National Character Area profile:

55: Manchester Conurbation

Supporting documents

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Introduction

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

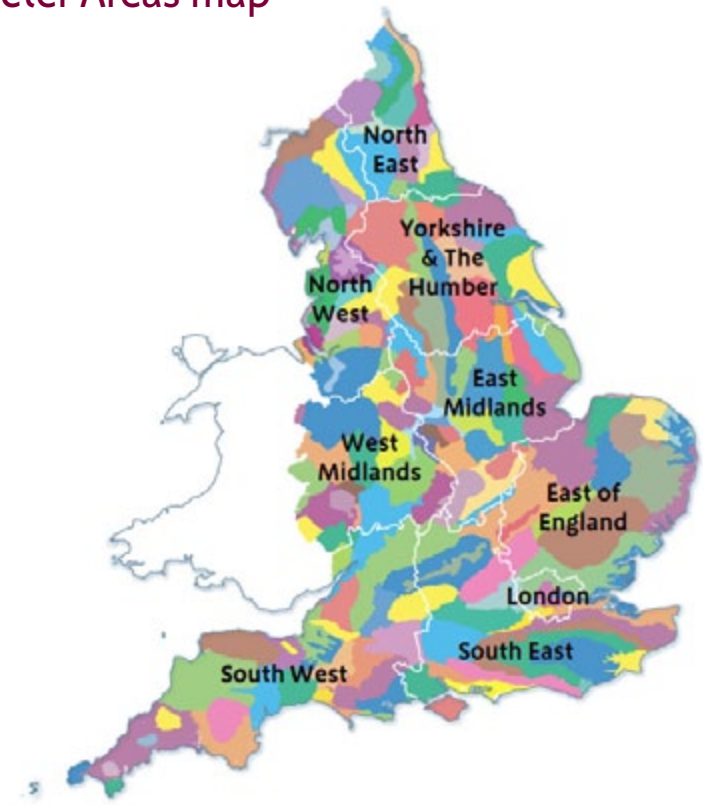
NCA profiles are guidance documents which can help communities to inform theirdecision-making about the places that they live in and care for. The informationthey contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and encourage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

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

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

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

National Character Areas map



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

Summary

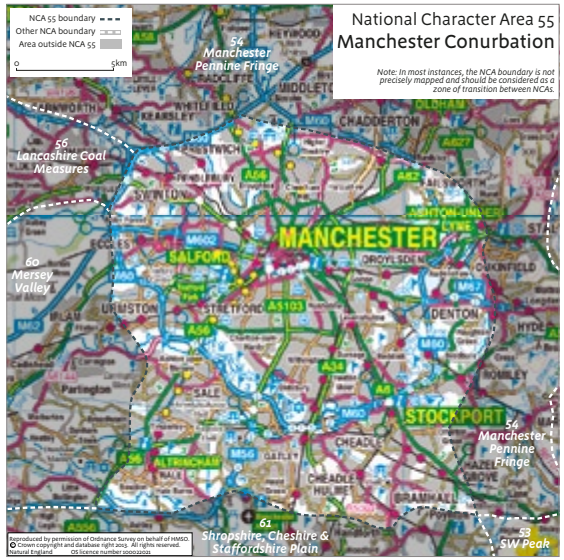
A number of settlements have grown and come together to form the Manchester Conurbation, including Manchester, Salford, Stockport, Sale, Ashton-under-Lyne, Swinton, Altrincham, Stretford, Prestwich, Cheadle Hulme, Denton and Droylsden. The area is characterised by dense urban and industrial development, commercial, financial, retail and administrative centres, commuter suburbs and housing, interspersed with a network of green infrastructure.

The conurbation is centred on low hills, crossed by several river valleys that thread through the urban fabric. The geology is dominated by sandstones, overlain by thick deposits of glacial till. The underlying Permo-Triassic sandstones provide an extensive aquifer, contributing groundwater for a large number of industrial users as well as public water supply.

River valleys form important corridors of semi-natural habitats and natural greenspace – with open grassland, woodland and wetland – linking urban centres with open countryside. The industrial heritage now provides sites of wildlife interest in the urban environment. Canals that weave through the conurbation not only offer opportunities for access and recreation, but also form a network of wetland habitats. Sections of the Rochdale Canal, in particular, have been designated as being of international importance as a Special Area of Conservation (SAC). Woodland cover is generally low, but variable – and significant for such a heavily urban location. New areas of community woodland have been created in the Red Rose Forest and Pennine Edge Forest.

The history of the landscape is evident through the legacy of industrial archaeology, particularly relating to the textile industry. In the late 18th century the area became rapidly industrialised, with dramatic growth in the cotton industry and expansion in ancillary trades. The population increased, fuelled by a need for labour, with rows of terraced housing built for the workers as well as mills and industrial buildings. Red brick and sandstone buildings are prominent in the city and town centres, alongside buildings using a mix of modern materials, high-rise buildings, and landmark 19th-, 20th- and 21st-century buildings.

Drivers for change within the Manchester Conurbation include the ongoing aspiration for economic growth. Development pressures are high, as is the need to provide infrastructure and associated services. There are challenges in ensuring that the area's natural environment is resilient enough to meet the demands of economic and population growth. Securing and enhancing green infrastructure provides an opportunity to deliver the benefits of a high-quality, healthy natural environment, including managing surface waters and reducing flood risk, adapting urban environments for climate change resilience, enabling healthy activity, recreation and social cohesion, and conserving the area's distinctive biodiversity, landscape and heritage.



Click map to enlarge; click again to reduce.

Statements of Environmental Opportunity

SEO 1: Provide and maintain green infrastructure, including multi-functional green spaces and trees, improving links between habitats as well as creating a high-quality urban environment – to aid adaptation to climate change, to provide opportunities for recreation, and to enable people to enjoy the benefits that access to nature brings.

SEO 2: Conserve and enhance the cultural heritage and character of the Manchester Conurbation, recognising the industrial and textile history of the area, and providing opportunities for access and interpretation of the urban environment for people to understand and enjoy.

SEO 3: Provide a healthy water environment – with rivers, canals, wetlands, streams and aquifers – creating habitats for wildlife, delivering sustainably managed water and bringing multiple benefits for people.

SEO 4: Conserve and enhance the river valleys and canals, as corridors through the urban areas, for the multiple benefits that the natural environment provides, to improve the landscape, and to make green spaces available for the benefit of both wildlife and people.

Provision of vegetation including trees can support urban wildlife, help keep urban environments cooler, provide green routes across the urban fabric, help manage surface water and contribute to people's health and wellbeing.

Description

Physical and functional links to other National Character Areas

The Manchester Conurbation National Character Area (NCA) is a predominantly urban area, bringing together a number of large settlements. The Manchester Pennine Fringe NCA wraps around the conurbation to the east and to the north. The Mersey Valley NCA lies to the west of the area, while the Shropshire, Cheshire and Staffordshire Plain NCA extends to the south.

The high-rise buildings of Manchester city centre serve as a visual orientation point within the surrounding urban context, and can be seen from many viewpoints in the conurbation and in surrounding NCAs. From the central and eastern extent of the Manchester Conurbation, views outwards include the moors of the Southern Pennines NCA, Dark Peak NCA and the Peak District National Park. Views to the west of the conurbation are typically more limited by the low-lying character of the landscape.

Drainage is through a series of river valleys, flowing broadly from the Pennine moors to the east and north, and the Peak District to the south-east, across the conurbation, and towards the lower-lying areas of the south and west. River valleys include those of the Mersey, Irwell, Tame and Bollin. Tributaries meet the River Mersey and Manchester Ship Canal, then cross the adjacent Mersey Valley NCA, ultimately reaching the Mersey Estuary in the west. The Manchester Ship Canal follows the original routes of the rivers Mersey and Irwell. The Manchester Ship Canal, the Bridgewater Canal, the Leeds and Liverpool Canal, and the Rochdale Canal are all connected, linking the Manchester Conurbation

The high rise buildings of Manchester city centre serve as a visual orientation point within the surrounding urban context and can be seen from many viewpoints.

with the Port of Liverpool. Water supply is from surrounding uplands, including reservoirs in the Dark Peak NCA, the Southern Pennines NCA, the Cumbria High Fells NCA and north Wales, supplemented by groundwater.

The Manchester Conurbation forms a busy transport hub, interlinked with surrounding areas by an extensive web of infrastructure into, out of, and around, the centre. Roads, tramways and railways all serve to connect the area, while the Manchester ring motorway serves to divert traffic around Manchester and Salford city centres. The transport network links mainline railways and motorways to the north and south. There are also connections from east to west, linking the area with the Merseyside Conurbation NCA and with trans-Pennine routes. The Trans Pennine Trail, a multi-user route for walkers, cyclists and horse riders, crosses the Manchester Conurbation from coast to coast, between the North Sea and Irish Sea.

The River Irwell and Salford Meadows are an important feature of the area, valued recreational space, wildlife resource, setting for residential, education and commercial infrastructure.

Key characteristics

- Large settlements have come together to form the conurbation, characterised by dense urban and industrial development, commercial, financial, retail and administrative centres, commuter suburbs and housing.
- The area is centred on low hills, enclosed by the Pennine hills to the north and east, and crossed by several meandering river valleys.
- The geology is dominated by sandstones, with the underlying Permo-Triassic sandstones forming an extensive aquifer; this is overlain by thick deposits of glacial till.
- Woodland is usually found in corridors along the slopes of the river valleys, and also on what was once brownfield land.
- There are small pockets of farmland, bounded by fences or hedges. However, an increasing number of farms are now given over to urban farming uses such as equestrian facilities, supplying the demand for recreation.
- Public parks and recreation facilities provide valuable open spaces for people within this urban environment; community gardens and allotments are places for local food growing.
- River valleys form important corridors of semi-natural habitats and natural green spaces – with open grassland, woodland and wetland – linking urban centres with open countryside. Many post-industrial sites and canals provide wildlife habitats.
- Drainage is through a series of river valleys that weave through the urban fabric, flowing broadly from the Pennine moors to the east and north, towards the lower-lying areas of the south and west.
- The area's legacy of industrial archaeology – particularly relating to the textile industry – is increasingly recognised. Red brick and sandstone buildings are prominent in the city and town centres, alongside buildings using a mix of modern materials, high-rise buildings, and landmark 19th-, 20th- and 21st-century buildings.
- The Manchester Conurbation forms a busy transport hub, interlinked with surrounding areas by an extensive web of roads, tramways and railways – major communications corridors. Access is also provided by the canal network.

Small patches of green space in the heart of the city can attract high levels of usage. A space to relax, enjoy events and socialise.

Red brick and sandstone buildings are prominent, alongside a mix of modern materials and high rise buildings.

Manchester Conurbation today

The Manchester Conurbation is characterised by dense urban and industrial development, with 82 per cent of the area being classed as urban. This development is focused around the principal commercial, financial, retail and cultural centres of Manchester, Salford and Stockport. Other main settlements that come together to form the conurbation include Sale, Ashton-under-Lyne, Swinton, Altrincham, Stretford, Prestwich, Cheadle Hulme, Denton and Droylsden.

The NCA is centred on low hills, which rise above a drift-covered sandstone plain. This is crossed by several river valleys that thread through the urban fabric, flowing down from the moors of the Pennines in the north and east, and the Peak District in the south-east, towards the Mersey Valley in the west. Elevations range from 15 m to 130 m. The geology is dominated by sandstones – some of which form part of an extensive aquifer. This is overlain by thick deposits of glacial till. Sands and river alluvium lie along the valleys of the Mersey and its tributaries.

Landscapes are predominantly urban in character, with green infrastructure threading through. There are strong visual connections with surrounding urban centres and the distant Pennine hills. The distinctive visibility of the Pennines on the skyline, as well as the high-rise buildings of Manchester city centre, contribute to the area's orientation and sense of place. From the central and eastern extent of the Manchester Conurbation, views outwards include the moors of the distant Pennine hills and the Peak District National Park. In settlements to the west of the area, there is limited inter-visibility with the surrounding low-lying agricultural landscape.

Community gardens and allotments provide places for local food growing.

Semi-natural broadleaved woodland can be found in small pockets, some of which are ancient woodland sites, such as Bailey's Wood, Mere Clough and Prestwich Clough in the north, and Bramhall and Carr Woods in the south. The flora of this NCA was well documented by the Victorians – both by artisan naturalists such as Richard Buxton and by more academic naturalists such as Leopold Grindon. Many of the river valleys have large areas of woodland along their slopes. The Red Rose Forest and the Pennine Edge Forest cover this NCA. They have encouraged the establishment of new community woodland, semi-natural habitats and other green spaces for people to enjoy within the conurbation, recognising the important quality-of-life benefits that these features provide.

Field boundaries, where they occur, include both fences and hedges in river valleys and on the peripheries of the urban areas.

Small pockets of farmland can be found along the river valleys. Most of the agricultural land is grade 3, but there are some areas of grade 4 land. In some locations, peat soils provide grade 2 land – such as around Ashton-under-Lyne. The majority of holdings are grass and uncropped land. An increasing number of farms are given over to urban fringe uses, feeding the demand for recreational facilities such as equestrian centres, playing fields and golf courses.

The countryside filters through the Manchester Conurbation, following the network of corridors formed by the rivers (and, to a lesser extent, canals and railways), which cut through the urban fabric. All the river valleys contain sizeable networks of semi-natural habitats, including open grassland, woodland and wetland.

The area's industrial heritage provides many important post-industrial sites, which now provide sites of wildlife interest in the urban environment. Canals that extend through the conurbation not only offer opportunities for access and recreation, but also form a network of wetland habitats. These include the Bridgewater Canal, Rochdale Canal, Macclesfield Canal, and Leeds and Liverpool Canal. Some sections of the disused Manchester, Bolton and Bury Canal still hold water. The Rochdale Canal, in particular, is widely recognised for its aquatic plant assemblages: sections have been designated as a Special Area of Conservation (SAC) for an internationally important population of floating water plantain. Elsewhere, the borrow pits that were excavated to provide material for motorway construction have now been developed into extensive lakes. These now form habitats for wildlife, as well as recreational areas for people. There are major examples at Sale and Chorlton Water Parks.

As is typical with urban areas, there are a number of Local Nature Reserves (LNRs). Parks, cemeteries, disused railway lines, gardens, golf courses and allotments are all important refuges for wildlife, while providing places of relative tranquillity for people to enjoy. A number of conspicuous species have colonised the urban areas. Fox, badger, peregrine falcon, black redstart and marsh orchid are among the best-publicised examples. The mosaic of built environment and open space is also important for urban specialist species such as house sparrow and house martin. The tolerance of black poplars to industrial pollution has meant that this species was widely planted as an urban tree in Manchester in the late 19th and early 20th centuries. It has become known as the 'Manchester poplar', and until recently it survived almost anywhere. Since around 2000 a virulent disease diagnosed as poplar scab has affected the Manchester poplar, and badly diseased trees have been felled.

A series of river valleys flow through the urban fabric of the Manchester Conurbation, from the Pennine hills in the north and east, and Peak District to the south-east, ultimately draining into the Mersey Estuary in the west. These provide corridors of greenspace for wildlife and for people. The Mersey river valley is the largest stretch of continuous countryside within the conurbation, dominated by its heavily meandering river within a broad flood plain. Other river valleys include those of the Irwell, Tame and Bollin, which are smaller, more sinuous and narrower than the Mersey, but nevertheless form important countryside corridors throughout this otherwise built-up area. The Rivers Goyt, Irk and Medlock also flow into the Manchester Conurbation.

The Manchester Conurbation has an increasingly recognised legacy of industrial archaeology, with its industrial past evident in the landscape.

Manchester is seen as an archetypal city of the Industrial Revolution: the canal network, mainline railways and industrial suburbs were all created as a result of it. The surviving built heritage includes former cotton warehouses, steam-powered mills and large engineering works that were established to serve the textile industry. The historic centres of Manchester, Salford and Stockport house many museums, galleries and impressive municipal buildings. Grand country houses and parklands are located within the wider NCA, such as at Heaton Park and Wythenshawe Park. The formal parks and green spaces provided through Victorian and Edwardian planning are just as crucial today, and offer spaces of tranquillity and well as places for wildlife.

The many high-rise and landmark buildings give the area a strong sense of identity. Laurence Stephen Lowry famously painted scenes of life in industrial Manchester and Salford. The Lowry Building, an arts centre in the redeveloped Salford Quays area, now takes the artist's name. Other noteworthy buildings include Manchester Cathedral, Salford Cathedral, Manchester Town Hall, Manchester Library, Stockport Viaduct and Stockport Pyramid. At 168 m, the Beetham Tower is a prominent feature on the Manchester skyline. Red brick and sandstone are prominent, alongside a mix of modern materials. The dominance of modern residential land use reflects the substantial expansion of the area over the later 19th and 20th centuries. The city-edge commuter suburbs include affluent, leafy settlements around the southern fringes of Manchester, and the more generic western suburbs. Some of the conurbation suburbs exhibit a distinct character typical of mill-towns in the wider area.

The Manchester Conurbation forms a busy transport hub, interlinked with surrounding areas by an extensive web of infrastructure into, out of, and around, the centre. Communications corridors and other infrastructure are dominant, with major communications routes including mainline railways, tramways and the Manchester ring motorway. The transport network creates links to the north and south, as well as east to west, connecting the area with the Port of Liverpool and trans-Pennine routes. Many of the towns and villages within the area function as commuter settlements, benefiting from the concentration of transport infrastructure in the area. Recreational trails, including the Trans Pennine Trail, also serve to connect people. Manchester Airport is adjacent to this NCA.

River and canal corridors continue to provide a focus for redevelopment, but they can also contain important recreation routes and surprisingly rich biodiversity.

Unsurprisingly, this predominantly urban area has very low levels of tranquillity. The areas with the lowest tranquillity scores are found in the urban centres of Manchester, Salford and Stockport. This makes the comparatively tranquil areas all the more important for local residents, as well as acting as access routes out to the wider countryside.

Most of the available countryside is suburban in character, and often used for leisure or keeping horses. The river valleys are important as recreational areas, with large expanses of playing fields, numerous golf courses and countryside. Country parks, and Victorian and Edwardian urban parks, are associated with the river valleys and often connected by recreational trails. The canal network is used for activities such as canoeing and recreational boating, while the towpath is used for walking and cycling, and is a setting for angling. These areas are complemented by a series of 26 LNRs that are either wholly or partly in this NCA, providing accessible areas where people can enjoy wildlife. The Red Rose Forest and Pennine Edge Forest cover this NCA, supporting community woodland and delivering multiple environmental and social benefits, such as providing places for recreation and enhancing quality of life.

Hulme Park.

The landscape through time

The oldest exposed rocks in the Manchester Conurbation are of Westphalian age (305 to 298 million years old). The Carboniferous coal-bearing strata of the South Lancashire Coalfield consist of a succession of sandstones, siltstones and coal seams. The Coal Measures extend into the north-west of the conurbation and also down the eastern side of Manchester, through Ashton-Under-Lyne.

The majority of the Manchester Conurbation is located over sandstones and mudstones of Permian and Triassic age. The sandstones and breccias of Permian age (290 to 248 million years old) form a number of ridges, running from north to south across north-east Manchester and down to Stockport. A ridge of Permian sandstone also steepens the bed of the River Mersey in Stockport, the fast flow rate of which was once important for early industry. Lower Triassic rocks (248 to 205 million years old) underlie much of central Manchester and the southern conurbation. These consist largely of red, yellow and brown sandstones and mudstones.

Much of the Manchester Conurbation is mantled by thick deposits of till, and pockets of sand and gravel. The deposits of Quaternary-age till formed in and beneath glaciers and ice sheets. Following melting of the ice sheets at the end of the last glacial period, some 12,000 years ago, large amounts of gravel and sand were released. These are mainly concentrated in the lower-lying river valleys. Glacial meltwater was responsible for deepening a number of the river valleys that flow into Manchester. River terrace deposits are dominated by reworked glacial material, and extensive shallow lakes have become vegetated, leading to the build-up of peat and the development of raised mires.

The Manchester and East Cheshire aquifer is comprised of Permo-Triassic sandstones. The aquifer extends from Macclesfield in the south to Prestwich in the north, and incorporates much of the Manchester Conurbation. The aquifer system includes the Lower Permian Collyhurst Sandstone Formation and the Triassic Sherwood Sandstone Group. The sandstones are separated by the Manchester Marl Formation. The extensive Manchester and East Cheshire aquifer provides groundwater sources for a large number of industrial users, as well as public water supply and a source of base flow to maintain river flow.

For much of its early history, the area had a pattern of extensive rather than intensive settlement and agriculture. By the medieval period, a landscape of widely scattered farms and hamlets had evolved, with the occasional larger population centre of village or town status.

The principal centres of Manchester, Salford and Stockport emerged as market towns during the later medieval period, surrounded by agricultural areas and isolated settlements. Some remnants of the area's agricultural past remain, with linear farmsteads dating from the 17th century (including laithe houses associated with smallholdings).

The Manchester Conurbation developed at a phenomenal rate from the late 18th century, with settlement spreading from the medieval core of the towns, subsuming agricultural land. An explosion of the textile industry and the introduction of steam-powered textile mills, which were built in urban areas rather than being limited to riverside locations, led to dramatic growth. Manchester became a major centre of cotton manufacturing. Associated closely with the textile industry was an expansion in ancillary trades, such as the production of textile machinery and associated engineering. Coal, mined from the Lancashire coalfield, provided the power and heat necessary for the cotton mills, engineering factories and chemical plants.

The population increased from the late 18th century, fuelled by a need for labour to work in industries associated with cotton (weaving, dyeing and distribution), manufacturing and coal mining. Wealthy merchants bought up large areas of the countryside around Manchester as parkland for their stately homes, which were then absorbed into the subsequent expansion of the city. Rows of red brick terraced housing were built for the workers. The area's rapid transformation and industrial growth was globally renowned, and attracted the attention of many social reformers and thinkers – most famously Friedrich Engels.

The transformation of Manchester into a leading centre of cotton manufacturing was facilitated greatly by the construction of canals, which provided an efficient means of transporting bulk loads of goods. The first true industrial canal in Britain was that built by the Duke of Bridgewater in 1761, the terminus of which was at Castlefield. This soon became a hub for a network of canals, including the Ashton Canal, constructed in 1796 and the Rochdale Canal, built in 1804. The Manchester Ship Canal was opened in 1894: it provided a direct link between the docks at Salford and the sea, bypassing the need for imported goods to be off-loaded at Liverpool. In the mid-1800s, the establishment of the rail network through the Manchester area also allowed for the more efficient transportation of goods.

In the 20th century, the cotton manufacturing industry declined. However, industrial activity in areas like Trafford Park, and the aerospace industries in Stockport, for example, continued to ensure prosperity in the south and west of the NCA. Industrial activities left a legacy of contaminated land and groundwater pollution, as well as derelict land. During the Second World War the urban and industrial concentrations were a focus for bombing raids, with many warehouses, business premises and old buildings destroyed. A terrorist bomb also devastated parts of Manchester city centre in 1996, damaging several buildings beyond repair. The centre was subsequently rebuilt.

Transitory green space is an important part of the urban ecology. Such previously developed land is often earmarked for redevelopment but can develop diverse communities of plants and animals in the meantime.

Significant regeneration has taken place in the Manchester Conurbation during the late 20th and early 21st centuries. Several high-profile regeneration development projects have taken place, such as Salford Quays, Media City and New Islington Millennium Village. Service industries have emerged, with retail and leisure facilities particularly around the M60 corridor, including around

the Trafford Centre area, Stockport and Ashton. The canals, once important for trade, are now mainly used for recreation, although the Manchester Ship Canal still links Salford Quays with the Mersey Estuary. There has been significant development along the Manchester Ship Canal corridor. In 2002 Manchester hosted the Commonwealth Games, which led to widespread redevelopment and regeneration in the area.

The Manchester Conurbation is seen as being of national economic importance. Significant challenges still remain around sustainable development, the enhancement of transport links, the regeneration of housing and business, flood risk management and green infrastructure provision.

Rivers, canals and railways cut through the urban fabric. Many of the river corridors are hidden from view such as the Irk here just behind Victoria Station.

Ecosystem services

The Manchester Conurbation 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 Manchester Conurbation NCA is contained in the 'Analysis' section of this document.

Provisioning services (food, fibre and water supply)

- **Water availability:** The high urban demand for water, coupled with development pressures, means that the sustainable use of water is a key issue in this area. Water supply is from surrounding uplands – including from the Lake District's Thirlmere and Haweswater valleys, and from north Wales – and is supplemented by groundwater. The Manchester and East Cheshire aquifer extends northwards to Manchester, south to Macclesfield and west through to Liverpool, providing drinking water for the region.

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

- **Climate regulation:** High-density urban areas such as those found in the Manchester Conurbation are potentially vulnerable to heat island and warming effects. Adaptation can increase the resilience of the urban environment to the changing climate. The provision of vegetation (including trees) can cool and shade urban environments, as well as providing green spaces and green routes close to where people live.

- **Regulating water quality:** Water quality has improved over the last 30 years, allowing fish populations to recover and giving opportunities for enhancement

Many of the water courses are heavily modified. The River Medlock, seen here near Charles Street, shows the river constrained within deep culverts.

and regeneration. Water quality in some urban areas is still affected by pollution from point sources and from land. Urbanisation can change land cover to more impervious surfaces: this causes water to run off the land more quickly, taking any contaminants with it. These problems are particularly found in highly populated areas where traffic densities and road networks are concentrated, and where there is a legacy of industrial activity.

- **Regulating water flow:** The cities of Manchester and Salford are extensively urbanised in the lower catchment, where the topography is at its lowest. In addition to fluvial flooding, there are also risks from surface water. The legacy of industrial development means that many of the watercourses are heavily modified with banks, embankments, culverts, weirs, locks and dams. Surfaces in town centres, high-density residential areas and industrial areas are highly sealed and impermeable, resulting in rapid run-off that can lead to flash flooding.

Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration:** The sense of place is dominated by Manchester and the extensive development that defines this NCA. Manchester is seen as an archetypal city of the Industrial Revolution. The built heritage (including historic structures, canals, mills and modern architecture) contributes to providing a sense of place and inspiration. The natural heritage, including river valleys, countryside, woodlands, canals, parks and urban green spaces, is important, providing access to natural history close to where people live.

- **Sense of history:** The history of the landscape is evident in its industrial past. The area was particularly significant globally in the Industrial Revolution period. The area's industrial legacy means that there is a rich cultural heritage, including impressive Victorian municipal buildings, a transport network of railways and canals, and parkland. The canals made a crucial contribution to the industrial development of the area, and now provide really significant routes for wildlife and recreation, as well as the interpretation of history.

- **Recreation:** In extensive urban areas, local green spaces provide opportunities for people to engage with nature close to where they live and work. The river valleys and canals form a network of recreational trails, as well as opportunities for canoeing, angling, cycling and horse riding. Recreation is further supported by the area's urban parks and green spaces, and the rights-of-way network provides access both within the NCA and to the wider countryside.

Local green spaces provide opportunities for people to engage with nature close to where they live and work. The Bridgewater Canal, crossed by the motorway, is a focus for recreation.

Statements of Environmental Opportunity

SEO 1: Provide and maintain green infrastructure, including multi-functional green spaces and trees, improving links between habitats as well as creating a high-quality urban environment – to aid adaptation to climate change, to provide opportunities for recreation, and to enable people to enjoy the benefits that access to nature brings.

For example by:

- Safeguarding and enhancing existing green infrastructure, including open spaces (parks, woodlands, informal open spaces, nature reserves, lakes, accessible countryside, the natural elements of historic sites, built conservation areas and civic spaces), linkages (river corridors and canals, pathways, cycle routes and greenways) and networks of 'urban green' (the collective resource of private gardens, allotments, pocket parks, street trees, verges and green roofs).
- Planning for significant new green infrastructure provision, in association with areas of new urban development, to expand and link the existing ecological networks with corridors connecting urban areas with the countryside.
- Managing future developments to incorporate green infrastructure, providing access to green spaces of relative tranquillity within towns, cities and the surrounding countryside, building sustainable urban drainage systems and creating new habitats for wildlife.
- Seeking opportunities to 'retrofit' green infrastructure into urban areas, to help moderate urban heat, provide permeable surfaces for water infiltration and provide visual interest, as well as creating wildlife habitats.
- Creating new green infrastructure features via development: providing green roofs and street trees, and incorporating opportunities for nesting birds and roosting bats. Considering the reclamation of post-industrial sites where appropriate, to add to and enhance the greenspace network.
- Providing opportunities for people to access urban greenspace in town centres and high-density residential areas: this has multiple benefits including improved health and wellbeing, improved tranquillity, improved quality of environment and better wildlife habitats.
- Protecting the nature conservation interest of the Manchester Conurbation through conserving and enhancing existing habitats such as woodlands and canals.
- Seeking opportunities to encourage urban populations to engage with, learn about and enjoy the natural environment, such as at Local Nature Reserves (LNRs) and country parks.
- Protecting woodlands and trees, including ancient woodlands, and seeking opportunities to create new community woodlands and street trees, particularly in the Red Rose Forest and Pennine Edge Forest: this will help to moderate urban heat, increase the carbon storage potential of the area, provide visual interest and improve wildlife habitats. Making the most of opportunities for renewable heat from wood fuel from woodlands, waste wood and arboricultural work.
- Conserving the Manchester poplar to improve the urban environment, moderate the climate in urban areas, and enhance the urban and historic landscape.
- Developing a strong evidence base, including through research and study initiatives, to inform a greater understanding of the value and functionality of green infrastructure.

SEO 2: Conserve and enhance the cultural heritage and character of the Manchester Conurbation, recognising the industrial and textile history of the area, and providing opportunities for access and interpretation of the urban environment for people to understand and enjoy.

For example by:

- Conserving, managing and interpreting the distinctive industrial heritage and iconic architecture, providing a unique setting for understanding the area's history and maintaining the character of the area.
- Conserving the area's cultural identity through providing access to and interpretation of the landscape, so that people can enjoy and learn about its history, geology and features.
- Managing the existing network of public rights of way, cycle routes and towpaths, and improving access by ensuring that paths are maintained, well signposted, and cater for all levels of ability and interest. Linking urban access routes to the wider countryside.
- Ensuring that people have access to greenspace and green routes, reasonably close to where they live, so that communities can connect with their local green spaces, benefiting their health and wellbeing. Providing interpretation for people to understand and enjoy wildlife, and efficiently access key areas such as LNRs and country parks.
- Managing, expanding and connecting pockets of habitat in urban areas – such as rivers, canals, parks and green spaces – conserving their wildlife, historical and geodiversity interest, as well as providing opportunities for people to learn about and enjoy the natural environment.
- Conserving the heritage of the canals, which are so important for wildlife and for recreation.
- Managing existing community woodland and providing new community woodlands and other habitats, to create quiet, tranquil areas for people to enjoy. Using sensitively designed new planting to assimilate development. Providing multi-purpose community woodland with opportunities for small-scale timber, wood fuel and biomass provision, and enhancing recreation, landscape and biodiversity interests. Conserving trees that are of heritage and cultural value.
- Ensuring that significant geological and landform features are recognised and conserved, and that the geological interest of the Manchester Conurbation is promoted and used as an educational resource.
- Providing interpretations of the links between geology, the history of the landscape and wildlife habitats – and the relevance of these to sustainable development – to landowners, industry and the public.

Public parks provide valuable open spaces for people. Angel Meadows in the Irk Valley is an old graveyard in an area that has seen considerable development.

SEO 3: Provide a healthy water environment – with rivers, canals, wetlands, streams and aquifers – creating habitats for wildlife, delivering sustainably managed water and bringing multiple benefits for people.

For example by:

- Maintaining and improving water quality, such as in the rivers and canals, to provide more attractive and accessible water environments for both people and wildlife to enjoy.
- Ensuring that habitats, especially those within developed or residential areas, are under good environmental management, increasing their capacity to retain water, reduce run-off and improve water infiltration.
- Restoring modified river channels where appropriate, and re-establishing strategically important flood plain habitats in green spaces – to improve flood management both in and upstream of urban flood zones.
- Creating habitats such as wetlands, woodlands and grasslands, to improve infiltration and increase the capacity to retain water, which also reduces the rate of run-off and captures sediments and contaminants.
- Incorporating sustainable urban drainage systems (such as green roofs, permeable surfaces and open swales) into new and existing development, to improve infiltration and manage surface water.
- Sustaining and increasing urban greenspace and permeable surfaces in town centres and high-density residential areas. This will deliver multiple benefits, including improving flood management both in and upstream of urban flood zones, attenuating storm flows, and aiding the infiltration of rainfall and the filtering of water.
- Promoting opportunities to increase water storage and to alleviate the speed of run-off, through the expansion of wetlands and other habitats (such as reedbeds and wet woodland) in flood plains.
- Managing and enhancing riparian habitats to reduce soil erosion rates, creating permanent grassland or woodland strips to trap sediment run-off before it enters the streams.
- Managing over-abstraction from groundwater, rivers, reservoirs and lakes through the careful and efficient use of water.

The River Irwell is a focus for regeneration, including delivering high quality public realm along the Irwell River Park between The Meadows at Salford University and Salford Quays.

SEO 4: Conserve and enhance the river valleys and canals, as corridors through the urban areas, for the multiple benefits that the natural environment provides, to improve the landscape, and to make green spaces available for the benefit of both wildlife and people.

For example by:

- Retaining and managing open countryside and semi-natural habitats along the corridors of the river valleys and canals, protecting the sense of place and enabling people to access and enjoy these areas.
- Safeguarding and managing habitats (including grassland, woodland and wetlands) along river valleys and canal corridors for wildlife. This will enhance local landscapes and will provide multiple benefits including flood management, and opportunities for recreation and community activity.
- Buffering, linking and expanding fragmented habitats such as grasslands, woodlands and wetlands, and creating new woodland and wetland habitats.
- Managing linear routes and 'stepping stones' that connect pockets of habitats, especially along river and canal corridors, to provide a framework of linked habitats through the urban fabric. This will enable the movement of species as well as creating green routes (such as walking or cycling paths) for people to enjoy.
- Managing and restoring hedges and field boundary trees to link fragmented habitats, provide habitats and corridors for wildlife, enhance local landscapes, act as a windbreak and conserve soils.
- Protecting and enhancing the remaining pockets of farmland through sustainable agricultural practices, and supporting farms to provide habitats for wildlife, reduce soil erosion, improve water quality and enhance the character of the landscape. Providing new educational access through an interpretation of the landscape that promotes the connections between farming, food and the public.
- Encouraging recreational management techniques in the river valleys to avoid compaction, to avoid poaching or puddling soils, to conserve soils, to improve the infiltration of rainwater, to retain soil carbon levels, to reduce soil erosion rates and to minimise the structural deterioration of soil.
- Providing spaces (such as allotments and community gardens) to enable urban communities to enjoy growing food locally, to improve health and wellbeing, and to encourage community cohesion, as well as providing benefits such as new habitats for wildlife.

The river valleys and canals form a network of recreational trails, with opportunities for canoeing, angling, cycling and horse riding.

Supporting document 1: Key facts and data

Total area: 34,223 ha

1. Landscape and nature conservation designations

There are no designated landscapes within the Manchester Conurbation.

Source: Natural England (2011)

1.1 Designated nature conservation sites

The NCA includes the following statutory nature conservation designations:

Tier	Designation	Name	Area (ha)	% of NCA
International	n/a	n/a	0	0
European	Special Protection Area (SPA)	n/a	0	0
	Special Area of Conservation (SAC)	Rochdale Canal SAC	3	<1
National	National Nature Reserve (NNR)	n/a	0	0
National	Site of Special Scientific Interest (SSSI)	A total of 3 sites wholly or partly within the NCA	5	<1

Source: Natural England (2011)

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

There are 123 local sites in the Manchester Conurbation NCA covering 1,041 ha which is 3 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: 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

A breakdown of SSSI condition as of March 2011 is as follows:

SSSI condition category	Area (ha)	% of SSSI land in category condition
Unfavourable declining	0	0
Favourable	0	0
Unfavourable no change	1	21
Unfavourable recovering	4	79

Source: Natural England (March 2011)

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

2. Landform, geology and soils

2.1 Elevation

Elevation ranges from 15 m above sea level to a maximum of 130 m above sea level. The average elevation is 56 m above sea level.

Source: Natural England 2010

2.2 Landform and process

The Manchester Conurbation is centred on low hills which rise above the drift covered plain of Permian and Triassic sandstones and mudstones. Post glacial melt water erosion has deepened a number of the valleys and today there are significant valley deposits of gravel and alluvium and where valleys have been over-steepened landslides occur.

Source: Manchester Conurbation Countryside Character Area description

2.3 Bedrock geology

In the east bedrock is dominated by Coal bearing strata of the South Lancashire Coalfield. Westwards Permian and Triassic sandstones and mudstones dominate underlying much of Manchester. Though largely concealed by overlying superficial deposits rivers have cut natural sections through the bedrock and quarries, canal and road cuttings provide important evidence of underlying geology.

Source: Natural England (2010); Manchester Conurbation Countryside Character Area description

2.4 Superficial deposits

The glaciations of the Pleistocene caused extreme denudation of the land as a result of ice sheets extending southwards down what is now the Irish Sea. Many pre-glacial river channels became dammed by ice movement forcing rivers to cut new routes through the glacial deposits. Sands and gravels which accumulated in the ice-dammed lakes occur in several locations and one large deposit of this type underlies much of the land between Rochdale, Oldham, Manchester and Bury. The development of fen and swamp vegetation after the last ice age and the consequent build up of dead plant material has led to the formation of raised mires.

Source: Manchester Conurbation Countryside Character Area description

2.5 Designated geological sites

Designation	Number of sites
Geological Site of Special Scientific Interest (SSSI)	n/a
Mixed interest SSSI	n/a

There are no Local Geological Sites currently recognised within the NCA

Source: Natural England (2011)

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

2.6 Soils and Agricultural Land Classification

While the valleys do still include areas of farming, including arable and pasture, many areas are now used for keeping horses or recreational uses, for example playing fields and golf courses, water treatment works and country parks. There are 6 main soilscape types in this NCA: slowly permeable seasonally wet acid loamy and clayey soils, covering 41 per cent of the NCA; naturally wet very acid sandy and loamy soils (19 per cent); slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (18 per cent); freely draining slightly acid loamy soils (8 per cent); loamy and clayey flood plain soils with naturally high groundwater (6 per cent); and freely draining slightly acid sandy soils (5 per cent). Most of the agricultural land is Grade 3, but there are also some areas of Grade 2 and 4. Most agricultural land can be found along the river valleys of the Mersey and the Tame, as well as in areas such as Ashton-under-Lyne where areas of peat soils provide Grade 2 agricultural land.

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):

Agricultural Land Classification	Area (ha)	% of NCA
Grade 1	0	0
Grade 2	331	1
Grade 3	3,305	10
Grade 4	1,156	3
Grade 5	0	0
Non-agricultural	1,276	4
Urban	28,155	82

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.

Name	Length (km)
River Mersey	27
Manchester Ship Canal	22
River Tame	18
River Irwell	16
Bridgewater Canal	11
Rochdale Canal	8
Macclesfield Canal	8
Leeds and Liverpool Canal	7
River Bollin	6

Source: Natural England (2010)

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

The River Tame flows south along the eastern side of the NCA, and eventually joins the River Goyt at Stockport to form the River Mersey.

The River Mersey flows west through Greater Manchester towards Irlam where it flows into the Manchester Ship Canal.

The River Irwell flows through (and separates) the city centres of Manchester and Salford, before joining the River Mersey near Irlam. The River Bollin is also a tributary of the River Mersey.

The Manchester Ship Canal, the Bridgewater Canal, the Leeds and Liverpool Canal and the Rochdale Canal are all connected. The Manchester Ship Canal follows the original routes of the rivers Mersey and Irwell.

3.2 Water quality

The total area of Nitrate Vulnerable Zone is 27,917 ha, or 82 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 http://maps.environment-agency.gov.uk/wiyby/wiybyController?ep=maptopics&lang=_e

4. Trees and woodlands

4.1 Total woodland cover

The NCA contains 2,301 ha of woodland, approximately 7 per cent of the total area, of which 134 ha is ancient woodland. Red Rose Community Forest, one of twelve Community Forests established to demonstrate the contribution of environmental improvement to economic and social regeneration, covers 22,514 ha of this NCA, which is 66 per cent of the area. The Pennine Edge Forest also lies within this NCA.

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

4.2 Distribution and size of woodland and trees in the landscape

Many of the river valleys have large areas of woodland along their valley sides providing a buffer to neighbouring urban development. Woodlands can also be found along the river valleys flowing from the Pennines into Manchester and on to the Mersey, providing important ecological links between areas.

Source: Manchester Conurbation Countryside Character Area description

4.3 Woodland types

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

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

Woodland type	Area (ha)	% of NCA
Broadleaved	2,165	6
Coniferous	8	<1
Mixed	78	<1
Other	50	<1

Source: Forestry Commission (2011)

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

Woodland type	Area (ha)	% of NCA
Ancient semi-natural woodland	134	<1
Ancient re-planted woodland (PAWS)	0	0

Source: Natural England (2004)

5. Boundary features and patterns

5.1 Boundary features

Field boundaries, where they occur, include both fences and hedgerows. Data from March 2011 suggests that 1,210 m of ditch and 29,293 m of hedgerows are under Environmental Stewardship boundary options.

Source: Manchester Conurbation Countryside Character Area description; Countryside Quality Counts (2003)

5.2 Field patterns

Field patterns are now generally obscured by development of housing and recreational areas.

Source: Manchester Conurbation 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

The farming character of this landscape is shown in the breakdown of main farm types with 10 horticulture holdings (14 per cent), 13 lowland grazing livestock holdings (18 per cent) and 35 holdings classed as 'other' (49 per cent) in 2009. There were also small numbers of cereals, general cropping, specialist

pigs, specialist poultry, dairy and mixed holdings. Survey data from 2000 to 2009 shows a decrease of 5 horticulture holdings (33 per cent), a decrease of 4 lowland grazing livestock holdings (24 per cent) and an increase of 9 holdings classed as 'other' (35 per cent).

Source: Agricultural Census, Defra (2010)

6.2 Farm size

In 2000 there were 82 holdings in the Manchester Conurbation, but by 2009 this had decreased by 12 per cent to 72 holdings. According to the 2009 figures farms of between 5 ha and 20 ha were most numerous accounting for 37 holdings or 51 per cent, followed by 17 (24 per cent) holdings of between 20 ha and 50 ha and 6 (8 per cent) holdings of between 50 ha and 100 ha. Between 2000 and 2009 the main trends were a 26 per cent reduction in the number of holdings between 20 ha and 50 ha (from 23 to 17).

Source: Agricultural Census, Defra (2010)

6.3 Farm ownership

In 2009, 45 per cent of the total farmed area was owned. There was an 8 per cent decrease in the area of owned land between 2000 and 2009.

2009: Total farm area = 1,735 ha; owned land = 779 ha
2000: Total farm area = 2,478 ha; owned land = 844 ha

Source: Agricultural Census, Defra (2010)

6.4 Land use

The farmed area is only 1,735 ha. The dominant land use is grass and uncropped land accounting for 1,374 ha or 79 per cent (2009). This is followed by cereals (75 ha or 4 per cent). Between 2000 and 2009 there was an 87 per cent decrease in the area of land used for cereal production. There was also a decrease in the area of land used for other crops, although there was a slight (6 per cent) increase in the area of grass and uncropped land.

Source: Agricultural Census, Defra (2010)

6.5 Livestock numbers

The predominant type of livestock in the Manchester Conurbation is cattle (1,000), followed by sheep (700) and then pigs (400). Between 2000 and 2009 there was a 74 per cent decrease in the number of pigs from 1,600 to 400, a 46 per cent decrease in the number of cattle from 1,900 to 1,000, and a 20 per cent increase in the number of sheep from 600 to 700.

Source: Agricultural Census, Defra (2010)

6.6 Farm labour

Trends from 2000 to 2009 show a decrease in the number of principal farmers from 141 to 114, a decrease in the number of full-time workers from 70 to 50, an increase in part-time workers from 29 to 32 and an increase in the number of casual/gang workers from 35 to 40.

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 Mersey river valley is the largest stretch of continuous countryside within the conurbation, dominated by its heavily meandering river within a broad flood plain. Other river valleys include those of the Irwell, Irk, Medlock, Tame and Goyt which are more sinuous and narrow than the Mersey, but even so form important countryside corridors throughout the area. Many of these have large areas of woodland along their valley sides providing a buffer to neighbouring urban development. All the river valleys contain sizeable areas of open grassland and other semi-natural habitats. There are pockets of farmland within the river valleys and parts of the river valleys associated with the canals have areas of derelict land.

Source: Urban Mersey Basin Natural Area Profile

7.2 UK Biodiversity Action Plan (BAP) priority habitats

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

UK BAP priority habitat	Area (ha)	% of NCA
Broadleaved mixed and yew woodland (broad habitat)	712	<1
Coastal and flood plain grazing marsh	141	<1
Lowland calcareous grassland	1	<1
Lowland dry acid grassland	2	<1
Lowland meadows	47	<1
Purple moor grass and rush pasture	6	<1

Source: Natural England (2011)

7.3 Key species and assemblages of species

- Maps showing locations of UK BAP Priority Habitats are available at: http://magic.defra.gov.uk/website/magic/ – select 'Habitat Inventories'
- Maps showing locations of S41 species are available at: http://data.nbn.org.uk/

8. Settlement and development patterns

8.1 Settlement pattern

This area comprises the urban and suburban development of several major towns and cities with limited areas of open countryside in between.

Source: Manchester Conurbation Countryside Character Area description; Countryside Quality Counts (2003)

8.2 Main settlements

The main settlements are Manchester, Salford, Stockport, Sale, Ashton-under-Lyne, Swinton, Altrincham, Stretford, Prestwich, Cheadle Hulme, Denton and Droylsden. The total estimated population for this NCA (derived from ONS 2001 census data) is: 882,616.

Source: Manchester Conurbation Countryside Character Area description; Countryside Quality Counts (2003), Natural England (2012)

8.3 Local vernacular and building materials

Housing is typically brick built. In the city and town centres there are fine municipal buildings, such as town halls, museums and banks dating from the 19th century and reflecting the wealth generated by industry, that are built of local sandstones.

Source: Manchester Conurbation Countryside Character Area description; Countryside Quality Counts (2003)

9. Key historic sites and features

9.1 Origin of historic features

This is primarily an urban landscape reflecting major industrial and residential expansion from the 18th century onwards. Mainly 19th and 20th century development is visible. The industrial past has resulted in an outstanding historical and archaeological industrial legacy. Allotments are an important aspect of social history. Some linear farmsteads dating from 17th century, including laithe houses associated with smallholdings, survive among the industry.

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

9.2 Designated historic assets

This NCA has the following historic designations:

- 15 Registered Parks and Gardens covering 409 ha
- No Registered Battlefields covering
- 12 Scheduled Monuments
- 1,526 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

- Four per cent of the NCA or 1,531 ha is classified as being publically accessible.
- There are 361 km of public rights of way at a density of 1 km per km2.
- There are no national trails within the NCA.

Sources: Natural England (2010)

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

Access designation	Area (ha)	% of NCA
National Trust (Accessible all year)	0	0
Common Land	0	0
Country Parks	44	<1
CROW Access Land (Section 4 and 16)	38	<1
CROW Section 15	1	<1
Village Greens	12	<1
Doorstep Greens	4	<1
Forestry Commission Walkers Welcome Grants	613	<1
Local Nature Reserves (LNR)	462	1
Millennium Greens	4	<1
Accessible National Nature Reserves (NNR)	0	0
Agri-environment Scheme Access	0	0
Woods for People	1,177	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) this area has very low levels of tranquillity. Areas with the highest tranquillity scores are along the river valleys such as those of the rivers Mersey and Tame, and in some of the less urban areas on the NCA fringe. The areas with the lowest tranquillity scores are found in the urban centres of Manchester, Salford and Stockport.

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

Tranquillity	Tranquillity Score
Highest value within NCA	-29
Lowest value within NCA	-131
Mean value within NCA	-82

Sources: CPRE (2006)

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

11.2 Intrusion

The 2007 Intrusion Map (CPRE) shows the extent to which rural landscapes are 'intruded on' from urban development, noise (primarily traffic noise), and other sources of visual and auditory intrusion. This shows that all areas within this NCA are disturbed or urban. The non-urban areas can mostly be found around the river valleys of the Mersey and Tame. A breakdown of intrusion values for this NCA is detailed in the table below.

Intrusion category	1960s (%)	1990s (%)	2007 (%)	Percentage change (1960s-2007)
Disturbed	20	20	19	<1
Undisturbed	0	0	0	0
Urban	80	80	81	<1

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are the consistency in the levels of intrusion within this NCA.

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

12 Data sources

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

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

Supporting document 2: Landscape change

Recent changes and trends

Trees and woodlands

- Since 1991 the Red Rose Forest Partnership has been creating new areas of community woodland. New planting has been approved under the Woodland Grant Scheme and the Newlands programme, much of it within the community forest area, such as in the valleys of the Mersey and Irwell. The Newlands includes the Lower Irwell Valley Improvement Area (LIVIA) (190 ha) and Moston Vale (21 ha), as well as street tree schemes.

- The Pennine Edge Forest has also been established in the east of this NCA.

Boundary features

- Field patterns are now generally obscured by the development of housing and recreational areas.

- Field boundaries, where they occur, include both fences and hedges. Data from March 2011 suggests that 1,210 m of ditches and 29,293 m of hedgerows are under Environmental Stewardship boundary options.

Agriculture

- Although there is not a large area of agricultural land within the NCA, what there is has decreased significantly between 2000 and 2009. In 2000 there were 2,478 ha agricultural land, and in 2009 there was 1,735 ha. In 2000 there were 82 holdings, but by 2009 this had decreased by 12 per cent to 72 holdings. Survey data from 2000 to 2009 shows a decrease of 5 horticulture holdings (33 per cent). A decrease of 4 lowland grazing livestock holdings (24 per cent) and an increase of 9 holdings classed as 'other' (35 per cent).

- The dominant land use is grass and uncropped land accounting for 1,374 ha (27 per cent) in 2009. Livestock numbers have decreased significantly. Between 2000 and 2009 there was a 74 per cent decrease in the number of pigs (from 1,600 to 400), a 46 per cent decrease in the number of cattle (from 1,900 to 1,000) and a 20 per cent increase in the number of sheep (from 600 to 700).

Hulme Park, built in 1999, formed part of the regeneration programme of Hulme and Moss Side and occupies the former site of residential high-rise flats.

- The Greater Manchester Urban Historic Landscape Characterisation[4] identified a considerable loss of undeveloped land and allotments within the towns and cities of Greater Manchester. Over half of the area identified as former allotments in Greater Manchester is now under development.

Settlement and development

- There is a number of high profile regeneration developments (including those replacing characteristic terraced housing, such as the New Islington Millennium Village). Housing development has included the conversion of former mill buildings to apartments, which has retained the basic heritage resource, albeit with some loss of internal fabric.

- All open spaces are in close proximity to major settlements and are influenced by development pressures and changes within them. There is ongoing pressure for development and regeneration.

- In 1992 a new tram network began running to enable people to efficiently access key areas and this network is being extended.

Semi-natural habitat

- Much of the land has been modified and impacted by human activity. Green spaces including amenity grassland, private gardens, allotments, town parks, planted shrubberies, playing fields, golf courses, grounds of buildings, churchyards and cemeteries, can all be important reservoirs for wildlife in their urban settings.

- Brownfield sites that have been cleared for development also provide valuable ephemeral habitats for plants, insects and other wildlife.

- The most extensive annual Environmental Stewardship agreements in 2003 were for lowland pastures on neutral/acid soils (31 ha) and lowland hay meadows (1 ha). 79 per cent of Sites of Special Scientific Interest (SSSI) are in unfavourable recovering condition, while 21 per cent of SSSI are in unfavourable no change condition but these only cover 5 ha of the NCA (<1 per cent).

- Some non-native invasive species such as Himalayan balsam, giant hogweed and Japanese knotweed have become established.

Historic features

- In 1918 about 2.1 per cent of the area was historic parkland. By 1995 it is estimated that 22 per cent of the 1918 area had been lost. About 48 per cent of the remaining parkland is covered by an Historic Parkland Grant. About 50 per cent of historic farm buildings remain unconverted. Most are intact structurally.

- The Greater Manchester Urban Historic Landscape Characterisation1 has documented a notable loss of industrial heritage, particularly large complexes of redundant industrial types. There has been conversion of former mill buildings to apartments thus retaining the basic heritage resource,

- A pattern seen across much of the landscape is one where former industrial complexes have been demolished but the surrounding infrastructure, such as workers' housing, shops and institutes (such as. schools, churches and chapels), and communications routes, have survived.

[4] *Greater Manchester Urban Historic Landscape Characterisation.* English Heritage Project Number 4664 Main, Greater Manchester Archaeological Unit (March 2012; URL: http://archaeologydataservice.ac.uk/catalogue/adsdata/arch-1145-1/dissemination/pdf/Final_Report.pdf)

Coast and rivers

- 82 per cent (27,917 ha) of the NCA is a designated Nitrate Vulnerable Zone.
- Water quality has improved in recent years as a result of initiatives such as the Mersey Basin Campaign and more stringent European Union requirements, and also by technological changes and advances in scientific understanding.
- The accumulation of polluted material from years of sewage and industrial discharges and contaminated runoff from roads has resulted in chronic oxygen depletion in Salford Quays and the Manchester Ship Canal. A compressed air injection system was installed in 2001, raising oxygen levels in the water, increasing the number of invertebrate species, and increasing spawning and growth rates of fish such as roach and perch.
- Elsewhere there has been a general improvement in the aquatic ecology. Over the last 25 years fish stocks have improved and there are now healthy populations of many species of fish in many of the rivers.

Minerals

- Extensive sheets of sand and gravel were laid down in the valleys of the Rivers Mersey and Irwell, deposited by glacial melt water at the end of the last glacial period. These are currently being worked along the river terraces of the River Goyt in Offerton Quarry near Stockport.
- The quality of primary sand and gravel and crushed rock is generally relatively low. The area imports high specification aggregates from quarries in North Wales, Derbyshire, Lancashire, Cumbria, Staffordshire and Cheshire. Materials are mainly transported by road, and to a lesser extent by rail.

Drivers of change

Climate change

- The North West Landscape Framework Climate Change Assessment 2010/11 briefly covers the urban landscapes in Greater Manchester. Urban areas such as this are identified as having a higher vulnerability to climate change due to their lack of habitats and for generally being located on the flattest areas of land. These two factors restrict species movement and ecosystem functionality. Urban suburbs with extensive gardens and areas rich in greenspace can act as a substitute in some locations.
- The EcoCities project[5] set out baseline and predicted climate changes for three climatic zones in Greater Manchester. This report summarises the climate projections information for Greater Manchester. They indicate a robust pattern of warming of annual and seasonal temperatures, both during day and night. Rainfall patterns are more uncertain, but the central estimate of change shows an enhanced seasonal variation with summer precipitation decreasing, while winter precipitation is increasing.
- The EcoCities[5] neighbourhood scale case study focussed on a 5x5 km grid square covering most of Manchester and Salford city centres, although it is emphasised that caution should be taken in interpreting the results. Projections indicate a reduction in the number of days with a mean temperature less than 15.50C. This could reduce the number of days when heating of buildings is required. Projections also indicated an increase in

[5] *Climate Change Projections for Greater Manchester.* Version 2, EcoCities project, University of Manchester, G Cavan (2010; URL: www.sed.manchester.ac.uk/architecture/research/ecocities/library/documents/Climate_change_projections_GMv2.pdf)

days with a mean temperature exceeding 220C. This indicates that the need for cooling of buildings is likely to increase in the future.

- The built environment stores heat during the day and re-radiates it at night (causing the Urban Heat Island effect), thus enhancing night-time temperatures. High night-time temperatures in summer cause a great risk to human health, particularly for vulnerable groups and especially when in combination with high day-time temperatures.

- Adaptation interventions are needed to increase the resilience of the urban environment to the changing climate. These may reduce the exposure to impacts such as flooding or heat stress. Providing and enhancing green infrastructure can help attenuate storm water run-off and reduce the 'urban heat island' effect.

Other key drivers

- Forces for change within the Manchester Conurbation include the ongoing aspiration for growth. Associated with the growth agenda is the desire to provide safe, sustainable, healthy places for communities to live, improving public health and quality of life.

- Development pressures include housing expansion from adjoining urban areas, business park developments, particularly associated with key road intersections, as well as regeneration projects.

- Major development sites, projects and schemes require both additional infrastructure such as transport connections, and associated services, such as the provision of places for landfill and the expansion of water treatment facilities.

- Managing water quality and quantity, including flood risk mitigation will become increasingly important particularly in a changing climate with potential increased extreme events such intense rainfall and periods of drought.

- There are challenges in ensuring that the Manchester Conurbation's natural environment is resilient to meet the demands of economic and population growth.

- Securing and enhancing green infrastructure provides opportunities to deliver benefits from a high quality healthy natural environment. Benefits include managing surface water and reducing flood risk; adapting urban environments for climate change resilience; enabling healthy activity, recreation and social cohesion; maintaining and enhancing distinctive biodiversity, landscape and heritage. Outdoor environments provide the places where 'growth-support functions' can occur[6].

- There are increasing pressures from new tree pests and diseases affecting the NCA. A virulent disease, diagnosed as poplar scab, has affected the Manchester poplar.

[6] *Towards a Green Infrastructure Framework for Greater Manchester.* Final Report, TEP (September 2008; URL: www.greeninfrastructurenw.co.uk/resources/1547.058_Final_Report_September_2008.pdf)

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.

River valleys form important corridors of semi-natural habitats and natural green spaces, with pockets of open grassland, woodland and wetland.

Statement of Environmental Opportunity	Ecosystem service: Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place / Inspiration	Sense of history	Tranquillity	Recreation	Biodiversity	Geodiversity
SEO 1: Provide and maintain green infrastructure, including multi-functional green spaces and trees, improving links between habitats as well as creating a high-quality urban environment – to aid adaptation to climate change, to provide opportunities for recreation, and to enable people to enjoy the benefits that access to nature brings.	↔ **	↗ **	↔ **	***	↗ *	↗ **	↗ **	↗ **	↗ **	↔ **	↗ **	***	***	↑ **	↗ **	↗ **	↗ **	↗ ***	↔ **
SEO 2: Conserve and enhance the cultural heritage and character of the Manchester Conurbation, recognising the industrial and textile history of the area, and providing opportunities for access and interpretation of the urban environment for people to understand and enjoy.	↔ **	↔ **	↔ **	***	↔ *	↔ **	↔ **	↔ **	↔ **	↔ **	↔ **	***	***	↑ ***	↑ ***	↗ **	↑ ***	↗ **	↑ **
SEO 3: Provide a healthy water environment – with rivers, canals, wetlands, streams and aquifers – creating habitats for wildlife, delivering sustainably managed water and bringing multiple benefits for people.	↔ **	↔ **	↑ ***	***	↔ *	↔ **	↑ ***	↑ ***	↗ **	↗ **	↔ **	***	***	↗ **	↔ **	↔ **	↗ ***	↗ ***	↔ **
SEO 4: Conserve and enhance the river valleys and canals, as corridors through the urban areas, for the multiple benefits that the natural environment provides, to improve the landscape, and to make green spaces available for the benefit of both wildlife and people.	↗ **	↗ **	↗ **	***	↗ *	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	***	***	↗ **	↗ **	↗ **	↗ **	↗ ***	↔ **

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

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

Landscape attributes

Landscape attribute	Justification for selection
Large settlements that have come together to form the conurbation, characterised by dense urban and industrial development, commercial, financial, retail and administrative centres, commuter suburbs and housing.	■ 82 per cent of this NCA is urban. ■ Sense of place is dominated by several cities, towns and other development. ■ Principal urban centres are Manchester, Salford and Stockport. ■ Other main settlements include Sale, Ashton-under-Lyne, Swinton, Altrincham, Stretford, Prestwich, Cheadle Hulme, Denton and Droylsden.
The area is centred on low hills, enclosed by the Pennine hills to the north and east and crossed by several meandering river valleys.	■ The conurbation is centred on low hills with elevations ranging from 15 m to 130 m. ■ The low hills are crossed by a series of several river valleys that meander through the conurbation.
Underlying Permo-Triassic sandstones form an extensive aquifer system. This is overlain by thick deposits of glacial till.	■ The majority of the Manchester Conurbation is located over Permian sandstones and red Triassic sandstones and mudstones. ■ The Manchester and East Cheshire aquifer is comprised of Permo-Triassic Sherwood and Collyhurst sandstones. ■ Much of the area is covered by thick deposits of glacial till and pockets of sand and gravel of Quaternary age.
Woodland is usually found in corridors along the slopes of the river valleys, and also on what was once brownfield land.	■ Woodland cover is 6.7 per cent of the NCA. ■ Semi-natural broadleaved woodland can be found in small pockets, some of which are ancient woodland sites, such as Bailey's Wood, Mere Clough and Prestwich Clough in the north and Bramhall and Carr Woods in the south. ■ Many of the river valleys have large areas of woodland on their slopes. ■ The Red Rose Forest covers 22,514 ha of this NCA, which is 66 per cent of the area and the Pennine Edge Forest covers part of the east of the NCA.
Small pockets of farmland bounded by fences or hedges; however an increasing number of farms are given over to urban farming uses such as equestrian facilities, supplying the demand for recreation.	■ Pockets of farmland are mainly within the river valleys. ■ Most of the agricultural land is grade 3, but there are also some areas of grade 2 and 4. ■ An increasing number of farms have diversified to more urban farming uses feeding the demand for recreational facilities such as equestrian centres, playing fields, golf courses.

Landscape attribute	Justification for selection
Public parks and recreation facilities provide valuable open spaces for people within this urban environment; community gardens and allotments are places for local food growing.	■ Managed greenspace offers an important refuge for many plants and animals, as well as enhancing human quality of life in urban situations. ■ Amenity grassland, private gardens, allotments, town parks, planted shrubberies, playing fields, golf courses, grounds of buildings, churchyards and cemeteries are all managed to some degree for their particular purpose. However, they can still be important reservoirs for wildlife in urban settings. ■ Green spaces contribute to the health and well-being of local people and provide opportunities for increased social connectivity and cohesion. ■ The proximity of green spaces to schools and housing make them an ideal resource for learning about the natural world, and opportunities for recreation and enjoyment.
River valleys form important corridors of semi-natural habitat, with open grassland, woodland and wetland, linking urban centres with open countryside; while many post-industrial sites and canals provide wildlife habitats.	■ Countryside extends throughout the Manchester Conurbation following the network of corridors formed by the rivers and, to a lesser extent, canals, railways and roads which cut through the urban fabric. All the river valleys contain sizeable networks of semi-natural habitats including open grassland, woodland and wetland. ■ The past industrial heritage provides important post-industrial sites such as the canal network which now harbour much of Manchester's wildlife interest, including the internationally recognised Rochdale Canal Special Area of Conservation (SAC). ■ There are 123 local wildlife sites, which is 3 per cent of the NCA.
Drainage is through a series of river valleys that weave through the urban fabric, flowing broadly from the Pennine moors to the east and north, towards the lower lying areas of the south and west.	■ A series of river valleys flow through the urban fabric from the Pennine hills in the north and east and ultimately draining into the Mersey Estuary in the west. ■ The Mersey river valley is the largest stretch of continuous countryside within the conurbation, dominated by its heavily meandering river within a broad flood plain. ■ Other river valleys include those of the Irwell, Tame and Bollin which are more sinuous and narrow than the Mersey. ■ Sizeable lengths of the rivers Goyt, Irk and Medlock lie within this NCA.

Landscape attribute	Justification for selection
An increasingly recognised legacy of industrial archaeology particularly relating to the textile industry; red brick and sandstone buildings are prominent in the city and town centres, alongside a mix of modern materials and high-rise buildings, with landmark 19th-, 20th- and 21st-century buildings.	■ The historic centre of Manchester and other town centres house many museums and galleries and impressive municipal buildings. ■ Victorian architecture of municipal buildings in town and city centres. ■ The many high-rise and landmark buildings give a strong sense of place, including Manchester Cathedral, Salford Cathedral, Manchester Town Hall, Manchester Library, the Lowry, Stockport railway viaduct and Stockport Pyramid. ■ At 168 m, the Beetham Tower is a prominent feature on the Manchester skyline. ■ Red brick and sandstone are prominent building materials alongside a mix of modern materials. ■ Mill buildings and rows of workers' terraced housing.
A busy transport hub interlinked with surrounding areas by an extensive road, tram and railway infrastructure, via major communications corridors, while access is also provided by the canal network.	■ Extensive transport infrastructure into, out of, and around the city and town centres. ■ Major communications routes include mainline railways and the Manchester ring motorway, as well as the tram network. ■ The transport network links to the north and south, and east to west connecting the area with the Port of Liverpool as well as trans-Pennine routes. ■ Many of the towns and villages within the area function as commuter settlements, benefitting from the concentration of transport infrastructure in the area. ■ Stretches of the Bridgewater, Rochdale, Macclesfield, Leeds Liverpool and Manchester Ship canals cross the area. ■ Recreational trails, including public rights of way and the Trans Pennine Trail, also serve to connect people.

Landscape opportunities

- Safeguard existing green infrastructure and enhance and create new green infrastructure including: open spaces (parks, woodlands, informal open spaces, nature reserves, lakes, accessible countryside, the natural elements of historic sites, built conservation areas and civic spaces); linkages (river corridors and canals, pathways, cycle routes and greenways); networks of 'urban green' (the collective resource of private gardens, allotments, pocket parks, street trees, verges and green roofs).

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

- Plan to restore, manage and expand habitats on former industrial sites to provide opportunities to enhance biodiversity and the landscape, while ensuring that the legacy of the industrial heritage remains legible within the landscape. These developing habitats form an important component of the landscape character and are of wildlife and recreational value.

- Increase tree cover and street trees and conserve the 'Manchester poplar' to improve the urban environment, moderate the climate in urban areas, and enhance the urban and historic landscape.

- Manage, expand and connect pockets of habitats in urban areas, conserving their wildlife and historical interest as well as providing opportunities for people to learn about and enjoy the natural environment and enabling communities to volunteer to monitor and manage its future.

- Plan to link and connect potentially fragmented habitats into a more cohesive network and enable movement of species.

- Retain and manage open countryside and semi-natural habitats, for example, in the river valleys.

- Conserve and enhance networks of rivers and canals for wildlife, to enhance local landscapes and to provide multiple benefits such as walking or cycling routes, and other multi-user access provision.

- Safeguard wetlands and create new wetland habitats.

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

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

- Protect and enhance the remaining pockets of farmland, including permanent grassland, and support farming to develop ecological networks and enhance the character of the landscape.
- Manage the existing access network of public rights of way, cycle routes and towpaths, and plan new links, particularly within urban areas and to the wider countryside.
- Ensure that people have access to greenspace and to green routes, close to where they live and work.

Public parks and recreation facilities provide valuable open spaces for people within this urban environment, such as here at Ashton-on-Mersey Park.

Ecosystem service analysis

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

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

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Food provision	Agricultural land Local food grown in allotments and community or private gardens	In 2009 the total farm area was 1,735 ha. There were 1,003 cattle (1,859 in 2000). 732 sheep (610 in 2000) and 421 pigs (1,617 in 2000). In 2009, 1,374 ha (79 per cent) of commercial holdings were grass and uncropped land; 75 ha (4 per cent) were cereals. In 2009, 35 commercial holdings (49 per cent) were classed as type 'other', which includes holdings with only horses, only grass or fodder crops or with only fallow land or buildings and holdings with unknown activity. Gardens, allotments and other green spaces can contribute to local food production.	Local	Food production is limited in the area, with very little land area given to agriculture. There is a high proportion of 'other' holding types, which is likely to be indicative of a range of other urban fringe land uses. Urban farms could be a useful educational resource for people to learn about farming, food and the environment. The urban location enables a large number of people to access these farms. With the high proportion of urban land use and significant pressure on land, the potential for expanding farming and food production is very limited. Access to allotments and community food growing projects supports social cohesion and provides small-scale opportunities for people to grow food locally.[7]	Encourage good agricultural management of remaining farmland for food production and grazing to improve its long term viability. Work with the local farming community to seek opportunities and consider how food production can be managed sustainably in urban fringe and marginal areas. Seek opportunities to expand the provision of allotments, community gardens and encourage the use of amenity space and roofs within housing areas to enable urban communities to grow food locally.	**Food provision** **Regulating soil quality** **Regulating soil erosion** **Biodiversity**

[7] Urban open space in the 21st century. Landscape and Urban Planning 60(2): 59–72, C Ward Thompson (2002)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Timber provision	Woodland Red Rose Forest Pennine Edge Forest	Woodland cover is 6.7 per cent of which 2,165 ha is broadleaf woodland, 8 ha conifer woodland, 78 ha mixed woodland. There are 23 woodfuel boilers and 2 woodfuel suppliers. The area includes the Red Rose Forest and the Pennine Edge Forest.	Local	Across most of the area, woodland cover is limited, and is generally found within river valleys. With much of the land being urban, there are limited opportunities for large-scale woodland creation. However, increasing woodland cover in suitable locations, as well as improving management of existing woodlands, could provide opportunities for small-scale timber provision for local use as woodfuel as well as providing other benefits. Dead wood is an important component of semi-natural woodland for biodiversity as well as soil formation and nutrient cycling, which underpins other services, such as climate regulation, soil quality, soil, erosion and water quality. A range of woodland management may be needed, including non-intervention. Woodland expansion in the Red Rose Forest and Pennine Edge Forest is likely to bring about changes to the character of the valley landscapes though this is likely to be directed toward the poor quality amenity grassland and not at the expense of semi-natural habitats.	Encourage the appropriate management of existing woodlands and create new woodlands for multi-purpose use as part of the community forest initiative including; small-scale timber, wood fuel and biomass provision, and enhancement of recreation, landscape and biodiversity interests. Make the most of opportunities from woodfuel for heat from woodlands, waste wood and arboriculture.	**Timber provision** **Biomass energy** **Climate regulation** **Regulating water quality** **Regulating soil erosion** **Recreation** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability	Rivers Aquifers	The NCA has 125 km of rivers running through it including the River Bollin 6 km, River Irwell 16 km, River Mersey 27 km, River Tame 18 km. The north of the NCA overlays the Irwell Valley and Blackley Groundwater Management Unit (GWMU), the former classified as 'over-licensed' and the latter as having 'water available'.[8] The east of the NCA overlies part of the East Manchester Collyhurst Sandstone Groundwater Management Unit (GWMU) which has 'water available'.[9] The west of the NCA overlies part of the Trafford Groundwater Management Unit (GWMU) which is 'over abstracted'.[10] Principal surface water resources within the NCA are the River Mersey and its tributaries the rivers Irwell and Tame, as well as the Manchester Ship Canal into which the Irwell flows. The Tame, Goyt and Etherow Catchment Abstraction Management Strategy (CAMS) area (covers the River Tame within this NCA) has a large number of reservoirs upstream (for example the Longdendale Reservoir Complex in the Dark Peak NCA) which provide public water supply, the dominant use of abstracted water, with industrial use also significant. These reservoirs and linking aqueducts provide an integrated regional water supply system capable of meeting changing demand and conditions. All of the surface waters within this NCA have 'water available' with the exception of tributary streams to the Mersey in the south-east of the NCA near Cheadle, which have 'no water available'.	Regional	The high urban demand for water and development pressures mean that the sustainable use of water is a key issue in this area. Water supply is from surrounding uplands including from the Lake District's Thirlmere and Haweswater valleys and north Wales, supplemented by groundwater. The majority of the water abstraction in the Northern Manchester CAMS area (covering the River Irwell within this NCA) is used for industrial purposes, such as chemical, construction, metals and mineral, mining, leather and textiles with abstraction for public water supply also significant.[11] Abstractions in the Mersey and Bollin CAMS area (covering most of the Mersey within this NCA) are fed into an integrated regional network for north-west England and are used mainly for public water supply, amenity/leisure and industry.[12] The built-up areas of the towns and cities create impervious surfaces that cause water to run-off land more quickly and not to percolate into and recharge the aquifer.	Plan to manage over-abstraction from groundwater, rivers, reservoirs and lakes through careful and efficient use of water. Encourage and promote opportunities to ensure habitats, especially those within developed/housing areas are under good environmental management, increasing their capacity to retain water, reduce run-off and improve water infiltration. Seek opportunities to create habitats, for example permanent grassland and reedbeds, to improve infiltration and increase the capacity to retain water, which also reduces the rate of run-off and captures sediments and contaminants. Encourage the collection and storage of rainwater to irrigate gardens, allotments and green spaces. Manage the efficient use of water.	**Water availability** **Regulating water quality** **Regulating water flow** **Biodiversity**

[8] *The Northern Manchester Catchment Abstraction Management Strategy*, Environment Agency (May 2007; URL: www.environment-agency.gov.uk/business/topics/water/119927.aspx)

[9] *The Tame, Goyt and Etherow Catchment Abstraction Management Strategy*, Environment Agency (March 2004; URL: www.environment-agency.gov.uk/business/topics/water/119927.aspx)

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

[11] *The Northern Manchester Catchment Abstraction Management Strategy*, Environment Agency (May 2007; www.environment-agency.gov.uk/business/topics/water/119927.aspx)

[12] *The Tame, Goyt and Etherow Catchment Abstraction Management Strategy*, Environment Agency (March 2004; URL: www.environment-agency.gov.uk/business/topics/water/119927.aspx)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Genetic diversity	Not considered important in this NCA					
Biomass energy	Woodland	In this heavily urbanised NCA the existing woodland cover (6.7 per cent) offers low potential for the provision of biomass, either through bringing unmanaged woodland into management or as a by-product of commercial timber production. There are few opportunities for biomass crops other than in river valleys and on the periphery of the urban areas.	Local	There may be some limited opportunities for miscanthus and short rotation coppice to be accommodated although both have very limited potential as while the physical and land use characteristics of the area are sometimes favourable for planting in these areas, the complex land use patterns mean that each case would need to be considered on its merits. More could be done to improve outputs of woodfuel for local use from existing woodlands. Dead wood is an important component of semi-natural woodland for biodiversity as well as soil formation and nutrient cycling, which underpins other services, such as climate regulation, soil quality, soil, erosion and water quality. Improved woodland management may be needed, including non-intervention. For information on the potential landscape impacts of biomass plantings within the NCA, refer to the tables on the Natural England website.[13]	Look for opportunities for small-scale biomass production through planting on sites including small parcels of land isolated by development that are not suitable for agriculture such as spoil heaps and closed landfill sites. Ensure that existing woodlands are managed to produce timber which could be used to provide local sources of biomass such as for wood-fired boilers. There may be some opportunity to establish new small woodlands which could provide multiple benefits including additional habitat for wildlife and recreational opportunities.	**Biomass energy** **Timber provision** **Regulating soil erosion** **Recreation** **Biodiversity**

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

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation	Soils Woodland Grazing marsh Green infrastructure	Soil carbon levels are generally low/ medium (0–10 per cent), with a large area of higher carbon content in the west (20–50 per cent). Soils with a high peat or organic content: naturally wet very acid sandy and loamy soils (19 per cent of NCA); the loamy and clayey flood plain soils with naturally high groundwater (6 per cent of NCA). 2,165 ha broadleaf woodland, 8 ha conifer woodland, 78 ha mixed woodland, 141 ha grazing marsh. Green and blue infrastructure including open spaces (parks, woodlands, informal open spaces, allotments, nature reserves, lakes, accessible countryside, the natural elements of historic sites, built conservation areas and civic spaces); linkages (river corridors and canals, pathways, cycle routes and greenways); networks of 'urban green' (the collective resource of private gardens, allotments, pocket parks, street trees, verges and green roofs).	Regional	Soil carbon levels are generally low/ medium, with a large area of higher carbon content in the west likely to be associated with the large tracts of lowland peat bog once contained in the central Mersey Valley prior to its urbanisation. Soils with a high peat or organic content cover approximately 25 per cent of the NCA. These soils can act as an important store of carbon and thus it is important to conserve them. If not managed sustainably soils with high carbon content can become a carbon source rather than sink. Carbon storage is provided by woodlands and street trees although cover is relatively moderate within the NCA. High density residential areas are potentially most vulnerable to heat island and warming effects.[14] Provision of vegetation can cool and shade urban environments as well as provide greenspace and green routes, close to where people live. Modelling suggests that a 10 per cent increase of green cover within Greater Manchester can ameliorate the predicted impacts of climate change up to a 2080 high scenario.[15] **Continued over...**	Seek to manage soils through sustainable agricultural practices to protect and bind the soil to help them retain their soil carbon levels. Conserve habitats such as woodland. Seek opportunities to increase the carbon storage potential of the area through the management of woodlands and the planting of new woodland where appropriate. Seek opportunities to sustain and increase urban greenspace, including green roofs and street trees, in town centres and high density residential areas giving multiple benefits such as walking or cycling routes, improved tranquillity, improved quality of environment and habitats for wildlife. Seek opportunities for buffering, linking and expanding fragmented habitats such as grasslands and wetlands.	**Climate regulation** **Regulating soil quality** **Regulating soil erosion** **Sense of place / inspiration** **Recreation** **Biodiversity**

[14] *Towards a Green Infrastructure Framework for Greater Manchester.* Final Report, TEP (September 2008; URL: www.greeninfrastructurenw.co.uk/resources/1547.058_Final_Report_September_2008.pdf)

[15] *Adapting cities for climate change: the role of the green infrastructure. Built Environment 30: 97–115,* S Gill, J Handley, R Ennos and S Pauleit (2007)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation continued				**...continued from previous.** Space for vegetation is limited, particularly in the cities, but there can be opportunities to 'retrofit' green infrastructure into the urban environment, such as green roofs or street trees. Benefits include attenuation of storm water run-off; absorption of air pollutants and dust; reduction in the 'urban heat island' effect and provision of wildlife habitat. Good management of habitats to ensure favourable condition and buffering, linking and expanding fragmented sites can make them more resilient to climate change and enable the movement of species.		

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality	Rivers Canals Manchester and East Cheshire aquifer Nitrate Vulnerable Zone	The ecological quality of surface waters is moderate across most of the NCA, although the Rochdale and Bridgewater canals have good quality. The chemical status of surface waters, where assessed, fails to achieve good status, specifically in the rivers Mersey, Irwell and Tame and the Manchester Ship Canal. The chemical status of groundwater is poor.[16] 82 per cent (27,917 ha) of the NCA is within a Nitrate Vulnerable Zone.	Regional	Significant improvements have already been seen in water quality over the last 30 years, allowing coarse fish populations to recover from very low levels. Water quality improvements have also allowed opportunities for enhancement and regeneration, for example in Manchester city centre, the waterways provide a setting for bar, restaurant and residential development, allowing the rivers and canals to be enjoyed by local residents and visitors alike. Moderate and poor water status fails to meet Water Framework Directive targets. Water quality in urban areas remains highly impacted by pollution coming from point sources and land. Diffuse urban pollution (for example dirty water coming from roads, badly connected sewers and old landfills) and physical modifications to rivers (such as weirs, culverts and artificial river banks) are causing some rivers and other water bodies in the Irwell Catchment to fail to meet the legally required standards of water quality. These problems are particularly found in highly populated areas here traffic densities and road networks are concentrated and where there is a legacy of industrial activity.[17] The built-up areas of the towns and cities create impervious surfaces that cause water to run-off land more quickly taking with it any contaminants.	There are opportunities to develop sustainable urban drainage systems in new development to improve infiltration and water quality. Improve water quality by reducing and managing point source and diffuse pollution. Seek opportunities to sustain and increase urban greenspace in town centres and high density residential areas giving multiple benefits including attenuating storm flows and filtering water. Restore modified channels and manage and enhance habitats such as wetlands and grasslands to capture sediments and contaminants before they enter water courses. Encourage the use of more porous and permeable surface materials in new developments for hard standing areas, roads and car parks.	**Regulating water quality** **Regulating soil erosion** **Biodiversity**

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

[17] *The Irwell Catchment Pilot: The Rivers Return*, P James, S Atkinson, D Barlow et al. (2012)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow	Rivers Flood plains Flood storage areas	The principal rivers in the NCA are the River Mersey and its tributaries the rivers Irwell and Tame. The Irwell Catchment has a history of flooding, with Salford and Manchester city centre being worst affected after widespread and/or prolonged heavy rain. The Environment Agency's preferred approach to managing flood risk includes identifying potential flood storage areas, implementing sustainable gravel/sediment management strategies, and exploring ways of achieving land management change to reduce run-off from the rural upper catchment outside the NCA, for example through blocking of moorland grips, creation of storage ponds, and targeted woodland creation.[18] In the east of the NCA the River Tame has its confluence with the River Mersey. The upper part of the Mersey catchment lies to the east in the Dark Peak NCA, South West Peak NCA and Southern Pennines NCA, before crossing the Manchester Pennine Fringe NCA and into this NCA. The greatest flood risk in the Mersey catchment occurs in Didsbury, Sale and Altrincham.[19]	Regional	Flooding is caused by widespread heavy rain and/or prolonged periods of wet weather. In addition to fluvial flooding, there are also risks from surface water flooding particularly on hard impermeable surfaces and when the ground is already saturated. The legacy of industrial development means that many of the water courses are heavily modified with embankments, culverts, weirs, locks and dams. Town centres, high-density residential and industrial areas have highly sealed and impermeable surfaces that cause water to run-off land more quickly, leading to flash flooding, and placing pressure on underground surface water and sewerage infrastructure. Providing green spaces can contribute to flood risk mitigation and can improve the lifespan and resilience of flood defences for example by attenuating storm flows and free up water storage capacity in existing infrastructure to reduce risk of damage to urban property. Additional benefits occur as green spaces also provide places for wildlife, enhance the landscape and provide opportunities for recreation. Land management practices in upper catchments outside the NCA and rural fringes can affect resilience of the conurbation's urban environment to flood risk. Incorporating green infrastructure into the built environment reduced the volume and speed of water discharged to the drainage system.[20]	There are opportunities to develop sustainable urban drainage systems in new and existing development to store water, improve infiltration and reduce the risk of surface water flooding. Create and restore strategically important flood plain habitats in green spaces to improve flood management in and upstream of urban flood zones. Promote opportunities to increase water storage and slow high flows through the restoration and expansion of wetlands and other habitats such as reedbeds and wet woodland in flood plains. Seek opportunities to increase greenspace and woodland cover to intercept and infiltrate rainfall and slow run-off into drainage systems and rivers.	**Regulating water flow** **Regulating water quality** **Regulating soil erosion** **Recreation** **Biodiversity**

[18] *Irwell Catchment Flood Management Plan Summary Report*, Environment Agency (December 2009; URL: www.environment-agency.gov.uk/research/planning/33586.aspx)

[19] *Upper Mersey Catchment Flood Management Plan Summary Report*, Environment Agency (December 2009; URL: www.environment-agency.gov.uk/research/planning/33586.aspx)

[20] *Green Benefits in Victoria Business Improvement District: An analysis of the benefits of trees and other green assets in the Victoria Business Improvement District*, Victoria Business Improvement District (2012)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil quality	Soils	Slowly permeable seasonally wet acid loamy and clayey soils (41 per cent); naturally wet very acid sandy and loamy soils (19 per cent); slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (18 per cent); freely draining slightly acid loamy soils (8 per cent); loamy and clayey flood plain soils with naturally high groundwater (6 per cent); and freely draining slightly acid sandy soils (5 per cent).	Local	The slowly permeable seasonally wet acid loamy and clayey soils and 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 surface water run-off. Management measures that increase organic matter levels can help reduce these problems. 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.	Encourage sound land management practices which minimise/reduce negative impacts of soil structural deterioration for example through appropriate stocking densities and extensive grazing. Use recreational management techniques to manage public access in sensitive areas to avoid compaction, poaching or puddling of soils.	**Regulating soil quality** **Regulating soil erosion** **Regulating water quality** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion	Soils	The soils that cover 65 per cent of this NCA are not susceptible to erosion. Soils at risk of erosion include the freely draining slightly acid loamy soils (8 per cent), the freely draining slightly acid sandy soils (5 per cent) and the naturally wet very acid sandy and loamy soils (19 per cent).	Local	The freely draining, slightly acid loamy soils and the freely draining slightly acid sandy soils are prone to erosion especially where vegetation is removed or where organic matter levels are low after continuous cultivation. The naturally wet very acid sandy and loamy soils can also be prone to erosion if heavily trafficked or after heavy rain. All of these soil types are light and at risk of wind erosion, especially where coarse textured (freely draining slightly acid loamy soils), cultivated or left bare.	Seek opportunities to manage, protect and increase areas of woodland and permanent grassland especially on steeper slopes. Encourage opportunities to manage pastures in ways that build up organic matter and avoid compaction, for instance by reducing grazing pressures, thus improving infiltration of rain water. Manage and enhance riparian habitats to reduce soil erosion rates, creating permanent grassland strips to trap sediment run-off before it enters the streams. Encourage restoration and management of 'gappy' hedgerows in poor condition to act as a wind break and bind/filter out the soil in times of flood.	**Regulating soil erosion** **Climate regulation** **Regulating water quality** **Biodiversity**
Pollination	Gardens Urban greenspace Green infrastructure	The NCA has little high quality habitat to support pollinating insects, save for isolated fragments of lowland meadow. Private gardens, allotments and more natural areas within greenspace supporting pollinating insects and contributing to local food production.	Local	Motorway and road verges, river and canal corridors and other suitable locations could be managed to provide improved nectar sources. Landscape heterogeneity and the sheltered climates of urban habitats can provide havens for pollinators. However, habitat fragmentation can restrict dispersal of some species and makes pollinators more vulnerable to climate change.[21]	Seek opportunities to introduce species rich grassland, pollen and nectar strips, margins along motorway and road verges and alongside watercourses such as the river valleys and canals, to encourage and support pollinating insects. Improve management of small greens and parks within cities and towns.	**Pollination** **Biodiversity**

[21] *Making B Lines. A report on the practicalities of making a B Lines network*, P Evans (2012)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pest regulation	N/A	N/A		N/A	N/A	**Pest regulation**
Sense of place/ inspiration	Industrial heritage River valleys Canals and railways Museums and art galleries Country houses and parkland	Sense of place is dominated by extensive urban development. Manchester is seen as an archetype city of the Industrial Revolution. The river valleys form important countryside corridors through the area. Moderate areas of woodland remain along the side of river valleys. Canals and railways thread through the urban fabric forming important green corridors. Most of the available countryside is suburban in character. There are significant views from urban fringe areas within the NCA, and out across surrounding landscapes. A sense of inspiration is likely to be found within the historic centre of Manchester with its numerous museums and art galleries, and in the area's grand country houses and parklands and mills.	National	The built heritage, including historic structures, canals, mills, and modern architecture contribute to providing a sense of place and inspiration. Laurence Stephen Lowry famously painted scenes of life in industrial Manchester and Salford. The Lowry Centre, in the redeveloped Salford Quays area, named after the artist, is a major visitor attraction. The natural heritage, river valleys, countryside, woodlands, canals, parks and urban green spaces are important as recreational areas being close to where people live, as well as providing valuable wildlife corridors, contributing to providing a sense of place and inspiration. The Irwell Sculpture Trail runs though Salford, connecting the NCA with the Manchester Pennine Fringe NCA. This trail is the largest sculpture route in the UK and contains artworks by locally, nationally and internationally renowned artists. The hills that surround the urban areas add to the 'sense of place,' and it is important to conserve significant views from urban areas.	Protect and interpret the distinctive industrial heritage and iconic architecture. Safeguard and encourage sensitive enjoyment of the historic landscape. Protect the sense of place by conserving and enhancing the network of river valleys, countryside, woodlands, canals, parks and urban green spaces and enabling people to access and enjoy them. Seek opportunities to encourage the urban populations to engage with the natural environment. Carefully design and integrate green infrastructure within housing and industrial development, linking new developments with the wider countryside.	**Sense of place / inspiration** **Climate regulation** **Regulating water quality** **Regulating water flow** **Sense of history** **Tranquillity** **Recreation** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history	12 Scheduled Monuments 1,526 Listed Buildings 15 Registered Parks and Gardens Allotments Green spaces Manchester poplar	The history of the landscape is evident in its industrial past. Aside from large-scale development some remnants of the area's agricultural past do remain, with linear 17th-century farmsteads including laithe houses, while allotments also form an important element of the area's social history. Aspects of history likely to be particularly apparent to the general public include the area's parks, urban parks and cemeteries, and the historic centre of Manchester itself with its grand cathedral.	National	The area was particularly significant globally in the Industrial Revolution period. The industrial legacy means that there is a rich cultural heritage including striking architecture in the town centres, stone built municipal buildings from the 19th-century, mill buildings, and Scheduled Ancient Monuments. Encouraging the use and appreciation of the conurbation's natural and built heritage, including rivers, canals, woodlands, mills, parks, Victorian and modern architecture will help to build a positive image, fostering civic pride and enhancing the landscape for people to enjoy. In Greater Manchester the tolerance of black poplars to industrial pollution has meant that it was widely planted as an urban tree (known as the 'Manchester poplar') in the late 19th and early 20th century. The canals were a key feature that contributed to the industrial development of the area, and now provide really significant routes for wildlife, recreation, as well as interpretation of history.	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. Safeguard the architecture of the town centres the heritage of buildings and industrial features, providing a unique setting for interpreting the area's history. Conserve the rivers, canals, parks and greenspace for people to enjoy and learn about the history of this environment. Provide interpretation of the landscape, its history and its features. Conserve the heritage of the canals with their importance for wildlife and for recreation.	**Sense of history** **Sense of place / inspiration** **Recreation** **Geodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Tranquillity	Woodlands River valleys Parks, gardens and urban greenspace	Tranquillity is not a feature typically associated with this area given the extent of urban development and busy transport network. None of the NCA is classified as 'undisturbed' according to CPRE data (little changed since the 1960s). A sense of relative tranquillity may nevertheless still be associated with the area's parks, cemeteries, river valleys and canals, parks, cemeteries and other green spaces.	Local	Despite the overall low levels of tranquillity within this NCA, the parks, woodlands, canals and other urban green spaces are an important source of perceived tranquillity in the local area and are highly valued for the relative tranquillity they provide. The formal parks and green spaces provided through Victorian and Edwardian planning are just as crucial today and offer spaces of tranquillity. Providing increased opportunities and access to a tranquil environment through management, enhancement and expansion of existing and new woodlands, habitats and urban green spaces should ensure that these important places can remain tranquil and contribute to biodiversity, sense of place and recreation. The Red Rose Forest and Pennine Edge Forest provides opportunities to increase woodland and other habitats, to create quite tranquil areas for people to enjoy. There is a positive association between visiting natural green spaces and good mental health. Both physical activity and exposure to nature have separately been demonstrated to provide benefits for mental wellbeing.[22] Feelings of calm and wellbeing increase with increased biodiversity richness of greenspace.[23]	Seek opportunities to conserve and extend green infrastructure and urban green spaces, to ensure the continued provision of access to sites of relative tranquillity within the towns and cities. Encourage opportunities to improve, maintain and expand habitats which may increase the sense of tranquillity. For example, by planting woodlands and ensuring any new developments are sensitively designed to reduce visual, noise and infrastructure impacts. Manage community woodland and provide new community woodlands and other habitats, to create quiet tranquil areas where people can relax, reflect and improve their mental wellbeing.	**Tranquillity** **Timber provision** **Biomass energy** **Climate regulation** **Sense of place / inspiration** **Biodiversity**

[22] *The mental and physical health outcomes of green exercise. International Journal of Environmental Health Research 15(5): 319–337*, J Pretty, J Peacock, M Sellens and M Griffin (2005); *Vitalizing effects of being outdoors and in nature. Journal of Environmental Psychology 30: 159–168*, RM Ryan, N Weinstein, J Bernstein et al. (2010)

[23] *Psychological benefits of greenspace increase with biodiversity. Biological Letters 3: 390–394*, RA Fuller, KN Irvine, P Devine-Eright and KJ Gaston (2007)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation	Country parks Local Nature Reserves Forestry Commission Walkers Welcome Grants Woods for People Rights of way 15 Registered parks and gardens Red Rose Forest Pennine Edge Forest	Recreation is supported by the 361 km rights of way network (with a density of 1 km per km^2). Over 66 per cent of the area is designated as part of Red Rose Forest which aims to provide accessible land for recreation. The Pennine Edge Forest has been established, aiming to enrich community life. The river valleys and canals form a network of recreational trails as well as opportunities for canoeing, angling, cycling and horse riding. Recreation is further supported by the area's urban parks and green spaces. The rights of way network provides access within the NCA and to the wider countryside.	Regional	Only 4 per cent of the Manchester Conurbation is classified as being publically accessible. 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, and that help encourage a sense of community and reduce isolation. Most visits to the natural environment take place within 3 km of home and are on foot. Those living in the most deprived areas and the black and ethnic minority population are most likely to make their visits in urban areas close to home.[24] The Irwell Sculpture Trail is the largest sculpture route in the UK, and runs though Salford and Bury. Parks, such as Heaton Park, are important green spaces for people to enjoy. Many water sports are undertaken at Salford Quays such as rowing, and open water swimming. **Continued over...**	Seek opportunities to provide increased access to green spaces, especially within urban and urban fringe areas so communities can connect with their local green spaces. Create links between urban areas and green infrastructure and wider countryside beyond the conurbation. Seek opportunities to improve access by ensuring that paths are maintained and well signposted, creating new/ circular routes, and some surfaced paths suitable for all levels of ability and interest at key locations. Seek opportunities to increase recreation provision through access to and interpretation of historical and industrial sites and their restoration. 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.	**Recreation** **Sense of place / inspiration** **Sense of history** **Biodiversity**

[24] *Monitor of Engagement with the Natural Environment: The national survey on people and the natural environment – Annual Report from the 2011–12 survey.* Natural England Commissioned Report NECR094, Natural England (2012; URL: http://publications.naturalengland.org.uk/publication/1712385)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation continued				**...continued from previous.** Footpaths, cycle ways, canal towpaths and bridleways which link open 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. People-centred routes in and around regenerating urban areas enable doorstep access to the natural outdoor environment. Nature can encourage participation in physical activity: individuals with easy access to nature are 3 times more likely to participate in physical activity than those with poorer access, and, therefore 40 per cent less likely to become overweight or obese.[25] Many of the main outdoor destinations such as the river valleys are close to centres of population. There is scope to expand the visibility and range of outdoor destinations in particular around the extensive river valley network. Providing opportunities for communities to enjoy these areas can yield health benefits.		

[25] *A systematic review of evidence for the added benefits to health of exposure to natural environments. BMC Public Health 10: 456–466*, DE Bowler, LM Buyung-Ali, TM Knight and AS Pullin (2010); *Environment, design and obesity. Environment and Behaviour 39(1): 6–33*, NM Wells, SP Ashdown, EHS Davies et al. (2007)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity	Rochdale Canal SSSI and SAC 3 ha Hollinwood Branch Canal Huddersfield Narrow Canal Broadleaved mixed and yew woodland Flood plain grazing marsh Small and fragmented areas of lowland calcareous grassland Lowland dry acid grassland Lowland meadows Purple moor grass and rush pasture **Continued over...**	Biodiversity habitats within the NCA are limited in extent and very fragmented, with isolated areas of flood plain grazing marsh, wet woodland and lowland meadows. The NCA contains 1 SAC and only 5 ha are nationally designated as SSSI. Additional opportunities for wildlife are also to be found within the 7 country parks and 26 Local Nature Reserves that are found wholly or partly within the NCA. Large town parks and green spaces can be important refuges for wildlife, especially in the larger cities where open land is limited. Mature trees common to many such parks are important refuges for invertebrates, birds and, in some places, bats. A number of conspicuous species have colonised the urban areas in quite recent times. Fox, badger, peregrine falcon, black redstart and marsh orchids are among the best-publicised examples.	Local	Conserving and enhancing the network of designated sites and local wildlife sites will bring multiple benefits, as well as improving biodiversity. Pockets of semi-natural habitats are often fragmented. Consideration should be given to an integrated approach, through linking habitats and populations, to improve resilience. This could include providing buffers along watercourses; managing and extending and linking green spaces creating green corridors within urban areas to improve connectivity. Green infrastructure designed with biodiversity in mind can provide resources for wildlife in city centres and aid dispersal. There are potential ecological networks in place, especially for woodlands in the south, east and north of the city, and wetland networks, along the river valleys. Opportunities for biodiversity expansion are limited, but could involve expanding wetland habitats in the river valleys, and woodlands. Changes to park management to increase areas of unmown grass and increase vegetation richness and structure can increase opportunities for wildlife and may reduce maintenance costs. **Continued over...**	Conserve and enhance biodiversity and the network of designated sites and local wildlife sites. Manage linear routes and stepping stones that connect pockets of habitats, especially rivers, canals, water bodies and road verges. Encourage the identification, expansion and protection of green corridors or ecological networks to provide a network of semi- natural habitat within the urban fabric, enabling movement of species as well as creating green routes for people to enjoy. Incorporate conservation and enhancement of wildlife in the management of urban greenspace. Conserve and expand for habitats for wildlife including woodlands, wetlands and grasslands. There are opportunities to 'retrofit' green infrastructure into urban areas and create new features via development that will deliver regulatory services as well as wildlife habitats. **Continued over...**	**Biodiversity** **Climate regulation** **Regulating water quality** **Sense of place / inspiration** **Tranquillity** **Recreation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity continued	**...continued from previous.** 123 Local wildlife sites (1,041 ha, which is 3 per cent of the NCA) 7 country parks 26 Local Nature Reserves			**...continued from previous.** Urban wildlife sites are a useful educational resource and contribute to a greener, more congenial environment for all. The urban location, with a high population within easy reach, enables people to experience wildlife, for example at Local Nature Reserves and country parks. The more frequently people visit the natural environment, the more likely they are to appreciate it and to be concerned about environmental damage.[26] There is a small but important breeding population of black redstarts in Manchester city centre. In Greater Manchester the tolerance of black poplars to industrial pollution has meant that it was widely planted as an urban tree (known as the 'Manchester poplar'). Although planted, Greater Manchester has the highest concentration of black poplar in the UK. Since around 2000 a virulent disease diagnosed as poplar scab has affected the Manchester poplar, which in most cases leads to death.	**...continued from previous.** There are opportunities to promote sustainable recreation and education opportunities linked to biodiversity, for example at Local Nature Reserves. Increase appreciation of the nature conservation and educational value of urban 'wildspace' as a means of involving people in the conservation of the wider environment. Provide interpretation for people to understand and enjoy wildlife and the benefits of the natural environment.	

[26] *Monitor of Engagement with the Natural Environment: The national survey on people and the natural environment – Annual Report from the 2011–12 survey.* Natural England Commissioned Report NECR094, Natural England (2012; URL: http://publications.naturalengland.org.uk/publication/1712385)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Geodiversity	Key geological and landform features	The Carboniferous Westphalian sequence of rocks (the Coal Measures). Isolated outcrops of Upper Permian strata. Sequence of Triassic sandstones and siltstones.	Local	Geological sites provide important and often publicly accessible sections allowing the interpretation, understanding and continued research into the geodiversity of the NCA. The urban location enables people to learn about geodiversity in their local area. Manchester owns much of its success to its associated geodiversity. A source of coal, building materials (Triassic sandstones and Carboniferous and glacial clays) and, perhaps most importantly, a source of water; the river system and underlying aquifer have been central to early industrialisation, transport and water supply. Today, geodiversity is a key part of the cultural identity of the NCA and visible as part of the topography, natural and man-made exposures and fabric of the city. The Greater Manchester Local Geodiversity Action Plan has been developed to conserve, protect and enhance the unique geological and geomorphological heritage of Greater Manchester for the future.[27]	Ensure that significant geological and landform features are adequately documented and registered as Regionally Important Geological Sites (RIGS). Maintain and where possible enhance existing rock exposures and natural landforms which make important contributions to an understanding of the origin and geological development of the NCA. There are opportunities to promote the geological interest of the Manchester Conurbation as an educational resource and provide interpretation of the links between geology, history of the landscape and wildlife habitats and their relevance to sustainable development to landowners, industry and the public.	**Geodiversity** **Sense of place / inspiration** **Sense of history**

[27] *Local Geodiversity Action Plan Greater Manchester*, Greater Manchester RIGS Group (URL: www.trafford.gov.uk/environmentandplanning/strategicplanning/localdevelopmentframework/corestrategyexaminationinpublicdocuments/documents/GM-Geo-Diversity-Action-Plan.pdf)

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