National Character Area profile:

13. South East Northumberland Coastal Plain

NATURAL ENGLAND

www.naturalengland.org.uk

Introduction

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

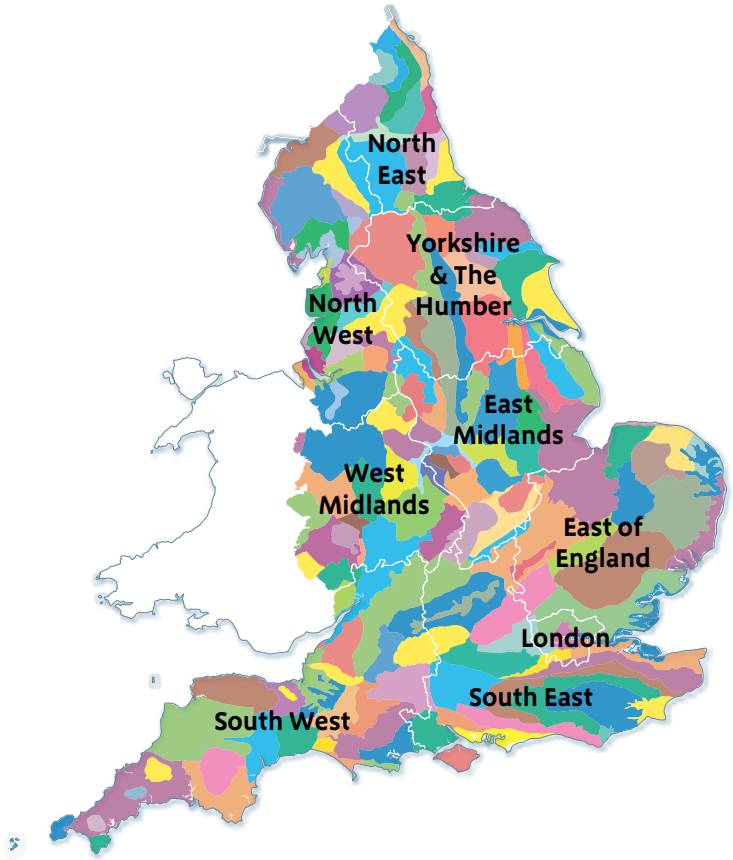
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and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

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

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

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

National Character Areas map



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

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

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

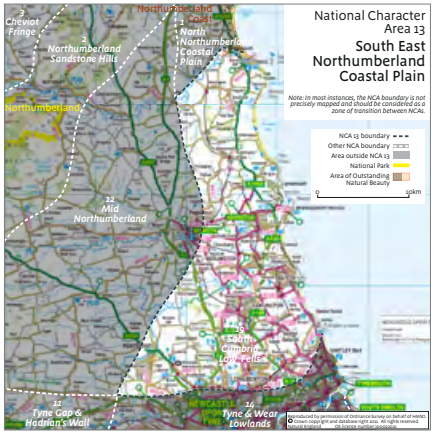
Summary

The South East Northumberland Coastal Plain is a flat, low-lying strip along the coast of the North Sea, extending from north Tyneside in the south to Amble and the Coquet Estuary in the north. It is largely urbanised in the south and more rural to the north, with large fields, restored and active open cast coal mines and a coast of rocky headlands and wide, sandy bays. Rural areas support mixed farming, with fields divided by low, often gappy hedgerows and few trees. The underlying geology has had a significant effect on the character of the area. Its accessible seams of coal which have been mined from the 13th century to the present day are of great economic importance to the area.

The coast supports a wide diversity of habitats including sand dunes, maritime cliffs and slopes, coastal and flood plain grazing marsh and mudflats. Parts of the coast are of European importance for the bird populations (roseate and Arctic tern, purple sandpiper and turnstone) at Druridge Bay and Coquet Island, which are included in the Northumbria Coast Special Protection Area, and for its dune systems and their plant communities, which are part of the North Northumberland Dunes Special Area of Conservation. The area supports a diverse range of marine species and ecosystems as a consequence of its geological diversity and the natural variation in the sediment loading of the water. The rivers Blyth, Wansbeck, Coquet, Pont and Seaton Burn drain through the coastal plain from the uplands to the west into the North Sea to the east, often passing through incised valleys with fragments of ancient woodland. They support rich wildlife, including white-clawed crayfish, otter, water vole and salmonids, and are important for recreation (walking, fishing and wildlife watching), water abstraction and sense of place.

The area is rich in Mesolithic and industrial archaeology and retains many defensive features from both World Wars. The wealth derived from coal in the 18th and 19th centuries enabled the creation of a number of stately homes and designed parklands, which are today important tourist attractions and sites for outdoor recreation. The coast provides opportunities for many land- and water-based activities in a beautiful and inspiring setting, and is a popular tourist destination.

Ecosystem services provided by the National Character Area include food production, water availability, regulating water quality, sense of history and recreation. Food produced by the area consists primarily of arable crops and fish, with a small fishing fleet still operating off the coast, albeit affected by low fish stocks. The major rivers provide water for abstraction, and the watercourses, wetlands and the sea provide an important service in diluting and metabolising pollutants, particularly from water treatment plants, agriculture and mines. Although some restored ex-mining areas lack a historical context, other parts of the area are rich in industrial, wartime and prehistoric archaeology, as well as traditional buildings and field patterns. Recreational opportunities are provided by country parks and historic estates, restoration sites, access network, rivers and the coast, but significant gaps remain in the access network, particularly in terms of bridleways.



Click map to enlarge; click again to reduce.

The coast provides tranquil places and inspiring views, such as here at Bondi Carrs beach.

Statements of Environmental Opportunity

- **SEO 1**: Ensure that mining and development sites are managed and restored so as to minimise pollution and disturbance while contributing to flood alleviation, ecological networks, sense of place and recreational opportunities, particularly alongside Druridge Bay and in growth areas around Ashington, Ellington, Blyth and Cramlington.
- **SEO 2**: Conserve and enhance coastal and estuarine habitats and species, and allow habitats to adapt to coastal change, to improve the coast's value for wildlife, geodiversity, recreation, archaeology and sense of place.
- **SEO 3**: Improve the connectivity and resilience of semi-natural inland habitats, particularly wetlands and native woodland, and enhance the management of agricultural land to deliver benefits for wildlife, climate regulation, water quality, soil quality, food production, sense of place, sense of history and flood alleviation.
- **SEO 4**: Enhance recreational opportunities by addressing key gaps in the access network, such as across major roads and rivers, enhancing public transport, protecting and improving water quality and providing interpretation of key geological and historic sites.

Description

Physical and functional links to other National Character Areas

The River Coquet to the north forms the boundary with the North Northumberland Coastal Plain. It also links the upstream National Character Areas (NCAs) of the Northumberland Sandstone Hills and Cheviot Fringe to the coast. The Northumbria coastal dune system stretches down from North Northumberland into this NCA as do the North Northumberland Heritage Coast and Northumbria Coast Special Protection Area (SPA) and Ramsar site.

Coastal sediment transfer along the coast is from north to south into the area from the North Northumberland Coastal Plain NCA. Wave action produces strong seasonal onshore and offshore sand movement while tidal currents reinforce the general southerly direction of sediment transport in the near-shore environment[4]. Mid Northumberland lies to the west, linked by the easterly flow of the rivers Wansbeck and Blyth. To the south is the Tyne and Wear Lowlands NCA, providing a large potential market for food products, fuel and energy, and demand for recreational opportunities, particularly along the coast.

The coastline is a diverse mixture of broad sandy bays, such as here at Druridge Bay, and rocky headlands and mudflats.

[4] *Eastern Scottish Border to North Bank of the River Tyne Maritime Natural Area Profile,* English Nature (1998) (accessed October 2013; URL: **www.naturalareas.naturalengland.org.uk/Science/natural/profiles/naProfile98.pdf**)

Key characteristics

- A wide, low-lying coastal plain with widespread urban and industrial development, extending north from the urban edge of Newcastle across the coastal plain, with mining towns and villages merging into rural landscape towards the north.
- Sweeping sandy beaches and rocky headlands remain within largely developed coast, along with mudflats and salt marshes in river estuaries.
- Large-scale open cast coal mining sites and restored mine sites which include deep mine spoil heaps. Restoration has created large tracts of simple, relatively featureless agricultural land with strips of plantation.
- Limited woodland cover, confined to prominent blocks of mixed and coniferous woodland on reclaimed colliery sites, with broadleaved woods on steeper valley sides and within estate parkland.
- Large, open arable fields, served by large-scale farmsteads, are interspersed with pastures on the poorer reclaimed soils. Fields are bounded by post-and-wire fences or by low and gappy hedges.
- Frequent areas of open water and wetland in areas of mining subsidence and as features within restored landscapes.
- Major rivers (Blyth, Coquet and Wansbeck) meandering across the landscape from west to east, often flowing through steeply incised wooded river valleys.
- Scattered large country houses with distinctive parkland settings, institutions (a hospital, prisons and colleges), and an extensive urban fringe effect near settlements where pit villages have often merged.

South East Northumberland Coastal Plain today

The South East Northumberland Coastal Plain encompasses the low-lying plain of the Northumberland coalfield. Agricultural land use is evenly split between arable and grassland. Fields tend to be large, fences are frequent and hedges are often small and gappy, with few hedgerow trees. The plain is open, largely treeless and windswept. Broadleaved woodland cover, partly semi-natural, is a feature of the incised river valleys of the Blyth, Wansbeck and Seaton Burn. Blocks of mixed woodland are scattered within farmland and prominently top many former spoil heaps. Plantation woodlands and parkland trees are a feature of country estates such as Gosforth Park, Seaton Delaval and Blagdon.

The North Sea coast is low but varied, with expansive stretches of sandy beach backed by dunes and interspersed with small rocky peninsulas. Undeveloped areas support rare vegetation communities and important bird habitats, including mudflats and salt marshes along the estuaries of the major rivers. To the north, Druridge Bay forms a long sweep of sandy beach backed by mature sand dunes, lakes and wetlands. Druridge Bay is included in the North Northumberland Heritage Coast and Northumbria SPA and Ramsar site designations. Coquet Island is of particular importance for its breeding roseate terns as well as Arctic, common and Sandwich tern and puffin. Other important bird species on the coast include purple sandpiper, turnstone, eider duck, pink-footed goose and whooper swan. More than half of Northumbria's fishing fleet operates from this stretch of coast, mostly from Amble and Blyth.

Inland, semi-natural habitats include fragments of lowland heath, grassland bog and fen, for example at Arcot Hall, Havannah Nature Reserve and Prestwick Carr. Extensive reedbeds are found at Gosforth Park Nature Reserve. There are many other small wetlands and ponds as a result in part of subsidence associated with mining. The area's major rivers support otter,

Subsidence caused by past mining activity gives rise to a number of wetlands and ponds, such as Creswell Pond, which are of great wildlife value.

water vole and white-clawed crayfish. Farmland provides roosts and feeding for golden plover and grey partridge, and breeding sites for lapwing, tree sparrow, corn bunting and yellow wagtail. Areas of post-industrial land have developed significant value for wildlife with species-rich grassland and open mosaic habitats supporting species such as the dingy skipper butterfly.

Restoration of extensive open-cast mining has lead to large tracts of relatively simplified and featureless agricultural land, as found here near Acklington.

In the south, the landscape is dominated by large-scale industry and the urban settlements of Blyth, Ashington, Bedlington and Cramlington, which spread along an extensive web of major roads and railway lines. The built environment provides important habitats for wildlife: gardens and allotments sheltering birds and small mammals, ponds offering refuges for amphibians, and buildings providing roosts for bats and nest sites for birds such as swift, swallow and house martin.

The landscape is much affected by a long history of both open cast and deep pit coal mining. Extensive reclamation works have partially erased the industrial history. Early restoration schemes resulted in large tracts of simplified agricultural landscape and plantations, but more recent schemes have created valuable wildlife habitats and recreational landscapes. The area has both active and planned large-scale open cast coal mines and has one of the highest densities of current and past coal mining activity in the country. Large-scale artificial structures, such as the bauxite hoppers at Blyth, pylons and wind turbines, are frequent features of the landscape.

The area has several popular locations for outdoor recreation, particularly the coast, country parks and stately homes and parklands, all of which are valuable and easily accessible assets for the large population in the south of the NCA. The series of 18 Local Nature Reserves provide important places for people to interact with and learn about nature close to where they live and work, as well as valuable habitats for local wildlife. The coast, especially around Druridge Bay, is very popular for watersports, walking, cycling, horse riding and birdwatching, with boat trips for Coquet Island leaving from the fishing town of Amble. Some ex-mining infrastructure has been converted for recreational use, such as wagon-ways which now form a valuable network of footpaths and cycle routes and restoration sites that are now used as country parks, for example Queen Elizabeth II Country Park.

The landscape through time

The area coincides closely with the limits of the Northumberland Coalfield and is underlain by Coal Measures (mudstones, sandstones and coal seams) of Upper Carboniferous age. The Coal Measures were deposited about 310 million years ago when tropical deltas existed in this part of the world. The coastline is of considerable geological and geomorphological interest and diversity. In the south, between Tynemouth and Lynemouth, cliffs and foreshore expose the most complete sequence of Carboniferous Westphalian rocks in the north east of England.

Boulders known as erratics, originating from the Cheviots, south-west Scotland and the Lake District, were left behind as the ice retreated after the last ice age. A thick layer of boulder clay and till was also deposited, burying pre-glacial valleys and leaving the flat till plain which characterises the present-day landscape. The land uplifted and rivers such as the Wansbeck and Blyth became deepened and incised. Tidal mud has been deposited, and salt marshes have developed along river estuaries. Wind-blown sand forms a long line of dunes along the coast, most notably at Druridge Bay.

The earliest evidence of human settlement in the area comes from Mesolithic sites along the coast, such as Hauxley and Newbiggin-by-the-Sea. Medieval settlement was largely nucleated and related to the arable cultivation of large, open fields across the relatively fertile soils of the coastal plain, with significant settlements at Warkworth, Newbiggin and Widdrington. The medieval layout of roads and building plots within settlements to the north (for example, Warkworth and Widdrington) remains, although border conflict resulted in the destruction and rebuilding of many settlements. Older buildings in the area tend to be built with the local sandstone, with more recent additions, such as the terraced mining villages, being made of brick. The defensive importance of this area against raids from the north is attested to by stone-built churches and defensive tower houses such as Warkworth Castle and Cresswell Tower.

The UK's first offshore wind farm was commissioned at Blyth in 2000.

Extensive reorganisation of the medieval landscape from the 17th century, driven by estates, resulted in intensive grain cultivation, cattle rearing and fattening, and dairy and sheep farming. The large, regular fields were re-ordered as production was centred around large farmsteads, many linked to coal-enriched country estates. During the 18th and 19th centuries there was widespread drainage of land for agriculture, which saw a dramatic reduction in grazing marshes, wetlands, natural streams and open water, and an increase in cultivated land. Along the coast, settlements developed around fishing, salt working and coastal trade.

Coal has been worked in this part of Northumberland since at least the early 13th century, from outcrops or seams on or near the ground surface. For many centuries coal was mined on a relatively small scale for local use, in shallow bell pits which peppered the landscape. During the 18th and 19th centuries, improved technology allowed deeper pits to open up the coalfield, greatly increasing coal production and making it one of the richest coal mining regions in the country. Coal was taken by direct rail and road links from the pitheads to the coast for export, and small fishing villages, such as Blyth, expanded rapidly to handle the new coal export trade.

The coal industry provided a tremendous stimulus to urban development and heavy industry, with the wealth generated by the mines being used to create a number of rural stately homes and designed parklands, such as Gosforth Park, High Gosforth, Seaton Delaval and Blagdon. Mines were accompanied by pithead buildings and new villages, which introduced elements of urban character (brick terraces with slate roofs) into rural landscapes, such as at Ashington. The expansion and growth of both industry and the local population continued throughout the 19th and until the mid 20th centuries, creating a landscape of widespread urban and industrial development. However, in the 1950s and 1960s the decline of deep mining was rapid, leaving a legacy of degraded land and spoil heaps. Many mining artefacts have now been dismantled, though exceptions remain such as Lynemouth pithead baths and Woodhorn Colliery. Many of the spoil heaps have been removed as part of the restoration process of open cast mining, but some remain as a legacy.

The First and Second World Wars left a legacy of defensive structures as the wide beaches were seen as possible invasion sites. Remains include pillboxes, searchlight bases, gun emplacements and long lines of anti-tank blocks. Notable among these are the hidden pillbox within the ruins of the medieval Low Chibburn Preceptory, Blyth Battery and the camouflaged 'cottage' pillbox at Hemscott Hill.

More recently, settlement and infrastructure pressure continues to transform the area around major towns and along stretches of the coast. The 1953 floods were a trigger to build sea defences in order to protect the area from sea-flooding. The character of farmland has been enhanced through agri-environment schemes, and restorations of former mining sites continue to mature. When Northumberland Heritage Coast was designated in 1973, Druridge Bay was excluded as it was felt that the 'natural quality' of the bay had been compromised to too great an extent by mining, heavy industry and associated development. However, by 1995 restoration of industrial sites had improved the landscape to such an extent that the coastline and dunes of Druridge Bay were included in the designation[5]. Wind turbines are an increasingly common feature of the landscape: the first UK offshore wind farm was commissioned at Blyth in 2000.

[5] *Druridge Bay: A Strategy for Management to 2010,* The Druridge Bay Partnership (2006)

Ecosystem services

The South East Northumberland Coastal Plain 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 South East Northumberland Coastal Plain NCA is contained in the 'Analysis' section of this document.

Provisioning services (food, fibre and water supply)

- **Food provision:** This is a mixed farming landscape with arable farming, livestock fattening and dairying. Cereals and oilseed rape are grown within the NCA as are some root crops including potatoes and sugar beet. Fishing fleets operate from Amble Harbour and the Port of Blyth. The provision of local food, particularly fish and seafood, has the potential to play an important role in attracting tourism to the area.

- **Water availability:** The NCA does not overlay any major aquifers. Principal surface water resources within the NCA are the lower reaches of the River Coquet (along the NCA's northern border), the River Wansbeck and the River Blyth, which all form part of the Northumberland Rivers Catchment Abstraction Management Strategy (CAMS) area. The predominant (80 per cent) use of abstracted water is domestic water supply, followed by industrial and commercial (11 per cent). The River Coquet is the greatest source of abstracted water in the CAMS area and the Lower Coquet is the only catchment within the NCA categorised as 'over licensed', all others having 'water available' status.

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

- **Climate regulation:** The soils of the NCA generally have low carbon content (0–5 per cent). In addition, carbon storage is provided by the 3,500 ha of woodland within the NCA (8 per cent of its area) and its underlying humus-rich soils. Carbon storage may also be available from limited areas of other carbon-rich habitats in the NCA where soils have remained undisturbed for a long period, including unimproved grassland, lowland heathland, wetland, and coastal and flood plain grazing marsh. The carbon storage of arable soils could be improved by increasing organic matter content.

- **Regulating water quality:** The ecological status of rivers is judged to be moderate or poor along large stretches of the NCA's main rivers, with the River Wansbeck also failing to achieve good chemical status. The chemical status of groundwater is also poor, but the ecological and chemical quality of coastal waters is good.

- **Regulating coastal flooding and erosion:** The present coastline comprises well-defined and relatively stable bays, backed by dunes or slowly eroding glacial deposits and held by harder headlands or areas of rock exposed over the foreshore. Rates of coastal erosion are relatively low, although more significant coastal change could arise from sea level changes. Particular areas at risk of coastal flooding as a result of coastal erosion and/or sea level rise, with consequent impacts on the natural and human environment, are in the Lynemouth area and in the settlement of Blyth. River flood risk in Warkworth is also influenced by the tide. Coastal habitats are important flood defences in terms of dissipating wave energy.

Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration:** A sense of place is provided by a strong history of mining and reclamation which has resulted in a landscape of industrial and urban character, interspersed with large, regular arable fields and occasional pasture land, prominent blocks of mixed or coniferous woodland on reclaimed spoil heaps, deciduous woodland on steep-sided valleys and within estate parklands, country parks, Local Nature Reserves, local green spaces and institutional establishments. This inland landscape contrasts with rich mudflats, salt marshes, expansive stretches of sandy beaches and dunes, and small rocky peninsulas along the coastline. Feelings of inspiration and escapism are likely to be associated with the expansive views and seascapes along the coast and estuaries, particularly in the less developed areas to the north.

- **Sense of history:** The sense of history is very much influenced by the settlement patterns, building style and infrastructure associated with the mining industry of the 18th and 19th centuries. There are many estates and country houses built using profits from the coal industry, including Gosforth Park, High Gosforth, Seaton Delaval and Blagdon, with exotic specimen trees and plantations, and large institutional buildings in open countryside. Historic character is further influenced by distinctive features such as defensive structures from the First and Second World Wars, and earlier against raids from the north, as well as Mesolithic sites along the coast.

- **Tranquillity:** The NCA has experienced a sharp decline in tranquillity levels since the 1960s, although valuable areas of tranquillity remain around Druridge Bay and west of Widdrington. Characteristics of the landscape that are particularly important in conveying a sense of tranquillity are the semi-natural deciduous woodlands, largely confined to river valleys, mudflats and salt marshes along the River Blyth, and some areas of urban greenspace.

- **Recreation**: The NCA offers a network of rights of way but only limited areas of open access land. There are gaps in the current network, particularly for bridleways, and some footpaths reach dead ends as a result of development or uncrossable rivers. There is good provision for cyclists, with a number of cycle tracks linking some of the main settlements. The main strategic cycling route passing through the area is the Coast and Castles cycle route linking Tynemouth with Berwick-upon-Tweed. Popular recreation sites include: Gosforth Park, the setting for Newcastle racecourse; and seven country parks, for example Queen Elizabeth II Country Park, Druridge Bay, Wansbeck Riverside Park, Ashington and Bedlington. Recreation is further supported by the area's other green spaces, such as Ashington Community Woodland, and urban parks, where people have opportunities to engage with nature close to where they live. The sea is a particular asset for water-based recreation, and there are seven designated bathing waters.

- **Biodiversity**: Coastal and estuarine habitats are of particular biodiversity value and are protected by numerous national and European designations. They support internationally important populations of breeding roseate tern and nationally important populations of a number of species including Arctic tern and Sandwich tern. They are also of international importance for wintering purple sandpiper and turnstone. Wetlands, grasslands, rivers, ponds and small areas of native woodland are also valuable for wildlife. The high proportion of ex mining sites provides many opportunities to create new habitats, particularly grassland, woodland and wetland, thereby strengthening the habitat network and providing movement corridors and new sites for vulnerable species.

Statements of Environmental Opportunity

SEO 1: Ensure that mining and development sites are managed and restored so as to minimise pollution and disturbance while contributing to flood alleviation, ecological networks, sense of place and recreational opportunities, particularly alongside Druridge Bay and in growth areas around Ashington, Ellington, Blyth and Cramlington.

For example, by:

- Ensuring that restoration schemes for ex-mining sites incorporate: a mosaic of habitats that enhance the surrounding habitat network and allow for species movement; high-quality recreational and access opportunities; and measures to help to alleviate potential pollution from mine waters or run-off (such as reedbeds) and contribute to floodwater storage (such as ponds and wetlands).
- Ensuring that restoration and management of post-industrial sites that modifies the soil, hydrology or vegetation of the sites does not cause mobilisation of industrial pollutants, particularly heavy metals.
- Ensuring that new development incorporates green infrastructure that links with open greenspace.
- Ensuring that new developments are built in areas at low risk of riverine or coastal flooding and low risk of coastal erosion.
- Ensuring that new developments include sustainable urban drainage systems, water efficiency features, rainwater harvesting and re-use of grey water, to minimise additional pressure on wastewater treatment works and pollution load to local watercourses, and to reduce surface flooding.
- Seeking opportunities to retrofit sustainable urban drainage systems and water efficiency features into existing developments.
- Encouraging strategic tree-planting within urban and industrial areas and in new developments to shade and cool buildings and public greenspace, slow rainwater run-off and provide wildlife habitat/movement corridors.
- Encouraging consideration of short rotation coppice to screen new development and enhance restored mining sites.
- Exploring opportunities for timber production from woodland planted on restoration sites, where this is compatible with recreation and nature conservation objectives.
- Encouraging use of nectar-rich plant varieties in municipal planting schemes, private gardens and new developments, to support pollinator species.

SEO 2: Conserve and enhance coastal and estuarine habitats and species, and allow habitats to adapt to coastal change, to improve the coast's value for wildlife, geodiversity, recreation, archaeology and sense of place.

For example, by:

- Planning for the effects of coastal change, allowing the operation of natural coastal processes and the creation of new habitats and roll-back of existing habitats as the coast erodes, to maintain and enhance local landscape character and biodiversity and reduce flooding in built up areas.
- Managing the coastal strip and removing artificial barriers so that habitats such as sand dunes and dune grassland have the space to develop inland as the coast erodes.
- Seeking opportunities for the restoration and creation of coastal wetlands, such as salt marshes, ponds and saline lagoons, to deliver benefits for coastal flooding and erosion, as well as biodiversity, water quality, sense of place and recreation.
- Managing vegetated dunes to maintain cover and diversity of plant communities, by securing appropriate grazing regimes and directing public access, thereby minimising erosion, maintaining stability and preserving wildlife interest and flood defence value.
- Working with water companies, farmers, the fishing community, restoration site owners, developers, local residents and industry to minimise diffuse and point source pollution to rivers and the sea, and to reduce the amount of litter washed up and left on the area's beaches.
- Encouraging sustainable use of fisheries resources in terms of catch sizes and catch types so that fish stocks and marine ecosystems are maintained and restored.
- Excavating and recording coastal archaeological sites that are at risk of loss through coastal erosion, and providing interpretation of coastal archaeology, particularly structures from the World Wars and buried bronze-age archaeology.
- Improving public transport links and bridleways linking with the coast to minimise the use of private cars and potential associated issues of disturbance, congestion and air pollution.

Some of the earliest evidence of human settlement can be found at Low Hauxley where Mesolithic remains have been revealed as the coast erodes.

SEO 3: Improve the connectivity and resilience of semi-natural inland habitats, particularly wetlands and native woodland, and enhance the management of agricultural land to deliver benefits for wildlife, climate regulation, water quality, soil quality, food production, sense of place, sense of history and flood alleviation.

For example, by:

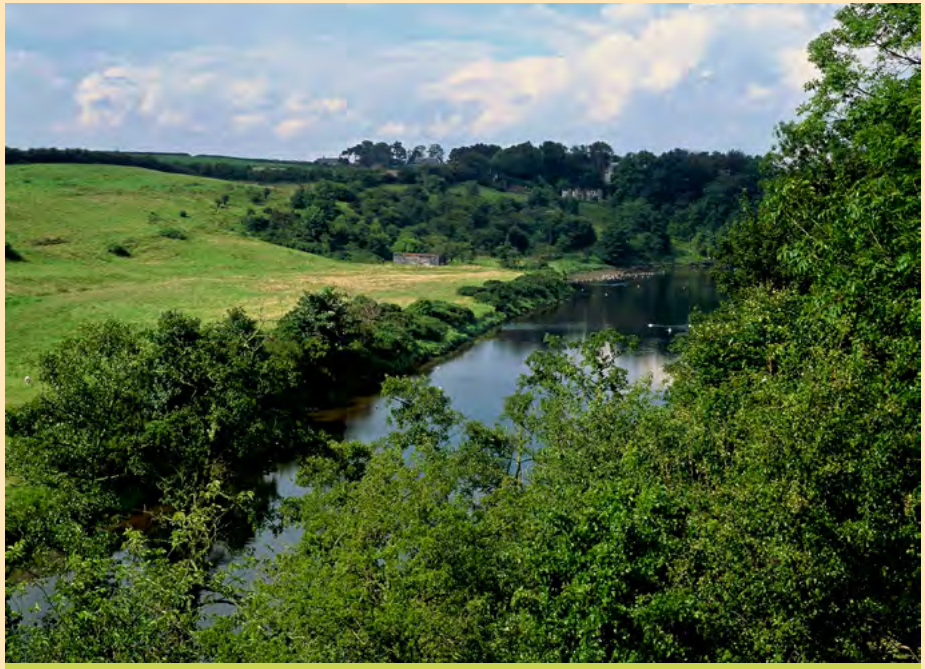
- Creating new areas of woodland, permanent grassland (including acid grassland and meadows), lowland heath and wetlands (including fens and reedbeds) in locations where they will create links or stepping stones between fragmented habitats and extend or buffer priority sites.
- Exploring opportunities for the creation of new ponds and wetlands, particularly on mine restoration sites and where this will increase floodwater storage capacity.
- Seeking opportunities for native tree, scrub and woodland planting where this will help to slow run-off into rivers, enhance landscape features such as parkland, and contribute to climate change adaptation (for example, shade and/or shelterbelts in new developments, as scattered infield trees on livestock grazing land and in strips along watercourses) and carbon sequestration and/or storage.
- Protecting and restoring hedgerows and encouraging less frequent cutting to allow greater flowering.
- Working with farmers to ensure that any intensification is sustainable and optimises resource efficiency (fuel, agro-chemicals and water), soil management, habitat provision and use of precision farming techniques.
- Encouraging management of farmland to improve soil structure and organic matter content such as minimum tillage, controlled farm traffic, appropriate timing of grazing and machinery use, incorporation of organic matter and use of green manure and winter cover crops, to give benefits for soil quality, soil erosion, water quality, water availability, flood alleviation, food production and biodiversity.
- Working with farmers to reduce nutrient, agro-chemical and sediment load to watercourses through best practice measures to reduce risk of pollution (relating to chemical and/or nutrient use and farm infrastructure) and use of measures to intercept run-off and pollutants such as buffer strips, riparian tree planting and settlement ponds.
- Encouraging take-up of agri-environment schemes and environmental grants for farmers, particularly where this can support more efficient use of resources, adoption of new environmentally beneficial technology and habitat creation on less productive land such as the creation of wetlands and of good habitat for farm wildlife, pollinators or predators of agricultural pests.
- Supporting research into the pest regulation services offered by semi-natural habitats in the area, and how the agronomic benefits could be maximised, and communicating findings to local farmers along with practical advice on how to secure any proven benefits on their land.
- Encouraging farmers to provide habitat and food sources for pollinators and predators of pest species (such as hedges which are not cut every year, flower-rich field margins, beetle banks, and pollen and nectar mixes) using agri-environment schemes where possible.
- Retaining the historic field boundary network, ensuring that hedgerows are sympathetically managed, and encouraging the restoration of hedgerows to strengthen field patterns.

Continued on next page...

SEO 3: Improve the connectivity and resilience of semi-natural inland habitats, particularly wetlands and native woodland, and enhance the management of agricultural land to deliver benefits for wildlife, climate regulation, water quality, soil quality, food production, sense of place, sense of history and flood alleviation.

... continued from previous page

- Exploring opportunities for better management of ground features and below-ground archaeology on arable land, such as the establishment of permanent grassland, shallow cultivation or minimum tillage agriculture, and encouraging uptake of agri-environment schemes to fund such work.
- Enhancing features that act as wildlife movement corridors or stepping stones in urban areas, such as river corridors, green routes, parks and gardens.
- Seeking opportunities to remove artificial barriers to fish migration from rivers and, where complete removal is not feasible, exploring possibilities for the creation of fish passes.
- Enabling rivers to return to more natural courses, where feasible, thereby allowing active geomorphological processes to take place.



The River Coquet and the other major rivers of the area, are major wildlife assets, supporting otter, water vole, and white-clawed crayfish, while also supplying drinking water and water-based recreation opportunities.

SEO 4: Enhance recreational opportunities by addressing key gaps in the access network, such as across major roads and rivers, enhancing public transport, protecting and improving water quality and providing interpretation of key geological and historic sites.

For example, by:

- Seeking opportunities to bridge gaps in the rights of way network, particularly crossings over rivers and busy roads.
- Seeking opportunities to enhance the bridleway network and provide additional opportunities for traffic-free cycling and horse riding routes.
- Seeking opportunities to improve water quality for the benefit of wildlife and recreational users in the area by working with water companies, farmers, the fishing community, restoration site owners, developers, local residents and industry to minimise diffuse and point source pollution.
- Ensuring that new development incorporates green infrastructure that links with greenspace and with the open countryside and allows for modes of transport other than just private cars.
- Ensuring that people have access to greenspace and green routes close to where they live, so that they can easily access greenspace and enjoy the associated benefits for their health and wellbeing while learning about nature and the environment.
- Managing access to popular tranquil areas in order to maintain tranquillity and environmental quality for the benefit of all users and wildlife, through measures such as providing cycle routes and public transport to minimise private car use.
- Protecting and enhancing the quality of recreational facilities and access opportunities at the coast while seeking to minimise disturbance, particularly to protected bird populations and designated sites.
- Encouraging better understanding of the value of the coast and its history, geology, habitats and wildlife through provision of more interpretation material and educational events.
- Improving public rights of way along the area's major rivers, particularly the River Wansbeck.
- Seeking opportunities to provide interpretation of less visible archaeological sites such as restored industrial sites and buried prehistoric sites along the coast.
- Providing interpretation at mining sites, particularly where visible reminders of mining have all been removed.
- Seeking opportunities to identify and establish local geological sites.
- Using geological sites as an educational resource, particularly to increase awareness of past climatic change, the formation of the Coal Measures and how they have influenced the area.
- Seeking opportunities to improve access to key geological sites, where appropriate, and provide interpretation and educational opportunities to increase visitors' enjoyment and understanding of the significance of the sites and the area's geological past.

Supporting document 1: Key facts and data

Area of South East Northumberland Coastal Plain National Character Area (NCA): 43,709 ha

1. Landscape and nature conservation designations

Less than 1 per cent (107 ha) of the NCA lies in the Northumberland Coast Area of Outstanding Natural Beauty. Less than 1 per cent (288 ha) of the NCA lies within the Northumberland Heritage Coast.

Management plans for the protected landscapes can be found at:

- www.northumberland.gov.uk/

Source: Natural England (2011)

Tier	Designation	Name	Area (ha)	% of NCA
National	National Nature Reserve (NNR)	n/a	0	0
	Site of Special Scientific Interest (SSSI)	A total of 19 sites wholly or partly within the NCA	512	1

Source: Natural England (2011)

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

1.1 Designated nature conservation sites

The NCA includes the following statutory nature conservation designations:

Tier	Designation	Name	Area (ha)	% of NCA
International	Ramsar	Northumbria Coast	31	<1
European	Special Protection Area (SPA)	Northumbria Coast SPA	31	<1
	Special Area of Conservation (SAC)	North Northumberland Dunes SAC	28	<1

The boundaries of the SPA and Ramsar sites are identical. The international and European sites are completely within the SSSI area.

There are 47 Local Wildlife Sites in South East Northumberland Coastal Plain covering 1,460 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 at: http://www.lnr.naturalengland.org.uk/Special/lnr/lnr_search.asp
- Maps showing locations of Statutory sites can be found at: http://magic.Defra.gov.uk/website/magic/ – select 'Rural Designations Statutory'

1.1.1 Condition of designated sites

SSSI condition category	Area (ha)	Percentage of NCA SSSI resource
Unfavourable declining	25	5
Favourable	264	54
Unfavourable no change	82	17
Unfavourable recovering	114	23

Source: Natural England (March 2011)

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

2. Landform, geology and soils

2.1 Elevation

Elevation ranges from sea level at the coast to a maximum of 145 m at Berwick Hill north of Ponteland.

Source: Natural England (2012)

2.2 Landform and process

The landscape is typically a relatively low lying till plain with isolated low Carboniferous sandstone hills. The coast is dominated by rocky headlands and shores with wide sandy bays, with dynamic coastal processes of erosion and accretion in places. Tidal mud is deposited in estuaries, and windblown sands have formed extensive sand dunes such as seen in Druridge Bay. Incised river valleys such as the Wansbeck and Blyth are caused by increased post-glacial erosion and down-cutting by rivers.

Source: South East Northumberland Coastal Plain Countryside Character Area Description

2.3 Bedrock geology

The area is underlain with Upper Carboniferous Coal Measures and coincides with the Northumberland Coalfield. The Coal Measures consist of repeated mudstones and sandstones, with numerous coal seams. Coal Measures are best exposed along the coastline and inland along the sides of the incised river valleys such as the Blyth and Wansbeck. The coastline is of outstanding geological interest and diversity; between Tynemouth and Lynemouth there is the most complete sequence of Westphalian rocks in the region including coal seams. A breakdown of solid geology as a proportion of total land area is as follows: 65 per cent mudstone, siltstone and sandstone; 24 per cent sandstone and 10 per cent mudstone, sandstone and limestone.

Source: Natural England (2012)

2.4 Superficial deposits

The bedrock is largely overlain by a thick layer of glacial debris, mainly boulder clay or till deposited from ice sheets which covered the area during the last glacial period. More recent windblown sands are important along the coast forming extensive sand dunes such as seen in Druridge Bay.

Source: South East Northumberland Coastal Plain Countryside Character Area Description

2.5 Designated geological sites

Tier	Designation	Number
National	Geological Site of Special Scientific Interest (SSSI)	2
National	Mixed Interest SSSI	1
Local	Local Geological Sites	0

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

The main soils overlaying the NCA are the Dunkeswick and Hallsworth series which tend to be waterlogged in winter and early spring, therefore need to be under-drained and traditionally favour light grazing and winter crops. These are intercepted with more easily drained soils along the river terraces that are better able to support arable production. Soils of restored spoil heaps and open cast sites, are very common in this NCA and if farmed support mixed farming and stock rearing occurs. There are 6 main soilscape types in this NCA: slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils, covering 66 per cent of the NCA; slowly permeable seasonally wet acid loamy and clayey soils (14 per cent); restored soils mostly from quarry and opencast spoil (12 per cent); freely draining slightly acid loamy soils (2 per cent); slightly acid loamy and clayey soils with impeded drainage (2 per cent) and sand dune soils.

Source: Soils of Alnwick and Rothbury district. 1990, by R.W.Payton and R.C. Palmer

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

Grade	Area (ha)	% of NCA
Grade 1	n/a	n/a
Grade 2	n/a	n/a
Grade 3	35,157	80
Grade 4	595	1
Grade 5	n/a	n/a
Non-agricultural	1,068	2
Urban	6,708	15

Source: Natural England (2010)

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

3. Key water bodies and catchments

3.1 Major rivers/canals

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

- River Blyth 17 km
- River Wansbeck 10 km
- River Coquet 9 km
- River Pont 8 km
- Ouseburn 7 km

Source: Natural England (2010)

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

3.2 Water quality

The total area of Nitrate Vulnerable Zone is 6,146 ha, 21 per cent of the NCA.

Source: Natural England (2010)

3.3 Water Framework Directive

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

4. Trees and woodlands

4.1 Total woodland cover

This NCA contains 3,492 ha of woodland (8 per cent) where woodlands are over 2 ha in size, including 371 ha of ancient woodland.

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

4.2 Distribution and size of woodland and trees in the landscape

Broadleaved woodland cover is largely limited to the incised valleys of the rivers Blyth and Wansbeck and Seaton Burn. Blocks of mixed or coniferous woodland are scattered within farmland and prominent in mining reclamation schemes, where some are now developed as country parks for example Druridge Bay and Queen Elizabeth II. Native hedgerows with standard trees are also a feature of former mining restoration sites. Plantation woodlands and parkland trees are a feature of several country houses such as Seaton Delaval, Gosforth Park, Woolsington and Blagdon.

Source: South East Northumberland Coastal Plain Countryside Character Area Description

4.3 Woodland types

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

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

Woodland type	Area (ha)	% of NCA
Broadleaved	1,788	4
Coniferous	881	2
Mixed	388	1
Other	435	1

Source: Forestry Commission (2011)

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

Type	Area (ha)	% of NCA
Ancient semi-natural woodland	302	1
Planted Ancient Woodland (PAWS)	69	<1

Source: Natural England (2004)

5. Boundary features and patterns

5.1 Boundary features

Fields which have been reclaimed from opencast coal mining tend to be bounded by post and wire fences, hedges or woodland windbreaks. 294,504 m of hedge improvements have taken place through agri-environment schemes. Hedgerow condition improves towards the more rural areas, where there is no influence from opencast mining, where older, species rich hedges still occur.

Source: South East Northumberland Coastal Plain Countryside Character Area description; Countryside Quality Counts (2003)

5.2 Field patterns

In the south of the NCA on the urban fringe, fields are small and irregular. Further north and where the land has been opencast, fields become larger and more regular in shape.

Source: South Northumberland Coastal Plain Countryside Character Area description; Countryside Quality Counts (2003)

6. Agriculture

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

The total farmed area is 24,025 ha, comprising a total of 197 holdings. All figures relate to 2009 unless otherwise stated.

6.1 Farm type

The landscapes mixed character is reflected in its breakdown of farm types: 79 cereals (44 per cent), other 47 (26 per cent), 32 grazing livestock (16 per cent), 18 mixed (10 per cent), 9 horticulture (5 per cent), 6 dairy (3 per cent) and 6 general cropping (3 per cent). Farms classified as other are likely to be small holdings, reflecting the urban fringe effect on agriculture. Since 2000, the number of holdings has fallen from 210, the biggest reduction occurring in cereal farms (from 87 to 79). Other types (probably smallholdings) have increased from 36 to 47 over the same period.

Source: Agricultural Census, Defra (2010)

6.2 Farm size

Farms over 100 ha are the most numerous, accounting for 74 holdings (38 per cent) and 85 per cent of the farmed area. There are 66 farms under 20 ha (11 per cent of all holdings) but these only account for 2 per cent of the farmed area. Since 2000 farm size has not significantly changed; the reduction in the number of holdings has been spread across the range of holdings with the exception of farms between 5 and 20 ha where there has been an increase in the number of holdings from 40 to 45.

Source: Agricultural Census, Defra (2010)

6.3 Farm ownership

50 per cent of the total farmed area is owner occupied, accounting for 12,118 holdings. This is an increase of 5 per cent in owner occupation since 2000.
2009: Total farm area = 24,025 ha; owned land = 12,118 ha
2000: Total farm area = 24,573 ha; owned land = 11,059 ha.

Source: Agricultural Census, Defra (2010)

6.4 Land use

Land use is evenly split between cereals (10,473 ha) and grass and uncropped land (10,322) which dominate the area (86 per cent). Oilseeds account for 1,650 ha of the farmed area (7 per cent). Since 2000 there has been a reduction in the area of cereals by 5 per cent and an increase in the area of grass and uncropped land by 5 per cent.

Source: Agricultural Census, Defra (2010)

6.5 Livestock numbers

Sheep are the most numerous livestock type (26,100 animals) followed by 10,700 cattle and <100 pigs. Pig and sheep numbers have dropped significantly since 2000, pigs by 97 per cent (from 1,660 to <100 animals) and sheep by 45 per cent (47,500 to 26,100 animals).

Source: Agricultural Census, Defra (2010)

6.6 Farm labour

There are 294 principal farmers, and 22 salaried managers. Since 2000 the number of principal farmers has dropped from 328 to 294, full time workers have dropped from 167 to 94, and casual workers from 67 to 24. The number of salaried managers remains the same, while there has been an increase in part time workers from 33 to 52.

Source: Agricultural Census, Defra (2010)

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

7. Key habitats and species

7.1 Habitat distribution/coverage

The rocky foreshore at Cresswell, Newbiggin and particularly around St. Mary's Island provides roost sites for flocks for wintering purple sandpiper (*Calidris maritime*) and support flocks of golden plover (*Pluvialis apricaria*) which in winter feed on fields behind the coast and at the Alcan settling tanks at Lynemouth. Some artificial structures, such as Blyth East Pier are also important purple sandpiper roost sites.

The RSPB reserve at Coquet Island is of particular importance for its population of breeding roseate terns (*Sterna dougallii*). The island also supports nationally important breeding populations of arctic tern (*Sterna paradisaea*), common tern (*Sterna hirundo*), sandwich tern (*Sterna sandvicensis*) and puffin (*Fratercula arctica*).

Other breeding birds of note include eider duck (*Somateria mollissima*) at their most southerly breeding location on the east coast of England, kittiwakes (*Rissa tridactyla*) and black headed gulls (*Chroicocephalus ridibundus*).

Wind-blown sand forms a long line of dunes along the coast, most notably at Druridge bay Examples of embryonic, mobile and fixed dunes are all found. Examples of dune slacks are found in places such as Hadston Links and support a number of wetland species. Saline lagoons are found behind the sand dunes around Druridge Bay.

One of the most significant areas of natural habitat in the NCA is the lowland raised bog and associated fen and wetland habitats at Prestwick Carr. Extensive areas of reedbed are found at Gosforth Park Lake and East Chevington.

Fragments of lowland heath and meadow are located at Arcot Hall, Gosforth Park, Havannah Nature Reserve and Newbiggin by the Sea, among other locations.

Open mosaic habitats are to be found on post industrial land for example the former Bates Colliery site, and provide important habitat for species such as dingy skipper (*Erynnis tages*).

Subsidence ponds and associated wetlands, a direct impact of mining, are a prominent feature of the landscape and include long established ponds (such as Holywell Pond SSSI, Havannah and Big Water Nature Reserves) and newly forming areas. Within developed areas landscape and amenity ponds and lakes also have an important role to play and support important populations of species such as great crested newt (*Triturus cristatus*).

The River Coquet along the northern border of the area is an SSSI for a variety of interests including its vegetation, use by birds, aquatic invertebrates and migratory fish. Together with the Blyth and the Wansbeck, these rivers are particularly significant for their use by otters (*Lutra lutra*), water voles (*Arvicola amphibious*) and the native white clawed crayfish (*Austropotamobius pallipes*) all important species nationally.

Native woodland and Ancient Semi-natural Woodland is found along the river valleys of the Coquet, Blyth and Wanbeck. Wet carr woodland is found at locations such as Prestwick Carr and Gosforth Park, the latter supporting a healthy population of coral-root orchid (*Corallorhiza trifida*).

Source: Northumbria Coal Measures 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;

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

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

Priority habitat	Area (ha)	% of NCA
Broadleaved mixed and yew woodland (broad habitat)	973	2
Coastal & floodplain grazing marsh	254	<1
Coastal sand dunes	224	<1
Reedbeds	111	<1
Lowland meadows	68	<1
Lowland dry acid grassland	54	<1
Lowland raised bog	25	<1
Maritime cliff & slope	23	<1
Purple moor grass & rush pasture	16	<1
Fens	10	<1
Saline Lagoons	9	<1
Lowland heathland	8	<1
Mudflats	5	<1

Source: Natural England (2011)

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

7.3 Key species and assemblages of species

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

8. Settlement and development patterns

8.1 Settlement pattern

The pattern of settlement is dominated by the rapid industrial expansion of the late 18th and 19th centuries directly linked to the mining industry. Traces of earlier medieval, nucleated settlement patterns do survive, particularly in the more rural north of the area at Warkworth, Newbiggin Bothal and Widdrington). Coastal settlements such as Amble, developed around fishing, salt working and coastal trade. Blyth in particular underwent major expansion in the 19th century due to coal exports. The pit villages continued to grow into the 20th century, particularly in the south creating the modern urban and industrial areas which often merged along the growing network of major roads. The 20th century also saw the development of the planned new town of Cramlington.

Source: South East Northumberland Coastal Plain Countryside Character Area description; Countryside Quality Counts (2003)Countryside Quality Counts (2003)

8.2 Main settlements

The main settlements within the NCA are: Blyth; The Northern suburbs of Newcastle (Longbenton and Killingworth); Cramlington; Ashington; Bedlington; Ponteland and Amble. The total estimated population for this NCA (derived from ONS 2001 census data) is: 287,451.

Source: South East Northumberland Coastal Plain Countryside Character Area description; Countryside Quality Counts (2003), Natural England (2012)

8.3 Local vernacular and building materials

Most of the building stock dates from the mid 18th century, sandstone being the traditional building material. New planned villages constructed in the 19th century such as Ashington, exported elements of the urban character of the main towns - brick terraces, roofed in slate.

Source: South East Northumberland Coastal Plain Countryside Character Area description; Countryside Quality Counts (2003)

9. Key historic sites and features

9.1 Origin of historic features

The earliest known human activity goes back over 3,000 years and by the medieval period was farmed with significant settlement such as Warkworth, Newbiggin and Widdrington. Some ridge and furrow remains in places. Mining and subsequent land reclamation has erased some historic features, and left a legacy of its own, such as the pithead buildings at Woodhorn. There are a number of Registered Parks and Gardens including Blagdon Estate and Seaton Delaval Hall. World War I coastal batteries at Blyth are scheduled monuments, and there are several historic buildings close to Blyth Harbour, reflecting the former prosperity of the port.

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

9.2 Designated historic assets

This NCA has the following historic designations:

- 3 Registered Parks and Gardens covering 332 ha
- 0 Registered Battlefields
- 34 Scheduled Monuments
- 600 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

- 2 per cent of the NCA 1,385 ha is classified as being publically accessible.
- There are 517 km of Public Rights of Way at a density of 1 km per km^2.
- There are no National Trails within the NCA. However, the coast to Castle Cycle route runs along the coast.

Sources: Natural England (2010)

The coast is popular with holidaymakers and day trippers from nearby conurbations and from further afield. Caravan parks are particularly frequent in the area.

Public access is encouraged at Druridge Bay Country Park and within other country parks such as the Queen Elizabeth Country Park and Ashington Community Woodland which have resulted from the restoration of former coal mining activities.

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

Access designation	Area (ha)	% of NCA
National Trust (Accessible all year)	38	<1
Common Land	8	<1
Country Parks	547	1
CROW Access Land (Section 4 and 16)	8	<1
CROW Section 15	6	<1
Village Greens	2	<1
Doorstep Greens	5	<1
Forestry Commission Walkers Welcome Grants	29	<1
Local Nature Reserves (LNRs)	468	1
Millennium Greens	12	<1
Accessible National Nature Reserves (NNRs)	0	0
Agri-environment Scheme Access	0	0
Woods for People	298	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) the lowest scores for tranquillity are at Blyth, Ashington, Cramlington and the northern edge of Newcastle. The highest scores for tranquillity are to be found in the north of the NCA.

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

Category of tranquillity	Score
Highest value within NCA	33
Lowest value within NCA	-83
Mean value within NCA	-14

Sources: CPRE (2006)

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

11.2 Intrusion

The 2007 Intrusion Map (CPRE) shows the extent to which rural landscapes are 'intruded on' from urban development, noise (primarily traffic noise), and other sources of visual and auditory intrusion. This shows that the majority of the NCA is intruded upon, particularly in the south around the urban areas and following the main transport routes north.

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

Category of intrusion	1960s (%)	1990s (%)	2007 (%)	% change (1960s-2007)
Disturbed	57	69	67	10
Undisturbed	35	21	20	-15
Urban	7	7	13	7

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are urban intrusion increased by 7 per cent between 1960 and 2007, contributing towards an increase in disturbance of 10 per cent.

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

A cyclist at Blyth Links enjoying one of the many opportunities provided along the coast for outdoor recreation.

12. Data sources

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

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

Supporting document 2: Landscape change

Recent changes

Trees and woodlands

- There has been limited uptake of Woodland Grant Scheme agreements for woodland management and restocking. Rates of uptake have declined relative to the period before 1999. Some new planting that is locally significant has been carried out, for example, between Ashington and Waddington.

- Community woodlands, such as in Ashington, have recently been used to provide opportunities for environmental education through Forest Schools programmes, conservation volunteering and informal recreation.

Boundary features

- Environmental Stewardship agreements between 2005 and 2013 included more than 300 km of hedgerow management options, specifying less frequent than annual cutting.

Agriculture

- The Defra June Agricultural Census returns for the NCA showed a number of changes in agriculture between 2000 and 2009. Numbers of pigs and sheep fell dramatically in this NCA; pig numbers fell from 1,660 to 52 (-97 per cent) and sheep numbers fell from 47,453 to 26,064 (-45 per cent).

- The farm labour force changed considerably, with the number of full-time workers falling from 167 to 94 (-44 per cent) and casual workers from 67 to 24 (-65 per cent), whereas the number of part-time workers increased from 33 to 52 (+57 per cent).

Settlement and development

- The south of the area has seen the highest level of new development in recent years, with a significant expansion in housing. Formerly isolated mining towns have in some cases become linked by new development.

Semi-natural habitat

- There a number of large-scale projects under way which are delivering habitat creation, such as the Environment Agency's 4 Shores project and Northumberland Wildlife Trust's wetland restoration at Prestwick Carr.

- Numerous mine restoration projects in the area have included the creation of new habitats, including grassland, woodland, wetland and open water.

- Environmental Stewardship agreements included more than 1,000 ha of options for grasslands managed with low or very low levels of nutrient inputs.

Historic features

- Coastal erosion is revealing significant archaeological features, such as the Mesolithic sites at Low Hauxley in Druridge Bay.

Coast and rivers

- In 2005 all raw sewage discharges into Druridge Bay were discontinued and full secondary treatment of all sewage previously discharged without treatment was introduced[6].

[6] *Druridge Bay: A Strategy for Management to 2010,* The Druridge Bay Partnership (2006)

- Beach litter has become a serious problem along many parts of the coast, particularly Druridge Bay, where a Marine Conservation Society 'Beachwatch' litter collection scheme in 2003 collected 4,000 pieces of rubbish per km, compared with a national average of 2,000. Fly-tipping in coastal dunes has also increased in recent years as the cost of legal waste disposal has increased.

Minerals

- Dumping of colliery waste at Lynemouth ended with the closure of Ellington Colliery in 2005. Extensive slag banks remain, with some stable and some eroding (at a rate of 2 m/yr between 2007 and 2008) to create a much steeper seaward bank[7].

- Until recently large quantities of sand were extracted from the coast by the aggregates industry, which undermined the stability of coastal dunes by enhancing rates of coastal erosion. Cessation of extraction and management measures over the last 15 to 20 years has reversed the situation and resulted in widespread dune and vegetation recovery[8].

- Sand extraction is still authorised at Helmscott Hill and at Druridge Bay until the end of 2020, but little extraction has taken place since the mid-1990s[9]. Sand extraction in other areas of Druridge Bay has now ceased[10].

- Recently restored open cast coal mining sites include Stobswood and Maiden's Head.

- New open-cast mines for the extraction of coal, shales and fireclay have recently been established at Butterwell, Potland Burn[11] and Shotton[12], with permissions running until 2016.

Drivers of change

Climate change

- The most vulnerable areas to the impacts of climate change in the NCA are the coastal strip and major river estuaries, with potential for significant impacts on the geodiversity, biodiversity and historic environment. While this is an area which already experiences coastal erosion, climate change may exacerbate these effects with sea level rise and more frequent flood and storm surge events, accelerating the recession of the sea cliffs and beaches. Potential impacts of climate change along the coast include:

  - Exposure of historic features and archaeology, in particular Second World War defences and prehistoric sites such as the Mesolithic site of Low Hauxley.

  - Loss of coastal habitats such as sand dunes, salt marsh, maritime cliffs and rocky foreshore, and the species which depend on them. While these habitats are currently part of dynamic coastal processes, many will be subject to coastal squeeze and unable to roll-back resulting in significant habitat loss. The loss of estuarine mud flats is likely to have a particular devastating impact on key bird species which are dependent on such habitats for feeding and roosting. It is likely that the most significant threat will be around the southern end of the coastline where there are hard defences.

[7] *Cell 1 Regional Monitoring Programme,* N Cooper, S Rowe, A Parsons and T Cooper (Royal Haskoning, Scarborough Borough Council and Halcrow) (2009) [8] *Assessing the Potential Consequences of Climate Change for England's Landscapes: South East Northumberland,* Natural England Research Report Number 045, L Speakman, N Macgregor, N Van Dijk, G Darch and A Neale (2013)
[9] *Minerals and Waste Site Monitoring Report 2010/11 – Helmscott Hill Sand Extraction,* Northumberland County Council (2010) [10] *Study to Map the Key Environmental Considerations and Mineral Resources in Northumberland,* Northumberland County Council (2011) [11] UK Coal website (accessed 25 July 2013; URL: www.surface-mining-ukcoal.com/) [12] *Shotton Additional Coal Extraction Proposals*, Banks Mining (2010) (accessed October 2013; URL: www.banksgroup.co.uk/wp-content/uploads/2010/10/Shotton-Additional-Coal-Non-Technical-Summary.pdf)

- Many of the wetlands close to the coast around Druridge Bay are vulnerable to the impacts of sea inundation and saline intrusion leading to loss of freshwater habitats with the creation of more brackish habitats. Further inland, many of the smaller subsidence ponds and reedbeds are also vulnerable to warmer summer temperatures and drought, while increased heavy rain events will lead to greater run-off with risk of eutrophication.

- Two habitats particularly vulnerable to increased summer temperatures and reduced rainfall are the lowland raised bogs around Prestwick Carr and the lowland heath around Havannah Nature Reserve. Both these habitats have peat-based soils, and are therefore important carbon stores. Drying out of the peat soils could lead to oxidation and erosion of the peat; any deterioration could result in significant carbon losses.

- The nature of the topography means that significant areas of the NCA will be at increased risk from coastal and fluvial flooding as a result of climate change, as most of the land is flat and low lying. Communities along the rivers Blyth, Wansbeck and Coquet and their estuaries will be particularly at risk of flooding.

- The changing climate, together with pressure on global food markets is likely to see an intensification of agriculture in south-east Northumberland with changes in cropping and agricultural practices. It is inevitable such a move will impact of the character of the landscape, altering colours, textures and field patterns, and may impact on the wider environment, depending on how 'sustainable' the intensification is.

- Indirectly climate change policy to encourage a move towards a low carbon economy is likely to see an increase in structures associated with renewable energy. South East Northumberland is seen as a potential area for the further expansion of onshore and offshore wind farms, wave energy and energy crops.

- The lack of variation in elevation, large coverage of arable land and fragmentation of semi-natural habitats all make the wildlife of the area particularly vulnerable for climate change as they minimise the likelihood of species being able to move to alternative suitable niches.

- It is thought that a changing climate may already be having an effect on Coquet Island and its bird populations. Warm, wet summers, combined with a high level of bird guano, has led to increased growth of vegetation, resulting in fewer nesting sites, and climatic changes are thought to be resulting in a decrease in the distribution and abundance of sand eels, the birds' main prey species.

- The ponds and watercourses of the area will be particularly vulnerable to climate change in terms of: increased risk of pollution and sedimentation from run-off during high rainfall; stress due to low water levels, high temperatures and inability to dilute pollutants during periods of low rainfall and high temperatures; and, increased spread of invasive species.

Other key drivers

- Port and renewable energy related developments along the coast at Blyth, including plans to extend the port and regenerate the site of the former power station.
- There is likely to be new development in and around urban centres. The North East Northumberland Growth Point was identified in 2008, with growth areas earmarked for new housing at Ashington, Ellington, Blyth and Cramlington. New development may provide opportunities for delivering enhancements to landscape and enhancing brownfield biodiversity through provision of green infrastructure, which can also support recreation activities such as walking, running and cycling that benefit the health and wellbeing of local communities.
- Contaminated land remains an issue and opportunity in terms of its developing biodiversity interest.
- The restoration of minerals development especially open-cast coal mining will provide opportunities to deliver large scale habitat creation, green spaces and access opportunities.
- The area remains important for open-cast coal extraction, with active sites (at Steadsburn near Widdrington, Potland Burn near Ashington and Shotton near Stannington) and plans for new sites and extension of existing ones. The NCA falls almost entirely within an area identified in Northumberland Core Strategy as a "principal resource area" for coal extraction.
- The northern section of coast, around Druridge Bay, is likely to experience sustained or increased pressure from tourism, particularly as restored open-cast mining areas mature and become more attractive to visitors, and there may be increased demand for tourism related development.
- There is likely to be continued recreational pressure at popular locations such as the coast and country parks, which will need to be managed to maintain the quality of the visitor experience, minimise damage to sites and retain a sense of tranquillity.
- Major wetland restoration and expansion at Prestwick Carr by Northumberland Wildlife Trust and Druridge Bay Coal and Coast Project.
- The closure of the Alcan aluminium smelter will change the local landscape and have other cultural and social impacts. It will present new opportunities for recreation and wildlife.

The closure of the Alcan aluminium smelter at Blyth will see the loss of a local industrial landmark and employer, but is likely to present new opportunities for wildlife habitat creation and public access.

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.

Agriculture in the area is a mix of arable crops and livestock grazing, with field boundaries including hedges, fences and walls.

Statement of Environmental Opportunity	Ecosystem Service: Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place/inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
SEO 1: Ensure that mining and development sites are managed and restored so as to minimise pollution and disturbance while contributing to flood alleviation, ecological networks, sense of place and recreational opportunities, particularly alongside Druridge Bay and in growth areas around Ashington, Ellington, Blyth and Cramlington.	↗ *	↗ *	↗ *	↗ *	↗ *	↗ *	↗ *	↗ *	↗ *	↗ *	↗ *	↗ *	↗ *	↗ *	↗ *	↗ **	↗ *	↑ **	↗ **
SEO 2: Conserve and enhance coastal and estuarine habitats and species, and allow habitats to adapt to coastal change, to improve the coast's value for wildlife, geodiversity, recreation, archaeology and sense of place.	↗ *	↔ *	↗ *	↗ **	↔ *	↗ *	↗ *	↗ *	↗ *	↗ *	↗ *	↗ *	↑ **	↑ **	↑ **	↑ **	↗ **	↑ ***	↑ **

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

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

Statement of Environmental Opportunity	Ecosystem Service: Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place/inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
SEO 3: Improve the connectivity and resilience of semi-natural inland habitats, particularly wetlands and native woodland, and enhance the management of agricultural land to deliver benefits for wildlife, climate regulation, water quality, soil quality, food production, sense of place, sense of history and flood alleviation.	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ *	↗ **	↗ *	↗ **	↗ *	↑ **	↗ *
SEO 4: Enhance recreational opportunities by addressing key gaps in the access network, such as across major roads and rivers, enhancing public transport, protecting and improving water quality and providing interpretation of key geological and historic sites.	↔ *	↔ *	↔ *	↔ *	↔ *	↔ *	↗ **	↔ *	↔ *	↗ *	↔ *	↔ *	↗ *	↗ *	↗ *	↗ *	↑ **	↗ *	↗ *

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

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

Landscape attribute	Justification for selection
Carboniferous geology and Quaternary glacial deposits are defining features of the area. The NCA coincides closely with the limits of the Northumberland Coalfield and is underlain by Coal Measures, topped by a layer of glacial till.	■ The underlying geology, of Coal Measures rocks (mudstones, sandstones and coal seams) heavily mantled by glacial boulder clay and till, typically gives rise to a relatively featureless till plain landscape. Exposures of the underlying rocks are few, though the incised valleys of the rivers Blyth and Wansbeck locally reveal Coal Measures rocks in their steep sides. ■ The coastline is of considerable geological interest and diversity. In the south the cliff exposures between Tynemouth and Lynemouth cliff show the most complete sequence of Westphalian rocks in the region.
Large open fields, a mixture of grassland and arable land bounded by post and wire fences or low, gappy hedges with few trees, interspersed with large country houses, and institutional establishments. Extensive urban fringe effect near settlements.	■ The large regular fields reflect the 17th–18th-century enclosures by coal-enriched country estates. Hedges, particularly where long established, are recognised as important habitats in their own right and wildlife movement corridors in a landscape with low coverage of semi-natural habitats and low permeability to wildlife. ■ Arable habitats support a range of farmland birds including grey partridge, particularly around the Tyneside conurbation and behind Druridge Bay. The arable area is also important for breeding lapwing, tree sparrow, corn bunting and yellow wagtail. ■ In winter golden plover feed in flocks of several hundred on fields behind the coast and at the Alcan settling tanks at Lynemouth, roosting on the rocky shore, particularly around St Mary's Island in North Tyneside.
Relatively low woodland cover, with prominent blocks of mixed and coniferous woodland on restored colliery sites, with broadleaved woods on steeper valley sides, and within estate parkland.	■ Broadleaved woodland cover, partly semi-natural, is a feature of the incised river valleys of the Blyth and Wansbeck, and Seaton Burn. ■ Plantation woodlands and parkland trees are a feature of the estates of several country houses, such as Gosforth Park, High Gosforth, Seaton Delaval, Woolsington and Blagdon. Planned landscapes, both recent and long established, and amenity and recreational landscapes have a widespread influence. In particular, the designed parkland of the historic Gosforth Park estate on the northern boundary of Newcastle.

Landscape attribute	Justification for selection
Varied coastal topography of low limestone cliffs and clay slopes, sandy bays and rocky headlands. Wind-blown sand forms a long line of dunes along the coast, most notably at Druridge Bay, together with isolated tidal lagoons.	■ Druridge Bay forms a virtually unbroken sweep of open sandy beach backed by mature sand dunes, peppered with Second World War military remains. Much of the coastal dune area and shore is frequented by walkers and bird watchers and 7 miles of the northern stretch of coast fall within the North Northumberland Heritage Coast designation. ■ A number of large artificial structures are dominant features in the coastal landscape, for example, the wind turbines at Blyth and the aluminium smelting works and power station at Lynemouth. ■ Although much of the southern coastline is heavily built up, important undeveloped areas remain, including the rich mud flats and salt marshes along the estuaries of the rivers Coquet, Blyth and Sleek Burn and expansive stretches of unbroken sandy beach, backed by dunes. ■ Almost half the length of the coast is included in the North Northumbria Coast Special Protection Area (SPA) for the significance of its bird populations. The Sites of Special Scientific Interest (SSSI) at Cresswell Ponds is the longest established lagoon on the Northumberland coast.
Widespread urban and industrial development, extending north from the urban edge of Newcastle across the coastal plain, numerous active and restored mining sites.	■ Older settlements with medieval origins, such as Bothal, contrast with 19th-century mining villages and coastal ports, and with the planned 'New Town' settlement of Cramlington. ■ Within the southern part of the coastal plain, the landscape is dominated by large-scale industry and by the urban settlements of Blyth, Ashington, Bedlington, and Cramlington, together with a range of smaller towns and an extensive web of major road and rail routes. ■ Further north, the area has a much more rural feel, with few settlements, large arable fields and occasional pastures and leys. Farmsteads here tend to be large and dispersed. ■ Extensive mine restoration schemes, many of which are still maturing, have partially erased the industrial history. Early schemes tended to create large tracts of a simplified landscape, with relatively featureless agricultural land and strip plantations of limited value for biodiversity. Many of these sites are valuable for their open mosaic habitats and associated species such as dingy skipper.

Landscape attribute	Justification for selection
A historic landscape largely defined by industrial heritage originating from the widespread and long-lasting coal mining industry, with some important Mesolithic archaeology, defensive structures from the First and Second World Wars and stately 18th–19th-century country houses and parklands.	■ The earliest evidence of human activity in the area goes back at least 3,000 years. Erosion of the coast has revealed a number of prehistoric sites, including bronze-age burial sites. Relatively fertile land, the area was farmed during the medieval period, with significant settlements such as Warkworth, Newbiggin and Widdington. ■ Former wagon ways are not only an important component of the industrial heritage, but also provide valuable access routes and corridors for wildlife and recreation. In some places former mining sites have been developed into recreational landscapes such as country parks,for example, Queen Elizabeth II Country Park and Wansbeck Riverside. ■ Plantation woodlands and parkland trees are a feature of the estates of several country houses, such as Gosforth Park, High Gosforth, Seaton Delaval, Woolsington and Blagdon. Planned landscapes, both recent and long established, and amenity and recreational landscapes have a widespread influence. In particular, the designed parkland of the historic Gosforth Park estate on the northern boundary of Newcastle. ■ A number of 19th-century rocket houses survive as a testament to the pioneering life saving brigades established by coastal communities. More recent features include Second World War defensive structures such as pillboxes, anti-tank cubes, anti-tank ditch and gun emplacements.
Rivers and estuaries flowing eastwards to the North Sea.	■ The whole coastal plain is low lying, rarely rising above 70 m AOD. It is crossed by the rivers Blyth and Wansbeck which flow eastwards to the North Sea. ■ The Blyth and Wansbeck river systems have cut down through the boulder clay drift to flow eastwards to the sea. The River Coquet along the northern border of the area is a SSSI for a variety of interests including its vegetation, birds, aquatic invertebrates and migratory fish. These major rivers are important components of ecological networks and of green infrastructure, providing corridors for wildlife and people. ■ Himalayan balsam, Japanese knotweed and giant hogweed are invading river banks at the expense of the local vegetation. ■ Tidal mud has been deposited, and salt marshes have developed along the estuaries of rivers. Those along the estuaries of the rivers Coquet, Blyth and Sleek Burn, are important roosting and feeding grounds for thousands of wading birds.

Landscape attribute	Justification for selection
Small inland wetlands are scattered throughout the area. Ponds formed in hollows created by the collapse of underground mine workings are numerous.	■ Within developed areas, subsidence ponds, landscape and amenity ponds have an important role to play for access, recreation and support important populations of species such as great crested newt. ■ Wet grasslands support breeding populations of waders such as snipe, lapwing, redshank and yellow wagtail. Some reedbeds remain on the edges of open water bodies as at Holywell, Gosforth Park Lake, Prestwick Carr and at East Chevington. ■ One of the most significant areas of natural habitat is the raised mire and associated habitats at Prestwick Carr, a wetland which is a priority for restoration and expansion.
Lowland grasslands and lowland heathland remain as fragments across the area and new habitats are developing on former colliery sites and other previously developed land.	■ Neutral grasslands have significantly declined in extent in the past century. Key sites include Arcot Hall, Gosforth Park and Havannah Nature Reserve. ■ A few lowland heathland sites remain, together with some development on post-industrial sites.

Landscape opportunities

- Maintain and enhance the species-rich coastal mud flats and salt marshes along the estuaries of the rivers Coquet, Blyth and Sleek Burn, and expansive stretches of unbroken sandy beach, backed by dunes.
- Deliver large-scale projects to benefit biodiversity, landscape and ecosystem services in priority areas such as Druridge Bay and Prestwick Carr.
- Create new ecological links between existing habitats and boundary features to reduce the effects of habitat fragmentation and development of a robust ecological network that connects isolated sites, buffers sensitive sites and allows wildlife to move in response to climate change. In agricultural landscapes this could include measures such as hedgerow restoration and creation, and creation of grass buffer strips around arable fields, and in urban landscapes creation of green infrastructure that will also provide new routes/areas for recreation.
- Restore, expand and create wetland habitats, particularly where these can play a part in ameliorating river or tidal flooding, and where they can contribute to sustainable urban drainage systems and take run-off from the extensive road network and hard standing associated with urban and industrial areas.
- Protect, manage and enhance characteristic inland priority habitats: lowland acid grasslands and heathland, lowland meadows, woodlands, raised mires, reedbeds and brownfield sites.
- Enhance early mine restoration areas through creation of hedgerows, woodlands, wetlands and better access and recreation opportunities, to better integrate the sites into local landscape patterns and improve their value for wildlife and people.
- Plan for high quality restoration schemes on current and future open-cast coal mining sites that maximise the value for wildlife and people and enhance adjacent priority areas such as the Heritage Coast at Druridge Bay.
- Protect past industrial landmarks whilst engaging communities with the area's heritage.
- Seek opportunities to provide and enhance green infrastructure through new development and settlement expansion.
- Plan sustainably for the creation of new landscapes associated with planned expansion around towns such as Cambois, Blyth and Cramlington, taking account of the cumulative impacts of new development.
- Manage coniferous woodlands to incorporate broadleaved tree species and achieve a more diverse age structure. Removal of inappropriately planted trees is also needed from brownfield sites of value for their open mosaic habitats and associated species such as dingy skipper.
- Plan for tree planting and creation of new native woodlands where they will contribute to restoring, expanding and linking existing semi-natural ancient woodlands, and where they can contribute to flood alleviation and water quality, such as willow and alder in wet riparian areas.
- Protect and manage the important geological sites for their value for education, research and public understanding of their natural environment, whilst allowing natural coastal processes to operate.

Ecosystem service analysis

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

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

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Food provision	Soils Semi-natural habitats (terrestrial and marine/coastal) Coast and sea Agricultural livestock breeds and plant varieties Precipitation	This is a mixed farming landscape with arable farming, livestock fattening and dairying. Cereals and oil seed rape are grown within the NCA and some root crops including potatoes and sugar beet. The majority of soils are Agricultural Land Classification Grade 3, and therefore of moderate productivity. The coastal location brings opportunities for fishing especially at the Amble Harbour and the Port of Blyth, out of which more than half of Northumberland's commercial fishing fleet operates[13]. In 2010 there were 28 trawling boats, 27 potting boats and 11 salmon boats operating commercially in the area, employing approximately 140 fishermen. These are usually joined by up to 130 visiting trawlers (from Northern Ireland, the West Coast and Scotland) for the winter prawn harvest[14].	Regional	"Sustainable intensification" could have an important role to play in maximising food production in this area while optimising environmental impact. Use of techniques such as precision farming, increasing resource efficiency and improving soil structure and organic matter could all play an important role. Improving soil quality could be very important in this area where there are large areas of reclaimed land on ex-mining sites, as these soils can often be thin, lacking in organic matter and prone to compaction, water logging and drought. Better soil quality and use of nutrients and chemicals could have a range **Continued on next page...**	Work with farmers to ensure that any intensification is sustainable and optimises; resource efficiency (fuel, agro-chemicals, and water), good soil management (particularly on reclaimed soils) and the use of precision farming techniques (especially along major rivers and near the coast where it will also help ameliorate water pollution).	**Food provision** **Regulating soil quality** **Regulating soil erosion** **Regulating water quality** **Regulating water flow** **Climate regulation** **Biodiversity**

[13] *Northumberland IFCA Strategic Environmental Assessment Scoping Report,* Mott MacDonald (2013) [14] *An Insight into the Fisheries Throughout the District of the Authority's Predecessor Body Northumberland Sea Fisheries Committee in 2010*, Northumberland Inshore Fisheries and Conservation Authority (2010) (accessed October 2013; URL: www.nifca.gov.uk/wp-content/uploads/2013/07/insight-Fisheries-2010-Final-1-May.pdf)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Food provision cont.				**... continued from previous page** of environmental benefits such as improving water quality, reducing soil erosion, regulating flooding and increasing carbon storage. A changing climate might result in opportunities to grow new crops. It could also cause increased problems with pests and diseases. The commercial fishery along this coast has contracted, with stocks greatly diminished by years of overfishing, particularly in the case of cod. Policies are in place to regulate the size and type of catch in order to help stocks recover. Locally sourced food, particularly seafood, has a role to play in attracting tourism and supporting the local economy.	Encourage management of farmland to improve soil structure and organic matter content such as minimum tillage, controlled farm traffic, appropriate timing of grazing and machinery use, incorporation of organic matter and use of green manure and cover crops. Encourage take-up of agri-environment schemes, particularly where this can help fund habitat creation on less productive land alongside more efficient use of resources. Encourage sustainable use of fisheries resources in terms of catch sizes, catch types so that fish stocks and marine ecosystems are maintained and restored.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Timber provision	Soils Woodland Precipitation	There is very little commercial forestry in the NCA. Of the 3,492 ha of woodland, only 881 ha is coniferous.	Local	With a high proportion of productive arable land and an open character to the landscape, this area has low potential for increased timber production. Woodland planting on restoration sites is one potential opportunity, but the thin poor soils on many of these sites may limit the quantity and quality of timber they could produce.	Explore opportunities for timber production from woodland planted on restoration sites, where this is compatible with recreation and nature conservation objectives.	**Timber provision** **Recreation** **Biodiversity**
Water availability	Watercourses Precipitation	The area receives an average of 700 mm of rain per year. The NCA does not overlay any major aquifers. Principal surface water resources within the NCA are the lower reaches of the River Coquet (along the NCA's northern border), the River Wansbeck and the River Blyth which all form part of the Northumberland Rivers Catchment Abstraction Management Strategy (CAMS) area. Although the predominant land use in the CAMS area is agriculture, the predominant use of **Continued on next page...**	Regional	As the majority of the land is either under arable cultivation or urban, the condition of agricultural soils and the permeability of urban land will both be of critical importance. Good infiltration rates on both types of land will help to slow the run-off into rivers and out into the North Sea, thereby moderating peaks and troughs in water availability. On agricultural land measures to improve permeability could include those to improve soil structure (controlled farm traffic, minimum tillage, avoiding compaction) and to increase organic matter (organic matter incorporation, green manures, and inclusion of fallow in rotations).	Encourage farmers to use best practice in soil management, in order to increase infiltration rates and water holding capacity and slow run off using techniques such as minimum tillage and controlled farm traffic to protect soil structure, and incorporation of organic matter and use of green manures to increase organic matter and cover crops, in-field grass strips and beetle banks to reduce rates of run-off. Encourage new developments to incorporate permeable ground surfaces, sustainable urban drainage systems, water efficiency features and rainwater/grey water harvesting.	**Water availability** **Food production** **Regulating water quality** **Regulating water flow** **Regulating soil quality** **Regulating soil erosion** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability cont.		**... continued from previous page** abstracted water (80 per cent) is domestic water supply, followed by industrial and commercial (11 per cent). The River Coquet is the greatest source of abstracted water in the CAMS area. All rivers in the area are assessed as having "water available". Most of the water bodies in the area are rated as having "consumptive abstraction available at least 95 per cent of the time". [15]		Measures to slow run-off could include grass or woodland buffer strips, in-field grass strips, beetle banks, hedgerow restoration and use of winter cover crops/green manure.		
Genetic diversity	Livestock breeds Wild plant species	Sea beet, a wild relative of sugar beet, grows along this stretch of coast [16].	Local	Native livestock breeds could play an important role in the wetland restoration within the NCA, as they are better suited to wetter ground and poorer grazing. Populations of sea beet may be at risk from coastal squeeze, so should be monitored and management undertaken to help the populations move as the coast erodes.	Encourage use of native breeds to help with wetland restoration and sand dune management, where appropriate, and encourage marketing of products from traditional breeds, linking them to the local landscape and wildlife. Monitor sea beet populations and manage sites to ensure that appropriate conditions exist for the species to move as the coast erodes.	**Genetic diversity** **Food production** **Biodiversity**

[15] *Northumberland Rivers Abstraction Licensing Strategy,* Environment Agency (2013) (accessed October 2013; URL: www.environment-agency.gov.uk/static/documents/Business/LIT_7872.pdf)
[16] *Crop Wild Relatives: Plant Conservation for Food Security*, Natural England Research Report NERR037, Natural England (2011) (accessed October 2013; URL: http://publications.naturalengland.org.uk/publication/31031)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biomass energy	Soils Woodland Biomass crops	The existing woodland cover (8 per cent) offers some potential for the provision of biomass. The NCA has medium potential short rotation coppice yield across most of its area but low potential yield to the east and south of Bedlington; potential miscanthus yield is medium. For information on the potential landscape impacts of biomass plantings within the NCA, refer to the tables on the Natural England website[17]. There are 17 biomass boilers in the NCA, providing 5,254 kWh, and 3 wood fuel suppliers.	Local	Biomass crops could be incorporated into some parts of the landscape. Short rotation coppice could be used to screen new development. Existing woodland could be brought under more proactive management, which would generate small amounts of woody biomass for local use. Such management should incorporate nature conservation objectives and ensure that woodlands retain standing and fallen dead wood, as well as a diverse age structure.	Encourage the use of short rotation coppice to screen new development and for incorporation into restored mining sites. Encourage management of existing woodland to provide woody biomass, where this is consistent with nature conservation objectives.	**Biomass energy** **Tranquillity** **Biodiversity**

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

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation	Soils Woodland and other vegetation	Soil carbon levels are generally low (0-5 per cent) but are likely to be higher under areas of woodland (3,500 ha / 8 per cent of NCA area) and the limited extent of unimproved grassland, lowland heathland, wetland, and coastal and floodplain grazing marsh habitats within the NCA. Carbon storage is also provided by the woodland itself. Small areas of peat soil (~4km^2) occur around Prestwick Carr and Pegswood Fen.	Regional	Increasing the area of woodland would help to sequester and store more carbon. The amount of carbon stored in agricultural soils could be increased by improving soil organic matter content through measures such as incorporation of manure/ straw/other organic matter, use of green manures and minimum tillage. Cultivation of permanent pasture can cause release of large quantities of carbon, so protection of permanent pastures will retain these carbon stores. Tree planting in certain locations can help with adaptation to climate change. As part of new developments they can have a cooling effect through both shade and transpiration. Along watercourses they provide shade, thereby maintaining lower temperatures and higher oxygen levels, and in some locations help to **Continued on next page...**	Encourage tree planting and woodland creation in locations that will help with adaptation to climate change (such as in new developments, on reclaimed land, as scattered trees on livestock grazing land and along watercourses) while increasing carbon sequestration and storage. Encourage good agricultural practice to minimise energy and resource use and maximise soil organic matter content.	**Climate regulation** **Food provision** **Biomass energy** **Timber provision** **Regulating water quality** **Regulating water flow** **Biodiversity** **Regulating soil quality**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation cont.				**... continued from previous page** minimise erosion of river banks by stabilising bank sides and reducing speed of run-off. These will be of benefit to riparian and aquatic wildlife, particularly fish stocks. On agricultural land they can provide shade for livestock and help to reduce water and wind erosion of soil. Mining reclamation sites often have both thin top soils and problems with soil compaction. This makes them particularly vulnerable to climate change; in terms of water logging, run-off and erosion during high levels of rainfall; and in terms of drought stress to vegetation. The worst effects could be modified by measures to improve soil structure, increase organic matter and the use of strategic tree planting to provide shade and stabilise steep slopes. The carbon sequestration potential of salt marshes could be increased by removing artificial landward barriers, and allowing the habitat to extend inland, and by reducing the nutrient load marshes receive from rivers and sea water, which can limit below ground carbon storage[18].		

[18] *Carbon Storage by Habitat: Review of the evidence of the impacts of management decisions and condition of carbon status and sources,* Natural England Research Report NERR043, Natural England (2012; URL: http://publications.naturalengland.org.uk/publication/1412347?category=40003)

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality	Geology Precipitation Soils Semi-natural habitats (particularly reedbeds and other wetlands)	Ecological river water quality is moderate or poor along large stretches of the NCA's main rivers, with the River Wansbeck also failing to achieve good chemical status, particularly for high levels of Tributylin at Sheepwash from an unidentified source[19]. The chemical status of groundwater is also poor[20]. The water quality along the coast is deemed to be good for both ecological and chemical quality[21]. There are seven designated bathing waters within the NCA (Amble Links, Druridge Bay North, Druridge Bay South, Newbiggin North, Newbiggin South, Blyth South Beach and Seaton Sluice) at which bathing water quality is usually good because sewerage and sewage treatment systems in the catchments that can affect these bathing waters have been designed to protect them[22]. Large amounts of run-off from the areas extensive road network, urban areas and past and current industrial sites are a potential threat to water quality.	Regional	Issues affecting the water quality in the NCAs rivers include sedimentation and nutrient enrichment resulting from diffuse pollution in agricultural areas, particularly in the River Blyth, urban run-off, particularly in Seaton Burn, and pollution from active and legacy mines. South East Northumberland's industrial legacy has caused contamination of both soils and water as a result of mining and heavy engineering. The Coal Authority have committed to running Bates pumping station in perpetuity, minimising risk of major pollution incidents from disused mines in this area[23]. Reed beds are being used to treat water from disused mines. Care should be taken to avoid mobilisation of pollutants through works which disturb soil or hydrology on ex-industrial sites. **Continued on next page...**	Work with farmers to reduce nutrient, agro-chemical and sediment load to watercourses through best practice measures to reduce risk of pollution (relating to chemical/nutrient use, farm infrastructure and soil quality). Seek opportunities to create grass buffer strips, riparian woodland, reedbeds, settlement ponds and other wetlands to intercept sediment, nutrients and chemicals in run-off. Work with water companies to reduce the level of nutrients and other pollutants discharged into watercourses and the sea from wastewater treatment works. Ensure that restoration schemes for ex-mining sites include measures to minimise pollution from mine-water or run-off/leachate from contaminated land, such as reed beds to treat mine water and permanent vegetation cover to slow run-off.	**Regulating water quality** **Food provision** **Regulating soil quality** **Regulating soil erosion** **Biodiversity**

[19, 22] Pers. comm. from Environment Agency [20] *Northumbria River Basin Management Plan,* Environment Agency (December 2009) (accessed October 2013; URL: www.environment-agency.gov.uk/research/planning/33106.aspx) [21] Environment Agency 'What's in Your Backyard?' maps, accessed online 24 July 2013 [23] *Assessing the Potential Consequences of Climate Change for England's Landscapes: South East Northumberland,* Natural England (2013)

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality cont.				**... continued from previous page** Climate change poses a potentially serious threat to water quality in the area through an increased risk of pollution and sedimentation from rapid run-off during high rainfall, and stress due to low water levels, high temperatures and inability of watercourses to dilute pollutants during periods of low rainfall and high temperatures. The water resources in this NCA are particularly at risk due to the high population density in the south and the relatively high proportion of arable land. Measures to reduce loads of pollutants and sediment reaching water bodies and wetlands will be very important in helping protect water quality during low flows and high temperatures. Coastal waters along the NCA are now in good ecological and chemical condition. Substantial investment in waste water treatment facilities saw the end of raw sewage discharge along much of the coast by 2005; however oil pollution remains a real and constant threat along the whole of the Northumberland coast, posing a threat to marine life, coastal habitats and sea birds[24]. The major rivers, wetlands and coastal waters in the area, and their flora and fauna, provide an important service in regulating water quality by diluting and carrying away pollutants. The salinity of coastal waters also helps to minimise proliferation of bacteria. Tree planting along watercourses could help to reduce diffuse pollution and sedimentation, where they intercept polluting run-off or slow erosion. Areas to the south of the River Blyth and the River Font are among those highlighted by Forest Research as priority areas for woodland planting for this purpose[25]. Maintaining and improving water quality would be of great value for recreational users in the area.	Ensure that the economic and environmental importance of the coast and offshore fisheries are taken into account in the oil pollution emergency planning process. Ensure that new developments include sustainable urban drainage systems, water efficiency features, rainwater harvesting and re-use of grey water, to minimise additional pressure on wastewater treatment works and pollution load to local watercourses.	

[24] *Druridge Bay: A Strategy for Management to 2010,* Druridge Bay Partnership (2006) [25] *Woodlands for Water Opportunity Mapping,* Forest Research (2012)

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow	Geology Soils Vegetation (particularly wetlands and woodlands)	The main catchments within the NCA are the rivers Coquet, Wansbeck and Blyth. The physical characteristics of the River Coquet catchment mean that it responds quickly to rainfall leading to a rapid onset of flooding. The rivers Wansbeck and Blyth drain a lowland agricultural area with gentle gradients in the west in the Mid-Northumberland NCA. Larger settlements where properties are at risk of flooding include Warkworth at the mouth of the Coquet (on the northern boundary of the NCA), Rothbury (upstream of the NCA) and Ponteland. Flood risk to people and property is highest in the east of the NCA. Most of the urban areas within the Wansbeck and Blyth catchments are at risk of flooding from the surface water drainage system[26]. **Continued on next page...**	Local	Flooding in this NCA is likely to be most influenced by activity to moderate flows upstream of the NCA, particularly in the upland headwaters in the Cheviots and the Northumberland Sandstone Hills. Within the NCA improving the infiltration speed of water through arable soils in the area could help to reduce rates of rainwater run-off and moderate peak and low flows. Measures to improve soil structure, organic matter and surface roughness could all have a role to play (also see "Regulating water availability" above). Areas such as wetlands and ponds, which offer a degree of flood protection, occur within the NCA, particularly on restoration sites, but are not currently recognised or protected in the local planning system. The risk of river flooding is likely to increase as a result of climate change. Opportunities should be explored for increasing flood storage within the floodplains of the major rivers.	Encourage good management of agricultural soils to improve water infiltration rates, slow run-off and increase water-holding capacity. Seek opportunities to create flood storage along river corridors, thus establishing wetland habitats such as wet pastures and reedbeds. Explore opportunities for increasing flood water storage by creating new ponds and wetlands, particularly on ex-mining restoration sites. Seek opportunities to increase water storage capacity in the flood plains of the major rivers.	**Regulating water flow** **Water availability** **Regulating water quality** **Regulating soil quality** **Regulating soil erosion** **Recreation** **Biodiversity**

[26] *Wansbeck and Blyth Catchment Flood Management Plan Summary Report,* Environment Agency (December 2009; accessed from www.environment-agency.gov.uk/research/planning/33586.aspx)

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow cont.		**... continued from previous page** There are areas in the flood plains, as well as many ponds and wetlands, which currently provide an element of flood storage and help to protect nearby properties from flooding. Large amounts of run-off from the areas extensive road network, urban areas and industrial developments can exacerbate peak flow events.		The extensive road networks and large areas of hard-standing in urban and industrial areas create a strong need for sustainable urban drainage systems and incorporation/ retrofitting of permeable surfaces.	Seek opportunities for tree and woodland planting where this will help slow run-off into rivers. Ensure that new developments are built in low flood risk areas and incorporate sustainable urban drainage systems and do not exacerbate flooding events by incorporating permeable surfaces and rainwater harvesting.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil quality	Soils Vegetation	The slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils, covering 66 per cent of the NCA and the slowly permeable seasonally wet acid loamy and clayey soils (14 per cent) have poor water infiltration heightening risks of flooding and diffuse pollution[27]. Restored soils over areas of past opencast mining (12 per cent) are often made up of a mix of different soils, with a loss of the original topsoil layer. These soils are frequently compacted, making them droughty in summer and waterlogged in winter as moisture finds it difficult to penetrate and compacted ground limits plant rooting.	Local	Management to improve the structure and organic matter content of agricultural soils in the area should be encouraged. Measures to protect soil structure could include: controlled farm traffic, aeration, minimum tillage, inclusion of deep-rooting plant species/ varieties into grass leys, appropriate timing of machinery use and grazing. Measures to increase soil organic matter could include the incorporation of straw, manure and compost, and the use of green manure and winter cover crops. Improving soil structure will not only increase agricultural productivity but also rates of rainwater infiltration, helping to reduce runoff and therefore water pollution, flooding and soil erosion. Increasing organic matter will improve agricultural productivity of soils while also increasing carbon storage and water retention. Increasing organic matter will be particularly beneficial on restored soils to help vegetation survive periods of low rainfall, thereby also reducing potential soil erosion.	Encourage agricultural practices which enhance soil structure and organic matter content, such as: minimum tillage, controlled farm traffic, appropriate timing of machinery use and grazing, incorporation of straw/ manure/ compost, use of cover crops or green manure. Explore opportunities to increase organic matter content of restored soils on agricultural land.	**Regulating soil quality** **Food provision** **Climate regulation** **Water availability** **Regulating water quality** **Regulating water availability** **Regulating soil erosion** **Sense of place / inspiration**

[27] *Soils Data (© Cranfield University (NSRI) and for the Controller of HMSO 2011)*

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion	Geology Vegetation	This area is not within a Defra Priority Catchment under the England Catchment Sensitive Farming Delivery Initiative (ECSFDI). The slowly permeable seasonally wet soils that dominate most of this NCA are at low risk of soil erosion. Areas at higher risk of erosion include: the small areas of slightly acid, loamy soils (easily compacted when wet, increasing the risk of erosion by surface water run-off, especially on steeper slopes); freely draining slightly acid loamy soils on moderately or steeply sloping land where bare soil is exposed; restored soils over past open-cast coal mines (often compacted and subject to erosion from rainfall that cannot infiltrate); sand dune soils (characteristically very droughty and unstable particularly in disturbed areas such as along paths and tracks). "Blow-outs" on dunes occur during strong winds with the extent of erosion dependent on the amount of vegetation cover[28].	Local	Arable soils, particularly those without cover during winter, are at risk of erosion, particularly in areas with large fields and few hedgerows or trees. Erosion risks can be minimised by ensuring that soil structure and organic matter content are optimised and that cover is established or soils subject to rough cultivation over winter. (See text on soils for "Water availability" above.) Hedgerows can play a valuable role in limiting wind erosion of soils, especially as this is a low, flat windswept area. Hedgerow restoration and planting could help reduce wind erosion risk, while also strengthening the habitat network and contributing to flood risk mitigation in some areas.	Encourage farmers to use best practice in soil management, in order to increase infiltration rates and water holding capacity and slow run off using techniques such as minimum tillage and controlled farm traffic to protect soil structure, and incorporation of organic matter and use of green manures to increase organic matter and cover crops, in-field grass strips and beetle banks to reduce rates of run-off. Encourage retention, sympathetic management, restoration and planting of hedgerows.	**Regulating soil erosion** **Food provision** **Regulating water quality** **Regulating water flow** **Biodiversity**

[28] *Soils Data (© Cranfield University (NSRI) and for the Controller of HMSO 2011)*

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pollination	Semi-natural habitats Gardens, parks and allotments Pollinator species	The NCA has low coverage of crops needing insect pollination (1,650 ha of oilseeds). However many wild plants rely on insect pollination, as do many domestically grown fruit and vegetable plants. The small patches of lowland heathland, flower-rich grassland and wetlands provide important nectar sources for pollinating insects, but these are highly fragmented and widely dispersed.	Local	Habitat for pollinators could be improved in this area through more sensitive management of hedges (cutting every two years or less often, gapping up and restoring hedges, replanting lost hedges) and provision of nectar-rich habitats in intensive arable areas (such as pollen and nectar mix areas and flower-rich grassland through agri-environment schemes). Urban areas within the NCA could also be managed for the benefit of pollinators, by using nectar-rich plant varieties in municipal planting schemes, encouraging home-owners to grow nectar rich plants and encouraging use of nectar-rich plants in planting schemes and green roofs within new developments.	Protect and restore hedgerows and encourage less frequent cutting to allow greater flowering. Encourage creation of nectar-rich habitats on farms, particularly in intensive arable areas. Encourage use of nectar-rich plant varieties in municipal planting schemes, private gardens and new development.	**Pollination** **Food provision** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pest regulation	Semi-natural habitats Beneficial predator species	Hedgerows, grassland and heathland, as well as arable headlands, provide habitat for predators of pest species, which could potentially be of benefit to arable crops. Direct evidence of the state of the service in the NCA is, however, lacking, and supporting habitat is mostly either small and fragmented or in poor condition.	Local	There is some evidence to suggest that certain habitats (such as hedges, flower-rich buffer strips, unimproved grassland) can support populations of beneficial predator species which can help control common agricultural pests (for example, ladybirds can control aphids)[29]. Habitats which provide a nectar source, shelter and additional prey species all have the potential to increase beneficial predator numbers. In this area the primary habitats for beneficial predators are likely to be hedges, grassland, lowland heath, buffer strips and headlands. Studies suggest that hedgerows cut every year have less value for invertebrates, so less frequent cutting of hedges in this area, could help support higher numbers of beneficial predators. Where pest regulation services are provided by semi-natural habitats and associated species, this could reduce the need for pesticides, thereby affording benefits for water quality, soil quality and wider biodiversity. If the approach could be perfected for this area, to maximise the agronomic benefits, it could play a valuable role in terms of increasing production of arable crops while minimising negative impacts on the environment.	Support research into the pest regulation services offered by semi-natural habitats in the area, and how the agronomic benefits could be maximised. Communicate any clear benefits of natural pest control to farmers and provide information on how to manage crops and adjacent land to maximise beneficial predator numbers. Encourage farmers to cut hedges less frequently than every year, to provide habitat for beneficial predators, wildlife movement corridors and a range of other ecosystem services. Encourage uptake of agri-environment options to provide habitats within arable areas, such as pollen and nectar mixes, beetle banks and buffer strips.	**Pest regulation** **Food provision** **Regulating water quality** **Biodiversity**

[29] *Ecosystem Services from Environmental Stewardship that Benefit Agricultural Production,* Natural England (2012)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating coastal erosion and flooding	Geodiversity Semi-natural habitats (including dunes, salt marshes and mud flats)	The present coastline comprises well-defined and relatively stable bays, backed by dunes or slowly eroding glacial deposits, held by harder headlands or areas of rock exposed over the foreshore. Rates of coastal erosion along this coastline are relatively low (approx. 0.3 m/yr). There is a net longshore sediment transport from north to south, but despite this coast being exposed to high wave energies the rate of sediment transport is relatively low, with sediment movement mostly within bays[30]. Cross-shore sediment transport during storm events has been an issue at Newbiggin Bay, leading to the undermining of defences. Subsidence due to past mining activity underneath the sea bed has led to a general lowering of the bay by 1 to 2 m, increasing erosion and redistribution of sediment. **Continued on next page...**	Regional	Coastal defence policies along this NCA's coastline set out in the Shoreline Management Plan are a mixture of 'managed realignment', 'no active intervention' and 'hold the line'. An example of managed realignment which may offer opportunities for habitat enhancement is Druridge Bay South with potential creation and management of tidal incursion behind the dunes[31]. Natural features which could be impacted by coastal erosion include the Tynemouth to Seaton Sluice SSSI which provides one of the best exposures of Coal Measures strata in Great Britain, the Northumbria Coast SPA/Ramsar and a variety of SSSI. There are a number of important Mesolithic archaeological sites along the coast which are extremely vulnerable to coastal erosion, such as at Hauxley. The coastline at Low Hauxley is particularly vulnerable to erosion, due to its geology and location, and is forecast to erode by 42 m by 2060[31].	Conserve, enhance and manage coastal habitats to ensure that they are robust and functioning well (for example by dissipating wave energy, being resilient to high tides and storm events). Explore opportunities for allowing coastal habitats to extend inland, by removing artificial barriers where appropriate, to help them roll back as the coastline retreats. Encourage timely excavation of important coastal archaeological sites, so that they can be recorded before they are lost to the sea. Pursue opportunities for the restoration and creation of coastal wetlands to deliver benefits for coastal flooding and erosion, as well as biodiversity, water quality, sense of place and recreation.	**Regulating coastal erosion and flooding** **Regulating water quality** **Regulating soil erosion** **Sense of place / inspiration** **Sense of history** **Biodiversity** **Geodiversity**

[30] *Northumberland Shoreline Management Plan 2 (Final report),* Royal Haskoning (2009; URL: www.northumberland-smp2.org.uk)

[31] *Assessing the Potential Consequences of Climate Change for England's Landscapes: South East Northumberland,* Natural England Research Report 045, L Speakman, N Macgregor, N Van Dijk, G Darch and A Neale (2013)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating coastal erosion and flooding cont.		**... continued from previous page** Wind transport moves significant quantities of sand at Druridge Bay, due to its wide open shape and with its dune systems acting as a reservoir of material that is returned to the beach during offshore wind conditions[32]. The estuaries of the rivers Coquet, Blyth and Wansbeck are all net sinks for sediment and are subject to maintenance dredging, with siltation a particular problem in Coquet harbour and marina[32]. Coastal salt marshes and mud flats protect the coast by dissipating wave energy and reducing erosion. The dune systems, as well as being priority habitats, make an important contribution to flood protection. The dune line is cut in several locations by streams, many of which flow from ponds inland. The streams are generally controlled with sluices, with the exception of Cresswell and are often cut off by beach material. The town of Blythe is set in a low-lying basin and subject to coastal flooding[32].		The sand dune systems have suffered erosion in the past as a result of being destabilised by sand extraction and overgrazing. Ensuring that dunes are managed sensitively, with appropriate grazing levels and vegetation cover, will give them optimum wildlife value and resilience to erosion. Many of the area's sand dunes are also restricted due to artificial landward barriers (roads, fences, intensively managed farmland) that prevent inland development of dune systems. Creation and restoration of coastal wetlands, particularly in the north behind Druridge Bay, could help to reduce the impact of coastal flooding, by receiving and holding sea water during the highest tides, as happens currently at Cresswell Ponds. However the most suitable sites exist in areas of low population density so are unlikely to deliver significant benefits for large numbers of local residents. More significant coastal change could arise from sea level rise associated with climate change.		

[32] *Royal Haskoning (2009)*

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
A sense of place/ inspiration	Typical habitats (dunes, woodland, salt marshes and other wetlands) Coast and seascapes Topography Geodiversity	A sense of place is provided by a strong history of mining and reclamation which has resulted in a landscape of industrial and urban character, interspersed with: large, regular arable and occasional pastureland bounded by low gappy hedges; and prominent blocks of mixed or coniferous woodland on reclaimed spoil heaps, deciduous woodland on steep sided valleys and within estate parklands, country parks, Local Nature Reserves and other local green spaces, together with and institutional establishments. This inland landscape contrasts with the mud flats, salt marshes and expansive stretches of sandy beaches and dunes and small rocky peninsulas along the coastline. The character of settlements in the area is very diverse from mining villages, such as Ashington, traditional fishing villages, such as Amble, to the "New Town" of Cramlington)[33]. Feelings of inspiration and escapism are likely to be associated with the expansive views across the open, exposed sweeping sandy beaches and rocky headlands, rich mud flats and salt marshes. The large areas of development marred slightly by a largely developed coastline[34].	Regional	Some reclamation sites have been designed to standard schemes and can be lacking in character that roots them in the local area. Future schemes should give consideration to inclusion of features that reflect local characteristics, such as locally appropriate tree species and boundary styles, and make them more appealing, both visually and for recreational use. While many restoration schemes have resulted in a lack of character and landscape features, some have added new features to the landscape, such as "Northumberlandia" a reclining female figure created by landscape artist Charles Jencks at Shotton Surface Mine between 2010 and 2012. The coast makes a very strong contribution to sense of place, and measures that help typical coastal habitats to roll-back as the coast changes and that facilitate coastal access and recreation while minimising disturbance or damage, will all help to preserve this inspirational landscape and its strong sense of place.	Protect undeveloped areas on the coast. Ensure that new development incorporates green infrastructure that links with open greenspace and allows for sustainable modes of transport. Provide interpretation of ex-mining sites to promote the significance of mining heritage to local character and culture.	**Sense of place / inspiration** **Tranquillity** **Recreation** **Biodiversity**

[33] Countryside Character Descriptions, Natural England (regional volumes published by Countryside Commission/Countryside Agency 1998/1999)
[34] Further supported by the research 'Capturing the cultural services and experiential qualities of landscape' (2009), Research Box, Land Use Consultants and Rick Minter for Natural England, NECR024

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history	Archaeological sites Settlement patterns Field boundaries	A sense of history in the area is primarily derived from settlement patterns (mining towns), building styles (local sandstone, brick and slate terraces) and infrastructure (wagon ways, spoil heaps and winding gear) from the rise of the coal industry in the 18th and 19th centuries. Large country estates and parklands, such as Gosforth Park, Seaton Delaval and Blagdon, also contribute to the sense of history in the area, as do defensive structures from the First and Second World Wars along the coast, such as pill boxes at Low Chibburn and Helmscott Hill. Historic settlements exist along the coast that developed with the salt and fishing industries. The area also has important Mesolithic remains on the coast that have been revealed through westward coastal erosion, such as at Hauxley. **Continued on next page...**	Regional	Mesolithic sites along the coast are extremely vulnerable to loss through coastal erosion. This has prompted the establishment of projects to excavate and catalogue sites before they are lost, as at Hauxley. Opportunities exist to excavate and record other sites, and to provide interpretation. Understanding and appreciation of mining heritage could be enhanced by providing more interpretation material, particularly on sites where mining infrastructure has been completely removed and sites lack historical context. As many below ground archaeological remains may have been lost on mining sites, protection of surviving earthworks is particularly important. For sites on arable land opportunities should be explored for removing sites from cultivation or for introducing less damaging management such as shallow cultivation or minimum tillage.	Excavate and record coastal archaeological sites that are at risk of loss through coastal erosion. Provide interpretation and educational opportunities at mining sites, particularly where visible reminders of mining have all been removed, to help people understand and appreciate their significance. Explore opportunities for better management of below-ground archaeology on arable land, such as establishment of permanent grassland, shallow cultivation or minimum tillage agriculture, and encourage uptake of agri-environment schemes to fund such work. Protect historic buildings and structures such as parkland features, First and Second World War defensive structures, traditional farm buildings and mining infrastructure.	**Sense of history** **Sense of place / inspiration** **Recreation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history cont		**... continued from previous page** Some ex-mining reclamation sites are lacking in historical context, with pre-mining historic features having been destroyed and mining infrastructure removed. The Woodhorn Museum and Northumberland Archives provide educational opportunities relating to coal mining and industrial heritage, including exhibitions of mining banners and the world famous Ashington Pitmen Paintings.		Removal of hedgerows and loss through neglect erodes the historic character of the open countryside through loss of the large regular field patterns typical of planned enclosure of open common fields in the 18th and 19th centuries. Hedgerows should be retained and sympathetically managed, and restoration encouraged.	Retain the historic field-boundary network and ensure hedgerows are sympathetically managed and restored where necessary.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Tranquillity	Coast and coastal habitats Woodland	The NCA has experienced a sharp decline in tranquillity levels. Undisturbed areas have decreased from 46 per cent in the 1960s to 13 per cent in 2007. Remaining areas of tranquillity are concentrated around Druridge Bay and west of Widdrington. Characteristics of the landscape that are particularly important in conveying a sense of tranquillity are the semi-natural deciduous woodlands largely confined to river valleys, and mud flats and salt marshes of the rivers Wansbeck, Blyth and Seaton Burn[35].	Regional	As settlements grow and local population increases, pressure on popular sites of relative tranquillity, such as country parks, historic parklands and the coast will increase. This is a particular threat in this NCA due to the concentration of urban areas and settlements both within the NCA and just to the south. Negative impacts of increased visitor numbers could be minimised through careful planning of transport routes, provision of public transport and cycle routes to minimise private car use and design and management of public access routes and infrastructure.	Protect undeveloped areas of coastline. Manage access to popular more tranquil areas to minimise negative impacts and disturbance, through measures such as disturbance by providing cycle routes and public transport to minimise private car use.	**Tranquillity** **Sense of place / inspiration** **Recreation** **Biodiversity**

[35] *National Tranquillity mapping data and Intrusion map data,* CPRE (2006/2007)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation	Coast Sea Rivers Country parks Lowland heath Local Nature Reserves Woods for people	The NCA offers a network of rights of way totalling 390 km at a density of less than 1km per km2 and a limited area of open access land totalling 223 ha [36]. There are gaps in the current footpath network, with some routes ending in dead ends as a result of previous development or uncrossable rivers. The area has a limited and fragmented bridleway network but opportunities to improve this have been pursued. There is good provision for cyclists, with a number of cycle tracks linking some of the main settlements. The main strategic cycling route passing through the area is the Coast and Castles cycle route linking Tynemouth with Berwick-upon-Tweed. Popular locations for recreation include: Gosforth Park, the setting of the Newcastle racecourse; Newcastle Great Park; and seven country parks including Queen Elizabeth II Country Park, Druridge Bay, Wansbeck Riverside Park and Bedlington. Ashington Community Woodlands and numerous urban parks also provide local communities with nearby access to greenspace. **Continued on next page...**	Regional	The most important assets for recreation in the NCA are the coast and sea, a large number of country parks and restored colliery sites now open to the public as nature reserves. Most of these are near large urban populations. The Rights of Way Improvement Plan identifies a number of gaps and needs. There are significant gaps in the footpath network, with many routes coming to a dead end because of uncrossable rivers or new roads/developments. Although there are a number of riding stables and livery businesses and a burgeoning cycling community in the area, the bridleway network is poor. There is a demand for better access along some of the NCA's rivers (particularly the River Wansbeck) and woodland (particularly North Ashington Woods).	Protect and enhance the quality of recreational facilities and access opportunities for users of all abilities, particularly at the coast, country parks and nature reserves, while seeking to minimise disturbance, particularly to protection bird populations and designated sites. Seek opportunities to bridge gaps in the rights of way network, particularly crossings over rivers and busy roads. Seek opportunities to enhance the bridleway network and opportunities for traffic-free cycling and horse riding routes.	**Recreation** **Food production** **Regulating water quality** **Sense of place / inspiration** **Sense of history** **Biodiversity**

[36] Open Country GIS data, Natural England (2004), Public Rights of Way Density, Natural England (2003)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation cont.		**...continued from previous page** The area's special importance for birds provides excellent opportunities for bird watching, and the coast and major rivers provide the perfect place for a range of water sports.		In the urban fringe area to the south of the NCA levels of outdoor recreation are lower than the average for Northumberland and levels of poor health are higher[37]. Fishing and bird watching are hugely popular activities both along the coast and inland, especially along the major rivers and at wetland sites. Potential to improve opportunities for these activities while protecting fish stocks and avoiding disturbance to birds should be explored. The coast and rivers provide opportunities for a wide range of water sports such as swimming, canoeing and windsurfing. Water quality should be maintained and improved wherever possible for the benefit of both wildlife and recreational users. The area has some very important industrial and pre-historic archaeological sites that are not easily readable by a casual observer. Interpretation of sites such as restored colliery sites and bronze-age remains along the coast would increase understanding and appreciate of the area and enhance recreational enjoyment. Beach litter is becoming an increasing problem in the area, comprising a mix of domestic waste, fisheries waste and also war-time barbed wire and spiral posts revealed from eroding dunes.	Seek opportunities to improve water quality for the benefit of wildlife and recreational users in the area by working with water companies, farmers, fishermen, restoration site owners, developers, local residents and industry to minimise diffuse and point source pollution. Seek opportunities to provide interpretation of less visible archaeological sites such as restored industrial sites and buried pre-historic sites along the coast. Promote the use of local greenspace for recreation and outdoor education close to where people live, allowing local communities to enjoy their environment, take action to improve it and benefit from the health and social rewards it offers.	

[37] *Northumberland Rights of Way Improvement Plan,* Northumberland County Council (2007; URL: www.northumberland.gov.uk/default.aspx?page=2223#Rights)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity	Coast Habitats Species Rivers, ponds and wetlands Geodiversity	A large proportion of the NCA's nature conservation designations are concentrated around Druridge Bay in the north-east of the NCA – SSSI, Northumbria Coast SPA, North Northumberland Dunes SAC, Northumbria Coast SAC – in recognition of its mosaic of important coastal habitats (such as dunes, dune slacks, lagoons) and internationally rare bird species. Coquet Island supports one of only two UK breeding populations of roseate tern as well as Arctic tern, common tern, Sandwich tern and puffin. The rivers (Coquet, Wansbeck and Blyth) and their valleys are an important wildlife resource supporting fragments of ancient woodland and species such as otter, water vole and white-clawed crayfish. **Continued on next page...**	National	The coast is one of the NCA's primary wildlife assets, particularly in the north around Druridge Bay. This area is of great importance for wading birds, and is recognised by the inclusion of this area in the Northumbria Coast SPA. The wildlife value of the area could be protected and enhanced by creating new areas of coastal habitats, such as salt marsh, in order to extend existing habitats back from the coast to help them survive coastal erosion, and to create space to allow dune roll-back (opportunities exist to the south of Druridge Bay). Improvements in estuarine and coastal water quality would also enhance the wildlife value of the coast, as would action to reduce the amount of litter washed up and dumped along the coast. The rivers of the NCA are of significant importance for wildlife, supporting populations of otter, water vole and salmonids. The River Wansbeck supports one of the best populations of native white-clawed crayfish in western Europe. Sedimentation and artificial barriers to migration undermine the value of the rivers for salmonids and the Northumberland Rivers Trust is working to address these and other issues affecting the water quality and ecology of rivers in the area.	Work with water companies, farmers, developers, fishermen and local residents to improve water quality in rivers, estuaries and along the coast, and to reduce the amount of litter washed up and left on the areas beaches. Create new areas of coastal habitat to extend existing habitat and allow "roll-back". Create new areas of woodland, lowland heath, permanent grassland (acid grassland and meadows) and wetlands (fens and reedbeds) in locations where they will not detract from other ecosystem services and where they will: provide links or stepping stones fragmented habitats, particularly along watercourses; extend or buffer priority sites; or provide stepping stones between isolated habitats.	**Biodiversity** **Food provision** **Climate regulation** **Regulating water quality** **Regulating coastal erosion and flooding** **Sense of place / inspiration** **Tranquillity** **Recreation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity cont.		**... continued from previous page** Ponds and wetlands, resulting from mining subsidence, are also important habitats. The area is also important for great crested newt.		The landscape in this area is of relatively low permeability to wildlife due to high levels of development, dense transport infrastructure and high coverage of arable land. Measures to improve connectivity, in rural and urban areas, and buffer priority sites could make a huge contribution to improving the viability of wildlife populations and their ability to move and adapt to climate change.	Enhance features that act as wildlife movement corridors or stepping stones in urban areas, such as river corridors, green routes, parks and gardens. Remove barriers to fish migration along rivers, or install fish-passes where complete removal is not appropriate. Enable rivers to return to more natural courses, where feasible, thereby allowing active geomorphological processes to take place. Encourage use of Local Nature Reserves, country parks, restoration sites and other green spaces near to settlements, for education and to engage people with their local wildlife through volunteering and events such as "Bio-Blitz" surveys.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Geodiversity	Carboniferous and Quaternary Geology Watercourses Coast	2 geological SSSI (Cresswell and Newbiggin Shores, Low Hauxley) and 1 mixed interest SSSI (Tynemouth to Seaton Sluice). There are no designated Local Geological Sites because the audit has not yet reported. Low Hauxley Shore SSSI contains important Quaternary deposits including fluvial, peat, till, dune sand and soil horizons, and is valuable for the understanding of past sea-level change. Cresswell and Newbiggin Shores SSSI is an outcrop exposing strata from the Middle Carboniferous Period indicating the geographic conditions and tectonic activity (earth movements) during this period and is also an important location for studying glacial till.	Local	As the area currently lacks any Local Geological Sites, there is potential to identify some sites, particularly in the Druridge Bay area.	Conserve manage and promote geological and mixed interest SSSI. Encourage the establishment/ development of a local geoconservation group to finalise the geological audit and work with the local authority to notify and manage these sites as Local Geological Sites Where possible, use important geological sites as an educational resource, particularly to increase awareness of past climatic change, the formation of the Coal Measures and the influence of these on the industry, landscape and culture of the area. Seek opportunities to improve access to key geological sites and provide interpretation and educational activities to help visitors understand the significance of the sites and the area's geological past.	**Geodiversity** **Sense of history** **Sense of place / inspiration** **Recreation**

Photo credits

Front cover: Straw Bales near Ponteland © Natural England/David Key
Pages 4, 5, 8, 9, 27, 32: © Natural England/Graeme Peacock
Pages 7, 33: © Steve Scoffin
Page 14: © Archaeological Research Services Ltd
Page 16: © Natural England/John Morrison

Natural England is here to secure a healthy natural environment for people to enjoy, where wildlife is protected and England's traditional landscapes are safeguarded for future generations.

Catalogue Code: NE498 ISBN 978-1-78367-058-1

Should an alternative format of this publication be required, please contact our enquiries line for more information:
0845 600 3078 or email enquiries@naturalengland.org.uk

www.naturalengland.org.uk