National Character Area profile:

40. Holderness

NATURAL ENGLAND

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Introduction

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

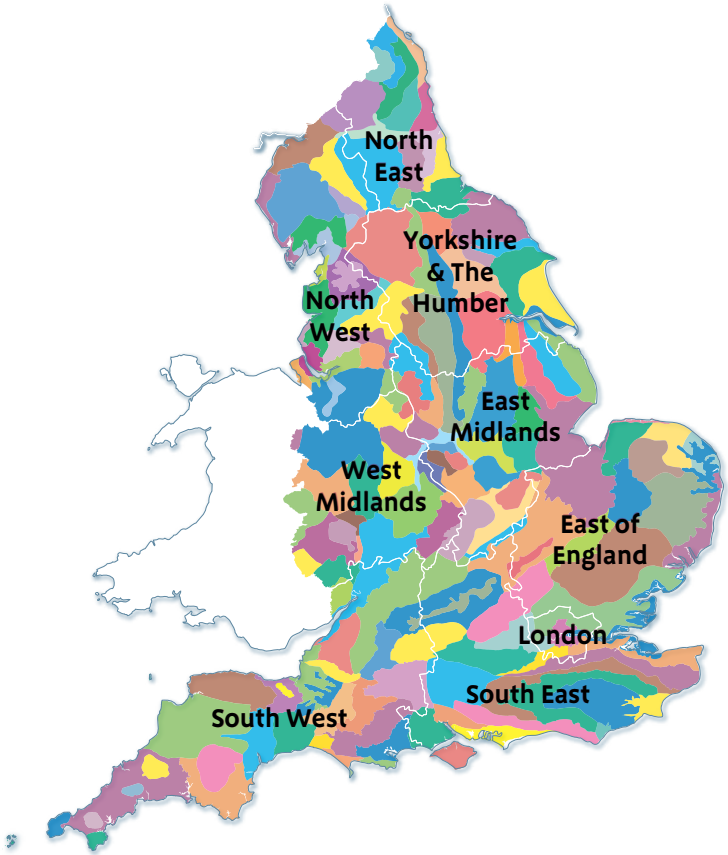
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and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

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

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

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

National Character Areas map



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

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

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

Summary

Holderness is a rural, low-lying, undulating plain with the broad, shallow valley of the River Hull flowing southwards through the centre towards Hull. The river eventually joins the expansive Humber Estuary where it becomes tidal, enclosed by flood banks, and drains into the North Sea.

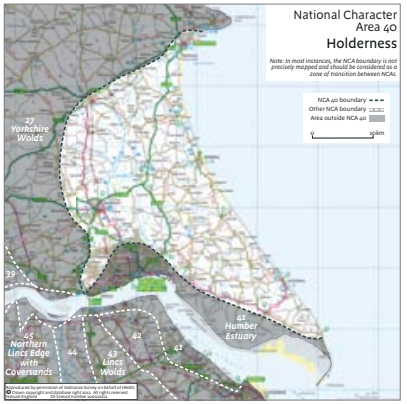
The National Character Area (NCA) is bounded by the dip slope of the Yorkshire Wolds to the north and west, while eastwards, beyond the coastline of soft boulder clay cliffs, lies the North Sea. Rapid erosion of these cliffs is a conspicuous feature of this NCA, and forms part of an important coastal process of sediment transfer. Holderness is the single most important source of sediment in the southern North Sea: the sediment is carried south to the Humber, the Lincolnshire coast and the Wash, where it feeds beaches and through accretion helps intertidal habitats to adjust to rising sea levels.

Holderness shares an underlying chalk aquifer with the Yorkshire Wolds and is an important water resource for the area. The springs and streams flowing from the Wolds are part of the most northerly chalk streams in Britain, and they merge to form the River Hull in Holderness. The River Hull's headwaters are designated as a Site of Special Scientific Interest (SSSI) as a chalk stream and for marginal riparian habitats. Holderness has six SSSI which provide evidence of the glacial and post-glacial history of the area. These consist of exposures in cliffs and gravel pits, and also include the remnants of bogs and meres. Hornsea Mere is a large, natural lake and is designated as an SSSI for its marginal habitats and as a Special Protection Area for populations of wintering wildfowl.

An extensive network of rivers, ditches, becks, dykes and canals drains the River Hull. The river's flood plain, of mainly base-rich loamy and clayey soils, is important for food production, with vegetables and root crops grown in the shallow valley and arable farming taking place on higher land in the west and the south-east, near the coast. The high-quality agricultural land comprises large field patterns bounded by drainage ditches on the River Hull flood plain, and there are hedgerows on higher ground. Rare remnants of species-rich grassland occur around Hornsea and Lambwath meres, where low-lying, seasonally flooded hay fields are maintained by traditional farming practices.

Long views over the flat landscape and the relatively dispersed nature of settlement instil a sense of tranquillity, which is reinforced by sparse woodland cover and open views along the coastline. In contrast to this, there are some large caravan sites at certain points along the coast and the seaside resorts of Hornsea, Withernsea and Bridlington can be busy in the summer. Small, traditional villages are dispersed throughout the area, many of which have village greens, ponds and churches, some dating back to Norman times. Beverley is the largest inland settlement in the NCA and is distinctive for its large minster and historic expanses of open access grazing land – Beverley Westwood, Figham and Swinemoor.

Key challenges in this area include groundwater management, coastal flooding and coastal management. Ensuring a sustainable approach to flood and coastal risk management and enabling the coast to continue to provide sediment to other areas will be important considerations for the future.



Click map to enlarge; click again to reduce.

There are many drains, ditches and dykes in Holderness such as here at the Leven Canal SSSI (Akdale Bridge looking east).

Statements of Environmental Opportunity

- **SEO 1**: Conserve, manage and enhance the River Hull and associated river system with its many associated drains, dykes and streams to improve water quality and supply, sustainably address flood risk management, and enhance biodiversity and the historic environment through a strategic, landscape-scale approach.
- **SEO 2**: Work with landowners and land managers to support sustainable food production while enhancing and strengthening the network of farmland features; create and expand habitats in the farmed environment to enhance biodiversity and improve soil and water quality; strengthen resilience of habitats to climate change; and enhance landscape character.
- **SEO 3**: Allow essential coastal processes to occur, including erosion of the soft clay cliffs, while respecting policies that reduce erosion and flood risk in relation to key coastal settlements.
- **SEO 4**: Enhance people's understanding and enjoyment of the geodiversity, historic sites, seaside character and remoteness that contribute to the varied sense of place and valuable recreational assets that the area provides.

Description

Physical and functional links to other National Character Areas

Holderness is a low-lying, broad, undulating plain with the River Hull flowing south through the centre towards Hull. Eastwards lies the North Sea with the large expanse of the Humber Estuary to the south, while to the north and west the land rises to the dip slope of the Yorkshire Wolds.

Holderness shares a coastline with the adjoining Yorkshire Wolds where the resistant, hard chalk headland of Flamborough Head provides a sheltered bay. By contrast, the Holderness coastline is dominated by a long stretch of rapidly eroding soft cliffs of glacial till. Erosion of these cliffs is part of the coastal process, whereby sediment is transferred further south into the Humber Estuary National Character Area (NCA), contributing to estuarine sediments, the creation of important intertidal habitats and reduction of flood risk in the Humber. Even further south on the Lincolnshire coast, it helps to form beaches and reduces erosion.

Holderness and the adjoining Yorkshire Wolds share a major chalk aquifer of national importance which is used extensively for private and public water supply, businesses and agriculture. It also provides much of the base flow of the River Hull and its headwaters which are located within Holderness, while the upper tributaries of the River Hull arise from calcareous springs in the Yorkshire Wolds NCA. The Hull headwaters form the most northerly chalk stream system in Britain and are designated as a Site of Special Scientific Interest (SSSI). The River Hull runs southwards through a shallow valley, dominating the western landscape of Holderness. At its southernmost end, towards Hull, it increases in salinity, becoming tidal. Other key waterbodies include the Leven Canal which stretches for 5 km between Leven and the River Hull and Tophill Low Reservoir, an important water storage area.

Eastwards along the dip slope of the Yorkshire Wolds, views are extensive in this predominantly flat, open and gently undulating plain which extends over the valley of the River Humber and runs south to Hull. The Humber Estuary is visible but with restricted views where there are flood embankments. Towards the coast, the proximity of the sea is scarcely apparent due to the low-lying cliffs. a, provide a backdrop of upland views.

The River Hull headwaters form the most northerly chalk stream system in Britain and are designated a Site of Special Scientific Interest (SSSI).

Key characteristics

- A broad, gently undulating plain which is centred on the valley of the River Hull and is drained by a network of canals, ditches and canalised tributaries.
- Long views with arable farmland sloping upwards bounded by the dip slope of the Yorkshire Wolds to the north and west.
- Glacial landscape of boulder clay, gravels and alluvium over chalk with many glacial features including hummocky terrain, moraine-like ridges and kettle holes. Low, rapidly eroding coastline of soft clay cliffs.
- Sparse tree and woodland cover leading to a generally open landscape with long views, enclosed by the Wolds to the north and west.
- High-quality agricultural land used predominantly for large-scale arable cultivation and some livestock farming.
- Large field patterns bounded by drainage ditches on the River Hull flood plain, and hedgerows on higher ground.
- Highly fragmented remnants of semi-natural vegetation including carr, swamp and wet grassland and Hornsea Mere, a large, natural lake designated for its associated habitats and bird species.
- Gently undulating land towards the coastal strip, characterised by arable farmland, wind-pruned trees, holiday homes, caravan parks and some historical sites.
- Inland, the agricultural landscape is separated from the North Sea by a line of soft boulder clay cliffs with long views out to sea along a sweeping coastline with the Chalk headland of Flamborough visible in the north.
- The interaction between different currents at the Flamborough Front provides good feeding grounds for fish, birds and marine mammals.

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Open landscape with long views and large-scale arable farmland near Hornsea.

Key characteristics continued

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- A wide range of seabirds (such as razorbill and gannet) visible throughout inshore waters, dispersing from nesting sites further north. At certain times of the year large numbers of little gull are present at Hornsea Mere. Little tern forages along the Holderness coast.

Beverley Minster, completed in 1425, inspried the design of Westminster Abbey.

- A network of minor winding roads and lanes, linking dispersed villages and hamlets, with village churches providing prominent landmarks in the flat landscape. Many villages have a variety of buildings grouped around ponds and village greens.
- The principal towns of Holderness are Driffield, Beverley and the coastal resort of Bridlington, together with the smaller coastal settlements of Hornsea and Withernsea. Part of the urban fringe of the City of Hull extends northwards into Holderness.
- Traditional farmsteads, houses and other buildings characterised by red brick and pantiles. Occasional buildings towards the coast constructed from Holderness cobbles and older buildings including churches often built in limestone.
- Beverley Minster, a large gothic building completed in 1425, and Burton Constable, an Elizabethan country house whose parkland was landscaped by Lancelot 'Capability' Brown, are key heritage assets.
- The adjoining Yorkshire Wolds NCA has provided inspiration to artists and poets, the most notable being David Hockney.

Holderness today

Holderness is a productively farmed, low-lying landscape located east of the Yorkshire Wolds. A broad, undulating plain, centred on the valley of the River Hull, this largely rural area is shaped by modest changes in topography, tree cover and land use.

Hornsea Mere is a large natural lake with important marginal habitats and attracts large populations of wintering wildfowl.

The gentle terrain undulates from the Wolds to the North Sea and contains widespread remnants of glacial features. Deposits of boulder clay and alluvium cloak the underlying Chalk strata, creating rich, loamy and clayey soils which support arable cultivation. Dried-out post-glacial meres are common, and Hornsea Mere, designated as an SSSI for its marginal habitats of species-rich fen, carr woodland and reed swamp, is one of the few post-glacial meres that retain any water. It is also a Special Protection Area (SPA) for populations of wintering wildfowl including gadwall, goldeneye and pochard, and the reedbeds provide habitat for hundreds of breeding pairs of reed warbler, and roosting areas for large numbers of starling and swallow.

The River Hull, the most northerly chalk river system in Britain, originates on the southern edge of the Yorkshire Wolds before entering the alluvial flood plain of Holderness. Its headwaters are designated as an SSSI as its calcium-rich waters support scarce plant species such as flat-stalked pondweed and river water-dropwort. Otters are also re-colonising in the upper reaches. Within the wider Hull Valley, drainage ditches and semi-improved flood plain pastures at Swinemoor and Figham Common provide wildlife habitats. The Hull Valley supports important bird species including lapwing, snipe and redshank. There are rare remnants of species-rich grassland occurring around Hornsea and Lambwath Meadows, where low-lying, seasonally flooded hay fields are maintained by traditional farming practices.

Fens are found along the upper reaches of the River Hull between Driffield and Wansford and reed swamp at Pulfin Bog. Man-made waterbodies such as the Leven Canal and Tophill Low Reservoir retain water and drain the land for agriculture. In 1802, former meres and fens of Leven Carrs were dug to construct the Leven Canal, stretching 5 km between Leven and the River Hull.

Evidence of this connectivity with the former surrounding marshland survives through the rich aquatic and water-margin flora that these waterbodies support. Tophill Low Pumping Station, south of Driffield, contains two artificial reservoirs which are havens for wintering wildfowl. Former borrow pits and sand and gravel pits such as those at Brandesburton and Pulfin now act as wetland habitats as well as providing recreation by way of fishing and water sports.

Arable cultivation accounts for 82 per cent of land cover. Mainly cereals and root crops are grown on the lower slopes of the Wolds and the slightly raised land between Hull and the North Sea, while in the lower reaches of the Hull Valley root crops and vegetables are grown. Arable farmland also supports a number of declining farmland birds, mainly grey partridge, skylark, barn owl, corn bunting, yellowhammer, linnet and tree sparrow. Fragmented patchworks of grasslands, ditches, small copses, hedgerow trees and hedgerows remain in some parts of the NCA, providing habitats for farmland birds.

Fields are generally large and woodland cover sparse, and in the Hull Valley the large fields, bounded by ditches and dykes, contribute to an open landscape character with long and open views throughout. Where woods do occur, they provide enclosure and structure, but areas of ancient woodland are limited.

Eastwards, the coastal area is characterised by a strip of coastal farmland, extensive caravan parks, holiday homes, wind-pruned trees and visible evidence of coastal erosion. Material eroded from the soft clay cliffs of the Holderness coastline is carried south by waves and currents to Spurn Head and to offshore sand banks at the mouth of the Humber Estuary, where the silt and mud contribute to estuarine sediments. Further south along the Lincolnshire coast, this sediment transfer helps the Humber to adjust to sea level rise and reduces erosion in Lincolnshire.

In the marine environment around Holderness, the North Sea is an important shellfish ground of significance to the local economy, with the largest port located at Bridlington and additional landings at Hornsea and Withernsea.

Views of the North Sea along the Holderness coast looking towards Bridlington. The North Sea is an important shellfish ground.

In the sparsely populated areas, there is a strong sense of rural character owing to farmland, dispersed villages and hamlets. Village ponds and greens are a common feature and church spires are prominent landmarks in this flat, open landscape. Farmsteads are often large and widely dispersed. Brick and pantiles are the common building materials and are of a soft, rich red colour, long and narrow in shape. Limestone imported from the Southern Magnesian Limestone ridge appears in some buildings such as Beverley Minster where the slender west towers can be seen above the surrounding countryside from kilometres around.

Coastal towns and villages are dotted along the coastline with Bridlington being the largest, where older buildings are constructed with the distinctive herringbone pattern of beach cobbles of Holderness. A number of churches along the coastal belt are built from this material, sometimes used in combination with brick. Small market towns such as Beverley and Driffield have strong agricultural associations and west of Beverley is a historic area of common grazing land known as Beverley Westwood. This includes mature trees dotted across an open, grazed landscape with Burton Bushes providing a small patch of remnant ancient woodland. Southwards, the urban settlement of Hull expands into Holderness with its extensive development of housing, industry, roads and pylons contrasting against the lightly settled rural areas.

A small number of active sand, gravel and chalk quarries are located south of Brandesburton, near Keyingham and south-west of Beverley. Brandesburton Pits are generally used for fishing and watersports and the borrow pits at Pulfin (the largest one known as High Eske) are a nature reserve managed by the Environment Agency. Aggregate dredging occurs far offshore in licensed zones near the southern part of the coast which extends into the Humber Estuary NCA.

There is a low density of public rights of way but minor roads and quiet lanes link settlements, enabling walking, cycling and horse riding opportunities. The Trans Pennine Trail, an important strategic route, provides links with Hull in the adjoining Humber Estuary NCA. Following the 24-kilometre Hull–Hornsea Rail Trail to Hornsea, this former railway line has recently been upgraded to a bridleway. A short stretch of the National Cycle Route, the Way of the Roses, runs through the adjoining Yorkshire Wolds into Bridlington and an 80-kilometre long-distance walking route, the Minster Way, runs between York and Beverley minsters. Coastal access along parts of the Holderness coast is currently limited owing to caravan sites and rapid erosion. Any opportunities identified to extend access would have to include 'roll back' provision. The seaside resort of Bridlington is the home of David Hockney who, in partnership with Welcome to Yorkshire, has created an official Hockney tourist trail featuring a number of sites across Yorkshire, particularly focusing on places that he has painted in the adjoining Yorkshire Wolds NCA.

The landscape through time

Chalk underlies Holderness and is deeply buried beneath younger glacial deposits, which consist of boulder clay, gravels and sands, thickening towards the coast. They were deposited by ice sheets, which reached as far as the Wolds. In retreat, the ice sheets left an uneven terrain of hummocky ground, low moraine ridges and kettle holes. Evidence of the conditions at the time is provided by the cliff exposures at Flamborough Head SSSI, Dimlington Cliff SSSI and the gravel pits of Kelsey Hill. Post-glacial meres formed in the uneven ground and hollows left by the glaciers. The sediments deposited in the meres provide evidence of the post-glacial climate and vegetation history. Pollen from Skipsea Bail Mere SSSI includes that of the water chestnut and indicates a post-glacial climatic optimum about 2°C higher than at present. Hornsea Mere is the only surviving example of a large post-glacial lake, and is a remnant of the meres and marshland that were once common in the area.

Along the coastline, the Holderness cliffs are some of the fastest eroding in Europe. Over the last 1,000 years, 26 villages which were recorded in Domesday Book of 1086 have been lost to coastal erosion. The coastline is retreating at an average rate of 1.5 to 2.5 m a year, although coastal erosion can be unpredictable and larger losses than this can occur, with a number of properties at risk.

Evidence suggests that the first settlers arrived in Neolithic times, when the plain probably consisted of lakes, marshes, islands and woodland. Wetland areas spread inland as sea levels rose and the climate cooled over the Bronze Age, this being particularly marked towards the end of the second millennium BC, enabling the use of waterways as a communication link to the Pennines and via the Trent into the Midlands. Fishing, fowling and other marsh-edge activities represented important additional sources of income in these former wetland areas where, prior to enclosure and drainage, the lush grasslands provided a source of summer grazing for surrounding communities.

Settlement was concentrated on the high areas of hills and ridges. Early drainage occurred in medieval times and continued until the mid-18th century when the last reaches of the River Hull were drained. Ancient enclosure occurred in Holderness on the glacial tills, while the fertile peaty carr lands in the Hull Valley continued to be used in common. Open field villages survived until the 17th

The soft, boulder clay cliffs of Holderness erode rapidly.

century when the landscape must have been a mix of enclosed land, common pastures and open fields, supporting production of grass, corn, hay, sheep and cattle. Parliamentary enclosure introduced a similar pattern of dispersed farmsteads set apart from the villages and areas of large, regular fields enclosed by thorn hedges. The coastal farmland from Hornsea to Bridlington was enclosed early in the 19th century with straight roads and tracks, and the formation of new farmsteads. Large and widely dispersed 18th- and 19th-century farmsteads occurred and industrial-scale pig rearing developed after 1940.

Burton Bushes in Beverley Westwood may have links to ancient woodland.

The formation of the low woodland cover of today's landscape began with clearance from the Neolithic period and, by the 11th century, the survival of woodland cover was low except for shelterbelts in coastal farmland and boundary trees and hedges. Ancient woodland is very limited and most woods are of relatively recent origin. A few examples that may link back to the ancient forests include Low Wood with its extensive alder and willow carr, Bail Wood near Aldbrough, and Burton Bushes in Beverley Westwood with its canopy of oak and understory of field maple, wych elm and holly.

Although the buildings no longer remain, there are several sites of medieval interest including Meux Abbey, a Cistercian monastery east of Beverley founded in 1150 on flat, marshy land in the flood plain of the River Hull. Along the coastline there is evidence of deserted medieval villages and a moated motte-and-bailey castle at Skipsea. The coastline was thought vulnerable to invasion during the two world wars and was heavily fortified. Evidence of this can be seen in the First and Second World War pillboxes and beach defence emplacements along the coastline. These are vulnerable to coastal erosion and are now often found on the beaches themselves, such as at Fraisthorpe beach.

The most common building material is brick and pantiles and this has historic links to the brick making industry in Hull and Beverley, which dates back to the 14th century, possibly owing to connections with the Low Countries where the industry was established. Limestone is used in some older buildings such as village churches, some of which date back to Norman times, as at Lockington. The grandest limestone building is found in the historic town of Beverley which has developed around its minster, originally the site of a monastery. Work began on the current structure in 1220 and was completed in 1425. It is regarded as one of the finest examples of perpendicular design, particularly the twin towers of the west front which inspired the design of Westminster Abbey.

The area is also notable, as are other parts of eastern England further south, for the early use of brick. A fine example of the use of red brick materials for building is Burton Constable, an Elizabethan country house located north of Sproatley village. It was originally a brick manor house built around 1500 with a deer park, the creation of which entailed the clearance of a village. In the 1560s Sir John Constable demolished most of the manor house to build the Elizabethan mansion that we see today: this was completed by the end of the 16th century. The parkland surrounding the house was designed by Lancelot 'Capability' Brown who was commissioned from 1772 to 1782 to landscape the park: this involved joining up fish ponds to create two lakes separated by a dam-cum-bridge, tree clumps, sunken fences and a ha-ha.

Most of Holderness remains predominantly rural but there is evidence of housing, road and retail development outside urban and fringe areas along corridors such as the A614 in the north and the A1079, north of Hull and around Beverley. The coastal resorts around Bridlington, Hornsea and Withernsea are influenced by holiday homes and several large caravan parks, At Dimlington, there is gas production with large pipelines stretching 25–30 km offshore to the gas terminal at Easington in the Humber Estuary.

Ecosystem services

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

Provisioning services (food, fibre and water supply)

- **Food provision**: Agricultural land covers more than 71,000 ha (82 per cent of the NCA). Farming is predominantly arable with cereal production covering 38,997 ha (45 per cent of the NCA). Grade 2 land covers 42 per cent of the NCA and is found mainly on the lower slopes of the Wolds along the western edge of Holderness and on slightly raised land. However, the flood plain of the Hull Valley is predominantly Grade 3 land and the lower reaches are farmed to produce vegetables and root crops.

Farming is predominantly arable with cereal production covering 38,997 ha.

Only 11 per cent of farm holdings manage livestock, including some specialist pig and poultry units. The largest numbers of livestock are pigs totalling 219,500 animals and this food provision is concentrated on a relatively small number of specialised holdings. As few as 10 per cent of agricultural holdings rear pigs and poultry (2009 figures).

- **Water availability**: The chalk aquifer, shared with the Yorkshire Wolds, underlies the NCA and is one of the main contributors of water to the Yorkshire and Humber region, used extensively by businesses and agriculture and for public and private water supply. It also provides much of the base flow of the River Hull and its headwaters and areas of water storage such as the reservoir at Tophill Low. The aquifer is over-abstracted, particularly in the north-eastern area and further south near Hull where abstraction is reduced to prevent saline intrusion.

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

- **Regulating soil erosion**: The main soil types are slowly permeable, seasonally wet, slightly acid but base-rich loamy and clayey soils (48 per cent of the NCA) and slightly acid, loamy and clayey soils with impeded drainage (24 per cent). These soils are vulnerable to erosion and are easily compacted by machinery or livestock, which also carries the risk of surface water run-off in wet conditions and sediment build-up in rivers and other watercourses. Management measures to maintain good soil structure on cultivated land include increasing organic matter content by growing green cover crops, introducing fallow into rotations, retaining stubble over winter and conversion to grassland. Carefully timed activities using farm machinery, particularly during very wet periods, and implementing extensive grazing regimes where feasible will help.
- **Regulating soil quality**: The slowly permeable, seasonally wet, slightly acid but base-rich loamy and clayey soils (48 per cent of the NCA) may suffer compaction and/or capping as they are easily damaged when wet. In turn, this may lead to increasingly poor water infiltration and diffuse pollution as a result of surface water run-off. Management measures on cultivated land that increase organic matter content can help to reduce these problems. Similarly, the slightly acid, loamy and clayey soils with impeded drainage (24 per cent of the NCA) 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 as well as adopting cultivation practices such as increasing the organic content of soils, introducing fallow into rotations and overwinter stubbles, and avoiding overstocking or using machinery where it would lead to the compaction of vulnerable soils.
- **Regulating water quality**: Holderness falls within the Hull and East Riding Catchment. Within this catchment 73 per cent of waterbodies are classed as moderate, 6 per cent are poor and 3 per cent are bad. The main factor affecting water quality is high nitrate levels leaching into the water, the causes of which include agriculture, industry and sewage disposal systems (private). Solutions include following good agricultural practice such as adherence to nitrate vulnerable zone guidelines and planting cover crops/ buffer strips to prevent run-off. By contrast, coastal bathing water quality is good and should be maintained.

- **Regulating water flow**: Groundwater flooding in this NCA can last for several months at a time; once groundwater levels have risen, there is little that can be done to reduce high levels until they fall naturally. The agricultural productivity of the area is dependent on pumped drainage, as it would be naturally waterlogged for much of the time.

Pumped drainage on the River Hull helps protect agricultural land from flooding.

Flooding along the course of the River Hull can affect properties, businesses, the transport infrastructure and farming. This is particularly prevalent around Beverley, and further south in and around the City of Hull and the Humber Estuary where flood events can be heightened by tidal influences. Policies to prevent inappropriate development within flood plains should be supported, farming practices should be modified to safeguard soil resources where there is frequent water inundation and the expansion of flood storage areas should be implemented where appropriate.

- **Regulating coastal flooding and erosion**: The Holderness cliffs erode at an average rate of 1.5 to 2.5 m a year which is part of the important coastal process occurring within the NCA and beyond. This eroded material is transported southwards to contribute to the beaches and intertidal habitat in the Humber Estuary and along the Lincolnshire coast. Current climate change modelling suggests that sea level rise and more frequent storm events may exacerbate coastal erosion and increase the scale of flood events. Where possible, natural processes should be allowed to continue and any modification to sea defences should seek to recognise the importance of naturally eroding cliffs in the NCA.

Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration**: A range of factors contribute to the sense of place in the area: its largely flat topography and open views across the sea; low tree cover; the broad, shallow valley of the River Hull with its large field patterns bounded by drainage ditches; the expansive coastline; and coastal towns. Light settlement patterns in rural areas of dispersed villages and hamlets (many with village ponds) and prominent church spires produce a sense of tranquillity and remoteness. The local vernacular of red brick buildings, pantile roofs and local Holderness cobbles for buildings constructed near the coast strengthen the character of the area.

- **Sense of history**: The open character of the area with its distinctive boundaries and range of natural and historic features retains a strong sense of having been reclaimed from the sea and marsh over thousands of years, and indeed recently in the prominence of its isolated farmsteads. Monastic sites and granges such as Meux Abbey, a Cistercian monastery east of Beverley, provide witness to medieval colonisation as do deserted medieval villages to the high point and then partial desertion of medieval settlement in the 13th century. The coastline with its anti-invasion defences is highly evocative of its vulnerability to attack during the two world wars.

  The 14th-century heritage of brick making in Hull and Beverley can be seen in the Elizabethan country house of Burton Constable, north of Sproatley village. Limestone is used in older buildings such as village churches, the grandest limestone building being Beverley Minster which was begun in 1220 and completed in 1425; it is one of the finest examples of perpendicular design and inspired the construction of Westminster Abbey.

- **Tranquillity**: Although the proportion of areas that are undisturbed remains high, they have declined from 82 per cent in the 1960s to 60 per cent in 2007. Strong contributors to tranquillity include the flat, low-lying topography and extensive views, sparse settlement patterns in rural areas, the farmed landscape, inaccessible parts of the coast, and long, distant sea views towards and from the coastline. Tranquillity is reduced around expanding urban settlements and main transport corridors.

- **Biodiversity**: There are 15 SSSI designated for their nature conservation value including the River Hull headwaters, the most northerly chalk stream system in Britain, and Hornsea Mere, the largest surviving post-glacial, natural lake in Yorkshire. This is also designated as an SPA owing to the large numbers of wintering wildfowl and nationally important numbers of little gull.

  The network of watercourses throughout the NCA provides corridors linking important wetland habitats, thus supporting the protection of designated sites and a diverse range of bird species. Important waterways include the River Hull headwaters, the Leven Canal, Tophill Low Reservoir, Lambwath Meadows and Hornsea Mere, although the last is affected by eutrophication as a result of physical modifications for land drainage and diffuse pollution.

  There is scope to maintain, create and restore a range of semi-natural wetland habitats by working with landowners and farmers on sustainable management interventions and exploring Countryside Stewardship options.

- **Geodiversity**: There are currently five nationally designated geological sites (SSSI) and one of both geological and biological interest. These consist of cliffs, gravel pits, bogs and meres, and provide evidence of the environment and conditions during the last glaciation, as well as a post-glacial vegetational history preserved in the peats of the now largely dried-out meres. Interpretation and developing research into the geodiversity of the NCA will contribute to the furthering of scientific understanding of the late Pleistocene and Holocene history of Holderness and surrounding NCAs. Sediment from erosion of the Holderness coast is also essential in sustaining the geomorphological site of Spurn, in the Humber Estuary NCA.

Statements of Environmental Opportunity

SEO 1: Conserve, manage and enhance the River Hull and associated river system with its many associated drains, dykes and streams to improve water quality and supply, sustainably address flood risk management, and enhance biodiversity and the historic environment through a strategic, landscape-scale approach.

For example, by:

- Maintaining and improving water quality and provision from the chalk aquifer by working with landowners and farmers to adopt sustainable farming practices that will improve filtration into the ground and reduce nutrient run-off by creating a network of meadow grasslands including grass field margins and grass buffers to watercourses and areas of open water.
- Encouraging the growth of crops that require less irrigation and increase on-farm water storage.
- Managing the network of drains, ditches and dykes on rotation so that they continue to function while retaining vegetation to form effective habitats for species such as water voles, thus providing links between wetland and other semi-natural habitats, improving water quality and preserving key landscape features.
- Ensuring that the small number of drains, ditches or dykes in the National Character Area (NCA) that are monastic in origin are managed in such a way as to preserve their archaeological value.
- Seeking opportunities to increase and link wetland habitats within the River Hull corridor including open water, reedbed, fen and wet grassland.
- Seeking opportunities to maintain and increase flood plain grazing marsh owing to its role in storing carbon, ensuring that sites are managed to enhance their biodiversity value.
- Encouraging agricultural practices such as planting winter cover crops, in-field grass areas to prevent run-off, permanent grassland with low inputs, and buffer strips on cultivated land adjacent to watercourses, improving infiltration of rainwater.
- Where feasible, through partnership, seeking opportunities to support habitat enhancement and wildlife opportunities, managing flood risk and avoiding saline intrusion in relevant areas by creating permanent grassland, wet grassland and wet woodlands, and expanding or creating flood storage areas.

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SEO 1: Conserve, manage and enhance the River Hull and associated river system with its many associated drains, dykes and streams to improve water quality and supply, sustainably address flood risk management, and enhance biodiversity and the historic environment through a strategic, landscape-scale approach.

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- Seeking opportunities to create woodland to reduce flood flows.
- Seeking opportunities to develop joint strategies in relation to the delivery of the Shoreline Management Plan and Catchment Flood Management Plan, ensuring that flood risk from the coast and waterways inland is managed effectively and protecting settlements within the Hull and Coastal Streams Catchment.
- Encouraging nature conservation management and the conservation of geological features of ex-gravel and borrow pits alongside their other uses, which include recreation.

Species-rich grassland of Lambwath Meadows.

SEO 2: Work with landowners and land managers to support sustainable food production while enhancing and strengthening the network of farmland features; create and expand habitats in the farmed environment to enhance biodiversity and improve soil and water quality; strengthen resilience of habitats to climate change; and enhance landscape character.

For example, by:

- Encouraging cultivation practices that will benefit wildlife such as farmland bird species (grey partridge, skylark, barn owl, corn bunting, yellowhammer, linnet and tree sparrow) as well as pollinating insects by adopting land management interventions such as fallow within rotations, overwintering stubbles, uncropped field margins, creating pollen and nectar strips, and planting bird seed mixtures.
- Taking opportunities to reduce habitat fragmentation by creating networks, corridors and stepping stones of semi-natural habitats, increasing the resilience of species and habitats to climate change, notably by creating more hedgerows on higher ground and pasture land, managing flood plain grazing marsh, and creating buffer strips of permanent grassland alongside watercourses as well as pollen and nectar strips.
- Working with landowners and farmers to create marginal habitats around designated sites such as reedbed, fen and carr woodland.
- Ensuring that all existing woodlands are brought under sound management and that those with links to ancient woodlands are managed to improve their biodiversity and heritage interest.
- Developing an integrated package of catchment sensitive farming initiatives along the River Hull including the chalk streams of the Yorkshire Wolds to benefit the local farming community and encourage best practice.
- Improving soil and crop management by encouraging the practice of increasing green cover crops such as grasslands on cultivated or bare soil and field margins and adopting appropriate grazing regimes on soils that are vulnerable to compaction.
- Seeking opportunities, notably along the River Hull and the surrounding flood plain and in and around Hornsea, to extend unimproved species-rich grassland and other riparian habitats around key waterways and designated sites, thereby improving water quality and providing wildlife corridors for water voles and bird species including wading birds such as lapwing, snipe and redshank, and other bird species such as yellow wagtail and sedge warbler.
- Seeking new opportunities with landowners and the aggregates industry to maintain and create more wetland habitats associated with sand, gravel and chalk quarries which make a positive contribution to biodiversity, geodiversity and landscape character.

SEO 3: Allow essential coastal processes to occur, including erosion of the soft clay cliffs, while respecting policies that reduce erosion and flood risk in relation to key coastal settlements.

For example, by:

- Responding to rising sea levels, storm events and flooding by promoting coastal adaptation measures and supporting planning policies that avoid development in flood-prone areas.
- On undefended coastlines (where the policy is 'No Active Intervention'), allowing natural processes to occur so that sediment can provide natural sea defences at Spurn, in the Humber Estuary and on the Lincolnshire coast. This also creates important habitats such as salt marsh, mud and sand flats.
- Seeking opportunities to study post-glacial meres on the Holderness plain to gain an understanding of post-glacial environments before the coastline encroaches.
- Supporting existing partnerships that are working to maintain the high standard of bathing waters in the NCA.
- Ensuring that the expansion of gas pipelines or development of renewable energy schemes is carefully managed to avoid reducing rates of erosion, and to achieve minimum disturbance to marine life and impact on seascape views.

The coastal resort of Bridlington is a fishing port and is popular with visitors to the area.

SEO 4: Enhance people's understanding and enjoyment of the geodiversity, historic sites, seaside character and remoteness that contribute to the varied sense of place and valuable recreational assets that the area provides.

For example, by:

- Working with local communities and schools to interpret the area's historic landscapes: its glacial history of moraine ridges, kettle holes and sediments at Dimlington and Withow Gap; the post-glacial history of the meres; evidence of medieval settlements along the coast (Skipsea Castle, Meux Cistercian Abbey and Watton Gilbertine Priory); and its First and Second World War coastal defences.
- Appropriately managing the historic environment for its contribution to local character and sense of identity and as a framework for habitat restoration and sustainable development.
- Conserving and interpreting archaeological earthworks and sub-surface archaeology, while recognising the high potential for undiscovered remains in this area.
- Seeking opportunities to enable local communities and visitors to enjoy access to the coast and recreation there, including provision of good facilities at its resorts and access to its geological heritage, eroding coastline and wildlife.
- Ensuring that significant built developments do not adversely impact on the open character of the area, helping to maintain viewpoints where there are strong visual links between the chalk ridge of the Wolds and the Holderness plateau as well as sea views from coastal areas.
- Ensuring that woodland planting schemes and biomass crops are carefully located, considering archaeological potential as well as impacts on long, open views.
- Seeking opportunities to work with the farming community by encouraging the maintenance and creation of semi-natural habitats that contribute natural features to the rural landscape, thereby helping to maintain the high levels of tranquillity found in the rural areas that are associated with farmed landscapes away from larger settlements.
- Using understanding of the area's traditional and historic architecture, and its distinct patterns of settlement, to inform appropriate conservation and use of historic buildings, and to plan for and inspire any environmentally beneficial new development which makes a positive contribution to local character and retains key views.
- Carefully ensuring that light spill is minimised through lighting design in new developments to minimise the impact on dark skies.

Additional opportunity

1. Improve access to public enjoyment of the open, rural landscape, the coast and wildlife by improving green infrastructure links between urban and rural/ coastal areas and within urban settlements.

For example, by:

- Seeking opportunities to improve access to the natural environment from urban areas by identifying new permissive routes and improving existing rights of way networks to link to the countryside and to coastal resorts.
- Developing initiatives to encourage local communities, particularly in deprived areas, to enjoy their local green space, to take action to improve it and to benefit from the recreation and health benefits that it affords them, including providing wildlife corridors to improve the resilience of species to climate change.
- Incorporating green spaces in new developments such as around the urban fringe of Hull and areas within Bridlington, Hornsea and Withernsea, ensuring a connection of green spaces with semi-natural habitats to benefit wildlife while providing communities with recreational green space.
- Seeking opportunities for community engagement to expand woodland cover in appropriate areas and increase public accessibility to existing woodlands such as Burton Bushes in Beverley Westwood.
- Exploring the potential to develop shorter circular routes linked to existing cycle routes, bridleways and strategic routes.

Bishop Burton. Many villages in Holderness have village ponds which contributes to the strong sense of place.

Supporting document 1: Key facts and data

Total area: 87,282 ha

1. Landscape and nature conservation designations

There are no designations or landscape management plans in this NCA except for a very small proportion of the Flamborough Headland Heritage Coast forming less than 1 per cent of the area.

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	Humber Estuary	<1	<1
European	Special Protection Area (SPA)	Hornsea Mere SPA; Humber Estuary SPA	232	<1
	Special Area of Conservation (SAC)	Flamborough Head SAC; Humber Estuary SAC	7	<1

Tier	Designation	Name	Area (ha)	Percentage of NCA
National	National Nature Reserve (NNR)	n/a	0	0
	Site of Special Scientific Interest (SSSI)	A total of 15 sites wholly or partly within the NCA	543	1

Source: Natural England (2011)

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

Most of the area designated for nature conservation, 232 ha, falls within Hornsea Mere all of which is designated SPA, SAC and SSSI.

There are 210 local sites in the Holderness NCA covering 1,869 ha which is 2 per cent of the NCA.

Source: Natural England (2011)

- Details of individual Sites of Special Scientific Interest can be searched at: **http://www.sssi.naturalengland.org.uk/Special/sssi/search.cfm**
- Details of Local Nature Reserves (LNR) can be searched at: **http://www.lnr.naturalengland.org.uk/Special/lnr/lnr_search.asp**
- 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	5	1
Favourable	205	38
Unfavourable no change	194	36
Unfavourable recovering	138	25

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

Holderness is a low-lying, predominantly flat or gently undulating plain at sea level and rising to 65 m on the lower slopes of the Yorkshire Wolds in the west.

Source: Natural England 2010

2.2 Landform and process

Holderness forms a low-lying, broad, flat or gently undulating plain, centred on the valley of the River Hull which flows south to Hull. It is bounded by the North Sea to the east, by the Humber Estuary to the south and the dip slope of the Yorkshire Wolds to the west and north.

Source: Holderness Countryside Character Area Description

2.3 Bedrock geology

Holderness is underlain by Cretaceous Chalk, most of which is deeply buried beneath later glacial deposits which have been influential in fashioning the landscape.

Source: Holderness Countryside Character Area Description

2.4 Superficial deposits

Glacial deposits, including tills, boulder and glacial lake clays, sands and gravel have formed a low-lying, slightly undulating plain, with evidence of glacial features such as subdued moraine ridges, kettle holes and former meres.

Source: Holderness Countryside Character Area Description

2.5 Designated geological sites

Tier	Designation	Number
National	Geological Site of Special Scientific Interest (SSSI)	5
National	Mixed Interest SSSI	1
Local	Local Geological Sites	25

Source: Natural England (2011)

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

2.6 Soils and Agricultural Land Classification

The glacial till and alluvium which cloak the underlying Chalk strata, create generally rich loamy and clayey soils which support intensive arable cultivation. Grade 2 agricultural land is found on the lower slopes of the Wolds along the western edge of the NCA, and on slightly raised land elsewhere; especially

between Hull and the North Sea coast. Fertile soils also occur in the lower reaches of the valley north of Hull, where drainage enables cultivation of vegetables and root crops. The soil composition of Holderness breaks down as follows: slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils, covering 48 per cent of the area; slightly acid loamy and clayey soils with impeded drainage covering 24 per cent; loamy and clayey soils of coastal flats with naturally high groundwater over 8 per cent; loamy and sandy soils with naturally high groundwater and a peaty surface covering 7 per cent; freely draining lime-rich loamy soils, 4 per cent; freely draining slightly acid loamy soils, 3 per cent; loamy and clayey flood plain soils with naturally high groundwater, 3 per cent; and freely draining slightly acid but base-rich soils, 2 per cent.

Source: Holderness Countryside Character Area Description, 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	n/a	n/a
Grade 2	36,547	42
Grade 3	43,985	50
Grade 4	1,661	2
Grade 5	n/a	n/a
Non-agricultural	1,087	13
Urban	3,898	45

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)
Driffield Canal	8
Frodingham Beck	3
Gypsey Race	2
Holderness Drain	20
Kelk Beck	9
Leven Canal	5
Monk Dike	8
Old Howe	8
River Hull	36
Watton Beck	5

Source: Natural England (2010)

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

The upper tributaries of the River Hull arise from calcareous springs originating from the Yorkshire Wolds NCA and flowing east to enter the plain. The Hull headwaters form the most northerly chalk stream system in Britain and are designated a SSSI. The River Hull runs southwards through a shallow valley which dominates the western landscape of Holderness and supports a diverse range of plants and animals. The southernmost end of the River Hull towards Hull becomes tidal with an increase in salinity. These lower reaches of the river are enclosed by floodbanks to protect

adjoining farmland. The Leven Canal stretches for 5 km between Leven and the River Hull supporting a remnant of the flora and fauna formerly found in what was surrounding marshland prior to drainage for cultivation.

3.2 Water quality

The total area of Nitrate Vulnerable Zone is 80,807 ha, or 93 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 2,273 ha of woodland, 3 per cent of the total area, of which 79 ha is ancient woodland.

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

4.2 Distribution and size of woodland and trees in the landscape

The NCA is a very sparsely wooded landscape with small scattered blocks, often occurring on sandy deposits, and as shelterbelts around farmsteads. The sparse woodland cover, few of them of ancient origin, is testament to the woodland clearance and drainage for crop cultivation that began with the earliest settlers.

A small number of ancient woodlands remain such as Low Wood with its extensive alder and willow carr characteristic of 'wet' areas at Hornsea Mere, Bail Wood near Aldbrough, and Burton Bushes at Beverley.

Source: Holderness Countryside Character Area Description; Natural England (2012)

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	1,526	2
Coniferous	202	<1
Mixed	180	<1
Other	365	<1

Source: Forestry Commission (2011)

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

Woodland type	Area (ha)	Percentage of NCA
Ancient semi-natural woodland	79	<1
Planted ancient woodland sites (PAWS)	0	0

Source: Natural England (2004)

5. Boundary features and patterns

5.1 Boundary features

Fields are often divided by ditches, especially on the flood plain of the River Hull, and by hedgerows on higher ground. Between 1999 and 2003 27 km or just 2 per cent of the estimated length of boundary features in the NCA were in Countryside Stewardship schemes. Capital agreements for linear features included fencing (31 km), hedgerow management (20 km), hedgerow planting and restoration (63 km), and restored boundary protection (13 km). Currently 932 km of the NCA boundary features are now in Environmental Stewardship schemes, with the highest proportion being hedgerow options.

Source: Holderness Countryside Character Area description; Countryside Quality Counts (2003), Natural England (2011)

5.2 Field patterns

Fields are generally large, bounded by ditches in some areas, especially on the flood plain of the River Hull. Field patterns around settlements often show evidence of medieval enclosure, with larger more rectilinear fields a result of later enclosure and drained flood plains.

Source: Holderness 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

Farm holdings are predominantly arable, general cropping and horticulture, accounting for 459 holdings, 58 per cent of all holding, in 2009. This figure has remained relatively stable between 2000 and 2009, only slightly increasing in numbers. Only 85 or 11 per cent of farm holdings are livestock. This figure has remained relatively stable between 2000 and 2009, slightly increasing in numbers. There are some specialist pig and poultry holdings, 10 per cent, but dairy production only accounts for 2 per cent of holdings.

Source: Agricultural Census, Defra (2010)

6.2 Farm size

Large farms over 100 ha are the most common farm size, accounting for 224 units and the large majority of the farmed land, 75 per cent. Nearly half of all holdings are over 50 ha and account for 90 per cent of the area of farmed land. While there are 261 holdings under 20 ha they account for just 2 per cent of the area of farmed land. Between 2000 and 2009, trends show a decrease in numbers of all sizes of farm holdings except for those between 20 and 50 ha which have shown a small increase. The biggest decrease is of small holdings of 5 ha by 28 holdings.

Source: Agricultural Census, Defra (2010)

6.3 Farm ownership

2009: Total farm area = 71,153 ha; owned land = 51,483 ha
2000: Total farm area = 71,632 ha; owned land = 49,907 ha

Seventy-two per cent of the farmed area is owned land which is relatively high within the region.

Source: Agricultural Census, Defra (2010)

6.4 Land use

The land is predominantly used for arable and horticultural farming; accounting for 59 per cent of the farmed area which is relatively high, with a further 21 per cent put down to cash roots, oilseeds and other arable crops. Grass and uncropped land accounts for 17 per cent of the land. Between 2000 and 2009 the area of arable farming (cereals and oilseed) increased from 49,421 ha to 50,239 ha, mainly due to an increase in oilseed crops.

Source: Agricultural Census, Defra (2010)

6.5 Livestock numbers

There were 219,500 pigs in the NCA in 2009, which represents a drop in numbers from 298,300 in 2000 or a 3 per cent decline. The number of sheep has decreased by 2 per cent from 24,200 in 2000 to 23,100 in 2009. The number of cattle has dropped by 1 per cent from 21,600 in 2000 to 18,400 in 2009.

Source: Agricultural Census, Defra (2010)

6.6 Farm labour

In 2009 the largest number of holdings, 1,197, was managed by principal farmers covering 49 per cent of the farmed area. Since 2000 they have fallen slightly in numbers by 220. In 2009 there were 120 salaried managers, while the numbers of other workers were: full time workers, 552, casual/gang workers, 345, part time workers, 173. Between 2000 and 2009 the number of full time workers had fallen significantly by 476, while casual/gang workers fell by 139, part time workers by 48 and salaried managers by 15.

Source: Agricultural Census, Defra (2010)

lease 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.

Arable farming along the coast.

7. Key habitats and species

7.1 Habitat distribution/coverage

The main habitats are wetlands, unimproved grasslands, woodlands and scrub. Semi-natural vegetation is fragmented due to land drainage and the predominance of arable farming, but there is some unimproved neutral grassland on the boulder clays. Tree and woodland cover is sparse while marshland and other post-glacial features were once common with Hornsea Mere being the largest surviving example of a natural lake. Waterways now provide important habitats with the River Hull and its headwaters flowing from north to south supporting a diverse range of plants and animals. The Driffield and Leven Canal is also an important corridor stretching for 5 km. The proximity of the coast and Humber estuary has an important influence on the landscape and its biodiversity.

River Hull and riparian fringes

The River Hull headwaters are the most northerly chalk stream system in Britain and designated SSSI. The upper reaches support species such as water crowfoot, lesser water parsnip, mare's-tail and spiked water milfoil. The scarce river water-dropwort occurs in the middle reaches where it is at the northern limit of its British range.

Along the River Hull aquatic and marginal vegetation provide habitats for a range of invertebrates. Otter have recently re-colonised the upper reaches of the river and its headwaters, but the once-common water vole is now confined to a few isolated populations.

Influenced by the River Hull the riparian habitats are of great value for wildlife such as species-rich wet grassland and in the upper reaches marsh is quite extensive between Driffield and Wansford.

The diversity of the River Hull valley is reflected in the range of bird species that it supports including several waders such as; lapwing, snipe and redshank. More widely occurring bird species include wildfowl such as mallard and mute swan, together with yellow wagtail, sedge warbler, reed warbler and reed bunting. The grasslands adjacent to the watercourses are important for barn owl and in winter, short-eared owl.

Mere and other wetlands

Once part of the extensive wetland that covered Holderness, Hornsea Mere remains as the largest surviving post-glacial natural lake in Yorkshire. It is a refuge for wintering wildfowl such as gadwall, shoveler, goldeneye, pochard and tufted duck. Nationally important numbers of little gull also congregate in large numbers in autumn, while the fringes hold important numbers of reed warbler. The national and international significance of this habitat and the species is reflected by its designations of Site of Special Scientific Interest (SSSI) and Special Protection Area (SPA).

Marginal habitats found around the fringes of Hornsea Mere, the River Hull (between Driffield and Wansford) and at Pulfin Bog along the Leven Canal, contain species-rich fen, carr woodland and reed swamp, the latter of entomological interest supporting a number of scarce craneflies, danceflies, snail-killing flies and wainscot moths.

The Leven Canal constructed in 1802 stretches for 5 km between Leven and the River Hull and supports a remnant of the flora and associated fauna that would have been found in the surrounding marshland prior to its drainage for cultivation. The nationally rare narrow small-reed, a relict sub-arctic species, grows along the Canal where it also hybridises with purple small-reed.

Extraction of sand and gravel deposits has created pits that have filled with water and re-vegetated, such as the linear pits at Brandesburton and borrow pits by the River Hull at Pulfin, which support what may be the only native population of water soldier in Yorkshire.

At Tophill Low pumping station two artificial reservoirs built close to the River Hull, south of Driffield, have become a haven for wintering wildfowl supporting nationally important populations of gadwall, shoveler and tufted duck, demonstrating how artificial waterbodies for water storage can also provide valuable habitats for wildlife.

Neutral grassland
Unimproved species-rich grassland occurs on soils with a neutral pH with notable remnants around Hornsea and Lambwath Meres. The most significant of which occurs along the valley of the Lambwath Stream near Withernwick where low-lying, seasonally flooded hay fields are maintained by traditional farming practices of hay-cutting followed by aftermath grazing.

Woodland, hedgerows and scrub
The landscape of Holderness with its long views, large arable fields and sparse woodland is due to clearance and drainage by early settlers. The few remaining woods that may have had links to ancient forests are Low Wood with its extensive alder and willow carr, characteristic of 'wet' areas at Hornsea Mere, Bail Wood near Aldbrough and Burton Bushes at Beverley.

Farmland
The predominantly arable farmland in the NCA is intensively managed grassland with the majority of farmland having lost important features for wildlife such as, winter stubbles, uncropped field margins and boundary habitats. Typical farmland species survive where there is a patchwork of arable, grassland, ditches, small copses and hedgerows. Species associated with such arable areas are barn owl and corn bunting as well as grey partridge, skylark, tree sparrow and hare. After crops have been sown on the large open arable fields in the autumn, important numbers of golden plover and lapwing congregate.

Source: Holderness Natural Area Profile

7.2 Priority habitats

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

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

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

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

Priority habitat	Area (ha)	Percentage of NCA
Coastal and flood plain grazing marsh	3,106	4
Broadleaved mixed and yew woodland (broad woodland)	422	<1
Maritime cliff and slope	163	<1
Lowland meadows	50	<1
Fens	13	<1
Reedbeds	13	<1
Purple moor grass and rush pastures	1	<1

Sources: Natural England (2011)

- 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

Settlements are generally located on higher ground, often surrounded by smaller fields. Hamlets and villages are widely dispersed, with some closely packed and nucleated, while others are strung out along roads. Much of the area is predominantly rural with widely dispersed large farmsteads. There is more recent development on urban fringe areas, such as north of Hull and around Beverley, and along transport routes such as the A614 in the north and the A1079. The coastal landscape around Bridlington and Hornsea is influenced by holiday homes and caravan parks.

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

8.2 Main settlements

The main towns and cities within the NCA have the following populations: Beverley 29,110, Bridlington 33,000, Driffield 11,477 and Hornsea 8,243. The city of Hull lies close to the southern boundary of the NCA with the largest population of 243,589. The total estimated population for this NCA (derived from ONS 2001 census data) is: 230,792.

Source: 2001 Census Countryside Character Area description; Countryside Quality Counts (2003), Natural England (2012)

8.3 Local vernacular and building materials

Local buildings are commonly constructed from red brick, flint and distinct Holderness 'cobbles', (the latter found near the coast), with pantile or fishscale roofs. Limestone is also used in some buildings.

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

9. Key historic sites and features

9.1 Origin of historic features

There was widespread clearance of woodland from the Neolithic period. Wetland areas spread inland as sea levels rose and climate cooled over the Bronze Age.

There has been a long history of mixed arable and pasture, and extensive use as summer grazing on land surrounding settlements prior to drainage and enclosure. Arable intensified in tandem with drainage from the 18th century with the cultivation of root crops and vegetables.

Field patterns around settlements often show evidence of medieval enclosure, with larger more rectilinear fields a result of later enclosure and drained flood plains.

The coastal farmland from Hornsea to Bridlington was subject to extensive early- to mid-19th century enclosure, with straight roads and tracks, and the formation of new farmsteads.

Large and widely dispersed farmsteads and large-scale piggeries, mostly of mid-19th century date, occur across the area; industrial-scale pig rearing has developed in the post-1940 period.

The historic town of Beverley has developed around its Minster.

Along the river valleys, deposited fluvial soils contain important palaeo-environmental remains of past land use and changes in sea levels.

Erosion of soft boulder clay leads to the exposure of new archaeological sites as well as the loss of existing sites, settlements and agricultural land. Archaeological sites have also been identified along the beach during seasons of sand movement.

There are a small number of historic parklands, such as at Burton Constable and Thwaite Hall.

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:

- 2 Registered Parks and Gardens covering 404 ha.
- 0 Registered Battlefields.
- 87 Scheduled Monuments.
- 1,300 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

- Just greater than half a per cent of the NCA or 482 ha is classified as being publically accessible.
- There are 623 km of public rights of way at a density of 0.7 km per km^2.
- There are no national trails within the NCA.

Sources: Natural England (2010)

The area of publically accessible land in the NCA is very low. The coast offers tourism and recreation opportunities at Bridlington and Hornsea where there are holiday homes and caravan parks, and beaches.

Beverley Westwood common land.

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

Access designation	Area (ha)	Percentage of NCA
National Trust (Accessible all year)	n/a	n/a
Common Land	425	<1
Country Parks	77	<1
CROW Access Land (Section 4 and 16)	482	<1
CROW Section 15	12	<1
Village Greens	5	<1
Doorstep Greens	n/a	n/a
Forestry Commission Walkers Welcome Grants	16	<1
Local Nature Reserves (LNRs)	22	<1
Millennium Greens	0	0
Accessible National Nature Reserves (NNRs)	n/a	n/a
Agri-environment Scheme Access	24	<1
Woods for People	102	<1

Sources: Natural England (2011)

Please note: Common Land refers to land included in the 1965 commons register; CROW = Countryside and Rights of Way Act 2000; OC and RCL = Open Country and Registered Common Land.

11. Experiential qualities

11.1 Tranquillity

Based on the CPRE map of tranquillity (2006) the NCA has high levels of tranquillity found in the rural areas away from the larger settlements and main roads.

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

Tranquillity	Score
Highest value within NCA	46
Lowest value within NCA	-68
Mean value within NCA	6

Sources: CPRE (2006)

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

11.2 Intrusion

The 2007 Intrusion Map (CPRE) shows the extent to which rural landscapes are 'intruded on' from urban development, noise (primarily traffic noise), and other sources of visual and auditory intrusion. This shows that the areas of highest intrusion are found around the settlements of Beverley, Driffield, Bridlington and Hull (the latter in the adjoining NCA) and along connecting transport routes mainly A164, A165, A1035 and A1033.

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

Intrusion category	1960s (%)	1990s (%)	2007 (%)	Percentage change (1960s-2007)
Disturbed	17	26	35	18
Undisturbed	82	71	60	-21
Urban	2	2	5	3

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are an increase of 18 per cent disturbance with a small increase in urbanisation of 3 per cent. However, 60 per cent of the area remains largely undisturbed which contributes to its largely remote and rural character.

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

12. Data sources

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

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

Supporting document 2: Landscape change

Recent changes and trends

Trees and woodlands

- Data from Countryside Quality Counts for the period 1999 to 2003 indicates that a significant expansion of woodland cover occurred resulting from woodland grant scheme agreements.
- New planting is mostly in small, scattered blocks or shelterbelts.
- In some locations, an aging population of hedgerows trees is not being replanted, weakening the mosaic of farmland habitats and impacting on the character of the landscape.

Boundary features

- While many of the field boundaries are ditches and dykes, the data from Countryside Quality Counts for the period 1999 to 2003, shows that Countryside Stewardship agreements were for fencing, hedge management, planting and restoration, totalling 127 km (2 per cent of the estimated boundary length of the NCA).
- Data from Natural England (March 2011), shows an increase from 2 per cent to 14 per cent of the estimated boundary length of the NCA as being managed under agri-environment agreements. These are mainly for ditches, hedgerows, stone walls and woodland.

Agriculture

- During the period 2000–2009, arable, general cropping and horticulture remained dominant, specialist pig units remained unchanged but there was a reduction by 54 per cent in specialist poultry.
- During the period 2000–2009, there was a slight increase from 70 per cent to 72 per cent of the farmed area in private ownership. Overall, this is relatively high within the region.
- Large farms (over 100 ha) were the most common size, although between 2000 and 2009, they have decreased in number by 5 per cent. Only 0.3 per cent of the farmed area was covered by small holdings under 5 ha, and these have decreased by 20 per cent.
- During the period 2000–2009, the largest number of holdings was managed by principal farmers covering 49 per cent of the farmed area, but these have fallen in number by 16 per cent since 2000. The number of full time workers has fallen by 46 per cent.

Settlement and development

- There is evidence of road, retail and housing development in urban and fringe areas along route corridors, mainly the A614 in the north, the A1079 north of Hull and around Beverley (including a new by-pass).
- There is an increasing number of proposals for both on and offshore wind farms.

Semi-natural habitat

- The main habitats are wetlands, unimproved grasslands, woodlands and scrub. Semi-natural vegetation is fragmented due to land drainage, canalised waterways and the predominance of arable farming. However, there is scope to maintain, create and restore a range of wetland, semi-natural habitats by working with land owners and farmers on management interventions and exploring Countryside Stewardship options.

- Semi-natural habitats designated for nature conservation cover only 1 per cent of the NCA. Overall, only 38 per cent of SSSI are in favourable condition, 25 per cent in unfavourable recovering condition and 36 per cent in unfavourable, no change. However, by creating, restoring and maintaining waterways and their associated riparian habitats such as species-rich, wet grasslands for wildlife, an important network of habitats will have been created as part of the landscape-scale approach to biodiversity, thereby addressing habitat fragmentation and ultimately helping SSSI reach favourable condition.

- The River Hull Headwaters SSSI, the most northerly chalk stream in Britain supports a diverse range of plants and animals as does Hornsea Mere SSSI, the latter also being an important glacial feature. However, these habitats are currently unable to reach favourable condition due to physical modifications of land drainage and eutrophication from diffuse pollution.

- The most common Countryside Stewardship agreements in 2003 were for lowland pastures on neutral/acid soils (254 ha), regeneration of grassland/ semi-natural vegetation (212 ha), and stubble.

- More recently, through the Higher Level Stewardship Scheme, 932 km of boundary features are covered by agreements, with the highest proportion being hedgerow options. Other options include non-payment option for permanent grassland (1,131 ha), organic management (686 ha), permanent grassland with low inputs (350 ha), maintenance of grassland for target features (260 ha), management of archaeological features on grassland (183 ha) and buffer strips (138 ha).

Historic features

- In 1918 approximately 2 per cent of the NCA was historic parkland, but by 1995 it is estimated that 51 per cent had been lost, with 31 per cent of the remaining parkland supported by historic parkland grants and 39 per cent in agri-environment schemes.

- It is estimated that 82 per cent of historic farm buildings remain unconverted and 89 per cent are structurally intact.

Coast and rivers

- The Holderness coastline is fast-eroding but forms an essential part of the coastal system between Flamborough Head and Gibraltar Point, allowing sediment to be transported from the Holderness shoreline to be deposited southwards, in the Humber Estuary and the Lincolnshire Coast.

- The bathing waters along the Holderness coastline are of high standard with the main resorts of Hornsea, Withernsea, and Bridlington North Bay, holding 'Keep Britain Tidy' Blue Flag awards (2012). This is likely to be maintained through partnership work involving the Environment Agency, Yorkshire Water, and local authorities.

- A network of artificial drains (Beverley, Barmston and Holderness) are regulated by pumping stations helping to alleviate flood risk while optimising drainage and enabling a large area of the East Riding of Yorkshire to be effectively farmed. The Hull Valley and Holderness drains lie within the Catchment Sensitive Farming priority area for the county. Much of the drainage system in individual fields and those managed by internal drainage boards has been improved to take advantage of the infrastructure.

- In 1995, the biological river water quality was predominantly excellent and the chemical water quality predominantly very good. However, the Water Framework Directive (WFD) classifications (2009) show that of the 68 water bodies designated in the Hull and East Riding catchment, 20 are classed as natural and 48 are artificial. Biological and chemical data shows that 50 water bodies (73 per cent) in the Hull and East Riding catchment are moderate, 4 (6 per cent) are poor and 2 (3 per cent) are bad.

Minerals

- The Yorkshire and Humber aggregate mineral resources map shows a small number of active sand, gravel and chalk quarries south of Brandesburton, near Keyingham and south-west of Beverley.

- Aggregate dredging takes place offshore in licensed zones and there are a number of sites located adjacent to the southern part of the coast and in the Humber Estuary NCA.

Drivers of change

Climate change

- Climate change trends suggest sea level rise and more frequent storm events. If realised, these climatic conditions would exacerbate coastal erosion and increase flooding. Planning policies should advocate coastal adaptation measures and avoid inappropriate developments in flood-prone, vulnerable areas.

- Increased summer droughts could result in greater demands from groundwater resources associated with the underlying chalk aquifer. Low groundwater levels will reduce river flows to the headwaters of the River Hull and its ecology.

- Increased rainfall may cause ground water flooding and a number of semi-natural habitats to change. For example, increased water in flood plain meadows could change the habitat to species-poor swamp, attracting different birds and invertebrates.

- Small or isolated habitats may be lost, changes to species range migration may occur, changes in tide levels would affect coastal and flood plain grazing marsh and should increased coastal erosion occur, it may reduce (or possibly increase), the extent of maritime cliffs and slopes.

- Longer growing seasons could potentially lead to double cropping or the introduction of new crops, more resilient to climatic/meteorological extremes changing the agricultural landscape. The possibility of more severe winter cold, (a suggested consequence of the loss of the north polar ice cap), could limit extension of the growing season and reduce attractiveness of the area to overwintering wildlife.

- There is increasing demand for renewable energy. A number of on- and off-shore wind farm proposals are in development as well as a proposed expansion of natural gas storage at Aldborough including installation of a monopile offshore structure. These should be carefully managed for minimum disturbance to marine life and impact on seascape views, and on land, viewpoints should be maintained where there are strong visual links between the chalk ridge of the Wolds and the Holderness plateau.

- Expansion of gas pipelines or development of renewable energy schemes may need to be carefully managed to avoid reducing rates of erosion, for minimum disturbance to marine life and impact on seascape views.

- Crops that can be used for biofuels, such as oilseed rape, are common across the NCA and may increase if there is further demand, along with crops such as miscanthus. Planting of miscanthus should be sensitive taking into account areas where there may be an impact on long, open views.

Other key drivers

- The chalk aquifer underlying Holderness is used extensively for public water supply, industry and agriculture and provides the base flow of the River Hull and its headwaters. Protection of water resources may be required as the aquifer is over-abstracted, with 'no water available' in some areas. In the south and east, restrictions are in place to prevent saline intrusion.

- 93 per cent of Holderness is designated a nitrate vulnerable zone (NVZ) and the chalk aquifer beneath the Yorkshire Wolds and Holderness is affected by nitrates and sewage which may continue to affect water quality. Opportunities to address water quality issues include; delivering catchment sensitive farming initiatives/encouraging good practice and ensuring adequate maintenance of private sewage treatments.

- A number of settlements within the Hull and coastal streams catchment may be vulnerable to frequent flooding from rivers and the sea, particularly when water is unable to drain into the Humber Estuary during high tides, and inland from surface water due to the low-lying topography.

- Flood risk management assets in the Hull and Holderness valleys are constantly assessed by the Environment Agency for value for money and adaptation to climate change, which may lead to some pumping stations being categorised as uneconomic. Partnership working with a range of organisations and land managers to manage flood risk effectively including accessing appropriate funding mechanisms, should be sought.

- Long term trends identified in the shoreline management plan predict a slow cliff recession in some areas of Holderness on unprotected cliffs, which may bring conservation opportunities regarding re-naturalisation of the coastal strip.

- Post-glacial meres on the Holderness coast form low points with peat deposits which are prone to coastal erosion. Where they are associated with watercourses flowing inland, coastal flood defences may be required such as those at Tunstall.

- Flow patterns of the River Hull, are affected by river profile, dredging, habitat make-up, sedimentation and installation of structures such as weirs and locks. Accumulatively these could discourage fish populations to thrive by reducing good fishery habitats or by directly impeding fish passage further upstream.

- Biological and chemical data from the WFD classifications show that Hornsea Mere is poor. A sluice regulating the outfall from Hornsea Mere regulates overflows to the receiving watercourse (Stream Dyke) and drains an outlying area of Hornsea. Lacking mains drainage, there is potential for private sewage disposal treatments to enter watercourses. This will affect bathing water quality.

- Farmland features have declined including; winter stubble, uncropped field margins, ditches and hedgerows. Encouraging land managers to take up Countryside Stewardship should incorporate farmland habitats and develop networks of linked habitats to help retain farmland features and enhance habitats for wildlife, particularly farmland birds.

- Ancient woodland is scarce in Holderness and should be preserved.

- The Marine and Coastal Access Act 2009 should provide opportunities to protect the marine environment whilst ensuring access to all parts of the coast by working in partnership with landowners.

- The towns of Beverley and coastal resorts of Bridlington, Hornsea and Withernsea are important settlements for recreation and tourism and further opportunities should be explored.

- Along the Holderness coast, those First and Second World War coastal defences (pillboxes and beach defence emplacements) that are at risk from coastal erosion and should be recorded.

- Continued expansion of industry and housing in urban areas and along route corridors will increase pressure on land and increase light saturation of dark skies. Opportunities for incorporating accessible green infrastructure and use of local vernacular for construction of buildings should be sought.

- Further development of mineral/aggregates extraction should include conserving interesting geological features exposed by mineral workings and the creation of opportunities for biodiversity enhancement through restoration schemes from minerals planning.

- Nationally important gas supplies from as far away as Norway are transported to the Holderness coast through a network of pipelines which come ashore at Dimlington. These are then linked to the Easington Gas terminal in the Humber Estuary NCA. If gas extraction pipelines are expanded to meet increasing energy demands, careful management should be employed to minimise disturbance to sea life, coastal processes and views over seascapes.

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.

Mappleton coastline.

Statement of Environmental Opportunity	Ecosystem service																		
	Food provision	Timber provision	Water availability	Genetic diversity	Biomass energy	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place/inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
SEO 1: Conserve, manage and enhance the River Hull and associated river system with its many associated drains, dykes and streams to improve water quality and supply, sustainably address flood risk management, and enhance biodiversity and the historic environment through a strategic, landscape-scale approach.	↔ **	↔ **	↑ ***	n/a	↔ **	↗ *	↑ ***	↗ **	↗ **	↗ **	↗ *	↗ *	↔ ***	↗ **	↔ ***	↗ **	↗ **	↑ **	↔ **
SEO 2: Work with landowners and land managers to support sustainable food production while enhancing and strengthening the network of farmland features; create and expand habitats in the farmed environment to enhance biodiversity and improve soil and water quality; strengthen resilience of habitats to climate change; and enhance landscape character.	↔ **	↗ ***	↗ **	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

Statement of Environmental Opportunity	Ecosystem Service																		
	Food provision	Timber provision	Water availability	Genetic diversity	Biomass energy	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place/inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
SEO 3: Allow essential coastal processes to occur, including erosion of the soft clay cliffs, while respecting policies that reduce erosion and flood risk in relation to key coastal settlements.	↔ ***	↔ ***	↔ ***	n/a	↔ ***	↗ *	↔ **	↗ *	↔ ***	↔ ***	↔ ***	↔ ***	↔ **	↗ *	↘ **	↔ ***	↘ *	↗ ***	↔ ***
SEO 4: Enhance people's understanding and enjoyment of the geodiversity, historic sites, seaside character and remoteness that contribute to the varied sense of place and valuable recreational assets that the area provides.	↔ **	↔ ***	↗ *	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
Broad, shallow River Hull valley with large field patterns bounded by drainage ditches and an extensive network of canals and canalised tributaries.	■ The River Hull, the most northerly chalk stream in Britain, drains into the Humber Estuary to the south and is designated as an SSSI for habitats of reed swamp, fen, carr, and flood plain grassland. ■ The Hull Valley supports important bird species including; lapwing, snipe and redshank. ■ Otteris re-colonising in the upper reaches of the River Hull. ■ The valley is dominated by arable farming mainly vegetables and root crops grown on the drained flood plain. ■ Low-lying flood plain meadows such as at Lambwath are scarce habitats that are seasonally flooded and involve traditional practices of aftermath grazing. ■ Riparian habitats along the watercourses; species-rich wet grassland, species-rich fen, carr woodland and reed swamp. ■ Tophill Low Reservoir attracts large populations of gadwall, shoveler and tufted duck. ■ The watercourses including the Level Canal play a key role in draining the low-lying, surrounding farmland managed by a pumped system, although the area can suffer from groundwater flooding. ■ Sand and gravel pits in the vicinity of Brandesburton, High Eske and Watton Carrs form a series of manmade open water with marginal habitats valuable for wildlife as well as recreation opportunities.
A landscape of glacial features of meres, hummocky terrain inland and sweeping, coastline of soft, boulder clay cliffs with some designated sites of geological interest.	■ Post-glacial meres forming peat deposits on the coast are historic remnants of once common landscape features including geological SSSI around Skipsea (relict mere with peat deposits). ■ Hornsea Mere is the only significant water-retaining mere in Holderness and largest natural lake in Yorkshire. Designated as an SSSI surrounded by reedbeds, fen and carr woodland and an SPA for overwintering wildfowl. ■ A coastline of narrow beaches and constantly changing, rapidly-eroding cliffs essential for transporting sediment to form beaches and areas of intertidal habitat along the coast to key sites further south (Humber Estuary and on the Lincolnshire coast). ■ Seabirds from adjoining NCAs with SPA designations forage frequently along the Holderness coast. ■ Many small field ponds originate from glacial kettle-holes and depressions in the generally flat landscape separating the moraine ridges running north–south on Holderness. ■ Dimlington Cliffs SSSI and Withow Gap SSSI are designated for the glacial and late glacial sediments respectively, providing insights into environmental conditions during the last glaciation. Both sites are features of geomorphological and geological interest to science and provide opportunities for education as well as further research.

Landscape attribute	Justification for selection
Large-scale arable farming and some livestock production with fields bounded by drainage ditches and some hedgerows on higher ground and pasture land.	■ Large, rectangular arable fields bounded by ditches, marked by lines of reeds and occasional willows on lower land and clipped hedgerows on higher ground to the east and west providing important wildlife corridors. ■ Arable farmland supports a number of declining farmland birds - mainly grey partridge, skylark, barn owl, corn bunting, yellow hammer, linnet and tree sparrow. ■ Arable cultivation accounts for 83 per cent of land cover as the deposits of glacial till and alluvium, which cloak the underlying Chalk strata have created rich soils. Holderness is a producer of cereals and root crops, with pigs, notably within the lower reaches of the Hull Valley. Forty two per cent of the land is Grade 2 and 50 per cent is Grade 3.
An open landscape of low-lying, predominantly flat or gently undulating rural land, sloping gently eastwards towards the North Sea. Sea views along the eastern fringes and long, open rural views over the area from the Wolds to the north and west.	■ Strong visual links between the chalk ridge of the Wolds and the Holderness plateau. ■ Sparse tree and woodland cover create a generally open landscape with long views. ■ The inland, agricultural landscape is separated from the coast. ■ Coastal views include a long stretch of rapidly-eroding, soft clay cliffs with views of Flamborough, chalk headland in the north. ■ Along some parts of the coast, views of the gently undulating land towards the coastal strip is also characterised by arable farmland, wind-pruned trees, holiday homes and caravan parks.
Strong sense of rural character in remote areas of arable farmland, dispersed villages and hamlets linked by minor roads and lanes. Towns and villages located along the coastline and the larger settlements of Bridlington, Driffield and Beverley provide more urban character, as do the outskirts of Hull.	■ Local vernacular characterised by red brick and pantiles, and buildings towards the coastline constructed from Holderness 'cobbles'. ■ Church spires from towns and villages are prominent in the flat landscape including views of Beverley Minster. ■ Some villages and hamlets are designated as Conservation Areas. ■ The distinctive market town of Beverley has historic character and a medieval minster. ■ Coastal character in resorts such as Bridlington, Hornsea and Withernsea. ■ Expansion of road, retail and housing development outside the larger settlements of Bridlington, Driffield and Beverley.

Limited network of public rights of way and very little open access land so that access for recreation from urban areas to the countryside and coast is poor.	■ Green infrastructure strategies, development of coastal access and new links to existing rights of way. ■ Hull to Hornsea disused railway line is a strategic route (part of the Trans Pennine Trail) and potentially provides wildlife corridors linking to semi-natural habitats. ■ The coastal town of Bridlington ranks as one of the worst areas experiencing multiple deprivation. ■ Short stretch of the national cycle route, the 'Way of the Roses', runs through the adjoining Yorkshire Wolds into Beverley and a 80 km long distance walking route, 'The Minster Way', runs between York and Beverley minsters. ■ Coastal access is fragmented in some areas due to coastal erosion and extensive caravan parks. ■ Rural lanes linking villages provide quiet rural routes which are popular for cycling, horse riding and walking.
Land gently undulating eastwards towards the sea where the coastal strip from Withernsea in the south, past Hornsea to Bridlington in the north, is characterised by arable farmland, sparse tree cover, holiday homes and caravan parks, and some historical sites.	■ Prominent seaside resorts of Bridlington, Hornsea and Withernsea with static caravan parks. ■ Historic coastline with visible evidence of military sea defences dating from the First and Second World Wars. ■ Dimlington gas pipelines are large structures extending offshore and may impede coastal processes (erosion) and impact on sea views. ■ Several sites of medieval interest including Meux Abbey, a Cistercian monastery east of Beverley. Along the coast are several deserted medieval villages and a moated motte-and-bailey castle at Skipsea.
Sparse woodland cover restricted to a few remaining woodlands linked to ancient forests and small pockets of deciduous woodland and shelter belts.	■ Alder and willow carr woodland is the native woodland characteristic of the wetland corridor. ■ Low Wood with its extensive alder and willow carr, characteristic of 'wet' areas at Hornsea Mere, Bail Wood near Aldbrough and Burton Bushes on Beverley Westwood historic grazing land. ■ Copses and woodlands spread through the farmland outside the River Hull valley.
Tourism and recreation opportunities related to historic buildings, seaside and art.	■ The grand, medieval minster located in the historic town of Beverley was constructed between 1220 and 1425. It inspired the design of Westminster Abbey. ■ Burton Constable Elizabethan country house with landscaped gardens designed by Lancelot 'Capability' Brown. ■ Popular seaside resorts include Hornsea and Bridlington. The latter is home to renowned artist, David Hockney.

Landscape opportunities

- Manage, enhance and restore the network of riparian and other wetland habitats in the Hull Valley by encouraging land managers to adopt sustainable management interventions and produce good quality habitats that form links between wetlands and other semi-natural habitats such as wet grassland, reedbeds and small-scale woodland or scrub.
- Manage, enhance and restore the network of watercourses in the Hull Valley by working with land managers to improve biodiversity, water quality and reduce flood risk while enhancing these landscape features by creating or maintaining marginal habitats around watercourses and creating buffer strips of wet grassland.
- Conserve and protect the post-glacial remnants of features that would have once been commonplace in a wetter landscape including Hornsea Mere SSSI, by creating and restoring marginal habitats associated the mere and through interpretation and education of geological SSSI for local communities and visitors.
- Plan to allow natural coastal processes to continue in appropriate areas along the Holderness coastline to allow essential sediment transportation to create other intertidal habitats and natural sea defences further south.
- Plan to extend coastal access where feasible by working in partnership including caravan park owners and ensuring provision for roll back so that rights of way are adaptable to the effects of coastal erosion.
- Plan for sea level rise and increased storm events by seeking opportunities to support soft defences such as meres so that they will allow natural coastal processes and enhance the landscape character of the coast.
- Manage, enhance and restore declining farmland features such as grasslands, networks of ditches, small copses and hedgerows, providing roosting and feeding areas for barn owl, corn bunting and tree sparrow, by encouraging the take-up of Countryside Stewardship options.
- Protect the open, exposed and low-lying landscape in rural areas and on the coast with its long views.
- Manage the historic environment for its contribution to local character and sense of identity and as a framework for habitat restoration and sustainable development.
- Plan opportunities to provide links between the urban settlements in Holderness (including Hull) to the surrounding countryside so that people in urban areas can enjoy the tranquillity of the rural areas, its history and the coast and including development of more green spaces within the towns and cities.
- Protect quiet rural areas by encouraging sensitive development, respecting long and open views, strong rural character of the area and local vernacular.
- Use understanding of the area's traditional and historic architecture and its distinct patterns of settlement, to plan for and inspire any environmentally beneficial new development, which makes a positive contribution to local character and retains key views.

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	Root crops Oil seeds Vegetables Livestock (mainly pigs and poultry) Soils Water	Rich, loamy, clayey soils support intensive arable cultivation. 42 per cent of the NCA is Grade 2 agricultural land, mainly on the lower slopes near the adjoining Yorkshire Wolds along the western edge of the NCA and on the slightly raised land especially in the south-east of the NCA extending towards the North Sea coast. **Continued on next page...**	Regional	Food provision is an important service but commercial scale arable cultivation, pig production and free-range poultry may be making a significant contribution to a loss of water quality due to diffuse pollution. Although there may be scope for increasing food provision, issues around water quality, soil erosion and flooding provide limitations. Extensive arable land and lack of/ fragmented semi-natural habitats reduce the range of nectar sources for pollinating insects.	Encourage sustainable farming practices to reduce the impact on water and soil quality while providing opportunities for biodiversity and pollination by promoting compliance with nitrate vulnerable zones (NVZ) to reduce the impact on soil and water quality. Ensure the waste of pig and poultry units is managed to avoid impacting on water quality.	**Food provision** **Regulating water quality** **Water availability** **Biodiversity** **Climate regulation** **Regulating soil erosion** **Regulating soil quality** **Sense of place / inspiration**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Food provision cont.		**... continued from previous page** Over 81 per cent of the NCA is farmed. Over 55 per cent of the farmed area is arable but along the lower reaches of the valley north of Hull, drainage enables cultivation of vegetables and root crops comprising 5 per cent. The largest numbers of livestock are pigs and recently, there is growing demand for poultry holdings.			Support the creation and restoration of habitats that provide a network of nectar sources such as hedgerows, species-rich grassland, carr and wet woodland.	
Timber provision		There is very limited scope for commercial timber production. Woodland only covers 1 per cent of the NCA. Sparse woodland cover is due to woodland clearance and drainage for crop cultivation. Some scattered woodland blocks occur as do shelterbelts around farmsteads. There are few areas of ancient woodland linked to ancient forests mainly Hornsea Mere, Bail Wood near Aldbrough and Burton Bushes on Beverley Westwood.	Local	New woodland planting should occur where this does not restrict long and open views. There may be potential for woodland planting to reduce flood flows downstream.	Seek opportunities to bring appropriate woodlands into management to produce timber. Explore opportunities to maintain ancient woodlands such as Low Wood near Hornsea Mere, Bail Wood near Aldbrough and Burton Bushes near Beverley. Explore opportunities to plant woodlands alongside watercourses and in flood plains, to increase surface roughness and slow flood flows where this does not affect areas where there are long and open views.	**Timber provision** **Climate regulation** **Regulating soil erosion** **Regulating water flow** **Regulating water quality** **Regulating water flow** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability	Chalk aquifer Network of watercourses including River Hull, Kelk Beck, Holderness Drain and Leven Canal Semi-natural habitats	A major chalk aquifer underlies Holderness and Yorkshire Wolds NCAs, supplying water to the region for industry, agriculture and drinking. It also helps to form the base flow of the River Hull and its headwaters. Two water storage reservoirs are located at Tophill Low pumping station.	Regional	The majority of the chalk aquifer (which also underlies the adjoining Yorkshire Wolds NCA), is classified as no water available, with part of the north-eastern area of the Chalk being over-licensed. In the Hull area in the Humber Estuary NCA, but also straddling Holderness, no consumptive abstractions[4] are granted in order to prevent saline intrusion. The upper reaches of the River Hull, from its headwaters at Driffield to Hempholme Weir, is 'over licensed'. Kelk Beck, one of the headwater tributaries to the River Hull running east of Driffield, has 'no water available' for additional abstraction. The River Hull headwaters are spring-fed from the chalk aquifer and the Tophill Low reservoirs are filled directly from the river for public water supply.	Work with farmers, landowners and businesses to use and manage water sustainably and encourage adoption of land management practices including creating water storage areas, increase semi-natural habitats for infiltration such as grassland strips along water courses and recreation of flood plain grazing marsh.	**Water availability** **Food provision** **Regulating water flow** **Regulating water quality** **Regulating soil quality** **Biodiversity**
Genetic diversity	N/A	N/A	N/A	N/A	N/A	N/A

[4] Whereby a significant proportion of the water is not returned to the source of supply after use.

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biomass energy	Existing woodland Miscanthus	There is limited scope for biomass production from existing woodlands as coverage is sparce (only 1 per cent of the NCA).	Local	There are limited opportunities for biomass provision by managing existing woodland to provide wood fuel for local boilers. There is future potential for increasing biomass crops as the area offers high potential yields[5] for miscanthus and medium potential for short rotation coppice throughout the NCA.	Ensure appropriate, existing woodlands are managed to produce surplus timber as wood fuel for local use. Explore opportunities to increase the growing of miscanthus and short rotation coppice in appropriate areas respecting areas with long and open views.	**Biomass energy**

[5] For information on the potential landscape impacts of biomass plantings within the NCA, refer to http://archive.defra.gov.uk/foodfarm/growing/crops/industrial/energy/opportunities/index.htm

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation	Flood plain grazing Marsh and woodland Peaty topsoils and loamy, clay soils Marine environment	There is low soil carbon content at (0-5 per cent) throughout most of the NCA, especially where there is extensive, arable cultivation. West of the centre of the NCA, there is a higher carbon content of 10-20 per cent associated with the peaty topsoils, and the loamy and clayey flood plain soils with naturally high groundwater. Semi-natural habitats help to mitigate against climate change, the most extensive in the NCA being flood plain grazing marsh (3,106 ha). Woodland cover is low at 1 per cent of the NCA. A number of off and on-shore wind farm proposals are in development as well as a proposed expansion of natural gas storage at Aldborough (including installation of a monopile offshore structure).	Regional	Carbon content/storage may be improved by increasing organic matter content and by reducing the frequency/area of cultivation. It will be important to conserve the more organic-rich, peaty topsoils and loamy, clayey flood plain soils. Carbon storage will be provided by the 3,106 ha of flood plain grazing marsh which store high levels of organic matter, although some of these may be lost through predicted sea level rise. Climate change trends suggest sea level rise and more frequent storm events so that species will need networks of semi-natural habitats and corridors to be able to move in response to those changes. Increased rainfall and water in flood plain meadows could create more wetland habitats thus providing increased opportunities for carbon storage. **Continued on next page...**	Increase opportunities to manage and protect the soil resource by building up organic matter by establishing areas of permanent grassland and other uncultivated land such as semi-natural habitats. Through appropriate Countryside Stewardship options, maintain, restore and create flood plain grazing marsh, increase areas of permanent grassland and allow inundation of grassland in flood plains where this is feasible. Introduce fallow in rotation and plant green cover crops to reduce nitrate leaching. Adopt cultivation practices that reduce reliance on high levels of fertiliser application and where used, encourage adherence to government guidelines (NVZ regulations). Encourage woodland creation but ensure woodland planting is sensitive to the potential impacts on areas where there are long, open views.	**Climate regulation** **Regulating soil quality** **Regulating soil erosion** **Regulating water quality** **Water availability** **Biodiversity** **Timber provision**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation cont.				**... continued from previous page** The very low woodland cover (1 per cent) makes a limited contribution. The installation of off-shore wind turbines and gas pipelines in the marine environment should be carefully managed to avoid disturbance to marine life and coastal processes.		

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality	Chalk aquifer Network of watercourses including River Hull, Kelk Beck, Holderness Drain and Leven Canal Semi natural habitats	High nitrate levels are found in the chalk aquifer which also includes the adjoining Yorkshire Wolds NCA from which the springs emerge that feed into the River Hull headwaters in Holderness. Since the Water Framework Directive was established in 2003, biological and chemical data shows that 50 water bodies (73 per cent) in the Hull and East Riding catchment are moderate, 4 (6 per cent) are poor and 2 (3 per cent) are bad. Hornsea Mere SSSI suffers from eutrophication. A sluice regulating the outfall from Hornsea Mere regulates overflows to the receiving watercourse (Stream Dyke) and also drains an outlying area of Hornsea. Bathing waters along the Holderness coastline are of a high standard with the main resorts Hornsea, Withernsea, and Bridlington North Bay, holding 'Keep Britain Tidy' Blue Flag awards (2012).	Regional	Diffuse nitrate pollution occurs in the adjoining Yorkshire Wolds NCA and affects watercourses in Holderness, the latter of which falls within the 'East Riding of Yorkshire Priority Catchment' and are noted to be failing river quality due to eutrophication. All surface waters contain high levels of phosphate and most major reaches suffer from high nitrates and pesticides. This is also exacerbated by physical modifications for land drainage. In addition to diffuse pollution from excessive sediments from agriculture, other sources include sewage. Without mains drainage, there is potential for private sewage disposal systems to enter watercourses. Within agricultural areas, measures can be taken to reduce nutrient and sediment run-off by establishing permanent grassland as a buffer along watercourses. Hornsea Mere lies within the priority catchment and eutrophication is thought to be as a result of high phosphate levels in its three feeder streams, caused by diffuse pollution.	Encourage land managers to develop good agricultural practices by working with them on nutrient management planning, precision farming, NVZ updates and providing one-to-one training. Plant winter cover crops, in-field grass areas to reduce soil run-off, permanent grassland with low inputs and grass buffer strips on land adjacent to watercourses to reduce nutrient run-off and aid water infiltration. Bathing water quality should be maintained through partnership work involving the Environment Agency, Yorkshire Water, and local authorities aiming to maintain excellent water quality and investigating sources of pollution to afford effective solutions Explore ways of reducing nutrient inputs into Hornsea Mere such as creating/managing reedbeds and supporting measures to improve small private discharges where private sewage disposal contributes to poor water quality. Through landscape-scale partnerships, undertaking joint initiatives in the adjoining Yorkshire Wolds and River Hull Valley by working with landowners, farmers and other businesses to protect the water quality and supply of groundwater.	**Food provision** **Climate regulation** **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
Regulating water flow	Chalk aquifer Network of watercourses including River Hull, Kelk Beck, Holderness Drain and Leven Canal Semi-natural habitats Coastal processes Flood defence structures	Groundwater flooding can last for several months once levels have risen. Flow patterns of the River Hull, which is tidal in its lower reaches, are affected by river profile, dredging, habitat make-up, sedimentation from agriculture and installation of structures such as weirs and locks. In some low-lying areas in the Hull valley, agricultural productivity is dependent on a system of pumped drainage in an otherwise naturally waterlogged area. Drainage of the low-lying farmland has enabled the fertile alluvial soil to be cultivated and arable crops became the predominant land use. Flooding is primarily a threat through tidal locking of the River Hull and of the numerous drains which cross the area. This is particularly relevant when water is unable to drain into the Humber Estuary during high tides and inland from surface water due to the low-lying topography. **Continued on next page...**	Regional	Flooding from the River Hull and tidal influences on the water courses puts properties, businesses and infrastructure at risk, particularly around Beverley, and further south in Hull and the Humber Estuary. Accumulatively, issues affecting flow patterns could discourage fish populations to thrive by affecting fish habitats or by directly impeding fish passage further upstream. Regular flooding is likely to affect agriculture and may result in the introduction of new crops or livestock that are more adaptable to flood prone areas. Management of flood risk in the NCA is constantly assessed which may lead to some pumping stations being categorised as uneconomic and this may also impact on agriculture. Funding mechanisms for capital schemes are available but will require partnership working with a range of organisations and land managers to manage flood risk effectively.	Identify areas where there is an opportunity for attenuation to reduce water levels during flood events. Protect undeveloped flood plains from inappropriate development to manage future flood risk adequately. Adopt farming practices that are adaptable to conditions where flooding is unavoidable and/or managed as part of an agreed flood management strategy, for example grazing with suitable livestock and the creation of more permanent grassland. Manage the network of ditches and drains to ensure that whilstoperating effectively to drain the land, they also make a positive contribution to biodiversity and landscape characterand act as links between other semi-natural habitats.	**Regulating water flow** **Regulating coastal erosion and flooding** **Biodiversity** **Regulating water quality** **Food production**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow cont.		**... continued from previous page** Mappleton and the gas terminal at Easington (in adjoining Humber Estuary NCA) are defended from coastal erosion and flooding.		In the Eastern Drains, the height of the tide is important in understanding the level and duration of flooding in the area, as this determines the impact of tidal locking on surrounding land and properties. In the future, rising sea levels will result in rivers and drains being tide locked for a longer duration and therefore needs to be considered within the flood risk management strategy. Woodland planting alongside watercourses in flood plains may help to reduce flood flows.	Support the alignment of the flood risk management strategy and shoreline management plan taking a long-term approach to flood risk management. Explore opportunities to plant woodlands alongside watercourses and in flood plains, to reduce flood flows downstream, where this does not affect areas where there are long and open views. Explore opportunities to expand or create flood storage areas where appropriate.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil quality	Soils Sustainable farming practices	The slowly permeable, seasonally wet, slightly acid but base-rich loamy and clayey soils (48 per cent of the NCA) may suffer compaction and/ or capping as they are easily damaged when wet. In turn this may lead to increasingly poor water infiltration affecting water quality and leading to diffuse pollution as a result of surface water run-off. The slightly acid, loamy and clayey soils with impeded drainage (24 per cent of the NCA) are easily poached by livestock and compacted by machinery when the soil is wet.	National	Management measures on cultivated land that increase organic matter content can help reduce compaction and capping by improving soil structure and water infiltration. To avoid damage of weak topsoil structures from machinery and poaching by livestock, use of machinery for land management activities should be carefully timed and extensive grazing regimes considered.	Increase organic content of soils by introducing fallow into rotations, conversion to grassland and avoiding overstocking or using machinery when it would lead to the compaction of vulnerable soils. Encourage carefully timed activities such as avoiding use of farm machinery, during very wet periods. Take up of extensive grazing regimes will reduce soil compaction.	**Regulating soil quality** **Food provision** **Regulating soil erosion** **Climate regulation** **Regulating water flow** **Regulating water quality** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion	Loamy and clayey soils Loamy and sandy soils with peaty surface Semi-natural habitats	The soils across 60 per cent of this NCA are not subject to soil erosion including the slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils and other clayey soils of flood plains and coastal grazing marsh. In addition, the loamy and sandy soils with naturally high groundwater and a peaty surface have a low risk of water erosion but a high risk of wind erosion (blowing) and peat erosion and carbon loss through peat wastage.	Regional	Many of the slightly acid loamy and clayey soils with impeded drainage and the freely draining, slightly acid but base-rich soils are prone to capping/ slaking and are easily compacted by machinery or livestock if accessed when wet, it increases the risk of soil erosion by surface water run-off. The entire NCA lies within Defra's 'East Riding of Yorkshire and North Lincolnshire' priority catchment but soil erosion is not generally identified as a problem. However, a priority is to reduce sedimentation of watercourses as a result of soil erosion caused by grazing animals having access to stream banks, in the headwaters of the River Hull.	Increase organic matter content to improve soil structure by growing green cover crops or converting to grassland. Create buffer strips of permanent grassland alongside watercourses to reduce sediment run-off. Ensure well- timed cultivations (early autumn) and access onto land by machinery and stock to prevent compaction and poaching. Employ minimum tillage methods such as direct drilling to avoid damage to soil structure. Through the Catchment Sensitive Farming Scheme, work with farmers on nutrient management planning, precision farming, NVZ updates and one-to-one training. Encourage extensive grazing regimes to reduce poaching, ensure animal feeding areas are carefully placed to avoid pollution of watercourses.	**Food provision** **Regulating soil erosion** **Regulating soil quality** **Climate regulation** **Regulating water flow** **Regulating water quality** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pollination	Flood plain grazing marsh Hedgerows Riparian grassland Ancient woodland Roadside verges Pollinating insects	Semi-natural vegetation is fragmented due to land drainage and the predominance of arable farming with its large field patterns bounded largely by drainage ditches, (particularly on the River Hull flood plain). Hedgerows are generally found on higher ground but the most extensive semi-natural habitat and nectar source is flood plain grazing marsh which covers 3,106 ha.	Local	Pollinating insects are supported by a range of semi-natural habitats, in particular species-rich grassland which are few in the NCA, however, flood plain grazing marsh is the most extensive semi-natural habitat and should be restored and maintained. Sensitive management of hedges and verges to allow plants to flower and improve availability to pollinators. There are potential nectar sources from the marginal riparian habitats along the canals, rivers and other waterways and in the small areas of ancient woodland near Hornsea Mere, Aldbrough and Burton Bushes (Beverley).	Create, restore and maintain semi-natural habitats such as flood plain grazing marsh, coastal grassland and hedgerows. Encourage sustainable farming practices such as uncropped field margins and planting of pollen and nectar mixes that will also enhance landscape character and increase landscape connectivity. Carefully time the management of boundary features and roadside verges to extend flowering time. Encourage partnership working with a range of organisations to manage road side verges so that they produce a range of flowering species and form a network of nectar sources.	**Pollination** **Food production** **Pest regulation** **Biodiversity** **Sense of place / inspiration**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pest regulation	Flood plain grazing marsh Hedgerows Ancient woodland Riparian grassland Roadside verges	A variety of semi-natural habitats support populations of pest-regulating species (invertebrates, birds and mammals). In the NCA these are fragmented due to land drainage and the predominance of arable farming with its large field patterns bounded largely by drainage ditches, (particularly on the River Hull flood plain). The extent of species-rich grassland is low but hedgerows are generally found on higher ground, riparian grassland is found along the canals and other waterways and the most extensive semi-natural habitat is flood plain grazing marsh which covers 3,106 ha.	Local	Semi-natural habitats within the NCA are fragmented. The existing field boundary hedgerows are sparse and increasing diversity in species and structure of field margins will increase the ability for these areas to support populations of pest-regulating species.	Encourage sustainable farming practices to manage existing semi-natural habitats and create new areas of habitat; mainly hedgerows, woodlands, flood plain grazing marsh and riparian grassland along waterways. Opportunities to improve the network of semi-natural habitats across the NCA should be sought.	**Pest regulation** **Food production** **Pollination** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating coastal erosion and flooding	Coastal processes (sediment transfer)	The Holderness soft, clay cliffs are eroding rapidly at an average rate of 1.5-2.5 metres per year with generally lower rates of erosion near Bridlington in the north. Holderness is the single most important source of sediment in the southern North Sea. Climate change trends suggest sea level rise and more frequent storm events that may exacerbate coastal erosion and flooding.	Regional	Essential coastal processes occurring on the Holderness coast carry sediment south to the Humber, the Lincolnshire Coast and the Wash, where it feeds beaches and through accretion helps inter-tidal habitats adjust to rising sea-levels. However, hard defences on the coastline interrupt this natural sediment transfer to downdrift coastlines. Where possible, natural processes should be allowed to continue and any modification to sea defences should seek to recognise the importance of naturally eroding cliffs in the NCA in retaining sediment transfer rates. Post-glacial meres on the Holderness coast form low points with peat deposits which are prone to coastal erosion. Where they are associated with watercourses flowing inland, coastal flood defences may be required such as those at Tunstall. Planning policies should advocate coastal adaptation measures and avoid inappropriate developments in flood-prone, vulnerable areas. **Continued on next page...**	Allow natural processes to continue along the frontage as far as possible, maintaining sediment supplies to the coastline further south. Allow beaches/intertidal habitats to build up in front of coastal defences to provide natural flood defences supporting man-made structures. Support planning policies that include coastal adaptation measures and avoidance of development in flood-prone areas.	**Regulating coastal erosion and flooding** **Sense of place / inspiration** **Biodiversity** **Geodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating coastal erosion cont.				**... continued from previous page** Shoreline management policy along this coastline aims to ensure the continued protection from coastal flooding of the towns of Bridlington, Hornsea and Withernsea, while allowing the continuation of natural processes along the remainder of the coast. Long term trends identified in the Shoreline Management Plan predict a slow cliff recession in some areas of Holderness on unprotected cliffs, which may bring conservation opportunities regarding re-naturalisation of the coastal strip.		

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of place/ inspiration	Flat topography and open views across the sea Low woodland cover Broad, shallow Hull Valley with large field patterns bounded by drainage ditches Expansive and rapidly eroding coastline. Coastal towns Dispersed villages and hamlets, with prominent church spires in a flat landscape	Open, exposed character due to low-lying coastal topography and absence of vegetation. A number of on and off-shore wind farm proposals are in development Predominantly flat, open and gently undulating plain centred on the valley of the River Hull with large-scale arable farming and large field patterns bounded by drainage ditches Eastwards, a long, eroding, clay cliff stretches along the North Sea. Coastal resorts of Bridlington and Hornsea are influenced by holiday homes and caravan parks. A predominantly rural area with dispersed settlements linked by winding roads, and churches often providing important landmarks. Villages are scattered, with buildings grouped around ponds and village greens. **Continued on next page...**	Local	The low-lying, open landscape character means that the sky features strongly in any view accentuated by the windswept nature of the plain and fast-eroding character of the coastline. There are strong visual links between the chalk ridge of the Wolds and the Holderness plateau. Feelings of escapism and tranquillity are associated with quiet, undeveloped areas along some parts of the coast, views across Hornsea Mere and long views over the Hull valley to the sea. The proposed on and off-shore wind farm proposals may impact in areas where there are long and open views or seascapes. Such developments will need to be carefully considered and designed. There is potential to grow more biomass crops such as short rotation coppice and miscanthus but planting should be sensitive to adverse impacts on areas where there are long, open views. The same applies to woodland planting schemes.	Ensure that development respects local settlement patterns, using traditional building materials where possible. Retain long, expansive viewpoints. Maintain and restore village and field ponds as important features in the landscape.	**Sense of place / inspiration** **Tranquillity** **Recreation** **Regulating coastal erosion and flooding** **Biodiversity** **Geodiversity** **Sense of history**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of place/ inspiration cont.		**... continued from previous page** Large, sometimes isolated, farmsteads are commonly located on higher ground. Buildings are largely built of red brick and pantiles except for Holderness beach cobbles along the coast. There are a number of small field ponds around Hornsea and these are a traditional feature in a number of villages.		The tradition of brick making in the area contributes to the built character as do the Holderness cobbles. Villages often traditional contain village greens and ponds and some carry Conservation Designation Area status.		

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history	Glacial features; moraines, meres and kettle holes Historic field patterns Sites of medieval castles and abbeys First and Second World War coastal defences Estate parkland Red brick buildings and Holderness 'Cobbles'	Several meres existed within this landscape, which have now been drained. Large, rectilinear fields typical of 19th century enclosure as well as the drained flood plains. Farmsteads are often large and widely dispersed. Brick and pantiles are the common building material and are of a soft, rich red colour, long and narrow in shape. Medieval settlement sites; Skipsea Castle, Meux Cistercian Abbey and Watton Gilbertine Priory. Along the Holderness coast are many First and Second World War coastal defences. Brick making in England began around Hull and Beverley in the 14th century. Rich, red brick was used for buildings, except in coastal areas where Holderness 'cobbles' were commonly used as well as limestone for building churches.	Regional	The glacial features of the past potentially provide the best palaeoenvironmental material within the area of the Humber Wetlands. Characteristic medieval field patterns around settlements and hedgerows along parish boundaries have survived in some areas showing evidence of medieval enclosure. Evidence of early enclosure with regular rectangular hedged fields imposed on a previously open landscape. Straight roads with verges were laid out, and large new farms protected by shelter belts were located away from villages. A number of medieval sites remain along the coast as well as evidence of late 19th and 20th century military defences (pillboxes and beach defence emplacements) which may be at threat from coastal erosion. The use of traditional building materials are reflected in key historic buildings including Beverley Minster in the historic market town of Beverley and Burton Constable Hall (with parkland designed by Lancelot 'Capability' Brown) located north of Sproatley village.	Develop opportunities for research into and interpretation of palaeoenvironmental remains/glacial features in the NCA. Develop visitor opportunities to historic places and towns in the NCA. Develop good quality interpretation/education about habitats, wildlife, geology and history at key sites including working with schools and other educational institutions. Encourage work by local community groups to record evidence of the historic coastal defences. Seek opportunities through grant schemes to enhance and conserve traditional farm buildings, and the use of traditional building materials where appropriate.	**Sense of history** **Sense of place/ inspiration** **Recreation** **Tranquillity** **Geodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Tranquillity	Flat, low-lying topography providing extensive views Sparse settlement patterns Remote areas along some parts the coast and inland in rural areas Long, distant sea views towards and from the coastline	Although undisturbed areas remain high, they have declined from 82 per cent in the 1960s to 60 per cent in 2007 according to CPRE intrusion mapping.	Local	The main source of disturbance is associated with the larger settlements and route corridors such as Beverley, Driffield and the outskirts of Hull involving the development of housing, industry, road building and pylons which reduced levels of tranquillity. A sense of remoteness characterises stretches of coast inaccessible by car and further inland in the rural areas. This is less evident around Bridlington and Hornsea where there are holiday homes and caravan parks.	Encourage sensitive development respecting long and open viewpoints and strong rural character of the area. Also see opportunities to enhance the sense of place. Minimise light spill, particularly in areas classes as 'undisturbed' on CPRE intrusion maps	**Tranquillity** **Sense of place / inspiration** **Recreation** **Sense of history**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation	Network of footpaths (0.72 km per km²) Transpennine Trail Seaside resorts and coastline Burton Constable Hall Beverley and Beverley Minster Coastal medieval sites and military defences Burton Bushes/ Beverley Westwood	Only 0.55 per cent of the area is open access land. There are 627.03 km of rights of way at a density of 0.72 km per km2 in the NCA. There is poor coastal access around Withernsea and further north. There are few accessible woodlands except for Burton Bushes and around Hornsea Mere and there is common grazing land on Beverley Westwood, Figham and Swinemoor. The outskirts of Hull and Bridlington South have poor access to greenspace and are areas with a high Index of multiple deprivation[6] as well as Withernsea, in the south-east of Holderness. These areas are classified in the 'rural worst' 5-10 per cent and the NCA is generally rural worst at 5 per cent.	Regional	Generally an agricultural area with very limited access to the rural landscape but there may be opportunities to extend access to the coast under the Coastal Access Plan. Where woodland occurs there is often limited public access but west of Beverley, at Beverley Westwood, common grazing land includes mature trees dotted across an open, grazed landscape and Burton Bushes which is a small patch of remnant ancient woodland. The coastline, coastal resorts and historic towns offer recreation opportunities for local communities and visitors. The settlements classified as having a high index of Multiple Deprivation would benefit from improved access to the countryside and urban greenspace.	Identify opportunities to create new permissive routes, especially around larger settlements linking with existing rights of way within settlements and into the surrounding countryside and extending coastal access with roll back provision and by working in partnership with others. Incorporate green spaces in new developments, in particular aroundthe urban fringe of Hull and areas within Bridlington and Withernsea. Connect green spaces with semi-natural habitats where possible, providing communities with recreational green space and wildlife corridors. Seek opportunities to increase public accessibility to existing woodlands and identify new community woodland creation schemes. Seek opportunities to provide surfaced paths for use by all levels of ability.	**Recreation** **Tranquillity** **Sense of place / inspiration** **Sense of history** **Biodiversity** **Geodiversity**

[6] The purpose of the English Indices of Deprivation 2010 is to identify small areas of England which are experiencing multiple aspects of deprivation.

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity	Sites designated for their nature conservation interest, for exampleSAC, SPAs, SSSI Semi natural habitats: Flood plain grazing marsh Broadleaved mixed & yew woodland Maritime cliff and slope Lowland meadows Fen Farmland bird species Overwintering wildfowl Glacial meres and kettle holes River Hull headwaters, canals, ditches and dykes Riparian grassland **Continued on next page...**	Designated nature conservation sites cover less than 1 per cent of the NCA, the largest being Hornsea Mere at 232 ha. Another key SSSI is the headwaters of the River Hull. There are 15 SSSI covering less than 1 per cent of the NCA and only 38 per cent of these are in favourable condition. Many small ponds are found in and around Hornsea, particularly on the Wassand Estate and generally north-south on Holderness. There are declining farmland features that support farmland birds including winter stubble and uncropped field margins.	International	Improving the biological condition of the designated resource is likely to involve working with farmers and landowners to encourage sustainable land management activities, principally through restoration, maintenance and increase of semi-natural habitats. This will also improve resilience of designated sites to climate change, while addressing issues of water quality and provision and soil condition. Key SSSI include the headwaters of the River Hull forming the most northerly chalk stream system in Britain, and of rich, diverse, ecological value, vulnerable to changes in flow levels and higher incidences of low flow periods. Accumulatively, flow pattern issues could discourage fish populations to thrive by reducing good fish habitats or by directly impeding fish passage further upstream. Hornsea Mere SSSI is a surviving example of a glacial lake in what was once a landscape of extensive marshes and lakes found in Holderness. Today, it provides important habitat for huge numbers of wintering wildfowl.	Work with farmers and landowners by encouraging maintenance, restoration and creation of flood plain grazing marsh, broadleaved and yew woodland, lowland grassland meadows and fen around key designated sites. Work with framers and landowners to adopt management interventions that will protect or improve priority habitats as well as water and soil resources by creating buffer strips of meadow grassland to accommodate habitat change, creating more space for species-rich grassland. Also providing habitats for farmland bird species (grey partridge, skylark, barn owl, corn bunting and tree sparrow, yellow hammer, linnet) by creating in-field nesting habitats, planting bird seed mixtures for spring and winter food and creating a network of insect-rich habitats through arable plants and grassland.	**Biodiversity** **Recreation** **Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Water availability** **Sense of place / inspiration** **Tranquillity** **Climate regulation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity cont.	**... continued from previous page** Coastal strip of grassland Remnants of species-rich grassland occurring around Hornsea Mere and Lambwath Mere	Recognised as a high priority area for farmland birds, butterflies and bees. There are rare remnants of species-rich grassland occurring around Hornsea and Lambwath Meres, where low-lying, seasonally flooded hay fields are maintained by traditional farming practices.		The network of rivers, ditches and dykes provides an important resource for wildlife as well as connections with other semi-natural habitats. The management of water quality, particularly from diffuse pollution is essential in order to prevent degradation of watercourses particularly when they are designated sites. Small ponds often originate from kettle-holes and depressions in the generally flat land separating the moraine ridges that run north-south. Small field and village ponds are also a notable landscape feature throughout the NCA helping to create stepping stones to link with other semi-natural habitats. Where areas of species-rich grassland occur, they should be protected and maintained.	Seek opportunities to maintain and restore ponds for their contribution to biodiversity and as a key landscape feature that enhances landscape character. Support traditional farming practices in areas where there are species-rich grassland such as aftermath grazing for lowland hay meadows.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Geodiversity	Designated geological sites (Dimlington and Flamborough Head Cliffs, Kelsey Hill Gravel Pit, Roos Bog, Skipsea Bail Mere, Skipsea Withow Gap) Glacial features	There are currently 5 nationally designated geological sites and 1 of geological and biodiversity interest consisting largely of cliffs, gravel pits, bogs and meres.	Local	These designated, geological sites provide important opportunities for allowing interpretation, understanding and research into geodiversity and key glacial features of the NCA as well as contributing to the sense of place, history and biodiversity in the NCA.	Develop approaches to interpret the glacial features and designated areas to a large audience, showing how they reveal the story of glacial history and landscape change and how they have influenced land use and settlement.	**Geodiversity** **Biodiversity** **Sense of history** **Sense of place / inspiration** **Tranquillity**

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