





## Introduction

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

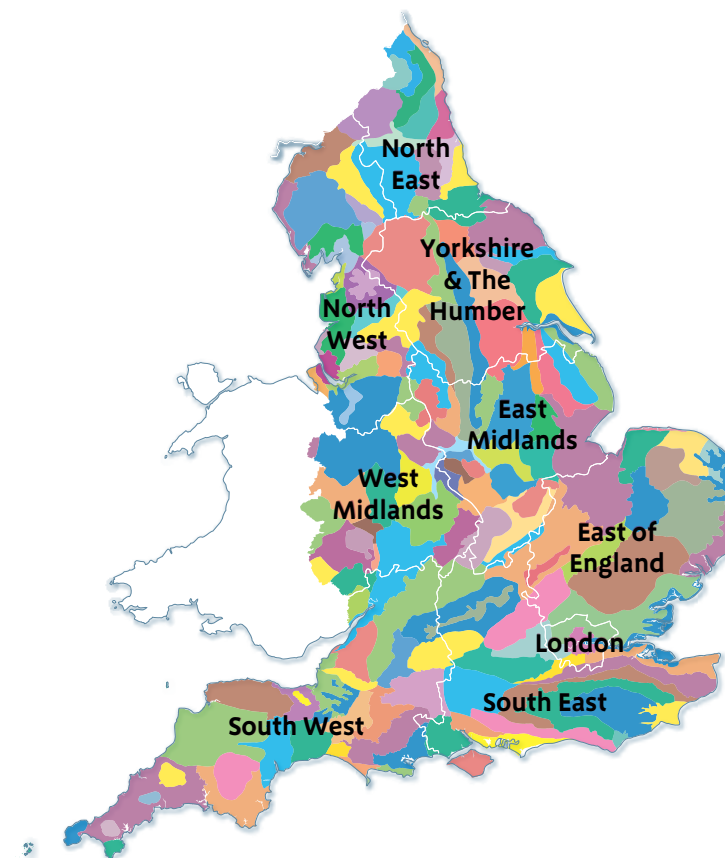
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and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

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

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

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

## National Character Areas map



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

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

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

### Summary

The Tees Lowlands National Character Area (NCA) forms a broad, open plain dominated by the meandering lower reaches of the River Tees and its tributaries, with wide views to distant hills. The large conurbation around the Lower Tees and Teesmouth contrasts with the rural area to the south and west, which is largely agricultural in character. The mosaic of intertidal and wetland habitats within the Tees Estuary are internationally designated as Teesmouth and Cleveland Coast Special Protection Area and Ramsar site, due to their importance for waterfowl. These areas are in close proximity to heavy industry, which has developed due to the estuary's strategic location close to; mineral reserves, a network of main roads, railways and Teesport. Industrial installations form a dramatic skyline when viewed from the surrounding hills. Early successional grasslands and scrub have also emerged on previously developed land; these brownfield sites have significant biodiversity value.

Agricultural land is intensively farmed, with large fields and sparse woodland, and a settlement pattern influenced both by the river and by past agricultural practices. Areas of parkland and more extensive woodland are found to the north-west. Recent changes include the development of infrastructure associated with the energy industry, in particular onshore and offshore wind farms.

Dynamic processes of sediment movement influence the coastline in this NCA, and the protection of intertidal habitats through managed realignment will be a key challenge. Protection and expansion of wetland areas can help to reduce flood risk in urban areas, and this should be a priority along with the restoration of wildlife-friendly habitats and low intensity land uses in rural areas. Other future challenges include adapting agricultural practices to mitigate the impacts of climate change, and linking green corridors in urban areas to form a strategic green infrastructure network.

Click map to enlarge; click again to reduce.



The Tees Lowlands are dominated by high quality, mainly arable farmland with scattered trees and hedgerows.

### Statements of Environmental Opportunity

- **SEO 1:** Protect and enhance the unique landscape of the Tees Estuary with its mosaic of internationally important intertidal, wetland and brownfield habitats.
- **SEO 2:** Incorporate semi-natural habitats within the farmed environment, and use innovative farming techniques in order to improve the value of food provision alongside biodiversity, flood water storage capacity, and the ability of the landscape to adapt to the impacts of climate change.
- **SEO 3:** Ensure that there is a well-connected network of high-quality green infrastructure throughout the Tees Lowlands which will enable people to understand and enjoy the natural environment, as well as providing a range of other benefits including biodiversity enhancement, food provision and flood risk mitigation.

## Description

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

The Tees Lowlands National Character Area (NCA) forms a broad, low-lying plain framed to wide views to the south-east towards the North Yorkshire Moors and Cleveland Hills NCA, which rises dramatically in a steep escarpment. To the west, the land rises gradually into the Pennine Dales Fringe NCA. The Tees Lowlands NCA merges with the more undulating Durham Coalfield Pennine Fringe and the Durham Magnesian Limestone Plateau NCAs to the north, and with the Vale of Mowbray NCA to the south. The low-lying mouth of the River Tees gives way to a dynamic coastline of unstable cliffs to the north-west and south-east.

The River Tees has its origin in the high fells of the North Pennines to the west, while its major tributary, the River Leven, rises in the Cleveland Hills to the south. Management of both of these upland areas therefore has the potential to have an impact on fluvial processes in the Tees Lowlands. The surrounding uplands are also breeding areas for wading birds which occur on the Tees Estuary in large numbers during the winter.

There are a number of major transport corridors through the NCA. The East Coast Main Line railway, the A1(M) motorway and A19 trunk road provide links through the Vale of Mowbray NCA to the south, and northwards to the Tyne and Wear conurbations and beyond.



Wide views are afforded from the steep escarpment of the Cleveland Hills over the broad, low-lying plain to the industrial development beyond.



### Key characteristics

- A broad, low-lying and open plain of predominantly arable agricultural land, with low woodland cover and large fields, defined by wide views to distant hills.
- A large area of urban and industrial development around the Tees Estuary, much of which is on reclaimed land, contrasts with the quieter rural areas to the south and west.
- Major industrial installations around Teesmouth form a dramatic skyline, but are juxtaposed with expansive mudflats, sand dunes and salt marshes which are nationally and internationally designated for their assemblage of waterfowl.
- Slow-moving rivers Tees and Leven meander through the landscape with steep, well-wooded banks.
- A distinctive area of low-lying farmland with remnants of former wetland habitat in the flood plain of the River Skerne to the north-west.
- Permo-Triassic red mudstones and sandstones are masked by glacial drift and alluvial material but can be seen outcropping at the coast in places.
- Principal transport corridors, power lines and energy infrastructure are conspicuous elements in the landscape.
- Brownfield sites where semi-natural vegetation has started to regenerate on previously developed land.
- Green corridors such as minor valleys and former railway lines provide links between urban areas and the surrounding countryside.



Industrial development fringing the tidal reaches of the River Tees contrasts with the surrounding rural landscape.

### Tees Lowlands today

The Tees Lowlands NCA forms a broad, low-lying plain around the lower reaches of the River Tees, which meets the North Sea at Teesmouth on a north-east facing coastline. It is defined to the south-east by a steep escarpment to the plateau of the Cleveland Hills, with more gradually rising land to the west. The underlying geology of the area consists principally of red mudstones and sandstones, but this is overlain by a thick layer of glacial and alluvial drift material. However, sandstones and shales can be seen outcropping at the coast in places.



Large-scale industrial installations such as the nuclear power station at Hartlepool are juxtaposed with internationally designated inter-tidal habitats.

The conurbation centred on Middlesbrough, Stockton-on-Tees and Billingham forms a large area of urban and industrial development fringing the tidal reaches of the River Tees. Around the mouth of the estuary there is a large amount of heavy industry, including chemical and oil refining works, a nuclear power plant and container terminals, which extends eastwards towards Redcar and northwards towards Hartlepool. Much of this is on reclaimed land, which also contains significant areas of grassland and scrub.

Contrasting with this extensive urban development is a quiet rural hinterland. To the south and west of Teesside, the slow-moving rivers Tees and Leven meander through a rural landscape of high-quality agricultural land, predominantly arable, with scattered trees and hedgerows. Although woodland cover as a whole is relatively low, the steep riverbanks feature deciduous woodland, especially in the deeper meanders, with artificial embankments in places and a few bridging points. The market towns of Yarm and Stokesley, as well as a number of small villages, are found in this area. The River Skerne flows from the north-west of the NCA through the industrial town of Darlington. Green corridors provide links from the rural hinterland into the urban area, including routes along former railway lines, and watercourses such as the five Beck Valleys of Middlesbrough which flow northwards into the lower reaches of the Tees from the escarpment south of Middlesbrough.



The large-scale industrial installations at Teesmouth form a dramatic skyline, but this is juxtaposed with areas of significant nature conservation importance, which have been internationally designated as part of Teesmouth and Cleveland Coast Special Protection Area and Ramsar site. The mudflats and sand flats, salt marsh and dune systems at North and South Gare and Seal Sands and Bran Sands, wet grassland at Cowpen Marsh and salt marsh at Greatham Creek support important numbers of little tern, sandwich tern, knot and redshank, as well as both common and grey seals. The unique mosaic of heavy industry and valuable wildlife habitats has arisen partly as a result of the inland pools which emerged due to subsidence following brine extraction. There is also archaeological and geological interest in this area such as the Hartlepool Submerged Forest, which contains 5,000-year-old peat deposits.

To the north and west of Billingham is a more undulating rural landscape, with some pasture and wooded areas, most notably in and around the parkland estates of Wynyard Park and Hardwick Park. The low-lying farmland in the flood plain around the south-flowing River Skerne, in the far north-west of the NCA, was once occupied by extensive areas of fenland and carr habitat.

A major north-south transport corridor, which includes the A1(M) motorway and East Coast Main Line railway, runs through the NCA. Other major routes include the A19 and A66 through the Teesside conurbation and the iconic Transporter Bridge across the Tees. These routes, together with other infrastructure elements such as power lines and wind turbines, form conspicuous elements in the landscape, particularly around the Teesside conurbation.



This tidal scrape at Seal Sands is one of a number of different inter-tidal habitat types found at Teesmouth.



### The landscape through time

The red mudstones and sandstones which form the underlying geology of the Tees Lowlands NCA are principally of Permo-Triassic age, laid down during desert conditions. These were replaced by successively deeper seas, resulting in different bedrock types deposited above. Some Jurassic sandstones and shales are present, as evidenced by the Lower Jurassic sandstone sequence which outcrops at the coast at Redcar. The Cleveland Dyke intruded into the area as the Atlantic Ocean opened during the Tertiary Period. At Hartlepool Bay, extensive peat deposits preserve the story of a post-glacial mixed deciduous woodland subject to climate changes, successive marine transgressions and increasing human interaction.

The Tees Lowlands has always been an important agricultural area, its forest cover having been largely cleared more than 2,000 years ago. There is evidence of Roman influences in the landscape, such as Dere Street, a Roman road which now forms part of the modern A1 and B6275, and the fortified crossing of the River Tees at Piercebridge. There is also evidence of Roman activity at Ingleby Barwick, Linthorpe and Warrenby. There were few bridging points across the river, but extensive use was made of fords and ferries, and villages were sited beside the river to make use of its resources. There was a relatively large rural population during the medieval period when mixed farming was practised, the ploughing resulting in strips of ridge and furrow that were preserved by subsequent pastoral land use and still survive in parts of the area. Villages are largely of Norman origin with a linear plan of farmsteads either side of a village green. There was a difference in character between villages to the north and south of the River Tees, with those to the north being under the ownership of the Bishop of Durham and having monastic influence, while those to the south appear to have been wealthier. Many villages were deserted or contracted between the 14th and 18th centuries, while larger market towns such as

Darlington, Yarm and Stokesley developed during the 18th and 19th centuries. Agricultural intensification from the late 18th century led to the loss of hedgerows to form larger field units, investment in new courtyard farmsteads for yard-fed cattle and the drainage of wetland areas, particularly in the Skerne lowlands where large amounts of fenland and carr habitat have been lost. Rural settlements, farmsteads and market towns were affected by widespread rebuilding in brick and sandstone in the later 18th and 19th centuries.

The rapid industrial development around the Tees Estuary in more recent times has its origin in the abundance of mineral deposits in the wider area, including the Durham Coalfield and ironstone in the Cleveland Hills, and the ease of transporting goods to and from a number of ports within the estuary. The area played a significant part in the development of railways, as the world's first steam-hauled passenger railway opened in 1825 and ran between Stockton-on-Tees and Darlington, pioneering the expansion of the rail network in the area and facilitating the transport of coal from the Durham Coalfield to the estuary. This historical legacy can be observed in the large number of disused railways in the area today. The availability of ironstones from the Cleveland Hills, as well as coal, led to the development of Teesside as a steel-making and major ship-building location during the Industrial Revolution. Teesside's chemical industry developed largely as a result of the extraction of salt from underground deposits in the form of brine.

Industrial development around the estuary, based largely on steel manufacture, production of chemicals and agricultural fertiliser, and later oil refining, continued on a large scale through the 19th and 20th centuries. The port moved progressively seawards with the subsequent growth of new conjoined settlements.



Industrial expansion at Teesside resulted in the rapid expansion of the transport network, including the construction of Middlesbrough's iconic Transporter Bridge.

Middlesbrough grew rapidly from a single farmstead in 1830 to a sizeable, planned settlement for workers leaving farmland under the enclosures to seek work in the new shipyards and steelworks. The transport network developed rapidly and many bridges were created across the lower reaches of the Tees, including the iconic Transporter Bridge and Newport Bridge in Middlesbrough. Land reclamation resulted in the loss of many areas of intertidal habitat (although remaining areas are now protected as part of the Natura 2000 designation). Coastal anti-invasion defences, such as at Greatham Creek, testify to the area's vulnerability to invasion during both World Wars. The Tees Barrage was constructed in the early 1990s to control tidal flow and boost urban regeneration in Stockton-on-Tees, but may also have influenced sedimentation in the estuary.

The last few decades of the 20th century saw a decline in traditional heavy industry leading to subsequent dereliction in places. Lack of management of disused post-industrial sites and urban fringe areas has affected the appearance of the land. However, these issues began to be addressed through initiatives such as the Cleveland Community Forest (later the Tees Forest), which aimed to increase woodland cover on the urban fringe. Early successional grasslands and scrub have emerged on slag substrates on previously developed land and have become important habitats for invertebrates and other species. Recovery from the effects of industrial pollution has also led to the return of iconic species, such as seals around the Tees Estuary and otters further inland. Wind farms are a recent addition to the landscape, particularly on the urban fringe, as well as the Tees Offshore Windfarm at Redcar.



## Ecosystem services

The Tees Lowlands 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 Tees Lowlands NCA is contained in the 'Analysis' section of this document.

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

- **Food provision:** Agricultural land quality within the NCA is generally high, with 78 per cent being Grade 2 or 3. Consequently, intensive arable agriculture predominates, in particular cereal crops. Agricultural production will need to adapt to the impacts of climate change through the use of innovative techniques and the selection of appropriate crops.

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

- **Climate regulation:** Intertidal habitats in the Tees Estuary, and smaller areas of fenland and carr further inland, provide significant carbon storage. Protecting these habitats and allowing for their natural regeneration will help to mitigate the effects of climate change. Initiatives to increase the net amount of tree coverage may also play an important role.

- **Regulating water quality:** Water quality in the lower reaches of rivers within the NCA has historically been low, largely as a result of the industrial legacy. Water quality has improved markedly in recent years and it will be important to monitor pollution sources, and to put in place measures to control industrial pollution, to ensure that this trend continues. Water quality is also reduced by the presence of fertiliser in run-off from agricultural land, so it will be important to promote agricultural practices that increase infiltration and reduce the demand for fertiliser.
- **Regulating water flow:** There is a high risk of flooding in urban areas located in the lower sections of the rivers Tees, Skerne and Leven. The risk could be mitigated by provision of adequate flood storage provision in river valleys and the use of sustainable drainage techniques in urban areas. Appropriate land management in upstream areas to increase infiltration and reduce run-off may also contribute to reducing flood risk.
- **Regulating coastal flooding and erosion:** The natural movement of sediment from north-west to south-east within this NCA is influenced by the breakwaters at North and South Gare. Dredging within the Tees Estuary may be depleting sediment to the south-east at Redcar, contributing to coastal erosion. Urban areas will need to be protected by maintaining coastal defences, but away from these areas there is the opportunity to allow intertidal habitats to shift through managed realignment within defined sections of the coast.

## Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration:** The sense of place in the NCA is provided by the broad, low-lying plain dominated by the meandering River Tees and its tributaries. There is a notable contrast between the large Teesside conurbation and the rural area to the south and west, which has a strong agricultural character. In the Tees Estuary, intertidal habitats are closely juxtaposed with heavy industry which forms a dramatic skyline from distant hills. Other areas, such as the wetlands of the Skerne carrs, have their own distinct character.
- **Sense of history:** The agricultural history of the NCA is evident in the archaeological remains of ridge-and-furrow farming and deserted medieval villages, indicating a large rural population at that time, distinctive planned villages and courtyard farmsteads. The strategic importance of the Tees Estuary is evidenced by the large number of disused railway lines which were used to transport local mineral reserves to the coast as heavy industry developed during the 19th century. The area has a strong railway heritage, being the site of the world's first passenger railway, and defences along the coast testify to its vulnerability to invasion during both World Wars.
- **Tranquillity:** Undisturbed areas are still present in the undeveloped parts of the Tees Estuary, and in the quiet rural area to the south and west of the NCA. These tranquil areas can be protected by focusing new development around urban centres.
- **Recreation:** There are a large number of country parks and accessible nature reserves within the NCA. Teesmouth National Nature Reserve provides access to, and aids understanding of, the valuable intertidal habitats of the estuary. There are also accessible woodlands, principally in the north-west of the NCA, and local greenspace and green corridors in urban areas. There is the opportunity to link existing green corridors to form a strategic green infrastructure network.
- **Biodiversity:** The intertidal habitats, coastal and flood plain grazing marsh of the Tees Estuary are internationally designated for their importance for waterfowl. Protection of these areas, and appropriate management to encourage their regeneration, should be a priority in the NCA. Early successional grassland and scrub on brownfield sites also have significant biodiversity value. Semi-natural habitats within the farmed environment also provide an important biodiversity resource, and it will be important to protect and expand these habitats to form a coherent network.
- **Geodiversity:** The underlying mudstones and sandstones in the NCA are covered by a thick layer of glacial and alluvial drift material, but are exposed at outcrops along the coast, most notably the Lower Jurassic sequence at Redcar. Red sandstones formed the vernacular building material in the area. Other features of interest include the ancient peat shelves at Hartlepool Submerged Forest; Cleveland Dyke, an intrusion of hard igneous material into the local strata; and the Sherwood Sandstone aquifer.



### Statements of Environmental Opportunity

**SEO 1: Protect and enhance the unique landscape of the Tees Estuary with its mosaic of internationally important intertidal, wetland and brownfield habitats.**

**For example, by:**

- Protecting the remaining areas of intertidal flats, dynamic dune systems, salt marsh, and coastal and flood plain grazing marsh, and ensuring that they are managed to maintain and enhance their unique ecology (and the international importance of the wetland system to the vast assemblage of waterfowl).
- Seeking to minimise the detrimental effect that activities such as dredging may have on the integrity of intertidal habitats, and ensuring that future developments are well managed and recognise the importance of intertidal and brownfield habitats.
- Allowing the extent of intertidal habitats and semi-natural dune systems to shift in response to the dynamic processes of erosion and accretion, within defined sections of the coast.
- Seeking opportunities for creation of new areas of wetland and intertidal habitat where appropriate, for instance through managed realignment schemes.
- Improving understanding and interpretation of coastal geological features such as the Hartlepool Submerged Forest and the Lower Jurassic exposures at Redcar.

**SEO 2: Incorporate semi-natural habitats within the farmed environment, and use innovative farming techniques in order to improve the value of food provision alongside biodiversity, flood water storage capacity, and the ability of the landscape to adapt to the impacts of climate change.**

**For example, by:**

- Maintaining and enhancing networks of semi-natural habitat within the farmed environment such as species-rich meadows, uncultivated field margins, hedgerows and ponds.
- Increasing the number of hedgerow trees, actively managing hedgerows using techniques such as coppicing and 'gapping up', and improving the connectivity of field boundaries.
- Allowing the River Tees and its tributaries to re-engage with natural fluvial processes by restoring them to their natural courses where possible, maintaining vegetated buffers along watercourses to reduce sediment run-off, and protecting natural flood plains as permanent pasture in order to reduce the scale of flood risk downstream.
- Restoring ditches, watercourses and areas of fenland and carr habitat in the Skerne carrs area, and working with farmers to manage water tables and increase the extent of grazing marsh, in order to provide flood storage capacity upstream from Darlington.
- Encouraging the use of agricultural techniques which will increase soil organic content and rates of water infiltration, such as the use of permanent grassland and the inclusion of fallow in crop rotation, and the selection of appropriate crops to minimise the requirement for irrigation and adapt to the effects of climate change.
- Increasing the extent of woodlands along riverbanks for their landscape and nature conservation value, and managing existing woodlands to increase the value of their biodiversity and provide wood fuel for local use.



**SEO 3: Ensure that there is a well-connected network of high-quality green infrastructure throughout the Tees Lowlands which will enable people to understand and enjoy the natural environment, as well as providing a range of other benefits including biodiversity enhancement, food provision and flood risk mitigation.**

**For example, by:**

- Improving access provision along green corridors both within and between urban areas, linking existing corridors such as those along the river channels and disused railway lines, and creating new routes in order to form a strategic green infrastructure network.
- Ensuring that people living in existing urban areas as well as new housing sites have access to green infrastructure assets such as parks and other accessible open spaces, sports pitches and allotments and making best use of former industrial sites on the urban fringe to provide access to the countryside.
- Managing access within Teesmouth National Nature Reserve and Saltholme RSPB reserve, providing interpretation which allows people to experience and understand the importance of intertidal habitats while minimising disturbance to plants and animals.
- Conserving and managing historic parklands, including establishing new generations of trees in a way that is sensitive to their historic character, appropriately managing ancient and veteran trees and retaining deadwood fauna and flora, and provision of access opportunities where appropriate.

### Additional opportunity

**1. Protect and interpret the geological and historic interest and agricultural character of the Tees Lowlands NCA.**

**For example, by:**

- Providing interpretation of geological features such as the rock exposures at Redcar and peat deposits at Hartlepool, to aid understanding of the area's geological history.
- Conserving and interpreting archaeological features showing evidence of a large medieval population based on an agricultural economy, such as the remnants of ridge-and-furrow farming and deserted villages, by encouraging agricultural practices such as shallow cultivation and reversion to permanent grassland.
- Conserving the settlement pattern of medieval villages with a row of farmsteads either side of a village green.
- Improving understanding and interpretation of historic features which demonstrate the strategic importance of the area, such as coastal defences, the fortified crossing of the River Tees at Piercebridge, and disused railway lines which supplied coal to the Tees Estuary.

## Supporting document 1: Key facts and data

Area of Tees Lowlands  
National Character Area (NCA): 102,194 ha

### 1. Landscape and nature conservation designations

1,144 ha or 1 per cent of the NCA, lies within the North York Moors National Park (NYMNP). More information about the protected landscape can be found at:

■ [www.northyorkmoors.org.uk/](http://www.northyorkmoors.org.uk/)

Source: Natural England (2011)

#### 1.1 Designated nature conservation sites

The NCA includes the following statutory nature conservation designations:

Tier	Designation	Name	Area (ha)	% of NCA
International	Ramsar	Teesmouth and Cleveland Coast	581	1
European	Special Protection Area (SPA)	Teesmouth and Cleveland Coast SPA	581	1
	Special Area of Conservation (SAC)	n/a	0	0

Tier	Designation	Name	Area (ha)	% of NCA
National	National Nature Reserve (NNR)	Teesmouth NNR	102	<1
	Site of Special Scientific Interest (SSSI)	A total of 15 sites wholly or partly within the NCA	764	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.

The NCA has a proportion of its area under international, European and national nature conservation designations. The international and European sites – Teesmouth and Cleveland Coast – cover the same geographic location. Similarly the National Nature Reserve at Teesmouth is underpinned by SSSI designation; therefore all these areas have either a total or element of designation overlap.

There are 189 local sites in Tees Lowlands NCA covering 1,768 ha or 2 per cent of the NCA.

Source: Natural England (2011)



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

### 1.1.1 Condition of designated sites

SSSI condition category	Area (ha)	Percentage of NCA SSSI resource
Unfavourable declining	77	10
Favourable	323	42
Unfavourable no change	29	4
Unfavourable recovering	334	44

Source: Natural England (March 2011)

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

## 2. Landform, geology and soils

### 2.1 Elevation

The land falls south and south-eastwards from a high point of 224 m on the dip slope of the Magnesian Limestone plateau, down to sea level. The majority of the NCA is relatively low-lying with an average elevation of 58 m.

Source: Natural England 2010

### 2.2 Landform and process

The Tees Lowlands is a broad low-lying plain with extensive coastal plains, estuarine marshes and mudflats where the Tees flows into the North Sea. The land rises gently towards the west, with undulating land associated with glacial moraines.

Source: Tees Lowland Countryside Character Area Description

### 2.3 Bedrock geology

The area is largely underlain by red mudstones and sandstones of Permo-Triassic age. Jurassic sandstones and shales, resistant to weathering, outcrop on the coast and form the upstanding edge of Eston and Upleatham Hills near Guisborough.

Source: Tees Lowland Countryside Character Area Description

### 2.4 Superficial deposits

The majority of the NCA is overlain by thick layers of glacial drift and alluvial material of sands and gravel.

Source: Tees Lowland Countryside Character Area Description, Natural England (2010)

### 2.5 Designated geological sites

Tier	Designation	Number
National	Geological Site of Special Scientific Interest (SSSI)	3
National	Mixed Interest SSSIs	1
Local	Local Geological Sites	2

Source: Natural England (2011)

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

### 2.6 Soils and Agricultural Land Classification

This NCA has 7 main soilscape types: slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils, covering 77 per cent; freely draining slightly acid loamy soils, 6 per cent; loamy and clayey soils of coastal flats with naturally high groundwater, 5 per cent; slightly acid loamy and clayey soils with impeded drainage, 3 per cent; slowly permeable seasonally wet acid loamy and clayey soils, 3 per cent; freely draining flood plain soils, 2 per cent; and loamy and clayey flood plain soils with naturally high groundwater, 2 per cent. Most of the area is Grade 3 agricultural land, with some stretches of Grade 2 to the west.

Source: Natural England (2010), National Soils Resources Institute Soilscape Maps

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	0	0
Grade 2	10,971	11
Grade 3	68,367	67
Grade 4	1,998	2
Grade 5	1,157	1
Non-agricultural	1,092	1
Urban	18,457	18

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 Tees	56 km	■ River Skerne	33 km
■ River Leven	31 km	■ River Wiske	13 km

Source: Natural England (2010)

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

The meandering, slow moving River Tees flows through the heart of the NCA from west to east dividing the lowlands to the north and south. Along its middle reaches, where it cuts through glacial deposits, local bluffs with gorge like characteristics are formed. Two principal tributaries flow into the Tees, the River Skerne from the north and the River Leven to the south. The Wiske has been deflected by glacial deposits to flow south into the Vale of Mowbray where it meets the River Swale.

### 3.2 Water quality

The total area of Nitrate Vulnerable Zone is 45,809 ha or 45 per cent of the NCA.

Source: Natural England (2010)

### 3.3 Water Framework Directive

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

[http://maps.environment-agency.gov.uk/wiyby/wiybyController?ep=maptopics&lang=\\_e](http://maps.environment-agency.gov.uk/wiyby/wiybyController?ep=maptopics&lang=_e)

## 4. Trees and woodlands

### 4.1 Total woodland cover

The NCA contains 4,833 ha of woodland, 5 per cent of the total area, of which 567 ha or 1 per cent is ancient woodland. The Tees Community Forest, one of twelve Community Forests established to demonstrate the contribution of environmental improvement to economic and social regeneration, covers 28,128 ha of this NCA, which is 28 per cent of the NCA.

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

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

Woodland cover is generally sparse with exceptions such as; the steep banks of the middle Tees and Leven; semi-natural woodland on heathy soils north of Billingham; and parkland and managed estates. Orchards historically were important in the area south of the River Tees. To the west is a broad area of open arable and mixed farmland, large in scale, with limited numbers of hedgerow trees of ash and sycamore. There has been significant planting of new trees in the Tees Community Forest, in particular where it meets the urban areas of Middlesbrough, Stockton, Redcar and Hartlepool.

Source: Tees Lowland 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	3,212	3
Coniferous	511	1
Mixed	422	<1
Other	688	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	269	<1
Planted Ancient Woodland (PAWS)	299	<1

Source: Natural England (2004)



## 5. Boundary features and patterns

### 5.1 Boundary features

Low, heavily managed hawthorn hedgerows are the most frequent field boundary, although some stone walls are present towards the west. Linear woodland blocks are also present throughout as boundary features. In low lying areas in the river flood plains, ditch boundary systems are frequent. During the period between 1999 and 2003 the estimated hedgerow boundary length in the NCA was 6,169 km. By March 2011 the following boundary options – maintenance, creation or restoration – under Environmental Stewardship schemes were in place: hedgerows 1,295 km; ditches 65 km; woodland 49 km; stone-faced hedgebank 3 km; and stone wall 20 km.

**Source:** Tees Lowlands Countryside Character Area description;  
Countryside Quality Counts (2003)

### 5.2 Field patterns

Field patterns vary across the area, with some early irregular field patterns still remaining in places. The more semi-regular field boundary patterns from 16th, 17th and 18th century field enclosures, have been altered by the merging of fields to accommodate large scale farm machinery.

**Source:** Tees Lowlands Countryside Character Area description;  
Countryside Quality Counts (2003)

## 6. Agriculture

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

### 6.1 Farm type

There were 328 cereal farms in 2009, a slight increase from 2000. General cropping accounted for 39 holdings in 2009, a significant drop from 2000, and horticulture accounted for 25 holdings. There were 141 grazing livestock holdings in 2009, 51 dairy holdings, representing a significant drop since 2000, 26 poultry and 7 specialist pig holdings. The overall number of livestock holdings and the number of mixed holdings has decreased since 2000.

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

### 6.2 Farm size

The numbers of farms are generally spread evenly across the size bands; however, 52 per cent of farms are over 50 ha, and these account for 88 per cent of the farmed area. During the assessment period 2000 to 2009 there has been little change in the thresholds of farm size across bands.

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

### 6.3 Farm ownership

2009: Total farm area = 63,056 ha; owned land = 42,941 ha.

2000: Total farm area = 68,153 ha; owned land = 47,207 ha.

In 2009 67 per cent of farmed land was owner occupied, compared to 69 per cent in 2000. There was a decrease of 10 per cent in land ownership between 2000 and 2009.

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

## 6.4 Land use

In 2009, cereal production covered 27,914 ha or 44 per cent of total farmed area, a 7 per cent decrease from 2000. Grass and uncropped land covered 24,036 ha or 38 per cent of total farmed area, a 9 per cent decrease from 2000. Oilseeds increased markedly from 2000, but comprised only 10 per cent of the farmed area.

Source: Agricultural Census, Defra (2010)

## 6.5 Livestock numbers

In 2009 there were 42,449 cattle, a reduction of 4 per cent from the 2000 figure of 44,226. There were 81,271 sheep, down significantly by 40 per cent from the 2000 figure of 135,751. There were 57,375 pigs, a reduction of 20 per cent from the 2000 figure of 71,805.

Source: Agricultural Census, Defra (2010)

## 6.6 Farm labour

Figures show that in 2009 the number of farms run by principal farmers, including landowners, their spouses and business partners, was 1,289, a fall of 10 per cent from the 2000 figure of 1,434. Trends from 2000 to 2009 show declines in the numbers of; salaried managers, 45 in 2000 and 32 in 2009; full time workers, 425 in 2000 and 262 in 2009; and casual / gang workers, 167 in 2000 and 105 in 2009. There was an increase in the number of part time workers over the same period; 144 in 2000 and 171 in 2009. The overall figure for farm workers in 2009 is 1,859; a 16 per cent decrease from the 2000 figure of 2,215.

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

There are extensive areas of semi-natural habitats around the coastal and estuarine regions of Teesmouth, where open water, mudflats, saltmarsh, dunes and meadow occur, some having been reclaimed from the industrial installations around Teesmouth.

Pockets of rough grazing and carr land exist along stretches of the main rivers and their tributaries and include isolated and sporadic components of fen, reedbed and purple moor grass pasture.

Native broadleaved woodlands are scattered and mostly allied to tracts of the newly developed Community Forest and along the steeper banks of the Tees and the Leven.

Orchards were historically important south of the Tees, especially around Ormesby, Guisborough and Yarm. Some traditional orchards remain associated with larger country houses and manorial estates, such as Crathorne Hall, Upleatham Hall and Skelton Castle.

Source: Tees Lowlands Natural Area Profile

### 7.2 Biodiversity Action Plan (BAP) priority habitats

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

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

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

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

Habitat	Area (ha)	% of NCA
Broadleaved mixed and yew woodland (broad habitat)	1,798	2
Coastal and flood plain grazing marsh	786	1
Coastal sand dunes	332	<1
Reedbeds	268	<1
Maritime cliff and slope	32	<1
Fens	26	<1
Mudflats	13	<1
Saline lagoons	9	<1
Lowland meadows	2	<1
Purple moor grass and rush pasture	2	<1
Upland hay meadow	1	<1

Source: Natural England (2011)

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

### 7.3 Key species and assemblages of species

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

## 8. Settlement and development patterns

### 8.1 Settlement pattern

Quiet rural areas contrast with the extensive urban and industrial development of Darlington, Stockton, Middlesbrough, Billingham and Redcar, which are concentrated along the lower reaches of the Tees, the estuary and coast.

Large-scale chemical and oil refining works, docks and other heavy industries along the estuary form a distinctive skyline, and transport and infrastructure corridors are also prominent.

Rail heritage is of international significance for early and pioneering engineering and technological development at Darlington and Stockton.

In rural areas a nucleated pattern of small green villages connected by winding lanes, and scattered farms remains. The southern part of the area has a series of attractive Georgian market towns including Yarm and Stokesley.

Larger urban areas in the west such as Darlington and Newton Aycliff follow the northerly route of the A1 and the railway.

Source: Tees Lowlands Countryside Character Area description; Countryside Quality Counts (2003)



## 8.2 Main settlements

The main settlement of this NCA is an urban industrial conurbation centred around the town of Middlesbrough, which lies on the south bank of the River Tees. The wider conurbation known as Teesside comprises Middlesbrough and Redcar on the south bank, and Stockton-on-Tees, and Billingham, which lie on the north bank. The NCA boundary in the north includes the southern half of Hartlepool on the north-east coast. Other principal towns include Darlington to the east and the expanding new housing developments of Ingleby Barwick, Middleton St George, Yarm and Eaglescliffe within the central belt. The small towns of Stokesley, Great Ayton and Hutton Rudby lay to the south of the area, and Sedgfield to the north. The total estimated population for this NCA (derived from ONS 2001 census data) is: 598,459.

**Source: Tees Lowlands Countryside Character Area description; Countryside Quality Counts (2003)**

## 8.3 Local vernacular and building materials

Some of the small villages, such as Gainford, are early 'green villages', typically with terraced cottages of red sandstone built around a central tree-lined green and often retaining their long characteristic tofts and garths radiating out to meet the countryside beyond.

Yarm has developed as a market town with a long, wide central street and market place lined with elegant Georgian town houses.

The historic centres of Middlesbrough, Stokesley and Darlington have fine 19th century municipal buildings in the town centres built of local sandstones.

Darlington is an amalgam of Victorian town houses and railway worker terraces of red brick and slate roof construction.

**Source: Tees Lowlands Countryside Character Area description; Countryside Quality Counts (2003)**

## 9. Key historic sites and features

### 9.1 Origin of historic features

Woodland clearance occurred in Iron Age and Romano-British periods when the area was well populated with numerous small settlements.

Roman influence can still be seen in the north-south alignment of Dere Street through the fortified Tees crossing at Piercebridge. The fertile soils of the lowlands supported numerous village settlements in the medieval period, many of which were abandoned or contracted after the 14th century leaving earthwork remains of settlements and ridge and furrow cultivation, especially notable around Skerne Carrs.

Villages arranged around 'greens' with radiating tofts and garths are generally 12th and 13th century in origin and particularly notable, for example Gainford. Some were rebuilt with fine Georgian houses as farmsteads relocated into the reordered farmland.

Rapid industrial growth was based on mineral extraction wealth and good sea links, with an important shipbuilding tradition, and later the pioneering stages and development of rail communications, including the world's first passenger steam railway, and from the 1830s chemical manufacture.

This developed into extensive urban and industrial development along the lower Tees and estuary from the 18th to the mid-20th century.

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

## 9.2 Designated historic assets

This NCA has the following historic designations:

- 10 Registered Parks and Gardens covering 651 ha
- 0 Registered Battlefields
- 80 Scheduled Monuments
- 2,058 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

- Two per cent of the NCA 1,991 ha is classified as being publically accessible. Most easily available public access is associated with access to the landscape along the coast and estuary, the Community Forest woodland and Country Parks close to towns.
- There are 1,206 km of public rights of way at a density of 1km per km<sup>2</sup>.
- There is 1 national trail within the NCA; The Cleveland Way runs along the southern boundary of the NCA, at Saltburn-by-the-Sea.

Sources: Natural England (2010)

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

Access designation	Area (ha)	% of NCA
National Trust (Accessible all year)	<1	<1
Common Land	6	<1
Country Parks	646	1
CROW Access Land (Section 4 and 16)	293	<1
CROW Section 15	6	<1
Village Greens	211	<1
Doorstep Greens	11	<1
Forestry Commission Walkers Welcome Grants	91	<1
Local Nature Reserves (LNRs)	432	<1
Millennium Greens	13	<1
Accessible National Nature Reserves (NNRs)	102	<1
Agri-environment Scheme Access	16	<1
Woods for People	1,014	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 areas of Teesside and Darlington are of low tranquillity, while the rest of the NCA is classed as having a medium tranquillity.

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

Category of tranquillity	Score
Highest value within NCA	36
Lowest value within NCA	-103
Mean value within NCA	-12

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 there has been a significant increase in the amount of intrusion since the 1960s particularly due to urban and industrial expansion around the Teesside conurbation and the connection this area has to the Tees Valley flowing eastwards to Darlington.

The major road arteries of the A1, A19 and A66, along with connecting A roads between towns and railway routes, coupled with access to, and use of the Durham Tees Valley Airport, widen the zones of intrusion. Least intruded areas in 2007 were; the tracts of rural land to the far west of the area, west of the A1, centred around Piercebridge; pockets of rural land on either side of the A19 south of the Teesside conurbation, towards the southern boundary of the area; and pockets north of Middlesbrough and east of Sedgefield. A breakdown of intrusion values for this NCA is detailed in the table below.

Category of intrusion	1960s (%)	1990s (%)	2007 (%)	% change (1960s-2007)
Disturbed	36	51	54	18
Undisturbed	54	37	30	-24
Urban	10	11	16	6

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are the increase in levels of disturbance, not only in the expansion of existing urban areas but the encroachment of development onto rural and undisturbed land and the increase in road traffic.

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



## 12. Data sources

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

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

# Supporting document 2: Landscape change

## Recent changes

### Trees and woodlands

- Increase in woodland cover resulting from the recent Tees Forest initiative, particularly around the urban fringe of the Teesside conurbation.

### Boundary features

- Countryside Quality Counts (CQC) data (1999–2003) indicates that Countryside Stewardship agreements for hedgerow management and restoration during this period were limited in their extent, equivalent to only 5 per cent of the total hedgerow length.
- Boundaries have generally been maintained, but poorly managed.
- Hedgerows represent by far the greatest extent of boundary features under Environmental Stewardship.

### Agriculture

- Temporary grassland has declined, with an increase in the area under arable. General cropping declined significantly between 2000 and 2009. Cereal cropping decreased slightly, but still represented 44 per cent of the total farmed area. There has been an increase in oilseed rape, but this still represented only 10 per cent of the overall area.
- There was a decline in numbers of all livestock types between 2000 and 2009, with significant declines in sheep numbers (40 per cent) and pigs (20 per cent). There was also a significant drop in the number of dairy holdings.

- There has been little change in the overall farmed area or proportion of owner-occupied farms. Overall numbers of farm workers have declined between 2000 and 2009.

### Settlement and development

- There has been an increase in development associated with the energy sector, in particular onshore and offshore wind farms.
- There is continued demand for housing development on the urban fringe of Teesside. However, the demand for housing and other development is on a relatively small scale in a national context.

### Semi-natural habitat

- Countryside Quality Counts (CQC) data from 1999–2003 indicates that uptake of Countryside Stewardship schemes was below national average, with the most extensive agreements for lowland pastures and regeneration of grassland/semi-natural vegetation.
- The RSPB has recently created new wet grassland habitat on former industrial land at its Salholme reserve and in the surrounding area. The Environment Agency's Greatham Managed Realignment Scheme will also provide new intertidal habitat.
- The Tees Valley Wildlife Trust has recently created a 50 hectare wetland nature reserve on the flood plain of the Tees upstream of Stockton-on-Tees, providing habitat for waterfowl outside of the intertidal zone.

### Historic features

- Historic parklands and farm buildings have generally been eroded.
- Approximately a quarter of parkland is covered by an Historic Parkland Grant, with a small amount also included in an agri-environment scheme.
- Archaeological remains, such as those of medieval shrunken villages, remain relatively well preserved.

### Coast and rivers

- CQC data (1999–2003) indicates that biological river water quality was maintained as excellent and chemical water quality has been maintained as good, since 1995.
- Sediment depletion may be occurring around Redcar and Cleveland.

### Minerals

- The NCA holds relatively few extant minerals permissions, although one that does remain is a beach sand winning operation at North Gare, which lies within a number of designated sites, including Teesmouth National Nature Reserve.

## Drivers of change

### Climate change

- Climate change is likely to result in warmer, wetter winters and hotter, dryer summers in the north-east of England. This could increase the length of the growing season but also cause increased drought stress which may necessitate changes to agricultural crops. There may also be increased opportunities for growth of wood fuel and biomass crops.
- Climate change may result in changes in the species composition of semi-natural habitats, with a general northward movement of species. It will therefore be important to ensure connectivity between areas of semi-natural habitat.
- There is likely to be a more frequent incidence of very high rainfall events, which will result in an increased frequency of storm flows in streams and rivers, caused by increased waterlogging and run-off. Climate change is also likely to result in rising sea levels and higher tidal surges. These factors are likely to combine to significantly increase flood risk in the Tees and Leven valleys.
- Increasing sea levels may result in the loss of mudflats, salt marsh and sand dunes in the Teesmouth and Cleveland Coast Special Protection Area and Ramsar site. The 'coastal pinch' effect of increasing sea levels, combined with more frequent storm surges affecting river systems, is likely to put pressure on intertidal habitats, exacerbating the losses already brought about by land reclamation. However, the onset of milder winters is likely to result in wetland habitats beyond the tidal limit being used by waterfowl more frequently as they will be frozen for a reduced period of time.



### Other key drivers

- There has been significant investment in the energy sector in recent years, with ongoing development of, onshore and offshore wind farms and their associated infrastructure (such as the Tees Offshore wind farm), gas-fired power stations and gas pipelines, energy from waste facilities, and electricity supply infrastructure. This is likely to continue, with renewable energy becoming increasingly important within the local economy.
- Increased demand for industrial development around the Tees Estuary has the potential to destroy significant areas of early successional grasslands and scrub on brownfield sites. However, these habitats could potentially be retained and/or re-created around the margins of new developments.
- There is continued pressure for housing development on the urban fringe and often on greenfield sites, particularly to the west of Billingham and Hartlepool, and on the southern and western fringes of Stockton-on-Tees.
- The North East Shoreline Management Plan<sup>4</sup> recommends that while coastal defence should be maintained at main population centres (the 'hold the line' policy approach), there is the opportunity for a 'no active intervention' policy approach to allow coastal retreat in areas away from urban centres, such as at Seaton Sands and Coatham Sands, to help retain intertidal habitats.
- There has been a recent drive to increase the extent of semi-natural habitat in and around the Tees Estuary, with schemes implemented by the RSPB, Tees Valley Wildlife Trust, Natural England and the Environment Agency.
- Following on from the work of the Tees Forest, the Tees Valley Green Infrastructure Strategy and other borough-wide green infrastructure strategies have been prepared with the aim of creating a strategic network of green infrastructure corridors, providing links between green spaces for local communities.

<sup>4</sup> *Shoreline Management Plan 2: River Tyne to Flamborough Head*, North East Coastal Authorities Group (February 2007)

### 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.



At Teesmouth National Nature Reserve, access can be gained to the dune systems at North Gare.

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: Protect and enhance the unique landscape of the Tees Estuary with its mosaic of internationally important intertidal, wetland and brownfield habitats.	↔ *	↔ **	↗ *	↗ *	↔ ***	↑ ***	↗ *	↗ **	↗ *	○	↑ ***	↗ *	↑ ***	↑ ***	↗ **	↑ ***	↗ ***	↑ ***	↑ **	
SEO 2: Incorporate semi-natural habitats within the farmed environment, and use innovative farming techniques in order to improve the value of food provision alongside biodiversity, flood water storage capacity, and the ability of the landscape to adapt to the impacts of climate change.	↗ *	↔ **	↗ **	○	↗ *	↗ *	↗ *	↑ ***	↗ *	↑ ***	↑ ***	↗ *	↔ **	↑ ***	↗ ***	↗ ***	↗ ***	↑ ***	← **	
SEO 3: Ensure that there is a well-connected network of high-quality green infrastructure throughout the Tees Lowlands which will enable people to understand and enjoy the natural environment, as well as providing a range of other benefits including biodiversity enhancement, food provision and flood risk mitigation.	↗ *	↑ ***	↗ **	○	↗ ***	↑ ***	↑ *	↑ ***	↗ *	↑ ***	↑ ***	↗ *	↗ **	↑ ***	↗ **	↑ ***	↑ ***	↑ ***	← **	

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
Mosaic of mud and sand flats, peatbeds, dunes, salt marsh and brownfield sites at Teesside, in close proximity to heavy industry.	<ul style="list-style-type: none"> <li>■ Estuarine habitats at the mouth of the Tees form a series of nationally designated Sites of Special Scientific Interest (SSSI), including salt marsh and grazing marsh at Cowpen Marsh, intertidal mudflats at Seal Sands, peatbeds at Seaton Carew and Redcar and the dune system at South Gare and Coatham Sands.</li> <li>■ These sites have been internationally designated as both Teesmouth and Cleveland Coast Special Protection Area and Ramsar site due to the importance of the wetland ecosystem and shorebird assemblage. Part of the area is also designated as Teesmouth National Nature Reserve.</li> <li>■ Intertidal habitats are found in close proximity to heavy industrial installations including chemical and oil-refining works and a nuclear power station, which form a dramatic skyline.</li> <li>■ Early successional grassland and scrub has emerged in slag substrate on previously developed sites.</li> </ul>
Broad, low-lying plain of fertile agricultural land in the valleys of the Rivers Tees and Leven, with large fields bounded by hedges and wide views to distant hills, contrasting with the urban and industrial development at Teesside.	<ul style="list-style-type: none"> <li>■ The rural hinterland is predominantly agricultural in character, with the majority of land being Grade 2 or 3 agricultural land.</li> <li>■ There is evidence of past agricultural patterns in the landscape, such as archaeological evidence of ridge-and-furrow farming and deserted villages.</li> <li>■ This quiet rural area contrasts sharply with the large Teesside conurbation, and its associated transport corridors and other infrastructure.</li> </ul>
Meandering river channels with steep, well-wooded banks.	<ul style="list-style-type: none"> <li>■ The River Tees and its tributary the Leven form deeply meandering river channels in their lower reaches. The steeper sections of riverbank are often well wooded, predominantly ash and alder, in contrast to the sparse woodland cover in the Tees Lowland NCA as a whole.</li> <li>■ The River Tees has strongly influenced settlement pattern historically, with villages being sited beside it to make use of its resources.</li> </ul>
Low-lying farmland with remnants of former wetland habitat in the Skerne Lowlands.	<ul style="list-style-type: none"> <li>■ A distinctive area of low-lying valley farmland occurs in the valley of the River Skerne north of Darlington.</li> <li>■ An extensive area of wetland fen and carr habitat once occurred at Preston, Bradbury and Morden carrs, but has been largely drained for agricultural use. The ditch at Railway Stell West, the most notable remnant of fenland flora, has been designated as an SSSI and provides a refuge for a range of aquatic plants and invertebrates.</li> </ul>



Landscape attribute	Justification for selection
Green corridors forming links between large urban areas and the surrounding countryside.	<ul style="list-style-type: none"> <li>■ Former railways have been converted into pedestrian and cycle routes providing links between the urban areas of Teesside, the estuary and the surrounding countryside.</li> <li>■ Watercourses also provide green routes, such as the small becks which flow from the escarpment of the Cleveland Hills northwards through Middlesbrough into the Tees.</li> <li>■ Green corridors form an important recreational and nature conservation resource in an area which has undergone rapid urban expansion since the 19th century.</li> </ul>

## Landscape opportunities

- Protect the remaining areas of mud and sand flat, dunes and salt marsh at Teesmouth, and plan to increase their extent, through managed realignment of the coastline away from urban centres, allowing habitats to gradually shift as a result of dynamic coastal processes.
- Protect the agricultural character of rural parts of the Tees Lowlands NCA with their wide views to distant hills, and the strong contrast between these areas and the urban development around the Tees Estuary.
- Enhance the nature conservation value of agricultural land and restore wildlife-friendly habitats such as hedgerows, permanent pasture, meadows and orchards, by promoting the uptake of agri-environment schemes. Enhance existing hedgerows by planting more frequent hedgerow trees.
- Conserve archaeological evidence of former ridge-and-furrow farming and deserted villages, as well as the historic form of existing 'green' villages.
- Enhance the character of the Tees, Skerne and Leven river corridors, and their value for wildlife, by maintaining natural flow patterns, restoring riverside vegetation where it has been lost, and promoting low intensity management of adjacent farmland.
- Manage, protect and look for opportunities to restore wet pasture, and other wetland habitats in the Skerne Lowlands, providing a natural buffer for flood waters, by restoring former ditches, and maintaining water table levels.
- Restore native broadleaved woodland and appropriately manage existing woodland to enhance its value.
- Create new areas of accessible greenspace on the urban fringe, enhance access to existing assets such as green wedges, beck valleys, walkways and disused railway lines, and improve links between green corridors to form a strategic green network.
- Provide interpretation of geological features of interest, such as the sandstone exposures at Redcar and peat deposits at Hartlepool Submerged Forest.

## Ecosystem service analysis

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

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

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Food provision</b>	Topography  Fertile, alluvial soils  Estuary and coastal waters	Fertile soils enable the NCA to support high quality agricultural land with 67 per cent of the total land area grade 3 and 11 per cent grade 2.  The Tees Estuary retains an active fishing industry from Hartlepool, South Gare, Redcar and Marske.	Regional	Fertile soils have led to intensive, predominantly arable farming over the majority of the area, with cereal crops predominating but with oilseed rape also occupying a sizeable area.  Intensification of agriculture during the latter half of the 20th century led to the loss of field boundaries, and of many wetland habitats as a result of drainage. Intensively farmed soils are vulnerable to compaction and erosion, and it will be important to maintain high levels of soil organic content and water infiltration to ensure soils remain productive.  <b>Continued on next page...</b>	Use modern agricultural practices to increase yields while conserving biodiversity.  Manage soils to allow continued sustainable agricultural production by increasing soil organic content and water infiltration, for example use of grass buffers along watercourses and inclusion of fallow in crop rotation.  Seek opportunities to use alternative crops which are better adapted to climatic change.	<b>Food provision</b>  <b>Regulating water quality</b>  <b>Water availability</b>  <b>Regulating soil quality</b>  <b>Sense of place / inspiration</b>  <b>Sense of history</b>  <b>Biodiversity</b>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Food provision cont.				<p><b>... continued from previous page</b></p> <p>Modern agricultural techniques such as precision farming can be used to increase yields while allowing semi-natural habitats to be maintained within the farmed environment.</p> <p>Archaeological features providing evidence of past agricultural practices and settlement pattern are vulnerable to damage as a result of cultivation.</p> <p>Fishing operates on a commercial but relatively small scale. However, North Sea fish stocks have historically been overfished and have recently collapsed. It will be essential to ensure that sustainable fishing techniques are used and quotas are adhered to if the industry is to continue.</p>	Encourage fishing practices which ensure fish stocks are used sustainably.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Timber provision</b>	Woodland	<p>The area was largely cleared of woodland for agriculture more than 2000 years ago. Existing woodland cover is low (5 per cent) and restricted mainly to steep riverbanks, with some more extensive woodland in the area north of Billingham.</p> <p>Woodland cover has increased as a result of planting schemes such as the Tees Community Forest, and a new area of Forestry Commission woodland has been created to the south-west of Stockton-on-Tees.</p>	Local	<p>Continued woodland planting where appropriate will provide benefits for biodiversity and recreation (particularly around the conurbation), enhancement of the landscape, as well as timber provision. Planting of deciduous rather than coniferous woodland should be favoured, and woodland creation should be avoided where it may impact on other important habitats such as grazing marsh.</p> <p>There is also the opportunity to harvest wood fuel from existing woodland areas, particularly in the north of the NCA, using sustainable management techniques such as coppicing. However, non-intervention may be more appropriate in some woodlands.</p>	<p>Plant trees where appropriate, particularly around the fringe of urban areas.</p> <p>Manage existing woodlands to allow the sustainable harvesting of timber.</p>	<p><b>Timber provision</b></p> <p><b>Climate regulation</b></p> <p><b>Biodiversity</b></p>



Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Water availability</b>	Rainfall  Groundwater bodies  Rivers Tees, Leven and Skerne	Water flows into this NCA principally from the North Pennines to the west, where rainfall levels are high and where the River Tees has its source.  Part of the NCA overlays the Sherwood Sandstone aquifer which has 'water available' status, as do surface water resources in the Rivers Skerne and Leven.	Regional	The principal use of water abstracted from the Tees catchment is industrial, with domestic (serving the populations of Teesside) and agricultural abstractions also taking place <sup>5</sup> . This part of the country is vulnerable to drought, and this may be exacerbated by the impacts of climate change, as high rainfall events and increased flashiness of streams may result in reduced infiltration rates. It will therefore be important to reduce the demand for irrigation through appropriate cultivation practices.	Adopt agricultural practices that increase infiltration and reduce run-off, such as measures to increase the organic content of soils where arable cultivation dominates.  Increase the extent of semi-natural habitats and wet pasture to reduce run-off rates.	<b>Water availability</b>  <b>Geodiversity</b>  <b>Biodiversity</b>
<b>Genetic diversity</b>	Semi-natural habitats  Traditional breeds and varieties  Traditional orchards	The mudflats and salt marshes at Teesside have the potential to support wild varieties of cultivated plants.  The Shorthorn cattle breed originated from the border between this NCA and the Durham Magnesian Limestone plateau in 18th century.  There are a number of traditional orchards in the southern part of the NCA.	Local	Semi-natural habitats supporting wild varieties of commonly cultivated plants represent important genetic stores of these species.  Traditional breeds can play a useful role in grazing conservation sites. Traditional orchards in the area support varieties of fruit which may no longer be grown on a commercial scale, but which provide a valuable genetic resource.	Protect and expand areas of mudflat and salt marsh.  Promote husbandry of traditional breeds of livestock and management of traditional orchards.	<b>Genetic diversity</b>  <b>Pollination</b>  <b>Pest regulation</b>  <b>Regulating coastal erosion and flooding</b>  <b>Biodiversity</b>

<sup>5</sup> The Tees Catchment Abstraction Management Strategy, Environment Agency (March 2008) (accessed April 2013; URL: [www.environment-agency.gov.uk/business/topics/water/119927.aspx](http://www.environment-agency.gov.uk/business/topics/water/119927.aspx))

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Biomass energy</b>	Woodland  Biomass crops	<p>Woodland cover is low (5 per cent).</p> <p>The NCA has low to medium potential yield for short rotation coppice (SRC) around Middlesbrough but high potential further to the west. Some SRC wood is grown in this NCA for the Wilton 10 wood-burning power station at Teesside.</p> <p>Potential miscanthus yield is high around the mouth of the Tees but medium over most of the NCA.</p>	Local	<p>The NCA offers limited potential for the provision of biomass through the use of SRC. This is used to supply the Wilton 10 wood burning power station at Teesside. There is also potential to generate energy using biomass crops.</p> <p>Information on the potential landscape impacts of biomass plantings within the NCA can be found in the tables on the Natural England website<sup>6</sup>.</p>	<p>Plant trees and woodland where appropriate.</p> <p>Manage existing woodland (for instance through SRC) and plant biomass crops to meet local demand, for example power stations.</p>	<b>Biomass energy</b>

<sup>6</sup> Opportunities and optimum sitings for energy crops, Natural England (accessed October 2010; URL: [www.naturalengland.org.uk/ourwork/farming/funding/ecs/sitings/areas/041.aspx](http://www.naturalengland.org.uk/ourwork/farming/funding/ecs/sitings/areas/041.aspx))

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Climate regulation</b>	Mudflats Salt marsh Peaty fenland / carrs Woodland	Soil carbon levels are generally low (0-5 per cent) however, mudflats and salt marsh at Teesmouth and peaty fenland, carr and reedbeds at Skerne carrs have a high carbon content.  Soil carbon content is also higher in woodland, although woodland cover is low (5 per cent).	National	The peaty fenland and carrs at Skerne carrs have been reduced markedly in area due to drainage for agriculture. Salt marshes and mudflats of the Tees Estuary have also been lost due to land take for industrial development. It will be important to protect the remaining areas. Carbon content of agricultural soils can also be increased by employing appropriate agricultural techniques.  Woodland cover is low and therefore plays a relatively unimportant role in climate regulation within this NCA; however there is the potential to increase this through woodland planting in appropriate areas.	Protect remaining areas of mudflat and salt marsh and allow them to naturally shift through coastal realignment, to prevent ongoing coastal squeeze and further loss of habitat.  Protect fenland and carr habitat in the Skerne carrs by working with farmers to manage water table levels and extend the area of grazing marsh.  Increase woodland cover through tree planting where appropriate, for example on riverbanks and in existing wooded areas in the north west of the NCA.  Adopt cultivation practices that maintain high levels of organic matter in soil to increase carbon storage, such as the use of permanent grassland and the inclusion of fallow in crop rotation.	<b>Climate regulation</b>  <b>Pollination</b>  <b>Sense of place / inspiration</b>  <b>Biodiversity</b>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Regulating water quality</b>	Rivers Tees, Leven and Skerne  Tees Estuary  Sandstone aquifer	<p>Ecological water quality in the River Skerne, and the River Tees downstream of its confluence with the Skerne, is mainly poor, with upstream parts of the Tees, the Tees Estuary and much of the River Leven within the NCA having moderate quality. The ecological quality of coastal waters is good.</p> <p>The chemical status of the Tees Estuary and the River Tees as far upstream as Yarm fails to achieve good quality but further upstream the River Tees has good quality, as does the River Skerne.</p> <p>The chemical status of groundwater is good within the Sherwood Sandstone aquifer but poor elsewhere within the NCA (2009 data).</p> <p>The NCA does not lie within a priority catchment designated under Defra's ECSFDI.</p>	Regional	<p>Poor ecological and chemical water quality is reported in the lower sections of the rivers within the NCA, as well as groundwater, and is largely a result of the industrial legacy<sup>7</sup>. However, this has improved markedly under the Urban Wastewater Directive. It will be important to ensure that sources of diffuse pollution are identified through monitoring and pollution prevention measures are put in place through targeted pollution prevention campaigns.</p> <p>Use of fertiliser and high levels of run-off from agricultural land reduces water quality. This is likely to be exacerbated by climate change resulting in high rainfall events and increased flashiness of streams. It will be important to address this through appropriate agricultural practices.</p>	<p>Monitor sources of industrial pollution.</p> <p>Promote measures to reduce pollution from industrial sources and remediation of former industrial sites.</p> <p>Adopt agricultural practices that increase infiltration and reduce run-off, such as the use of grass buffers along watercourses to capture sediment.</p> <p>Reduce the demand for fertiliser, for example through crop selection and increased soil analysis.</p>	<p><b>Regulating water quality</b></p> <p><b>Food provision</b></p> <p><b>Regulating soil quality</b></p> <p><b>Water availability</b></p> <p><b>Regulating water flow</b></p> <p><b>Biodiversity</b></p>

<sup>7</sup> Northumbria River Basin Management Plan, Environment Agency (December 2009) (accessed April 2013; URL: [www.environment-agency.gov.uk/research/planning/33106.aspx](http://www.environment-agency.gov.uk/research/planning/33106.aspx))



Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow	Rivers  Soils	The River Tees headwaters drain remote moorland in the North Pennines (NCA 10) and flow through narrow, steep valleys over soils often saturated by heavy rainfall, resulting in downstream flood risk within this NCA at Middlesbrough/Tees Mouth, Billingham, Croft-on-Tees, and Yarm on the River Tees.	Regional	Flood risk is likely to be worsened by the increasing incidence of storm events associate with climate change and consequent flashiness of streams. There are also likely to be more frequent and severe coastal storm surges.	Restore the ecology of peat bogs and block the active grips upon heather moorland in the North Pennines to help preserve peat, increase interception and reduce run-off.	Regulating water flow
		The River Skerne has its headwaters on the Durham Magnesian Limestone Plateau (NCA 15) while the River Leven rises in the North Yorkshire Moors and Cleveland Hills (NCA 25). These rivers pose a risk from fluvial flooding to a significant number of properties in Darlington and Stokesley respectively.		The Environment Agency's preferred approach to river flood risk management includes promotion of upland land management practices in the Pennines aimed at increasing interception and reducing the rate of run-off, which may reduce flood risk downstream <sup>8</sup> .	Restore minor rivers to their natural courses where appropriate.	Regulating water quality
		Tidal flood risk is also a significant issue in this NCA.		Further downstream, agricultural practices and provision of flood storage capacity upstream from major settlements, such as in the Skerne Lowlands north of Darlington, will help to address flood risk.	Increase the area of wet pasture providing flood storage, for example in the Skerne carrs area, to provide flood storage upstream from Darlington.	Regulating soil quality
		Natural river courses and flows have been altered by the creation of flood defence schemes that include works at Croft-on-Tees and the Tees Barrage. However, a section of the River Skerne north of Darlington has been restored with new meanders created <sup>8</sup> .		In urban areas, flood risk can be reduced by using permeable surfaces and sustainable drainage techniques and this has successfully reduced flood risk in Stockton-on-Tees and Darlington.	Adopt agricultural practices that increase infiltration and reduce run-off, such as the use of grass buffers along watercourses.	Regulating soil erosion
					Promote the use of sustainable drainage schemes in new development to reduce run-off, for example through the use of permeable surfaces and swales.	

<sup>8</sup> [http://www.therrc.co.uk/rrc\\_river\\_projects1.php?csid=38](http://www.therrc.co.uk/rrc_river_projects1.php?csid=38) <sup>9</sup> Tees Catchment Flood Management Plan Summary Report, December 2009 (Environment Agency), accessed from: <http://www.environment-agency.gov.uk/research/planning/33586.aspx>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Regulating soil quality</b>	Fertile soils	<p>This NCA has seven main soilscape types:</p> <p>Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils, covering 77 per cent of the NCA.</p> <p>Freely draining slightly acid loamy soils (6 per cent).</p> <p>Loamy and clayey soils of coastal flats with naturally high groundwater (5 per cent).</p> <p>Slightly acid loamy and clayey soils with impeded drainage (3 per cent).</p> <p>Slowly permeable seasonally wet acid loamy and clayey soils (3 per cent).</p> <p>Freely draining flood plain soils (2 per cent).</p> <p>Loamy and clayey flood plain soils with naturally high groundwater (2 per cent).</p>	Local	<p>The slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (77 per cent) are easily damaged when wet and are vulnerable to compaction due to livestock trampling and machinery. In turn this may lead to increasingly poor water infiltration and diffuse pollution as a result of surface water run-off.</p> <p>Increasing incidence of high rainfall events associated with climatic changes is likely to exacerbate problems associated with soil damage. Management measures that increase levels of organic matter can help reduce these problems. These include the use of permanent grassland strips, compost and manure, and winter stubbles. Minimum tillage techniques and the inclusion of fallow in crop rotation will also help to maintain soil organic levels. Avoiding the use of machinery during wet conditions will also help to reduce compaction.</p>	<p>Adopt cultivation practices that increase levels of organic matter in soil, such as the use of permanent grassland, incorporating compost and manure, winter stubbles, fallow and minimum tillage techniques, as well as appropriate timing of machinery use.</p>	<p><b>Regulating soil quality</b></p> <p><b>Food provision</b></p>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Regulating soil erosion</b>	Fertile soils	<p>Slowly permeable, seasonally wet, slightly acid but base-rich loamy and clayey soils.</p> <p>Loamy and clayey soils of coastal flats with naturally high groundwater.</p> <p>Slightly acid loamy and clayey soils with impeded drainage.</p> <p>Slowly permeable seasonally wet acid loamy and clayey soils.</p> <p>Freely draining flood plain soils.</p> <p>Loamy and clayey flood plain soils with naturally high groundwater.</p>	Regional	<p>The soils covering most (89 per cent) of this NCA are at low risk of erosion. Remaining higher risk areas are as follows:</p> <p>The freely draining slightly acid loamy soils (6 per cent) can erode easily on steep slopes, especially where vegetation is removed or where organic matter levels are low after continuous cultivation. There is the potential for wind erosion on some coarse textured cultivated variants.</p> <p>The slightly acid loamy and clayey soils with impeded drainage (3 per cent) are easily compacted by machinery or livestock if accessed when wet and are prone to capping or slaking, increasing the risks of soil erosion by surface water run-off, especially on steeper slopes.</p> <p>The risk of erosion of agricultural soils can be minimised by using appropriate cultivation techniques such as the use of over-wintering stubbles, and by maintaining vegetated buffers alongside watercourses to trap sediment.</p> <p>Soils are also vulnerable to coastal erosion and this is likely to be exacerbated by rising sea levels associated with climate change.</p>	<p>Adopt cultivation practices that increase infiltration and reduce soil compaction and run-off, such as the use of over-wintering stubbles and grass buffers along watercourses.</p> <p>Protect remaining areas of mudflat and salt marsh and allow them to shift through managed realignment, to maintain a natural buffer against coastal erosion.</p>	<p><b>Regulating soil erosion</b></p> <p><b>Food provision</b></p> <p><b>Regulating water flow</b></p>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Pollination</b>	Semi-natural habitat in the farmed environment  Previously developed land	Semi-natural habitats such as hedgerows, species-rich grassland and traditional orchards support pollinating insects, although these occupy a relatively low proportion of the farmed landscape.  Semi-natural habitats in and around urban areas, and previously developed land where semi-natural habitats are regenerating provide an important resource for pollinating insects.	Local	It will be important to ensure that there is a network of semi-natural habitats across the farmed environment to provide habitat for pollinating insects close to where crops are grown, to help to increase yields of crops such as oil seed rape.  Semi-natural habitat can be created in and around urban areas as part of the green infrastructure network, and this will be particularly important where naturally regenerated sites are lost to new development.	Create linear strips of uncultivated land alongside hedgerows and watercourses, and links between existing areas of semi-natural habitat.  Promote the uptake of agri- environment schemes for the creation and appropriate management of hedgerows, species—rich meadows, uncultivated margins and other semi-natural features on agricultural land.  Protect and seek opportunities to expand wildlife-rich habitats in and around urban areas.	<b>Pollination</b>  <b>Food production</b>  <b>Genetic diversity</b>  <b>Pest regulation</b>  <b>Biodiversity</b>
<b>Pest regulation</b>	Semi-natural habitat in the farmed environment	Semi-natural habitats such as hedgerows, species-rich grassland and traditional orchards, all provide suitable habitat for species which prey on agricultural pests.	Local	Networks of semi-natural habitat across farmed areas, such as hedgerows, uncultivated buffer strips and beetle banks, will be important in controlling agricultural pests.  If the biological control of agricultural pests can be increased by providing suitable habitat for predator species, there will be a reduced requirement for chemical pesticides.	Create linear strips of uncultivated land alongside hedgerows and watercourses, and links between existing areas of semi-natural habitat.  Promote the creation and appropriate management of hedgerows, species—rich meadows, uncultivated margins and other semi-natural features on agricultural land.	<b>Pest regulation</b>  <b>Genetic diversity</b>  <b>Pollination</b>  <b>Biodiversity</b>



Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Regulating coastal erosion and flooding</b>	Coastline and estuary	Longshore drift moves sediment southwards in this NCA. The overall shape of the coast in this area is held by the natural physical features to either end of the frontage (the headlands at Hartlepool Bay and Saltburn) and by the breakwaters at the mouth of the Tees.	Regional	<p>As set out in the Shoreline Management Plan (SMP), the sea front of Hartlepool town will be sustained. Further south at Seaton Carew, there is opportunity as the existing defences deteriorate for some set back of the defence line, provided that this opportunity is not lost by inappropriate development.</p> <p>Because of the control imposed at the mouth of the Tees by the breakwaters, the semi-natural dune frontages can be allowed to retreat under managed conditions, creating an opportunity for habitat development in an area quite unique to this section of the coastline.</p> <p>At Redcar there are concerns that there will be a loss of beach and the Shoreline Management Plan recommends that, without undue constraint, management of this area should allow natural development of the coast to the west. Overall, there is little pressure at present on the frontage to the east of Redcar, although it will continue to erode. Within this context the defence of Marske and Saltburn appears sustainable<sup>10</sup>.</p>	<p>Maintain coastal defences protecting the towns of Hartlepool, Saltburn and Marske.</p> <p>Allow intertidal habitats to shift through managed realignment at Seaton Carew and Coatham Sands.</p> <p>Seek opportunities to create new areas of intertidal habitat.</p>	<p><b>Regulating coastal erosion and flooding</b></p> <p><b>Genetic diversity</b></p> <p><b>Biodiversity</b></p>

<sup>10</sup> River Tyne to Flamborough Head SMP2, Non Technical Summary for Redcar & Cleveland Area, North East Authorities Group (February 2007) (accessed April 2013; URL: [www.northeastsm2.org.uk/finalSMP2.htm](http://www.northeastsm2.org.uk/finalSMP2.htm))

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>A sense of place/ inspiration</b>	<p>Broad, low-lying plain with meandering river channel, with wide views to distant hills</p> <p>Contrast between quiet rural area and large urban / industrial complex</p> <p>Heavy industry interspersed with internationally designated intertidal habitat</p> <p>Flat, peaty fenland and carrs</p> <p>'Beck Valleys' forming green corridors into urban area.</p>	<p>A sense of place is provided by the broad, low-lying plain of open agricultural land with large fields, sparse woodlands and distinctive 'green' villages, with wide views to distant hills, dominated by the meandering River Tees and its tributaries.</p> <p>A notable contrast is evident between the quiet rural areas and the dense urban development with large-scale industrial installations which form a distinctive skyline along the Tees Estuary, and have spread across the estuarine flats forming an almost continuous conurbation between Hartlepool and Redcar. Surviving amidst this industrial development are the distinctive mudflats and salt marshes of the Tees Estuary that, combined with artificially created lagoons, create habitats of international importance for wildfowl and a significant seal population.</p> <p>Minor valleys and linear strips of open land extend as distinctive green corridors from rural farmland into the heart of the conurbation.</p> <p>Distinctive areas of flat, peaty fenland and carrs are to be found at Skerne.</p>	Regional	<p>The close juxtaposition of heavy industry and internationally designated intertidal habitats is a distinctive characteristic of this NCA, as is the contrast on a larger scale between the large conurbation around the estuary and the rural hinterland to the south and west.</p> <p>There is a strong rural character to the area south-west of the Teesside conurbation, while localised areas such as the Skerne carrs have their own distinct character.</p>	<p>Conserve the character of the rural hinterland by planning new development to retain quiet rural areas between settlements.</p> <p>Protect the internationally designated intertidal habitats and allow their natural realignment as a result of coastal retreat.</p> <p>Protect and restore fenland and carr habitat in the Skerne carrs through appropriate management of the water table.</p>	<p><b>Sense of place / inspiration</b></p> <p><b>Tranquillity</b></p> <p><b>Biodiversity</b></p> <p><b>Sense of history</b></p>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Sense of history</b>	<p>Archaeological remains of former settlement pattern and agricultural practice</p> <p>Field pattern</p> <p>Green villages</p> <p>Disused railways</p> <p>Defence structures</p> <p>Teesside industry</p> <p>Tees Heritage Park</p>	<p>A sense of history is evident in the cropmarks and other remains from iron-age and Roman settlements and surviving and deserted medieval settlements and their associated ridge-and-furrow.</p> <p>Evidence of historic land management and agricultural intensification is provided by the broad large-scale fields bounded by (usually low-cut) hedges, and courtyard farmsteads.</p> <p>Aspects of history that are likely to be particularly evident to the general public are the the rural villages with farmsteads and cottages built of stone in the west of the area and brick in the east and with red pantile or grey slate roofs, built beside a central tree-lined green.</p> <p>The history of early railway development is reflected in historic features such as disused railway lines and viaducts.</p> <p>Also evident is the history of defence with the strategic siting of rifle section posts and pillboxes designed to prevent an invading force along the coast.</p> <p>A sense of history is reinforced by the major industry of the Teesside conurbation which has its roots in rich local mineral reserves, good communication links and an estuarine and coastal location.</p> <p>The Tees Heritage Park will provide interpretation of the landscape history around the River Tees.</p>	Local	<p>Agriculture has influenced the landscape since pre-historic times and this is evident both from archaeological remains and settlement pattern. It will be important to ensure that modern agricultural practices allow for the retention of these historic features.</p> <p>The more rapid industrial development has also left its mark on the landscape, and the remains of former railways are an indicator of the area's rich railway heritage.</p> <p>The Tees Heritage Park will provide further opportunities for interpretation of historical influences on the landscape.</p>	<p>Conserve the character of historic 'green villages' through careful planning of new development.</p> <p>Management of cultivation practices to allow conservation of archaeological features, for example encouraging shallow cultivation and reversion to permanent grassland.</p> <p>Conserve elements of the area's industrial and railway heritage such as viaducts and disused railway lines.</p>	<p><b>Sense of history</b></p> <p><b>Sense of place / inspiration</b></p> <p><b>Food production</b></p> <p><b>Recreation</b></p> <p><b>Geodiversity</b></p>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Tranquillity</b>	Rural areas around slow-moving rivers Tees, Leven and Skerne.  Estuary	Rural parts of the Tees, Leven and Skerne Valleys, and coastal parts of the estuary with expansive skies, are the most tranquil parts of the NCA. The Tees Lowlands has experienced a significant decline in tranquillity with undisturbed areas having decreased from 54 per cent in the 1960s to 30 per cent in 2007 according to CPRE Intrusion Map 2007.	Local	The sense of tranquillity is dependent on the contrast between heavily disturbed urban and industrial areas and quiet rural areas. It will be important in particular to ensure that small, isolated areas of high tranquillity within the river valleys are protected from intrusion.	Plan to focus new development around existing urban / disturbed areas to maintain the contrast between these and the quiet rural areas.	<b>Tranquillity</b>  <b>Sense of place / inspiration</b>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation	Rights of way	The NCA offers a network of rights of way totalling 1,206 km at a density of just under 1.2 km per km², including the Teesdale Way footpath, as well as a small amount of open access land covering 14.25 ha or just 0.1 per cent of the NCA.	Local	Although access to intertidal habitat is limited, Teesmouth National Nature Reserve allows people to experience and learn about the internationally important intertidal habitats in the Tees Estuary and the species they support, and the RSPB reserve at Saltholme provides further opportunities for access and interpretation.	Provide improved access along existing green corridors in urban areas, and join together existing green infrastructure assets to form a strategic green infrastructure network.	Recreation  Sense of place / inspiration  Sense of history
	Access land					
	National Nature Reserve					
	Country parks	Teesmouth National Nature Reserve covers 102 ha within the Tees Estuary. The RSPB has also recently opened its Saltholme reserve.		The Teesdale Way footpath provides a route along the River Tees inland, and the Tees Heritage Park and River Tees Rediscovered landscape partnership will provide further recreational opportunities.		
	Registered Parks & Gardens					
	Woods for People					
	Local Nature Reserves	Country Parks cover 646 or 1 per cent of the NCA, Registered Parks and Gardens 651 ha and Local Nature Reserves 432 ha. Woods for People cover 1,014 ha or approximately 1 per cent. The Tees Heritage Park will provide recreational facilities between Yarm and Stockton-on-Tees.		There is good provision of Country Parks and Woods for People, particularly in the area to the north-west of Billingham.		
	Accessible greenspace					
	Coastal recreation					
	Caravan sites	The NCA has opportunities for public access to local greenspace and green corridors in urban areas, such as the ‘Beck Valleys’ of Middlesbrough.		Provision of accessible natural greenspace is most important in and around urban areas. The close juxtaposition of these areas with the intertidal habitats of the Tees Estuary provides an opportunity for people to experience the natural environment in their local area.		
Tees Heritage Park.						
	There are coastal recreational opportunities along the Redcar and Cleveland coast.					



Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Biodiversity</b>	<p>Ramsar and SPA: 581 ha</p> <p>Coastal and flood plain grazing marsh (786 ha)</p> <p>Coastal sand dunes (332 ha)</p> <p>Reedbed (268 ha)</p> <p>Broadleaved mixed and yew woodland (3212 ha)</p> <p>Open mosaic habitat on previously developed land</p>	<p>Teesmouth and Cleveland Coast is designated as SPA and Ramsar on the basis of its intertidal habitats, coastal and flood plain grazing marsh, and internationally important numbers of little tern, sandwich tern, knot and redshank. It also has colonies of grey and common seals.</p> <p>The total area of the NCA designated as SSSI, including this site, is 764 ha. Other BAP priority habitats include reedbed and broad-leaved woodland.</p> <p>Early successional grassland and scrub that has emerged on slag substrates on previously developed 'brownfield' sites support a diverse range of wild flowers and notable invertebrate species such as grayling and dingy skipper.</p> <p>The 'Beck Valleys' of Middlesbrough support populations of water vole and have recently been re-colonised by otter.</p> <p>The NCA also supports significant numbers of farmland birds and a number of great crested newt populations.</p>	International	<p>Large areas of intertidal habitat have already been lost through land reclamation associated with industrial development of the Tees Estuary. Protection of the remaining areas, and creating new intertidal habitat where appropriate as has been achieved at Saltholme, is therefore a priority. It will also be important to protect and expand undesignated areas of wetland habitat around the estuary which are also used by the waterfowl.</p> <p>Remnants of semi-natural habitats within the farmed environment, such as hedgerows, uncultivated field margins, permanent pastures and ponds, support farmland birds, great crested newts and other species, and are important in allowing wildlife to move between larger areas of habitat. It will be important to manage these features for biodiversity benefit, for instance by increasing the species diversity of existing hedgerows, and to maintain links between them.</p> <p><b>Continued on next page...</b></p>	<p>Protect remaining areas of mudflat and salt marsh, and allow them to shift through managed realignment, to prevent further net losses due to coastal squeeze. Seek opportunities to create new areas of intertidal habitat.</p> <p>Promote creation and appropriate management of hedgerows, species—rich meadows, uncultivated margins, ponds and other semi-natural features on agricultural land.</p> <p>Expand woodland cover where appropriate and manage existing woodland appropriately.</p> <p>Protect, and create links between, wildlife-rich habitats in urban areas.</p> <p>Protect remnants of wetland habitat in the Skerne carrs. Seek opportunities to restore ditches and wet pasture through appropriate management of the water table.</p>	<p><b>Biodiversity</b></p> <p><b>Genetic diversity</b></p> <p><b>Climate regulation</b></p> <p><b>Pollination</b></p> <p><b>Pest regulation</b></p> <p><b>Sense of place / inspiration</b></p> <p><b>Tranquillity</b></p> <p><b>Pollination</b></p>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity cont.				<p><b>... continued from previous page</b></p> <p>Similarly, 'brownfield' sites with early successional habitats on previously developed land provide valuable wildlife habitat, and green infrastructure corridors allow wildlife to move through urban areas.</p> <p>Woodland has been cleared historically and large areas of wet woodland and reedbed have been lost due to agricultural intensification and drainage. Surviving remnants provide a valuable biodiversity resource. It will be important to protect these and increase their extent by promoting appropriate land management practices. A non-intervention approach to woodland management should be used where appropriate, and the retention of deadwood will help to enhance biodiversity in woodlands. Opportunities should also be sought to increase woodland cover in appropriate areas.</p>		

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Geodiversity</b>	<p>Hartlepool Submerged Forest</p> <p>Coastal sandstone outcrops</p> <p>Cleveland Dyke</p> <p>Geological SSSI</p> <p>Geomorphological processes</p>	<p>There are three geological SSSI in this NCA.</p> <p>The Permo-Triassic mudstones and sandstones in this NCA are overlain by a thick layer of glacial and alluvial drift material which has formed low undulating hills of moraine to the south of the River Tees. Red sandstones formed the predominant vernacular building material in the area. Jurassic sandstones outcrop at the coast, most notably in the Lower Jurassic sequence at Redcar, and also form the Eston and Upleatham Hills near Guisborough.</p> <p>The coastline is undergoing a dynamic system of erosion and accretion with material moving from north-west to south-east. At Hartlepool Submerged Forest SSSI, ancient peat shelves and the preserve the remains of mixed deciduous forests which have been subject to successive marine transgressions.</p> <p>Cleveland Dyke is an intrusion of hard igneous material into the local strata, the geological features of which have been revealed by extraction. The Sherwood Sandstone aquifer also underlies the NCA.</p>	National	<p>Dynamic processes continue to affect the geomorphology of the coast.</p> <p>Coastal exposures provide an understanding of the geological history of the area. Providing access to these and other geological features can aid understanding of the processes which led to their creation.</p>	<p>Allow natural coastal processes to take place with a policy of 'no active intervention' away from urban areas.</p> <p>Provide an appropriate level of access to features of geological interest to aid interpretation.</p> <p>Continue to study natural geomorphological processes in order to improve understanding and inform management decisions.</p>	<p><b>Geodiversity</b></p> <p><b>Regulating coastal flooding and erosion</b></p> <p><b>Water availability</b></p> <p><b>Sense of place / inspiration</b></p> <p><b>Recreation</b></p>

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