, to conserve peat soils, protect and enhance biodiversity, conserve archaeological deposits, contribute to landscape character and store carbon.**

**For example, by:**

- Managing and enhancing the Manchester Mosses SAC and other important lowland raised bog habitats.
- Managing areas of lowland raised bog and adjacent land, restoring peat soils to protect wildlife and increase the ability of habitats to actively store and sequester carbon from the atmosphere.
- Restoring and improving the condition of lowland bogs by working with landowners to manage and restore water table levels, and providing hydrological buffer zones of fens, wet pastures or wet woodland to help to manage water.
- Seeking opportunities to re-establish the geomorphological function of mosslands to safeguard the records of palaeo-environmental evidence and to prevent damage to potential buried archaeological remains.
- Seeking opportunities for restoring, enhancing and linking fragmented wetland habitats in former peat-cutting areas and farmlands to realise the potential for restoration schemes and create a complex mossland landscape capable of sustaining the full range of mossland habitats.
- Encouraging the restoration of lowland raised bogs and the mosaic of wetland habitats to conserve wildlife and retain the open character of the NCA's mossland landscape.
- Improving people's understanding and enjoyment of the mosslands and the network of lowland raised bogs by providing access and interpretation where possible.
- Seeking opportunities to extend areas of wetland along rivers and in valley bottoms.
- Managing the ditch network to increase their contribution to biodiversity interest.
- Managing existing woodlands, while conserving mossland habitats, to contribute to the character of the wider area.

## Supporting document 1: Key facts and data

Area of Mersey Valley National Character Area (NCA): 44,718 ha

### 1. Landscape and nature conservation designations

There are no protected landscape designations within the Mersey Valley NCA.

Source: Natural England (2011)

#### 1.1 Designated nature conservation sites

The NCA includes the following statutory nature conservation designations:

Tier	Designation	Name	Area (ha)	% of NCA
International	Ramsar	Mersey Estuary	968	2
European	Special Protection Area (SPA)	Mersey Estuary SPA	968	2
	Special Area of Conservation (SAC)	Manchester Mosses SAC; Rixton Clay Pits SAC	184	<1
National	National Nature Reserve (NNR)	n/a	0	0
	Site of Special Scientific Interest (SSSI)	A total of 13 sites wholly or partly within the NCA	1,585	4

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 83 local sites in the Mersey Valley covering 2,963 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](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	43	3
Favourable	1,320	83
Unfavourable no change	31	2
Unfavourable recovering	187	12

Source: Natural England (March 2011)

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

## 2. Landform, geology and soils

### 2.1 Elevation

The Mersey Valley elevation ranges from slightly above sea level to a maximum height of 144 m. The mean elevation is relatively low at 23 m.

Source: Natural England 2010

### 2.2 Landform and process

The Mersey Valley NCA consists of a broad linear valley with large-scale, open, predominantly flat farmland supporting substantial bands of mixed agriculture.

Source: Mersey Valley Countryside Character Area Description

### 2.3 Bedrock geology

The solid geology of the Mersey Valley is dominated by red sandstones and mudstones of Triassic age (248-205 million years old) that underlie almost the entire area. To the south of the River Mersey the landform is a series of low, but prominent sandstone ridges.

Source: Natural England 2010

### 2.4 Superficial deposits

The surface geology consists principally of superficial deposits. The valley bottom is underlain by estuarine and river alluvium bordered in places by wind-blown sand. Much of the remainder of the area is mantled by glacial till with pockets of sand and gravel. Brick earth deposits are a notable feature near Rixton. Outcrops of Triassic sandstone bedrock poke through the superficial deposits to the east and south of Runcorn. An important feature in the east of the Valley is the occurrence of peat, covering 9 per cent of the NCA. These mosslands developed in drainage hollows in the early post-glacial period.

Source: Mersey Valley Countryside Character Description, Natural England 2010

### 2.5 Designated geological sites

Tier	Designation	Number
National	Geological Site of Special Scientific Interest (SSSI)	2
National	Mixed Interest SSSI	0
Local	Local Geological Sites	12

There is a wide mixture of geological site types, but the majority are inland outcrops, disused quarries, road sections and geomorphology sites. Frodsham Railway and Road Cuttings SSSI, for example, shows a sequence of sandstones representing the upper part of the Triassic Helsby Sandstone Formation.

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

Small amounts of Grade 1 agricultural land occur to the north-east of Warrington with larger expanses of Grade 2 land found around the perimeter of the NCA. Grade 3 soils more common in the south and to the north of Warrington.

Source: 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	2,629	6
Grade 2	11,283	25
Grade 3	13,610	30
Grade 4	675	1
Grade 5	1,856	4
Non-agricultural	1,957	4
Urban	12,515	30

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.

■ Manchester Ship Canal	44 km
■ Bridgewater Canal	30 km
■ River Mersey	24 km
■ River Bollin	7 km
■ Leeds and Liverpool Canal	6 km
■ Shropshire Union Canal	6 km
■ Weaver Navigation	6 km
■ River Weaver	5 km
■ Trent and Mersey Canal	1 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.**

### 3.2 Water quality

The total area of Nitrate Vulnerable Zone is 20,468 ha or 46 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](http://maps.environment-agency.gov.uk/wiyby/wiybyController?ep=maptopics&lang=_e)



## 4. Trees and woodlands

### 4.1 Total woodland cover

Woodlands cover an area of 3,383 ha, 8 per cent of the NCA, of which less than 1 per cent is ancient woodland. The NCA contains 2 Community Forests: the Red Rose Community Forest and the Mersey Community Forest.

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

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

Trees and woodland are scarce within the NCA and often associated with areas of settlement.

Source: Mersey Valley Countryside Character 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	2,645	6
Coniferous	114	<1
Mixed	253	1
Other	371	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	131	<1
Planted Ancient Woodland (PAWS)	2	<1

Source: Natural England (2004)

## 5. Boundary features and patterns

### 5.1 Boundary features

Hedgerows represent the dominant boundary feature though many have now been replaced with post-and-wire fencing.

Source: Mersey Valley Countryside Character Area description; Countryside Quality Counts (2003)

### 5.2 Field patterns

Ancient enclosures are poorly represented with scattered examples most notable to the east between Warrington and Urmston. For the most part the area is characterised by successive changes to the underlying pattern of ancient fields – improvements and modifications in the 18th, 19th and 20th centuries matched to urban demands. In the north the field pattern is open with large fields. To the south the field pattern has become fragmented, with degraded hedgerows and the invasion of scrub into many fields.

Source: Mersey Valley Draft Historic Profile; Mersey Countryside Character Area description; Countryside Quality Counts (2003)

## 6. Agriculture

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

### 6.1 Farm type

In 2009 the Mersey Valley contained 335 registered holdings within the Agricultural Census. These consisted predominantly of a mix of arable and horticulture (47 per cent), mixed farming (7 per cent) and livestock (21 per cent).

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

### 6.2 Farm size

The majority of registered holdings in the area in 2009 were under 50 ha, though comparison with figures from 2000 suggests that this is changing with a shift towards larger holdings over this period.

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

### 6.3 Farm ownership

2009: Total farm area = 18,001 ha; owned land = 9,337 ha

2000: Total farm area = 17,188 ha; owned land = 10,079 ha

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

### 6.4 Land use

The total farm area for registered holdings within the Mersey Valley in 2009 was 18,000 ha. Forty per cent of this area was recorded as being under cereals and 44 per cent as grass and uncropped land with the remainder largely split between cash roots, oilseeds and other arable. This pattern of agricultural land use has remained largely unchanged since 2000.

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

### 6.5 Livestock numbers

Livestock in Mersey Valley is made up of a mixture of cattle (9,000 animals), sheep (8,000 animals) and approximately 5,000 pigs. Over the last decade there has been a considerable decrease in the number of cattle and pigs within the NCA and an increase in the number of sheep.

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

### 6.6 Farm labour

Farm labour within the NCA is predominately provided by principal farmers (accounting for 62 per cent of the work force). Over the last decade there has been a considerable decline in full time and casual labour.

**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 central Mersey Valley once contained large tracts of lowland peat bog which had developed through the infill of shallow lakes, initially by swamp and fen vegetation, then by a woodland phase and finally, resulting from climatic changes, the establishment of peat bog vegetation. When it became technically feasible to drain the bogs, peat cutting was carried out on a large scale for fuel and other uses and, with the addition of manure or fertiliser, conversion to arable farmland became a viable option. By the early part of the 20th century very little peat bog in the Mersey Basin remained unaltered. Some of the best agricultural land in the NCA is now found on former mossland. The mosslands belong to a category of peatland known as lowland raised bog, so-called

because the most active growth occurs in the middle where the specialised plants can draw up and retain sufficient water to raise the water table to a higher level than occurs at the margins. Remnants of this internationally important habitat remain to the north-east of the NCA. Coastal and flood plain grazing marsh can also be found as the Mersey winds to the east of Warrington. This provides habitat for breeding waders and wintering wildfowl. Mudflats occur to west of the NCA at the estuary. In addition the NCA contains important arable habitats. These support nationally important assemblages of arable birds.

Source: : Urban Mersey Valley Natural Area Profile, Natural England (2012)

### 7.2 Priority habitats

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

More information about *Biodiversity 2020* can be found at;

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

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

Priority habitat	Area (ha)	% of NCA
Coastal and flood plain grazing marsh	1,204	3
Broadleaved mixed and yew woodland (broad habitat)	880	2
Mudflats	513	1
Lowland raised bog	341	1
Lowland dry acid grassland	80	<1
Purple moor grass and rush pasture	66	<1
Lowland meadows	32	<1
Lowland calcareous grassland	23	<1
Lowland heathland	11	<1
Upland hay meadows	8	<1
Maritime cliff and slope	8	<1
Reedbeds	7	<1

Source: Natural England (2011)

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

### 7.3 Key species and assemblages of species

- Maps showing locations of priority habitats are available at: <http://magic.Defra.gov.uk/website/magic/>
- Maps showing locations of 541 species are available at: <http://data.nbn.org.uk/>

## 8. Settlement and development patterns

### 8.1 Settlement pattern

Settlements are largely clustered around the main Mersey ports. The situation of the Mersey Valley (lying between the Lancashire coalfields to the north and the Cheshire Plain, with its salt and ore deposits, to the south) and associated trades have been a major influence on settlement pattern and development.

Source: Mersey Valley Countryside Character Area description; Countryside Quality Counts (2003)

### 8.2 Main settlements

The main settlements within the NCA are; Runcorn, Widnes and Warrington. The total estimated population for this NCA (derived from ONS 2001 census data) is: 459,724.

Source: Mersey Valley Countryside Character Area description; Countryside Quality Counts (2003)

### 8.3 Local vernacular and building materials

The predominant building material is red brick. Traditionally the buildings in this region would have been similar to the half-timbered buildings on the Shropshire, Cheshire and Staffordshire Plain. These have been engulfed and destroyed by the suburban sprawl of large housing estates. The village of Hale, adjacent to Liverpool Airport, has retained its distinctive character with many thatched houses lining the western approach.

Source: Mersey Valley Countryside Character Area description; Countryside Quality Counts (2003)

## 9. Key historic sites and features

### 9.1 Origin of historic features

The Mersey Valley has historically formed a natural frontier zone of impenetrable marshes. This area represented the boundary between English Mercia and Danish Northumbria. The valley may also have formed a provincial boundary during the Roman period and possibly a tribal frontier even earlier. This frontier land once contained many fortifications, most of which have been lost to modern industrial development.

Important strategic sites were located at Warrington which represented the lowest bridging point where a Roman road crossed the valley. This crossing was protected by a Castle Rock located on the south side of the river, which was removed in 1862 to improve navigation. There are only limited remains of ancient fortifications and, following local government reorganisation in 1974, the valley no longer represents a regional boundary.

Early settlement has largely been overwhelmed by urban and industrial expansion in the last 100 to 150 years – subsuming former areas of high density dispersed farming settlement as well as former villages. This has resulted in very low survival of pre-1750 farmstead buildings.

Source: Mersey Countryside character Description; Draft Historic Profile

### 9.2 Designated historic assets

This NCA has the following historic designations:

- 2 Registered Parks and Gardens covering 155 ha
- 0 Registered Battlefields
- 33 Scheduled Monuments
- 779 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

- Less than 1 per cent of the NCA 37 ha is classified as being publically accessible.
- There are 515 km of public rights of way at a density of 1.1 km per km<sup>2</sup>.
- There are no National Trails within the NCA.

Sources: Natural England (2010)

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

Access designation	Area (ha)	% of NCA
National Trust (Accessible all year)	162	<1
Common Land	11	<1
Country Parks	66	<1
CROW Access Land (Section 4 and 16)	80	<1
CROW Section 15	57	<1
Village Greens	41	<1
Doorstep Greens	2	<1
Forestry Commission Walkers Welcome Grants	831	2
Local Nature Reserves (LNRs)	361	1
Millennium Greens	14	<1
Accessible National Nature Reserves (NNRs)	0	0
Agri-environment Scheme Access	0	0
Woods for People	1,168	3

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) there are small areas to the east of the NCA that experience the highest tranquillity. However, the majority of the NCA is recorded as having low levels of tranquillity. The lowest values are found in Warrington and other urban areas.

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

Category of tranquillity	Score
Highest value within NCA	8
Lowest value within NCA	-112
Mean value within NCA	-51

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 the whole NCA to be either disturbed or urban.

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

Category of intrusion	1960s (%)	1990s (%)	2007 (%)	% change (1960s-2007)
Disturbed	72	77	71	-1
Undisturbed	6	1	n/a	n/a
Urban	20	21	29	9

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are the increase in urban area since the 1990s.

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

## 12. Data sources

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

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

## Supporting document 2: Landscape change

### Recent changes

#### Trees and woodlands

- The majority of woodland falls within the Mersey and Red Rose community forests, together providing a network of green spaces, woodlands, street trees and creating high quality environments. This has resulted in tree and woodland cover increasing and woodlands being brought into positive management. In recent years new community woodlands have been created in this area, for example, Windy Bank Wood (40 ha) and Upper Moss Side (74 ha) managed by the Forestry Commission. The Public Forest estate also have significant new community woodland areas on the boundaries of the NCA; Wheatacre (44 ha), Sutton Manor (64 ha) and Higher Folds (132 ha).
- Between 1999 and 2003 an area equivalent to 14 per cent of the 1999 total stock was approved for new planting under a Woodland Grant Scheme agreement (170 ha). In 1999 about 27 per cent of the established eligible National Inventory of Woodlands and Trees stock was covered by a Woodland Grant Scheme management agreement.

#### Boundary features

- Hedgerows represent the dominant boundary features, though many have fallen into disrepair and have now been replaced with post and wire fencing. Between 1999 and 2003 Countryside Stewardship capital agreements for linear features included fencing (28 km), hedge management (9 km), hedge planting and restoration (22 km), and restored boundary protection (15 km). In 2011 boundaries under Environmental Stewardship options were ditches (54 km), hedgerows (295 km) and woodlands (5 km).

#### Agriculture

- Changes have occurred in the agricultural landscape, with a move away from traditional horticultural practice towards more arable farming (cereals and oil seeds). Between 2000 and 2009 horticulture and general cropping decreased, while production of cereals increased.
- Between 2000 and 2009 there was a decrease in the number of cattle and pigs, and an increase in the number of sheep. In 2009 there were 8,848 cattle (10,927 in 2000), 7,768 sheep (6,856 in 2000) and 4,615 pigs (9,792 in 2000).
- Where farmland has been fragmented by industrial or urban development, field patterns have been lost or fragmented.

#### Settlement and development

- The rate of change to urban is high in some areas, especially around Widnes, Great Sankey, Lymm, Stockton Heath and Runcorn. There is a marked concentration of commercial developments evident to the east of Lymm and Runcorn. Dispersed development in open countryside is evident north of the M62.
- The area is heavily industrialised, with cluster growth based on chemicals, automotives and the vast manufacturing complexes at Ellesmere Port and Runcorn. The area is a focus for new and upgraded industrial development and transport links. Liverpool Airport has expanded, with the completion of a new passenger terminal in 2002.
- The potential of the area to provide renewable energy has been considered by developers, and there is at least one consented large scale wind energy scheme.



## Semi-natural habitat

- In 2011, 83 per cent (1,320 ha) of Sites of Special Scientific Interest (SSSI) were in favourable condition, 12 per cent (187 ha) were in unfavourable recovering condition, 2 per cent (31 ha) were in unfavourable condition, and 3 per cent (43 ha) were in unfavourable declining condition.
- The most extensive annual Countryside Stewardship agreements in 2003 were for managing inter-tidal habitats (635 ha).
- In the years between 1990 and 2004 extensive areas of mossland were lost to landfill and to peat cutting. The mossland SSSI all had areas of sphagnum-dominated wet bog habitat, however even these sites showed signs of drying out along their edges<sup>4</sup>. This loss and decline has now largely been halted and there have been significant areas of mossland brought into conservation management. Approximately 264 ha of mossland are managed under the Higher Level Stewardship Scheme and a further 32 ha of mossland is being restored under planning conditions. There are also some areas of fen and marshy grassland being managed as a buffer adjacent to the mosslands.
- Significant effort has been made to improve the condition of flood plain grazing marsh, notably around Frodsham, Helsby and Ince Marshes and in the lower Gowy. Large areas of flood plain grazing marsh are now managed sensitively for species such as wading birds, amphibians and mammals.

<sup>4</sup> *Mosslands of Northwest 1 (Merseyside, Lancashire and Greater Manchester) State and extent of surviving acid mossland habitats*, Dr Paul Thomas and Martin Walker (2004)

## Historic features

- Only about 68 per cent of historic farm buildings remain unconverted, and most are intact structurally. Moreover, in 1918 about 2 per cent of the area was historic parkland. By 1995 it is estimated that 54 per cent of the 1918 area had been lost. About 31 per cent of the remaining parkland is covered by a Historic Parkland Grant, and 32 per cent is included in an agri-environment scheme.

## Coast and rivers

- Historically, the Mersey Estuary catchment has been associated with shipping, manufacturing, the chemical industry, mining and agriculture. These industries left a legacy of environmental issues and by the 1980s the Mersey and its tributaries were some of the most polluted watercourses in Europe. The area still has clusters of pharmaceutical and chemical industries. Although outputs from these are regulated, discharges can adversely impact on water quality. Accumulated pollution in the sediment of the estuary remains a problem. However, through successful campaigns and investment, the River Mersey's water quality has greatly improved as shown by the return of salmon to the river<sup>5</sup>.
- The Manchester Ship Canal is a physically modified water body. Barriers within the canal affect young salmon migrating from the upper Mersey catchment. Many of the urban rivers are either enclosed by culverts, or barriers such as weirs have meant fish have not been able to pass through. Salmon are returning to the River Bollin after fish passes were installed at Heatley and Little Bollington weirs. Structures such as eel passes have been built to allow fish to move more freely; for example on the River Gowy.<sup>6</sup>

<sup>5</sup> *North West River Basin District: Challenges and choices*, Environment Agency (June 2013)

<sup>6</sup> *North West Landscape Framework – Climate Change Assessment – 2010/11*, Natural England (accessed October 2013; URL: [www.naturalengland.org.uk/regions/north\\_west/ourwork/climatechangeassessment.aspx](http://www.naturalengland.org.uk/regions/north_west/ourwork/climatechangeassessment.aspx))

## Minerals

- Many of the peat deposits in the Mersey Valley have been worked extensively in the past and today a large percentage of these areas have been 'reclaimed' to agricultural land. Limited extraction of peat is still in operation within the area. However, some extraction sites are being restored to semi-natural habitat, including lowland raised bog, such as Little Woolden Moss.

## Drivers of change

### Climate change

- The North West Landscape Framework Climate Change Assessment 2010/11<sup>7</sup> assessed the exposure of the area and its natural assets to the impacts of climate change and its capacity to adapt.
- Mosslands are vulnerable to the drying of peat soils, reducing both their carbon storage capacity and also their ability to re-hydrate. The net effect of this process is both to increase carbon emissions from the soils and to decrease its resistance to further drying.
- Mudflats/sand flats and salt marshes are vulnerable to sea level rise due to storm events, particularly where they lie in front of flood defences and consequently have no way of moving in-land.
- In urban areas the lack of habitats and generally flat topography make species movement and ecosystem function very restricted.
- Some farmland soils are vulnerable to increased drying with reduced summer rainfall. The low variation in topography and intensive land use make the area less likely to cope with climate change. Providing reasonable variation with arable, pastoral and woodland mosaics will help to increase variability thereby reducing its vulnerability.

- Changes to water bodies through drier summers and wetter winters and effects on parkland landscapes through increased storm events may occur. Changes to woodland and trees in the driest places are possible.
- Understanding and planning for increased tidal and fluvial flood risk in vulnerable parts of the area. Predicted changes in rainfall patterns with future climate change may increase river flows in the Mersey, which may in turn affect river channel meandering and siltation rates. In the long term there is uncertainty over the balance between sediment supply from Liverpool Bay and sea level rise<sup>8</sup>.
- Shifts in agriculture are possible as a result of longer drier summers resulting in the growth of more drought tolerant planting, possibly double cropping and new crops, along with an increased focus on biomass fuel planting to increase renewable forms of energy production.
- Potential for increased incidents of pests and diseases able to migrate further north, as well as competition with native species from invasive species, which are able to expand their habitat ranges, as temperatures increase.
- Carbon sequestration and storage by habitats such as salt marshes, mosslands and organic soils, which are important features of this NCA, could help reduce atmospheric carbon dioxide levels.

<sup>7</sup> North West Landscape Framework – Climate Change Assessment – 2010/11, Natural England (accessed October 2013; URL: [www.naturalengland.org.uk/regions/north\\_west/ourwork/climatechangeassessment.aspx](http://www.naturalengland.org.uk/regions/north_west/ourwork/climatechangeassessment.aspx))

<sup>8</sup> North West England and North Wales Coastal Group Shoreline Management Plan 2. Accessed from: <http://www.mycoastline.org/index.php/shoreline-management/smp2>

## Other key drivers

- The area faces challenges around providing and managing critical infrastructure to support the delivery of future growth and new development, such as water supply, electricity supply and waste. Innovative approaches may be needed to address this.
- There is continuing industrial and manufacturing development alongside pressure for expansion of housing land. Some of the landfill sites across the landscape are open and active, others have recently closed and some have issues with leaching or ongoing management. Nevertheless, they present opportunities for restoration, for example to woodland, meadows and pasture with amenity access.
- There is continuing pressure for new and upgraded transport routes. The Mersey Gateway Project, for example, is a major scheme to build a new six lane bridge over the Mersey between the towns of Runcorn and Widnes. The project aims to be more than just a bridge, but also a transformational catalyst, connecting communities and encouraging regeneration. Construction is due to start in 2014 and be completed in 2017. The planned route for the proposed high speed railway between London and the north-west also crosses this NCA. There are further proposals to expand Liverpool Airport.
- There is pressure to accommodate renewable energy schemes, such as wind and tidal power, although there are challenges around feasibility in this complex area. Other potential future energy development includes fracking.
- There is continuing pressure for further development of housing and industry which would open up opportunities for creating a high quality natural environment through providing green infrastructure.

- There are particular challenges around managing ecological connectivity for species movement as set out in the report 'Making space for nature'. Projects such as the Life EConet toolkit<sup>9</sup> offer an approach to linking priority habitats to form a coherent and sustainable network that will improve conditions for many species of plants and animals.
- Green infrastructure approaches to the integration of built and undeveloped land uses provide an opportunity to link potentially fragmented elements of historic land use into a more cohesive whole. The Liverpool City Region Green Infrastructure Framework is being developed to maximise the benefits that the city region can gain from the sustainable management of its natural environment. The framework covers the whole of Merseyside plus Warrington and Halton<sup>10</sup>.
- Opportunities offered by the Community Forests and forest plans<sup>11</sup>.
- The Mersey Valley and its tributaries have extensive coverage of non-native invasive terrestrial plants associated with lowlands and river courses namely Himalayan balsam, Japanese knotweed and giant hogweed.
- Challenges around managing new pests and diseases, such as *Chalara fraxinea* (or ash dieback).

<sup>9</sup> Accessed from <http://maps.cheshire.gov.uk/econet/index.asp>

<sup>10</sup> *Liverpool City Region and Warrington Green Infrastructure Framework DRAFT Action Plan*, The Mersey Forest (January 2013) (accessed October 2013; URL: [www.merseyforest.org.uk/our-work/green-infrastructure/liverpool-city-region-green-infrastructure-framework/](http://www.merseyforest.org.uk/our-work/green-infrastructure/liverpool-city-region-green-infrastructure-framework/))

<sup>11</sup> [www.merseyforest.org.uk/plan](http://www.merseyforest.org.uk/plan); <http://www.redroseforest.co.uk/web/>

## 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.



Recreational trails including long distance paths, also serve to connect people. Cyclists at an access point next to the river at Mersey Way, Hale.

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	
<b>SEO 1:</b> Conserve and enhance the Mersey Valley's rivers, tributaries and estuary, improving the ability of the fluvial and estuarine systems to adapt to climate change and mitigate flood risk while also enhancing habitats for wildlife and for people's enjoyment of the landscape.	↔ **	↔ **	↑ **	N/A ***	↔ **	↑ **	↑ **	↑ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **
<b>SEO 2:</b> Promote the Mersey Valley's historic environment and landscape character and positively integrate the environmental resource with industry and development, providing greenspace within existing and new development, to further the benefits provided by a healthy natural environment, as a framework for habitat restoration and for public amenity.	↔ **	↗ **	↗ **	N/A ***	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↔ **	↑ ***	↑ ***	↗ ***	↑ **	↗ **	↗ **	↗ **

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

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

Statement of Environmental Opportunity	Ecosystem Service																			
	Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place/inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity	
<b>SEO 3:</b> Manage the arable and mixed farmland along the broad linear Mersey Valley, and create semi-natural habitats, woodlands and ecological networks, to protect soils and water, enhance biodiversity, increase connectivity and improve the character of the landscape, while enabling sustainable food production.	↗ ***	↔ ***	↗ **	N/A ***	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↔ ***	↗ **	↔ **	↗ **	↗ **	↗ **	↗ ***	↔ **
<b>SEO 4:</b> Manage and enhance the mossland landscape in the east, safeguarding wetlands including the internationally important lowland raised bogs, to conserve peat soils, protect and enhance biodiversity, conserve archaeological deposits, contribute to landscape character and store carbon.	↔ **	↘ **	↗ **	N/A ***	↔ **	↑ ***	↗ **	↗ **	↗ ***	↗ ***	↗ **	↗ **	↔ ***	↗ ***	↗ **	↗ ***	↔ **	↗ ***	↗ ***	↗ ***

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

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

Landscape attribute	Justification for selection
<p>A low-lying landscape focusing on the broad linear valley of the River Mersey; estuarine in the west and with extensive areas of reclaimed mossland in the east.</p>	<ul style="list-style-type: none"> <li>■ The River Mersey flows from east to west, forming a central, low-lying area.</li> <li>■ Distinctive river valley landscape focusing on the Mersey, its estuary and associated tributaries and waterways, although the Mersey itself is often obscured.</li> <li>■ Downstream of Warrington Weir, the Mersey is tidally influenced.</li> <li>■ In the east, small pockets of former mossland remain among land drained by ditches.</li> <li>■ Generally low relief topography, with an average elevation of just 23 m, rising locally to 144 m towards the Cheshire Sandstone Ridge.</li> <li>■ Some long distance views from elevated land such as Runcorn Hill, Helsby Hill and Overton Hill.</li> </ul>
<p>Underlain by Triassic sandstone, surface geology is principally drift material; marine and river alluvium in the valley bottom, extensive areas of till, pockets of glacial sands and gravels, with peat in some drainage hollows.</p>	<ul style="list-style-type: none"> <li>■ An important feature is the occurrence of peat soils (covering 9 per cent of the NCA).</li> <li>■ Two geological Sites of Special Scientific Interest (SSSI).</li> <li>■ 12 Local Geological Sites, including a Local Nature Reserve.</li> <li>■ The Permo-Triassic sandstone forms an important aquifer providing public and private water supplies to towns, farms and industry.</li> </ul>
<p>The Mersey Estuary is a defining element in the landscape, with expansive intertidal mud/sand flats and low exposed cliffs.</p>	<ul style="list-style-type: none"> <li>■ In the west, the Mersey is estuarine in character with intertidal mud and sand flats and low exposed cliffs.</li> <li>■ Estuarine habitats, in particular mudflats/sand flats and fringing salt marshes, contribute to landscape character and support a wide range of wildlife.</li> <li>■ Open and expansive views out to and across the estuary.</li> <li>■ Dynamic estuarine processes.</li> <li>■ Constantly changing views with the flow and ebb of the tide.</li> <li>■ The area around the river crossings at Runcorn and Widnes has become particularly industrialised.</li> </ul>

Landscape attribute	Justification for selection
<p>The River Mersey flows from east to west, joined by associated tributaries, although the Mersey itself is often obscured from view.</p>	<ul style="list-style-type: none"> <li>■ Tributaries include the rivers Weaver, Bollin, Ditton Brook and Sankey Brook.</li> <li>■ The Manchester Ship Canal generally follows the original route of the River Mersey.</li> <li>■ The Mersey itself is often obscured, inaccessible, and blocked from view by industry; in Ellesmere Port, for example, it is barely obvious at all that the town is situated on the Mersey.</li> </ul>
<p>Trees and woodland are mainly associated with settlements, occasional parkland and isolated woodland blocks; and in recent years new community woodlands have been planted.</p>	<ul style="list-style-type: none"> <li>■ Woodland covers 7.6 per cent of the NCA (3,383 ha).</li> <li>■ The Red Rose Community Forest and Mersey Community Forest cover much of the area.</li> <li>■ The majority of Dunham Park is pasture-woodland or park-woodland and has been managed as such since medieval times.</li> <li>■ 132 ha ancient semi-natural woodland.</li> </ul>
<p>Large-scale, open, predominantly flat high-quality farmland between development, with primarily arable farming to north of valley and a mixture of arable and dairying to the south.</p>	<ul style="list-style-type: none"> <li>■ Two substantial bands of farmland follow the slopes of the broad linear Mersey Valley.</li> <li>■ To the north of the Mersey the farmland has a large-scale open character dominated by arable fields which extend up to the Lancashire Coal Measures.</li> <li>■ To the south, the area is a mix of arable and pasture which extends to the Shropshire, Cheshire and Staffordshire Plain.</li> <li>■ In the east an extensive area comprising large-scale, open, flat farmland on the dark, rich peaty soils of the former mosses.</li> <li>■ Grade 1 agricultural land on mosses west of Manchester and on the north side of the Mersey south of Speke; areas of Grade 2 and 3 land are intermixed between urban and industrial development.</li> </ul>
<p>Field pattern is regular and large-scale, often defined by hedgerows with isolated hedgerow trees; many hedgerows are intermittent and have been replaced by post and wire fencing; while field boundaries on the mosses are marked by ditches.</p>	<ul style="list-style-type: none"> <li>■ Where farmland has been fragmented by industrial or urban development field patterns are becoming fragmented fields are often defined by hedgerows and isolated hedgerow trees, many of which are intermittent and have been replaced by post and wire fencing.</li> <li>■ Fields on the mosses are bounded by ditches.</li> </ul>



Landscape attribute	Justification for selection
<p>A range of important wetland habitats remain including estuarine mud/sand flats and fringing salt marshes in the west, remnants of semi-natural mosslands and pockets of basin peats in the east, with the broad river valley in between.</p>	<ul style="list-style-type: none"> <li>■ Mersey Estuary Special Protection Area (SPA) and Ramsar site covers 2 per cent of the NCA (968 ha). Estuarine habitats are of major importance for over wintering waders and wildfowl and as a valuable staging post for migrating birds in spring and autumn.</li> <li>■ Manchester Mosses Special Area of Conservation (SAC).</li> <li>■ Rixton Clay Pits SAC.</li> <li>■ Relict semi-natural bog habitats include those at Astley and Bedford Moss, parts of Astley Moss East and Botany Bay Wood, Twelve Yards Road, Light Oaks Moss, Little Woolden Moss and Caddishead Moss, Holcroft Moss and Risley Moss.</li> <li>■ Other wetland sites include Woolston Eyes, where lagoons, set aside to receive dredging from Manchester Ship Canal, provide important habitat for wintering wildfowl and breeding birds in summer, with its large areas of open water, reedbed and scrub vegetation.</li> <li>■ A total of 13 SSSI wholly or partly within the NCA, covering 4 per cent (1,585 ha).</li> <li>■ 83 local sites covering 7 per cent of the NCA (2,963 ha).</li> </ul>
<p>The predominant building material is red brick though some sandstone construction remains and some survival of earlier timber frame.</p>	<ul style="list-style-type: none"> <li>■ Many 19th and 20th century buildings have been built from brick.</li> <li>■ The use of building stone tends to be confined to older buildings, churches, bridges and retaining walls.</li> <li>■ Traditionally the buildings in this region would have been similar to the half-timbered buildings on the Shropshire, Cheshire and Staffordshire Plain.</li> <li>■ Examples of the Cheshire vernacular, where timber-framed buildings were constructed on a stone plinth, can be found, an example being the 16th-century Speke Hall.</li> <li>■ The village of Hale has retained its distinctive character with many thatched houses.</li> </ul>
<p>Densely populated urban and suburban areas, with major towns particularly at the river crossings, including Runcorn, Widnes and Warrington, where there is continuing residential expansion.</p>	<ul style="list-style-type: none"> <li>■ The character of this landscape has been highly influenced by the urban and industrial developments lining the banks of the Mersey.</li> <li>■ The urban areas are characterised by a dispersed cluster of small to medium sized towns, located along the immediate banks and flood plain of the River Mersey.</li> </ul>

Landscape attribute	Justification for selection
<p>Large-scale highly visible industrial development, with docks, chemical and oil refineries.</p>	<ul style="list-style-type: none"> <li>■ There is significant industrial land use in the area including oil refinement, salt production, manufacturing industry and chemical processing.</li> <li>■ Industrial infrastructure is often prominent, with large-scale, highly visible, development including docks, chemical plants and oil refineries.</li> <li>■ With the proximity of the Lancashire coalfields to the north and the salt and ore deposits of the Cheshire Plain to the south, the areas around Runcorn and Widnes have become the focus for major chemical industries.</li> <li>■ Large-scale industry has also developed along the Mersey, especially the oil refineries at Ellesmere Port and the Fiddlers Ferry Power Station.</li> </ul>
<p>The river valley has a dense communication network with motorways, roads, railways and canals running east-west; power lines are also prominent.</p>	<ul style="list-style-type: none"> <li>■ The Manchester Ship Canal links the Mersey Estuary to the heart of Manchester and contributed to the industrial development of the area.</li> <li>■ The River Weaver Navigation, Bridgewater Canal, Leeds and Liverpool Canal and Shropshire Union Canal cross this NCA.</li> <li>■ To the west is Liverpool Airport, while two railways and two motorways (M56, M62) connect east to west, and the M6 runs north-south across the eastern end of the area.</li> </ul>

## Landscape opportunities

- Positive management of urban fringe landscapes including woodland planting, and hedgerow restoration and planting to assimilate development.
- Conserve green spaces and create greenspace, including individual trees, groups of trees, woodlands, urban parks, canals and other habitats, in appropriate urban and industrial areas and settlements, such as school playing fields, open spaces, streets, highway verges, institutional grounds, derelict land, tipped and industrial land and development sites, for their many benefits, including providing places for recreation, to improve quality of life and to create places of relative tranquillity locally.
- Ensure that greenspace is provided within urban and industrial areas, providing access opportunities, and pockets of tranquillity, and enhance the ecological diversity, such as providing new planting and leaving uncut areas of grass and wildflowers.
- Conserve woodlands, including ancient woodlands, and plant woodlands as a buffer.
- Establish woodlands, copses, hedgerows and other habitats to assimilate new and existing industrial and residential development into the landscape.
- Manage and restore hedgerows and field boundary trees in the farmland areas away from the mosses, wetlands and estuary, to strengthen field patterns, and aim to link fragmented and degraded habitats.
- Maintain agricultural productivity on good quality land between settlements.
- Manage agricultural land to improve the landscape and as a habitat resource, particularly for farmland birds such as corn bunting, grey partridge and lapwing.
- Conserve open and expansive views of the landscape, such as views from the top of Runcorn Hill, Helsby Hill, Overton Hill and the Cheshire Sandstone Ridge.
- Plan to link and connect potentially fragmented habitats into a more cohesive whole and enable movement of species.
- Protect, restore and buffer the mosslands and wetland areas, including lowland raised bogs.
- Conserve the historic buildings and character of the villages ensuring high quality design.
- Maintain and enhance the estuarine habitats, in particular mudflats/sand flats and salt marshes, that contribute to landscape character, provide tranquil places and support the wide range of wildlife.
- Conserve the open and expansive estuary views, including mudflats/sand flats and salt marshes along the Mersey Estuary.
- Allow for the continuing dynamic estuarine processes. Plan for and proactively seek opportunities to enhance estuarine habitats alongside coastal adaptation programmes.
- Provide improved interpretation and educational facilities to increase visitors' understanding and enjoyment of the NCA's natural and historic features, and engage the local community in its future management.
- Conserve and manage the banks of the linear features such as canals, roads, railways, for their biodiversity interest.
- Conserve the river corridor and enhance the visual unity of the Mersey river valley.
- Promote links between a healthy environment and economic growth, for example by promoting the benefits of a clean and healthy waterside environment as a positive focus for regeneration.

## 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
<b>Food provision</b>	Arable systems Grazing Horticulture Soils	<p>Total farm area in 2009 was 18,001 ha, with 21 per cent livestock, 47 per cent arable and horticulture, and 7 per cent mixed farms.</p> <p>Grades of agricultural land (Grade 1, 6 per cent; Grade 2, 25 per cent; Grade 3, 30 per cent; Grade 4, 1 per cent and Grade 5, 4 per cent).</p> <p>In 2009 total cattle 8,848; total sheep 7,468; total pigs 4,615.</p> <p>To the north of the River Mersey agriculture is dominated by arable cultivation.</p> <p>To the south of the River Mersey pasture becomes more frequent. Mixed farming with arable and dairying predominates.</p> <p><b>Continued on next page...</b></p>	Regional	<p>Agriculture is important to the area with over 30 per cent of the NCA being Grade 1 or Grade 2 agricultural land. However, the Agricultural Classification of Land masks a number of distinct differences across the area, with some land being used for turf production or equestrian use rather than food provision. There has also been an historic loss of agricultural land to industrial development and settlement expansion, along with a decline in field boundaries, particularly to the north.</p> <p>Some existing farming practices help to maintain important farmland bird species. There is some grazing of the coastal marshes by sheep and by cattle.</p>	<p>Work with the local farming community to explore how to produce food sustainably, while conserving soils and protecting water quality.</p> <p>Maintain biodiversity, through sustainable agricultural practices.</p> <p>Manage and restore hedges and field boundary trees in the farmland areas away from the mosses and wetlands to protect soils, water and enhance biodiversity and the landscape, as well as contributing to the production of high quality food. Manage and restore mosses and estuarine wetlands.</p>	<p><b>Food provision</b></p> <p><b>Regulating soil quality</b></p> <p><b>Regulating soil erosion</b></p> <p><b>Regulating water quality</b></p> <p><b>Pollination</b></p> <p><b>Pest regulation</b></p> <p><b>Sense of place / inspiration</b></p> <p><b>Biodiversity</b></p>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Food provision cont</b>		<p>... continued from previous page</p> <p>On the dark rich peaty soils of the former mosses farming is mixed, with arable cropping, potatoes and some limited horticulture.</p>		<p>The rich peaty soils in the drained mosslands are highly fertile, highly cultivated and dissected by a complex drainage network. Expansion of food production could place further pressure on remaining fragmented semi-natural mossland habitats.</p> <p>The combination of high quality land next to extensive urban populations, along with good communication routes, could provide nearby markets for locally branded products, thereby reducing food miles and re-establishing local pride in the farming industry.</p>	<p>Explore and promote the marketing of quality local produce to nearby extensive urban populations.</p>	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Timber provision</b>	<p>Broadleaf woodland</p> <p>Conifer woodland</p> <p>Mixed woodland</p> <p>2 Community Forests</p>	<p>Existing woodland 3,383 ha (broadleaf 2,645 ha, conifer 114 ha, mixed 253 ha).</p> <p>There are 132 ha ancient semi-natural woodland and 2 ha of Plantations on Ancient Woodland Sites (PAWS).</p> <p>The Red Rose and Mersey Community Forests.</p>	Local	<p>Woodland cover is limited across most of the area but there are some opportunities for woodland creation.</p> <p>Increasing woodland cover in appropriate locations such as on the fringes of urban and industrial areas and improving management of existing woodlands would provide opportunities to create innovative wood fuel and timber industries locally. This has multiple benefits including mitigating climate change as well as providing improved sense of place and an increase of habitats for wildlife and recreational use, and can also assist with assimilating new development into the landscape.</p> <p>The open character and wetland in some locations within the Mersey Valley, and the extensive urban and industrial areas, will limit the opportunities for expanding commercial timber production.</p> <p>There is a need to 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, open character or semi-natural habitats such as in the mosslands.</p>	<p>Encourage the appropriate management of existing woodlands.</p> <p>Create new woodlands in suitable locations such as on the fringes of urban and industrial areas for multi-purpose use as part of the Community Forest initiative including innovative wood fuel, timber and forest industries.</p> <p>Seek to ensure that new woodland strengthens the local landscape and enhances biodiversity, providing opportunities for recreation and, benefits for water quality, soil quality and flood risk management where possible.</p> <p>Create new woodlands to assimilate new development into the landscape to enhance local landscape character, but avoiding planting in open landscapes such as along the estuary or in semi-natural habitats such as the mosslands.</p>	<p><b>Timber provision</b></p> <p><b>Biomass energy</b></p> <p><b>Regulating water quality</b></p> <p><b>Regulating water flow</b></p> <p><b>Regulating soil erosion</b></p> <p><b>Tranquillity</b></p> <p><b>Recreation</b></p> <p><b>Biodiversity</b></p>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Water availability</b>	Rivers Aquifers Precipitation Semi-natural habitats	<p>Geology is dominated by sandstones that are part of the Permo-Triassic sandstone aquifer. The NCA overlays a variety of groundwater management units (GWMUs) consisting of major sandstone aquifers, with groundwater abstractions mainly for public water supply<sup>12</sup>.</p> <p>The principal rivers in the NCA are the River Mersey and its tributaries the River Bollin, Ditton Brook, Sankey Brook and Glaze Brook.</p> <p>Surface water abstraction within the lower Mersey area is heavily dominated by industrial abstraction, and to a lesser extent, agriculture.<sup>13</sup> There are no surface water abstractions for public water supply primarily due to water quality issues.<sup>13</sup></p> <p>The River Weaver flows from the south to its confluence with the Manchester Ship Canal and the Mersey Estuary just north of Frodsham.</p>	Regional	<p>The Lower Mersey catchment has had a long history of heavy groundwater abstraction mainly for domestic water supply and industry. This over abstraction, which continued into the 1980s, has lowered groundwater levels below surface and sea level. This has occurred in places such as the coastal strip around Warrington, Widnes, and Ellesmere Port, resulting in saline intrusion from the Mersey Estuary.</p> <p>The extensive built-up areas of the towns, roads and industrial areas create impervious surfaces that cause water to run off land more quickly. Improving permeability in urban and industrial areas through providing green spaces can improve infiltration rates.</p> <p>Increases in semi-natural habitats within the wider countryside, such as areas of grassland and woodland, can improve water infiltration.</p>	<p>Plan to manage over-abstraction from groundwater and rivers through careful and efficient use of water.</p> <p>There are opportunities to develop sustainable urban drainage systems (SUDs) in new and existing development to improving infiltration and manage surface water as well as increasing greenspace. Increasing the area of greenspace within urban and industrial areas would also provide benefits for access, recreation and biodiversity.</p> <p>Seek opportunities to create habitats in the wider countryside such as permanent grassland or woodlands, to improve infiltration, which also reduces rate of run-off and can capture sediments and contaminants.</p>	<p><b>Water availability</b></p> <p><b>Regulating water flow</b></p> <p><b>Regulating water quality</b></p> <p><b>Biodiversity</b></p> <p><b>Sense of place / inspiration</b></p> <p><b>Geodiversity</b></p>

<sup>12</sup> Lower Mersey and Alt abstraction licensing strategy, Environment Agency (February 2013) (accessed October 2013); URL: [http://a0768b4a8a31e106d8b0-50dc802554eb38a24458b98ff72d550b.r19.cf3.rackcdn.com/LIT\\_7881\\_35d3ed.pdf](http://a0768b4a8a31e106d8b0-50dc802554eb38a24458b98ff72d550b.r19.cf3.rackcdn.com/LIT_7881_35d3ed.pdf)

<sup>13</sup> Liverpool City Region and Warrington Green Infrastructure Framework DRAFT Action Plan, The Mersey Forest (January 2013) (accessed October 2013); URL: [www.merseyforest.org.uk/our-work/green-infrastructure/liverpool-city-region-green-infrastructure-framework/](http://www.merseyforest.org.uk/our-work/green-infrastructure/liverpool-city-region-green-infrastructure-framework/)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Genetic diversity</b>	N/A	N/A	N/A	N/A	N/A	<b>Genetic diversity</b>
<b>Biomass energy</b>	Woodland  Red Rose and Mersey Community Forests  19 wood fuel boilers  1 wood fuel supplier	Woodland cover (7.6 per cent) offers limited potential for the provision of biomass.  The indicative opportunities for energy crop yields are that the NCA predominantly has a low potential yield for SRC with some areas of medium or high potential, while potential miscanthus yield is high. For information on the potential landscape impacts of biomass plantings within the NCA, refer to the tables on the Natural England website <sup>14</sup> .	Regional	In this NCA the existing woodland cover (7.6 per cent) offers limited potential for the provision of biomass, either through bringing unmanaged woodland under management or as a by-product of commercial timber production.  Schemes such as wood allotments in the Mersey Forest enable woodland owners to engage local communities and manage their woods at the same time. People get fresh air, exercise, new skills, and a cheap, locally sourced renewable fuel, while the woodland receives important thinning to ensure its future health.  There are opportunities from arboricultural arisings and waste wood as well as small amounts from existing woodland including the newer community woodlands.  Power stations, including Fiddlers Ferry, are exploring ways of achieving more energy production through use of renewable biomass sources, and their decisions may impact on the crops grown in close proximity, such as miscanthus.  <b>Continued on next page...</b>	Seek opportunities to encourage sustainable management of woodlands where appropriate, to produce surplus timber and biomass for local use, such as wood-fired boilers.  Increase the extent of woodland where this would not impinge on sites of nature conservation value or obstruct long views and where new woodland can enhance the habitat mosaic.  Seek opportunities to accommodate SRC and miscanthus without impacting upon other services.	<b>Biomass energy</b>  <b>Timber provision</b>  <b>Biodiversity</b>  <b>Recreation</b>

<sup>14</sup> <http://www.naturalengland.org.uk/ourwork/farming/funding/ecs/sitings/areas/default.aspx>



Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biomass energy cont				<p><b>... continued from previous page</b></p> <p>There may be opportunities within the Mersey Valley for both SRC and miscanthus to be accommodated without significant landscape effects, due to the low-lying valley character, the complex land use pattern including arable and mixed farmland, and the existing urban influence on the landscape. However this is also an area under much pressure where there are sensitive views, habitats and other interests to be taken into account.</p> <p>Increased provision of SRC and miscanthus as a source of renewable energy could contribute towards addressing climate regulation, and assimilate new development into the landscape, but could also decrease provision of food if grown on the generally good quality farmland.</p>		

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Climate regulation</b>	<p>Soils</p> <p>Wetlands including lowland raised bogs</p> <p>Woodland</p> <p>Estuarine habitats</p>	<p>Soil carbon levels are low (0–5 per cent) across much of the western half of the NCA, reflecting the 52 per cent coverage by mineral soils.</p> <p>Large areas of higher carbon content (20–50 per cent) occur, largely in the east of the NCA, reflecting the area’s remaining soil types which all contain organic-rich or peaty layers. These cover a total of 45 per cent of the area, and include raised peat bog soils (9 per cent).</p> <p>Carbon storage is also provided by the woodland within the NCA (7.6 per cent of NCA), especially where it is brought under management.</p> <p>Salt marsh soils (2 per cent) can have elevated organic matter levels and be an important carbon store.</p>	National	<p>The peaty and organic soils of the NCA have an important role in carbon sequestration and storage.</p> <p>Raised peat bog soils provide an important store of carbon. Peat cutting, drainage and reclamation for agriculture can lead to loss of carbon stocks. Oxidation can make the peat vulnerable to both wind and water erosion. Adopting management options which reduce the soil disturbance, erosion and oxidation is likely to result in retaining carbon stores.</p> <p>Positive management of wetlands, including lowland raised bog, could result in significant gains in carbon sequestration.</p> <p>In cultivated areas, some soils may have potential for carbon sequestration by conserving soil structure and increasing the organic matter content, for example by introducing buffer strips alongside watercourses, and converting cropped land to grassland or woodland.</p> <p><b>Continued on next page...</b></p>	<p>Encourage the management, enhancement and expansion of areas of lowland raised bog to increase their ability to actively store and sequester carbon. Bring the Manchester Mosses SAC and other local sites into favourable condition.</p> <p>Encourage the buffering of lowland raised bogs by working with adjacent land managers to raise water table levels and create fen and wet woodland, to protect the hydrological function of the bog and improve carbon storage.</p> <p>Take actions to reduce soil loss in cultivated areas. Encourage introduction and adoption of low input grassland management to promote carbon sequestration, and the creation of unfertilised grassland buffer strips in arable areas.</p>	<p><b>Climate regulation</b></p> <p><b>Timber provision</b></p> <p><b>Regulating water flow</b></p> <p><b>Regulating soil erosion</b></p> <p><b>Regulating coastal erosion</b></p> <p><b>Biodiversity</b></p> <p><b>Geodiversity</b></p>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation cont				<p>... continued from previous page</p> <p>Carbon storage and sequestration is provided by the area's woodland and can also be provided by the mudflats, salt marsh and marine sediments, all of which store high levels of organic matter. Some of these may be lost through sea level rise.</p> <p>Wetland, woodland and estuarine habitats should be protected, managed and enhanced and expanded where possible and appropriate.</p>	<p>Seek opportunities to extend areas of wetland along rivers and in valley bottoms.</p> <p>Seek opportunities to increase the carbon storage potential of the area through the conservation management of woodlands and the planting of new woodland where appropriate.</p> <p>Seek opportunities to conserve and expand areas of mudflats and salt marsh, such as through managed realignment schemes allowing intertidal habitats to develop.</p>	

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Regulating water quality</b>	<p>Precipitation</p> <p>Rivers, streams and canals</p> <p>Semi-natural habitats</p> <p>Nitrate Vulnerable Zone 20,486 ha (46 per cent of the NCA)</p>	<p>The Mersey Valley NCA includes parts of the Upper Mersey, the Mersey Estuary, and the Weaver Gowy catchments. The number and status (in 2012) of the water bodies are presented in the North West River Basin District: Challenges and Choices<sup>15</sup>.</p> <p>There are 85 water bodies within the Upper Mersey Catchment. 12 are at good quality (14 per cent); 60 are moderate (71 per cent); 13 are poor (15 per cent). In the Upper Mersey Catchment pollution from waste water affects 36 per cent of the water bodies; pollution from towns, cities and transport affects 19 per cent of the water bodies; pollution from rural areas affects 15 per cent of the water bodies and includes slurry, manure and silage liquor.</p> <p>There are 32 water bodies within the Mersey Estuary Catchment. Twenty-one are at moderate quality (66 per cent); 8 are poor (25 per cent); 3 are bad (9 per cent).</p> <p><b>Continued on next page...</b></p>	National	<p>The Mersey Basin Campaign (1985–2010) was set up to improve water quality in the Mersey Basin, thereby stimulating the regeneration of derelict land beside the river and its tributaries. Significant water quality improvements have occurred. In urban areas, the waterside is now seen as a positive focus for regeneration<sup>16</sup>.</p> <p>Improvements to water quality mean that salmon and sea trout have returned to the Mersey. The coarse fisheries are improving but there is still much to be done.</p> <p>In the Upper Mersey Catchment, investment is needed to target waste water infrastructure. With an extensive transport network and large urban areas, pollution from towns, cities and transport is widespread. Residential and trade developments are significant sources of pollution in the form of discharges from storm water overflows and urban run-off. Releases from industrial discharges and historical landfills have also caused localised water quality problems.</p>	<p>Manage and enhance habitats such as wetlands and grasslands to capture sediments and contaminants before they enter watercourses.</p> <p>Identify river stretches for restoration by re-connecting rivers to their flood plains and take opportunities to de-culvert and re-naturalise rivers to provide space for water, enabling natural geomorphological processes and dissipating the energy of the flows, while also creating habitats for wildlife.</p> <p>There are opportunities to develop SUDS in new development and industrial areas to improve infiltration and water quality.</p> <p>Work with local land managers to encourage adoption of improved land management practices, such as matching nutrient inputs</p>	<p><b>Regulating water quality</b></p> <p><b>Water availability</b></p> <p><b>Regulating water flow</b></p> <p><b>Biodiversity</b></p> <p><b>Recreation</b></p> <p><b>Sense of place / inspiration</b></p>

<sup>15</sup> North West River Basin District: Challenges and choices, Environment Agency (June 2013) <http://www.naturalengland.org.uk/ourwork/farming/funding/ecs/sitings/areas/default.aspx>

<sup>16</sup> Mersey Basin Campaign Study: 2006 Final Report, Government Office North West (July 2006) (accessed October 2013; URL: [www.merseybasin.org.uk/archive/assets/57/original/57\\_EKOS\\_Consulting\\_2006\\_Evaluation\\_of\\_the\\_MBC\\_report\\_to\\_Govt\\_Office\\_NW.pdf](http://www.merseybasin.org.uk/archive/assets/57/original/57_EKOS_Consulting_2006_Evaluation_of_the_MBC_report_to_Govt_Office_NW.pdf))

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality cont		<p><b>... continued from previous page</b></p> <p>There are three designated bathing waters in the Mersey Estuary Catchment. All are predicted to achieve the standards required for bathing.</p> <p>There are two designated shellfish waters in the Mersey Estuary Catchment. Both fail the bacteriological standards. Pollution from waste water affects 94 per cent of the water bodies. Pollution from towns, cities and transport affects 72 per cent of the water bodies in the Mersey Estuary Catchment; pollution from rural areas affects 34 per cent of the water bodies.</p> <p>There are 85 water bodies within the Weaver Gowy Catchment. Nine are at good quality (11 per cent); 40 are at moderate quality (47 per cent); 27 are classed as poor (31 per cent); 4 are classed as bad (5 per cent); 5 are currently not assessed (6 per cent). Pollution from waste water is a significant issue in 72 per cent of the water bodies in the Weaver Gowy Catchment; pollution from rural areas is a significant issue in 71 per cent of water bodies. Groundwater drinking water supplies are affected by nitrate and parts of the sandstone aquifer in the west have been designated as a Safeguard Zone.</p> <p><b>Continued on next page...</b></p>		<p>Most houses and businesses in the Mersey Estuary Catchment are connected to the sewer network, but sometimes the sewerage systems do not discharge as they should or household waste water is wrongly connected. Similarly, ageing sewage treatment infrastructure can also cause problems.</p> <p>It is increasingly important that developments include sustainable urban drainage systems to control both run off and pollutants washed into watercourses. Pollution from wastewater is a significant issue, as the greatest contribution to phosphorus in the watercourses is from sewage treatment works. Future investment needs to take account of both the current capacity of the wastewater infrastructure and the capacity that will be needed in areas targeted for growth, such as Warrington and Runcorn.</p> <p>Many of the rivers in the catchment have been modified through channelisation, culverting and flood protection schemes; these modifications may pose barriers to fish migration and impact on the overall condition of the watercourse.</p>	<p>to crop requirements, to address water quality issues across the river catchment. On cropped land, establish buffers such as permanent unfertilised grassland or scrub along watercourses to capture nutrients and sediments.</p>	

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality cont		<p><b>... continued from previous page</b></p> <p>This mixed picture reflects pollution from the industrial heritage of the NCA, as well as discharges from major sewage treatment plants such as St Helens, Huyton and Liverpool. The catchment has a rich industrial past, and consequently, the Mersey became known as one of the most polluted rivers in Europe. Historic chemical industries also left a legacy of contaminated land.</p>		<p>The Environment Agency's approach includes creating suitable juvenile habitat for River Mersey fry; local investigations to find the origins, cause and solutions to pollution; investigating contaminated land issues and possible remediation; implementing measures to tackle oil pollution in ports, harbours and docks to improve water quality and reduce sedimentation; improving waste water treatment works; improving elver and eel passes in tributaries of the Lower Mersey to encourage eel migration currently obstructed by man-made barriers.</p> <p>Current water quality issues also include the impacts of agricultural activities which can lead to high nitrate and pesticide concentrations occurring in surface and groundwater. This has led to the designation of a Nitrate Vulnerable Zone.</p>		

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Regulating water flow</b>	Rivers and canals Wetlands Estuary Precipitation	<p>The River Mersey flows west through the area and enters the Irish Sea at Liverpool Bay. The Mersey is tidally influenced downstream from Howley Weir (Warrington). The catchment has been heavily modified for industrial purposes, and this has affected the natural response of river flows. The Manchester Ship Canal, which was built for navigation, reduces fluvial flood risk through Warrington<sup>17</sup>.</p> <p>The catchment is largely low lying with a few steeper areas. The response to rainfall is generally slow but is much faster for some of the smaller tributaries flowing through urbanised areas. Some properties are at risk of fluvial flooding, including in Warrington.</p> <p>Where rivers discharge into an estuary or the sea, such as the River Weaver at Runcorn, there can potentially be either a fluvial or tidal flood event or both at the same time. Therefore, flood damage in tidal and fluvial flood risk areas like Stanlow, Runcorn and Frodsham, could be relatively high<sup>18</sup>.</p> <p><b>Continued on next page...</b></p>	National	<p>Surface water flooding can occur throughout the catchment but usually only causes a low level of risk. Some of the urban areas of Warrington have high surface water flood risk.</p> <p>Isolated sewer flooding affects various locations across the catchment and there is an ongoing programme of work to maintain and improve public sewers in Warrington.</p> <p>The Environment Agency's preferred approach to managing flood risk is to address the issues in the upper catchment of the Mersey and its tributaries including investigating the use of upstream flood storage, for example using redundant reservoirs to store storm run-off or storage on agricultural land and beneficial land management changes. Appropriately designed SUDs will also be encouraged.</p> <p>Around the mosslands, there is a network of drainage ditches connected to an arterial network of streams, including Moss Brook and Glaze Brook, which have been enlarged and re-aligned over time and are at risk of flooding as they are low-lying and have relatively narrow flood plains.</p>	<p>Seek opportunities to increase water storage and alleviate the speed of run-off through the expansion of wetlands and other habitats such as reedbeds and wet woodland in flood plains. There are opportunities to develop SUDs in new development and industrial areas to alleviate the speed of run-off.</p> <p>Identify river stretches for restoration by re-connecting rivers to their flood plains and take opportunities to de-culvert and re-naturalise rivers to provide space for water, enabling natural geomorphological processes and dissipating the energy of the flows, while also creating habitats for wildlife.</p>	<p><b>Regulating water flow</b></p> <p><b>Water availability</b></p> <p><b>Regulating water quality</b></p> <p><b>Biodiversity</b></p> <p><b>Sense of place / inspiration</b></p>

<sup>17</sup> Mersey Estuary Catchment Flood Management Plan Summary Report, Environment Agency (December 2009) (accessed October 2013; URL: [www.environment-agency.gov.uk/research/planning/33586.aspx](http://www.environment-agency.gov.uk/research/planning/33586.aspx))

<sup>18</sup> Weaver Goway Catchment Flood Management Plan, Environment Agency (2009) (accessed October 2013; URL: [www.environment-agency.gov.uk/research/planning/114513.aspx](http://www.environment-agency.gov.uk/research/planning/114513.aspx))

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow cont		<p><b>... continued on next page</b></p> <p>The main sources of flooding are river flooding mainly from the Mersey's tributaries; Sankey Brook affects Warrington, Ditton Brook affects Widnes.</p> <p>Tidal flood risk exists at several locations along the Mersey Estuary. There are tidal defences for many of the areas at risk.</p> <p>There are areas where tidal flood risk combines with fluvial flood risk on the lower reaches of the tributaries, and on the stretch of the Mersey between Arpley Landfill Site and Woolston Weir in Warrington.</p>		<p>Water storage can be enhanced through the restoration and creation of habitats such as woodlands wetlands, ponds and other features, which also good for wildlife. Woodlands in flood plains and near to rivers allow the river to spread out over its natural flood plain, retaining water and slowing its progression downstream.</p>	<p>Ensure that drainage ditches and adjacent land are managed in ways which will conserve the biodiversity value of the remnant mosslands, maintain the peat soils, and which will facilitate their management.</p> <p>Manage brooks such as Glaze Brook to create a more natural, responsive environment. This could include creating wet grasslands, reedbeds and willow planting to increase biodiversity and amenity value.</p>	



Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Regulating soil quality</b>	Soils Geology	<p>There are 10 main soilscape types in this NCA:</p> <ul style="list-style-type: none"> <li>■ Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (44 per cent);</li> <li>■ Naturally wet very acid sandy and loamy soils (19 per cent);</li> <li>■ Raised bog peat soils (9 per cent);</li> <li>■ Freely draining slightly acid sandy soils (6 per cent);</li> <li>■ Loamy and clayey flood plain soils with naturally high groundwater (6 per cent);</li> <li>■ Loamy and sandy soils with naturally high groundwater and a peaty surface (5 per cent);</li> <li>■ Salt marsh soils (2 per cent);</li> <li>■ Freely draining slightly acid loamy soils (2 per cent);</li> <li>■ Freely draining very acid sandy and loamy soils (2 per cent);</li> <li>■ Loamy and clayey soils of coastal flats with naturally high groundwater (2 per cent).</li> </ul>	Regional	<p>The soils covering 10 per cent or more of the NCA are described below.</p> <p>The slowly permeable seasonally wet slightly acid but base-rich loamy and clayey 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 increased surface water run-off.</p> <p>Management measures that avoid compaction and increase organic matter levels can help reduce these problems. On cropped land these could include avoiding the use of heavy machinery, careful timing of cultivations, incorporating fallow into rotations, over-wintering stubble.</p> <p>The naturally wet very acid sandy and loamy soils can have a weak structure but are easily worked. Topsoil compaction can occur as well as cultivation pans.</p> <p>The raised bog peat soils are variable, often modified by drainage, peat cutting and reclamation for agriculture. All peaty soils are high risk soils, as these soils are susceptible to shrinkage and wastage, during which the peat dries out and oxidises.</p> <p><b>Continued on next page...</b></p>	<p>On grazed land, encourage sound land management practices which minimise/reduce negative impacts of soil structural deterioration such as extensive grazing, reduced inputs of artificial fertilisers and use of manure in preference, thereby supporting sustainable food provision.</p> <p>On cropped land, encourage the incorporation of fallow into crop rotations, ploughing in of over-wintering stubbles and careful timing of re-seeding and avoiding use of heavy machinery, to avoid compaction.</p> <p>Pursue opportunities to manage peat soils and implement soil protection measures, to prevent drying out, oxidation, and maintain soil structure. Safeguard soils to contribute to sustainable food production.</p> <p>Consider re-wetting peat soils for habitat creation. There may be scope for maintaining carbon stores by reducing cultivation or raising water levels.</p>	<p><b>Regulating soil quality</b></p> <p><b>Food provision</b></p> <p><b>Regulating soil erosion</b></p> <p><b>Biodiversity</b></p>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil quality cont				<p><b>... continued from previous page</b></p> <p>Appropriate soil protection measures on arable peat soils include use of cover crops, minimising the damage to plant cover, careful timing of operations, avoiding and addressing soil compaction. Lowland peat soils under agriculture should maintain water levels as high as practical.</p> <p>On grassland or in recreational areas avoid bare soil using sensitive grazing or recreational management techniques.</p>		
Regulating soil erosion	<p>Vegetation cover</p> <p>Soils</p>	<p>The soils that cover just over half (52 per cent) of this NCA are not susceptible to erosion.</p> <p>The remaining soil types that are susceptible to erosion are the freely draining slightly acid loamy soils (2 per cent); freely draining slightly acid sandy soils (6 per cent); freely draining very acid sandy and loamy soils (2 per cent); naturally wet very acid sandy and loamy soils (19 per cent); and raised bog peat soils (9 per cent).</p>	Regional	<p>The freely draining slightly acid loamy soils, the freely draining slightly acid sandy soils, and the freely draining very acid sandy and loamy soils can erode easily, especially on steep slopes, where vegetation is removed or where organic matter levels are low after continuous cultivation. The first two 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.</p> <p>The naturally wet very acid sandy and loamy soils are also susceptible to wind erosion and some variants are also easily eroded by water if heavily trafficked or after heavy rain.</p> <p><b>Continued on next page...</b></p>	<p>Work with the farming community to safeguard and enhance soil structure, to protect and enhance the soil resource and ensure soils can support sustainable food provision.</p> <p>In cropped areas, manage and enhance riparian habitats to reduce soil erosion rates, creating permanent grassland strips to trap sediment run-off before it enters the streams.</p> <p>In farmed land, encourage the restoration and management of 'gappy' hedgerows in poor condition so that they fill out and</p>	<p><b>Regulating soil erosion</b></p> <p><b>Food provision</b></p> <p><b>Regulating water quality</b></p> <p><b>Regulating soil quality</b></p> <p><b>Biodiversity</b></p> <p><b>Geodiversity</b></p>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion cont				<p><b>... continued from previous page</b></p> <p>Dry cultivated peat soils are very easily eroded by wind. Peaty soils which have not been fertilised are particularly suited to peat extraction but this can cause the remaining peat to shrink and oxidise, thus becoming susceptible to wind erosion.</p> <p>There is also a risk of wind erosion of these soils and the loamy and sandy soils with naturally high groundwater and a peaty surface (5 per cent of NCA), especially where surfaces are bare or spring crops are grown.</p> <p>Addressing these issues is likely to require a number of different measures, including use of cover crops, minimising the damage to plant cover, careful timing of operations, and avoiding and addressing soil compaction.</p>	<p>act effectively as windbreaks and bind/filter out the soil in times of flood.</p> <p>Seek opportunities to manage and create semi-natural habitats and ecological networks within the farmed landscape which will protect soils and water and enhance biodiversity.</p> <p>Pursue opportunities to manage peat soils and implement soil protection measures, to prevent drying out, oxidation, and maintain soil structure.</p>	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Pollination</b>	<p>Areas of semi-natural habitats</p> <p>Gardens and allotments</p> <p>Road verges</p> <p>Horticulture</p>	<p>Only about 8 per cent of the area is covered by semi-natural habitats, which support pollinating insects.</p> <p>Hedgerows within some of the farmed land, road verges, canal and railway banks, gardens, allotments and parks can all support pollinating insects.</p>	Local	<p>Insect pollination, mostly by bees, is necessary for production some crops (for example, most fruit trees, berries, oilseed rape and field beans). In 2009, 6 per cent of farms in the Mersey Valley were in horticulture. Providing suitable nectar sources at a landscape scale and the habitat structures required for pollinating insects should help to address the pollination needs of these and other farms.</p> <p>More pollinating sources could be provided by appropriate seeding and management of the network of road verges, motorway, canal and railway banks to encourage flower-rich grasslands.</p>	<p>Maintain and enhance nectar-rich margins and species-rich semi-natural habitats especially hedges, field margins and conservation headlands, to form a coherent network within the agricultural landscape.</p> <p>Seek opportunities to introduce species-rich grassland, and pollen and nectar strips, within urban areas, along motorway and road verges, canal and railway banks, and alongside watercourses such as the Mersey River, and appropriate management to provide habitats that will support pollinating insects.</p>	<p><b>Pollination</b></p> <p><b>Food provision</b></p> <p><b>Biodiversity</b></p>
<b>Pest regulation</b>	<p>Semi-natural habitats</p> <p>Field margins and hedgerows</p>	The habitats in the area support a variety of species, such as beetles, which can regulate the populations of pests such as aphids.	Local	<p>Many hedgerows have been replaced with post and wire fencing. Increasing diversity in species and structure of hedgerows and field margins will increase the ability for these areas to support populations of pest regulating species such as invertebrates, birds and mammals.</p>	<p>Within the farmed landscape, seek opportunities to restore and enhance hedgerows and field margins, and introduce beetle banks to encourage a network of habitats for pest regulating species close to areas of agricultural production.</p>	<p><b>Pest regulation</b></p> <p><b>Food provision</b></p> <p><b>Biodiversity</b></p>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Regulating coastal erosion and flooding</b>	<p>Tidal stretches of all the main rivers</p> <p>Natural intertidal mudflats/sand flats and salt marsh defences</p>	<p>The Mersey Estuary is very industrialised with extensive port facilities power stations and oil refineries. There are also substantial urban areas and the Manchester Ship Canal runs along the southern shoreline of the Inner and Upper estuary.</p> <p>Intertidal mud/sand flats and salt marsh vegetation is subject to tidal flooding.</p> <p>Intertidal habitats are valuable for effectively absorbing the energy from waves and thus provide a natural defence against flooding, but are under threat due to sea level rise. The dynamic process of erosion and accretion on mud/sand flats and salt marshes is necessary to maintain a succession of diverse habitats.</p>	National	<p>The hard defences along much of the estuary make it difficult to find space to allow intertidal habitats to move back ('coastal squeeze') thus exacerbating the impacts of flood waters.</p> <p>In the upper estuary, the long-term plan is to improve the natural functioning of the estuary, and potentially reduce flood risks upstream and create additional habitat<sup>19</sup>. A number of potential areas for managed realignment have been identified in the Upper Estuary.</p> <p>The long-term plan in the Narrows and Inner Mersey Estuary is to maintain the status quo by continuing to provide the same extent of protection currently afforded to property and infrastructure, while allowing natural evolution of the estuary where there are currently no defences present.</p> <p><b>Continued on next page...</b></p>	<p>Carry out research to better understand changes that will take place in event of sea water rise/ flooding and subsequent impact on estuarine habitats and land use. Understand and address sustainability and environmental priorities. Possible climate change adaptation actions include intertidal habitat roll back, and managed realignment.</p> <p>Where possible, ensure the retention of mudflats and salt marshes, to provide a cost effective defence against erosion and flooding.</p> <p>Work with the Environment Agency, landowners and other stakeholders to identify scope for pulling back flood defences, and for managed realignment schemes in accordance with the Shoreline Management Plan. Ensure that these sites are managed to create high quality habitats for biodiversity and sense of place.</p>	<p><b>Regulating coastal erosion and flooding</b></p> <p><b>Climate regulation</b></p> <p><b>Regulating soil erosion</b></p> <p><b>Sense of place / inspiration</b></p> <p><b>Recreation</b></p> <p><b>Biodiversity</b></p> <p><b>Geodiversity</b></p>

<sup>19</sup> North West England and North Wales Shoreline Management Plan SMP2 – main document and Mersey Estuary (Unit 11a 7), North West and North Wales Coastal Group (July 2010) (accessed from [http://mycoastline.org/index.php?option=com\\_frontpage&Itemid=1](http://mycoastline.org/index.php?option=com_frontpage&Itemid=1))

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating coastal erosion and flooding cont				<p>... continued from previous page</p> <p>In the Upper Mersey Estuary managed realignment was assessed as an alternative policy to offset for the potential loss of internationally designated habitat elsewhere (due to hold the line policies and predicted sea level rise resulting in coastal squeeze) and to help manage flood risk<sup>20</sup>.</p> <p>The risks from contamination related to potential flooding or erosion of historical landfills and industrial sites are uncertain and future studies will be required to address these uncertainties.</p>		

<sup>20</sup> Mersey Estuary Catchment Flood Management Plan Summary Report, Environment Agency (December 2009) (accessed October 2013; URL: [www.environment-agency.gov.uk/research/planning/33586.aspx](http://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
<b>A sense of place/ inspiration</b>	The Mersey River and Estuary	Sense of place is provided by the river valley and estuary of the Mersey and its associated tributaries and waterways, edged by major settlements including Ellesmere Port, Warrington, Runcorn and Widnes, and extensive areas of oil refineries, chemical works, docks and other industrial activities.	Regional	The area has a heavily industrial character, with docks, chemical and oil refineries and extensive urban and suburban areas, and associated transport infrastructure including the Manchester Ship Canal, Bridgewater Canal, Shropshire Union Canal and Leeds and Liverpool Canal.	Conserve the open and exposed character of the mud/sand flats and salt marshes along the Mersey Estuary.	<b>Sense of place / inspiration</b>
	Mosslands					
Farmland	Varied landscape ranging from intertidal mudflats/sand flats and low exposed cliffs in the west, to homogenous, large-scale open arable farmland in the north.	The Manchester Ship Canal is a major feature of the area, and can be seen where the M6 rises over the Thelwall Viaduct high above it and the marshy areas of Woolston Eyes.	Improve understanding and enjoyment of the mosslands and the mosaic of lowland raised bogs.	<b>Recreation</b>		
Extensive industrial complexes and docks					Mixed arable with dairying occurs to the south of the Mersey, often defined by degraded hedgerows, while in the east small pockets of former mossland remain amongst land drained by ditches. Here land use is defined by farming, industry and residential use, while isolated blocks of woodland are also a feature. Elsewhere, woodland and trees are limited to settlements, field boundaries and watercourses.	Senses of inspiration and escapism are likely to be constrained by urban development and industrialisation, although views of the industrial complexes themselves, both during daytime and at night when they are lit up, can be dramatic.
Canals	Daresbury village was the birth place of author Lewis Carroll.	<b>Continued on next page...</b>	Improve understanding and enjoyment of the mosslands and the mosaic of lowland raised bogs.			
Country Parks, Local Nature Reserves, Parks and other green spaces				Daresbury village was the birth place of author Lewis Carroll.	<b>Continued on next page...</b>	Protect the sense of place by conserving and enhancing the Mersey River valley, parks and urban green spaces. Increasing the provision of green spaces, as well as enabling people to access and enjoy them.

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
A sense of place/ inspiration cont				<p>... continued from previous page</p> <p>Inspiration is also provided by the broad panoramic views to the west across intertidal mudflats/sand flats and low, exposed cliffs, with significant areas of grazing marsh and fens and pockets of lowland raised bogs, views from Runcorn Hill.</p> <p>The natural heritage of the river valley, parks and urban green spaces, as well as the parklands such as Dunham Park, Castle Park and Walton Hall Gardens, are important as comparatively tranquil recreational areas being close to where people live, as well as providing valuable wildlife corridors, contributing to providing a sense of place and inspiration.</p>	Carefully design and integrate green infrastructure within housing and industrial development, linking new developments with the wider countryside.	



Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Sense of history</b>	Industry	The history of the landscape is associated with the Mersey.	Regional	Areas of peat, including lowland raised bog, have the potential to preserve organic remains including pollen, and other palaeo-environmental evidence. As peat dries out, the organic resource will deteriorate, leading to degradation of the archaeological resource. Managing areas of surviving peat to maintain high water table levels should prevent this.	Seek ways to protect, conserve, manage and interpret the area's historic and cultural identity to ensure a better understanding of past land use and retain evidence of the relationships between features for the future.	<b>Sense of history</b>
	Canals	Historic development, particularly linking to the ports, trade and industry.				
	Registered Parks and Gardens	Aspects of history likely to be particularly evident to the public are the reclaimed mosslands, industrial evidence including canals, railways, and the Registered Parks and Gardens of Dunham Massey and Castle Park, Frodsham.		At Dunham Park a large number of the oak and beech trees are ancient, with some dating back to the 17th century. This is the only site in north-west England and one of the few remaining sites in Britain with such a considerable number of old trees.	Seek opportunities to conserve and interpret the many layers of historic evidence to raise awareness and to increase public engagement, enjoyment and understanding.	<b>Sense of place / inspiration</b>
	Scheduled Monuments	The docks at Ellesmere Port were still in use as late as the 1950s. These now form part of the National Waterways Museum.		Little remains of early settlement, apart from prehistoric and Roman artefacts found within the river channel and flood plain, and some scattered examples of ancient enclosure to the east, between Warrington and Urmston. This is as a result of the radical changes in the landscape resulting from the expansion of development.	Promote a wider understanding of the current landscape in terms of historic development, linking to the ports, trade and industry and connections between Liverpool and Manchester. Increase the appreciation of the New Towns as a planning response to need.	<b>Tranquillity</b>
	Listed Buildings	Evidence of strategic crossing points remain in the form of ancient fortifications at Warrington and, more recently, gun sites defending the Mersey Valley during the Second World War.				<b>Recreation</b>
	Traditional churches and red-brick terraces	Twelve Local Geological Sites, one of which is a Local Nature Reserve (Helsby Quarry).			Promote a wider understanding the history of the reclamation of the mosslands.	<b>Recruitment</b>
	Local Geological Sites including Local Nature Reserves					<b>Biodiversity</b>
						<b>Geodiversity</b>
						<b>Regulating soil erosion</b>
				<b>Continued on next page...</b>		

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history cont				<p><b>... continued from previous page</b></p> <p>Historic areas include Norton Priory which is surrounded by a New Town development. New Towns represent a particular period in the history of town planning.</p> <p>The ancient Hale Duck Decoy has been restored for use as a nature reserve.</p> <p>There is wide historic interest in the industrialisation of the area based on the Mersey Estuary, the canal network, coal, minerals and links with inland resources (such as sheep and wool) and the port of Liverpool (bringing in cotton). Woolston Eyes SSSI has been formed from lagoons used for taking dredgings from the upper reaches of the Manchester Ship Canal, and is at various stages of colonisation.</p> <p>There is evidence of anti-aircraft gun sites defending the Mersey Valley and the conurbations during the Second World War. The ordnance works at Risley was a large military establishment. Cold War sites include nuclear bunkers and the vast US Army depot at Burtonwood.</p> <p>Helsby Quarry Local Nature Reserve contains a rock tunnel that was once a tramway used to move sandstone from the quarry to Ince Pier for wider distribution.</p>	<p>Maintain the wood-pasture management at Dunham Park, making provision for eventual replacement of trees, while retaining moribund and dead standing timber.</p>	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Tranquillity</b>	<p>Semi-natural habitats</p> <p>Mersey Forest and Red Rose Forest</p> <p>Country Parks, Local Nature Reserves, parks and other green spaces</p>	<p>Tranquillity is not a feature typically associated with this NCA, with none of it classified as 'undisturbed' according to CPRE data (in contrast to 6 per cent 'undisturbed' in the 1960s)<sup>21</sup>.</p> <p>A sense of tranquillity may nevertheless be associated with the areas of mossland in the east, and the extensive grazing marshes adjacent to the estuary in the west. Relative tranquillity can be found in parks and green spaces within the urban areas, and sites adjacent to the River Mersey.</p>	Local	<p>Despite the overall low levels of tranquillity within this NCA, the parks, woodlands, estuary and mosslands are an important source of relative tranquillity in the local area and are highly valued.</p> <p>Providing increased opportunities and access to a tranquil environment through management, enhancement and expansion of habitats should ensure that these important places can remain tranquil and contribute to biodiversity, sense of place and recreation.</p> <p>The Mersey and Red Rose Community Forests provide opportunities to increase woodland and other habitats, to create quite tranquil areas for people to enjoy.</p>	<p>Encourage opportunities to improve, maintain and expand habitats which may increase the sense of tranquillity such as in the areas of mossland in the east, and, the extensive estuarine habitats in the west.</p> <p>Seek further opportunities in the Red Rose and the Mersey Forest Community Forests to increase woodland and other habitats, to create tranquil areas for people to enjoy.</p> <p>Seek opportunities through new housing, transport and industrial developments to create additional green infrastructure to provide quiet enjoyment and improve wellbeing through increased contact with the natural environment.</p> <p>Opportunities exist to promote the calming and restorative effect that contact with tranquil and sensory environments have on visitors' health and wellbeing, including local green spaces.</p>	<p><b>Tranquillity</b></p> <p><b>Sense of place / inspiration</b></p> <p><b>Recreation</b></p> <p><b>Biodiversity</b></p>

<sup>21</sup> CPRE Intrusion Map, 2007

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Recreation</b>	Network of footpaths	Recreation is supported by the area's 513 km rights of way network (with a density of 1.15 km per km <sup>2</sup> ).	Regional	<p>There are large populations locally both within the towns of the Mersey Valley and the two adjacent conurbations.</p> <p>Communities value their local green spaces 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.</p> <p>Local woodlands and the two community forests have generated local interest to increase woodland and other habitats, create wildlife corridors and access for people. The maturing woodland resource of the community forests provides opportunities for access and recreation. Woodlands can be a green tourism attraction in their own right, and can enhance existing tourist attractions. Local Nature Reserves and country parks also provide opportunities for people to enjoy the natural environment.</p> <p><b>Continued on next page...</b></p>	<p>There are opportunities to promote sustainable recreation and education linked to biodiversity, for example at Local Nature Reserves and country parks, and provide links between urban areas and the surrounding countryside.</p> <p>Provide interpretation for people to understand and enjoy wildlife and the benefits of the natural environment.</p> <p>Increase opportunities for users to access the natural environment, and to benefit from the health and social rewards that their local environment affords them.</p> <p>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.</p>	<p><b>Recreation</b></p> <p><b>Sense of place / inspiration</b></p> <p><b>Sense of history</b></p> <p><b>Tranquillity</b></p> <p><b>Biodiversity</b></p>
	Open access land	Open access land (80 ha), country parks (66 ha), Local Nature Reserves (361 ha) and two Registered Parks and Gardens provide recreational access and facilities for quiet enjoyment.				
	Mersey Forest and Red Rose Forest					
	Country Parks					
	Local Nature Reserves	There are some multi-use recreational corridors, with long distance footpaths such as the Trans Pennine Trail and Mersey Way. Frodsham provides the starting point for one of the north-west area's popular long distance walking routes the Sandstone Trail, which runs south beyond the NCA to Whitchurch in Shropshire.				
	Registered Parks and Gardens					
	Canal towpaths					
	Woods for people					
Transpennine Trail, Sandstone Trail and Mersey Way	This is further supported by the canal network, the area's parks and more formal facilities such as golf courses.					
Greenbelt land						

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation cont				<p><b>... continued from previous page</b></p> <p>The mosslands are also an educational resource which is currently much underused.</p> <p>Poor water quality in the Mersey has been a deterrent to water-based recreation. It appears likely that as the water quality improves there will be more of a push to provide increased access to the shoreline. There is a network of footpaths in the Upper Estuary, with the potential to extend public access.</p> <p>Future provision of estuary access may supplement the existing resource, but will need to be implemented sympathetically to avoid potential conflicts with the internationally designated nature conservation interest of the estuary.</p> <p>Where environmental assets are sensitive to disturbance seek opportunities to manage recreational practice to minimise impacts.</p> <p><b>Continued on next page...</b></p>	<p>Seek opportunities to create green spaces, especially within towns, new housing and industrial developments, with easy access enabling communities to re-connect with the natural environment close to where they live, and allowing them to enjoy the health and social rewards it affords them.</p> <p>Maintaining and improving water quality, such as in the rivers and canals, for people and wildlife to enjoy the multiple benefits that clean water provides.</p> <p>Interpreting the mossland and the estuary habitats, to raise awareness, improve public understanding and increase enjoyment of these significant areas.</p>	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation cont				<p><b>... continued from previous page</b></p> <p>Footpaths, cycle ways, canal towpaths and bridleways which link green spaces to each other and to residential and employment areas provide a means of encouraging sustainable transport, healthier lifestyles, greener commuting and general enjoyment of open spaces.</p> <p>Where greenbelts have been defined, there are opportunities to provide access, outdoor sport and recreation, to retain and enhance landscapes, visual amenity and biodiversity or to improve damaged and derelict land<sup>22</sup>.</p>		

<sup>22</sup> NPPF (National Planning Policy Framework) Para 81

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Biodiversity</b>	<p>Semi-natural habitats</p> <p>Sites of Special Scientific Interest (SSSI) and Local Wildlife sites</p> <p>Rivers</p> <p>Estuary</p> <p>Species</p> <p>Country parks, Local Nature Reserves and other green spaces</p>	<p>Biodiversity priority habitats include:</p> <ul style="list-style-type: none"> <li>■ Coastal and flood plain grazing marsh 1,204 ha</li> <li>■ Broadleaved mixed &amp; yew woodland (broad habitat) 880 ha</li> <li>■ Mudflats 513 ha</li> <li>■ Lowland raised bog 341 ha.</li> </ul> <p>The NCA contains two SAC, one SPA and one Ramsar site, with 1,600 ha nationally designated as SSSI. There are a further 83 Local Wildlife Sites covering 2,963 ha (7 per cent of the area).</p> <p>There are three country parks and 16 Local Nature Reserves across the NCA.</p>	National	<p>The Mersey Valley river corridor is a significant link across the NCA, particularly connecting freshwater habitats in the east and marine habitats in the west. SSSI and Local Wildlife Sites provide opportunities to conserve important biodiversity habitats in the Mersey Valley.</p> <p>The Mersey Estuary has extensive intertidal mudflats and fringing salt marshes, providing essential feeding and roosting areas for large populations of wading birds and wildfowl. Adjacent farmland and wetland habitats also support wildlife. Significant effort has been made to improve the condition of flood plain grazing marsh, notably around Frodsham, Helsby and Ince Marshes and in the lower Gow.</p> <p>The Mersey Valley once supported huge expanses of mossland habitat. Many of these areas have been lost to agricultural improvement, peat extraction or development. Relict semi-natural bog habitats are degraded. These habitats have suffered from drainage in the past and are affected by scrub invasion. However there has been management to re-wet and restore parts of the habitat. The vegetation is now recovering over large areas.</p> <p><b>Continued on next page...</b></p>	<p>Protect and enhance the extent and quality of semi-natural habitats, including the coastal and flood plain grazing marsh, woodland, mudflats and lowland raised bog. Encourage improved management to bring nationally and locally designated habitats, into and maintain favourable condition.</p> <p>Conserve the Mersey Estuary habitats and geomorphological processes and seek opportunities to provide space for intertidal habitats to develop and move in response to coastal change. Enhance connectivity of habitats particularly in the coastal zone and along the river valley corridor.</p> <p>Restore and enhance the biodiversity of the mossland landscape by working with farmers and landowners to restore peat to lowland raised bog where feasible and provide hydrological buffer zones to help to manage water</p>	<p><b>Biodiversity</b></p> <p><b>Food provision</b></p> <p><b>Water availability</b></p> <p><b>Climate regulation</b></p> <p><b>Regulating water quality</b></p> <p><b>Regulating water flow</b></p> <p><b>Regulating soil quality</b></p> <p><b>Regulating soil erosion</b></p> <p><b>Pollination</b></p> <p><b>Sense of place / inspiration</b></p> <p><b>Tranquillity</b></p> <p><b>Recreation</b></p> <p><b>Geodiversity</b></p>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity cont				<p><b>... continued from previous page</b></p> <p>There are also extensive areas of modified peat being used for farming. There is potential for farmland adjacent to the remaining mossland to provide buffer zone, which if managed and water table levels allowed to rise, would result in these areas developing into fen or wet woodland.</p> <p>Woodland habitats include lowland mixed deciduous woodland, wet woodland and wood-pasture and parkland. Some woodlands are ancient semi-natural woodlands.</p> <p>The arable farmland is important for farmland birds. The brown hare is also present in arable land. Pastureland is also valuable habitat for ground nesting birds such as skylarks and lapwings.</p> <p>The network of hedgerows, trees, ditches and associated uncultivated margins form valuable linear habitats, as do the canal banks, road verges, railway banks, gardens and green spaces within urban areas. These provide 'wildlife corridors' enabling movement and migration of species, and food and cover for wildlife.</p> <p><b>Continued on next page...</b></p>	<p>water table levels and to protect the nature conservation value of the mosses.</p> <p>Seek opportunities in former peat cutting areas and farmlands for restoring, enhancing, buffering and linking of fragmented mosslands.</p> <p>The diversity of farmland could be restored to provide a significant habitat network for farmland birds. Provision of year round habitat for farmland birds should be sought where appropriate.</p> <p>Restore and manage the hedgerows within the farmed landscapes.</p> <p>Develop networks of linear habitats, corridors and stepping stones, making a more permeable landscape to enable species movement.</p>	



Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity cont				<p><b>... continued from previous page</b></p> <p>Some farmland locations have field ponds and the internationally designated Rixton Clay Pits SAC is in this NCA. Ponds provide breeding sites for amphibians and sustain a range of aquatic invertebrates. Ponds may serve as habitat 'stepping stones' enabling local wildlife migrations.</p> <p>Country Parks, LNRs and other local green spaces provide opportunities to encourage communities to become more involved in biodiversity close to where they live and work, such as taking part in biological recording through events such as Bioblitz, and by volunteering to be involved in site based conservation activities and in the future planning and management of these sites.</p>	<p>Management of the existing ponds and ditches for ecological benefits should be sought where appropriate.</p> <p>Maintain and, where appropriate, enhance the population size and distribution of locally, nationally and internationally important species populations and assemblages which are particularly important within the area including grey partridge, willow tit and lapwing.</p> <p>Use country parks, Local Nature Reserves and other local green spaces to encourage communities to become more involved in biodiversity close to where they live and work.</p>	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Geodiversity</b>	<p>Geological exposures</p> <p>Geomorphological processes</p>	<p>Two geological SSSI.</p> <p>Twelve Local Geological Sites including an LNR.</p> <p>Sequence of Triassic sandstones and siltstones.</p> <p>Post glacial sediments, including basin peat deposits.</p>	National	<p>Dynamic geomorphological processes of accretion and erosion in the estuary.</p> <p>Examples of soft cliff occur on the shores of the Mersey estuary, such as around Hale Head, but the total resource is very limited in extent. The cliffs are of geological and geomorphological importance for their sedimentary record and display of natural erosive processes.</p> <p>Peat-forming bogs and dynamic intertidal environments are both examples of dynamic geomorphological processes, with the former also maintaining an important palaeoenvironmental record. Supporting opportunities to restore mosslands to re-establish their geomorphological function as a recorder of environmental change will also restore their biodiversity and carbon sequestering role.</p> <p>Geological exposures, for example the sandstone sequences at Frodsham Road and Railway Cuttings SSSI, make an important contribution to the understanding of the origin and geological development of the NCA.</p>	<p>Allow natural evolution of the estuary, as well as the dynamic process of erosion and accretion on mudflats/sand flats and salt marshes to continue where possible.</p> <p>Seek opportunities to restore mosslands to re-establish their geomorphological function and as records of palaeoenvironmental evidence.</p> <p>Maintain and where possible enhance all the existing rock exposures and natural landforms, including SSSI, which make important contributions to an understanding of the origin and geological development of the NCA.</p> <p>Deepen appreciation among landowners, industry and the public, of the links between geology, landscape and wildlife habitat and their relevance to conserving biodiversity and to sustainable development.</p> <p>Protect and maintain geological sites, improving access and interpretation where appropriate in order to increase visitor understanding and enjoyment of these sites.</p>	<p><b>Geodiversity</b></p> <p><b>Climate regulating</b></p> <p><b>Regulating soil erosion</b></p> <p><b>Regulating coastal erosion and flooding</b></p> <p><b>Sense of place / inspiration</b></p> <p><b>Sense of history</b></p> <p><b>Biodiversity</b></p>

## Photo credits

Front cover: The Mersey Estuary is of international significance, with large areas designated as a Ramsar site and as a Special Protection Area with extensive intertidal habitats such as mud/sand flats supporting internationally important bird populations. © Natural England/Ruth Critchley

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