National Character Area profile:

25. North York Moors and Cleveland Hills

Supporting documents

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Introduction

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

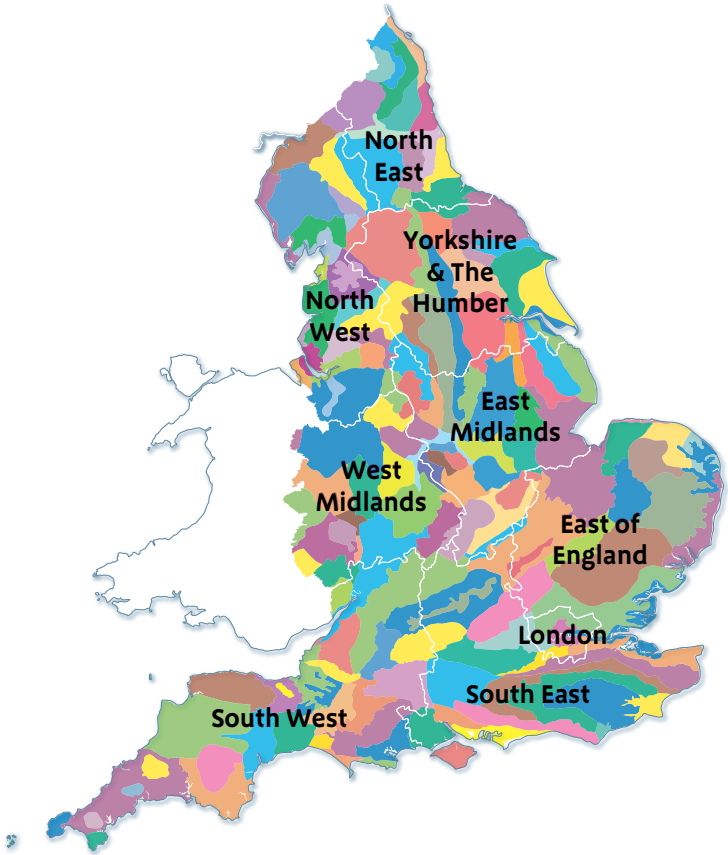
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and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

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

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

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

National Character Areas map



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

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

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

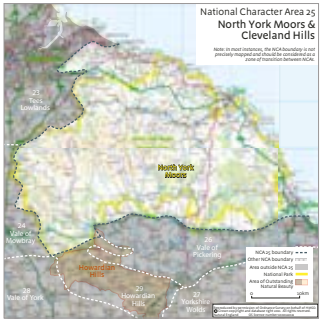
Summary

The North York Moors and Cleveland Hills National Character Area (NCA) comprises a well-defined upland area, rising from the Tees Lowlands to the north, the Vale of Mowbray and Howardian Hills to the west and the Vale of Pickering to the south. To the east it is bordered by the North Sea, the extensive stretches of high coastal cliffs exposing the geology that shaped these uplands. Some 85 per cent of the area falls within the North York Moors National Park.

The North York Moors and Cleveland Hills are an elevated upland of sandstone geology, incised by valleys, which features the largest continuous expanse of upland heather moorland in England, internationally recognised for its important habitats and the moorland bird population it supports. The expansive, largely treeless, central moorland plateau contrasts strongly with the enclosed valleys; some are narrow and wooded, while others such as the Esk are wider, with an upland landscape of walled and hedged pastures. Over 25 per cent of the area is semi-natural moorland habitat (upland heathland and blanket bog), much of which is designated as Sites of Special Scientific Interest, and the area has about 21 per cent woodland cover (mostly located to the south-west and south-east). It is largely unpopulated, with scattered farmsteads and small villages, and the main population centres lie along the coast and southern edge.

A substantial part of the area forms the North York Moors National Park, with both its natural and cultural heritage shaping a distinctive sense of place, drawing many visitors from afar. Sustainably managed uplands provide many ecosystem services of benefit to the wider area. These services include storing carbon in soils, preventing its loss to the air and water; holding rainfall in these wetland habitats and other vegetation, slowing its journey to major rivers and thence regulating flow through more densely populated areas vulnerable to river flooding; providing an expansive, open landscape, long views and a sense of remoteness.

Providing functioning ecosystems and preventing fragmentation of habitats presents a real challenge, particularly in the face of environmental change, as we increasingly depend on a resilient landscape supported by sustainable land management practices. There are opportunities here to strengthen the networks of semi-natural habitats, particularly wetlands, native woodland and species-rich grassland, enhancing their regulation of natural processes and provision of the public benefits mentioned. At the coast the dynamic processes of erosion and accretion can be accommodated, thus creating a more resilient natural environment that is capable of both ameliorating and adapting to climate change. Sustainable management of these natural resources will ensure that the landscape continues to provide food, clean water, energy, and inspiration and enjoyment to people locally, regionally and beyond.



Click map to enlarge; click again to reduce.

Statements of Environmental Opportunity:

- **SEO 1**: Protect and positively manage the large areas of open, expansive moorland for the internationally important habitats and species that they support, for the sense of wildness and strong character of the areas, for their ability to sequester carbon, and for the benefits that well managed moorland brings for water quality and flood control.

- **SEO 2**: Conserve, enhance and promote the special qualities of the coast, inshore waters and sheltered harbours allowing the operation of natural coastal processes, the creation of new habitats. Manage the development and recreational needs of coastal settlements and secure a sustainable future for communities that are dependent on inshore fisheries.

- **SEO 3**: Protect and improve access to and quiet enjoyment of the countryside, particularly in the North York Moors National Park, conserving the sense of tranquillity and relative remoteness, maintaining public access to the landscape, encouraging specialist forms of recreation appropriate to the area, conserving and providing interpretation of its history and numerous archaeological, biological and geological assets, and protecting the strong sense of place.

- **SEO 4**: Seek opportunities to restore lowland fens, reedbeds, flood plain grazing marsh, flushes and riparian habitat to enhance biodiversity and contribute to regulating flood flows, enhancing water quality, aquifer recharge, carbon sequestration and storage, leading to benefits being experienced within the NCA and beyond to NCAs downstream.

- **SEO 5**: Positively manage woodlands, trees, wood pasture and historic parklands for their contribution to the characteristic landscapes of the area, their priority habitats and the species that they support, as well as their potential for carbon storage, regulation of peak flood flows and provision of renewable materials.

Description

Physical and functional links to other National Character Areas

Extensive views are often afforded from within the NCA outwards over adjacent lower-lying NCAs, across the Vale of Pickering to the south, the Vale of Mowbray to the west and the Tees Lowlands to the north. Equally, the North York Moors are recognised in views of the dramatic scarp slopes from the west, in particular the White Horse and Sutton Bank, and the distinctive form of the outlier Roseberry Topping. The rising slopes of the Tabular Hills form the backdrop of views north within the Vale of Pickering, and similarly the uplands form the backdrop in views to the south from the conurbations of Teesside. Views of the dramatic eastern cliffs from along the cliff-top paths and from the sea looking landward are also significant.

Many of the watercourses that arise in the hills of this NCA drain south into the Vale of Pickering and form part of the River Derwent catchment; the Esk and some smaller rivers flow into the North Sea. These rivers and their associated riparian habitats provide strong ecological links from the uplands into the surrounding lowlands. Management of the upper stretches of these rivers clearly has an impact on flood flows and sedimentation further downstream. The moorland and its fringes provide resources for surrounding areas, be it summer grazing, recreation or field sports. At the coast, dynamic processes of sediment supplied by longshore drift operate across NCA boundaries.

Distinct areas

- South Hambleton Hills and Tabular Hills

Ravenscar Moorland.

Key characteristics

- Upland plateaux, generally below 400 m, dissected by a series of dales – some broad and sweeping but others narrow, steep sided and wooded – creating strong contrasts between open moors and enclosed valleys.
- Extensive areas of heather moorland on plateaux and hills, largely under sporting ownership, including large expanses of upland heathland and blanket bog habitats, creating a sense of space, expansiveness and openness.
- Upland plateau landscape underlain mainly by sandstone and mudstone of Middle Jurassic age and calcareous sandstone and limestone of Upper Jurassic age.
- Mosaics of upland heathland vegetation supporting internationally important populations of breeding merlin and golden plover.
- Some areas of extensive conifer and mixed plantations, especially in the south-east, and broadleaved woodland on steep valley sides.
- Valley landscapes characterised by pastoral farming, with a clear demarcation and strong visual contrast between the enclosed fields with some species-rich grasslands and wetlands, farms and settlements, and the bracken-fringed moorlands above.
- Drystone walls and hedgerows enclosing the small pastures and meadows in dales and fringing farmland, often replaced by fences in arable areas.
- Large-scale arable landscapes to the south and east.
- Jurassic sandstones, mudstones and limestone forming a dramatic coastal landscape of high cliffs, high vegetated maritime slopes, and small coves and bays, with coastal towns and compact fishing villages.
- Sparsely settled, with scattered farmsteads and small villages, and traditional buildings constructed of local sandstone or limestone and with red pantile roofs, creating a strong visual unity.
- A rich archaeological heritage from many different periods, especially on the moorland plateaux.
- Panoramic views over moorland plateaux, ridges and dales and out over surrounding lowland landscapes and the North Sea.

North York Moors and Cleveland Hills today

The North York Moors and Cleveland Hills are a very clearly demarcated block of high land in the north-east of Yorkshire and neighbouring Cleveland. The central moorland plateau is formed from Middle Jurassic sandstones and mudstones, with softer Lower Jurassic rocks being eroded in the west to form the western scarp above the Tees Valley and Vale of Mowbray. Here a curiously shaped, conical outlier of Lower Jurassic rocks, Roseberry Topping, is a distinctive and well-known landmark.

Towards Robin Hood's Bay from Ravenscar.

To the north-east the upland block meets the North Sea, resulting in dramatic coastal cliffs. The Cleveland Hills are the highest area, merging into the Hambleton Hills in the south-west – which in turn drop sharply down to the Vale of York. Along the southern margin the change in underlying rock is reflected in the distinct topography of the Tabular Hills, which dip gently to the south and east with a marked change in slope where the land drops down to the Vale of Pickering.

The expansive sweep of unenclosed heather moorland has been created by centuries of stock husbandry and other land management practices, and is a notable feature of the NCA. From these moorlands panoramic views in all directions give a strong feeling of wide open space, solitude and relative wildness and remoteness.

This feeling is enhanced by the relatively few roads and lack of settlements on the moorland plateau. This open moorland contrasts strongly with the more enclosed dales, with their scattered farmsteads and patterns of drystone walls enclosing small pastures. The moorland is the watershed: the dales that run south are broad and sweeping in their upper reaches, but narrow and steep sided where they cut through the limestone and calcareous sandstones of the Tabular Hills. The tributaries of the Esk in the northern dales are smaller and contained by hard shoulders of rock, while the Esk itself runs east to west through a wide upland valley.

The upland block extends eastwards to one of the highest stretches of cliff along England's North Sea coast. The proximity of the sea to the high moors and sheltered dales adds greatly to the diversity, drama and character of the landscape. Small fishing villages are tucked into sheltered locations where narrow valleys meet the coast, for example at Staithes and Robin Hood's Bay.

This dramatic coastline is widely known as the Dinosaur Coast, famous for its classic geological exposures and rich fossil resources. The unstable sea cliffs of the coastline support a range of vegetation from pioneer plant communities typical of the changing habitat to woodland where it is more resistant to erosion. Whitby jet can still be found on the shoreline, and the cliffs have had a history of quarrying for alum and other minerals.

The high moorland plateaux are largely treeless, but there are extensive coniferous plantations in the south-east, providing valuable habitat for nightjar and goshawk, and in the west and south-west. On the steep sides of narrow dales there are broadleaved woodlands, often of ancient origin, but in places replanted with productive timber species. The south-west of the area contains a nationally important concentration of ancient woodland sites and veteran trees.

The moorland represents the largest continuous expanse of upland heather moorland in England and supports internationally important areas of northern Atlantic wet heaths and European dry heaths, and blanket bog habitats. These habitats are dominated by ling heather and a range of other species, notably the bog mosses in wetter areas. Much of the moorland is managed for grouse and is of international significance for birds such as golden plover and merlin it also supports other moorland birds such as curlew.

Bracken is a significant feature on the higher land, forming a fringe to the moorlands and marking the transition from moor to valley pastures. Often there are strong colour contrasts – most notably the purple of the heather in late summer, the russet of the bracken through the winter months, the greens of the enclosed pastures in spring and early summer, and the darker conifers all year round. All these complement the grey or sandy colours of the walls, farms and hamlets, all built from local sandstone or limestone, creating a strong visual unity.

The valleys contain grasslands of varying degrees of agricultural improvement, to support the rearing of sheep and cattle. Some species-rich lowland meadows remain where agricultural management is less intensive, and wetlands occur where drainage is impeded or at upwellings and seepages of lime-rich groundwater on valley sides. Farndale is renowned for its extensive wild daffodils. Fields are bounded by drystone walls or in some lower valleys by hedges, often with hedgerow trees. Some older parklands notably Duncombe Park, contain a large number of magnificent veteran trees with their associated wildlife interest, supporting bat populations in the area. The southern fringe of the area holds isolated remnants of species-rich limestone grassland and calcareous fens. These grassland areas along with associated areas of shrub and woodland provide valuable habitat for the Duke of Burgundy butterfly and pearl-bordered fritillary.

Open moorland contrasts strongly with the enclosed dales, their scattered farmsteads and drystone walls.

In the south and east, where the soils are deeper and more fertile, there are extensive areas of arable cropping, with larger fields often bounded by fences. Sensitive management under Environmental Stewardship increases the importance of these areas for farmland birds such as tree sparrow and lapwing, and for rare arable flora. The arable landscape extends along the coastal strip, creating striking visual contrast where the farmed landscape meets the high cliff edge.

There is much evidence of early human activity in these uplands, for example in field systems, and in burial sites such as barrows and cairns. Particularly striking are the early Christian carved stone crosses that still stand out on remote moorland tracks. Walls, farms and villages are built of local stone, but roofed with red pantiles, which is unusual in upland areas, and thus very distinctive of this area.

Tucked in a twisting wooded valley is Rievaulx Abbey, the ruins of a 12th-century Cistercian monastery which has inspired many artists and poets. Medieval Whitby Abbey and Scarborough Castle are iconic features of the coast which have dominated their communities for centuries. More recently the railway line that winds its way through Newtondale between Pickering and Whitby has been preserved for recreational use. Large structures have a notable impact on the landscape, especially the chimney of the potash works at Boulby, the towering pyramid of the Ministry of Defence installation at Fylingdales, and the transmission mast at Bilsdale.

The landscape through time

This upland area is underlain by rocks of Jurassic age which rise sharply from the adjacent lowland regions. The oldest bedrock consists predominantly of sandstones and mudstones, found in valley bottoms, and also creates the precipitous cliffs along the coast from Kettleness to Scarborough. Seams of iron ore within the Jurassic sandstones and mudstones once provided a source of ironstone, which was extracted and used in the iron industry in the Esk Valley from the Middle Ages. More recently potash and associated halite salts have been extracted from the Permian rocks at great depth at the Boulby mine.

Limestone and calcareous sandstones have created the distinct form and character of the Tabular Hills and the Hambleton Hills.

The fossiliferous limestone and calcareous sandstones of the Upper Jurassic have created the distinct form and character of the Tabular Hills in the south and the Hambleton Hills in the south-west. The limestone has been worked for building materials, and numerous active and disused quarries are found here. These rocks resisted glacial action to form scarps, for example at Sutton Bank and traversing the moors from west to east. The central moorlands are of Middle Jurassic sandstones which give rise to impervious, infertile sandy soils, overlain by peat in places.

During the Tertiary Period, a process known as cambering occurred in the Helmsley area, resulting in a number of rock fissures. These features are known locally as the Windy Pits and provide shelter for swarming bats.

The Cleveland Dyke, a hard, crystalline intrusive rock formed from molten magma 58 million years ago, cuts across the NCA from west to east. Its qualities make it useful for road and railway building, and remains of quarries can be traced in a line from Great Ayton in the west to Goathland Moor in the east. Glacial deposits of till and sandy gravels give rise to a more undulating landform in the north and along the coastal strip. Glacial action created the dramatic Western Scarp while outflow channels cut deep valleys such as the narrow gorges of Newtondale and Forge Valley, and the narrow valleys running south through the Tabular Hills.

The North York Moors retain a rich archaeological heritage revealed through burial sites, field systems, settlements and boundaries, which are especially evident on the heather-clad uplands and quarry sites on coastal cliffs. Once wooded, these uplands were cleared in pre-historic times and then grazed. Mesolithic occupation sites are known on the central moorland and neolithic long barrows along the valley edges. The moors are also rich in bronze-age barrows, cairns and stone circles. Evidence of iron-age and Romano-British settlement is concentrated in the south and east, with several earthworks including Roulston Scar, the largest iron-age hill fort in northern England.

The present strong pattern of nucleated settlements developed between the 9th and 13th centuries. Carved stone crosses still remain from these early days of Christianity in Britain and form striking landmarks along the moorland tracks. A royal forest, centred upon Pickering, stretched far to the west and north with small villages within it. Planned linear and green settlements, with tofts behind the dwellings stretching to back lanes, are characteristic.

Major change came with the arrival of monasteries in the 12th century: Rievaulx and Byland abbeys were the most dominant, controlling extensive areas of moorland and establishing outlying granges. After the Dissolution of the Monasteries in the 1530s and 40s, prominent local families took over the monastic estates. Country houses and designed landscapes with ornamental trees were established, for instance at Rievaulx and Duncombe Park. Market towns developed at Helmsley, Pickering and Kirkbymoorside.

Common grazing lands were divided and enclosed in the late 18th and 19th centuries under local agreements and Parliamentary Acts, the former preserving the strip-field pattern, with clusters of common-field enclosures in the south and east. Larger, more regular enclosures are concentrated on the moorland fringes, mostly associated with arable farming in the late 18th and early 19th centuries. Common grazing continued on unenclosed moorland, and management for grouse shooting was introduced here from the late 19th century. More arable-based husbandry, combined with root crops, was practised on the deeper soils of the south and east and along the northern escarpment of the Howardian Hills from the later 18th century.

Scarborough, a small medieval port, developed after the discovery of mineral springs in the early 17th century, and expanded from the late 18th century, while the port at Whitby is notable for its 18th-century architecture. Seaside resorts also developed in the late 19th century around Whitby and the port of Saltburn. The maritime heritage of the area is focused around Captain James Cook, who served his apprenticeship in the local merchant navy fleet of the 18th century.

From medieval times small-scale industrial workings exploiting the mineral resources of stone, coal and ironstone were economically significant, and spoil heaps, bell pits and disused railways are all still visible on the moors, coastal cliffs and hillsides. Jet has been extracted since the Bronze Age, reaching its peak as a major industry in the 19th century, and has very strong cultural associations in this area, with Whitby in particular. Alum, used in tanning and dyeing, was a major industry of the area and was extracted from open quarries from the 17th century, altering the local landform, especially along the coast.

The area retains a high proportion of ancient woodland. In the early-to-mid 20th century extensive coniferous plantations altered the character of the landscape, especially in the west and south-east. More recently there has been an increase in new broadleaved woodland.

Many of the drystone walls and hedges are now managed under agri-environment schemes, which have also achieved improved enhancement of moorland habitats. While there has been limited development in the area, intrusion from road traffic has increased, and the extent of dark skies has decreased since 1993.

Ecosystem services

The North York Moors and Cleveland Hills National Character Area (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 NCA is contained in the 'Analysis' section of this document.

Provisioning services (food, fibre and water supply)

- **Food provision**: The area is a major producer of lamb, beef and dairy products as well as crops such as cereals, and other produce such as honey.
- **Timber provision**: There is a well established forestry industry, with extensive conifer plantations and overall woodland cover of 21 per cent.
- **Biomass energy**: The high existing woodland cover in this area offers significant potential for the provision of biomass through bringing unmanaged woodland under management and as a by-product of commercial forestry management.
- **Water availability**: Much of the NCA overlays the Corallian Limestone major aquifer, which gains significant quantities of water from the River Rye and River Derwent through swallow holes. The River Derwent is an important source of drinking water supply.

- **Genetic diversity**: A number of pedigree breeds are reared in the NCA, including beef shorthorn, belted Galloway and highland cattle.

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

- **Climate regulation**: The upland soils in this NCA generally have a relatively high carbon content with more significant carbon storage provided by the moorland habitats. Climate regulation is also offered by the extensive cover of woodland and wetlands – blanket bog, reedbeds, coastal and flood plain grazing marsh, fens, mudflats and saline lagoons along the coast.

- **Regulating soil erosion**: Careful management of moorland is required to achieve healthy vegetation in order to reduce erosion of peat soils. Soil erosion also often occurs in times of heavy rainfall on steeper slopes and woodland creation here can help to prevent this. There are also high levels of sediment run-off from agricultural land into the rivers Rye, Leven, Esk and Derwent. This can be addressed by securing sustainable grazing of grasslands and changes to management of arable land, such as grass buffer strips, uncropped land and tree planting alongside watercourses and on slopes, to reduce both run-off and wind erosion.

- **Regulating soil quality**: Soil quality can be improved through extensive management of in-bye and lowland grasslands which will enhance soil structure, increase the organic content, reduce poaching and compaction, and improve infiltration.

- **Regulating water quality**: Water quality in the Derwent catchment is affected by soil erosion and run-off, with consequent sedimentation and altered water chemistry of watercourses. This is largely attributable to the way in which the land is managed; improved water quality can be delivered by more sustainable management of upland peat, adopting best practice methods for conserving soils and measures to restrict nutrient input to watercourses.

- **Regulating water flow**: Many major rivers rise here, and are prone to flash floods, especially in the south of the area. The River Derwent and its upland tributaries also tend to respond quickly to rainfall events. Peak flow events can be regulated through managing moorlands to store more water, restoring and extending wetland zones, and carefully sited woodland creation.

- **Pollination**: Heathlands, grassland and meadows cover 27 per cent of the NCA, including a 43,000-hectare expanse of open heather moorland, and provide important nectar sources and habitats for pollinating insects and beneficial predator species.

- **Regulating coastal erosion**: Dynamic coastal processes operate along the coastline of this NCA, removing material from soft cliffs in one location and depositing it along the coast where these accretions are then fundamental to other natural processes, such as the development of beaches and intertidal areas which help to attenuate wave energy.

Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration**: A sense of place is provided by the high moorland plateau with its extensive moorlands, dissected by a series of dales that narrow to form intimate, steep-sided valleys. Roseberry Topping is a distinctive landmark in the outlying hills to the north. The sense of place is enhanced by the distinctive and dramatic coastal landscape of high cliffs, sandy coves and bays which contrast with the arable farmland and parkland with veteran trees. The area is valued for the sense of escapism that it provides and as a source of inspiration for writers and artists, Whitby famously being used as the dramatic setting for Dracula's landfall in Bram Stoker's novel.

- **Tranquillity**: The NCA is an important resource for tranquillity with 80 per cent of the area classified as 'undisturbed' according to the Campaign to Protect Rural England Intrusion Map of 2007.

- **Sense of history**: A sense of history is evident in the rich archaeology dating back to prehistoric times. Features include rock art, barrows, cairns, standing stones, forts, historic tracks and ecclesiastical sites. Attractive small villages built from local materials, early Christian stone crosses and the ruins of the 12th-century Rievaulx Abbey, along with more recent features such as the railway, add to the sense of history.

- **Recreation**: The NCA provides a significant area of open access land (28 per cent), along with a network of rights of way, including the Coast to Coast path, the Cleveland Way and the Ebor Way. The special qualities of the area are a major draw for recreation and tourism with North York Moors National Park accounting for 85 per cent of the NCA, and the North Yorkshire and Cleveland Heritage Coast being a major attraction.

- **Biodiversity**: Some 65 Sites of Special Scientific Interest (SSSI) have been designated in this NCA, a number of these having further levels of designation, including as European Special Protection Areas and Special Areas of Conservation, emphasising their importance.

- **Geodiversity**: A total of 29 SSSI have been designated wholly or in part for their geological interest (20 purely for geological interest, 9 for mixed biological and geological interest) within this NCA. The dramatic coastline is widely known as the Dinosaur Coast, coastal processes revealing the classic geological exposures and rich fossil resources for which it is famous.

Late silage cut at Rosedalehead. The valleys contain grasslands of varying degrees of agricultural improvement, to support the rearing of sheep and cattle.

Statements of Environmental Opportunity

SEO 1: Protect and positively manage the large areas of open, expansive moorland for the internationally important habitats and species that they support, for the sense of wildness and strong character of the areas, for their ability to sequester carbon, and for the benefits that well managed moorland brings for water quality and flood control.

For example, by:

- Restoring and maintaining in good condition the internationally important blanket bog and peat soils by securing sustainable grazing, sensitive burning programmes and appropriate gully-blocking regimes. This will promote hydrological integrity, effective carbon sequestration, increased capacity of the moorland to hold water thereby improving regulation of peak water flows, improved water quality, and structural and biological diversity, and preserve archaeology.
- Seeking opportunities to restore, expand and improve ecological links between moorland habitats – upland wet and dry heathlands, blanket bog, species-rich flushes, woodland, scrub and grassland – to achieve a strong ecological network and reduce habitat fragmentation, thus increasing resilience to environmental change.
- Enhancing the full range of moorland habitats, ensuring that they are ecologically robust and able to support a diverse assemblage of moorland birds.
- Maintaining open, undeveloped areas of moorland which retain panoramic views, visual connection with surrounding areas and a sense of wildness by encouraging maintenance of hefted flocks and discouraging new fencing and other man-made infrastructure.
- Working collaboratively to reduce fire risk and to deal speedily and effectively with wildfires when they arise.

SEO 2: Conserve, enhance and promote the special qualities of the coast, inshore waters and sheltered harbours allowing the operation of natural coastal processes, the creation of new habitats. Manage the development and recreational needs of coastal settlements and secure a sustainable future for communities that are dependent on inshore fisheries.

For example, by:

- Conserving the dramatic coastline features and the processes and geology that underpin them, including high coastal cliffs and distinctive headlands, which have been designated as the North Yorkshire and Cleveland Heritage Coast, and which, add greatly to the diversity, drama and character of the landscape because of their proximity to the high moors and sheltered dales.
- Conserving and enhancing the coastal villages and towns that cling to steep-sided valleys, including Staithes, Robin Hood's Bay and Whitby, which form an important part of the developed landscape and are popular tourist destinations; working to secure a sustainable future for communities dependent on inshore fisheries; and taking full account of dynamic coastal processes in planning for new development and, where hard defences are not sustainable, planning and allowing for natural adaptation to coastal change, including allowing for landward relocation of semi-natural coastal habitat in areas of high erosion to ensure no net loss.
- Conserving and managing the natural processes that influence the sea cliffs of the coastline, which provide habitat for internationally important seabird colonies and support a range of plant communities typical of the dynamic habitat.
- Conserving, promoting and enhancing the important geodiversity features along this coastline, known as the Dinosaur Coast, such as classic geological exposures and rich fossil resources, for their educational, scientific and recreational value.
- Conserving and promoting the well established 'easy access' stretches of the coast that are suitable for people of all abilities, for example those found along the Cleveland Way, and enhancing the wildlife and landscape experience associated with these routes.
- Protecting the character of the larger coastal settlements which are under pressure for development, and supporting infrastructure and recreational use through appropriate design of new development while taking account of the strategic management policies for the coast.

SEO 3: Protect and improve access to and quiet enjoyment of the countryside, particularly in the North York Moors National Park, conserving the sense of tranquillity and relative remoteness, maintaining public access to the landscape, encouraging specialist forms of recreation appropriate to the area, conserving and providing interpretation of its history and numerous archaeological, biological and geological assets, and protecting the strong sense of place.

For example, by:

- Protecting and positively managing the historic landscape features including tumuli, cairns, stone circles, historic tracks and buildings, ecclesiastical sites, deer parks, industrial features, pillow mounds and parkland, and reducing the risk status of scheduled monuments and listed buildings.
- Protecting and sympathetically managing the archaeological and palaeo-environmental evidence on moorlands, maintaining sustainable grazing intensities and managing scrub and bracken on archaeological sites.
- Protecting and positively managing geological and geomorphological features including exposures in rivers and disused quarries, landforms and river processes.
- Conserving and restoring historic farm buildings and longhouses throughout the area, and protecting monastic landscapes in remote valley heads.
- Raising understanding and awareness of the historic landscape and geology, by recording and monitoring those historic and geological features which may be impacted by climate change, and providing interpretation, for example of the area's rich industrial heritage – iron, coal, jet and alum extraction.
- Managing sustained pressure from tourism to avoid problems such as inappropriate development, increased traffic, erosion along popular rights of way and irresponsible recreation (such as damaging use of four-wheel-drive vehicles and motorbikes).
- Maintaining the sense of tranquillity and remoteness shaped by the open moors and low density of settlement by encouraging sustainable recreational uses and protecting the rural dispersed settlement patterns, nucleated villages and local vernacular.
- Maintaining continuity with the historic built environment through continued use of local building materials (as appropriate) for restoration or new build, emphasising local distinctiveness, for example rubble limestone or dressed sandstone with red pantile roofs.
- Protecting, managing and enhancing the extensive network of public paths and tracks including the 155 km of the Cleveland Way which runs along the western side of the NCA, as well as the other 2,762 km of public rights of way and large areas of open access.

SEO 4: Seek opportunities to restore lowland fens, reedbeds, flood plain grazing marsh, flushes and riparian habitat to enhance biodiversity and contribute to regulating flood flows, enhancing water quality, aquifer recharge, carbon sequestration and storage, leading to benefits being experienced within the NCA and beyond to NCAs downstream.

For example, by:

- Promoting agri-environment schemes and other mechanisms to encourage the restoration and expansion of these habitats to a more robust ecological network, supporting species such as water vole and the newly discovered alcathoe bat, reducing water pollution from agriculture, and enhancing biodiversity and resilience to environmental change.
- Raising awareness of the nationally important flushes which occur in this NCA. Encouraging the creation of buffers around wetland habitats and rivers, to enhance ecological quality and reduce water pollution and soil erosion resulting from agricultural run-off, particularly from intensive livestock and arable production, and in priority catchments.
- Encouraging the planting of riparian and flood plain habitats such as woodlands, in suitable locations, along the Esk, Seven and Leven rivers and in upland valleys to slow and reduce flood flows and sediment delivery to watercourses, and enhance biodiversity. Site-specific plans should consider other species' needs and the landscape context.
- Restoring natural river and stream dynamics, morphology profiles and marginal habitats, thus supporting species such as freshwater pearl mussel.
- Maintaining undeveloped flood plains to store or slow water, optimising the benefits from extending washlands and flood storage by managing land to establish more diverse habitats such as wet pastures, wet woodland and other wetland habitats.
- Restoring peat soils on moorland plateaux and lowland wetlands to improve water storage capacity while also reducing flooding risk and soil erosion and improving water quality, climate regulation, habitat networks and ecosystem resilience to climate change.
- Managing and controlling invasive species and preventing their spread.

SEO 5: Positively manage woodlands, trees, wood pasture and historic parklands for their contribution to the characteristic landscapes of the area, their priority habitats and the species that they support, as well as their potential for carbon storage, regulation of peak flood flows and provision of renewable materials.

For example, by:

- Maintaining and positively managing the pastoral and wooded character of the dales, their nationally important wildlife habitats and distinctive field patterns and boundaries. Ensuring that woodland biodiversity and soils are not damaged where woodland is used for activities such as recreation, livestock shelter and game rearing.
- Managing coniferous woodlands and restoring plantations on ancient woodland sites, ensuring sensitive management to protect and enhance breeding habitat for rare birds such as nightjar.
- Increasing cover of native woodland, trees and wood pasture characteristic of the area and appropriate to the local landscape to strengthen the habitat network and regulate peak flood flows, avoiding loss or damage to priority habitats or species or to geological or archaeological sites.
- Enhancing the positive character of historic parklands and deer parks and retaining veteran trees, in particular Duncombe Park and in the Hambleton Hills, and retaining 'feature' ornamental non-native trees.
- Planning for communities to make more use of renewable energy harvested from the landscape, developing opportunities for small-scale energy generation from wood fuel, ground source heat, solar and wind power.

Rare birds, such as nightjar, benefit from positive habitat management.

Additional opportunity

1: Support sustainable management of agricultural land and grasslands to allow important food provision to continue, to achieve a strong network of semi-natural grasslands, reduce the threats of fragmentation of these habitats and enhance wider public benefits.

For example, by:

- Restoring, expanding and reducing fragmentation of semi-natural grasslands, particularly lowland calcareous grassland on the Tabular and Hambleton Hills and species-rich lowland meadow grassland in the moorland dales – by limiting input of nutrients, managing the timing and intensity of grazing, managing encroaching or invasive vegetation, and introducing local provenance seed to the sward where required – thus improving habitat networks for iconic species such as the Duke of Burgundy and pearl-bordered fritillary butterflies, and other pollinator species, enabling greater movement of species through the landscape and increasing resilience to environmental change.
- Working with the farming community to secure more extensive and appropriate grazing of unimproved grasslands, increasing vegetation diversity and also avoiding compaction and poaching of soil by livestock, thereby enhancing carbon storage and water infiltration, and enhancing habitat for farmland birds of conservation concern.
- Enhancing arable habitats and promoting conservation headlands and margins to support rare arable weeds, nectar-feeding invertebrates and farmland birds such as tree sparrow and lapwing.
- Continuing provision of high-quality produce in the form of lamb, mutton, beef and dairy products in ways that optimise productivity while increasing the resilience of habitats and species to climate change and minimising carbon emissions.
- Supporting sustainable farming of rare breed livestock and enhancing management of semi-natural habitats through maintaining and (where appropriate) increasing stock numbers within extensive grazing systems; and developing local markets for rare breed food products.

Supporting document 1: Key facts and data

Total area: 165,900 ha

1. Landscape and nature conservation designations

Over 140,000 ha of this NCA fall within the North York Moors National Park (85 per cent of the NCA). Nearly all of the coastline falls within the North Yorkshire & Cleveland Heritage Coast, with the exception of short stretches of coast around Whitby and Scarborough, and the designation encompasses 5,993 ha (4 per cent) of the NCA.

- Management plans for the protected landscape can be found at: 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)	Percentage of NCA
International	Ramsar	n/a	0	0
European	Special Protection Area (SPA)	North York Moors SPA	44,095	27
	Special Area of Conservation (SAC)	North York Moors SAC; Beast Cliff-Whitby (Robin Hood's Bay) SAC; Arnecliff & Park Hole Woods SAC; Fen Bog SAC; Ellers Wood & Sand Dale SAC	44,308	27
National	National Nature Reserve (NNR)	Duncombe Park NNR; Forge Valley Woodlands NNR	171	<1
	Site of Special Scientific Interest (SSSI)	A total of 65 sites wholly or partly within the NCA	47,179	28

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 high proportion of its area under international and national nature conservation designations – note that the European sites and NNRs are underpinned by SSSI, therefore these areas overlap.

There are 90 Local sites in the North York Moors and Cleveland Hills covering 1,424 ha which is 1 per cent of the NCA.

Source: Natural England (2011)

- Details of individual Sites of Special Scientific Interest can be searched at: http://www.sssi.naturalengland.org.uk/Special/sssi/search.cfm
- Details of Local Nature Reserves (LNR) can be searched at: http://www.lnr.naturalengland.org.uk/Special/lnr/lnr_search.asp
- Maps showing locations of statutory sites can be found at: http://magic.defra.gov.uk – select 'Designations/Land-Based Designations/Statutory'

1.2 Condition of designated sites

SSSI condition category	Area (ha)	Percentage of SSSI in category condition
Unfavourable declining	367	1
Favourable	5,138	11
Unfavourable no change	267	1
Unfavourable recovering	41,355	88

Source: Natural England (March 2011)

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

2. Landform, geology and soils

2.1 Elevation

Elevation rises up from sea-level to a maximum of 452 m on the high moorland, creating dramatic cliffs along the coast.

Source: Natural England 2010

2.2 Landform and process

The upland landscape is formed from Jurassic shales, sandstones and limestones which have been gently folded and eroded over time. To the west and north-west the Cleveland Hills, consisting of shales and sandstones, form prominent escarpments shaped by glacial erosion. Glacial meltwaters have also scoured out steep sided valleys such as Newtondale and Forge Valley.

Source: North York Moors Countryside Character Area description

2.3 Bedrock geology

Sandstone underlies the main plateau of the North York Moors forming a distinctive high, flat plateau covered by heather moorland. Streams and rivers have over time cut down in to the plateau to form numerous valleys and dales and high ridges, for example Blakey Ridge. To the south and south-west, limestone forms most of the lower Tabular and Hambleton Hills, which are cut through by narrow river valleys. The Cleveland Dyke, a linear intrusion of once molten magma, can be traced from Great Ayton in the west to Goathland moor in the east. A breakdown of solid geology as a proportion of total land area (where more than 1 per cent) is as follows: 45 per cent sandstone (including ironstone), siltstone, mudstone; 25 per cent sandstone; 15 per cent mudstone; 7 per cent limestone; and 5 per cent limestone and calcareous sandstone.

Source: North York Moors Countryside Character Area description

2.4 Superficial deposits

T The high moors have very little drift geology but extensive areas of peat have developed. Glacial till and sandy gravel are found to the north of the area. Some boulder clay can be found along a narrow coastal strip.

Source: North York Moors Countryside Character Area description

2.5 Designated geological sites

Tier	Designation	Number
National	Geological Site of Special Scientific Interest (SSSI)	27
National	Mixed Interest SSSI	20
Local	Local Geological Sites	23

Source: Natural England (2011)

**Local sites are non statutory designations*

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

2.6 Soils and Agricultural Land Classification

The impervious sandstones and high altitude of the high moors produce poor soils (Grade 5) which support extensive heather moorland and rough grazing. Conifer plantations cover 10 per cent of the NCA, such as Dalby Forest, planted on the poorer sandy soils. Slightly deeper and more fertile soils (Grade 4) in the dales and valleys support pasture for livestock and dairy farms. The most productive land is found on the limestone in the south of the area, which gives rise to well drained more fertile soils (Grade 3) making it suitable for arable farming. Grade 4 land is mostly found in the dales and valleys, while Grade 5 soils are found on the moorland plateau.

Source: Natural England 2010

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

Agricultural Land Classification	Area (ha)	Percentage of NCA
Grade 1	0	0
Grade 2	1,019	1
Grade 3	48,743	29
Grade 4	37,978	23
Grade 5	58,838	35
Non-agricultural	17,243	10
Urban	2,014	1

Source: Natural England (2010)

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

3. Key waterbodies and catchments

3.1 Major rivers/canals

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

Name	Length in NCA (km)
Esk	44
Rye	26
Derwent	21
Seven	21
Dove	20
Hodge Beck	16
Seph	8
Leven	7
Riccal	7

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.

Several rivers drain the plateau and hills towards the south, crossing the limestone hills through narrow steep sided valleys and eventually joining the river Derwent which crosses the Vale of Pickering to flow south through the gap at Malton. These rivers include the Rye, Riccal, Hodge Beck, Dove, Seven, Pickering Beck and the Derwent. The river Esk flows east along a broader valley to enter the North Sea at Whitby. Other short rivers such as Kilton Beck and Easington Beck flow north and east from the plateau into the North Sea.

3.2 Water quality

The total area of nitrate vulnerable zone (NVZ) is 80,981 ha, 49 per cent of the NCA.

Source: Natural England (2010)

3.3 Water Framework Directive

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

http://maps.environment-agency.gov.uk/wiyby/wiybyController?ep=maptopics&lang=_e

4. Trees and woodlands

4.1 Total woodland cover

The NCA contains 34,467 ha of woodland (c. 21 per cent of the total area), of which 7,272 ha is ancient woodland. Part of the Tees Community Forest, one of twelve Community Forests established to demonstrate the contribution of environmental improvement to economic and social regeneration, falls within this NCA.

Source: Natural England (2010)

4.2 Distribution and size of woodland and trees in the landscape

All native woodland types within the NCA are generally more common on steep slopes and inaccessible areas, for example on the steep sided valleys that cut through the Hambleton and Tabular Hills, where difficult access has protected them from clearance. The most common woodlands are those of the lowland mixed deciduous woodland and lowland beech and yew woodlands types. Upland mixed ash woodlands are found on the valley sides, particularly on base-rich free draining soil, and are typical of the uplands. Upland oak woodlands are

found on acid soils, including the internationally important Arnecliff and Park Hole Woods SAC. Wet woodland is relatively rare and is mainly comprised of alder, willow and birch and is found in wet areas along valley bottoms. Woodland in the lowland areas tends to vary widely in terms of species composition.

Only around 4 per cent of the area supports ancient woodland which tends to be found on the valley sides, and more than half of this has been replanted with conifers.

Veteran trees are a significant landscape feature, especially in some of the older parklands such as Duncombe Park. In the broader pastoral valleys, hedgerow trees and in-field trees are important components of the landscape.

There are extensive conifer and mixed plantations in the east of the NCA, particularly on the lower slopes of the moorland. These are managed by the Forestry Commission, which is developing a 'continuous cover' approach to the felling cycle in specific areas such as Wykeham. Conifer and mixed plantations are also found in the west, in the Hambleton Hills.

The highest land on the moorland plateau lacks any tree cover, so the few wooded areas that do exist are often prominent.

Source: North York Moors Countryside Character Area description

4.3 Woodland types

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

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

Woodland type	Area (ha)	Percentage of NCA
Broadleaved	11,910	7
Coniferous	18,702	11
Mixed	918	1
Other	2,937	2

Source: Forestry Commission (2012)

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

Woodland type	Area (ha)	Percentage of NCA
Ancient semi-natural woodland	3,344	2
Planted ancient woodland sites (PAWS)	3,928	2

Source: Natural England (2004)

5. Boundary features and patterns

5.1 Boundary features

Pastures are bounded by drystone walls, although in some of the lower lying pastoral landscapes of the wide valleys hedgerows replace walls. Fences are now replacing some of the traditional boundaries.

Source: Yorkshire Wolds Countryside Character Area description; Countryside Quality Counts (2003)

5.2 Field patterns

Pastures in the valleys tend to be small or medium in size. Arable fields, on the better lighter soils of the limestone to the south tend to be large, defined by fences or without any boundaries.

Source: Yorkshire Wolds 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 has been a significant drop in numbers of dairy farms over the past 9 year period, and a slight increase in cereals, but the predominant farm type remains the rearing of livestock.

Source: Agricultural Census, Defra (2010)

6.2 Farm size

11 per cent of farms are very small (under 5 ha) but this number has decreased over the past 9 year period. 58 per cent of farms are under 50 ha, while there are also some very large farms with 20 per cent over 100 ha. These figures reflect the mixed agricultural economy, with small holdings based on livestock rearing in the valleys, and large arable holdings on the lighter more fertile soils to the south.

Source: Agricultural Census, Defra (2010)

6.3 Farm ownership

The number of farm holdings has decreased since 2000, while the total farmed area has increased slightly. Only just over half the holdings are owner occupied. There has been an increase in salaried managers, but a more substantial decrease in full-time farmers. Overall the figures seem to indicate fewer people working on slightly larger farms, but many of these on a part time basis.

Source: Agricultural Census, Defra (2010)

6.4 Land use

The area of land under different agricultural land uses has remained relatively stable over the past 9 year period.

Source: Agricultural Census, Defra (2010)

6.5 Livestock numbers

Numbers of livestock that graze moorland and upland pastures – sheep and cattle – have declined significantly since 2000. However, the number of pigs reared has gone up; as these are likely to be housed rather than free range, an increase in large farm buildings can be assumed.

Source: Agricultural Census, Defra (2010)

6.6 Farm labour

Figures show a general reduction in total farm labour, with reductions in most categories except for salaried managers, which increased over the period and a very slight increase in part-time workers

Source: Agricultural Census, Defra (2010)

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

7. Key habitats and species

7.1 Habitat distribution/coverage

There are over 40,000 ha of internationally important upland heathland which represents the largest expanse of this habitat type in England. Over half of this heathland consists of dry heath vegetation communities on free-draining soils or shallow peat, and these are dominated by ling heather and wavy hair grass, with bilberry and bell heather locally abundant. Where the soil drainage is impeded, wet heath communities occur. These heathland habitats, although the dominant land cover in some areas, exist in a complex mosaic of habitats including blanket bog and fen. These mosaics provide internationally important sites for breeding populations of golden plover and merlin. The variation in vegetation structure and site wetness provide a key nesting and feeding resource.

In valley bottoms where there is impeded drainage and a natural water supply, a range of wetland habitats are found including lowland fens, flushes, wet woodlands and purple moorgrass/rush pastures. Internationally important fen communities occur at Fen Bog (Newtondale) where bog mosses (Sphagnum sp.) are abundant alongside a range of sedges. At Eller's Wood and Sand Dale SAC the springs and flushes, where lime-rich water seeps from the hillsides, support important population of Geyer's whorl snail. A survey in 2011 has revealed a number of significant areas of alkaline fen including Jugger Howe, Newtondale, Blaiksey Bank, Sand Dale, Rosekirk Dale and Troutsdale, making this NCA one of the most important areas in England for this habitat.

The north of the NCA contains large areas of woodland including many of national and international significance. The internationally important upland oak woodlands at Arnecliff and Park Hole Woods supports the Killarney fern with a greater number of sporophytes present than anywhere else in the UK.

Coastal areas of the NCA comprise both hard and soft sloping cliffs of glacial till and Jurassic rocks. Most notable of these areas are the internationally important maritime cliff and slopes habitats of the Beast Cliff – Whitby (Robin Hood's Bay) SAC, which represent some of the best examples of vegetated sea cliffs on the north-east coast of England. Vertical hard cliffs support maritime crevice and ledge vegetation, and the more gently sloping parts of Beast Cliff itself are covered by scrub and woodland. Areas of calcareous clays support typical calcareous grassland and wet flush plant communities, whereas heathland species occur on more acidic sandstone outcrops. The recently extended list of priority habitats (formerly BAP habitats) includes a number of intertidal and marine habitats which are found along and off the North Yorkshire coast.

Species-rich grasslands are relatively rare in the NCA, although a range of types occur including lowland calcareous grasslands and lowland meadows. Of particular interest are the species-rich calcareous grasslands found on the thin, dry soils of the limestone areas of the Tabular and Hambleton Hills in the south. These grasslands support a range of interesting species including the Duke of Burgundy butterfly and pearl-bordered fritillary both of which require mosaics of grassland and shrub habitat.

There are extensive areas of bracken on moorland fringes and valley sides

Source: Natural Area Profile

7.2 Priority habitats

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

More information about Biodiversity 2020 can be found at; www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/englandsbiodiversitystrategy2011.aspx.

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

Priority habitat	Area (ha)	Percentage of NCA
Upland heathland	43,162	26
Broad-leaved woodland	7,592	5
Blanket bog	1,979	1
Reedbeds	2,965[1]	2
Lowland dry acid grassland	219	<1
Lowland calcareous grassland	78	<1
Lowland meadows	95	<1
Coastal floodplain & grazing marsh	26	<1
Purple moor grass & rush pasture	72	<1
Upland calcareous grassland	75	<1
Maritime Cliff & Slope	714	<1

Source: Natural England (2011)

[1] The area of reedbed listed in the habitats inventory is known to be incorrect due to the previous method of digitising these. For example the actual area of reedbed at Newtondale SSSI is believed to be just 1ha but is recorded as the whole SSSI area at c1000 ha. Similarly the small amount of reedbed in the North York Moors SSSI has been digitised to a larger polygon, possibly one of the larger management units. The inventory is currently being updated to correct this.

- Maps showing locations of priority habitats are available at: http://magic.defra.gov.uk – Select 'Habitats and Species/Habitats'

7.3 Key species and assemblages of species

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

8. Settlement and development patterns

8.1 Settlement pattern

The present strong pattern of nucleated villages in the upland dales, along the coast and the calcareous soils in the south, developed between the 9th and 13th centuries. Planned linear and green settlements, with tofts to back lanes, are a major feature. Industrialisation drove the nucleation of former dispersed settlements in the Cleveland Hills. Small settlements and farmsteads are more dispersed around the fringes of the open moorland plateau. The market towns of Helmsley, Pickering and Kirkbymoorside developed on the boundary of the upland with the low lying adjacent land. Small fishing villages with narrow streets developed on the coast, such as Robin Hood's Bay, Staithes, along with the larger port of Whitby with its fine 18th-century architecture. Scarborough, Whitby and Saltburn all also developed in the 19th century as seaside resorts.

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

8.2 Main settlements

Overall the area is sparsely populated, with settlements largely around the southern edge and along the coast, with small villages in the wider Esk dale. The main settlements include the seaside towns of Scarborough (38,364) and Whitby (13,594), and the market town of Helmsley (1559). The small towns of Pickering (6616) and Kirkbymoorside (2595) lie on the southern boundary of the NCA, along the spring line where the upland slopes meet the low lying Vale of Pickering.

Source: Office for National Statistics census data 2001. Countryside Character Area description; Countryside Quality Counts (2003)

8.3 Local vernacular and building materials

Traditional farmsteads relate to a mixed farming base serving the rearing and fattening of livestock. Earlier farmsteads predominate in village centres some of which relate to holding and field layouts established in the medieval period. Pre-1750 fabric is largely confined to evidence of former longhouses in surviving dwellings. Farmsteads are dominated by two-storey farmhouses and combination barns, predominantly constructed of stone. A limestone band spans the southern edge of the National Park with sandstone predominating elsewhere. Some brick farm buildings do occur although these often accompany a stone built farmhouse. Most have pantiled roofs although some have slate indicating wealth and status. Areas of thatch do occur to the south-east although usually restricted to domestic buildings. Many farmsteads retain original door and window fitments conforming to national pattern book exemplars. Local variations include the Yorkshire sliding sash and Whitby composite windows – the latter found mainly in the east. About 78 per cent of historic farm buildings remain unconverted, while about 92 per cent are intact structurally.

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

9. Key historic sites and features

9.1 Origin of historic features

Prehistoric evidence includes: rock art; Mesolithic occupation sites in the central moorlands; Neolithic barrows; prehistoric field systems; bronze-age funerary and associated ritual monuments (upstanding); iron-age hill forts such as Roulston Scar; boundary dykes such as Cockmoor Dyke; paleoenvironmental deposits are preserved by colluvial slippage on valley edges.

Features of Roman origin include Cawthorn Camps and Wade's Causeway, and coastal signal stations.

Evidence of early medieval activity: carved stone crosses; place names indicate settlement by Angles in Tabular Hills and Danes in the north-east and north-west uplands. Later Norse settlement across most of the uplands. Small nucleated villages with associated open field systems. The Royal Forest, centred on Pickering, also housed small villages. Anglo-Saxon monasteries date from this period.

Features of medieval date: cruck built heather-thatched buildings; wayside crosses; traditional communication routes; 12th to 15th-century monastic granges relating to the religious houses of Byland Abbey, Baysdale, Guisborough, Lastingham, Rosedale, Mount Grace, Newburgh, Wykeham and Whitby; Later 16th-century enclosure; castles in the central dales and moorland fringe such as Ayton, Cropton, Danby, Helmsley, Mulgrave, Pickering, Scarborough, Skelton, Whorlton; linear strip fields survive east and west of Pickering; small scale stone quarrying; use of water power for corn milling and fulling; pillow mounds (rabbit farming).

Post-medieval features: stone and pantile buildings; alum coal, stone, jet and ironstone exploitation in central moorlands; parliamentary and local enclosures; large estates such as Duncombe; water collection and management, such as Foord's water traces; forest clearance.

Features from more recent times include: Victorian tourism at Whitby; fishing; WWII and Cold War defensive structures along the coast such as RAF Danby Beacon.

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

9.2 Designated historic assets

This NCA contains the following numbers of designated heritage assets:

- 8 Registered Parks and Gardens covering 800 ha.
- 0 Registered Battlefields covering 0 ha.
- 1,000 Scheduled Monuments.
- 3,081 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

- 39 per cent of the NCA, 65,550 ha is classified as being publically accessible.
- There are 2,762 km of public rights of way at a density of 1.7 km per km^2. There is 1 National Trail within the NCA (Cleveland Way) that runs along the western, northern and eastern sides of the NCA.

Sources: Natural England (2010)

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

Access designation	Area (ha)	Percentage of NCA
National Trust (Accessible all year)	734	<1
Common Land	15,609	9
Country Parks	5	<1
CROW Access Land (Section 4 and 16)	61,665	36
CROW Section 15	578	<1
Village Greens	17	<1
Doorstep Greens	2	<1
Forestry Commission Walkers Welcome Grants	2,661	2
Local Nature Reserves (LNRs)	83	<1
Millennium Greens	0	0
Accessible National Nature Reserves (NNRs)	171	<1
Agri-environment Scheme Access	261	<1
Woods for People	18,011	11

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 upland areas of the North York Moors are shown to be some of the most tranquil in the whole of Yorkshire and Humber. The towns and surrounds of Scarborough, Whitby and Saltburn are the least tranquil areas of this NCA.

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

Tranquillity	Score
Highest value within NCA	133
Lowest value within NCA	-78
Mean value within NCA	22

Sources: CPRE (2006)

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

11.2 Intrusion

The 2007 Intrusion Map (CPRE) shows the extent to which rural landscapes are 'intruded on' from urban development, noise (primarily traffic noise), and other sources of visual and auditory intrusion.

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

Intrusion category	1960s (%)	1990s (%)	2007 (%)	Percentage change (1960s-2007)
Disturbed	6	13	18	12
Undisturbed	93	84	81	-12
Urban	<1	<1	1	1

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are substantial increases in disturbed land over the period, from a very low 5.8 per cent to just under 18 per cent. Intrusion is due to noise, primarily from traffic, urban development (low in this area) and other sources of visual and auditory intrusion.

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

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

Supporting document 2: Landscape change

Recent changes and trends

Trees and woodlands

- Countryside Quality Counts data suggests changes to the farmed landscape and efforts to enhance semi-natural and woodland elements of the landscape strengthened the character of the area between 1999 and 2003.
- There was active woodland management and creation between 1999 and 2003, including the creation of new woodlands on the slopes of the valley sides within upper Bilsdale. This is just one site of many, over 500 ha new native woodland, that has been created in the NCA area since 1998.
- There has been an increase in the supply of wood biomass from the NCA. For example the Forestry Commission 2006 contract with Wilton Biomass Power Station to supply 80,000 tonnes from plantations in the North York Moors.
- Forest Design Plans for the Public Forest Estate have, and continue to, shape the landscape.

Boundary features

- For over 20 years the National Park Authority has operated an agri-environment grant scheme aimed at traditional boundary restoration. Introduced in the dales in 1990, this has had a significant impact on landscape quality. Boundary features have been managed under the Countryside Stewardship, continuing under Higher Level Stewardship – the area has a large proportion of land managed under agri-environment schemes, and figures for 2011 reveal over 2,000,000 m of boundary features managed under such schemes.

Agriculture

- There was good uptake of agri-environment agreements between 1990 and 2010. Between 2005 and 2010, 616 Environmental Stewardship agreements were set up which included options to: manage or restore 40 per cent of hedges and stone walls; control 1,700 ha of bracken; plant 13,700 trees; create 38 ha of woodland.

Settlement and development

- Development pressures were limited between 1999 and 2003. There was some enhancement in industrial heritage and in 2003 some 92 per cent of historic buildings were intact structurally.
- The main pressure for development is around existing centres such as Scarborough. Other settlements include Whitby and Guisborough, with Helmsley and Pickering on the southern fringe.

Semi-natural habitat

- Some 80 per cent of SSSI were in unfavourable condition in 2003, much of this being dwarf shrub heath. By 2010 over 98 per cent of SSSI were in favourable or unfavourable recovering condition. Despite these achievements the Lawton Review in 2010 concluded that the national ecological network remains in a fragmented state and the SSSI and local wildlife sites should form the cornerstone of efforts to reconnect across the landscape, increasing resilience of our native flora and fauna to environmental change.
- Breeding moorland waders are a prominent feature of the moors in spring and summer, their numbers remaining stable over the period, despite declines observed elsewhere in the country. There has been a decline in merlin, an interest feature of the North York Moors Special Protection Area.

- Species-rich grasslands were targeted for increased control of scrub and agricultural weeds between 2007 and 2009. Similar management has also taken place on selected road verges over the last ten years.

- It is considered that cover of invasive plant species, particularly bracken, Himalayan balsam and Japanese knotweed, has increased. There has been extensive bracken control in recent years, using private and government funding. Between 2008 and 2010 there have been coordinated efforts to control Himalayan balsam along the River Seph, and similar efforts since 2009 to control Himalayan balsam and Japanese knotweed along the Esk.

Historic features

- The Heritage at Risk register indicates that there are currently 844 designated monuments at risk in the NCA.

Coast and rivers

- Biological and chemical river water quality in 1995 was predominantly excellent and was maintained to 2003.

- Since 2007 the ecological status of waterbodies has been monitored under the Water Framework Directive (WFD). Ecological status is determined by biology, for example fish populations, physic-chemical elements, for example oxygen, concentrations of specific pollutants, and disturbance to hydromorphology. The ecological status for a water body is set at the worst scoring element. The rivers Rye, Derwent and Esk are considered 'heavily modified' and all have only a 'moderate' ecological potential. Tributaries to these main rivers generally have a 'poor' or 'moderate' ecological status, with a few stretches of river having good ecological status.

- Soil erosion from agricultural land and subsequent sedimentation of watercourses is a key pressure causing waterbodies to fail WFD objectives; there has been a considerable amount of river fencing to exclude livestock from water courses. Stretches of the River Esk are of poor or bad ecological condition, but since 2007/8 there has been substantial work to improve the condition of river under the Esk Pearl Mussel and Salmon Recovery Project, River Esk Regeneration Programme/Upper Derwent Enhancement Project and through the Catchment Sensitive Farming initiative. The chemical status of groundwater in the NCA is mostly 'good', however it is 'poor' in the north of the NCA around Guisborough.

- Estuarine and coastal waters in this NCA have 'good' ecological potential.

- Within the general area of the North York Moors, the coast is considered 'resilient' to erosion rates due to largely hard geology. There is greater local variability however, and around Whitby and Scarborough highly variable erosion rates combined with underlying instability of boulder clay coastal slope have caused significant landslips. Shoreline Management Plan no 2 for River Tyne and Flamborough Head seeks to work towards a more natural functioning coastal system which will help to reduce coastal flooding. Coastal defences at larger settlements such as Staithes, Runswick, Whitby and Scarborough are currently managed to 'hold the line' - though even here there is always risk of landslip - but elsewhere the long term approach is generally for no active intervention.

- A number of small scale hydro-power generation projects have been set up in recent years, with several funded by the North York Moors National Park Sustainable Development Fund since 2003.

Minerals

- The largest and most prominent mineral exploitation is at Boulby Mine which has been producing potash and rock salt since 1973 with continuing pressure for expansion.

Drivers of change

Climate change

Climate change is likely to result in:

- Increased 'flashiness' and volume of flows within all river catchments with potential for more frequent winter flooding and summer drought, although there may be more summer flood events; increase in sediment loads and nutrient run-off from agricultural and moorland to streams and rivers.
- Summer droughts may lead to drying out of peat, wetland habitats and ditches, increased risk and severity of fire and pest attack on the moors, degradation of peat and an increase in drought-resistant species.
- Species extinction or migration and loss of small or isolated habitats, and continued decline of biodiversity in fragmented habitats such as woodlands; changes in species mix of pastures and meadows as growing season lengthens; warmer winters leading to increased tree and bracken growth.
- Possible loss of access to historic features due to re-wetting or through being obscured by vegetation.
- Scope for new species to be used for crops and timber, but risk of increase in pests and diseases. These will require modification of silvicultural systems to adapt to the changing climate, some commercial species becoming less suitable in the future.

Other key drivers

- The increased focus on the importance of upland peat soils for carbon storage may see increased resources being put towards protection and restoration of moorland and blanket bogs. This will also protect water quality from issues related to peat degeneration such as increased colour. Natural England supports measures to stabilise eroding peat soils and restore blanket bog habitat. We also recognise the importance of well managed woodlands within the upland environment, including wood pasture and scrub.
- Delivery of preferred flood risk management options for North York Moors policy units (Environment Agency Yorkshire CFMPs 2010) should reduce flood risk. Implementation of the Water Framework Directive should improve ecological status or potential of waterbodies; the Wetland Vision initiative aims for increased wetland creation/restoration by 2050.
- The Natural Environment White Paper (2011) calls for joined-up efforts across the conservation sector and working at a landscape scale, to establish a coherent and resilient ecological network capable of adapting to environmental change and halting losses in biodiversity. An increased focus on connectivity and resilience of habitats could lead to greater networks of habitats, a more diverse mosaic of vegetation and larger areas of semi-natural habitat. The funding mechanism for European-funded agri-environment schemes is to be reviewed in 2014. The success of efforts to establish a more cohesive ecological network which allows for species and habitat movement in response to environmental change, will require appropriate flexibility within these schemes.

- Defra's Uplands Policy Review (March 2011) identifies the need to develop strong partnerships with the hill farming and moorland management sector and rural communities to deliver a wide range of public goods and environmental benefits.

- There is likely to be increased pressure for food production in the future as a result of a national drive for greater self-sufficiency in food. However, this is likely to be tempered by continuing negative pressures on farming such as a poor economic performance, and reduction in farm subsidies that may continue to result in loss of sheep from open moorland and loss of dairy farms.

- Changes in landownership could lead to further separation of farmsteads from their land and intensification of land and game management with associated introduction of artificial features, such as buildings and gravel tracks, in otherwise undeveloped landscapes.

- The 'sub regional' town of Scarborough and 'principal' town of Whitby will be strengthened as foci for housing, employment, shopping, leisure, education, health and cultural activities and facilities. Housing need, particularly for affordable housing, will see development pressure continue and increased pressure on supporting infrastructure such as sewerage and water supply systems.

- The Government's Low Carbon Transition Plan and the Regional Forestry Strategy indicate an increased rate of woodland creation over the next 15-20 years, alongside an increase in demand for timber and wood fuel. A requirement for increasing renewable energy generation could result in increased pressure for wind power, hydro power, wood fuel and biomass crops – Defra maps show some areas of high potential yield for short rotation coppice and medium potential for Miscanthus in this area.

- There is likely to be continued demand for resources of limestone found along the southern edge between Helmsley and Pickering, although no new quarries are likely within the National Park other than small scale supplying stone for local building and for production of potash. The demand for potash, currently mined at Boulby, is likely to increase. The current poor performance of the region in terms of recycling and recovery means there is likely to be an increasing need for waste management facilities, and the need for increase in landfill capacity has also been identified.

The town of Whitby, with its historic Abbey; a focus for housing, employment, shopping, leisure, education, health and recreation.

- Sustained pressure from tourism and recreation will need to be carefully managed to avoid problems such as inappropriate development, increased traffic, erosion along popular rights of way and irresponsible recreation (such as damaging use of 4x4s and motorbikes). The likely increase in woodland lodge and similar developments will need to be managed carefully.

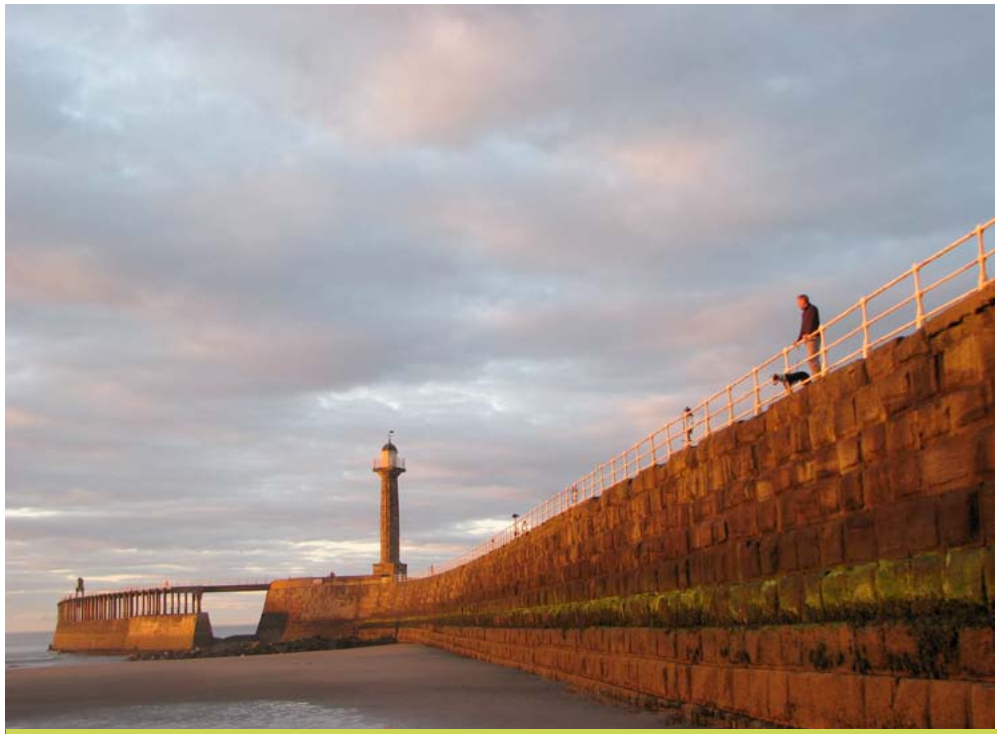
- There is likely to be continued slow retreat of the coastline of approximately 0.1 to 0.2 m per year for most of the coast, with up to 0.3 m per year at Robin Hood's Bay and 0.7 m per year at Saltwick Nab, which might increase with the effects of climate change and higher sea levels (increased groundwater in boulder clay from more rainfall in some seasons leading to greater risk of landslip; sea level rise and increased storminess increasing cliff erosion) and which will require adaptation of infrastructure and wildlife habitats. The Marine and Coastal Access Act 2009 provides opportunities to protect the marine environment and ensure access to all parts of the coast. The Coastal Access trail, including the spreading room, will be created by working in partnership over the next 10 years: a key element of this implementation needs to increase the opportunity of 'roll-back' as described by the scheme.

Coastal defences at larger settlements such as Staithes (left), Runswick, Whitby and Scarborough are currently managed to 'hold the line'.

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.



The west pier and sea walls at the entrance to Whitby harbour.

Statement of Environmental Opportunity	Food provision	Timber provision	Biomass energy	Water availability	Genetic diversity	Climate regulation	Regulating soil erosion	Regulating soil quality	Regulating water quality	Regulating water flow	Pollination	Pest regulation	Regulating coastal erosion	Sense of place/inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
	Ecosystem service																		
SEO 1: Protect and positively manage the large areas of open, expansive moorland for the internationally important habitats and species that they support, for the sense of wildness and strong character of the areas, for their ability to sequester carbon, and for the benefits that well managed moorland brings for water quality and flood control.	↗ *	↔	↔	↗ *	↗ *	↑ **	↑ **	↑ **	↑ **	↑ **	↗ *	o	n/a	↗ **	↗ *	↗ **	↔	↑ **	↔
SEO 2: Conserve, enhance and promote the special qualities of the coast, inshore waters and sheltered harbours allowing the operation of natural coastal processes, the creation of new habitats. Manage the development and recreational needs of coastal settlements and secure a sustainable future for communities that are dependent on inshore fisheries.	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↗ *	↑ **	↔	↔	↑ **	↗ **	↑ **

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

Dark plum = national importance; mid plum = regional importance; light plum = local importance

Statement of Environmental Opportunity	Ecosystem service: Food provision	Timber provision	Biomass energy	Water availability	Genetic diversity	Climate regulation	Regulating soil erosion	Regulating soil quality	Regulating water quality	Regulating water flow	Pollination	Pest regulation	Regulating coastal erosion	Sense of place/inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
SEO 3: Protect and improve access to and quiet enjoyment of the countryside, particularly in the North York Moors National Park, conserving the sense of tranquillity and relative remoteness, maintaining public access to the landscape, encouraging specialist forms of recreation appropriate to the area, conserving and providing interpretation of its history and numerous archaeological, biological and geological assets, and protecting the strong sense of place.	↗ *	↔	↔	↔	↔	↔	↗ **	↗ *	↔	↔	↔	↔	↔	↑ **	↑ **	↗ **	↗ **	↔	↔
SEO 4: Seek opportunities to restore lowland fens, reedbeds, flood plain grazing marsh, flushes and riparian habitat to enhance biodiversity and contribute to regulating flood flows, enhancing water quality, aquifer recharge, carbon sequestration and storage, leading to benefits being experienced within the NCA and beyond to NCAs downstream.	↘ *	↗ **	↗ *	↗ *	↔	↑ **	↑ **	↗ *	↑ **	↑ **	↗ *	↗ *	n/a	↗ **	↔	↗ **	↔	↑ **	↔
SEO 5: Positively manage woodlands, trees, wood pasture and historic parklands for their contribution to the characteristic landscapes of the area, their priority habitats and the species that they support, as well as their potential for carbon storage, regulation of peak flood flows and provision of renewable materials.	↘ *	↑ **	↑ **	↗ *	↔	↑ **	↑ **	↗ *	↗ *	↑ **	↗ *	↔	n/a	↗ *	↑ **	↗ **	↗ *	↑ **	↔

Note: Arrows shown in the table above indicate anticipated effect 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 effect is available.

Dark plum = national importance; mid plum = regional importance; light plum = local importance

Landscape attributes

Landscape attribute	Justification for selection
Upland plateau landscape underlain by sandstone and mudstones. Glacial deposits of till, sand and gravel creating undulating land primarily on the coast. Dissected by a series of dales, often broad and sweeping, others steep-sided and narrow, in particular in the Tabular Hills.	■ The changes in underlying geology of the NCA are reflected in the building materials used for vernacular, residential and farm buildings as well a dry stone walls and other features associated with the farmed landscape, and therefore have a strong influence on character. ■ The North York Moors National Park Authority 2004 survey of special qualities of the North York Moors identified the "special landforms from the Ice Age" as a key element, in particular the western edge and Newtondale. ■ Glacial features such as the inland cliff on the western edge provide ready examples of the shaping force of nature in the landscape. Glacial features such as Newtondale and Forge Valley are important. The glacially formed inland cliff of the western edge is unique in England. ■ Glacial deposits are dissected by a series of dales, often broad and sweeping, others steep-sided and narrow, in particular in the Tabular Hills. ■ Windy pits are a unique feature caused by fissuring of limestone.
One of the highest stretches of cliffs in England, punctuated by sandy or rocky bays.	■ The coastline of the NCA has been recognised as one of England's most beautiful and undeveloped coastlines and designated as the North Yorkshire and Cleveland Heritage Coast. ■ The Special Qualities of the National Park include "majestic coastal cliffs and sheltered harbours", "distinctive coastal headlands" and "exceptional coastal geology". ■ The coastline provides some of the most important geodiversity features in Yorkshire, revealing past geological evidence of international significance, of value for education and scientific research. ■ The contribution that the geological exposures of the cliffs make to understanding geodiversity is reflected in the long standing 'Dinosaur Coast' project currently run by Scarborough Museums Trust.

Landscape attribute	Justification for selection
Extensive moorland habitats create a sense of space, expansiveness, openness and tranquillity, with panoramic views over moorland ridges, dales, the surrounding lowlands and the sea.	■ The moorland on the high plateaux is perhaps the defining feature of the NCA and is a landscape of active grouse management and sheep grazing. This is the largest continuous expanse of heather moorland in England, the majority within the North York Moors National Park. ■ The importance of moorlands within the NCA is recognised by their UK and European designations. The majority of the moorland area is a Site of Special Scientific Interest (UK Wildlife and Countryside Act), a Special Area of Conservation (EC Habitats Directive) and a Special Protection Area (EC Birds Directive). ■ The high level of woodland cover is important to the character of this NCA. The semi-natural habitats which fringe the moorlands include important grassland areas and support iconic species such as the Duke of Burgundy butterfly. ■ 56 ha of calcareous grassland and 42 ha of fen, marsh and swamp within the NCA have been designated as SSSI in recognition of their botanical value. A survey in 2011 has revealed further significant areas of alkaline fen making this NCA one of the most important areas in England for the habitat. ■ The large extent of land that has never been cultivated - moorland plateau, rough grassland and steep valley sides - and has seen little development retains a very well-preserved archaeological record with high densities of remains spanning from pre-history to modern. ■ The North York Moors National Park Authority 2004 survey of special qualities of the North York Moors identified the following as key elements: “wide sweeps of open heather moorland”; “strong feeling of remoteness”; and “tranquillity”. ■ Moorlands are of considerable importance for the mosaics of moorland vegetation - dry heath, wet heath, blanket bog, ghyll woodland and flushes - for breeding birds, especially golden plover and merlin, and for extensive prehistoric remains. ■ Below the moors ancient semi natural woodland, coastal habitats, some grasslands and fens are also priority habitats, and create more intimate and varied landscapes. The River Esk is a UK priority habitat.

Landscape attribute	Justification for selection
Extensive conifer plantations are a feature especially on the Tabular Hills in the south east and north of Pickering need to be improved to make a positive contribution to the landscape and biodiversity, and to provide recreational opportunities.	■ 21 per cent of the NCA is made up of woodland, but approximately half of this is coniferous plantation and does not form an effective part of the habitat network. ■ The network of ancient semi-natural woodland and plantations on ancient woodland sites in south west, as well as veteran trees and in field/field boundary trees needs to be improved to make a positive contribution to the landscape and biodiversity, and to provide recreational opportunities. ■ Plantations on ancient woodland are on an important feature in the south west of the area.
Upland valleys characterised by pastoral farming with clear demarcation between the enclosed fields, farm settlements and moorland, accentuated by colour contrast.	■ The special qualities of the National Park include "great diversity of landscapes" and "sudden contrasts associated with this". ■ The NCA is a contrast of wide, open moorland with a wild and remote feel and intimate pastoral and wooded valleys with a more sheltered, managed character. ■ There are some notable examples of parkland and wood pasture with important populations of veteran trees such as Duncombe Park National Nature Reserve and Tripsdale SSSI. ■ There are mosaics of largely improved grasslands, semi-natural broadleaved woodland, fast-running rivers, fens and flushes, and bracken on the slopes, with hedges and veteran trees in lower lying dales.

Landscape attribute	Justification for selection
Nucleated settlement within the upland dales and along the coast with small fishing villages distinctive; dales contain scattered farmsteads (several 16th- and 17th-century longhouses) and strong historic patterns of dry stone walls enclosing small pastures. Many of the settlements in the south are linear villages.	■ The coastal villages and towns that cling to steep-sided valleys - including Staithes, Robin Hood's Bay, Whitby - form an iconic part of the developed landscape and are popular tourist destinations. ■ In all but the lowest dales, dry stone walls form the predominant field boundary type and are generally in good stock-proof condition. They form a very strong element of landscape character with distinctive patterns in many dales for example Bransdale and Farndale. Field patterns in the south of the NCA are characteristic, retaining the outline of extensive medieval strip fields. ■ There is a low density of settlement, particularly on higher land. In many of the valleys the majority of settlement takes the form of scattered farmsteads, individual houses with small villages and hamlets in some valleys. ■ The CPRE map of tranquillity (2006) shows that the upland areas of the North York Moors are some of the most tranquil areas in the whole of Yorkshire. ■ The dales contain scattered farmsteads - several 16th- and 17th-century longhouses - and strong historic patterns of dry-stone walls enclosing small pastures. ■ Many of the settlements in the south are linear villages.

Landscape attribute	Justification for selection
Rich sources of archaeological evidence dating back to prehistoric times. Historic buildings constructed in rubble limestone or dressed sandstone with red pantile roofs.	■ Special qualities of the North York Moors National Park include: "long imprint of human activity", "locally distinctive buildings and building materials" and "a wealth of archaeology from prehistory to the 20th century". ■ A sense of history is evident in the rich and extensive archaeology dating back to prehistoric times. Features include rock art, barrows, cairns, standing stones, historic tracks and ecclesiastical sites. Scarborough Castle provides the site for remains of a ring fort and bronze-working centre as well as a roman signal station. A sense of how people settled and worked the land is evident in the earth works of enclosed and unenclosed farmsteads in the south and west. ■ There are 1,000 scheduled monuments within the NCA. ■ The underlying geology and local custom is reflected in the traditional building styles and materials. This can create a visual unity and connection with the past where continued in present day building. ■ There is a legacy of industrial activity including features relating to exploitation of jet, iron and alum along the coast, ironstone in the Cleveland hills and stone, coal and ironstone workings and disused railways on the moors and hillsides, with evidence of rabbit farming from post-mediaeval times to the late 19th century. ■ Historic buildings constructed in rubble limestone or dressed sandstone with red pantile roofs.
The Coast to Coast path, Cleveland Way and Ebor Way long distance routes cross the area, providing opportunities for both short and long distance users, and increased engagement with nature.	■ Special qualities of the North York Moors National Park include: "a rich and diverse countryside for recreation" and "an extensive network of public paths and tracks". ■ 155 km of the Cleveland Way runs along the western side of the NCA, 47,180 (28.5 per cent) of the NCA is now open access land and there are 2,762 km of public rights of way. ■ The Cleveland Way has well established 'easy access' stretches on the coast suitable for people of all abilities.

Landscape opportunities

- Conserve and protect the open moorland, extensive views, sense of tranquillity and remoteness and the contrasts between enclosed pastoral and wooded valleys and the open moorland.
- Maintain clear links between land use and underlying geology and conserve and protect the historic walled and hedged field patterns, and the unity of building materials and styles.
- Conserve and protect the mosaics of moorland habitats, existing woodland and veteran trees, species rich grassland, wetlands and other semi-natural habitats.
- Conserve and protect the strong network of public rights of ways, linking key landscape features. Also the extensive archaeological evidence and historic sites.
- Conserve and protect water resources and quality through appropriate land management practices.
- Manage existing woodlands, including restoration of plantations on ancient woodland sites (PAWS).
- Manage moorland habitats, to enhance biodiversity, extend mosaics and protect/restore peat soils.
- Manage scrub and bracken areas to maximise wildlife value and prevent damage to/destruction of archaeology or vulnerable semi-natural habitats.
- Manage access, to protect sensitive sites, avoid impacting on sense of remoteness.
- Manage access for all levels of ability as well as interpretation of the landscape and the surviving historic evidence from all periods.
- Plan for sustainable moorland management, encouraging innovative solutions to restore peat, create habitat mosaics and enhance biodiversity.
- Plan for significant increases in woodland and wood pasture in priority areas where it is important to develop the habitat network such as on steep valley sides and moorland gills (avoiding other important habitats such as flushes/fens), and on suitable sites in areas of upland pasture, riparian zones and bracken beds, while recognising the value of open moorland landscape. Increase in field/field boundary trees.
- Plan for continued restoration of dry stone walls and hedgerows.
- Plan to increase the area of in-bye and lowland grassland under low intensity management to enhance breeding habitat for wading birds and restore traditional hay meadows and other species-rich grassland.
- Plan for improved management of the internationally important alkaline fen habitat by encouraging/supporting appropriate grazing.
- Plan to increase the proportion of the arable area that is under management for farmland birds/rare arable flora where possible.
- Plan for the extension of habitat networks in particular for woodland in mosaic with flower-rich grasslands and scrub.
- Plan for landscape scale biodiversity restoration, for example southern edge linked to Ryedale (Howardian Hills / CANDO area).
- Plan for accommodating dynamic coastal processes, while ensuring no net loss of semi-natural coastal habitat by creating new habitat landward where appropriate.
- Plan the development of local markets and niche produce to sustain high quality food production alongside delivery of environmental outcomes.

Ecosystem service analysis

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

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

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Food provision	Semi- natural vegetation Farming practice Traditional and rare breeds of domestic stock	The area is a major producer of lamb, beef and dairy products as well as some crops (particularly cereal crops in the south and east on the limestone slopes and in coastal areas) and other products such as honey.	Regional	Livestock farming remains the predominant farm type, with cereals and dairy also important. Reduction in hill sheep numbers over recent years has resulted in localised undergrazing. Factors such as grazing management and crop choice will largely determine the extent to which other services are delivered alongside food provision.	Opportunity for continued provision of high quality produce in the form of lamb, mutton, beef, dairy products, cereals, honey, fish and shellfish, thereby maintaining associated cultural landscapes and species associated with these landscapes. There are some opportunities for local increases in hill livestock numbers to improve the diversity of moorland habitats. The development of local and specialist markets is of importance. Food security is likely to be increasingly important, and it is crucial that increased /enhanced food production from the NCA is done in a sustainable way which does not undermine or deplete the resources it depends upon. Aim to produce food in ways that optimise productivity while increasing the resilience of habitats and species to climate change and minimising carbon emissions[4].	**Food provision** **Water availability** **Genetic diversity** **Climate regulation** **Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Sense of place/ inspiration**

[4] Yorkshire and Humber Climate Change Partnership (2009) Climate Change Plan for Yorkshire and Humber 2009-2014

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Timber provision	High proportion of woodland cover	21 per cent of the NCA is woodland. There are extensive conifer plantations in the south east of the NCA and on the Tabular Hills. These conifer plantations provide a source of timber. Although there are local sawmills, much of the timber is processed outside Yorkshire.	Regional	There are substantial areas of plantation forestry on ancient woodland sites. There is capacity to extend cover of native woodland in appropriate locations and to continue or reinstate traditional forms of woodland management.	There is an opportunity to increase woodland cover without detriment to protection of other attributes/ services, and indeed could have positive benefit to some other services such as regulating climate, flooding and soil erosion, and to biodiversity. Improve management of existing woodland resource to extract useful timber and perpetuate traditional management practices, for example coppicing, while also increasing carbon sequestration and improving wildlife value.	**Timber provision** **Biomass energy** **Water availability** **Climate regulation** **Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Regulating water flow** **Sense of place/ inspiration** **Recreation** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biomass energy	High proportion of woodland cover	The high existing woodland cover in this NCA (around 21 per cent) offers significant potential for the provision of biomass through bringing unmanaged woodland under management and as a by-product of commercial forestry management.	Regional	There is significant variation in potential yield for short rotation coppice throughout the NCA: with low potential yield on the high elevated moors, for example Westerdale and Glaisdale Moors, high potential yield around these moors along the river valleys; and low potential yield on the southern and north eastern fringe of the NCA. For information on the potential landscape impacts of biomass plantings within the NCA, refer to the tables on the Natural England website[5].	Increase sustainable production and use of wood and other biomass as a source of renewable energy, subject to landscape constraints and sustainable water use[6].	**Biomass energy** **Timber provision** **Water availability** **Climate regulation**

[5] http://www.naturalengland.org.uk/ourwork/farming/funding/ecs/sitings/areas/025.aspx

[6] Yorkshire and Humber Vision for Biomass 2008; Strategic Framework for Trees, Woods and People in the Yorkshire and Humber Region, July 2005

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability	Corallian Limestone major aquifer Rivers Reservoirs	Much of the NCA overlays the Corallian Limestone major aquifer, which gains significant quantities of water from the rivers Rye and Derwent through swallow holes[7]. Due to the complex interaction between the aquifer and the surface water, an accurate assessment has not yet been undertaken of groundwater availability[8]. However the River Derwent is an important source of drinking water supply. The major rivers are the Rye, Derwent and Esk, all of which arise in the NCA uplands. There are also numerous tributaries of these, draining to the south and to the east into the North Sea Reservoirs in the NCA include the Scaling Dam (42 ha) and Lockwood Beck in the north, both owned by Northumbrian Water Limited, and Cod Beck Reservoir (10 ha) in the west, owned by Yorkshire Water.	Regional	Overall there is 'no water available' from rivers in this NCA: the rivers Rye and Esk have 'no water available' and the River Derwent is 'over-licensed/ over abstracted[9, 10]. Climate change may impact adversely on water availability.	Restore peat soils on moorland plateaux and lowland wetlands to improve water storage capacity while also reducing flooding risk and soil erosion and improving water quality, climate regulation, habitat networks and ecosystem resilience to climate change.	**Water availability** **Climate regulation** **Regulating soil erosion** **Regulating water quality** **Regulating water flow** **Sense of place/ inspiration** **Biodiversity**

[7, 8, 9] Environment Agency, *Derwent Catchment Abstraction Management Strategy*, March 2006
[10] Environment Agency, *Esk and Coast Catchment Abstraction Management Strategy*, August 2007

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Genetic diversity	Pedigree rare breed cattle Semi-natural habitats	There are a number of farmers in the area who breed pedigree cattle breeds at risk, notably beef shorthorn, belted Galloway and highland cattle.	Regional	Rearing rare breed livestock not only helps to conserve the native genetic resource: they are often required in conservation grazing to restore semi-natural habitats, and offer opportunities to market quality niche food products.	Support sustainable farming of rare breed livestock and enhance management of semi-natural habitats through maintaining and where appropriate increasing stock numbers within extensive grazing systems; develop local markets for rare breed food products.	**Genetic diversity** **Food provision** **Climate regulation** **Regulating soil erosion** **Regulating soil quality** **Regulating water flow** **Sense of place/ inspiration** **Biodiversity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation	Soils with high carbon content High proportion of woodland cover Wetland habitats	The upland soils in this NCA generally have a relatively high carbon content of 10 to 20 per cent, with significant carbon storage provided by the moorland habitats. Climate regulation is also offered by woodland and wetlands – blanket bog, reedbeds, coastal and flood plain grazing marsh, fens, mudflats and saline lagoons along the coast.	National	Management of soils and vegetation to increase carbon storage and therefore mitigate climate change impacts, can also be beneficial in climate change adaptation where ecological networks are restored, and assist with regulation of soil erosion and soil quality, water quality and flood regulation.	Restore peatland areas through measures such as gully blocking, re-vegetation and implementing sustainable burning practices to increase the species diversity, including bryophytes, and safeguard carbon storage of these habitats while enhancing the range of other key ecosystem services: reduce the rate of runoff and improve water quality by decreasing the release of dissolved organic carbon. Reduce net greenhouse gas emissions through increased tree and woodland planting for carbon sequestration and improved management of existing trees and woodland. Increase the amount of carbon stored in agricultural soils through appropriate management, for example through low grazing levels, soil aeration and minimum tillage agriculture.	**Climate regulation** **Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Regulating water flow** **Sense of place/ inspiration** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion	Soil type (vulnerability to erosion) Semi-natural vegetation	The slowly permeable seasonally wet soils of this NCA (covering 29 per cent) are not generally susceptible to erosion but all the other soil types of this NCA are, with these erodible soils falling into three distinct groups. The peaty plateau soils (the slowly permeable wet very acid upland soils with a peaty surface and the blanket bog peat soils covering 23 per cent when combined) are at risk of gullying/ hagging and loss of particulate organic matter, where surface vegetation is damaged or lost and from surface run-off and can be affected by wind erosion where the soil is bare. The blanket bog soils are also vulnerable to occasional mass flow events and drainage of these soils (for example through gripping) may also result in increased oxidation of carbon and soil wastage. **Continued on next page...**	Regional	Key issues in the NCA include very high volumes of sediment runoff from agricultural land into the rivers Rye, Leven, Esk and Derwent, as a result of high rainfall combined with steep gradients and local soil types[11]. In upland areas the degradation of peat based soils can be associated with a decrease in water quality within associated watercourses. Peatland habitats also need to be managed to protect the integrity of peat based soils and implement measures to reverse rates of peat loss. Measures will be beneficial that retain water in situ, ensure good vegetative cover and avoid over grazing/ trampling or damage by mechanised activities.	Secure sustainable grazing and burning management of moorland in order to reduce erosion of peat soils and to allow development of vegetation which will hold water, reducing flood flow and erosion of downstream river banks, thereby also improving water quality and carbon sequestration and storage. Secure sustainable grazing and cutting management of in-bye and lowland grasslands in order to maintain soil structure and organic matter, limit poaching and compaction, improve infiltration and prevent channelling, run-off and flooding. Secure sustainable management of arable land (including use of appropriately placed buffer strips and permanent grassland, and uncropped land, tree planting and hedgerow restoration, avoiding crops associated with high erosion risk) in order to maintain soil structure and organic matter, limit compaction, improve infiltration prevent channelling, run-off and flooding and minimise wind-blow of soil in open areas.	**Regulating soil erosion** **Water availability** **Climate regulation** **Regulating soil quality** **Regulating water quality** **Regulating water flow** **Sense of place/ inspiration** **Biodiversity**

[11] Defra, *Catchment Priorities*, June 2007

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion		**... continued from previous page** The lighter soils, the freely draining slightly acid loamy soils, the freely draining very acid sandy and loamy soils, and the shallow lime-rich soils over limestone (28 per cent) are particularly at risk of erosion on sloping cultivated ground or where soils are left bare. Steep slopes will be at particular risk where there will be rapid run-off during storm events. In the case of the very acid loamy upland soils with a peaty surface, the combination of steep slopes, easily damaged peat layers and rapid run-off, result in a high erosion risk. The slightly acid loamy and clayey soils with impeded drainage (11 per cent), are easily compacted by machinery or livestock if accessed when wet and are prone to capping/slaking, leading to increased risk of soil erosion by surface water runoff, especially on steeper slopes.			Encourage fencing off and/or sustainable management of riparian areas, including buffer strips and/or tree planting, to limit bankside poaching and erosion while also improving water quality, limiting transmission of livestock diseases and increasing carbon sequestration. Manage recreational pressure and minimise erosion of footpaths. Plant native woodland on steeper bracken dominated land (where soil erosion often occurs in heavy rainfall events).	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil quality	Soil type Farming practice	The sandstones and altitude of the high moors produce poor soils (Grade 5) which support extensive heather moorland and rough grazing. Grade 3 land occurs in the south, on the limestone, while Grade 4 occurs in the dales and valleys. There are 9 main soilscape types in this NCA: ■ Slowly permeable wet very acid upland soils with a peaty surface, covering 19 per cent. ■ Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (16 per cent). ■ Slowly permeable seasonally wet acid loamy and clayey soils (13 per cent). ■ Freely draining slightly acid loamy soils (13 per cent). ■ Slightly acid loamy and clayey soils with impeded drainage (11 per cent). ■ Very acid loamy upland soils with a wet peaty surface (11 per cent). ■ Other soil types include shallow lime-rich soils over limestone, freely draining very acid sandy and loamy soils and blanket bog peat soils.	Local	The slowly permeable wet very acid upland soils with a peaty surface, often found on moorland plateau tops, are at risk of loss of organic matter through climate change and soil erosion. Measures should be encouraged that retain water in situ and potentially raise water levels (water storage will also aid flood attenuation), ensure good vegetative cover and avoid over grazing/ trampling or damage by mechanised activities. In the case of the very acid loamy upland soils with a wet peaty surface often found on steep slopes, the peat has low strength when wet and is easily damaged by grazing and trafficking for much of the year. Poaching of soil is common. The slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils and the slowly permeable seasonally wet acid loamy and clayey soils may suffer compaction and / or capping as they are easily damaged when wet. In turn this may lead to increasingly poor water infiltration (and potential flooding) and diffuse pollution as a result of surface water runoff. Management measures that increase organic matter levels can help reduce these problems. **Continued on next page...**	Secure sustainable grazing and cutting of in-bye and lowland grasslands in order to limit poaching and compaction and enhance soil structure and organic matter, improve infiltration and prevent channelling, runoff and flooding.	**Regulating soil quality** **Water availability** **Climate regulation** **Regulating soil erosion** **Regulating water quality** **Regulating water flow**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil quality cont.				**... continued from previous page** The slightly acid loamy and clayey soils with impeded drainage are easily poached by livestock and compacted by machinery when the soil is wet. Weak topsoil structures can easily be damaged. Careful timing of activities is required to reduce the likelihood of soil compaction. The freely draining slightly acid loamy soils have potential for increased organic matter levels through management interventions. They may be valuable for recharge of the underlying Corallian Limestone aquifer, requiring the maintenance of good soil structure to aid water infiltration and the matching of nutrients to needs to prevent pollution of the underlying aquifer.		

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality	Geology: Corallian Limestone major aquifer and groundwater Rivers Soil types and vulnerability to erosion Semi-natural habitat	The rivers Rye, Derwent and Esk are classed under the Water Framework Directive as 'heavily modified' and have 'moderate' ecological potential. Tributaries to these main rivers generally have a 'poor' or 'moderate' ecological status with a few river stretches having good ecological status. Estuarine and coastal waters within this NCA have 'good' ecological potential. The chemical status of the majority of rivers and lakes in the NCA 'does not require assessment'; however the River Esk has 'poor' chemical status. Estuarine and coastal waters in this NCA have a 'good' chemical status. The chemical status of groundwater in the NCA is mostly 'good' however it is 'poor' in the north of the NCA around Guisborough. There are investigations required through Water Framework Directive to protect drinking water supplies from the risk of contamination by pesticides.	Local	The primary issue in the Yorkshire Derwent priority catchment is that of soil erosion and consequent sedimentation of rivers. In upland areas burning of vegetation on peat can cause oxidation and denaturing of peat, resulting in erosion and hence elevated levels of dissolved organic carbon in water, affecting water chemistry in the catchment. Groundwater quality is affected by the direct and rapid pathway of river flow into the groundwater via the swallowholes. Similarly, surface water sources may be affected by the quality of runoff from the catchment upstream.	Protect water supplies through appropriate land management: securing sustainable burning management on peat; creating buffer strips; and increasing the area of permanent grassland, and appropriate tree and woodland planting. Manage recreational routes to minimise sedimentation through erosion.	**Regulating water quality** **Water availability** **Climate regulation** **Regulating soil erosion** **Regulating soil quality** **Regulating water flow** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow	Rivers Upland soil types – vulnerability to flooding Semi-natural vegetation, capacity to improve infiltration or otherwise attenuate heavy rainfall	There is localised flood risk along river valleys, in particular along the River Esk, which affects the town of Whitby[12]. In the south of the NCA, particularly along the River Seven, fluvial flooding occurs as a result of prolonged heavy rainfall across the North York Moors or rain falling on melting snow across the catchment. The River Derwent and its upland tributaries tend to be of a flashy nature responding quickly to rainfall events. However the Sea Cut, a sluice at Mowthorpe which diverts water from the Derwent in flood conditions to the North Sea, has 'dramatically reduced widespread flash flooding' since its construction in the early 1800s[13]. Scarborough is not significantly affected by fluvial flood risk; however there is localised flood risk associated with the minor Scalby Beck (in the north of Scarborough).	Regional	Sensitive management of the upper catchment and creation of wetland to increase storage capacity downstream will increase the time that water is held on the land, and thus reduce the velocity and volume of floodwater in rivers as they flow through more populated areas.	Secure sustainable levels of burning and grazing management of moorlands to increase the species and structural diversity of the vegetation, thereby enhancing its capacity to retain water and impede water flow off the moors. Reduce flood risk through woodland creation and carefully located tree planting. Extend the areas of wetlands and restore former wetland zones to create greater water storage capacity and slow the flow during flooding events as well as aiding the spread and dispersal of wetland species.	**Regulating water flow** **Water availability** **Climate regulation** **Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Biodiversity**

[12] Environment Agency, *Flood Map*, 2010
[13] Environment Agency, *Derwent Catchment Flood Management Plan*, July 2010

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating costal flooding and erosion	Geology: supply of eroded material from coastal rock	Within the general area of the North York Moors, the coast is considered 'resilient' to erosion rates, however around Whitby and Scarborough highly variable erosion rates combined with underlying instability of coastal slope have caused significant landslips.	Regional	Coastal defences at larger settlements such as Staithes, Runswick, Whitby and Scarborough are currently managed to 'hold the line'; elsewhere the long term approach is generally for no active intervention, which allows for continued supply of eroded material going into coastal sediment circulation. The development of beaches and intertidal areas helps to attenuate wave energy[14].	In areas of soft cliff habitat, the creation of buffer zones between the cliffs and development allows the coast to erode and dynamic coastal processes to continue: seek to provide such a buffer to allow coastal processes to continue without detriment to new development. Seek to relocate landwards priority coastal habitats which will be lost at eroding soft cliff.	**Regulating coastal flooding and erosion** **Geodiversity**
Pollination	Semi-natural habitats	Heathlands, grassland and meadows cover 27 per cent of the NCA area, including 43,000 ha expanse of open heather moorland, and provide important nectar sources and habitats for pollinating insects and beneficial predator species.	Local	Pollinators play a vital role in food provision, but research shows their numbers have declined sharply. Providing suitable nectar sources, at a landscape scale, and the habitat structure required for other stages of their life cycles, should help to address this.	Provide more feeding and breeding habitat for pollinators and beneficial predator species by maintaining, restoring and creating flower-rich habitats such as heather moorland, hay meadows, hedgerows, limestone grassland, arable flora and wild bird seed or nectar flower mixes on arable farms.	**Pollination** **Food provision** **Climate regulation** **Regulating soil erosion** **Regulating water quality** **Regulating water flow** **Biodiversity**

[14] The Seascape character area assessment for the East Inshore and East Offshore marine plan area can be seen here: www.gov.uk/government/publications/east-marine-plan-areas-seascapecharacter-assessment

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of place/ inspiration	Geology and landform: inland and coastal Historic assets Semi-natural habitats	The high moorland plateau supports the most extensive area of heather moorland in England and Wales. This is dissected by a series of dales that narrow to form intimate steep sided valleys. Roseberry Topping is a distinctive landmark in the outlying hills to the north. The sense of place is enhanced by the distinctive and dramatic coastal landscape, with its fossils and jet, contrasting with the arable farmland and parkland with veteran trees. This NCA has diversity and contrast: the western edge 'big sky' farmland of the limestone hills; intimate dales; forests and woodland; coast; open moorland. The area is further characterised by the sparse nature of settlement, with towns and villages concentrated in the dales and around the moors fringes. The close proximity of the sea to the eastern parts of the high moorland and sheltered dales adds to the character. The later development of fishing villages tucked into bays has a different sense of place to that of the dales villages.	Regional	This NCA has a strong and distinctive character which can be maintained and enhanced through careful management of the natural and built environment. The NCA is valued for the sense of escapism it provides and as a source of inspiration for writers and artists.	Conserve the current built and natural environment through supporting environmentally sensitive farming practices, encouraging use of traditional building materials and techniques, maintaining/ restoring traditional field boundary networks and veteran trees, maintaining the mosaic of typical habitats and through appropriate siting of new development and in locations that do not obstruct views or damage archaeology. Within ancient semi natural woodlands, development of sporting infrastructure should be discouraged as this alters their character and experience. Provide interpretation to aid understanding of the history and current use of the area. Retain historic and iconic features within the landscape. Retain wide-ranging views of moorland and coast.	**Sense of place/ inspiration** **Food provision** **Sense of history** **Tranquillity** **Recreation** **Biodiversity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history	Archaeological features Geodiversity	A sense of history is evident in the rich archaeology dating to prehistoric times. Features include rock art, barrows, cairns, standing stones, forts, roman remains, historic tracks/ trods and ecclesiastical sites. A sense of how people settled and worked the land is evident in the earth works of enclosed and unenclosed farmsteads in the south and east. Aspects of history that are likely to be particularly evident to the general public are the strikingly attractive small villages built from local materials that are evidence of early Dane and Norse arrivals. The settlements were concentrated in upland dales, along the coast and on the South Hambleton Hills. Of these, planned linear and green settlements with tofts to back lanes form a major feature. Rubble limestone or dressed sandstone with red pantile or slate roofs are the most commonly used building materials of most historic buildings in the area. Early Christian stone crosses and ruins of the 12th century Rievaulx Abbey add to the sense of history.	National	The strong character of this NCA is heightened by the clear evidence of past human use, and visual links with this use (settlement and field patterns, local building materials). Protecting this link with the past and enhancing our understanding of this will further strengthen the character of the area.	Protect the well-preserved archaeological resource by ensuring appropriate land management and development, managing impacts of recreation, controlling encroachment of damaging scrub or bracken. Promote and retain traditional crafts and techniques. Provide interpretation of the archaeological and historical sites to aid understanding..	**Sense of history** **Sense of place/ inspiration** **Recreation** **Geodiversity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Tranquillity	Geology/ landform Semi-natural vegetation	The area is an important resource for tranquillity with 80 per cent of the area classified as 'undisturbed' according to the CRPE Intrusion Map 2007 – a decrease from 93 per cent in 1960.	Regional	The expanse of heather moorland gives a strong feeling of space, openness, solitude and wildness, which contrasts strongly with the intimate dales villages.	Retain the open, remote and tranquil character of the moorland plateaux by discouraging development or additional manmade infrastructure.	**Tranquillity** **Sense of place/ inspiration** **Recreation**
Recreation	Rights of way network Open access land	A significant proportion of the NCA – 65,550 ha or 39 per cent - is accessible, and most of this is open access land, at 36 per cent of the area, largely comprising the open moorlands. There is also a network of rights of way totalling 2,762 km at a density of 0.7km per km2. Further opportunities for recreation are provided by the Coast to Coast path, the Cleveland Way and Ebor Way. In addition to this, the whole area is a major draw for recreation and tourism with North York Moors National Park accounting for 85 per cent of the NCA.	Regional	Any increase in recreational activity throughout the year, while offering positive economic and health benefits, must be managed sustainably, such that there is no increased erosion around paths and other well used areas.	Manage paths network and increased access to reduce sedimentation of the River Esk, thereby improving the condition of salmonid spawning gravels, enabling increased number of trout and salmon and improved recreational fishing. Such work would also serve to reduce soil erosion and improve conditions for the freshwater pearl mussel (BAP species).	**Recreation** **Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity	Semi-natural 'priority' habitats; S41 species; designated sites (SSSI, SAC, SPA, local sites)	65 Sites of Special Scientific Interest designated wholly or partly for biological interest within the NCA, some of these sites having further levels of designation as National Nature Reserves or as European Sites (SAC / SPA). A total area of 47,179 ha within the NCA has been designated. 90 local sites of biological interest have been designated within the NCA.	International	The network of designated sites is the cornerstone of efforts to reduce fragmentation of habitats, create stronger ecological networks and allow native habitats and species to adapt to climate change. Designated sites are also fundamental to long term monitoring and thus to our understanding of ecology and responses of organisms to environmental change.	Review SSSI series and consider what amendments may be needed at a series and site level to protect the biodiversity and best enable its adaptation to environmental change.	**Biodiversity** **Climate regulation**
Geodiversity	Geological exposures and features; designated sites (SSSI, local sites)	29 Sites of Special Scientific Interest designated wholly or partly for geological interest within the NCA. 23 local sites of geological interest have been designated within the NCA.	National	The network of designated sites underpins our knowledge of geology and is often the focus of research to further this understanding.	Review SSSI series in light of new research to ensure it continues to protect the best and most important examples of geodiversity.	**Geodiversity**

Photo credits

Front cover: The North York Moors and Cleveland Hills are an elevated upland of sandstone geology, incised by valleys, which supports the largest continuous expanse of upland heather moorland in England. © Natural England/Robert Goodison

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