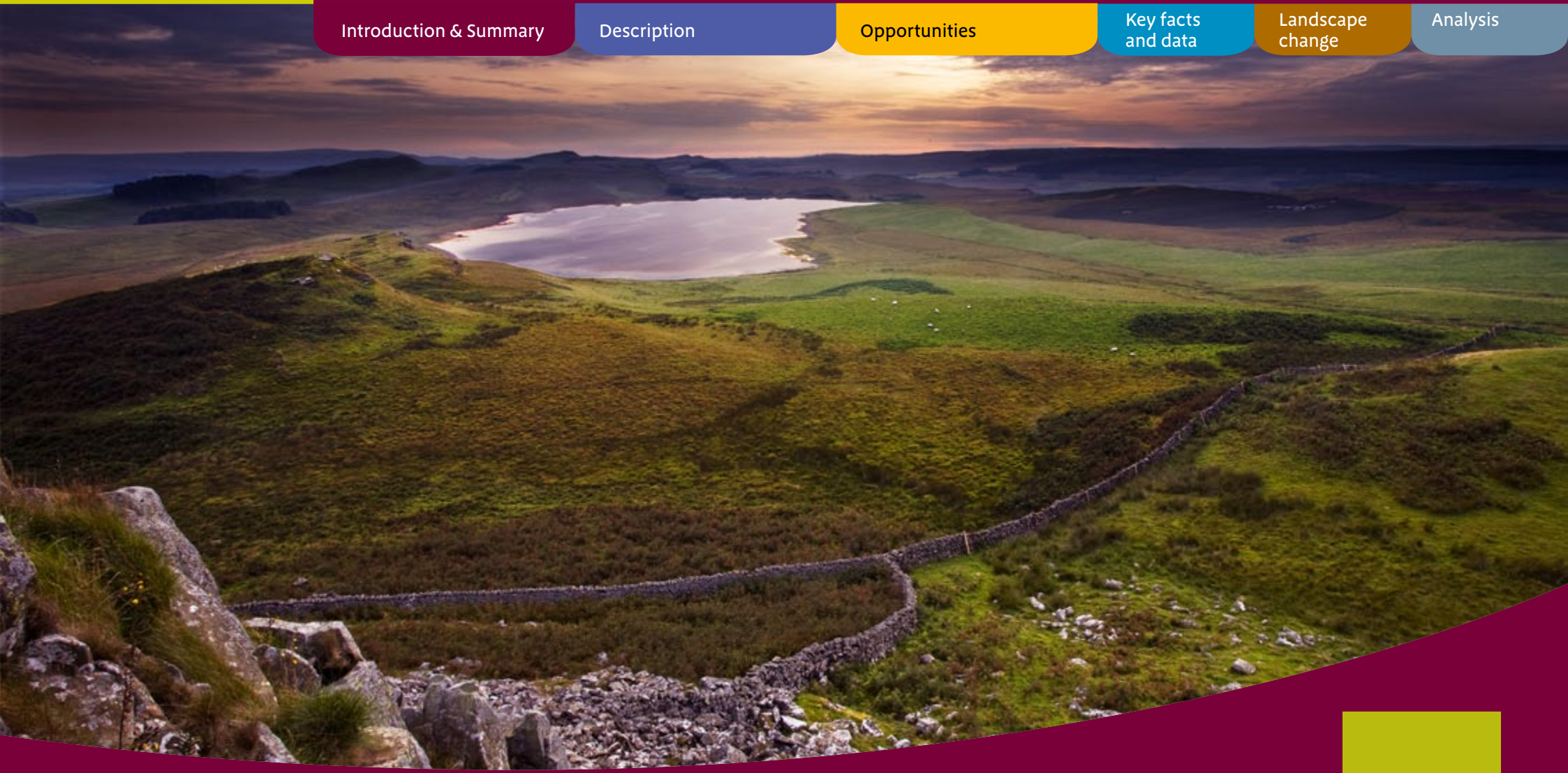
National Character Area profile:

11. Tyne Gap and Hadrian's Wall



NATURAL ENGLAND

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Introduction

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

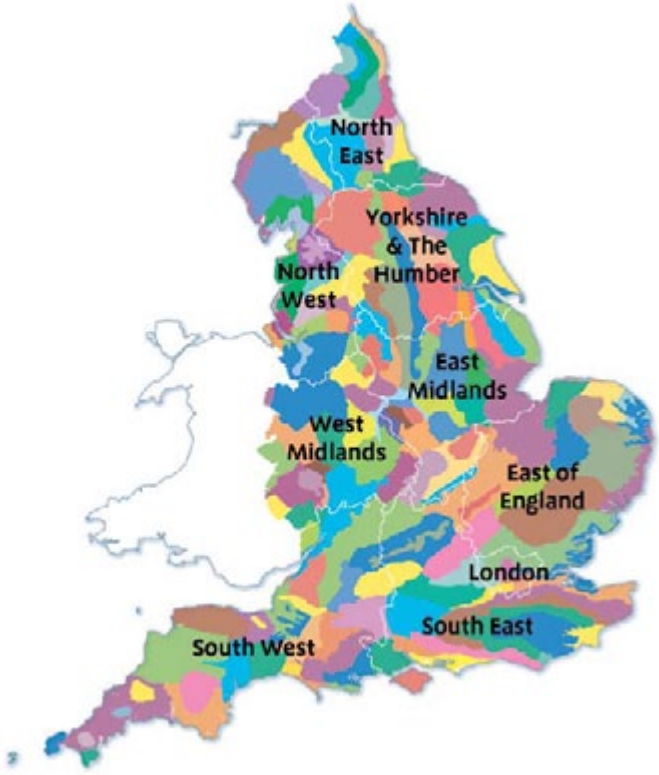
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and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

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

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

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

National Character Areas map



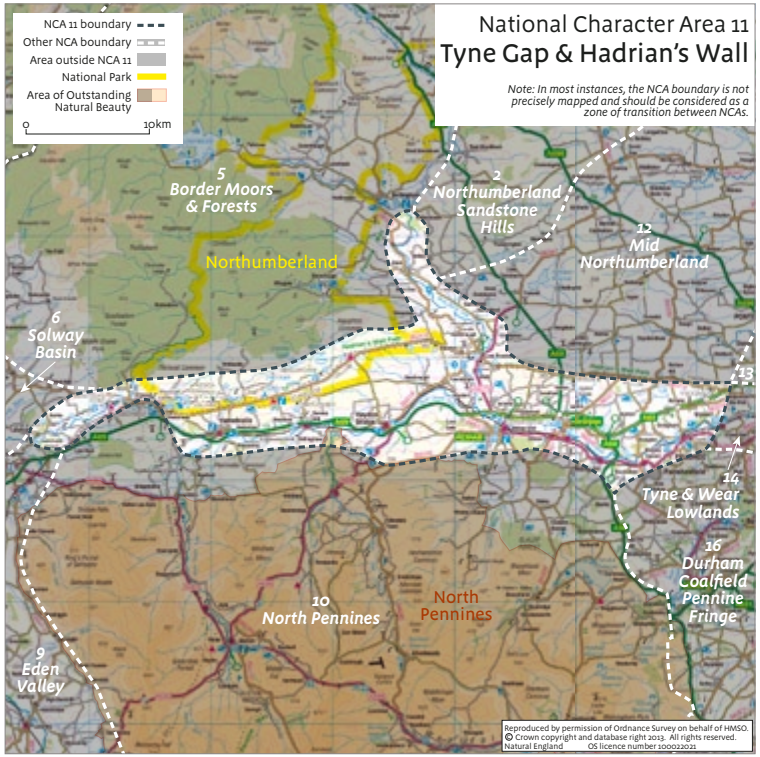
[1] The Natural Choice: Securing the Value of Nature, Defra (2011; URL: www.official-documents.gov.uk/document/cm80/8082/8082.pdf)
[2] Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services, Defra (2011; URL: www.defra.gov.uk/publications/files/pb13583-biodiversity-strategy-2020-111111.pdf)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

Summary

This narrow, distinctive corridor centred on the River Tyne separates the uplands of the North Pennines National Character Area (NCA) from the Border Moors and Forests NCA. Westwards are views of pastoral landscapes of the Solway Basin and Eden Valley NCAs and eastwards a more urban character prevails with views of the conurbation of Newcastle in the Tyne and Wear Lowlands NCA.

The Tyne valley is underlain by sedimentary Carboniferous rocks comprising a repetitive succession of limestones, sandstones, shales and intrusion of horizontal, igneous rock dolerite. Also, the prominent, intruded igneous Whin Sill formation forms a dramatic escarpment on which Hadrian's Wall is built. A mosaic of arable and pasture land, conifer plantations and well-wooded valley sides occur, along with the fertile lowland corridor of the river flood plain. Here, flat, arable fields contrast with the larger-scale upper slopes of valleys. In the west, cattle and sheep graze large areas of rough pasture, divided by walls and fences, merging to mixed and arable land in the east. A well-wooded mosaic of deciduous, mixed and coniferous woodland provides habitat for priority species – red squirrel and woodland birds. Broadleaved woodland on steeper slopes lines the rivers.

The River Tyne and a network of tributaries is a major landscape feature, with the South Tyne flowing west to east and North Tyne flowing north to south and both converging just outside Hexham. The only other watershed is in the west where the River Irthing flows in a westerly direction. These rivers supply drinking water to settlements, including large conurbations in the Tyne and Wear Lowlands NCA. Water levels are maintained by a water transfer system which diverts water from reservoirs in adjoining uplands. Water quality and downstream flooding are issues, occurring during heavy rainfall when water rapidly flows through steep valleys in the uplands carrying sediment load. Sustainable land management measures in the uplands and this NCA are a priority.



At higher elevations, semi-improved, pastoral landscapes covered with rough moorland are associated with the classic cuesta landscape of the Whin Sill and its unusual species-rich grasslands. Hadrian's Wall follows the crest of this imposing ridge. Along with other Roman heritage features, this World Heritage Site is one of the best-known archaeological landscapes in the world. The Tyne valley contains important east–west routes originating from early settlement and Roman roads are still followed today. As a border area, heritage sites include many fortified structures such as castles, bastles and pele towers.

Nearby, natural eutrophic lakes known as 'loughs' occur, designated as a Site of Special Scientific Interest and Special Area of Conservation (SAC) for their rare aquatic plants and associated habitats of heather and mire vegetation. Muckle Moss and Greenlee Lough National Nature Reserves offer recreation and educational opportunities. Near the South Tyne, rare Calaminarian grasslands are designated as an SAC and of national interest for rare plant communities.

A wide range of recreational activities are possible including walking, cycling, horse riding and birdwatching via easily accessible routes – the Hadrian's Wall Path and Pennine Way National Trails – and National Cycle Routes – the Hadrian's Cycleway and the Pennine Cycleway. The River Tyne enables fishing, canoeing and rowing and the NCA is part of the largest Dark Sky Park in Europe, providing opportunities to learn about and enjoy astronomy.

Hadrian's Wall National Trail Path overlooking Broomlee Lough, a natural eutrophic lake protected for its biodiversity interest.

Statements of Environmental Opportunity

- **SEO 1:** Manage and protect the extensive cultural heritage and geology of the area, while providing opportunities for visitors and communities to learn about the connections between the landscape and our past.

- **SEO 2:** Encourage sustainable ways of producing food, while managing rare habitats such as loughs and mires, Whin Sill and Calaminarian grasslands, to reduce the impact of climate change on biodiversity, soils, water and food provision.

- **SEO 3:** Manage and extend broadleaved woodlands and coniferous plantations in the Tyne valleys to strengthen landscape character and enhance biodiversity, while contributing to flood risk management, improving water quality and providing areas of recreation and tranquillity.

- **SEO 4:** Develop sustainable tourism and recreation opportunities while conserving and protecting the cultural, natural heritage and dark skies of the area.

Vindolanda and Stanegate Roman Road.

Description

Physical and functional links to other National Character Areas

Adjoining no fewer than nine other National Character Areas (NCAs), this narrow, distinctive corridor centred on the River Tyne separates the upland landscapes of the North Pennines NCA from the Border Moors and Forests and Northumberland Sandstone Hills NCAs. Between these uplands which lie in the south and north of the NCA respectively, long and uninterrupted views of open moorland impart a sense of space and isolation. Westwards there are views of the pastoral landscapes of the Solway Basin and Eden Valley NCAs and in the east a more lowland and urban character prevails with views of Mid Northumberland NCA and the conurbation of Newcastle in the Tyne and Wear Lowlands NCA.

The River Tyne and its tributaries flow west to east down the valley and are an important source of drinking water for settlements in the NCA and larger conurbations in the Tyne and Wear Lowlands NCA. Water levels are maintained by a water transfer system which captures and diverts water from the adjoining uplands of the North Pennines and Border Moors and Forests NCAs. Downstream flooding and diffuse pollution can occur in the NCA during periods of heavy rainfall when the extensive moorland watersheds capture high volumes of water that rapidly flows through saturated, steep valleys in the uplands gathering a sediment load as it flows. In the west of the NCA, the River Irthing flows from east to west, to join the River Eden which flows into the Solway estuary. Downstream flooding also occurs with the River Irthing affecting the lowlands of the Solway Basin NCA.

River North Tyne overlooking Chesters Roman Fort.

To the north-west of the River Tyne, flood plains give rise to steep valley sides and the classic cuesta landscape associated with Hadrian's Wall country. The higher elevations of the Whin Sill – a distinctive band of igneous rock with dramatic north-facing escarpments – lent themselves to the construction of a major defensive fortification known as Hadrian's Wall. The wall crossed northern England and marked the northern boundary of the Roman Empire in 125 ad. The surviving remains of Hadrian's Wall and associated structures were designated a World Heritage Site in 1987 extending from Newcastle to Bowness-on-Solway. The central section falls within the Northumberland National Park in this NCA, while the western end lies within the Solway Coast Area of Outstanding Natural Beauty. The Hadrian's Wall Path National Trail follows the wall, providing easy access to heritage and designated landscapes.

Important east–west routes have followed the Tyne valley from earliest times. Today the A69 trunk road and a mainline railway run across the Pennines linking Tyne and Wear and Northumberland with Cumbria, and the valley provides a strategic Pennine crossing point for the National Grid's electricity transmission network.

The Tyne Valley provides a strategic Pennine crossing point for the National Grid's electricity transmission network.

Key characteristics

- Narrow, distinctive corridor running east–west, graduating from lowland to upland through a low-lying gap, separating the Borders Moors and Forests NCA in the north from the North Pennines NCA in the south.
- Valleys underlain by sedimentary Carboniferous rocks comprising repetitive successions of tilted limestones, sandstones and shales, together with north-facing escarpments of Whin Sill, forming a cuesta landscape of east–west ridges.

The Whin Sill, forms a cuesta landscape of east-west ridges.

- The River Tyne and its tributaries within a valley of managed flood plains and mixed farmland. Source of potable water for conurbations further east and habitat for freshwater mussels, salmon and trout.
- Well-wooded mosaic of deciduous, mixed and coniferous woodland, broadleaved woodland on steeper slopes lining the rivers and little tree cover in upland areas.
- Fertile, lowland corridor of the river flood plain with flat, arable fields contrasting with larger-scale upper slopes of the valleys. Cattle and sheep graze large areas of rough pasture, divided by stone walls and fences in the west, merging to mixed farming in hedged fields in the east along the Tyne valley.
- Higher elevations to the north with rough grazing on moorland, loughs, raised mire and rushy pastures confined within the Whin Sill outcrops and its associated grasslands and specialised flora.
- Natural waterbodies (loughs) on the ridged plateau provide breeding and wintering areas for wildfowl (whooper swan, goldeneye and wigeon).
- Country estates – Chesters, Haughton Castle, Nunwick Hall, Blenkinsopp Castle and Chipchase Castle – set within parklands of mature trees in the lower valley.
- Extensive archaeology from Roman times: Hadrian's Wall, forts, camps, and roads; other historic features include fortified castles, bastles and pele towers; lime kilns; and evidence of ridge and furrow.
- Villages and towns strategically located along the River Tyne with sandstone buildings and original village centres, dispersed settlements in valley bottoms, with small, nucleated villages and buildings of Millstone Grit. Hamlets or isolated farmsteads on valley flanks.
- Significant transport route with road and rail linking east and west across the Pennines along with the Hadrian's Wall Path and Pennine Way National Trails and the National Cycle Routes, Hadrian's Cycleway and the Pennine Cycleway.

Tyne Gap and Hadrian's Wall today

Centred on the valley of the River Tyne, this is a mosaic of arable and pasture land, conifer plantations and well-wooded valley sides. At higher elevations there are semi-improved pastoral landscapes with open moorland associated with the Whin Sill outcrops.

The South Tyne at Haltwhistle flows from the North Pennine uplands, turning east to flow down the Tyne Gap where it is joined by small tributaries from the south, becoming the Tyne, which flows through Newcastle to the North Sea. The North Tyne flows south-east down from Kielder Forest to join the South Tyne near Hexham. The watershed near Haltwhistle separates the Tyne catchment from the River Irthing, which flows south into the NCA before flowing west to join the River Eden.

The Tyne valley has varied character. In the north-western area between the North Pennines and Border Moors and Forests NCAs, large-scale views impart a sense of remoteness. The north-facing dramatic Whin Sill escarpments define the valley in association with unimproved open moorland and grassland. Cattle and sheep graze large areas of rough pasture, divided by stone walls and fences. Bogs have formed in hollows, and small, open waterbodies known as 'loughs' have high biodiversity value. Isolated stone farmsteads are sheltered by clumps of conifers, and Hadrian's Wall follows the crest of the imposing ridge of the Whin Sill. The consolidated remains of the wall are widely visible between Birdoswald and Housesteads forts, while smaller sections remain elsewhere. Associated ditches including the Vallum are more prominent within the NCA, and the central section of the World Heritage Site falls within the Northumberland National Park. Further south, occasional coniferous shelterbelts contrast with undulating land and improved pasture on south-facing slopes.

The remains of Hadrian's Wall are visible near Housesteads Fort.

In the far west, the River Irthing flows west through a small, contained valley with pastures in the flood plain, arable crops on gentle slopes and broadleaved woodland on small, steep-sided slopes. At the watershed, at Haltwhistle, the River South Tyne turns eastwards along the valley where flat, managed arable fields of the flood plain contrast with a mosaic of semi-improved pasture and deciduous, mixed and coniferous woodland on slopes. In this confined valley, the river flows quickly over rocks between steep-wooded bluffs. Elsewhere, views are limited by horizons that are formed by the upper valley sides.

East of Bardon Mill, there is undulating farmed land on the broad flanks of the Tyne Gap, where fields are generally large and bounded by hedges. There are prominent blocks of coniferous or mixed woodland. The dominance of the A69 road and the Carlisle-to-Newcastle railway along the river corridor are emphasised by rows of trees, hedgerows and overhead power lines. Terraces of houses and industrial buildings have also developed along the route

The rivers North and South Tyne join at Waters Meet near High Warden, where the valley broadens out downstream forming a well-wooded landscape with semi-improved pasture on steeper slopes and arable fields on the valley bottom. Next to the river are managed country estates – Chesters, Haughton Castle, Nunwick Hall, Blenkinsopp Castle and Chipchase Castle – set within parklands of mature trees.

Undulating arable land on the broad flanks of the Tyne Gap, where fields are bounded by hedges and there are prominent blocks of coniferous or mixed woodland.

Around Hexham the valley is larger, with arable fields, intensively grazed pasture in the flood plain, and deciduous woodland and semi-improved pasture on low valley sides. Blocks of commercial conifer plantations to the south-east provide a backcloth to the town. The local economy is boosted by a chipboard manufacturing plant, which is highly visible with its smoking chimney and has considerable influence on the perception of the setting of the town and surrounding landscape. Hexham is also a commuter town for the city of Newcastle.

To the east of Corbridge the valley opens up, with large, arable fields in the flood plain subdivided by thin hedgerows and few hedgerow trees. A small number of active and disused quarries mainly for sand and gravel extraction occur, with some creating local areas devoid of distinctive natural features. The settlements of Prudhoe, Wylam and Heddon are sometimes dwarfed by housing estates and there are occasional long views towards the conurbation of Newcastle.

Several sites, mainly in the northern area, are designated for rare habitats, all of which contribute to tranquillity and wildness. The parallel ridges of the Whin Sill contain bent grasses on the slopes, with conifer shelterbelts and birch. Gorse and rushes are found in poorly drained areas, and acid grassland and heather cover outcrops of sandstone; localised patches of calcareous grassland are associated with the limestone slopes. The open moorlands are dominated by purple moor-grass, pockets of heather, cotton grass and some peatlands and give rise to the extensive views from higher elevations. A group of natural waterbodies north of Hadrian's Wall, known as the Roman Wall Loughs, are designated as a Special Area of Conservation (SAC) and a Site of Special Scientific Interest (SSSI), recognised for their diverse aquatic flora of submerged and emergent vegetation, including pondweeds, stoneworts, shoreweed and

bladderworts. Surrounding the loughs is unimproved grassland, with areas of heather and mire vegetation. Muckle Moss and Greenlee Lough National Nature Reserves offer recreation and educational opportunities. Near the South Tyne, rare riverine Calaminarian grasslands are of national interest and support wetland bird species. Freshwater mussels are found in the Tyne tributaries, and all the rivers provide habitat for mammals and aquatic life.

This is a landscape with limited industrial infrastructure, resulting in the cross-Pennine National Grid power line and chipboard manufacturing plant at Hexham being visually prominent.

Recreation opportunities include walking, cycling, horse riding, canoeing, angling, birdwatching and star gazing. Angling is a significant economic generator for the region, attracting visiting anglers from across the country, and the Tyne supports important fish populations, being one of the best-known rivers in England for salmon, sea trout and brown trout. The skies above Kielder Water and Forest Park and Northumberland National Park are officially recognised as the darkest in England. These areas have been designated by the International Dark-Sky Association as the largest Dark Sky Park in Europe.

Honeypot sites along Hadrian's Wall such as the Roman forts of Housesteads and Birdoswald are easily accessed by the Hadrian's Wall Path and the Pennine Way National Trails and by the Hadrian's Cycleway and the Pennine Cycleway National Cycle Routes. There are also opportunities to promote healthy walking schemes throughout the NCA and in nearby urban areas such as the Tyne and Wear Lowlands NCA.

Heritage contributes strongly to sense of place, with Hadrian's Wall notably inspiring children's literature. Renowned author Rudyard Kipling wrote a series of short stories set in different periods of English history called Puck of Pook's Hill; Hadrian's Wall features in the story of Parnesius, a Roman legionary who defended the wall against the Picts. The Eagle of the Ninth by Rosemary Sutcliff is set in Roman Britain in the 2nd century ad, after the building of Hadrian's Wall. Celebrated Victorian artist John Martin also painted many of the iconic views associated with Hadrian's Wall.

Re-enactment at Chesters Roman Fort.

The landscape through time

The area is underlain by sedimentary rocks of Carboniferous age, which form a succession of limestones, sandstones and shales, deposited in alternating shallow marine to estuarine and deltaic environments. This has given rise to a classic cuesta landscape, with resistant rocks forming striking escarpments that were further accentuated by parallel glacial flow from west to east. The glaciers occurred between 2 million and 12,000 years ago and included the formation of glacial lakes known as loughs, which were scoured out in the softer rocks. They still exist today and provide important freshwater habitats.

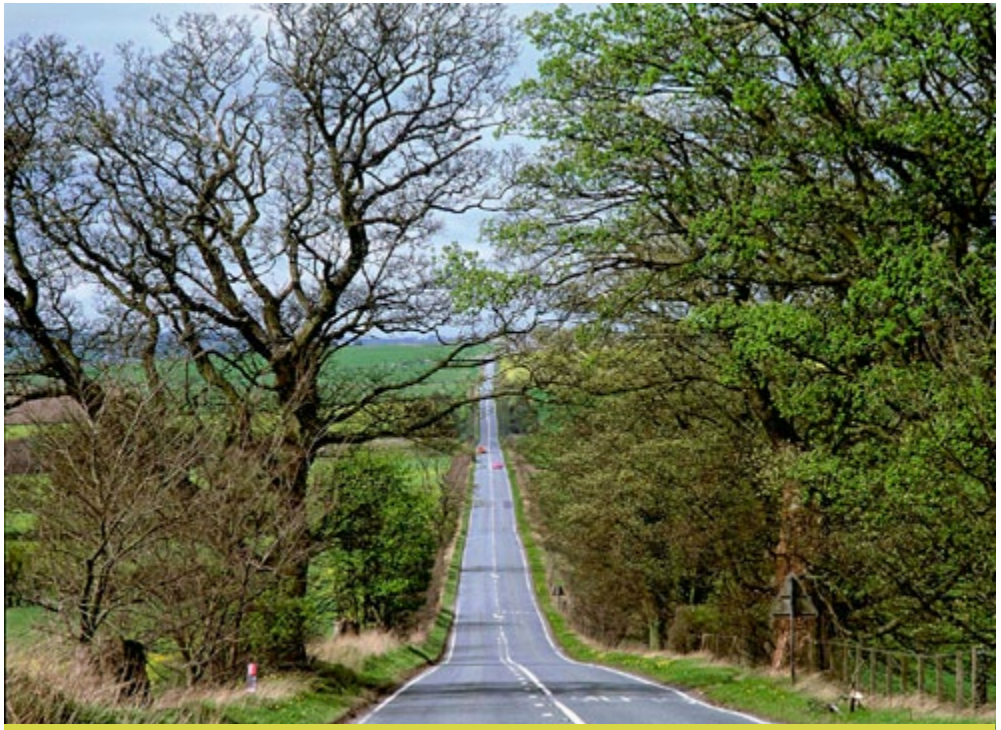
North of the Tyne, the rocks dip southwards, and striking north-facing escarpments are formed by the outcrop of the hard Whin Sill, an igneous dolerite, intruded parallel to the Carboniferous sedimentary rocks. The geological term 'sill' was first used in reference to the Whin Sill. 'Whin' is a quarryman's term for a hard black rock, while 'sill' is the term for any horizontal layer of rock. Hadrian's Wall exploits its natural defences by following Whin Sill's crest, although the wall itself was built from the more easily worked Carboniferous sandstones. The Whin Sill is also designated as a geological SSSI known as the Roman Wall Escarpments SSSI and supports unusual species-rich Whin Sill grasslands. Plants include wild chives, which are rare in Northumberland, and some nationally important waxcap communities.

The more easily eroded shales of the Millstone Grit Series have also influenced the stepped topography of the valley sides, with harder deposits to the north, together with Whin Sill outcrops, giving rise to a moorland landscape. Deposition of other glacial debris (mainly sand and gravel) occurred during the final melting stages, producing terrace deposits along the Tyne Gap. In post-glacial times, wide alluvial flats known as haughs developed in places alongside the River Tyne. Deposition diverted the River South Tyne at Haltwhistle, where it turned east to flow down the Tyne Gap.

Well-preserved section of Hadrian's Wall.

On the North Pennine Orefield, towards the end of the Carboniferous Period (about 290 million years ago), hot mineral-rich waters, heated by the Weardale Granite, cooled as they moved through faults and joints in the Carboniferous rocks. They precipitated out a range of minerals, notably barium such as baryte and witherite, which resulted in lead mining at locations such as the former Settlingstones and Fallowfield mines.

Fieldwork reveals that Mesolithic and Neolithic communities were active, and bronze-age stone circles and burial cairns survive in a wide linear band along the Tyne Gap, together with an iron-age hill fort at Warden, which overlooks the junction of the North and South Tyne valleys. Spectacular remains include Roman forts, camps, roads and Hadrian's Wall itself, which together form one of the world's best-known archaeological landscapes and was designated as a World Heritage Site in 1987. The Tyne valley contains important east–west routes originating from earliest times, and the Roman roads are still followed today.



Military Road (B6318) near Heddon on the Wall.

Much of Hadrian's Wall has disappeared, as the distinctive rectangular stone blocks were used to build many of the farmsteads and properties nearby; in the 18th century the stone blocks were also used for road building, particularly during the Jacobite insurrection such as the one that lies beneath the B6318) today.

As a border area, the NCA suffered intermittent conflict from the 14th to the 16th centuries, and other fortified structures, including bastles and pele towers, were built to withstand border raids. The castles at Blenkinsopp, Langley Featherstone (South Tyne) and Bellister (south of Haltwhistle) are examples of medieval strongholds now used as domestic properties. Pele towers at Willimoteswick, Corbridge, Halton and Stawarde are examples of fortified dwellings. Other notable castles include those at Prudhoe, Thirlwall, Aydon, Dilston and Bywell.

In the more sheltered, fertile parts of the Tyne Gap, south of the wall, the medieval landscape was one of small, nucleated settlements, surrounded by open fields of arable and pasture, beyond which was the extensive 'waste' of the wider countryside.

The 'great rebuilding' followed the end of cross-border warfare in the early 17th century. Agricultural land was improved and large country houses, often incorporating medieval fortified structures, were built and set in designed parklands. The 'corn road' was constructed from Hexham to Alnmouth in the mid 18th century to transport and export grain. In the 19th century the transport network was further developed by the construction of the first coast-to-coast passenger railway in 1838, linking Newcastle to Carlisle. The additional branch lines from Hexham to Allendale and Hexham to Kielder have subsequently closed, leaving historical reminders such as station houses, embankments and railway viaducts in the landscape.

Limestone beds around Thornbrough were mined for lead; indeed, lime kilns that once served the limestone quarries survive in the landscape. Limestone was a valuable material that was burnt in the kilns, with the residue used to improve acid soils and as lime wash for buildings. Near Prudhoe are the chalk waste heaps from an ICI chemical factory that operated until the 1960s, manufacturing ammonia. This area has now formed Northumberland's only chalk grassland habitat and is part of the Tyne Riverside Country Park.

A number of settlements such as Haltwhistle, Corbridge and Riding Mill developed as strategic locations in the valley and bridging points over the Tyne. Corbridge has been an important bridgehead since pre-Roman times and controlled routes across the Tyne which connected with the upland drove roads linking Scotland to northern England. The main town, Hexham, developed under its 7th-century Augustinian abbey, and became an important market town trading in livestock and grain. Today, its core of medieval buildings remains, along with small streets with later Regency and Georgian buildings. Notable buildings include Moot Hall, the Shambles market and the Old Gaol – England's first gaol. The building of Hexham Station in 1835 stimulated the town's development and it is now largely a residential area for commuters to the Newcastle conurbation.

The historic town of Hexham has a core of medieval buildings, small streets,and Regency and Georgian buildings.

Larger settlements along the Tyne are characterised by buildings of soft, warm sandstone within the village centres. Prudhoe, Haydon Bridge, Bardon Mill and Haltwhistle expanded due to coal mining and quarrying, boosted by the arrival of the railway, and now provide retail and commercial services for the local population. Apart from the bridge at Haydon Bridge and the older sandstone buildings forming the original centres, these settlements have a range of building styles and materials and have expanded in the 20th century with areas of housing and light industry.

Away from the valley bottom, settlements are more dispersed and include Ovington, Bywell, Warden, Humshaugh, Barrasford, Wark, Fourstones and Thorngrafton. They have a core of vernacular buildings constructed from Millstone Grit, often with a church, a pub and a substantial manor house or farm. On the flanks of the valleys, hamlets or isolated farmsteads are located at regular intervals, but higher slopes are unpopulated.

Upgrading of the A69 in the past resulted in extensive Whin Sill quarrying at Walltown and Cawfields for road stone. This included the loss of sections of Hadrian's Wall and the creation of distinct quarry faces within the landscape.

Ecosystem services

The Tyne Gap and Hadrian's Wall 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 Tyne Gap and Hadrian's Wall NCA is contained in the 'Analysis' section of this document.

Provisioning services (food, fibre and water supply)

- **Food provision:** Half of the agricultural land is Grade 3, and 7 per cent is Grade 2; most farming is pastoral, with sheep and cattle grazing. This occurs mainly in the north and western upland areas, while further east farming becomes mixed to largely arable in the flood plain. The remaining 41 per cent of Grade 4 and 5 land lies mostly on the higher ground and comprises the open moorland used for sheep farming. The extensive archaeological remains limit some agricultural practices, particularly in the northern parts. There is support for celebrating and promoting local produce.

- **Water availability:** There are no major aquifers, and surface water resources are categorised as 'water available'. Water abstracted from the Tyne catchment is mainly for public water supply. Major users are settlements in the NCA and the larger conurbations of Newcastle and Gateshead in the Tyne and Wear Lowlands NCA. Water reservoirs of the Border Moors and Forests and the North Pennines NCAs provide a potable source of water through a transfer system whereby water is transported down from these reservoirs into this NCA and the Tyne and Wear Lowlands.

- **Genetic diversity:** Farms in the north-west upland area are a stronghold for Whitebred Shorthorn and Blue Grey cattle and for Northumberland Blackface sheep. These breeds are ideally suited to the poor-quality grazing land found in these areas of open moorland. Rearing rare breed livestock conserves the native genetic resource of these hardy animals.

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

- **Climate regulation:** Soil carbon levels are generally low (0–5 per cent), although some areas of deep peat occur in the north-west. Woodland covers 4,415 ha (10.2 per cent) of the NCA. Increasing the extent of woodland in appropriate areas offers the most potential for carbon storage. Extensive grazing regimes should be encouraged, as intensive grazing can both increase the amount of greenhouse gases released through methane and lead to a decrease in soil carbon levels because it damages soil structure.

- **Regulating water quality:** There are no major aquifers or priority catchments in the NCA. In 2003, under the Water Framework Directive, the ecological status or potential of the River Tyne and its tributaries was classified as 'good' but with 'moderate' stretches, while the chemical status of most rivers failed to achieve 'good' status. However, the River Tyne, downstream of where the North and South Tyne tributaries join, was classified as 'good'. The chemical status of groundwater in the NCA was 'poor'.

  Maintaining and improving water quality are particularly important on the River Irthing, which is part of the River Eden SAC. There may be some issues with diffuse pollution, including from old lead mines. Adoption of sustainable land management practices, particularly on adjoining upland areas, and establishing buffers of grassland or woodland along watercourses will help to improve water quality in the NCA.

- **Regulating water flow:** During periods of heavy rainfall, water flows rapidly from the adjacent upland NCAs and causes downstream flooding of settlements along the River Tyne, and to the west in the Solway Basin NCA. Grip blocking on the open moorland and strategic planting of woodland in appropriate places within riparian zones and flood plains can reduce the risk of flooding.

Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration:** The north-western area has distinctive upland features – such as the Whin Sill escarpment, Hadrian's Wall, Whin Sill grasslands, mires and loughs – and panoramic views of designated landscapes, combining to provide a sense of openness, remoteness and escapism. By contrast, the dark-green wall of forestry – prominent in the adjacent Border Moors and Forests NCA – and other deciduous, mixed and coniferous woodland areas add texture, shelter and feelings of enclosure. Wind farms have been developed to the east. Running through the valley, the rivers Tyne, Allen and Irthing show distinctive changes in the landscape, from wild upland streams to wide, meandering rivers. Together with the A69 transport corridor, they have influenced the development of key settlement patterns. The largely unfettered skyline in the NCA is interrupted only by the manmade, vertical structures of the chipboard manufacturing plant at Hexham and the paper mill at Prudhoe.

- **Sense of history:** Extensive heritage sites occur throughout the NCA (above and below ground), from Mesolithic, Neolithic and bronze-age stone circles and burial cairns to Roman forts, camps, roads and Hadrian's Wall World Heritage Site. These combine to create one of the best-known archaeological landscapes in the world, attracting many visitors to the area. Regular conflicts occurred in this border area from the 14th to the 16th centuries and a range of other fortified structures also survive, such as castles, bastles and pele towers. Honeypot sites include Hadrian's Wall, Roman fortifications such as Vindolanda and Housesteads, and the historic town of Hexham.

In the north-western area, large-scale views impart a sense of remoteness overlooking open moorland and loughs.

- **Tranquillity:** This is a very tranquil area, particularly in the north-west, away from main settlements, where striking natural and heritage features occur in an open, expansive landscape. Tranquillity decreases during high season, when visitor numbers are high, and around larger settlements such as Hexham, Prudhoe and Haltwhistle and along the A69 transport corridor. The skies in Northumberland National Park, which includes this NCA, have been awarded 'Dark Sky Status' by the International Dark-Sky Association.

- **Recreation:** There are many opportunities for recreation and tourism via easily accessible routes, mainly National Trails and cycle ways, including the Hadrian's Wall Path, the Pennine Way, the Hadrian's Cycleway and the Pennine Cycleway. In addition to rowing and canoeing opportunities, the River Tyne is good for fishing, being one of the best rivers in England for salmon, sea trout and brown trout. The Tyne salmon fishery is worth in excess of £1 million per year to the local economy.

  Visitor attractions include those associated with historic features/sites (largely Roman and medieval) and the natural environment (Local and National Nature Reserves), all of which are well managed. There are also opportunities to encourage local communities and nearby urban populations to engage in Walking for Health schemes to improve their health and wellbeing.

Designated, a Dark Sky Park, stargazing is among the many recreational activities provided by the NCA.

- **Biodiversity:** A range of tree species occur in broadleaved woodlands (including 1,072 ha of ancient woodland), providing habitat for woodland birds and red squirrels. Rushy pastures occur on land around settlements, lower hills and valley bottoms. Many designated sites are located in the upland areas, including the Whin Sill grasslands (SSSI) and blanket bog and mires (SSSI and SAC) that support species of raptors, grouse and waders. The uplands are often surrounded by heather and purple moor-grass.

  Rare habitats include loughs, Calaminarian grasslands and waxcap-rich grasslands. Tributaries of the Tyne support important populations of freshwater mussels, and the Tyne itself supports important fish populations, particularly of salmon and trout. Maintaining biodiversity interest on the designated sites largely involves implementing the correct grazing regimes and scrub management, maintaining water quality and water levels, and controlling non-native plants (Himalayan balsam and Japanese knotweed). Woodland management involves increasing native tree species and the age range of trees, and undertaking thinning and coppicing. Where there are red squirrels, management methods include avoiding clear felling, planting small seed tree species and controlling grey squirrel populations.

- **Geodiversity**: There are seven geological SSSI, some of which are former quarries. The most striking feature is the classic cuesta landscape associated with the Whin Sill, together with a suite of complementary features that occur extensively to the north and south, in association with the outcrops of limestone and sandstone strata. Management generally involves removing scrub and, where appropriate, excavating new sections. Quarrying and woodland planting should be avoided where it is inappropriate. These unique sites offer opportunities for access and interpretation.

Statements of Environmental Opportunity

SEO 1: Manage and protect the extensive cultural heritage and geology of the area, while providing opportunities for visitors and communities to learn about the connections between the landscape and our past.

For example, by:

- Protecting historic heritage features on agricultural land by reversing arable to grassland, carrying out scrub removal on earthworks and monuments and maintaining grasslands with low-density grazing regimes.
- Maintaining exposure of geological features such as the Whin Sill escarpment by periodically clearing vegetation and rock debris and by avoiding forestry, quarrying and other developments that would damage features and obscure rock exposures.
- Encouraging responsible collecting of geological specimens following established geological field codes and guidance, to avoid damaging the geodiversity interest.
- Ensuring that new woodland or forestry proposals do not impact on the geodiversity and cultural heritage and its context within the landscape.
- Working with landowners and farmers on sites of historical and geological interest to increase and manage access to these sites.
- Developing a series of themed interpretation about geodiversity, including the cuesta landscape, the Whin Sill intrusions, Tipalt Burn fossils and the geomorphology of the river gravels.
- Developing visitor facilities in appropriate areas to inspire people and change the way in which they understand, access and enjoy unspoilt natural and cultural landscapes.
- Developing interpretation of built historic features, notably the Roman archaeology and the use of local stone in farmsteads and other vernacular architecture within settlements, including the defensive fortified structures.
- Promoting the opportunity for school trips and other visits to archaeological sites, to improve people's understanding and enjoyment of the many heritage sites throughout the National Character Area (NCA).

Fort granaries, Corbridge.

SEO 2: Encourage sustainable ways of producing food, while managing rare habitats such as loughs and mires, Whin Sill and Calaminarian grasslands, to reduce the impact of climate change on biodiversity, soils, water and food provision.

For example, by:

- Protecting and conserving vulnerable soils from compaction and capping by working with farmers and landowners to encourage light grazing regimes and thereby reduce poaching.
- Ensuring that animal feeding areas and storage of nutrients and manure are carefully placed, to avoid polluting watercourses.
- Establishing and maintaining buffers of permanent grassland, scrub and woodland along watercourses to reduce sediment and nutrient run-off; creating links between other semi-natural habitats; and re-connecting rivers with their flood plain, to enhance biodiversity.
- Establishing areas of permanent or semi-natural grassland without cultivation, to build up soil carbon levels and improve soil structure.
- Maintaining and creating semi-natural habitats that contribute to carbon storage. Build resilient habitat networks by creating more broadleaved woodlands, linking existing fragmented woodlands where possible, and by planting more trees along watercourses.
- Managing the existing species-rich hay meadows and pastures within the valleys, and seeking opportunities to increase the areas of semi-natural grassland, in particular alongside Hadrian's Wall.
- Maintaining and enhancing a mosaic of moorland habitats, including wet heath and mire and bogs, in upland heathland areas to the north and to the south, next to the North Pennine Moors Special Protection Area (SPA).
- Encouraging landowners and farmers to manage pastures and rough grazing close to the North Pennines SPA to create varied swards and rushy pastures, thereby providing feeding areas for waders.
- Working with farmers and landowners in adjoining upland areas to reduce the rate of run-off by for example creating leaky dams in appropriate areas.
- Promoting sustainable moorland management to encourage good vegetative growth, such as managing grazing levels and grip blocking, to preserve peat, reduce erosion and improve the biodiversity interest.
- Working with the Environment Agency to ensure that river water levels are maintained through water transfer networks.
- Encouraging sustainable farming practices, particularly on arable land such as uncropped field margins, and planting pollen and nectar mixes that will increase habitat connectivity.
- Supporting the marketing and retail of local produce through enhanced take-up by local retailers, events and initiatives such as food and drink fairs in more settlements throughout the NCA.
- Controlling the spread of invasive species (Himalayan balsam, Japanese knotweed and giant hogweed) along river corridors, particularly the Tyne and Allen River Gravels Special Area of Conservation, and promote awareness-raising of the impacts of alien species on watercourses by encouraging local voluntary groups to take action.

SEO 3: Manage and extend broadleaved woodlands and coniferous plantations throughout the Tyne valleys to strengthen landscape character and enhance biodiversity, while contributing to flood risk management, improving water quality and providing areas of recreation and tranquillity.

For example, by:

- Managing existing woodlands and seeking opportunities to extend, buffer and link, introducing more native broadleaved species and increasing the age range, to strengthen landscape character, increase tranquillity and improve biodiversity.
- Integrating conifer and mixed plantations into the landscape by improving the outline and shape of plantations so that they respond to local landform and are less obtrusive.
- Creating networks of habitat for pollinators linked to woodland habitats, including field margins, hedgerows, semi-natural grasslands and roadside verges.
- Managing woodlands within defined locations for red squirrels by clear felling and by planting only small seed tree species. Ensure good woodland structures (including understory) by introducing thinning, coppicing and protection of trees from browsing animals to benefit woodland birds.
- Where appropriate, improving access for visitors of all abilities, to enable them to enjoy recreational activities such as birdwatching and wildlife watching. Develop opportunities for (local) people to participate in surveys and the monitoring of woodlands and their species, such as red squirrels and woodland birds.
- Planting broadleaved woodland on valley slopes to improve infiltration of water and to reduce soil erosion and leaching of pollutants into surface water and groundwater.
- Avoiding increasing woodland in areas where there are open, moorland views and important open habitats and geological and heritage sites.
- Promoting woodland walks in local areas throughout the NCA for local communities, nearby urban populations and visitors, including Walking for Health schemes in settlements throughout the Tyne valley.

Introducing more native broadleaved species to woodlands in appropriate places will help strengthen landscape character, increase tranquillity and improve biodiversity.

SEO 4: Develop sustainable tourism and recreation opportunities while conserving and protecting the cultural, natural heritage and dark skies of the area.

For example, by:

- Supporting long-term visitor management plans, especially for the honeypot areas; introducing visitor payback schemes; developing more local produce opportunities; and maintaining programmes of nature-related events and guided walks.
- Continuing to develop accessible routes for people of all abilities and circular routes off Hadrian's Wall, to relieve pressure on the site resulting from high visitor numbers and to offer alternative experiences to visitors.
- Promoting the Countryside Code in areas where there are high visitor numbers, as well as areas of open access.
- Managing the area's recreational infrastructure, including tourism businesses, to accommodate the large numbers of visitors radiating from Hadrian's Wall World Heritage Site.
- Seeking opportunities to encourage local communities and visitors to engage with, learn about and enjoy the natural environment by using Local and National Nature Reserves, where shared learning events and volunteering opportunities are available.
- Seeking opportunities to encourage local communities and visitors to monitor wildlife such as red squirrels and woodland birds throughout the year.
- Developing more local produce opportunities, for example through food and drink festivals in more settlements in the NCA, raising awareness of the connections between a healthy natural environment and sustainable local food production.
- Promoting sustainable angling tourism within the Tyne valley.
- Promoting and delivering visitor development opportunities associated with the Dark Sky Park and ensuring that development does not have a negative impact on light pollution levels.

Walkers using Hadrian's Wall Path National Trail.

Supporting document 1: Key facts and data

Total area: 43,424 ha

1. Landscape and nature conservation designations

In the central portion of the NCA, 6,988 ha (16 per cent of the NCA) falls within the southern boundary of the Northumberland National Park. A small part of the western end of the NCA, 313 ha (<1 per cent of the NCA), falls within the North Pennines Area of Outstanding Natural Beauty (AONB).

Management Plans for the protected landscapes can be found at:

- www.northumberlandnationalpark.org.uk/lookingafter/corporateinformation/npmanagementplan
- www.northpennines.org.uk/Pages/Publications.aspx?CategoryID=14&OrderBy=Title?articleid=14161

Source: Natural England (2011)

1.1 Designated nature conservation sites

The NCA includes the following statutory nature conservation de1signations:

Tier	Designation	Name	Area (ha)	Percentage of NCA
International	n/a	n/a	0	0
European	Special Protection Area (SPA)	North Pennine Moors SPA	165	<1
	Special Area of Conservation (SAC)	Roman Wall Loughs SAC; Border Mires, Kielder-Butterburn SAC; River Eden SAC; North Pennine Moors SAC; Tyne and Allen River Gravels SAC	907	2
National	National Nature Reserve (NNR)	Muckle Moss NNR Green-lee Lough NNR	213	<1
National	Site of Special Scientific Interest (SSSI)	A total of 20 sites wholly or partly within the NCA	2,383	7

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 33 local sites in Tyne Gap and Hadrian's Wall NCA covering 1,223 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 – select 'Designations/Land-Based Designations/Statutory'

1.2 Condition of designated sites

SSSI condition category	Area (ha)	Percentage of SSSI land in category condition
Unfavourable declining	12	<1
Favourable	2,058	86
Unfavourable no change	2	<1
Unfavourable recovering	312	13

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 5 m above sea level to 333 m at Winshield Crags, north of Twice Brewed. The average elevation of the landscape is 143 m.

Source: Natural England (2010)

2.2 Landform and process

This is a distinctive lowland corridor which separates the upland blocks of the North Pennines to the south and the Border Moors and Forests to the north. A number of rivers flow in to join the Tyne which flows from west to east down the valley, while at the west end the River Irthing flows in a westerly direction. The lowland corridor of the river flood plain with its flat, arable fields contrast with the larger scale upper slopes of the valleys. At higher elevations to the north there are rough moorlands associated with the Whin Sill outcrops, which form a series of dramatic and rugged north facing escarpments.

Source: Tyne Gap and Hadrian's Wall Countryside Character Area description

2.3 Bedrock geology

The valleys are underlain by sedimentary Carboniferous rocks which comprise a repetitive succession of limestones, sandstones and shales, with local thin coals and mineral veins. North of the Tyne the rocks dip southwards, where differential weathering has produced a striking landform of sharply dipping escarpments. The hard Whin Sill forms an almost continuous north facing escarpment.

Source: Tyne Gap and Hadrian's Wall Countryside Character Area description

2.4 Superficial deposits

The Tyne Gap is a fault line corridor that has been subjected to river and ice erosion, and is thickly covered with glacial drift of boulder clay, with glacial action resulting in the creation of loughs and drumlins. Deposition of sands and gravels during melting stages produced terrace deposits along the Tyne Gap. In post-glacial times, wide alluvial flats, known as haughs, have developed in places alongside the River Tyne.

Source: Tyne Gap and Hadrian's Wall Countryside Character Area description

2.5 Designated geological sites

Tier	Designation	Number
National	Geological Site of Special Scientific Interest (SSSI)	7
National	Mixed interest SSSI	2
Local	Local Geological Sites	2

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

Almost half of the NCA comprises seasonally wet, acid loamy and clayey soils while the remaining area contains the following soil profile; freely draining slightly acid loamy soils (14 per cent), slightly acid loamy and clayey soils with impeded drainage (11 per cent), freely draining flood plain soils (6 per cent), slowly permeable wet very acid upland soils with a peaty surface (6 per cent), slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (6 per cent), freely draining slightly acid sandy soils (2 per cent), naturally wet very acid sandy and loamy soils (1 per cent), very acid loamy upland soils with a wet peaty surface (1 per cent), and raised bog peat soils (1 per cent).

The more fertile soils are found in the main Tyne valley whereas poorer, thin soils occur on the northern escarpments. More acidic soils are found on the moorland, where there is acid grassland and purple moor grass, while on the drier edge of the mires thin peatland soils have a high mineral content.

Grade 2 agricultural land is found within the Tyne valley, with Grade 4 land on the side slopes and Grade 5 land on the Whin Sill outcrops and other higher land along the north side of the Tyne valley.

Source: National Soil Resources Institute Soilscape Map

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

Agricultural Land Classification	Area (ha)	Percentage of NCA
Grade 1	0	0
Grade 2	3,106	7
Grade 3	21,697	50
Grade 4	10,509	24
Grade 5	7,424	17
Non-agricultural	300	<1
Urban	487	1

Source: Natural England (2010)

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

3. Key waterbodies and catchments

3.1 Major rivers/canals

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

Name	Length in NCA (km)
River South Tyne	29
River North Tyne	25
River Tyne	25
River Irthing	14
Devil's Water	3
River Allen	2
Warks Burn	2
Blacka Burn	1

Source: Natural England (2010)

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

The NCA is part of the watershed for two main catchments; the east-flowing Tyne and its tributaries, the South Tyne, the North Tyne and the Allen, and the west-flowing River Irthing. The River Irthing flows west, through a small,

contained valley. Near the watershed, at Haltwhistle, the River South Tyne flows north and then turns to head eastwards along the valley, joined by the River Allen from the south and the North Tyne from the north, to form the Tyne.

3.2 Water quality

The total area of Nitrate Vulnerable Zone is 2,100 ha, or 5 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 4,415 ha of woodland (10 per cent of the total area), of which 26 per cent (1,072 ha) is ancient woodland.

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

4.2 Distribution and size of woodland and trees in the landscape

Broadleaved woodland occurs on the steeper side slopes of the river valleys, with some conifer plantations and shelterbelts, in particular towards the east end of the valley. Approximately 49 per cent of the woodland cover is on an ancient woodland site with 26 per cent of these sites covered by a Woodland Grant Scheme agreement. There are few hedgerow trees and those that occur are mainly ash, with some sycamore. Parklands with mature trees spaced out in pastures, avenues and woodlands are characteristic of the middle reaches of the Tyne valley.

Source: Tyne Gap and Hadrian's Wall Countryside Character Area description

4.3 Woodland types

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

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

Woodland type	Area (ha)	Percentage of NCA
Broadleaved	2,040	5
Coniferous	1,755	4
Mixed	310	1
Other	310	1

Source: Forestry Commission (2011)

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

Woodland type	Area (ha)	Percentage of NCA
Ancient semi-natural woodland	424	1
Ancient re-planted woodland (PAWS)	647	1

Source: Natural England (2004)

5. Boundary features and patterns

5.1 Boundary features

There is a variety of enclosure patterns, with large, regular fields generally enclosed by drystone walls predominant in the west and on higher land, particularly in the upper reaches of the valleys, and large fields bounded by hedgerows in the middle and eastern reaches of the Tyne valley.

Source:Tyne Gap and Hadrian's Wall Countryside Character Area description; Countryside Quality Counts (2003)

5.2 Field patterns

In the western part of the NCA, and on the upper slopes, drystone walls and hedgerows define the fields. Some of the larger fields are sub-divided by

fences. Within the valleys and further east, hedgerows are more frequent, but with few hedgerow trees.

Source: Tyne Gap and Hadrian's Wall 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

Holdings are predominantly based on grazing livestock (Less Favoured Areas) accounting for 169 holdings (53 per cent) in 2009 (171 in 2000) with only 54 farms involved in cereal production (an increase from 35 between 2000 and 2009).

Source: Agricultural Census, Defra (2010)

6.2 Farm size

Large farms of over 100 ha are the most frequent farm size, accounting for 121 units and 84 per cent of the total farmed area. Much smaller holdings between 5 and 20 ha are the second most frequent farm size comprising 72 holdings (but only 2 per cent of the farmed area). The third most common farm size is those between 20 and 50 ha comprising 48 holdings (4 per cent of the farmed area). Between 2000 and 2009 trends show a slight decrease in numbers of large holdings (over 100 ha) and smaller holdings (5 to 20 ha), and little change to holdings of 20 to 50 ha.

Source: Agricultural Census, Defra (2010)

6.3 Farm ownership

From 2000 to 2009 the total farmed area increased slightly from 35,498 ha to 36,773 ha, while the number of holders decreased from 496 to 464.

2009: Total farm area = 36,773 ha; 19,008 ha owned land
2000: Total farm area = 35,498 ha; 18,229 ha owned land

Source: Agricultural Census, Defra (2010)

6.4 Land use

27,718 ha of the farmed area is grass or uncropped land, which has increased from 27,094 ha in 2000 to 27,718 ha in 2009 (75 per cent of the area). Cereals, oilseeds and stock feed account for 20 per cent of the area, and this increased since 2000, largely due to an increase in stock feeds being grown as cereal crops decreased from 6,047 ha to 5,877 ha in 2009.

Source: Agricultural Census, Defra (2010)

6.5 Livestock numbers

In 2009 there were 143,500 sheep in the NCA a number which had dropped significantly from 187,300 in 2000. In 2009 there were 21,600 cattle and 1,700 pigs.

Source: Agricultural Census, Defra (2010)

6.6 Farm labour

In 2009 the largest number of holdings were managed by principal farmers (464), followed by full-time workers (76) and part-time workers and casual/gang workers, (68 and 64) respectively, with 16 salaried managers. Between 2000 and 2009 the number of principal farmers fell by 32, while full-time workers declined by 47. The numbers of part-time workers and salaried managers have remained almost constant.

Source: Agricultural Census, Defra (2010)

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

7. Key habitats and species

7.1 Habitat distribution/coverage

Upland broadleaved woodlands
Broadleaved woodlands are generally limited to the steep slopes of the river valleys, in particular the North Tyne. Most of the woods comprise both sessile and pedunculate oak but associated species in the upland areas include birch, hazel, mountain ash and bird cherry. In the lower reaches, ash is more common and sycamore a frequent coloniser. Alder is typical of the upland woods on the stream sides.

The range of bird species supported by these woodlands includes dipper, goosander, pied flycatcher, redstart, wood warbler and tree pipit.

Blanket bog or mire
On the higher land mire and bogs form a mantle of peat in wet hollows and over large expanses of the undulating land surface and are fed by rainfall, the dominant vegetation being sphagnum bog mosses, heath species and cloudberry at higher levels.

Wetter mires often occur at lower levels, fed by run-off and water collecting from adjacent hills and rain fall. They are often characterised by heather. On the mires where there are shallower peat deposits that have been managed or disturbed, purple moor grass dominates.

Several upland bird species are supported by blanket bog or mire, notably raptors, grouse and waders and nationally rare invertebrates including flies, spiders and beetles are associated with blanket mire and bog pools.

Heather and grass moorlands
These habitats often occur in combination with the blanket mire and bogs, particularly on the lower hills and on free-draining substrates. Grass moorland swards are usually species-poor and purple moor grass, mat grass, bents and fescues are the dominant grass species. Heather and grass moorland make up a significant proportion of the grazing land for pastoral agriculture.

Rushy pasture
Rushy pasture is important in the NCA, principally for the breeding birds that it supports. It occurs as a mosaic of acid and neutral, wet and dry semi-improved grassland as enclosed land around settlements and farms on the lower hills and in valley bottoms. It is often grazed by cattle and sheep, at varying densities. Characteristic species include bents, fescues and crested dog's tail, with wetter areas containing various sedges, rushes, moor grass and tufted hair grass.

The structure of the sward is attractive to breeding waders including redshank, lapwing, curlew and snipe. If unimproved, and containing areas of wet flushes, rushy pasture supports large invertebrate populations, an important food resource for waders and black grouse chicks.

Roman wall loughs/wetlands
Greenlee and Broomlee loughs form some of the series of natural waterbodies found on the shallowly ridged plateau north of Hadrian's Wall. They are of national importance for their wetland interest, being predominantly open water and characterised by associated habitats including reedswamp, fen and basin mire. They also support aquatic invertebrates and lower plant species, providing breeding and wintering areas for wildfowl such as whooper swan, goldeneye, teal and widgeon.

Whin grassland

The Whin Sill outcrops to the north of the NCA from an intrusion of hard rock, a series of rugged, undulating escarpments. Vegetation on these thin soils supports specialised flora often occurring as a mosaic with species characteristic of calcareous grassland. Some species found on the exposures are long stalked cranesbill, hairy stonecrop and maiden pink.

Rivers

The NCA is characterised by several rivers, notably the Tyne and Irthing that support threatened species such as otter, water vole and freshwater pearl mussel. They show a distinctive zonation from wild upland streams to wide, slow-moving meandering river with abundant aquatic and bankside vegetation.

Source: Border Uplands Natural Area profile

7.2 Priority habitats

The Government's new strategy for biodiversity in England, Biodiversity 2020, replaces the previous Biodiversity Action Plan (BAP) led approach. Priority habitats and species are identified in Biodiversity 2020, but references to BAP priority habitats and species, and previous national targets have been removed. Biodiversity Action Plans remain a useful source of guidance and information. More information about Biodiversity 2020 can be found at; www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/englandsbiodiversitystrategy2011.aspx.

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

Priority habitat	Area (ha)	Percentage of NCA
Broad leaved mixed and yew woodland (broad habitat)	1,705	4
Upland heathland	462	1
Blanket bog	436	1
Reedbed	214	<1
Fen[1]	99	<1
Lowland heathland	87	<1
Lowland calcareous grassland	54	<1
Lowland meadow	40	<1
Upland calcareous grassland	1	<1
Lowland dry acid grassland	n/a	n/a

Source: Natural England (2011)

1. There are known problems with the national reedbed and fen inventories which has led to inflated figures being provided for this habitat. More reliable information on the extent of reedbed and fen habitat types within the Tyne Gap and Hadrian's Wall area is available through the 2010 survey commissioned by Natural England (NVC Survey of Fens and Flushes in Northumberland, Stuart Hedley 2010). Other priority habitats that are known to occur in the NCA, but which are not within national inventories are mesotrophic lakes (found in the Roman Wall Loughs SSSI) and calaminarian grassland (found at Beltingham River Shingle SSSI, Wharmley Riverside SSSI and other locations).

Maps showing locations of priority habitats are available at:

- http://magic.defra.gov.uk – Select 'Habitats and Species/Habitats'

7.3 Key species and assemblages of species

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

8. Settlement and development patterns

8.1 Settlement pattern

A number of large villages and small towns such as Corbridge, and Halwhistle, developed as strategic locations in the valley and as bridging points over the River Tyne. Hexham developed from its 7th-century Augustinian abbey to an important market town, and with the coming of the railway as a commuter settlement for Newcastle. Prudhoe developed rapidly in the late 19th century as a result of the coal mining industry as did Haydon Bridge and Haltwhistle. Settlement is more dispersed away from the valley bottom.

Source: Tyne Gap and Hadrian's Wall Countryside Character Area description; Countryside Quality Counts (2003)

8.2 Main settlements

The largest settlement is Hexham with a total population of 10,682. Some of the other main settlements include; Prudhoe, (10,437), Haltwhistle, (3,811), Corbridge (2,800), Wylam (1,549) and Stocksfield, (3,039). The total estimated population for this NCA (derived from ONS 2001 census data) is: 48,632.

Source: Tyne Gap and Hadrian's Wall Countryside Character Area description; Countryside Quality Counts (2003)

8.3 Local vernacular and building materials

Valley bottom settlements are characterised by stone buildings, built of sandstone. Millstone Grit was used in the dispersed settlements higher up the valley sides. There are a number of fortified castles and farmhouses, known as bastles, some of which are found at Haughton in the North Tyne Valley and Bellister near Haltwhistle.

Source:Tyne Gap and Hadrian's Wall Countryside Character Area description; Countryside Quality Counts (2003)

9. Key historic sites and features

9.1 Origin of historic features

Neolithic farmer-hunters and bronze-age settlers extended settlement, represented by stone circles and burial cairns, that follows a wide linear band along the major communication route of the Tyne Gap. Roman monuments are prominent, such as Hadrian's Wall following the Whin Sill outcrop east to west, and related roads, military camps and domestic settlements. By medieval times much of the area reverted to waste and woodland, leaving some fortified bastles or pele towers along the active road corridor. More settled border conditions encouraged the development of county house estates in the 17th century. Grain export was enabled by the turnpike constructed from Hexham to the coast in the mid 18th century. East-west communications further improved due to the construction of a military road along Hadrian's Wall and, from the mid 19th century the building of the railway. Traditional buildings are characterised by use of local sandstone, but later styles are mixed due to the availability of materials bought by rail. Hexham has a range of Regency and Georgian buildings around the medieval core.

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

9.2 Designated historic assets

This NCA has the following historic designations:

- 2 Registered Parks and Gardens covering 17,107 ha.
- 2 Registered Battlefields covering 80 ha.
- 159 Scheduled Monuments.
- 1,038 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

- Seven per cent of the NCA, 3,195 ha, is classified as being publically accessible. Six per cent of the NCA (2,791 ha) is classified as Registered Common Land / Open Country.
- There are 573 km of public rights of way at a density of 1.3 km per km2.
- There are 3 National Trails within the NCA. Hadrian's Wall path (54 km), Pennine Bridleway (37 km) and the Pennine Way (17 km).

Sources: Natural England (2010)

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

Access designation	Area (ha)	Percentage of NCA
National Trust (accessible all year)	91	<1
Common Land	30	<1
Country Parks	54	<1
CROW Access Land (Section 4 and 16)	2,791	6
CROW Section 15	28	<1
Village Greens	19	<1
Doorstep Greens	2	<1
Forestry Commission Walkers Welcome Grants	66	<1
Local Nature Reserves (LNR)	21	<1
Millennium Greens	<1	<1
Accessible National Nature Reserves (NNR)	213	<1
Agri-environment Scheme Access	<1	<1
Woods for People	<1	<1

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 is a very tranquil area, with the lowest scores for tranquillity found at Hexham, Prudhoe and Haltwhistle and the highest scores applicable to the north-west of the NCA, away from the main settlements and the A69.

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

Tranquillity	Score
Highest value within NCA	124
Lowest value within NCA	-71
Mean value within NCA	6

Sources: CPRE (2006)

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

11.2 Intrusion

The 2007 Intrusion Map (CPRE) shows the extent to which rural landscapes are 'intruded on' from urban development, noise (primarily traffic noise), and other sources of visual and auditory intrusion. This shows that the highest levels of intrusion are found along the A69, the Newcastle to Carlisle rail link and the route of the National Grid high voltage transmission lines. A breakdown of intrusion values for this NCA is detailed in the table over.

Intrusion category	1960s (%)	1990s (%)	2007 (%)	Percentage change (1960s-2007)
Disturbed	14	26	39	25
Undisturbed	86	74	59	-27
Urban	n/a	n/a	2	n/a

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are that disturbance has increased by approximately one third each decade, notably along the main communications corridor and around settlements.

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)
- 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

- Data from Countryside Quality Counts for the period 1999 to 2003 shows the proportion of sites covered by Woodland Grant Scheme Management Agreements increased from 14 per cent to 26 per cent. However, management of broadleaved woodlands, especially ancient semi-natural woodlands and copses require attention. Conifer and mixed plantations are intrusive in some locations, especially on higher ground. Where appropriate, in the National Park area, removal, restructuring or replacement with native broadleaves has occurred.

- As conifer and mixed plantations mature, better integration within the landscape can be achieved by softening outlines and diversifying species composition and structure.

Boundary features

- Data from Countryside Quality Counts for the period 1999 to 2003 showed that only 5 per cent of the estimated boundary length of the NCA had been restored or managed including dry stone walls (19 km), fencing (57 km), hedge management (14 km), hedge planting/restoration (57 km) and restored boundary protection (35 km).

- Data from Natural England (March 2011), showed a large increase from 5 per cent to 20 per cent of the estimated boundary length in restoration under Environmental Stewardship Agreements, covering ditches, hedgerows, stone walls, stone-faced hedgebanks and woodland.

Agriculture

- Livestock production is the predominant agricultural activity in the NCA. Between 2000 and 2009, there was a small decline in numbers of cattle and sheep and numbers of smallholdings reduced by 26 per cent.

- Between 2000 and 2009, there was little change to agricultural land use with grass and uncropped land covering 75 per cent of the farmed area and cereals covering only 16 per cent, while oil seed production increased by 82 per cent to cover 4 per cent of the area.

Settlement and development

- The expansion of dormitory housing on the outskirts of towns and villages continues to be concentrated in the major settlements along A69 such as Hexham, Haydon Bridge and Prudhoe.

- Conversion of traditional farm buildings into dwellings or tourism businesses is occurring.

- The chipboard manufacturing plant at Hexham has seen major expansion in recent years and A69 Haydon Bridge bypass built in 2009.

Semi-natural habitat

- There has been a recent reduction in grazing pressure, in line with national trends, which may improve management of heather moorlands.

- During recent decades, the area of unimproved grasslands, hay meadows, mires and wetlands declined.

Historic features

- In 1918 approximately 9 per cent of the NCA was historic parkland and by 1995 it is estimated that 25 per cent of the 1918 area had been lost.
- In 2003, approximately 7 per cent of the remaining parkland was covered by Historic Parkland Grants with 27 per cent in Environmental Stewardship Agreements.
- In 2003, approximately 81 per cent of historic farm buildings remained unconverted with most being structurally intact.

View towards Prudhoe industrial estate - more typical of settlements in the eastern part of the NCA and close to the conurbation of Newcastle.

Coast and rivers

- In 1995, the biological water quality was predominantly very good, and was enhanced, while the chemical water quality was predominantly excellent and maintained.
- Since the Water Framework Directive was introduced in 2003, data showed that the ecological status or potential of the River Tyne and its tributaries was generally good, but there were stretches of only moderate status (including the River South Tyne downstream of its confluence with the River Allen). The chemical status of much of the rivers North and South Tyne failed to achieve good status. However, the River Tyne downstream of where these tributaries join was good. The chemical status of groundwater in the NCA was poor.[4]
- Water quality failure in the North Tyne is due to concentrations of copper but there are no known anthropogenic sources of copper in the catchment and failure is attributed to natural causes. Water quality, particularly in the South Tyne including some tributaries, notably the rivers Nent and West Allen, is affected by the legacy of historic metal mining. Although lead was mined extensively, the main impact on water quality is due to zinc, which is more mobile (2014).

Minerals

- There are a number of active sand and gravel quarries located in the eastern area. Thornborough near Corbridge is now used to process and stock material.
- Some active Whin Stone quarries occur at Keepers Shield and Barrasford. A few sites have resulted in local landscapes devoid of distinctive natural features. In the longer term, there are plans for some sites to be restored as nature reserves or agricultural land.

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

Drivers of change

Climate change

- Changes in rainfall patterns including more frequent and intense storm events may increase the rate of run-off in the adjoining uplands leading to increased sediment loads and greater risks of surface and fluvial flooding further downstream. This will continue to affect settlements and agricultural land in the NCA and urban populations downstream in the Newcastle conurbation. Groundwater contamination from diffuse pollution may also worsen and this could affect designated biodiversity sites and other semi-natural habitats.

- Important wetland sites may dry up due to increased periods of drought resulting in loss of habitats and landscape features while the frequency and duration of algae blooms may increase.

- There may be impacts on agriculture, for example by affecting the productivity and growing season of grazing pastures.

- Rivers may be sensitive to drought, leading to low flows, poorer water quality and enhanced nutrient and sediment delivery, causing eutrophication.

- An increase in flash flooding can result in increased sediment loads in rivers and can destabilise existing riverine sediments and river banks. There remains a risk from flooding for properties along the Tyne, especially in Haydon Bridge and Corbridge and to the many bridges crossing it including historical structures as at Corbridge and Hexham.

- Purple moor-grass and rushy pastures may suffer from drought and low water tables, leading to loss of some mire species and scrub invasion. Prolonged inundation in winter could cause a shift to true fen or swamp communities. Current species assemblage may also change.

- Heritage features are vulnerable whether below ground, where increased erosion due to frequent stormy weather may expose buried features, or above ground where heritage features may be sensitive to drying out or soils may become eroded.

- Recreational areas including footpaths and habitats may be sensitive to drought leading to drying out of vegetated areas or increased footpath erosion. Where there is increased flooding, damage to footpaths may also occur in waterlogged conditions.

- Extreme weather events such as the prolonged cold spells will continue to cause freeze/thaw damage to exposed archaeological remains and other historic buildings and monuments.

- An increase in lighting could affect dark sky status, but can be addressed by implementing lighting management plans.

Other key drivers

- Improvements in upland land management practices upstream, in the North Pennines and Border Moors and Forests NCAs, may help to reduce flood risk and rate of run-off.

- There may be opportunities for developing green tourism and voluntary visitor payback schemes in the area to ensure that tourism has a net positive impact on the local environment and economy.

- Former mining activities pose a threat to water quality.

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.

Quarries, like this one at Cawfields, have provided distinctive quarry faces in the landscape.

Statement of Environmental Opportunity	Ecosystem service: Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place / Inspiration	Sense of history	Tranquillity	Recreation	Biodiversity	Geodiversity
SEO 1: Manage and protect the extensive cultural heritage and geology of the area, while providing opportunities for visitors and communities to learn about the connections between the landscape and our past.	↘ **	↓ ***	↔ ***	↔ ***	↓ ***	↔ ***	↔ ***	↔ ***	↔ ***	↔ ***	↔ ***	↔ ***	n/a	↑ ***	↑ ***	↑ ***	↑ ***	↔ **	↑ ***
SEO 2: Encourage sustainable ways of producing food, while managing rare habitats such as loughs and mires, Whin Sill and Calaminarian grasslands, to reduce the impact of climate change on biodiversity, soils, water and food provision.	↔ ***	↗ **	↑ ***	↗ ***	↗ **	↑ ***	↑ ***	↑ ***	↑ ***	↑ ***	↑ ***	↑ ***	n/a	↗ **	↔ ***	↗ ***	↑ ***	↑ ***	↗ ***
SEO 3: Manage and extend broadleaved woodlands and coniferous plantations in the Tyne valleys to strengthen landscape character and enhance biodiversity, while contributing to flood risk management, improving water quality and providing areas of recreation and tranquillity.	↔ ***	↑ ***	↗ ***	↔ ***	↑ ***	↑ ***	↗ ***	↗ ***	↔ ***	↑ ***	↗ ***	↗ ***	n/a	↑ ***	↗ ***	↗ ***	↑ ***	↑ ***	↔ ***
SEO 4: Provide a wide range of tourism and recreation opportunities while conserving and protecting the cultural, natural heritage and dark skies of the area.	↗ ***	↔ ***	↔ ***	↔ ***	↔ ***	↔ ***	↔ ***	↔ ***	↗ ***	↗ ***	↔ ***	↔ ***	n/a	↑ ***	↑ ***	↑ ***	↑ ***	↗ ***	↗ ***

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

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

Landscape attributes

Landscape attribute	Justification for selection
Tyne valley underlain by sedimentary Carboniferous rocks – a repetitive succession of limestones, sandstones and shales and horizontal, igneous rock dolerite, intrusion.	■ Narrow, distinctive corridor running east-west, graduating from lowland to upland through low-lying gap formed by glacial erosion. ■ Classic cuesta landscape of escarpments and dip slopes of sedimentary rocks, along with igneous intrusions of Whin Sill. ■ The Whin Sill (geological SSSI), creating dramatic ridges in a moorland landscape and providing a defensive site for Hadrian's Wall. ■ Limestones beds around Thornbrough (lead mine) and 19th-century limestone kilns ■ Hadrian's Wall built from Carboniferous Sandstones. ■ Seven sites designated SSSI for their geological interest.
Well-wooded mosaic of deciduous, mixed and coniferous woodland of the Tyne Valley.	■ Good woodland cover (10.2 per cent of the NCA) with varied tree species; broadleaved oak on steep slopes of river valleys, birch, hazel, mountain ash and bird cherry in uplands, ash in the lower reaches and alder in upland woods on stream sides. ■ Significant blocks of coniferous or mixed woodland occurring within the Tyne Gap Habitat potential for red squirrel populations surviving in Northumberland and woodland birds. ■ Opportunities for local wood fuel initiatives where access permits. ■ Country estates containing parklands of mature trees (mainly North Tyne). ■ Ancient woodland covering 1,072 ha.
River Tyne and several tributaries flowing east through the Tyne valley; Irthing flowing out to the west.	■ Rivers as potable water sources supplying settlements in the NCA and Tyne and Wear Lowlands. ■ Varied river character with wild upland streams and wide, slow-moving meandering rivers with abundant bankside vegetation. ■ Provide habitat for wildlife and enhance recreation such as walking, canoeing and angling (River Tyne is England's best salmon fishing river).
Agriculture is mainly rough pasture divided by stone walls and fences in the west merging to mixed and arable land in the east.	■ Pastoral farming covering over 57 per cent of the NCA, 17 per cent arable and 6 per cent mixed (2009). ■ Half of agricultural land classified Grade 3, and 7 per cent as Grade 2 and 41 per cent is Grade 4 and 5. ■ Sheep and cattle grazing in the west and mixed to arable farming further east.

Landscape attribute	Justification for selection
Nationally rare habitats of mires, loughs, blanket bog, Whin Sill and Calaminarian grasslands.	■ Roman Wall Loughs SAC and SSSI containing Loughs (Crag, Broomlee and Greenlee). ■ Associated habitats of Loughs (reedswamp, fen and basin mire) providing breeding and wintering areas for whooper swan, goldeneye and wigeon. ■ Border Mires – Butterburn SAC – one of the least-damaged and species-rich mire complexes in England. ■ Allolee to Walltown SSSI with specialised flora forming part of the Whin Sill grasslands and Waxcap-rich grassland. ■ River Tyne and Allen River Gravels SAC containing structurally varied, species-rich examples of riverine Calaminarian grasslands, rare lichens and fossilised river channel features. ■ Alien species (Japanese knotweed, Himalayan balsam and giant hogweed) affecting Tyne and Allen River Gravels SAC.
Important Roman fortified sites; Hadrian's Wall, Vindolanda, Housesteads and Birdoswald, other features associated with later border conflicts, range of historic settlements and historic parklands.	■ Mesolithic and Neolithic and bronze-age stone circles and burial cairns along the Tyne Gap. ■ Historic remains associated with Roman occupation; forts, camps, roads. Hadrian's Wall (World Heritage Site) and Vindolanda (Roman auxillary fort and Vindolanda tablets), Housesteads and Birdoswald. ■ Border conflicts and associated fortified structures (castles, bastles and pele towers) and construction of Military Roads during the Jacobite rebellion from Newcastle to Carlisle. ■ Hexham market town with 11th-century Hexham Abbey, Moot Hall, the Shambles market, and England's first gaol. ■ Large villages and small towns developed at bridging points on the River Tyne (Wylam, Corbridge, and Riding Mill), characterised by sandstone buildings. ■ Dispersed settlements of small, nucleated villages with core of vernacular buildings constructed from Millstone Grit. ■ Expansion of dormitory housing on the outskirts of towns and villages gives main settlements along the A69 such as Hexham and Prudhoe a more urban character. ■ Parkland landscapes, characteristic of the middle reaches of the Tyne Valley in private ownership.

Landscape attribute	Justification for selection
Easily accessible natural and heritage assets via Hadrian's Wall Path, Pennine Way and Hadrian's and Pennine Cycleways.	■ Public rights of way (573 km), open access land covering 6.4 per cent of the NCA including Hadrian's Wall Path and the Pennine Way National Trails and Hadrian's and Pennine National Cycleways. ■ Visitor attractions include historical features (Roman, Medieval, mining heritage) with some major visitor centres along Hadrian's Wall, and natural environment (Muckle Moss and Greenlee Lough National Nature Reserves). ■ Highly tranquil areas connecting people to the natural environment, contributing to health and wellbeing. ■ Well managed honeypot areas avoiding damage to footpaths and heritage assets. ■ Largely, unfettered skyline contributes strongly to sense of place, only interrupted by the manmade vertical structures of the chipboard manufacturing plant at Hexham and paper mill at Prudhoe.
Lack of light pollution leading to Dark Sky Park status by International Dark-Sky Association.	■ Opportunities for improved astronomical observations and increased tourism opportunities.

Left: There are many fortified structures such as Thirlwell Castle - a remnant of historic conflicts associated with this border area.

Right: 19th-century tower at Birdsowald Fort.

Landscape opportunities

- Manage broadleaved woodlands to ensure their continuation as features in the landscape. enhancing their biodiversity interest by increasing the proportion of native, broadleaved species, softening outlines and integrating conifers with mixed plantations.
- Manage coniferous plantations and other woodlands as habitat for red squirrels and woodland birds.
- Manage the occurrence of tree diseases such as ash dieback Chalara fraxinea, where it may significantly impact on woodland, hedgerow and parkland trees and instigate biosecurity measures where appropriate.
- Increase broadleaved woodland on valley sides, moorland fringes and alongside watercourses to improve water quality and manage flood risk, avoiding important ecological, heritage and geological sites and areas where panoramic views occur.
- Create more areas of semi-natural grassland and hay meadows in upland areas and along Hadrian's Wall, avoiding ecologically sensitive habitats.
- Maintain existing stone walls and field patterns while restoring and creating hedgerows where they are gappy to strengthen wildlife corridors and habitat networks.
- Plan integrated interpretation about the geodiversity, and habitats and associated wildlife of the area including the Whin Sill escarpments and grasslands, limestone kilns and Roman Wall Loughs on Local and National Nature Reserves and heritage sites.
- Protect heritage features on agricultural land by reversing arable to grassland, scrub removal on earthworks/monuments and maintaining grasslands with low-density grazing regimes.
- Protect the heritage of the area by developing and supporting long-term visitor management plans including visitor payback schemes and promotion of the Countryside Code.
- Plan appropriate access for all abilities by maintaining and expanding the public rights of way network and range of recreation opportunities, incorporating links to key geological and historical sites wherever possible, linking to visitor facilities and developing innovative activities to enhance people's access to and enjoyment of the natural environment.
- Protect important geological features such as those of the Whin Sill from woodland planting, quarrying, developments and invasive vegetation.
- Plan to ensure developments respect local settlement patterns, using traditional building materials in the restoration of vernacular buildings and protecting unfettered skylines.
- Ensure that green spaces are sensitively designed to fit with natural features in the surrounding rural areas and with minimal light spill.

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	Soils Water availability Livestock	In 2009, livestock farming (mainly sheep and cattle) covered 57 per cent of the farmed area, while arable covered only 17 per cent and mixed farming 6 per cent. Fifty per cent of agricultural land is Grade 3 and 7 per cent is Grade 2. In the most fertile, flood plain areas, mainly in the east, arable farming occurs, whereas in the west, in the upland areas there is pastoral farming with cattle and sheep grazing.	Regional	Food security could become increasingly important nationally, but there may be limited potential for increasing agricultural activity here due to effects on soils, water quality, biodiversity and heritage features. In order to minimise potential negative impacts on the natural environment, sustainable land management practices should be followed, particularly around key designated biodiversity and geology sites as well as seeking opportunities to create more semi-natural habitats on and around farmland. The extensive archaeology, above and below ground may restrict farming in some areas. A food and drink fair is held in spring in Hexham promoting local produce and the Northumbria Food and Wine Festival is held in Corbridge.	Encourage farmers and landowners to practice sustainable land management through Environmental Stewardship schemes and other opportunities (see Climate Regulation, Soil quality and Biodiversity services). Protect historic features by encouraging agricultural practices such as reversion of arable to grassland where land management threatens the integrity of earthworks/ below-ground archaeology, scrub removal on earthworks/ monuments and maintenance of grasslands with low-density grazing regimes to avoid poaching and compaction. Encourage marketing of local produce, such as through promoting rearing of local breeds, and holding local food and drink events.	**Food provision** **Sense of History** **Regulating water quality** **Regulating water flow** **Biodiversity** **Climate regulation** **Regulating soil erosion** **Regulating soil quality**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Timber provision	Semi-natural broadleaved woodland and conifer plantations Estates and parklands	Forestry Commission data (2012) shows that woodland covers 10.2 per cent of the NCA. A well-wooded mosaic of deciduous, mixed and coniferous woodland, with broadleaved woodland on steeper slopes lining the rivers and little tree cover in upland areas. In the Tyne Gap, significant blocks of coniferous or mixed woodland occur but in the North Tyne valley woodlands are smaller-scale with well-wooded valley floors. The adjoining Border Moors and Forests NCA supplies timber from Kielder Forest including to the chipboard plant near Hexham. The several country estates located in the North Tyne valley contain mature trees in parklands.	Local	There may be scope for increasing woodland cover, especially on valley sides, moorland fringes and alongside watercourses. However, planting of new woodlands should be carefully designed and located. Existing conifer and mixed plantations should be integrated within the landscape to improve their biodiversity interest and reduce their visual impact by softening outlines and introducing more native tree and shrub species, and varying the composition and structure. In areas where important heritage features occur, timber production will be extremely limited or unfeasible. There is a lack of evidence regarding the extent and condition of parkland trees on private estates.	Seek opportunities to increase woodland cover in appropriate areas for timber provision providing that it enhances biodiversity, recreation and landscape character. As conifer and mixed plantations mature, ensure they are better integrated into the landscape, softening outlines and increasing the proportion of native tree species, varying composition and structure. Ensure the design of new conifer and mixed plantations includes a proportion of native, broadleaved species, that conifers are integrated with mixed plantations and a range of ages of tree species are included. Encourage partnership work with the Forestry Commission, English Heritage and the National Park Authority to protect heritage sites and promote good practice when creating new woodlands. Encourage owners of parkland estates to take up Environmental Stewardship schemes to sustainably manage parkland trees.	**Timber provision** **Biodiversity** **Pollination** **Regulating water flow** **Regulating water quality** **Climate regulation** **Regulating soil erosion** **Tranquillity** **Recreation** **Sense of place/ inspiration**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability	Rivers Tyne, South and North Tyne, Irthing and Allen Rainfall Woodland	There are no major aquifers and surface water resources are categorised as 'water available'. Water is abstracted from the Tyne catchment for public water supply. Major users are large settlements of Newcastle and Gateshead further downstream as well as in the NCA. Pastoral farming is extensive in the area and farmers also rely on rainfall for water supply.	Regional	Despite demand for drinking water from large conurbations in the lowlands, water levels are maintained in the River Tyne through a water transfer network. This system moves water down from reservoirs in Derwent Water (North Pennines NCA) and Kielder Water (Border Moors and Forests NCA) supplying the NCA and the Tyne and Wear Lowlands NCA.	Work with and support the Environment Agency in ensuring water levels are maintained through water transfer networks.	**Water availability** **Regulating water flow** **Biodiversity** **Sense of place/ inspiration** **Food provision**
Genetic Diversity	Whitebred Shorthorn Cattle Local and traditional livestock breeds Semi-natural habitats	Farms in the north west upland area are a stronghold for the Whitebred Shorthorn and Blue Grey, rare breed cattle. This is an important area for rearing hardy hill livestock including Northumberland Blackface sheep.	National	The Whitebred Shorthorn is important for breeding, principally to produce blue grey cattle which are ideally suited to the climatic conditions and poor quality grazing land found in areas of open moorland in the area. Other traditional hardy breeds include Northumberland Blackface sheep. Rearing rare breed livestock conserves the native, genetic resource of these hardy livestock. Encouraging the promotion and development of supply chains and markets for high-quality local produce from traditional breeds has the potential to develop a green economy that supports local tourism.	Encourage the continued use of traditional breeds for conservation grazing, including supporting farmers in attempts to capitalise on the environmental/ heritage/genetic value of these breeds. Support farmers in recognising the commercial value of their traditional breeds through local food initiatives for the area, encouraging a green economy that supports local tourism including local food festivals such as 'Field to Fork' event held in Hexham.	**Genetic diversity** **Food provision** **Biodiversity** **Sense of place/ inspiration**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biomass energy	Existing Woodland	Woodland cover over 10.2 per cent of the area. Broadleaved woodland occurs on the steeper side slopes of river valleys with some conifer plantations and shelterbelts, towards the eastern end as well as parklands on private estates which contain mature trees.	Local	There is moderate potential for producing biomass, along with potential for developing markets for woodfuel in the conurbation of Newcastle and to pursue opportunities for local wood fuel initiatives where access permits. The NCA has a generally high potential yield for Short Rotation Coppice (SRC) while potential miscanthus yield is medium across most of the NCA. For information on the potential landscape impacts of biomass plantings within the NCA, refer to the tables on the Natural England website.[5]	Encourage the management of woodland to produce surplus timber as woodfuel and identify and encourage local initiatives. Explore opportunities for developing biomass markets within adjacent urban areas of Newcastle and its conurbation in Tyne and Wear Lowlands NCA.	**Biomass energy** **Timber provision** **Climate regulation**

[5]Refer to the tables on the Natural England website (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	Woodlands Heathland Blanket bog/mire Rushy pasture Grasslands Wetlands	Soil carbon levels are generally low (0-5 per cent), but higher where there is woodland, upland heathland and blanket bog, especially where it is actively developing. There are some areas of deep peat in the north west of the area. In areas under continuous arable cultivation, soils contain less organic matter. Increased greenhouse gases occur where arable farming involves high input fertilisers or where there are high density grazing regimes. The latter increases the release of methane and damage to soil structure caused by poaching (compaction).	Regional	Woodland comprises 4,415 ha (10.2 per cent) of the NCA offering the biggest potential for carbon storage, along with the small areas of upland heathland and blanket bog (covering some 2 per cent of the NCA). Peat formation may be affected by agricultural or forestry drainage work. Matching inputs of fertilisers to need on arable and managed grasslands, thus reducing fertiliser use will help reduce greenhouse gases. Increasing the resilience of habitats like purple moor-grass and rush pastures during periods of drought could prevent loss of mire species, and during prolonged inundation in winter could prevent changes in habitat to fen or swamp. Heritage features may suffer increased erosion or buried features may be exposed above ground. Footpaths may erode quicker due to increased flooding or waterlogging.	Increase the extent of and actively manage existing woodland (see Timber Provision service). Ensure areas of deep peat are not affected by new land management activities. Manage grazing levels and carry out grip blocking to encourage the protection of peat and the active development of peat in areas of blanket bog. Build up soil carbon levels by encouraging increased organic content of the soil by growing green manures or including fallow in rotations on arable land. Establish areas of permanent or semi-natural grassland especially within flood plains and alongside watercourses Establish woodlands along watercourses and on valley slopes to capture carbon, as well as reducing soil erosion and thus diffuse pollution. Adopt low intensity grazing regimes to reduce release of methane and poaching, particularly around watercourses, wetland habitats and heritage sites. Leave areas of permanent grassland around heritage features.	**Climate regulation** **Timber Provision** **Biodiversity** **Regulating water flow** **Regulating water quality** **Regulating soil quality** **Regulating soil erosion** **Pollination** **Food provision** **Sense of place / inspiration** **Recreation**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality	Rivers Tyne, South and North Tyne, Irthing and Allen Loughs Blanket bog/mire Rushy pasture	Since the Water Framework Directive (2003), data shows the ecological status or potential of the River Tyne and its tributaries as generally 'good', but with 'moderate' stretches, particularly River South Tyne downstream of its confluence with the River Allen. The chemical status of most of the rivers North and South Tyne has failed to achieve 'good' status but the River Tyne, downstream of where these tributaries join, has achieved it. However, the chemical status of groundwater in the NCA is' poor'.[6] Failure in the North Tyne is due to concentrations of copper attributed to natural causes. Water quality, in the South Tyne including some tributaries (rivers Nent and West Allen), is affected by the legacy of historic metal mining. The NCA does not overlap any Priority Catchments designated under Defra's ECSFDI, but there are some diffuse pollution issues. The north eastern part of the NCA which borders the South East Northumberland Coastal Plain NCA is identified as a priority area for woodland planting to reduce diffuse pollution. Pollution from non-coal mines occurs in the rivers Allen and Nent which are tributaries of the South Tyne in the North Pennines NCA which flow into this NCA.	Regional	Diffuse pollution arising from rapid run-off in adjoining upland areas may contribute to poor groundwater quality. During heavy rainfall, the sediment load increases which affects water quality and the ecology of the rivers here and downstream in both the Tyne and the Eden catchments. Limestone beds around Thornbrough were mined for lead and continue to pose a threat to water quality. Potential changes to weather patterns may affect freshwater habitats. Reduced river flows as a result of drought may result in increased algae blooms and eutrophication of rivers, loughs and other wetland areas, The projected increase in more frequent and intense rainfall may result in increased flooding; for rivers this will increase the risk of nutrient enhancement as a result of run-off from surrounding fields, increased sediment loading, and the destabilisation of riverine sediments and river banks affecting freshwater habitats. Maintaining and improving water quality is particularly important on the river Irthing, which is part of the Eden catchment SAC. Adopting sustainable management interventions should help reduce diffuse pollution, including sustainable moorland management, reduction of grazing levels on permanent pasture, management of fertiliser input on arable and managed grassland, creating and restoring semi-natural habitats and establishing permanent grassland or woodland buffers adjacent to watercourses.	Promote sustainable moorland management in adjacent upland NCAs to ensure good vegetative cover improving infiltration of rainfall and preventing erosion of peat. Increase the extent of broadleaved woodland on valley slopes to improve infiltration of water, reduce soil erosion and prevent leaching of pollutants into surface water and groundwater. Manage fertiliser inputs on arable and managed grassland so that they match needs as far as possible. Reduce compaction of soils and thus surface run-off from permanent pastures by reducing livestock densities and ensuring animal feeding areas/storage of nutrients/manure are located away from watercourse to avoid poaching leading to sedimentation of the watercourse. Extend areas of semi-natural habitat, particularly riparian buffers along river banks. Support the Environment Agency in partnership work; develop measures to address the impacts of former mining activities on water quality. Support initiatives led by the Environment Agency to ensure that water levels are maintained through water transfer networks.	**Regulating water quality** **Regulating water flow** **Regulating water availability** **Regulating soil erosion** **Biodiversity** **Sense of place/ inspiration** **Sense of history** **Food provision**

[6] *Tyne Catchment Flood Management Plan*, Environment Agency (2009)

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow	Rivers Tyne, South and North Tyne, Irthing and Allen Woodland	The NCA falls mainly within the Tyne Catchment. The headwaters of the River North Tyne lie in the Border Moors and Forests NCA, while those of the River South Tyne lie in the North Pennines NCA. Both drain remote upland moors and mires flowing through narrow, steep valleys often saturated by heavy rainfall which causes downstream flooding. Six areas lying close to the boundary of Tyne Gap and Hadrian's Wall NCA[7] are identified as at risk of flash flooding occurrences. Part of the adjacent North Pennines NCA is accordingly identified as a priority area for woodland planting to reduce downstream flood risk. A short stretch of the River Irthing, (a tributary of the River Eden), flows through the western end of the NCA where downstream flooding sometimes occurs in the lowlands of the Solway Basin NCA.	Regional	Settlements prone to flood risk include Haltwhistle, Haydon Bridge and Hexham, and downstream in Newcastle and Gateshead. In recent years, flooding has also occurred at Corbridge on the River Tyne and low-lying agricultural land. The regional water transfer network helps to maintain water flows for public water supply and to maintain water quality; to some extent this also assists with controlling flood flows. Sustainable moorland management and woodland planting should be encouraged in the adjacent upland NCAs to improve infiltration of rainfall and slow water flows. Harvesting of floodwater by creating 'leaky dams' should be encouraged. These permeable structures built across riverbeds retain flash flood water that has high silt load. Sediment settles behind the dam filtering the water which leaks downstream into the riverbed free of sediment deposits. However, as these structures trap contaminated sediments, periodical de-silting must be implemented as this can exacerbate flood risk and affect fish passages.	Seek opportunities to promote sustainable moorland management in adjacent upland NCAs, ensuring good vegetative cover to improve infiltration and water storage, thereby slow down water flow. Work with farmers and landowners in the upland areas to create leaky dams where appropriate, ensuring regular maintenance regimes are undertaken. Carry out woodland planting on steep valley slopes, adjacent to watercourses and on flood plains, where it can effectively reduce flood water flows.	**Regulating water flow** **Regulating water quality** **Water availability** **Timber provision** **Regulating soil erosion** **Climate Regulation** **Biodiversity** **Food provision**

[7] *Yorkshire & North East England Water for Woodland Project, Phase 1: Opportunity Mapping Final Report*, Samantha Broadmeadow and Tom Nisbet, Forest Research (March 2013)

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil quality	Soils Semi-natural habitats Woodland	Slowly permeable, seasonally wet, acid loamy and clayey soils cover 48 per cent of the area. Slightly acid, loamy and clayey soils with impeded drainage cover 11 per cent of the area and have weaker top soils. The more freely draining, slightly acid, loamy soils cover 14 per cent of the area and allow water infiltration.	Local	Slowly permeable, seasonally wet, acid loamy and clayey soils are easily damaged when wet which may lead to poor water infiltration and diffuse pollution as a result of surface water run-off. These soils are also vulnerable to compaction and capping. Slightly acid, loamy and clayey soils with impeded drainage can easily be poached by livestock and compacted by machinery when wet. Freely draining, slightly acid, loamy soils have the best potential for increasing organic matter, usually through land management interventions and may be valuable for groundwater recharge. Damage to these soils can occur when using heavy machinery, over-stocking (poaching) and poor location of feed or watering points.	Manage grazing levels; ensure animal feeding areas and storage of nutrients/manure are carefully placed to avoid compaction or poaching of soils. Increase organic content of soils by introducing fallow into rotations, or growing green manures, to improve soil quality. Ensure well-timed cultivations (preferably early autumn) and avoid using farm machinery in wet conditions.	**Regulating soil quality** **Regulating soil erosion** **Food provision** **Biodiversity** **Climate regulation** **Regulating water flow** **Regulating water quality**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion	Soils Semi-natural habitats Woodland Hay meadows	The main soil types in this NCA are at low risk of soil erosion, but are easily compacted or capped in wet conditions. The freely draining, slightly acid, loamy soils which cover 14 per cent of the NCA are prone to erosion on steep slopes during storm events; especially where vegetation is removed or where organic matter levels are low after continuous cultivation. There are no priority catchments designated under the England Catchment Sensitive Farming Delivery Initiative.	Local	Soils that are or prone to compaction or capping may be affected by poaching where there are high livestock levels or where stock gather at feeding points or go to rivers for water. Woodland planting on steep-sided valleys can help reduce soil erosion and provide shelter from the wind which improves soil strength and stability. Reducing erosion of these soil types will also reduce diffuse pollution/run-off.	Encourage sustainable land management practices for arable and livestock production. For example, by increasing permanent grassland (particularly on slopes), increasing organic content of soils, avoiding the erosion of banks by livestock by fencing them off and establishing buffers of grass, scrub or trees. Establish broadleaved woodland, particularly on steep valley sides, to improve soil stability, infiltration of rain water and strengthening biodiversity and landscape character.	**Regulating soil erosion** **Regulating soil quality** **Food provision** **Biodiversity** **Climate regulation** **Regulating water quality** **Regulating water flow**
Pollination	Woodland Roadside verges Semi-natural habitats Estates and parklands National and Local Nature Reserves	Managed flood plains of the River Tyne, South Tyne and the farmland of the North Tyne valley offer little invertebrate habitat and there are few hedgerows/hedgerow trees dividing arable land. The NCA contains 4,092 ha of woodland of which 1,072 ha is ancient woodland.	Local	Pollinating insects need a range of semi-natural habitats such as heathland and woodland, as well as species-rich road and track verges which are linear resources that could be linked to other habitats by creating habitat networks. There are potential early nectar sources from areas of broadleaved woodland and hedgerows, and on estates and parkland. There are areas of hay meadow along Hadrian's Wall that could be extended.	Create a network of habitats that provide nectar sources by increasing hedgerows in appropriate areas and creating more broadleaved woodland. Encourage the establishment of species rich uncropped field margins and planting pollen and nectar mixes that will increase habitat connectivity. Carefully time the management of boundary features and roadside verges to extend flowering time. Increase hay meadows to create a network especially along Hadrian's Wall.	**Pollination** **Pest regulation** **Biodiversity** **Timber provision** **Food provision** **Sense of place/ inspiration** **Tranquillity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pest regulation	Semi-natural habitats	A virulent form of Chalara fraxinea is affecting ash trees in several locations in England causing leaf loss and crown dieback and usually leading to tree death. A variety of semi-natural habitats support populations of pest-regulating species (invertebrates, birds and mammals).	Regional	Monitoring the occurrence of ash dieback, where it may have a significant impact on ash woodlands and ash trees (including hedgerows and around villages) should be instigated. There is evidence to suggest that certain habitats such as hedges, flower-rich buffer strips and unimproved grassland can support populations of beneficial predator species of insects. Providing nectar and shelter and opportunities to create and extend them should be sought.	Carry out surveys of ash woodlands and trees to identify locations of ash dieback, and work with landowners and managers to control its spread. Seek opportunities to support pest-regulating species by increasing hedgerows and field margins within farmed land and extending woodlands in appropriate areas.	**Pest regulation** **Biodiversity** **Sense of place/ inspiration** **Pollination** **Food provision** **Sense of place/ inspiration** **Tranquillity** **Semi-natural habitats**
Regulating coastal erosion and flooding	N/A					

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of place/ inspiration	Native, broadleaved, wooded river valleys Conifer blocks Estates and parkland Country parks River Tyne and tributaries River Irthing Pastoral and arable farming Whin Sill outcrops, open moorland and loughs National and Local Nature Reserves Historic market towns and villages Hadrian's Wall and other Roman artefacts **Continued over...**	Prominent features in the north western area include escarpments, dip slopes and igneous intrusions of the Whin Sill, Hadrian's Wall, the Whin Sill grasslands, mires, loughs and panoramic views of designated landscapes; (North Pennines AONB and Northumberland National Park). These natural and cultural features combine to provide a sense of openness, remoteness and escapism. Well-wooded mosaics of deciduous, mixed and coniferous woodland add texture, shelter and a feeling of enclosure in the landscape. In the North Tyne valley, country estates contain mature or veteran trees. Rivers are a key feature running throughout the valley showing distinctive changes in the landscape from wild upland streams to a wide, slow-moving meandering river with abundant bankside vegetation. The main A69 transport corridor and the river Tyne have influenced the location of larger settlement such as Wylam, Corbridge, and Riding Mill, located at bridging points on the river and along the main railway line. Further east, closer to the conurbation of Newcastle, towns such as Hexham and Prudhoe have a more urban character, due to the growth of housing and trading estates and their role as commuter towns. On the valley flanks, settlements are smaller and dispersed.	National	The crest of the Whin Sill closely followed by Hadrian's Wall are features in the landscape connecting people with nature and cultural heritage and should be protected and maintained. Opportunities to manage and protect the Whin Sill include reducing invasive vegetation and sample collections and avoiding woodland planting and quarrying. Disturbance and damage to heritage features can be reduced by maintaining low-density grazing regimes around the grasslands that surround them and developing good visitor management plans. Conservation management plans to maintain the biodiversity interest of key habitats; the Whin Sill grasslands, moorland vegetation, loughs and mires should be implemented. Woodland patterns vary from broadleaved on valley slopes to blocks of conifers and shelterbelts further east. They contribute to the landscape character by providing shelter, tranquillity, recreation and a more enclosed feeling in the landscape. In the North Tyne valley, managed landscapes of country estates set within parklands of mature or veteran trees but their condition and management is unknown. The River Tyne, its tributaries and the River Irthing are key landscape features with their associated riparian habitats. These should be appropriately managed along the river network. The rivers should be protected from diffuse pollution by planting trees along water courses in the uplands and in the NCA itself. **Continued over...**	Clear vegetation on some sections of the Whin Sill to maintain exposure of the rock. Avoid over-collection of rock samples, woodland planting and quarrying, which can all damage the geodiversity interest. Implement low intensity grazing regimes around important heritage features and manage habitats for their biodiversity interest Plan integrated interpretation about the geodiversity, heritage, habitats and associated wildlife of the area, maintain dry stone walls and implement visitor management plans. Seek opportunities to manage broadleaved woodlands to ensure their continuation as features within the landscape by integrating conifers with mixed plantations. Reducing the visual impact of blocks of woodland can also be achieved by varying composition and structure, usually by introducing a range of tree species and ages. **Continued over...**	**Sense of place/ inspiration** **Recreation** **Sense of history** **Biodiversity** **Tranquillity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of place/ inspiration continued	**...continued from previous** Fortified castles and pele towers Lime kilns A69 Trunk Road and Newcastle to Carlisle Railway line			**...continued from previous** The larger settlements have retained their historic core, often characterised by stone buildings of warm sandstone and the historic town of Hexham is dominated by blocks of commercial conifer plantations in the south east and a chipboard manufacturing plant is highly visible in the north. Along with other towns in the eastern area, Hexham has expanded. Smaller settlements on the valley flanks have vernacular buildings constructed from Millstone Grit.	**...continued from previous** Extend riparian habitats, to act as buffers along river banks, providing habitats for mammals and contributing visually to sense of place. Ensure developments respect local settlement patterns, and use traditional building materials in the restoration of vernacular buildings. Where developments occur in settlements, green spaces should be sensitively designed to fit with natural features in the surrounding rural areas with minimal light spill.	

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history	Hadrian's Wall World Heritage Site and other Roman forts, camps and roads Fortified castles and pele towers Lime kilns Parklands and country estates Tyne Riverside Country Park	Heritage occurs extensively from Mesolithic, Neolithic and bronze-age stone circles in the Tyne Gap to transport routes originating from earliest times. The strategic location of the NCA lying on the border between England and Scotland resulted in the construction of many fortified structures such as Hadrian's Wall, Vindolanda, Housesteads and medieval pele towers and castles. Most castles have been converted into fortified houses. Many of the aforementioned heritage sites are honeypot areas. Near Bardon Mill, the auxiliary fort of Vindolanda is a Roman Museum famous for the Vindolanda tablets, the oldest surviving handwritten documents in Britain. They contain stories of the daily lives of Romans soldiers and their families. Further east, a range of attractions include; Housesteads Roman Fort, and the Roman town of Corbridge. The historic town of Hexham has a medieval Abbey, Moot Hall, the Shambles market, and the Old Gaol (thought to be England's first gaol). Nucleated settlement patterns of some towns and villages are largely medieval and retain their historic core. The industrial heritage of the NCA includes limestone quarrying and limestone kilns survive in the landscape along with some lead mines. In the North Tyne valley, the managed landscapes of country estates are part of the heritage of managed landscapes and are set within parklands of mature trees, spaced out in pastures, avenues and woodlands.	International	The combination of below and above ground heritage sites, combine to create one of the best known archaeological landscapes in the country which should be protected and sustainably managed. Below-ground archaeological sites should be protected and maintained by implementing appropriate land management practices. There are high visitor numbers in honeypot areas where nationally important heritage sites occur such as Hadrian's Wall. In such areas, appropriate visitor management is crucial. A rolling six year Management Plan is being implemented to manage Hadrian's Wall, including protecting the archaeology, conserving the landscape that surrounds it and promoting understanding and access to the site. This includes a 10-mile buffer zone on either side of the wall. Vindolanda Roman Fort and Museum offers annual excavations allowing people to have hands-on experience of excavating Roman artefacts. The surviving limestone kilns in the landscape could provide interpretation opportunities enabling people to learn how the geology was used to produce products to improve acid soils and provide lime-wash for buildings. Parkland estates should be managed and restored including mature, veteran trees and other historic features that form part of these country estates.	Where land management threatens the integrity of earthworks/below-ground archaeology, work with farmers and landowners to follow practices such as reversion of arable to grassland, scrub removal on earthworks/monuments and maintenance of grasslands using low-density grazing regimes which will reduce poaching and compaction. On key heritage sites, encourage the development and implementation of visitor management plans. Encourage partnership working with a range of organisations, landowners and farmers on sites of historical interest to increase and/or manage access to appropriate heritage sites, providing education and interpretation to increase people's awareness of the heritage of the area. Encourage partnership working with landowners of country estates to encourage sustainable management where needed.	**Sense of history** **Sense of place/ inspiration** **Recreation**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Tranquillity	The Whin Sill outcrops Hadrian's Wall Semi-natural habitats Woodland River Tyne and tributaries Local and National Nature Reserves	This is a very tranquil area, particularly in the north west where there are few settlements. Tranquillity decreases around the larger settlements such as Hexham, Prudhoe and Haltwhistle. Despite tranquil areas, the A69 is a major transport corridor, and tranquillity has decreased since the 1960's dropping from 86 per cent of the area being classified as undisturbed to 59 per cent in 2007 (CPRE Map of Tranquillity). The skies in Northumberland National Park which fall within the northern part of the NCA have been identified as the darkest in England.	Local	Feelings of tranquillity are associated with long, uninterrupted views from points higher up the valley, along the Whin Sill ridge and the line of Hadrian's Wall with the open waterbodies (loughs) present. However, during the peak tourist season, levels of tranquillity are likely to decrease due to large visitors numbers to these areas. Expansion of main towns, particularly in the eastern end of the NCA should be developed by incorporating green spaces to provide tranquil, recreational areas for local residents. The area has been awarded 'Dark Sky Status' by the International Dark-Sky Association providing the opportunity for people to enjoy the night sky.	Implement good visitor management plans in honeypot areas to manage visitor numbers. Ensure new developments close to undisturbed areas are sensitively designed, minimising light spill and of sympathetic, visual design incorporating areas of green space.	**Tranquillity** **Sense of place/ inspiration** **Recreation** **Biodiversity** **Geodiversity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation	Network of public rights of way, National Trails, National Cycle Routes Well-wooded, steep sided valleys. River Tyne, River Irthing and their tributaries Hadrian's Wall Vindolanda Towns and settlements Local and National Nature Reserves and Country Parks Roman Wall Loughs, Border Mires -Butterburn, North Pennine Moors and Tyne and Allen River Gravels (4 x SAC) **Continued over...**	The public rights of way network totals 573 km at a density of over 1.3 km per km^2. Footpaths, trails, easy access routes and open access land covers 6.4 per cent of the NCA allowing many recreation and tourism experiences including; walking, cycling, horse riding, birdwatching, rock climbing, and visits to well-known heritage sites, historic towns and villages. There are two National Nature Reserves in the north western part of the NCA. In some areas, the network of rivers, offer canoeing, angling and fishing. The River Tyne is one of the best salmon fishing rivers in England and the annual Tyne Tour facilitates Europe's largest mass participation canoeing event. The recent award of 'Dark Sky Status' means the northern area lies within Europe's largest Dark Sky Park, important for having deep, dark skies where millions of stars ,visible in the night sky, offer opportunities for star-gazing.	International	Open Access land in the NCA includes two National Trails and Cycleways; Hadrian's Wall Path (135 km from Wallsend to Bowness-on-Solway), the Pennine Way (431 km from the Peak District to the Cheviots), Hadrian's Cycleway (241 km from Tynemouth to Ravenglass) and the Pennine Cycleway (571 km from Derby to Berwick- upon-Tweed). These National Trails and Cycle Routes are used by many people and should be protected from erosion. Pursuing opportunities to develop more circular routes will divert pressure away from the Trails and increase accessibility for a wide range of users. Key heritage sites include Roman, medieval, and mining heritage and local and National Nature Reserves. The impact of large visitor numbers on sites such as Hadrian's Wall can cause the soils surrounding them to erode, eventually affecting the underlying archaeology. This can be minimised by encouraging walkers to use the National Trails during summer months when soils are generally drier and can withstand heavy footfall. Management of the grassland around Hadrian's Wall as a grass sward enables soil resilience to erosion during winter/wet weather conditions. Muckle Moss and Greenlee Lough National Nature Reserves are located close to Hadrian's Wall and the Whin Sill. They are accessible by public transport and the National Trails running close-by. These natural waterbodies surrounded by mires and reedbeds, offer opportunities for quiet reflection, while connecting people to the natural environment and contributing to health and wellbeing. **Continued over...**	Ensure visitor management plans are renewed, particularly in honey pot areas for the protection of natural and cultural heritage assets. Continue to develop circular and accessible routes for people of all abilities and a range of user groups such as walkers, cyclists and horse riders that will also alleviate pressure on popular routes. Encourage initiatives that encourage visitors to use popular trails during drier, summer months to reduce the risk of footpath and soil erosion. Maintain annual programmes of family-friendly, nature-related events and guided walks on local and National Nature Reserves to enable people to learn more about the natural environment including rare habitats and associated wildlife. Seek opportunities to promote and facilitate star-gazing events.	**Recreation** **Sense of history** **Biodiversity** **Geodiversity** **Regulating water quality** **Regulating water flow** **Water availability** **Tranquillity** **Sense of place/ inspiration**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation continued	**...continued from previous** River Eden SAC North Pennine Moors SPA SSSI and NNRs Whin grassland Rivers LNRs Tyne Riverside Country Park			**...continued from previous** Water based activities play an important part in the local economy and sustainable management of the waterways is essential to ensure its continuation, while protecting aquatic flora and fauna and managing water quality. The award of 'Dark Sky Status' in the northern part of the NCA should result in opportunities to promote star-gazing events and learning about astronomy. There may be opportunities for developing green tourism and voluntary visitor payback schemes in the area to ensure that tourism has a net positive impact on the local environment and economy.		

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity	Mixed broadleaved, and coniferous woodland Country estates and parkland Blanket bog and mires Rushy pasture Upland and lowland heathland Lowland calcareous grassland and lowland meadows	Broadleaved woodland occurs throughout the NCA (oak, birch, hazel, mountain ash, bird cherry and alder), providing habitat for woodland birds such as dipper, pied flycatcher, wood warbler and tree pipit. Coniferous plantations and some broadleaved woodland also support populations of red squirrel. Mature specimen broadleaved trees, such as lime and beech, are set within pastures of parkland estates in the North Tyne valley. Rushy pasture occurs as a mosaic of acid, neutral, wet and dry, semi-improved grassland on land around settlements and farms, lower hills and in valley bottoms. They also provide habitat for breeding waders (redshank, lapwing, curlew and snipe). In the upland areas, the Whin Sill outcrops support specialised flora including a species of calcareous grassland known as the Whin Sill grasslands, (designated as part of the Allolee to Walltown SSSI). Heather and purple moor-grass occur in combination with the blanket bog and mires on higher land providing habitat for upland bird species such as raptors, grouse and waders. The Border Mires – Butterburn SAC (south of Hadrian's Wall), once formed the largest continuous tract of Blanket bogs across northern England and are fed by rainfall. At lower levels, wetter mires occur, also fed by rainfall and water collecting from adjacent hills. **Continued over...**	International	The biodiversity interest of broadleaved woodlands may be achieved by increasing the proportion of native tree species and varying composition and structure along with management for birds. Management of conifer plantations can provide good habitat and food sources for red squirrels, a species which is now extinct in most parts of England but survive in parts of Northumberland. Threats include the non-native species of grey squirrel. There are opportunities for local people to survey and monitor red squirrels. Protecting and enhancing the quality of ancient, semi natural woodlands and mature trees on country estates will ensure their long term survival, while retaining biodiversity and historic interest. However, their condition is largely unknown. Maintaining a varied sward structure of rushy pasture to benefit wading birds is achieved by grazing cattle and sheep at varying densities. Unimproved grasslands with areas of wet flushes and rushy pastures support large invertebrate populations, an important food source for waders. Such management is particularly relevant along the border south of Haltwhistle and Haydon Bridge on land adjacent to the North Pennines SPA. To maintain a species-rich sward on the Whin Sill grasslands, appropriate grazing levels to should be employed. **Continued over...**	Seek opportunities to enhance the biodiversity value of broadleaved woodlands by increasing the number of native species and age range of trees and ensuring good vegetation structure by undertaking thinning and coppicing. Manage woodlands for red squirrels by avoiding clear felling and planting only small seed tree species within defined locations and controlling grey squirrel populations. Encourage local community groups to record and report wildlife sightings of priority species. Protect and enhance the quality of ancient, semi-natural woodland and mature trees on country estates through agri-environment schemes including ensuring young trees replace over mature-stock, thinning and coppicing and protection from browsing livestock or wild animals. Encourage landowners and farmers to manage pastures and rough grazing close to the North Pennines SPA to create varied swards and rushy pastures to provide feeding areas for waders. **Continued over...**	**Biodiversity** **Sense of place/ inspiration** **Geodiversity** **Recreation** **Tranquillity** **Sense of history** **Food provision** **Regulating water quality** **Regulating water flow** **Water availability** **Climate Regulation** **Regulating soil erosion** **Regulating soil quality**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity continued		**...continued from previous** Rare habitats carry several overlapping national and international designations. The Roman Wall Loughs SAC and SSSI, north of Hadrian's Wall, comprise Crag, Broomlee and Greenlee Loughs, three natural eutrophic lakes. Of national significance, they are characterised by associated habitats of reedswamp, fen and basin mire which also provide breeding and wintering areas for wildfowl such as whooper swan, goldeneye and wigeon. Greenlee Lough is designated a National Nature Reserve. Rivers are a key biodiversity feature throughout the valley providing habitat for mammals and aquatic life as well as supporting the most extensive, species-rich example of riverine Calaminarian grasslands in the UK in the River Tyne and Allen River Gravels SAC. Chalk waste heaps from a former chemical factory have formed into Northumberland's only chalk grasslands known as the Spetchells. This habitat is part of the Tyne Riverside Country Park.		**...continued from previous** The Border Mires-Butterburn SAC shows transition between blanket bog and raised mire and is one of the least-damaged and species-rich complexes in England where Muckle Moss SSSI is located, which is also a National Nature Reserve. Management of this habitat needs little intervention except to maintain an open site and by preventing tree and scrub invasion. The natural waterbodies or loughs include Greenlee, one of the largest natural freshwater lakes in Northumberland. These loughs contain rare aquatic plant species such as the nationally-rare autumnal water-starwort Opportunities to manage and protect these rare habitats includes maintaining water quality (including groundwater), controlling water levels and maintaining structural diversity of associated habitats. Rare Baltic Bog Moss is found on Muckle Moss NNR, and is only known from 7 sites in the UK. The Tyne and Allen river gravels support Calaminarian grasslands, with sparse vegetation including rare lichens found on highly toxic ground created by mining spoil. The river gravels are also of interest for the series of fossilised river channel features. The river South Tyne, where these Calaminarian grasslands are found, is dynamic, and regularly floods with water coming downstream from the North Pennines. The rivers have abundant bankside vegetation, supporting mammals such as otters and water vole. In the upper reaches where there are small streams, aquatic life such as crayfish and the freshwater mussel can be found. Diffuse pollution from the uplands and invasive, non-native species such as Himalayan balsam and Japanese knotweed are a threat to riparian habitats including the Calaminarian grasslands and are prevalent throughout the Northumbria River Basin District.	**...continued from previous** Prevent pollution of waterbodies and other wetland habitats including the Calaminarian grasslands by encouraging farmers and landowners to carefully locate animal feeding areas and establish buffers along watercourses to reduce sedimentation and nutrient run-off. Encourage control measures to reduce the spread of invasive plant species along river corridors and promote awareness-raising of the impacts of alien plant species by encouraging local community groups to take action.	

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Geodiversity	SSSI including the Roman Wall Escarpments SSSI Tipalt Burn SSSI	Several geological SSSI are located in the NCA, with some being former quarries. Key sites include the Roman Wall Escarpments, a classic cuesta landscape associated with the Whin Sill which also extends into the North Pennines NCA. A suite of complementary features also occur extensively north and south in association with the outcrops of limestone and sandstone strata. The Tipalt Burn has around three kilometres of exposed local strata of the river bed and adjacent crags and scars. The valley shows sections of late Lower Carboniferous marine rocks formed towards the southern edge of the Northumberland Trough. The sequence consists of lower Brigantian-aged Yoredale sediments and the best knoll-reef development in the Yoredale sequences of northern England.	International	The distinctive landform and geology of these SSSI provide opportunities for access and interpretation for visitors and local communities. Maintaining the rock exposures of the Whin Sill escarpment free of vegetation and build-up of rock debris will help maintain this striking geological feature. Tipalt Burn has a rich variety of fossils, including cephalopod molluscs, echinoderms, bryozoans, corals and brachiopods. It is an important site for Dinantian facies and the interpretation of their fauna and palaeogeography. The Tyne and Allen series of fossilised river channel features are important examples of river geomorphology including the Calaminarian grasslands which they support.	To maintain exposure of the geological features of the Whin Sill and Tipalt Burn SSSI, manage relevant sections by periodically clearing vegetation and rock debris. Ensuring new woodland or forestry proposals do not impact upon the geodiversity and cultural heritage and its context within the landscape. Encourage responsible sample collecting including adherence to geological guidelines and field codes. Avoid forestry plantations or quarrying that may impact on the escarpments and developments that would obscure the rock exposures. Encourage access and interpretation of geological sites where appropriate to increase enjoyment and understanding of the distinctive geological resource and its links to historic development and current land uses. Allow the natural river processes to continue in order to maintain important river channel features.	**Geodiversity** **Biodiversity** **Sense of place/ inspiration** **Tranquillity** **Sense of history** **Recreation**

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