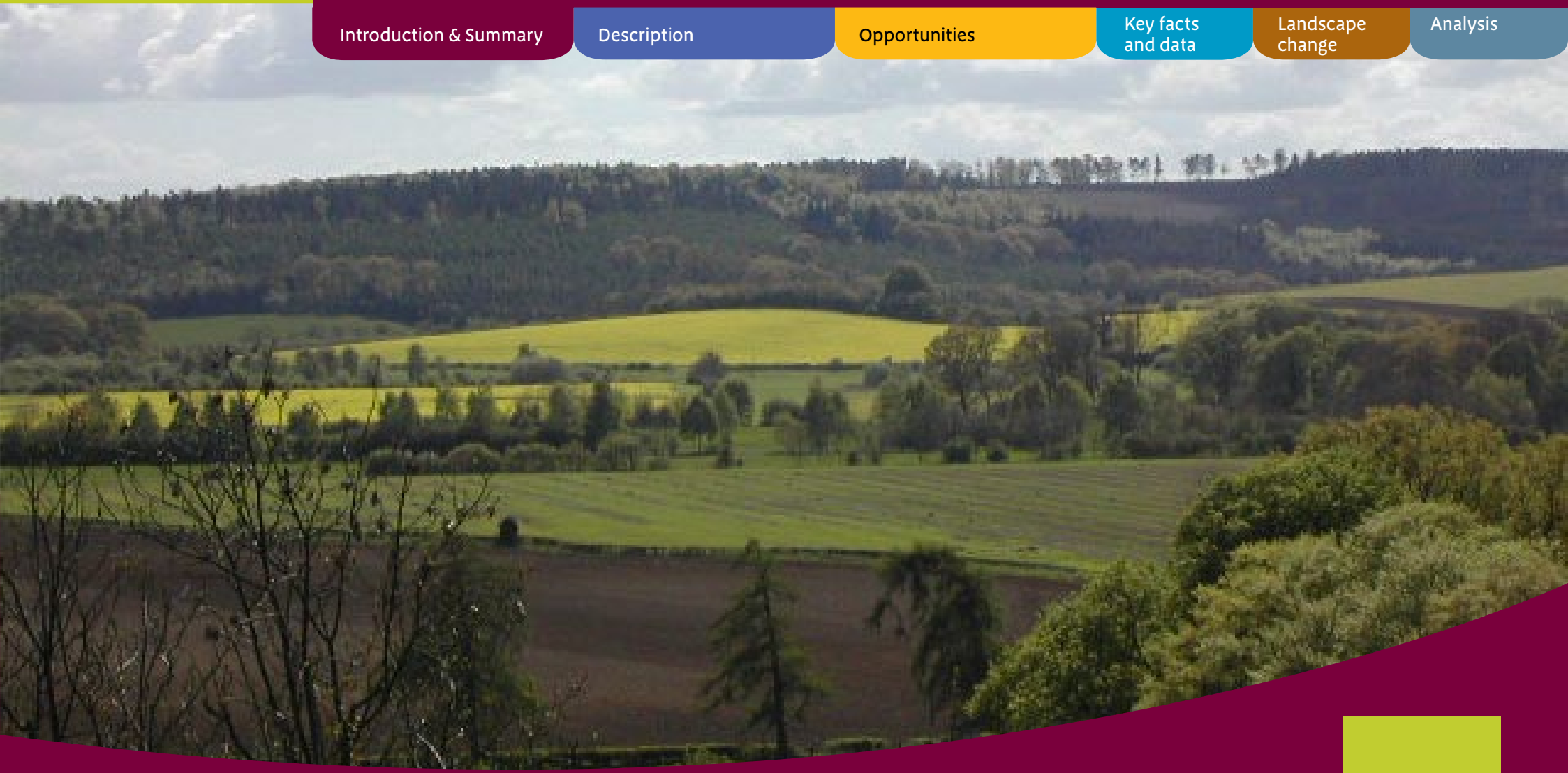
National Character Area profile:

29. Howardian Hills



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Introduction

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

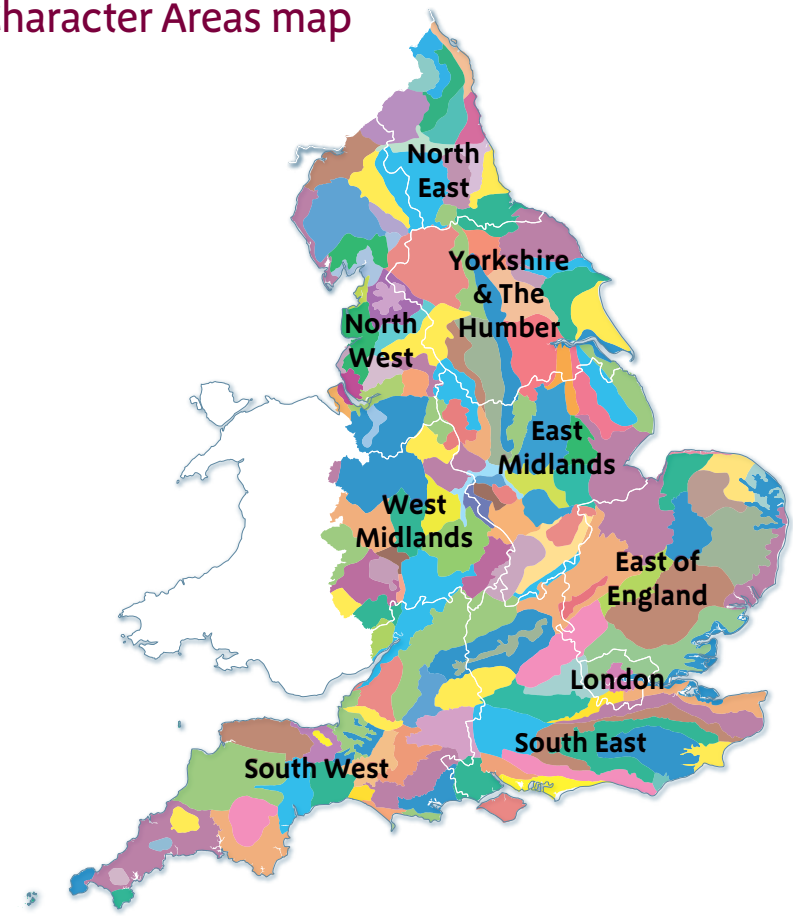
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and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

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

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

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

National Character Areas map



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

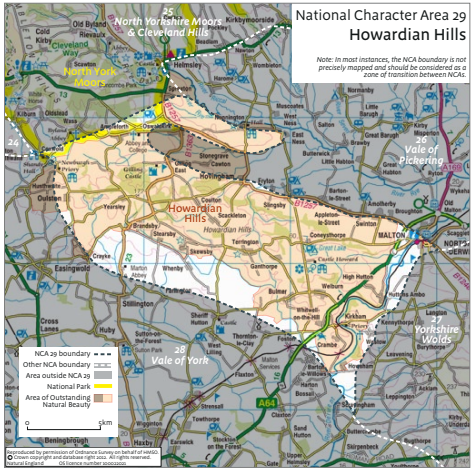
Summary

The Howardian Hills are a clearly defined belt of irregular, rounded ridges of Lower, Middle and Upper Jurassic rocks with intervening sheltered valleys, a diverse landscape of woodlands, historic buildings, designed parkland and villages, and rolling arable land on ridges and open plateaux.

Three-quarters of the Howardian Hills National Character Area (NCA) is within the Howardian Hills Area of Outstanding Natural Beauty (AONB), which lies immediately to the south-west of the North York Moors National Park; 3 per cent of the NCA lies within the National Park boundary. The ridges afford extensive views to the Vales of York and Mowbray to the west, and the Vale of Pickering and the Yorkshire Wolds to the east. It is in the Vale of Pickering that the River Derwent rises and, unusually, begins its journey inland, forced away from the sea by glacial ice during the last ice age and through the glacial outflow channel at Kirkham Gorge, into the Howardian Hills and from there southwards towards the Humber estuary. The Derwent is an important natural feature of the NCA: it is of European importance as a Special Area of Conservation (SAC) supporting otter, bullhead, and both river and sea lamprey.

The area has a relatively high proportion of woodland, often within historic designed parkland associated with large country houses, as well as native woods and conifer plantations. The way in which this woodland and scrub is managed and restored, and the way in which new woods are created, can help to provide multiple ecosystem services – principally in timber, carbon storage, water infiltration and recharge of the underlying minor rock aquifer, regulating peak flows, and contributing to the AONB's sense of place and high levels of tranquillity. Similarly, seeking opportunities to restore the highly fragmented grassland and wetland habitat networks will help to provide these crucial services and to achieve high levels of landscape permeability.

Perhaps the best known feature of the NCA is Castle Howard, after which the area is named. This is one of several country houses or religious establishments (with historically important grounds) that are accessible to the public and create focal points along popular walking routes.



Click map to enlarge; click again to reduce

Statements of Environmental Opportunities:

- **SEO 1:** Manage the wooded character of the NCA and its important historic parklands to optimise carbon storage, water quality and regulation of peak flow events, and to strengthen habitat networks, enhancing the sense of place and history.

- **SEO 2:** Support sustainable management of the agricultural landscape to retain important rates of food provision, while enhancing the network of semi-natural habitats within pastoral and arable landscapes, protecting the wildlife and water quality of the River Derwent, optimising carbon storage, soil quality and regulation of peak flow events, and strengthening the sense of place.

- **SEO 3:** Protect the geological and historic landscape features that are characteristic of the area, including its distinct landform, prehistoric earthworks, medieval monasteries, grand houses with designed parkland, and settlement pattern. Manage these features to provide diverse public benefits, enhancing the sense of place and history, and protecting natural resources.

- **SEO 4:** Promote enhanced access to and enjoyment of the Howardian Hills in ways that will maintain and enhance the AONB's special qualities and character, and its tranquillity, and that will support the essential underpinning ecosystem services, the quality of soils and water, and carbon storage.

Wooded ridges and farmed land; a classic view of the Howardian Hills.

Description

Physical and functional links to other National Character Areas

The Howardian Hills are physically distinct and, to some extent, separated from neighbouring areas: their Jurassic limestones and sandstones are relatively resistant to erosion compared with the marls, shales and clays of the surrounding vales. Nonetheless, the hills are linked – both visually and physically – by their pattern of rivers and watercourses. The majority of watercourses that rise in the hills of this NCA drain in a broadly eastward direction, into the River Derwent: some joining further upstream, with the River Rye, while others meet the Derwent further south, in the Vale of York NCA. The River Derwent rises in the Vale of Pickering, flowing down through Kirkham Gorge and through the Howardian Hills before flowing southwards into the Vale of York NCA, and from there towards the Humber estuary. The Derwent is the only major watercourse in the NCA. In the north of the area there is also a small stretch of the River Rye (a tributary of the Derwent).

There are strong visual links to and from this NCA across the lower-lying land of the Vale of Pickering to the east and the Vale of York to the west, and northwards to the elevated land mass of the North York Moors.

The only significant transport corridor within the Howardian Hills NCA, and linking it with surrounding areas, is the A64 in the south-east. Otherwise, this very rural NCA is served by a network of minor roads, and is characterised by very high levels of tranquillity and low levels of intrusion.

Farmed landscape with hedgerows and copses.

Key characteristics

- Complex landform of ridges, plateaux, plateau fringes, hills and valleys, with prominent scarps along the outermost edges, and glacial drift deposits forming a more undulating landform in the south and west.
- Extensive and varied woodland cover, often ancient in origin, including large coniferous plantations, mixed and deciduous woodlands in sheltered valleys, with alder woods in damp valley bottoms. Trees are a feature within the farmed landscape, demarcating boundaries and infield.
- Mixed agricultural landscape, with arable cropping predominant. This is mixed with pockets of pastures, unimproved calcareous grassland on steeper slopes and calcareous mires on the damper valley floors.
- Botanically-rich verges along roads and farm tracks, many designated locally as 'Special Interest Road Verges'. Locally uncommon knapweed broomrape is known at three sites within the AONB.
- Regular rectangular fields dating from 17th- to 19th-century enclosures, associated with large-scale courtyard-plan farmsteads, are most characteristic within the NCA. These are predominantly bounded by hedges and trees, with some fences and drystone walls on elevated plateaux.
- Country houses with their designed parklands, wood pasture, veteran trees and often actively managed woodland. Notably Castle Howard, Newburgh Priory, Hovingham Hall, Whitwell Hall and Nunnington Hall, and others such as Crayke Castle and Gilling Castle.
- Scattered settlements and small villages with village greens, such as at Hovingham, with buildings constructed in local limestone and sandstone, with red pantile roofs. The stones vary in colour from rich reds to pale creams.
- Many fine examples of early churches, with churchyards.
- Archaeological and historical features, ranging from bronze-age and iron-age earthworks on prominent hilltops to medieval monasteries at Newburgh and Kirkham, and evidence of a long history of arable cropping.
- Small rivers rising in the NCA drain outwards towards the River Derwent, its upper reaches in the Vale of Pickering, and its middle reaches in the Howardian Hills and Yorkshire Wolds/Vale of York. The River Derwent has cut the deeply incised and winding Kirkham Gorge, a glacial overflow channel that is of national importance for wildlife. The Derwent is internationally recognised for its otter, bullhead and lamprey populations.
- A very tranquil area, with low levels of intrusion or disturbance.
- The Ebor Way long-distance route crosses the NCA, as do the Foss Walk and the Derwent Valley Heritage Way.[4]
- A very rural area, served by a dense network of minor roads, the A64 being the only major through route.

4 Howardian Hills AONB Management Plan 2009–2014, Howardian Hills AONB Joint Advisory Committee (2009; URL: www.howardianhills.org.uk/downloads/Management_Plan_2009-14.pdf)

Howardian Hills today

The Howardian Hills comprise a belt of complex irregular limestone and sandstone ridges and valleys, rising above the surrounding vales of adjacent NCAs, with prominent scarp faces on the outermost ridges. It is thus physically very distinct and separate from the surrounding areas. The landscape is a diverse mosaic of sheltered valleys, woodland, historic buildings, parkland and villages, with open arable, pasture and large-scale plantations on the intervening ridges and plateaux. This rich mosaic and unspoilt nature create the area's special character: Three-quarters of the NCA has been designated as the Howardian Hills AONB and 3 per cent of the NCA area lies within the southern edge of the North York Moors National Park Authority area.

Woodland is a significant element of the overall character of the NCA, covering 15 per cent of the land area and occurring throughout. It has been described as forming a 'green web' across the landscape, and is one of this NCA's most significant unifying features.[5] Over half of the woodland cover is thought to be ancient in origin (that is, dating from before 1600), but only 16 per cent of this retains its native woodland character – predominantly pedunculate oak woods, with ash on the steeper slopes. The rest has been overplanted, often with conifer species – European larch, Scots pine, Norway spruce and others. Woodland cover often accentuates the NCA's landform of ridges and steep slopes. Many of the woodlands are small, although there are some large commercial plantations, such as at Yearsley Moor. The habitat mosaic supports farmland bird assemblages, including tree sparrow and grey partridge.

5 The Howardian Hills Landscape, Countryside Commission (1995)

Wood pasture and veteran trees are important features of the extensive designed landscapes and parklands associated with grand country houses, and are a key element of the woodland network across the NCA. In the 20th century areas of heathland and rough upland pasture were converted to agriculture, so that little now remains other than on rides within plantation woodland. This is an area of mixed farming, with arable cropping predominant.

The effects of the last glaciations left a particularly dramatic mark on the landscape of this area, creating a classic example of modified drainage. Prior to the last ice age, the natural drainage of the wider area was from west to east – along the Vale of Pickering, which lies between the uplands of the North York Moors and those of the Howardian Hills and Yorkshire Wolds. During the last glaciation, this natural flow was dammed by the North Sea ice sheet to the east and a finger of the Pennine ice sheet to the west, causing water to collect in the Vale of Pickering (which at the time became Lake Pickering), and eventually to overtop and outflow at its southern end, at Kirkham Gorge. Today the River Derwent enters the NCA from the north, flowing southwards through the deeply incised Kirkham Gorge, on the eastern edge of the area. The Derwent is the main watercourse within the NCA; minor watercourses arising within the Howardian Hills shed predominantly into the Derwent or its tributaries. The Derwent is afforded national and international importance for its wildlife, including river fish species whose ancestors migrated from the Rhine and other European rivers in the early post-glacial period, when the North Sea was a freshwater lake.

Wetlands – particularly fens, marshes and alder woodlands – associated with the Derwent flood plain and with other minor watercourses (such as at Dalby Bush Fen), represent some of the area's most important habitats. Similarly, wetland areas – such as those in the distinct low-lying Coxwold-Gilling Gap

in the north – provide an important habitat for breeding lapwing, curlew and snipe. Much semi-natural grassland habitat has been lost to agricultural improvement, although remnants persist on steeper slopes, such as the limestone grassland at Caulkleys Bank, and the hay meadows interspersed within the arable landscape – the largest concentration being in the Derwent valley. The AONB is noted for the parasitic plant knapweed broomrape, a local rarity. Verges alongside roads and tracks, as well as churchyards, provide other semi-natural habitat within the wider ecological network, increasing the permeability of this landscape.

Settlement consists mainly of small villages and isolated farmsteads, scattered throughout but predominantly found on ridgetops or valley-side spring line locations. Many of the nucleated valley settlements are medieval in origin. Settlements such as Hovingham, Slingsby and Malton are served by a network of minor roads similarly related to the topography, the only main roads being the A64 between York and Scarborough, and the B1363 and B1257. The area has a high proportion of vernacular buildings, created using diverse materials sourced from many former small-scale quarries. Traditional farmsteads tend to be large in scale and built from either limestone or sandstone, with red pantile roofs. They relate to the area's arable farming economy, and the importance of the rearing and fattening of livestock in yards. The overall field pattern tends to be fields of mixed size, mainly enclosed by hedgerows, but with some drystone walls on the raised plateaux. Parish and field patterns are pre-enclosure in origin around farmsteads and villages, overlain by later Parliamentary enclosure. Where linear strip fields survive, these tend to be in the immediate vicinity of settlements. Where well-drained soils have formed over limestone between Malton and Hovingham, grade 2 agricultural land allows intensive arable cultivation, with large fields and fewer boundary trees. Elsewhere, grade 3 land supports arable and livestock farming.

The landscape today continues to be influenced by features from the area's past: prominent bronze-age burial mounds and iron-age earthworks circle upper hillsides, and there are many fine examples of churches from the late Saxon and early Norman period – although most are medieval in origin. Particularly characteristic of this NCA are the number and quality of designed historic parklands and landscapes, the most important being Castle Howard, after which the NCA is named. Castle Howard was built mostly between 1699 and 1712, for the 3rd Earl of Carlisle, to a design by Sir John Vanbrugh. The house and estate originally extended over 5,000 hectares, incorporating notable architectural and landscape features such as the Great Lake (which, at 280,000 m2, is the largest waterbody in the NCA). The influence of the Castle Howard extends beyond its boundaries, in the vistas that have been opened up through the surrounding countryside. Other notable historic parklands include Newburgh Priory, Hovingham Hall, Whitwell Hall and Nunnington Hall. Throughout the NCA are numerous smaller parklands, including Crayke Castle, Gilling Castle, Howsham Hall, Hutton Hall, Wiganthorpe Hall, Swinton Grange, Hildenley and Brandsby Hall. The protection and maintenance of these landscapes is essential to maintaining the historic significance and character of the area, and the special character of the AONB.

Recreational activity is largely concentrated around the highly popular formal attractions of Castle Howard, Kirkham Priory and other historic buildings. The attractive villages and network of footpaths support more dispersed recreational activity within the area, which is notable for its high levels of tranquillity and low levels of intrusion.

The landscape through time

The Howardian Hills are formed from Middle Jurassic sandstones and mudstones created by inbraided rivers about 165 million years ago, and by Upper Jurassic limestones and calcareous sandstones deposited a few million years later, when shallow tropical seas submerged the land. Numerous east–west faults cross the Howardian Hills and contribute to the irregular ridges and valleys, which give rise to a generally rolling and hummocky landform. Among these east–west aligned faults is the Coxwold-Gilling rift, which forms the valley (known as the Coxwold-Gilling Gap) separating the Howardian Hills from the main Jurassic block of the Hambleton Hills to the north. These faults also influence the sudden changes in soil condition, other factors being superficial deposits, topography and hydrology. Although this is a prominent belt of hills, the maximum elevation is only some 170 m. Prominent scarps of limestone are a notable feature along the outermost ridges, where the land drops down to the Vales of York and Pickering.

Although the area was not covered by glaciers in the last glacial period, the effects of glaciation have nevertheless had a dramatic effect in altering drainage patterns. The natural drainage of the Vale of Pickering, which lies north of the Howardian Hills, was blocked by the North Sea ice sheet to the east and by the Pennine ice sheet, which occupied the Vale of York, to the west. These created a large dammed lake, which found an outlet to the south-west, cutting through the rocks to form the deeply-incised Kirkham Gorge. The course of the River Derwent was thus naturally and permanently diverted, to flow south through the Howardian Hills to the Ouse basin. Glacial drift deposits from the retreating Vale of York ice sheet have also left their mark, with a more undulating landform to the south and west of the area.

Early human activity dating from the Mesolithic and Neolithic periods is widely represented in the discovery of stone tools and flint scatters. The earliest signs of human habitation date from the Neolithic period: evidence of ritual burial sites indicates some organisation of the population. By the Bronze Age, tree clearance was making space for agriculture as population increased; it is likely that by the end of the Bronze Age much of the forest had been cleared, enabling moorland habitats to develop. The most striking feature dating from the Bronze Age is the system of banks and ditches that run along the edges of prominent hills for several hundred metres, for example above Slingsby Heights and Barton Heights. The early pattern of settlement on fertile land continued through the Iron Age, and there is extensive and well preserved evidence of both enclosed and unenclosed farmsteads, with round houses and field systems. When the Romans arrived, they discovered an organised agrarian society, with established arable and pastoral farming. They established the fort at Malton, and a pottery industry at Crambeck, supplying northern England with grey tableware, and left behind a complex landholding and administrative system.

Many of the place names in the Howardian Hills have Anglo-Saxon roots, such as Hovingham and Gilling. Later Viking influence is also indicated, for example Skewsby and Ganthorpe. From the 9th century, a period of landscape change began – associated with the development of villages, open field systems and estates. Many villages were planned in linear form, probably in the 12th and 13th centuries, and there is a high concentration of deserted medieval settlements, marking contraction from the early 14th century. Castles and priories (such as pre-Dissolution Newburgh and Kirkham Priories) were dominant in the landscape from this time, with country houses, estates and parkland developing later. The latter, with their associated estate villages, are a major aspect of today's landscape character – examples are

Castle Howard, Newburgh Priory and Hovingham Hall. The establishment of country houses by the aristocracy, mainly in the 18th century, with an emphasis on controlling, designing and remodelling the natural world for picturesque effect, led to particularly widespread change in the character of the landscape. Most significant of these country houses is Castle Howard. Popular features included long, formal avenues of trees leading to the house or main entrance, lakes created by damming small valleys, and walks laid out through woods and across fields, their routes designed to give glimpses of the house, long-distance views over the countryside, and views of features such as bridges and follies. This type of building style substantially altered the agricultural landscape, removing some villages and creating new estate villages, making for a planned, rural landscape. Estates were also responsible for the planting of blocks of woodland, including copses for field sports.

The enclosure of fields between the 17th and 19th centuries created the regular rectilinear pattern that remains a characteristic feature of today's landscape. The 20th century saw further landscape change, as heathland and rough upland pastures were converted to productive agriculture or planted with conifers (typically European larch, Scots pine and Norway spruce). Little of this semi-natural upland habitat now remains. The agricultural landscape has been substantially altered by the trend in the latter half of the 20th century for field enlargement, increased mechanisation, and conversion of pasture and less improved ground into more intensive arable farming. The colours and textures of the farmed landscape have changed as oilseed rape increases, and rough grazing land is reduced. Intensive pig and poultry farming have increased, smaller estates and parklands have been lost to modern agriculture, and substantial areas of remnant ancient woodland have been overplanted with commercial conifer species.

It is notable that the industrial expansion of the 19th century made little impact on the character of this landscape. The greatest evidence of its historic use dates from prehistory to the medieval period, and from the later development of grand country houses, with their formal designed landscapes.

In recent decades there has not been the pressure, faced in other parts of the country, for major new development in the Howardian Hills. However, a major upgrade of the A64 trunk road has been mooted, and there are existing small-scale quarries and proposals for oil and gas exploration. Arguably, greater change is occurring through the gradual erosion of character brought about by the cumulative effect of small-scale changes in building styles and materials, and by the introduction of street lighting into areas hitherto characterised by dark night skies and low intrusion.

The scenic value of the area was recognised in its designation by the Countryside Commission in 1986 as an AONB. Under the Countryside and Rights of Way Act 2000, North Yorkshire County Council, along with Ryedale and Hambleton District Councils, are required, jointly, to prepare and publish a management plan, reviewed every five years, for how they will manage these landscape changes within the AONB, while ensuring that its special qualities are protected.

Castle Howard in its landscape setting.

Ecosystem services

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

Provisioning services (food, fibre and water supply)

- **Food provision**: Over 82 per cent of the NCA is cultivated – mostly crops and fallow, with smaller areas of permanent grassland supported by fertile soils on grade 2 or 3 agricultural land. Holdings are largely given over to the production of cereals, mixed and general cropping, lowland cattle and sheep.

- **Timber provision:** This NCA has a high proportion of woodland cover and includes substantial areas of timber production, much of it from conifer plantation.

- **Biomass energy:** Department for Environment, Food and Rural Affairs (Defra) maps show a medium potential yield for short rotation coppice and miscanthus in this area.

- **Water availability:** The NCA overlies a minor post-Carboniferous rock aquifer; land management practice influences the extent to which water at the surface will infiltrate and recharge groundwater supplies. There is no water available for further abstraction from the River Derwent, largely to protect downstream flow levels outside the NCA.

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

- **Climate regulation:** The soils of this NCA tend to have a low carbon content, of between 0 and 5 per cent. There is a higher carbon content in the woodland soils, and in semi-natural habitats, particularly wetlands, with opportunities to increase carbon storage/sequestration through enhanced management of these.

- **Regulating soil erosion:** In over 50 per cent of the area the soils are classed as being prone to erosion. The NCA straddles two of Defra's priority catchments (Yorkshire Derwent and Yorkshire Ouse, Nidd and Swale), where the sedimentation of watercourses as a result of soil erosion is an identified problem. The problem can be regulated through appropriate land management practices.

- **Regulating soil quality:** Freely draining soils cover 44 per cent of the NCA, and play a valuable role in groundwater recharge. This enhanced infiltration is achieved through good soil management practices to maintain soil structure. The NCA's slowly permeable soils are at risk of suffering compaction and reduced infiltration, which can result in diffuse pollution/sedimentation.

- **Regulating water quality:** The NCA straddles two of Defra's priority catchments (Yorkshire Derwent and Yorkshire Ouse, Nidd and Swale), with only 'moderate' water quality and identified problems of diffuse agricultural pollution from phosphates and nitrates, from areas under cultivation. These issues can be addressed through good nutrient and soil management, and through measures to buffer watercourses and trap sediment, including appropriately sited woodland creation.

- **Regulating water flow:** There is some flood risk associated with the River Derwent and its tributaries. Land management within the wider catchment (woodland planting, wetland restoration/creation) can significantly reduce this risk by increasing the land's capacity to hold rainfall and by slowing its flow into watercourses.

Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration**: Sense of place is framed in this NCA by the landform – a belt of complex rounded limestone and calcareous sandstone ridges (including the prominent Caulkleys Bank) rising above the surrounding vales. The landscape is a diverse mosaic of sheltered valleys, a patchwork of woodland, parkland and villages, with open arable and large-scale plantations on the intervening ridges and plateaux, offering extensive views over the vales. The extent of designed parkland is a defining characteristic.

- **Sense of history**: A sense of history is evident in the remains of bronze-age burial mounds, iron-age earthworks circling prominent hills, and deserted medieval settlements. There is significant evidence of Roman occupation, and a strong pattern of medieval nucleated settlement in the valleys. Historic designed parkland associated with country houses is a strong feature of the landscape.

- **Tranquillity:** The area is an important resource for tranquillity, with 85 per cent of it classed as 'undisturbed'.

- **Recreation:** Recreation and access are supported by the Ebor Way long-distance route, a network of footpaths (343 km of rights of way at a density of 1.43 km per km2), and a small amount of open access land.

- **Biodiversity:** There is one internationally designated site within the NCA, part of the River Derwent Special Area of Conservation (SAC) – 75 ha of which lie within this NCA – a site that supports an abundance of aquatic vegetation, as well as otter, sea lamprey and bullhead. There are eight Sites of Special Scientific Interest (SSSI) in the NCA, making up less than 1 per cent (142 ha) of the area. These designated sites, and other areas of priority habitat (such as ancient woodlands), will be at the core of efforts to increase the resilience of native flora and fauna to future environmental change.

- **Geodiversity:** There are three geological SSSI within the NCA. Kirkham Gorge is of scientific importance as a classic, renowned example of a glacial overflow channel.

Wood pasture at Ampleforth.

Statements of Environmental Opportunity

SEO 1: Manage the wooded character of the NCA and its important historic parklands to optimise carbon storage, water quality and regulation of peak flow events, and to strengthen habitat networks, enhancing the sense of place and history.

For example, by:

- Seeking to protect, restore and increase the resilience of ancient woodlands across the NCA, seeking opportunities on Plantations on Ancient Woodland Sites (PAWS) (as planted conifers reach economic felling age) to restore to a native mix appropriate to the NCA, through natural regeneration and planting stock of local provenance, taking into account the potential impacts of climate change and the threat from pests and diseases.
- Ensuring that woodland management is operated flexibly to accommodate features that require cycles of open canopy, for example for birds or invertebrates.
- Protecting and improving existing woodland to retain historic features and structural diversity, retaining deadwood as important habitat and protecting woodland features in multiple-use woodlands. Seeking opportunities to reinstate traditional management practices (such as coppicing), which can also enhance biodiversity interest.
- Creating, extending and linking woodlands and scrub (particularly on steeper slopes, in valleys and along stretches of watercourses), in keeping with local landscape character and avoiding wetlands and species-rich grasslands. This will strengthen the habitat network, increase infiltration rates to recharge the aquifer, and build the water-holding capacity of the land, thus regulating peak flows.
- Seeking opportunities to expand the small area of heathland habitat through the restoration of clearfell areas and woodland rides, particularly where the seed bank persists, and with reference to the Forestry Commission's open habitats policy.
- Restoring and managing historic parklands and estates, such as at Castle Howard and Newburgh Priory – retaining veteran trees, restoring wood pasture and vistas, and bringing woodlands into appropriate management – enhancing the opportunities for sustainable recreational access and contributing to the creation of ecological networks.
- Restoring hedgerows, hedgerow trees and infield trees as characteristic features of this landscape.
- Managing existing woodland and expanding tree cover in appropriate locations to enhance biodiversity, protect soils and sequester carbon, as well as providing a source of timber and wood fuel. Seeking opportunities to develop alternative markets for timber.
- Ensuring that short rotation coppice or miscanthus grown for energy is assimilated into the wooded landscape character.
- Seeking to screen existing developments and future settlement-edge developments with woodland, to assimilate with the existing landscape character, and to reduce noise and light pollution, maintaining the area's high levels of tranquillity.

SEO 2: Support sustainable management of the agricultural landscape to retain important rates of food provision, while enhancing the network of semi-natural habitats within pastoral and arable landscapes, protecting the wildlife and water quality of the River Derwent, optimising carbon storage, soil quality and regulation of peak flow events, and strengthening the sense of place.

For example, by:

- Continuing and enhancing provision of high-quality farmed produce in ways that optimise productivity, utilise local skills and build on the success of local markets, while supporting the provision of ecosystem services in the farmed landscape, minimising carbon emissions and making a positive contribution to the sense of place.
- Maintaining pastoral land uses and supporting extensive grazing to maintain wildlife and historic interest, and local rarities such as knapweed broomrape. Protecting soil quality and encouraging water infiltration and aquifer recharge, thus enhancing water availability and regulating flow.
- Restoring, extending and linking species-rich or low-input grasslands, and strengthening the habitat network around the core sites of old unimproved pastures and hay meadows, calcareous grasslands, road verges and old churchyards, so that pollinators and species that prey on pests are supported in proximity to crops.
- Maintaining and restoring hedgerows and hedgerow trees, and widening the range of habitats in arable areas by creating permanent grassland field margins, reverting whole fields to meadow or pasture, and linking these to the wider grassland resource where possible.
- Working with neighbouring NCAs to encourage land management practices that will increase the interception of rainfall in upper catchments, and reduce the supply of nutrients and sediment to watercourses.
- Increasing the amount of carbon stored in agricultural soils by managing organic matter content, aerating and adopting minimum tillage. Adopting best practice in soils and nutrient management, using rotational cropping and 'green manure' legumes.
- Encouraging arable systems to support a greater diversity of flora and fauna through measures that will enhance arable flora, wild bird seed and nectar provision, and provide overwintered stubbles to support farmland birds, while protecting soils and supporting the network of semi-natural grassland habitats.
- Protecting and enhancing wetland habitats (and their associated species) as an important component of the farmed landscape that will improve water storage capacity and carbon storage. Seeking opportunities to strengthen the network of mires and wet woodlands around cores sites such as Dalby Bush Fen SSSI and Jeffry Bog SSSI.
- Along the River Derwent and in other riparian areas, encouraging management practices that will protect watercourses from diffuse nutrient inputs, such as permanent grassland buffer strips. Adopting measures that will protect soils from erosion, for example tree planting, and fencing livestock off from watercourses, thus minimising sediment input.
- Controlling invasive species such as Himalayan balsam.

SEO 3: Protect the geological and historic landscape features that are characteristic of the area, including its distinct landform, prehistoric earthworks, medieval monasteries, grand houses with designed parkland, and settlement pattern. Manage these features to provide diverse public benefits, enhancing the sense of place and history, and protecting natural resources.

For example, by:

- Enhancing the distinctive topography of ridges, plateaux, hills, scarps and gorges, using semi-natural vegetation to accentuate the landform, avoiding disruption to the topography and protecting views into and out of this landscape.
- Ensuring that important geological features and exposures (for example at Kirkham Gorge, Nunnington Cutting and Quarries, and Wath Quarry) are under appropriate management. Seeking opportunities to extend the series of geological sites by designating regionally or locally important sites (Regionally Important Geological Sites or Local Geological Sites), securing the appropriate management of their geological interest and, where appropriate, creating opportunities for access and learning.
- Protecting historic ground features under permanent grassland, and maintaining sustainable grazing and scrub management on archaeological sites and earthworks, thus also protecting soils, storing carbon, and managing water availability, flow and quality.
- In arable areas, seeking to protect historic ground features through reversion to pasture; where this is not feasible, encouraging shallow cultivation techniques.
- Restoring and managing historic parklands and estates – and their key features, such as monuments and buildings, veteran trees and planned vistas – preventing further loss from changes in land management or neglect. Supporting sustainable public access to and enjoyment of these sites, and managing them to enhance their native flora and fauna and their contribution to local habitat networks.
- Through management advice and support, seeking to reduce the numbers of historic buildings and structures on English Heritage's 'Heritage at Risk' list.
- Maintaining historic field patterns (including surviving linear strip fields) and managing field boundaries. Restoring hedgerows and boundary trees in lowland areas, and maintaining and restoring drystone walls on elevated plateaux.
- Conserving the nucleated or linear character of villages and their village greens, and elsewhere conserving the pattern of low-density scattered farmsteads, mostly on fringes around open plateaux.
- Promoting the use of local materials (Jurassic limestone and sandstone, with red pantile roofs) and traditional skills for new buildings within villages, for the restoration of historic buildings and for drystone walls, to maintain the integrity of village character. This may be supported by small-scale quarrying to provide suitable building stone, where this can be accommodated with minimal visual or noise intrusion.

SEO 4: Promote enhanced access to and enjoyment of the Howardian Hills in ways that will maintain and enhance the AONB's special qualities and character, and its tranquillity, and that will support the essential underpinning ecosystem services, the quality of soils and water, and carbon storage.

For example, by:

- Maintaining public access to enable enjoyment of this landscape, while conserving the sense of tranquillity, relative remoteness and sense of escapism, and protecting vulnerable habitats.
- Maintaining access to the landscape through open access land and footpaths. Promoting new links, in particular circular routes near to villages, to promote health and wellbeing, and to enhance public access to visitor attractions such as historic homes and gardens.
- Seeking opportunities to maintain and extend access provision in ways that will not cause localised disturbance to wildlife, or soil erosion or compaction, particularly near watercourses. Maximising the associated opportunities for restoring and extending habitat networks, and for engaging with local communities through volunteering events.
- Seeking opportunities to develop new educational access schemes to promote understanding of the strong agricultural, forestry, geological and cultural/historical significance of the landscape.
- Conserving the sense of tranquillity associated with this NCA, by minimising light spill at night through careful lighting design.
- Managing green spaces (such as verges alongside roads and tracks, and churchyards) as part of the habitat network – for species diversity, for pollinators and for an enhanced visitor experience.
- Maintaining the quiet, rural character of the area, ensuring that road improvements and development are designed to protect the area's special qualities, including its low levels of intrusion and disturbance. Ensuring that new development utilises innovative solutions to minimise water demand and energy use, and employs sustainable drainage systems.

The view north from Ampleforth. The Howardian Hills are renowned for their high level of tranquillity.

Supporting document 1: Key facts and data

Howardian Hills National Character Area (NCA): 24,011 ha

1. Landscape and nature conservation designations

Much of this NCA lies within protected landscapes: 75 per cent of the NCA area (18,125 ha) is in the Howardian Hills Area of Outstanding Natural Beauty (AONB), and 3 per cent (780 ha) is within the North York Moors National Park.

Management Plans for the protected landscape can be found at:

- **www.howardianhills.org.uk/**
- **www.northyorkmoors.org.uk/**

Source: Natural England (2011)

1.1 Designated nature conservation sites

The NCA includes the following statutory nature conservation designations:

Tier	Designation	Name	Area (ha)	% of NCA
International	n/a	n/a	0	0
European	Special Protection Area (SPA)	n/a	0	<0
	Special Area of Conservation (SAC)	River Derwent SAC	75	<1
National	National Nature Reserve (NNR)	n/a	0	0
National	Site of Special Scientific Interest (SSSI)	A total of 8 sites wholly or partly within the NCA	142	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.

Total area of designated sites is 142 ha. The European site at the River Derwent is wholly underpinned by the SSSI.

There are 75 Local sites in the Howardian Hills NCA covering 1,006 ha which is 4 per cent of the NCA.

Source: Natural England (2011)

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

1.1.1 Condition of designated sites

Condition category	Area (ha)	% of SSSI land in category condition
Unfavourable declining	4	3
Favourable	53	38
Unfavourable no change	15	11
Unfavourable recovering	68	49

Source: Natural England (March 2011)

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

2. Landform, geology and soils

2.1 Elevation

The land in this NCA ranges from 11 m to 228 m above sea level, the mean height being 73 m.

Source: Natural England (2010)

2.2 Landform and process

The Howardian Hills NCA has a complex landform of ridges, plateaux, plateau fringes, hills and valleys formed from the sandstones and mudstones of the Middle Jurassic period and the calcareous sandstone and limestone of the Upper Jurassic. Limestone scarps are prominent along the outermost edges, and glacial drift deposits form a more undulating landform in the south and west. During the last glaciation a large lake formed in the Vale of Pickering to the east, which found an outlet to the south-west, cutting through the rocks to form the deeply incised Kirkham Gorge.

Source: Howardian Hills Countryside Character Area Description

2.3 Bedrock geology

The Howardian Hills are formed from the sandstone and mudstone of the Middle Jurassic period and the calcareous sandstone and limestone of the Upper Jurassic. Numerous east-west faults cross the Howardian Hills and contribute to the irregular ridges and valleys which give rise to a generally rolling and hummocky landform. The solid geology of the NCA comprises: 39 per cent mudstone; 26 per cent sandstone, siltstone and mudstone; 15 per cent sandstone; 10 per cent ooidal limestone, and 4 per cent of mudstone, sandstone and limestone, with smaller amount of other rock types.

Source: Howardian Hills Countryside Character Area Description

2.4 Superficial deposits

Glacial drift deposits from the retreating Vale of York ice-sheet have left their mark in a more undulating landform to the south and west of the NCA area. There are no notable drift deposits over the area, apart from lower lying land to the south and west.

Source: Howardian Hills Countryside Character Area Description

2.5 Designated geological sites

Designation	Number
Geological Site of Special Scientific Interest (SSSI)	3
Mixed interest SSSIs	0

There are 0 Local Geological Sites within 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

2.6 Soils and Agricultural Land Classification

There are 5 main soilscape types in this NCA: freely draining slightly acid loamy soils, covering 44 per cent of the NCA; slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (39 per cent); shallow lime-rich soils over limestone (9 per cent); loamy and clayey floodplain soils with naturally high groundwater (4 per cent); and slightly acid loamy and clayey soils with impeded drainage (2 per cent).

Source: National Soil Resources Institute Soilscapes Map, 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)	% of NCA
Grade 1	0	0
Grade 2	2,292	10
Grade 3	19,285	80
Grade 4	1,668	7
Grade 5	64	<1
Non-agricultural	522	2
Urban	189	<1

Source: Natural England (2010)

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

Kirkham Bridge.

3. Key water bodies and catchments

3.1 Major rivers/canals

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

Name	Length in NCA (km)
River Derwent	18
River Rye	<1

Source: Natural England (2010)

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

The River Derwent has cut the deeply incised and winding Kirkham Gorge, a glacial overflow channel which is of national importance for wildlife and for its geological interest. Smaller rivers drain from the Howardian Hills into the Vale of Pickering to the north-east and the Vale of York to the south-west. The Great Lake at Castle Howard Estate is the largest waterbody within the NCA, covering 280,000 m^2.

3.2 Water quality

The total area of Nitrate Vulnerable Zone is 23,343 ha, 27 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 3,564 ha of woodlands over 2 ha (15 per cent of the total area), of which 1,583 ha (7 per cent of total area) is ancient woodland.

Source: Forestry Commission (2011)

4.2 Distribution and size of woodland and trees in the landscape

Varied patterns of woodland create a contrasting landscape, the principal contrast being between the sheltered valleys with their extensive areas of broadleaved woodlands and parkland landscapes, and the much more open plateau areas characterised by woodland blocks and large scale plantations. Alder woodlands remain a feature of damper valley bottoms.

Source: Howardian Hills Countryside Character Area Description

4.3 Woodland types

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

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

Woodland type	Area (ha)	% of NCA
Broadleaved	1,597	7
Coniferous	1,415	6
Mixed	168	<1
Other	384	2

Source: Forestry Commission (2011)

Area & proportion of Ancient Woodland & Planted Ancient Woodland within the NCA:

Type	Area (ha)	% of NCA
Ancient semi-natural woodland	160	<1
Ancient re-planted woodland (PAWS)	1,423	6

Source: Natural England (2004)

5. Boundary features and patterns

5.1 Boundary features

Field boundaries are predominantly hedges with some fences and some areas of walls in higher areas. CQC data: between 1999 and 2003 suggests the most extensive agri-environment agreements were hedge planting and restoration (31 km) and fencing (32 km), thus the extent of boundary management was limited. From this data there is little evidence of active wall restoration or management.

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

5.2 Field patterns

Varied pattern of field size and shape, reflecting variations in underlying topography.

Source: Howardian Hills 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

Comparison of Agricultural Census data between 2000 and 2009 shows a small overall decline in total number of farms. There has been an increase in farms producing cereals and a decrease in those under general cropping, and an increase in farms grazing livestock but reduction in numbers of dairy and pig farms. The data shows a decline in mixed farms, and increase in 'other' types of farms, not specified.

Source: Agricultural Census, Defra (2010)

6.2 Farm size

Comparison of data between 2000 and 2009 shows an increase in small farms and a decrease in larger farms.

Source: Agricultural Census, Defra (2010)

6.3 Farm ownership

2009: Total farm area = 16,691 ha; owned land = 11,617 ha
2000: Total farm area = 18,997 ha; owned land = 13,331 ha

Source: Agricultural Census, Defra (2010)

6.4 Land use

Arable farming is the dominant type, with livestock grazing also significant.

Source: Agricultural Census, Defra (2010)

6.5 Livestock numbers

Comparison of data between 2000 and 2009 shows a decline in livestock numbers in all categories, the decline (as a proportion of the 2000 figure) being greatest for sheep.

Source: Agricultural Census, Defra (2010)

6.6 Farm labour

Comparison of data between 2000 and 2009 shows a decline in farm labour, with just over half the numbers of salaried managers in 2009 compared with 2000, and large reductions in principal farmers, full-time workers and casual labour. However, part-time labourers have more than doubled in number.

Source: Agricultural Census, Defra (2010)

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

Caulkley's Bank to Hovingham: hay meadows, calcareous grassland and woodland.

7. Key habitats and species

7.1 Habitat distribution/coverage

There are remnants of semi-natural habitat, particularly on the higher ground of the central ridge (aligned north-west to south-east) and to the north of this. There are extensive conifer and mixed woodlands, the figures in section 4.3 (above) suggest that much planted conifer is on former ancient woodland. Native woodland is the largest habitat by area. There are small areas of fen, sometimes associated with the woodlands, and some lowland meadows.

Source: North York Moors & Hills Natural Area Profile

7.2 Biodiversity Action Plan (BAP) priority habitats

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

UK BAP priority habitat	Area (ha)	% of NCA
Broadleaved mixed & yew woodland (broad habitat)	1,177	5
Fens	414	2
Coastal floodplain and grazing marsh	182	1
Reedbeds	38	<1
Lowland meadows	21	<1
Purple moor-grass and rush pasture	10	<1

Source: Natural England (2011)

Maps showing locations of UK BAP priority habitats are available at

- **http://magic.defra.gov.uk/website/magic/** select 'Habitat Inventories'

7.3 Key species and assemblages of species

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

Pasture at Newburgh

8. Settlement and development patterns

8.1 Settlement pattern

Many villages are linear in form with wide verges forming village greens. In other villages, houses are clustered around a single village green. The simplicity and scale of these villages contrasts with the grandeur of the area's many stately homes. There has been some development in wider countryside and smaller settlements around Ampleforth, but overall the rural character has been maintained.

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

8.2 Main settlements

Malton is the largest town, lying on the eastern edge of the Howardian Hills NCA where it meets the Vale of Pickering NCA to the north-east. Hovingham is also located along this boundary between the two character areas, in the north-east of the Howardian Hills. Other smaller settlements include Ampleforth and Terrington. The total estimated population for this NCA (derived from ONS 2001 census data) is: 11,888.

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

8.3 Local vernacular and building materials

Farmsteads are dominated by 2-storey farmhouses and combination barns, predominantly constructed of stone. An abundance of former small-scale quarries has produced an abundance of local variations in building materials. In the main farmsteads and farm buildings tend to be built from Jurassic limestone or sandstone with red pantile roofs, although some are covered in slate indicating wealth and status. However, brick built farm buildings do occur throughout the NCA. Many farmsteads retain original door and window fitments, conforming to national pattern-book exemplars, which remain a consistent contributor to the character of these steadings.

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

Farmed landscape with trees

9. Key historic sites and features

9.1 Origin of historic features

Mesolithic and Neolithic activity is widely reflected by the discovery of stone tools and flint scatters. There is extensive and well-preserved evidence dating from the Bronze Age to the Romano-British period, including numerous burial mounds, cropmarks of enclosed and unenclosed farmsteads with round houses and field systems. This area has a dominant settlement pattern of nucleated villages (especially in valleys), with very low levels of dispersal mostly found on fringes around the open plateaux. Many villages were planned in linear form, probably in 12th and 13th centuries, and there is a high concentration of deserted / shrunken medieval settlement, marking contraction from the early 14th century. This was followed by the establishment of parklands and estates, such as those of pre-Dissolution Newburgh and Kirkham priories. Resulting parklands, with associated country houses and estate villages, are a major aspect of today's landscape character – notably Newburgh Priory, Hovingham Hall and Castle Howard.

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

9.2 Designated historic assets

This NCA has the following historic designations:

- 4 registered parks and gardens covering 1,758 ha.
- 0 registered battlefield/s.
- 105 scheduled monuments.
- 555 listed buildings.

Source: Natural England (2010)

- More information is available at the following address: **www.english-heritage.org.uk/caring/heritage-at-risk/**
- **www.english-heritage.org.uk/professional/protection/process/national-heritage-list-for-england/**

Features of the designed landscape of Hovingham Park.

10. Recreation and access

10.1 Public access

- 1 per cent of the NCA, 344 ha, is classified as being publically accessible.
- There are 343 km of public rights of way at a density of 1.4 km per km^2.
- There are 0 National Trails within the Howardian Hills NCA.

Sources: Natural England (2010)

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

Access designation	Area (ha)	% of NCA
National Trust (Accessible all year)	0	0
Common Land	14	<1
Country Parks	0	<1
CROW Access Land (Section 4 and 16)	79	<1
CROW Section 15	2	<1
Village Greens	6	<1
Doorstep Greens	0	0
Forestry Commission Walkers Welcome Grants	0	0
Local Nature Reserves (LNR)	0	0
Millennium Greens	2	<1
Accessible National Nature Reserves (NNR)	0	0
Agri-environment Scheme Access	6	<1
Woods for People	225	<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.

Infield tree.

11. Experiential qualities

11.1 Tranquillity

Based on the CPRE map of Tranquillity (2006) the majority of the area displays a moderately high level of tranquillity, with the least tranquil area along the A64 corridor in south eastern boundary of the NCA, and around the town of Malton.

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

Category of tranquillity	Score
Highest	49
Lowest	-43
Mean	20

Sources: CPRE (2006)

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

11.2 Intrusion

The 2007 Intrusion Map (CPRE) shows the extent to which rural landscapes are 'intruded on' from urban development, noise (primarily traffic noise), and other sources of visual and auditory intrusion. A breakdown of intrusion values for this NCA are detailed in the table below.

Intrusion category	1960s (%)	1990s (%)	2007 (%)	Percentage change (1960s-2007)
Disturbed	2	10	14	+12
Undisturbed	98	90	85	-7
Urban	n/a	n/a	1	n/a

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are an increase in the area categorised as 'disturbed' and a decrease in the area classed as 'undisturbed'. 'Disturbance' has spread from the Malton area in 1960, to the A64 corridor in 1990, and in 2007 has expanded slightly outwards from these zones. The intrusion maps show, between 1993 and 2000, a decline in the area of 'night skies'.

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

Wet woodland

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

Countryside Quality Counts data indicates that between 1999 and 2003 there was a continuing loss of permanent and rough grasslands, and a decline in mixed farming.

Trees and woodlands

- Between 1999 and 2003 the rate of uptake of woodland grant schemes for the management of established woodlands was low, but local evidence suggested that initiatives were enhancing the woodland resource significantly. The English Woodland Grant Scheme has been used to help support significant increases in woodland management and planning and in the restoration of some key ancient woodlands areas, for example at Castle Howard.

- The area is known for its high levels of active woodland management particularly in relation to the larger estates/woodlands.

- The threat from pests and diseases remains high, including the potential impact of Phytopthora ramorum on larch and Chalara fraxinea on ash.

Boundary features

- Within the AONB there has historically been a high uptake of countryside stewardship agreements across whole farms, which has enabled the maintenance or restoration of boundary features – between 1999 and 2003 the uptake of agri-environment grants for boundary restoration (notably hedgerow planting) was equivalent to 5 per cent of the total length.

- Data at 2011 shows that 305 km of hedgerows within the NCA were managed under environmental stewardship; the figure for stone walls was just over 4 km (these figures are not broken down into proportion maintained or restored).

Agriculture

- There was a continuing loss of permanent and rough grasslands, and decline in mixed farming between 1999 and 2003. The most extensive Countryside Stewardship agreements in 2003 were for lowland pastures and regeneration of grassland/semi-natural vegetation.

- Between 2000 and 2009 the total farmed area and total number of farms declined slightly, as did total livestock numbers. Numbers of farms in cereals or livestock increased, while numbers in dairy or pig rearing decreased.

- There has been an increased demand for new buildings for grain stores and livestock housing, and a feed mill complex has been developed.

Settlement and development

- Despite some development in the wider countryside and smaller settlements around Ampleforth, overall the rural character has been maintained. There was a reduction in dark night skies between 1993 and 2000, and increases in intrusion from traffic during the same period (4 per cent increase in disturbance between the 1990s and 2007).

- There has been continued pressure for upgrading the A64, and for large new dwellings on infill sites within villages.

Semi-natural habitat

- Between 1999 and 2003 there was a continuing loss of permanent and rough grasslands. Unimproved limestone grassland is now rare. This may be linked to a decline in livestock numbers across all categories between 2000 and 2009.

- Little dwarf shrub heath remains, although conifer felling has created some areas for heathland restoration, mostly on rides, as part of a more multi-objective approach to woodland management.

Historic features

- In 1918 parkland made up a significant component of the landscape (about 4.2 per cent), 41.6 per cent of which was lost in the period to 1995. 34 per cent of the historic parkland was covered by a Historic Parkland Grant in 2003 and 11 per cent was included in an agri-environment scheme.

- The 'Heritage at Risk' register indicates that there are currently 82 designated monuments at risk in this NCA, and some of the smaller historic designed landscapes are considered to be at risk from agricultural improvement. Some of these historic parklands have an ongoing high standard of maintenance.

Rivers

- Under the Water Framework Directive classification, the ecological potential of the River Derwent and the ecological status of other tributaries in the NCA are both 'moderate'. The entire NCA lies within Defra's 'Yorkshire Derwent' or 'Yorkshire Ouse, Nidd and Swale' Priority Catchments where, reflecting the 'moderate' status of water quality, there are identified problems in rivers of diffuse agricultural pollution from phosphates and nitrates from areas under cultivation.

- The spread of the non-native Himalayan balsam has created erosion and sedimentation problems along the River Derwent. The Derwent is used for boating and angling and this is regulated by Natural England consent on the SSSI.

Minerals

- The Yorkshire and Humber Aggregate Mineral Resources map shows existing limestone quarries in the east of the NCA, for example the active quarry at Wath. In recent years the existing planning permissions to quarry have been reviewed and proposals for oil and gas exploration have been put forward.

Drivers of change

Climate change

- Increased rainfall, especially periods of heavy rainfall, may lead to increased 'flashiness' of flows, especially within the Derwent Valley, with potential for more frequent winter flooding, soil erosion and sedimentation of water courses.
- More frequent summer droughts leading to increase in water demand for crop growth and an increase in drought-resistant species.
- Warmer winters leading to increased tree growth.
- Species migration and loss of small or isolated habitats.
- A requirement for increasing renewable energy generation which could result in onshore wind turbines and increased demand for biomass growth (Defra maps show mostly medium potential for miscanthus and short rotation coppice throughout the area).

Distinctive circular wood, Newburgh Estate.

Other key drivers

- 75 per cent of the NCA area is designated as an AONB, and the protection and enhancement of its special qualities will remain a priority.
- Landscape-scale initiatives will present opportunities for restoration of habitat/ecological networks and mitigation of and adaptation to climate change in support of the objectives of the Natural Environment White Paper, and Biodiversity 2020.
- There may be further opportunities to work with local geology groups to identify and designate Local Geological Sites.
- There is likely to be continued demand for resources of limestone found along the north-eastern edge of this area, between Malton and Hovingham.
- The possible major upgrading of the A64, realignment of overhead lines, telecommunications, review of old mineral permissions and proposals for oil and gas exploration are recurring issues presenting both challenges and opportunities to conserving the special qualities of the area[6] including its highly tranquil character.
- There is likely to be increased pressure for food production in the future as a result of a national drive for greater self-sufficiency in food, and potential for increased timber and biomass production.
- Many of the conifer plantations in the NCA are approaching economic felling age, offering considerable opportunity for restocking to a more native mix, resilient woodland, delivering multiple ecosystem services, and, in appropriate areas, opportunities for heathland restoration.
- Spread of pests and diseases, which may impact on both native and commercial species of broadleaved and coniferous trees, thereby reducing the capacity/options for timber production and adversely affecting both biodiversity and the landscape.
- Recently there has been an increase in the incidence of new and existing potentially devastating tree diseases affecting both native semi-natural woodlands and non-native plantation woodlands, and trees in the wider landscape. Ash, oak, larch and Corsican pine, and specimen rhododendron within designed landscapes could be at risk within this NCA.
- Increased recreational pressures associated with the distinctive historic parkland landscape and new visitor facilities, which attract large numbers of visitors.
- Recreational development in the wider countryside, including golf courses, caravan sites and car parking.
- The need for affordable local housing within the AONB, and proposals for large new houses on village in-fill sites.
- Construction of new multi-purpose farm buildings.
- Farm diversification into a range of activities, from biofuels, to tourism.

6 Howardian Hills AONB Management Plan 2009–2014, Howardian Hills AONB Joint Advisory Committee (2009; URL: www.howardianhills.org.uk/downloads/Management_Plan_2009-14.pdf)

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.

View south of Nunnington, trees and woodland are a prominent feature in the landscape.

Statement of Environmental Opportunity	Ecosystem Service: Food Provision	Timber Provision	Water Availability	Genetic Diversity	Biomass Energy	Climate Regulation	Regulating Water Quality	Regulating Soil Quality	Regulating Water Flow	Regultating Soil Erosion	Pollination	Pest Regulation	Regulating Coastal Erosion	Sense of Place / Inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
SEO 1: Manage the wooded character of the NCA and its important historic parklands to optimise carbon storage, water quality and regulation of peak flow events, and to strengthen habitat networks, enhancing the sense of place and history.	↔ *	↑ **	↗ **	↗ *	↑ **	↑ **	↑ **	↗ **	↑ **	↑ **	↗ **	↔ **	NA	↗ **	↗ **	↗ *	↗ **	↑ *	↔ **
SEO 2: Support sustainable management of the agricultural landscape to retain important rates of food provision, while enhancing the network of semi-natural habitats within pastoral and arable landscapes, protecting the wildlife and water quality of the River Derwent, optimising carbon storage, soil quality and regulation of peak flow events, and strengthening the sense of place.	↑ **	↔ **	↗ **	↗ *	↔ **	↗ **	↑ **	↑ **	↑ **	↑ **	↗ **	↗ **	NA	↗ **	↗ **	↗ *	↔ **	↗ **	↔ **
SEO 3: Protect the geological and historic landscape features that are characteristic of the area, including its distinct landform, prehistoric earthworks, medieval monasteries, grand houses with designed parkland, and settlement pattern. Manage these features to provide diverse public benefits, enhancing the sense of place and history, and protecting natural resources.	↗ **	↗ **	↗ *	↔ **	↗ *	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↔ **	NA	↑ **	↑ **	↗ **	↗ *	↗ **	↑ **
SEO 4: Promote enhanced access to and enjoyment of the Howardian Hills in ways that will maintain and enhance the AONB's special qualities and character, and its tranquillity, and that will support the essential underpinning ecosystem services, the quality of soils and water, and carbon storage.	↔ **	↔ **	↗ **	↔ **	↔ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ *	N/A	↑ **	↗ **	↑ **	↑ **	↗ **	↔ **

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

Landscape attributes

Landscape attribute	Justification for selection
Extensive and varied woodland cover and trees in the landscape.	■ Woodland is often ancient in origin, though much has been replanted in recent decades (these Plantations on Ancient Woodland Sites (PAWS) are a priority for habitat restoration). ■ Mixed and deciduous woodlands in sheltered valleys and on steep valley slopes, with alder woods in damp valley bottoms, in field and boundary trees, large blocks of coniferous plantations. ■ High proportion of trees in designed/historic parkland, including wood pasture and veteran trees.
Mixed agriculture dominant, in mosaic with semi-natural habitat.	■ Predominantly arable cropping intimately mixed with livestock farming on pockets of pastures and unimproved grassland on steeper slopes and damper valley floors, providing a varied agricultural landscape. ■ Although areas of semi-natural grassland habitats are small and fragmented, botanically-rich road verges and churchyards throughout the NCA create a high potential for 'permeability'.
Field boundaries.	■ Regular rectangular fields date from the 17th and 18th century enclosures, bounded predominantly by hedges with boundary trees, some fences and drystone walls on elevated plateaux.
Country houses and designed parklands.	■ The many stately homes and the designed parklands that surround them are key features, and include Castle Howard, Newburgh Priory, Hovingham Hall, Whitwell Hall, and Nunnington Hall. These houses and the designed parkland that surrounds them are major visitor attractions in the area. ■ There are 4 registered parks and gardens within the NCA, covering 1,758 ha.
Scattered settlements and small villages.	■ Tradition buildings are constructed in local limestone and sandstone with red pantile roofs. The stones vary in colour from rich reds to pale creams. ■ Small villages with village greens are characteristic as are medieval churches.
Archaeological and historical features.	■ There is a wide range of archaeological and historical features ranging from iron-age earthworks on prominent hilltops to Roman legacy and medieval monasteries. ■ Earthwork remains of common fields around shrunken and deserted medieval settlements provide evidence of the long history of arable cropping. ■ Eighty two of the NCA's scheduled monuments are on the Heritage at Risk register.
River valleys and wetlands and classic features of post-glacial 'modified drainage'.	■ The landform is strongly influenced by underlying geology, being formed from the sandstones and mudstones of Middle Jurassic period, and the calcareous sandstone and limestone of the Upper Jurassic, with prominent limestone scarps along the outermost edges, and glacial drift deposits forming a more undulating landform in the south and west.Complex landform of ridges, plateaux, plateau fringes, hills and valleys.
High level of tranquillity and unspoilt character.	■ This is a very tranquil area, with one of the lowest levels of intrusion and disturbance in the country. There are few settlements, and these are connected by a network of minor roads, with one major through route in the NCA, the A64.

Landscape opportunities

- Protect the complex and dramatic landform features of ridges, plateaux, hills, scarps, valleys and gorges.
- Manage the wooded character of the hills, seeking opportunities to restore ancient woodland sites which have been planted with conifers, expanding the woodland area as appropriate to the locality and where this will not be detrimental to species-rich grassland or other wildlife interest.
- Manage commercial woodland to deliver multiple ecosystem benefits, and accommodating cycles of open ground where this will be valuable for wildlife such as particular plants, birds and invertebrates. Pursue opportunities to restore dwarf shrub heath where seed bank persists in felled areas and along woodland rides.
- Retain permanent, extensively grazed grassland as a landscape feature which if well-managed, will provide a number of important ecosystem services, such as storing carbon, stabilising soil erosion, regulating water flow and water quality, alongside food provision.
- Manage the agricultural landscape to enhance semi-natural habitats and species, and their resilience to climate change, as well as contributing to the management of flooding and water quality. Pursue opportunities to extend the area of grassland habitat and strengthen this ecological network, using road verges and churchyards as key corridors and stepping stones.
- Enhance the landscape fabric through the restoration of traditional field boundary features typical of the locality - hedgerows around lower fields, drystone walls on the elevated plateaux.
- Manage the important historic parklands and their features, including veteran trees and wood pasture, preventing further loss of these features.
- Promote the use of local building stone, ensuring that quarrying is small-scale with minimal visual and noise intrusion.
- Protect historic landscape features such as iron-age earthworks, deserted medieval settlements and historic buildings and seek to reduce the number of sites on the Heritage at Risk register.
- Improve the ecological condition of the River Derwent through improvements to riparian management and by tackling diffuse sources of nutrient and sediment input as well as non native invasive species.
- Maintain the characteristically high levels of tranquillity, ensuring that improvement to infrastructure and other new development is assimilated to a high degree into the landscape and where possible ensure that such developments make a positive contribution to the character and features of the NCA.
- Improve access to, understanding and enjoyment of, the countryside, whilst reinforcing the special qualities of the AONB.

Ecosystem service analysis

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Food provision	Semi- natural vegetation Soils Sustainable farming practice	The majority of the NCA comprises grade 2 and 3 agricultural land (10 and 80 per cent respectively). Arable farming is dominant (for example cereals and oilseed rape) with cattle and sheep rearing also significant.	Regional	Food security is likely to be increasingly important and it is crucial that increased / enhanced food production from the NCA is done in a sustainable way which does not undermine or deplete the resources it depends on.	Secure sustainable future for food provision, ensuring this is based on sustainable resource use (water use, soil management, nutrient and chemical applications) such that this also provides wider public benefits, including carbon storage, water quality and regulation of peak flood events, and is permeable to species movement in response to climate change. Use livestock rearing to graze grassland habitats at sustainable levels, thus maintaining their wildlife interest and protecting soils and water quality. Support/develop the market for high quality local produce, and build on the success of local markets such as Hovingham, thereby contributing to sense of place and maintaining the cultural landscape and the biodiversity it supports.	**Food provision** **Climate regulation** **Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Regulating water** **Sense of place / inspiration** **Pollination** **Tranquillity**
Timber provision	High proportion of woodland cover Soils	The NCA is a well wooded landscape (15 per cent coverage), with large-scale conifer plantations and woodland blocks on the open plateaux, and small-scale alder woodlands in valley bottoms.[7] Much of the conifer plantation is overplanted ancient woodland (PAWS).	Regional	There are a total of 3,274 ha of woodland with considerable potential for expansion and bringing unmanaged woodland into active management.	Seek opportunities to increase the area of woodland within the habitat network through native woodland planting in appropriate locations which will complement local biodiversity interest and landscape character and support efforts to protect soil quality and prevent erosion. Seek opportunities to develop hardwood supplies by restoring PAWS sites to native woodland. Seek opportunities to restore traditional woodland management such as coppicing.	**Timber provision** **Biomass energy** **Water availability** **Climate regulation** **Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Regulating water flow** **Sense of place / inspiration** **Pollination** **Tranquillity**

7 Opportunities and optimum sitings for energy crops, Natural England (accessed December 2010; URL: www.naturalengland.org.uk/ourwork/farming/funding/ecs/sitings/areas/029.aspx)

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability	Rivers, lakes and aquifer Soils Farming practice	The main river in the NCA is the River Derwent, which flows for 18 km through the south-east of the NCA. The NCA overlies a minor aquifer – Yorkshire Water borehole at East Ness The landscaped grounds of the Castle Howard stately home contain several large ponds and lakes including the Great Lake, which is the largest water body in the NCA, covering some 280,000 square meters.[8]	Regional	There is 'no water available' for further abstraction from the Derwent, largely to protect downstream flow levels outside of the NCA (where resources are currently 'over licensed'). Several tributaries flow south or east through the NCA. These have not been assessed in terms of resource availability, however the rivers Rye and Derwent into which they flow have 'no water available'.[9]	Restore or create wetlands in appropriate locations to improve water storage capacity, while reducing flooding risk, improving climate regulation, habitat networks and ecosystem resilience to climate change; Expand native woodland in appropriate locations to increase infiltration of surface water to the aquifer. Secure sustainable grazing of grasslands and other soils management which will increase infiltration of surface water to the aquifer. Ensure that in planning for new development, or in selection of crop types, demand for water is given full consideration and sustainable solutions are developed – this may include water harvesting and sustainable drainage/ filtration systems.	**Water availability** **Food provision** **Timber provision** **Climate regulation** **Regulating soil erosion** **Regulating soil quality** **Regulating water flow** **Biodiversity**
Biomass energy	High proportion of woodland cover Soils	The NCA is a well wooded landscape, with large-scale conifer plantations and woodland blocks on the open plateaux, and small-scale alder woodlands in valley bottoms.[10]	Local	There is a total of 3,274ha of woodland (15 per cent of the NCA area), which offers very considerable potential for the provision of biomass by bringing unmanaged woodland under management and as a by-product of the commercial timber production. There is a medium potential yield for miscanthus within the NCA, and generally a medium potential yield for short rotation coppice, with a small number of pockets of high and low potential yield. For information on the potential landscape impacts of biomass plantings within the NCA, refer to the tables of 'opportunities and optimum sitings for energy crops' on the Natural England website.[11]	Seek opportunities to restore traditional woodland management such as coppicing, while maintaining an element of non-intervention management to support important deadwood biodiversity. Ensure that miscanthus crops are sited to support the provision of multiple ecosystem services (for example avoiding slopes or areas of semi-natural vegetation, where miscanthus crops can increase risk of soil erosion and run-off) and are well-integrated into the wooded landscape character.	**Biomass energy** **Climate regulation** **Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Regulating water flow**

8 Derwent Catchment Abstraction Management Strategy, Environment Agency (March 2006)
9 Ibid
10 Opportunities and optimum sitings for energy crops, Natural England (accessed December 2010; www.naturalengland.org.uk/ourwork/farming/funding/ecs/sitings/areas/029.aspx)
11 Ibid

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation	High proportion of woodland cover Permanent grasslands Wetland habitats Soils	There is a low soil carbon content of 0-5 per cent throughout the NCA reflecting the mineral soils that cover all the NCA. There will be a higher soil carbon content under the 3,274 ha of woodland within the NCA, as well as the 310 ha of floodplain grazing marsh, areas of semi-natural grassland and reedbeds.	National	Existing woodland cover could be managed and expanded to improve opportunities for carbon sequestration and storage Increased carbon sequestration and storage can be achieved by increasing soil organic matter content, especially in areas under continuous cultivation, and reducing the frequency / area of cultivation. Maintaining and expanding wetland areas can also create further carbon stores.	Improve management of existing trees and woodland, for example restoring PAWS plantations to native woodland, and seek to expand tree cover in appropriate locations and in ways that will strengthen ecological networks and support species' adaptation to climate change Increase the amount of carbon stored in agricultural soils through appropriate management such as soil aeration, minimum tillage agriculture, managing soil organic matter content and sustainable grazing levels. Restore/create wetlands in appropriate locations	**Food provision** **Timber provision** **Water availability** **Climate regulation** **Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Regulating water flow** **Sense of place / inspiration** **Biodiversity**
Regulating water quality	Rivers Soil types and vulnerability to erosion Semi-natural habitat Farming and forestry practice.	The ecological potential of the River Derwent and the ecological status of other tributaries in the NCA are classed by the Environment Agency as 'moderate'. The chemical status of groundwater in the NCA is generally 'good'.[12] 98 per cent of the area is classed as a nitrate vulnerable zone	Regional	The entire NCA lies within two of Defra's priority catchments, the 'Yorkshire Derwent' or 'Yorkshire Ouse, Nidd and Swale' These areas were among the first tranche of catchments to be identified in June 2006 and reflects the 'moderate' status of water quality. There are identified issues of diffuse agricultural pollution from phosphates and nitrates from areas under cultivation. [13, 14] The location of input-intensive crops in high-risk areas, and the condition of farm infrastructure are factors influencing diffuse supply of chemicals and sediment to surface and ground waters.	Promote good soil and land management practices to protect water supplies, particularly from sediment and nutrient input. This could include creating buffer strips to watercourses and preventing livestock access (the River Derwent and tributaries being priority), appropriate tree and woodland planting. Promote the use of best practice in nutrient application and crop treatment to minimise chemical run-off or groundwater pollution.	**Water availability** **Climate regulation** **Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Regulating water flow** **Biodiversity**

12 Humber River Basin Management Plan, Annex A: Current state of waters, Environment Agency (December 2009)
13 Capital Grant Scheme - Funding Priority Statement 2010/11, Catchment 8: Yorkshire Ouse, Nidd & Swale, Natural England
14 Capital Grant Scheme - Funding Priority Statement 2010/11, Catchment 21: Yorkshire Derwent, Natural England

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil quality	Soil type Farming and forestry practice	There are 5 main soilscape types in this NCA: freely draining slightly acid loamy soils, covering 44 per cent of the NCA; slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (39 per cent); shallow lime-rich soils over limestone (9 per cent); loamy and clayey floodplain soils with naturally high groundwater (4 per cent); and slightly acid loamy and clayey soils with impeded drainage (2 per cent).	Regional	The freely draining slightly acid loamy soils are permeable and retaining their porosity may be valuable for recharging groundwaters, providing base flows to the rivers of the area. This requires the maintenance of good soil structure to aid water infiltration and the matching of nutrients to needs to prevent pollution of groundwaters. The slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils may suffer compaction, for example from vehicle movement, 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.	Adopt best practice in soil management and nutrient application for example by: securing sustainable grazing levels to limit poaching and compaction, in particular focussing on important groundwater recharge areas and ensuring that the species-richness of vegetation cover is maintained; enhancing soil structure and nutrient levels through rotational cropping and use of 'green manure' legumes, and managing organic matter levels in soils. Ensure that vehicle and machinery use in forestry operations uses low ground pressure technology and avoids conditions where soil compaction is likely.	**Water availability** **Climate regulation** **Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Regulating water flow** **Biodiversity**
Regulating soil erosion	Soil type (vulnerability to erosion) Semi-natural vegetation	The soils covering some 57 per cent of the NCA are prone to soil erosion. Reflecting the potential for soil erosion, the entire NCA lies within one of Defra's 'Yorkshire Derwent' or 'Yorkshire Ouse, Nidd and Swale' priority catchments where sedimentation of water courses as a result of soil erosion is an indentified problem.[15, 16]	Regional	The freely draining slightly acid loamy soils and the shallow lime-rich soils (together covering 53 per cent of the NCA) have an enhanced risk of soil erosion on steeper slopes where soils are cultivated or left bare, exacerbated where organic matter levels are low after continuous cultivation or where soils are compacted. The slightly acid loamy and clayey soils with impeded drainage are prone to compaction, leading to increased risk of erosion by surface water run-off, especially on steeper slopes. Defra's catchment sensitive farming scheme supports good soils management within the priority catchments.	Encourage extensive grazing of lowland grasslands to maintain soil structure and organic matter, limit poaching and compaction, improve infiltration and prevent channelling, run-off and erosion, thus also maintaining /enhancing species-richness of semi-natural habitat. Secure sustainable management of arable land – including selection of crop type, use of appropriately placed buffer strips and uncropped land, tree planting on steeper slopes/ around watercourses, and hedgerow restoration. Encourage fencing off and/or sustainable management of riparian habitat including: buffer strips and/or tree planting and control of non-native invasive species such as Himalayan balsam, to limit bankside erosion while improving water quality in the Derwent SAC. These measures will also assist in limiting transmission of livestock diseases and increasing carbon sequestration.	**Climate regulation** **Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Regulating water flow** **Biodiversity**

15 Capital Grant Scheme - Funding Priority Statement 2010/11, Catchment 8: Yorkshire Ouse, Nidd & Swale, Natural England

16 Capital Grant Scheme - Funding Priority Statement 2010/11, Catchment 21: Yorkshire Derwent, Natural England

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow	Rivers Semi-natural vegetation and soils	The River Derwent reacts relatively slowly to rainfall or snow melt, due to the geology and shape of the catchment. This reduces the vulnerability of the river to short duration rainfall and flash floods, but increases the chance of large scale flood events after prolonged heavy rainfall, particularly within this NCA. The Holbeck and Wath Beck, tributaries to the Rye, draining low-lying agricultural land, have a shallow gradient and are similarly low energy river systems.[17] The capacity of semi-natural vegetation and soils to improve infiltration or otherwise attenuate heavy rainfall or lateral flows.	Regional	Prolonged rainfall over a number of days was the cause of significant floods affecting a large area, including the town of Malton, in 1999 and 2000. There is considerable flood risk on agricultural land south of Terrington, associated with the confluence of two minor becks flowing south into the Derwent; and north of Gilling East, from Holbeck (a tributary of the Rye).[18] Measures taken at catchment scale to increase the infiltration rates of water into the ground and increase the surface roughness of the ground (reducing surface flows), both involving the management and extension of semi-natural habitat can mitigate these risks. Thus, measures taken upstream in the North York Moors and Vale of Pickering can influence flows in the Howardian Hills, and measures taken here influence flows further downstream.	Work with authorities in the neighbouring NCAs (the North Yorks Moors and Vale of Pickering) to encourage land management practices which will increase the interception of rainfall in upper catchments. Reduce flood risk through woodland creation and carefully located tree planting. Improve infiltration of rain water and reduced surface flows, through retention and good management of permanent pasture. Extend the areas of wetlands and restore former wetland zones to create greater water storage capacity and slow the flow during flooding events as well as aiding the spread and dispersal of wetland species.	**Water availability** **Climate regulation** **Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Regulating water flow** **Biodiversity**
Pollination	Semi-natural habitats	Habitat inventories reveal there are 665 ha of non woodland semi-natural priority habitat within the NCA. This is largely interspersed in the agricultural landscape and will provide some nectar source for pollinating insects as do the hedgerows of the valleys, areas of wood pasture, and some boundary and infield trees. Species-rich road verges and old churchyards also provide important nectar sources.	Local	Pollinators play a vital role in food provision, in this area pollinating oilseed rape, field beans and orchards, but research shows their numbers have declined sharply. Providing suitable nectar sources at a landscape scale and the habitat structures required for other stages of their life cycles should help to address this and enable pollination, vital to much farming, to continue.	Provide more feeding, breeding and hibernation habitat for pollinators and beneficial predator species at a landscape scale by maintaining, restoring and creating flower-rich habitats, such as hay meadows, particularly in the Derwent Valley, calcareous grassland on steeper slopes, and hedgerows in the lower valleys. Encourage floral and structural diversity within arable systems: arable flora and wild bird seed or nectar flower mixes on arable farms. Enhance management of road verges for nectar provision and vegetation structure for pollinators.	**Food provision** **Climate regulation** **Regulating soil erosion** **Regulating water quality** **Regulating water flow** **Sense of place / inspiration** **Pollination** **Biodiversity**

17 Derwent Catchment Flood Management Plan, Environment Agency (July 2010)

18 Flood Map 2010, Environment Agency (accessed December 2010)

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pest regulation	Limited areas of semi-natural wetland and grassland habitats and hedgerows	Small areas of semi-natural habitat are interspersed with productive agricultural land.	Regional	Semi-natural habitat within productive agricultural landscapes may support species which prey on pest species, thereby regulating the potential damage of these to food production.	Enhance the network of semi-natural habitats throughout the agricultural landscape so they may provide habitat for predator species within close proximity of main food production areas. Enhance the network of hedgerows.	**Food provision** **Pest regulation** **Biodiversity**
Sense of place/ inspiration	Geology and landform Woodland cover Historic assets, particularly Castle Howard and other parkland / designed landscape and local building materials Semi-natural habitats	A sense of place is provided by this belt of complex rounded limestone ridges (including the prominent Caulkleys Bank) rising above the surrounding Vales of adjacent NCAs. The landscape is a diverse mosaic of sheltered valleys, patchwork of woodland, parkland and villages with open arable and large-scale plantations on the intervening ridges and plateaux, offering extensive views over the Vales. The landscape has a well-wooded feel, and contains many historic buildings such as Castle Howard, set within extensive designed grounds and parkland, a defining characteristic of the area. Villages are linear and located along springlines, raised ridges and vantage points. The use of local limestone and sandstone (featuring rich reds to pale cream colours) with red pantile roofs further reinforce a sense of place.	National	The Howardian Hills has a distinctive character which can be maintained and enhanced through careful management of the natural and built environment. Feelings of inspiration and escapism are likely to be associated with the dramatic landforms (prominent limestone scarps and deep river gorge), strongly wooded character, panoramic views for example from Crayke Hill castle, historic buildings and romantic parkland landscapes and absence of people in the less settled areas.	Protect/restore historic buildings, characteristic parkland features and veteran trees, enhancing opportunities for sustainable recreational access. Maintain/restore traditional field boundaries and maintain/enhance the network of semi-natural habitats, within the farmed landscape and native woodland on the slopes and ridges. Promote the use of traditional skills, encouraging the use of traditional building materials and techniques, thus ensuring the integrity of village character is maintained. Ensure that new developments are integrated into the landscape and extensive views out over surrounding vales are protected.	**Sense of place / inspiration** **Sense of history** **Recreation** **Biodiversity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history	Archaeological and historic features Pattern of historic settlement and enclosure Geodiversity	A sense of history is derived from the remains in the landscape of bronze-age burial mounds, and earthworks, ancient field systems, and medieval churches, priories and castles. There is significant evidence of Roman occupation including the remains of 20 pottery kilns at Cranbeck. There is a strong pattern of medieval nucleated settlement, particularly in the valleys, often in the form of distinctive linear villages. Regular patterns of rectilinear fields, a result of 17th and 18th-century enclosure, are characteristic of the Howardian Hills. Parkland associated with country houses form a strong feature in the landscape. The design of these estates, Castle Howard in particular, had a widespread influence on the former agricultural landscape including the incorporation of planned vistas stretching over long distances. There are 4 registered parks and gardens within the NCA.	National	The Howardian Hills NCA has a strong sense of being shaped by past human interventions in the landscape, most notably the country houses and designed landscapes, early and medieval churches, and prehistoric earthworks. These continue to give shape and texture in the landscape. Protecting this link with the past and enhancing our understanding of this will further strengthen the character of the area.	Protect the archaeological resource through appropriate land management (for example by protecting scheduled remains under permanent grassland or preventing scrub encroachment) and management of pressure for development and recreation, thus reducing the number of scheduled monuments on the Heritage at Risk register. Protect historic parkland and designed landscapes, preventing further loss from changes in land management, and seek to restore those sites which have suffered neglect or damage. Protect historic features within woodlands, and promote understanding of woodland and wood pasture as evidence of historic land use and practice. Retain and promote traditional crafts and techniques and the use of traditional materials in building restoration. Provide interpretation of the archaeological and historical sites to raise awareness and knowledge.	**Regulating soil erosion** **Sense of place / inspiration** **Sense of history** **Tranquillity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Tranquillity	Geology/ landform Semi-natural vegetation Ordered features of designed parkland landscape Very low levels of intrusion or disturbance	Tranquillity is a significant feature of this NCA with 85 per cent of the area classified as 'undisturbed', a decline from 98 per cent in the 1960s (according to CPRE data). A sense of tranquillity is likely to be associated with the sheltered valleys, woodlands and less densely settled rural areas and the parkland landscapes of the large estates.	Regional	Tranquillity is identified in the AONB Management Plan as a key quality of the area. There are very low levels of intrusion or disturbance in the NCA. The main source of disturbance is associated with the town of Malton and surrounding development in the south east and the main A64 transport route linking Malton with York and Scarborough.	Manage expansion around main settlements and transport networks and infrastructure improvements to contain intrusion into 'undisturbed' areas; Protect landscape features which contribute to sense of tranquillity, such as native woodlands and parkland features.	**Sense of place/ inspiring places** **Sense of history** **Tranquillity**
Recreation	Rights of way network and long distance routes Open access land 75 per cent of the NCA is within the Howardian Hills AONB	The NCA offers a network of rights of way totalling 343 km at a density of just over 1.4 km per km^2 as well as a small amount of open access land covering 19.4 ha or just 0.08 per cent of the NCA. In addition, part of the Ebor Way long distance route, and the Foss Way and Derwent Way pass through the area. There are also some walks and rides laid out through woods and across fields of the larger estates.	Regional	There is a very small proportion of open access land in this NCA. Recreational activity can lead to localised environmental degradation such as soil erosion but will have health and economic benefits.	Seek opportunities to extend and link rights of way and areas of open access or areas open to the public, for example historic houses and their designed landscapes, and promote their sustainable use. Manage paths network to reduce erosion and sedimentation, particularly to the River Derwent, thereby helping to improve the condition of this internationally important site for biodiversity. Ensure that new recreational facilities are capable of strengthening the special qualities of the AONB, and are assimilated into the landscape.	**Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Recreation** **Biodiversity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity	Semi-natural 'priority' habitats S41 species Designated sites (SSSI, SAC, SPA, local sites)	There is one internationally designated site within the NCA, part of the River Derwent SAC (75 ha within the NCA), a site which supports an abundance of aquatic vegetation, as well as otter and the sea lamprey and bullhead fish species.[19] There are 8 SSSI totalling less than 1 per cent (142 ha) of the NCA area. About 60 per cent of the SSSI are in 'unfavourable' condition, and 40 per cent are in 'favourable' condition. Habitat inventories indicate there is 665 ha of non woodland semi-natural priority habitat within the NCA, this largely interspersed in the agricultural landscape.	National	The network of designated sites is the cornerstone of efforts to reduce fragmentation of habitats, create stronger ecological networks and allow our native habitats and species to adapt to climate change. Designated sites are also fundamental to long-term monitoring and thus to our understanding of ecology and responses of organisms to environmental change. Diffuse pollution arising in the Derwent catchment (sediment and nutrient), and the spread of Himalayan balsam and related sediment input to the river is a threat to achieving favourable condition of the River Derwent SAC. Much of the non-woodland semi-natural habitat within the NCA such as calcareous grassland, calcareous fen, and neutral grassland, is small and fragmented, yet present in mosaic through the landscape, creating good opportunities to increase connectivity between these.	Encourage and support management which will achieve favourable condition of SSSI features. Through periodic review and amendment where necessary ensure that the SSSI series continues to be capable of supporting the interest features in predicted future climate scenarios; Promote land management practice that will reduce sediment and nutrient supplies to the River Derwent SAC. Control Himalayan balsam along the River Derwent. Ensure that opportunities listed elsewhere in this analysis to enhance or expand semi-natural habitats, are delivered in a coherent way which will expand, buffer or link habitats within an ecological network (for example maintaining and restoring botanically rich road verges as corridors between core areas of lowland neutral or calcareous grassland) and thus create greater resilience in our native flora and fauna to future environmental change. Maintain and expand the network of sites supporting the locally rare knapweed broomrape.	**Biodiversity** **Pollination** **Pest regulation**
Geodiversity	Geological exposures and features – scarps, ridges and valleys reflecting underlying geology and process Soils Designated sites (SSSI, local sites)	There are 3 Geological Sites of Special Scientific Interest within the NCA area, and geodiversity features in the wider landscape.	National	The network of designated sites underpins our knowledge of geology and is often the focus of research to further this understanding. Currently there are no locally identified Local Geological Sites within the NCA.	Review SSSI series in light of new research to ensure it continues to protect the best and most important examples of geodiversity. Explore opportunities within quarries to expose important geological features. Encourage the identification and designation of Local Geological Sites, making these accessible where appropriate to improve our understanding of geology and soils and provide opportunities for learning.	**Sense of place / inspiration** **Sense of history** **Recreation** **Geodiversity**

19 Joint Nature Conservation Committee (accessed December 2010; URL: www.jncc.gov.uk/protectedsites/sacselection/sac.asp?EUCode=UK0030253)

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