National Character Area profile:

34. Bowland Fells

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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.

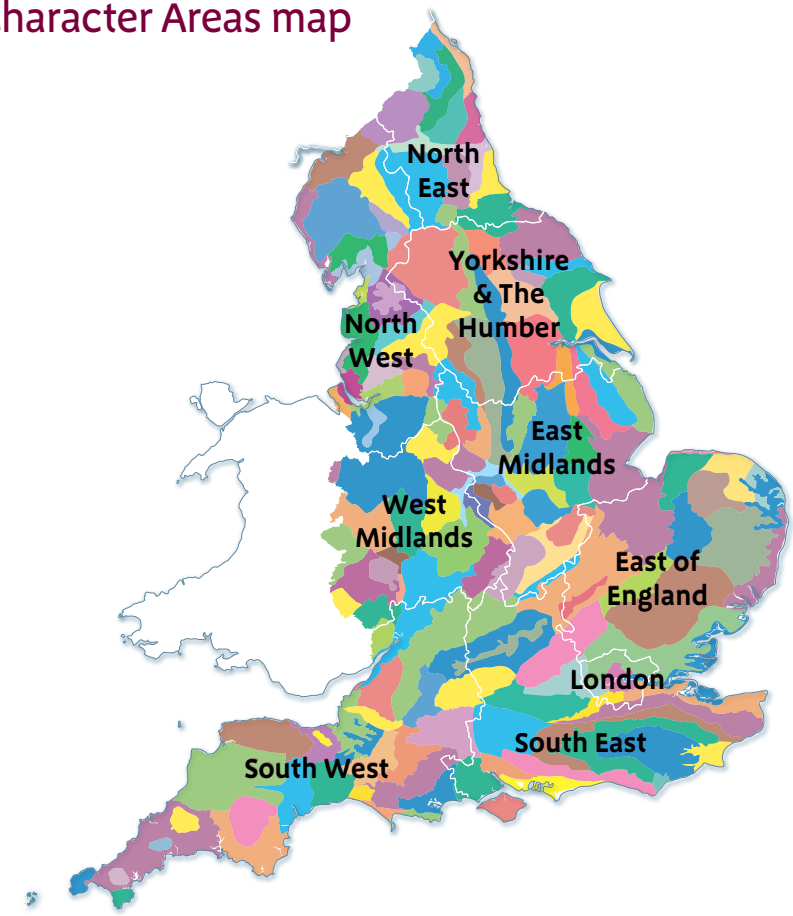
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and 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

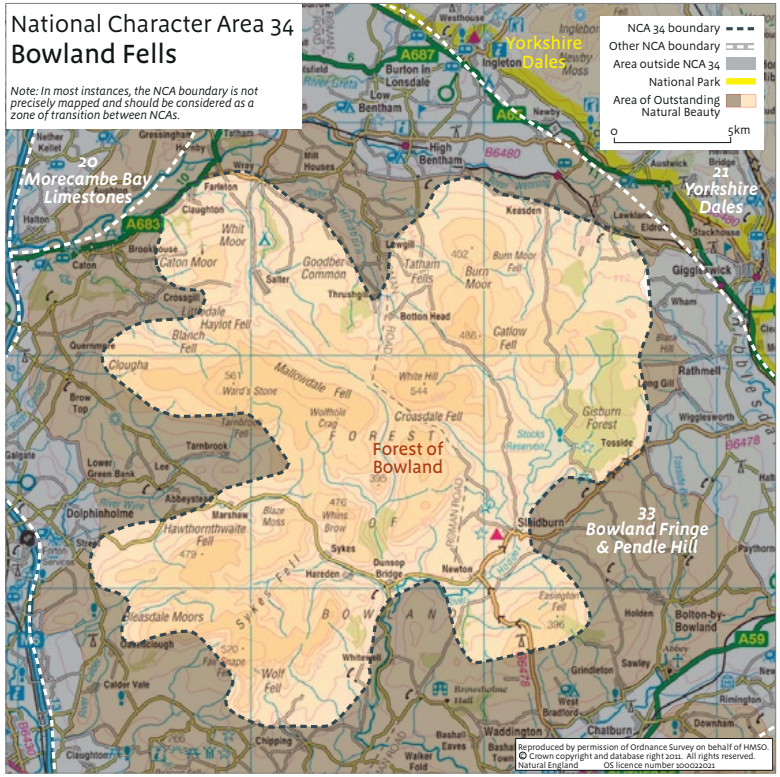


[1] The Natural Choice: Securing the Value of Nature, Defra (2011; URL: www.official-documents.gov.uk/document/cm80/8082/8082.pdf)
[2] Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services, Defra (2011; URL: www.defra.gov.uk/publications/files/pb13583-biodiversity-strategy-2020-111111.pdf)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

Summary

The Bowland Fells form a distinctive upland block on the boundary between north Lancashire and the Yorkshire Dales. The landscape is wild and windswept, with steep escarpments, upland pasture and expansive open moorland. The National Character Area is within the Forest of Bowland Area of Outstanding Natural Beauty and also contains areas of moorland, designated as a Special Protection Area due to its international importance for breeding hen harrier, merlin and lesser black-backed gull. It also provides for other important species such as peregrine, ring ouzel and breeding waders. The peat soils of the fells, including the deep columns of peat associated with blanket bog, store significant volumes of carbon. Blanket bog habitat is also important for water storage. High-quality species-rich meadows can be found in the limestone areas to the east. There are also a large number of important waterbodies throughout the area. Extensive conifer plantations occur to the south-east and east of the area, with fragmented broadleaved woodland largely in the cloughs.

Current and future challenges for the area include managing moorland to mediate against downstream flooding in the catchments originating in the Fells, managing the increasing pressure on water resources, achieving long-term improvement in habitat condition and connectivity, increasing carbon stores in soil/vegetation, strengthening landscape resilience and adaptation to climate change and managing increased tourism and recreational demand while promoting the positive benefits.



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Statements of Environmental Opportunities:

- **SEO 1:** Safeguard, manage and enhance the large areas of open, expansive blanket bog and wet-heath habitats and the important species they support, to ensure a strong network of habitats as well as for the benefits this brings to climate regulation, water quality and availability.

- **SEO 2:** Manage and enhance the landscape character and biodiversity of the moorland fringes, with their mosaic of pastures and meadows and their strong field patterns defined by drystone walls and hedgerow, to improve ecological networks and strengthen landscape character.

- **SEO 3:** Manage and enhance the watercourses and catchments for nature conservation, public enjoyment, recreation, water supply and flood management.

- **SEO 4:** Increase the significance of woodland and trees, and manage existing tree cover to provide a range of benefits, including helping to assimilate new infrastructure, restore lost habitats and landscape features, store carbon, reduce soil erosion, enhance water quality and provide timber, fuel and recreational opportunities.

- **SEO 5:** Manage the development of and support sustainable tourism to minimise its impact on the cultural heritage, landscape character and tranquillity of the area, and increase opportunities for visitor engagement, enjoyment and understanding of the natural environment.

Hen Harrier, Bowland's iconic bird of prey.

Description

Physical and functional links to other National Character Areas

The steeply sloping escarpments link the exposed moorland tops with the surrounding valleys of the rivers Lune, Ribble, Hodder and Wyre, which reinforces a strong physical and visual association with the surrounding Bowland Fringe and Pendle Hill National Character Area (NCA). Bowland Fells NCA lies entirely within the Forest of Bowland Area of Outstanding Natural Beauty (AONB).

The Bowland Fells share many characteristics with areas of the Yorkshire Dales and North Pennines, particularly the 'gritstone' geology and open expanses of moorland and blanket bog.

The area provides water catchment for many of the surrounding rivers in the adjacent Bowland Fringe and Pendle Hill NCA and beyond. The northern slopes of the Fells are drained by streams that flow to the rivers Wenning and Hindburn, tributaries of the Lune, which flows through Lancaster before entering the sea at Morecambe Bay. The western and south-western slopes are drained by the headwaters of the River Wyre and its tributaries, the rivers Calder and Brock, as well as the River Conder, which flows directly to the Irish Sea. The River Wyre enters the sea at Fleetwood. The southern and eastern slopes are drained by streams flowing to the River Ribble and by the headwaters of its tributary, the River Hodder. The Ribble flows through Preston before entering the Irish Sea at Lytham St Anne's.

The NCA has strong visual links with many of the surrounding NCAs, including views outwards to the Lake District, the Yorkshire Dales, and Morecambe Bay and the Irish Sea. Conversely, the Fells provide an impressive backdrop to views looking towards the NCA.

The Trough of Bowland, a picturesque routeway dividing the upland core into two main blocks.

A more detailed description of landscape character is provided in the Forest of Bowland AONB Landscape Character Assessment (2009)

Key characteristics

- The large-scale, sweeping landform of the Bowland Fells is incised by narrow, wooded, intimate valleys and cloughs. Steeply sloping sculptural escarpments and exposed moorland tops contrast with the surrounding lush green valleys of the Lune, Ribble, Hodder and Wyre.
- The dominant feature is the central upland core of Carboniferous Millstone Grit fells, with its large areas of moorland habitat – including some of England's most extensive tracts of blanket bog.
- Extensive coniferous plantations, such as Gisburn Forest, occur to the south-east and east of the area.
- The moorland is ringed by extensive rough grazing enclosures with mosaics of woodland, unimproved meadows, pasture, marshes and streams. These upland pastures are enclosed by drystone walls and are grazed mainly by sheep, with some cattle.
- Rare and endangered species are associated with the mosaic of habitats. The fells support a diverse upland breeding bird community of international importance, which includes three protected species of raptor – hen harrier, merlin and peregrine – and a large colony of lesser black-backed gulls. The mosaic of habitats also supports the red-listed ring ouzel and amber-listed whinchat. Similarly, fields of wet flushed grassland around the moorland fringe are important for breeding wader populations, including redshank, lapwing, snipe and curlew.
- The area is also home to a number of rare or important plant species, including the nationally scarce bog rosemary and pale forget-me-not, with high-quality species-rich grasslands found in the limestone areas to the east.
- The area's many rivers and streams provide habitat for nationally and internationally important species such as salmon, trout, eels, bullheads, grayling, otters, kingfishers and dippers.
- Piecemeal, irregular-shaped fields around individual farms are found on the slopes, where there is also a complex system of narrow lanes with occasional wide historic drove roads. Systematic division of the majority of the commons resulted in more regular enclosures on higher ground.
- The area is sparsely populated, with the scattered settlements restricted to villages, hamlets and isolated farmhouses.
- Traditional farmhouses are generally of gritstone and typically shelter a barn under the same roof line (laithe houses). There is strong unity of building materials, styles and village form.
- Large areas of the Bowland Fells are managed for field sports, principally red grouse shooting on the heather moors and pheasant rearing in plantations below the Fells. Fishing is also very popular.
- Large areas of open access land enable access to and enjoyment of, the many natural and cultural features of the landscape, and thus improve opportunities to experience escapism and inspiration.

Bowland Fells today

The Bowland Fells form part of the Forest of Bowland AONB. The growing numbers of day visitors underline the fact that Preston, Lancaster and the towns of east Lancashire lie close to the AONB boundary. The area provides a focus for recreational activities that are valued and enjoyed by visitors, which in turn delivers economic benefits to the local communities.

The dominant feature of this area is the central upland core of deeply incised gritstone fells and extensive tracts of heather moorland and blanket bog. The fells are designated as Sites of Special Scientific Interest (SSSI) (39 per cent of the NCA) and are also internationally important for upland bird populations, particularly hen harrier and merlin, while also supporting a large colony of lesser black-backed gull. As such they are designated as a Special Protection Area (SPA). Substantial areas of heather are managed for grouse shooting, resulting in access tracks, shooting butts and cabins. Management includes annual heather burning from October to mid-April, which encourages the growth of new young heather shoots as food for the grouse. In some areas the vegetation is dominated by rushes, grasses and cotton grass. Peat hags have developed in several eroded areas on the tops of the fells where rock outcrops and sandstone boulders occur sporadically on some moorland summits.

The isolation of the open and windswept Bowland Fells is complemented by steep escarpments and upland pasture, deeply dissected by steep-sided, intimate wooded valleys that open out into the broad, lush rural valleys of the Lune, Ribble, Hodder and Wyre. The upland pasture is criss-crossed by drystone walls and dotted with stone farms and villages, the cultivated character of which contrasts with the sweeping moorland heights. The Trough of Bowland, a natural pass connecting the valleys of Marshaw Wyre and Langden Brook, divides the upland core into distinct blocks and forms a picturesque routeway.

The drainage pattern of this area has cut deep cloughs through the harder sandstone in a radial pattern emanating from the upland moorland plateau. The moorland summit is predominantly raw peat soils (blanket bog), which infill hollows and produce a smooth, undulating land surface. The remaining uplands are soils from the Belmont series and are typically acid, coarse and loamy. This land has traditionally been converted, by drainage and fertiliser/lime application, to improved pastures for grazing but the process is subject

Oakenclough. Cloughs and wooded valleys are a particular feature of the area.

to reversion in places as economic prosperity fluctuates, resulting in rush rich pastures, which are of importance for breeding wading birds.

Steeply incised cloughs and wooded valleys are particular features that link the exposed mosaics of moorland and blanket bog vegetation with the lush green pastures and woodlands at lower levels. Areas of acid oak and birch woodland are also present in some areas, notably on the northern side of the Fells, where they are important for their rich assemblage of bryophytes, and birds such as pied flycatcher, redstart, wood warbler and tree pipit. Rapidly flowing streams and rivers provide a habitat for salmon, trout, eels, bullheads, grayling, otters, dippers, grey wagtail, common sandpiper, oystercatchers and kingfishers.

The escarpments support a mixture of semi-natural moorland habitats on the upper slopes of the fells, while large areas of unimproved or semi-improved rough pasture occur on the lower slopes within large enclosures of drystone walls. Extensive areas of bracken have also become established in places on the deeper, richer soils of the lower slopes. The escarpment slopes are generally unwooded, although coniferous and broadleaved woodland blocks occur in places, most notably Fair Oak Fell and Tarnbrook Fell. The largest of the coniferous plantations is Gisburn Forest, which is associated with the large waterbody at Stocks Reservoir; as well as being important for tourism and recreation the area is important for wintering wildfowl and breeding birds such as red-breasted merganser, black-headed gull and ringed plover. It also supports small but locally important populations of crossbill, black grouse, nightjar and goshawk.

The valley bottoms and lower slopes of upland fringe farmland predominantly support fields of species-poor grassland used for silage production. Above this, enclosures of rough pasture are usually present at the moorland edge. Such areas had previously been reclaimed from the moorland and converted into pasture, but are now often dominated by rush, provide important breeding grounds for waders such as lapwing, redshank, curlew, snipe and oystercatchers. The field boundaries in this area are usually a combination of hedgerows, drystone walls and post and wire fencing. Herb-rich hay meadows occur in the limestone areas of the east around Slaidburn and along the river valleys of Tarnbrook and the Hindburn.

A short distance beyond the boundary of the NCA, the major conurbations of Lancaster to the west and Preston to the south-east have an influence over the area, through visits for recreational activities, tourism and commerce.

Ward's Stone. Sporadic sandstone outcrops interrupt the smooth broad fell tops.

The landscape through time

The character of Bowland is dominated by the Millstone Grit, laid down by rivers and deltas in the Carboniferous Period. This occurs as alternating thick beds of coarse-grained sandstone ('gritstone') separated by layers of more easily eroded mudstone. The core of Bowland is hard sandstone, which forms the fell tops, while the softer beds of shale have eroded to form lower undulating areas broken by low scarps and valleys. The smooth, broad fell tops are interrupted only by sporadic outcrops of sandstone, as at Ward's Stone and Clougha Pike. Glacial action has smoothed the outline of the Fells and has formed the distinctive scenery of small hills and drumlins, as seen in the river valleys to the north-east of Bowland. Meltwater from retreating glaciers has cut outwash channels, which create conspicuous notches in the skyline of the Fells to the north of Clougha Pike.

The lower slopes of the Bowland Fells are covered in slightly calcareous glacial till derived from Carboniferous parent materials. These areas are generally under permanent grassland, with some more fertile areas suitable for limited cultivation.

The formation of the open moorland landscape dates from the episodes of cultivation, and then extensive cultivation and removal of woodland cover completed by the end of the Neolithic Period. A combination of soil exhaustion and climate change gave rise to heathland and blanket bog and the permanent abandonment of most upland settlement in the late Bronze Age, in the late second millennium BC. The open aspect of the landscape was sustained through the use of the moorland for summer grazing and fuel, which extended into modern times. It is possible that woodland returned to some areas in the 1st millennium AD, and Anglo-Saxon and Norse place names testify to colonisation and woodland clearance from the 7th century.

The Bowland Fells have long been used as a hunting area and constituted part of the Royal Forest of Lancaster in medieval times. Increased population pressure led to the clearance and colonisation of the Bowland fringes in the 12th to 13th centuries, based around a cattle-rearing economy. Vaccaries (cattle stock farms on large estates) founded in the 12th and 13th centuries had a large impact on settlement pattern, developing into farmsteads and hamlets as they were let out by landowners from the 14th century and as population increased from the late 15th century. The extinction of wolves by the end of the 14th century further perpetuated the farming culture and enabled sheep grazing to extend onto the Fells. Large-scale enclosure occurred from the 1550s to 1630 and had a profound effect on the Bowland landscape. The main change was

Slaidburn, one of the area's picturesque villages.

the conversion of moorland and woodland waste to meadow and permanent pasture. The form of enclosure varied from piecemeal, irregular-shaped fields around individual farms to systematic divisions of the majority of the commons resulting in regular enclosure, although commons were retained in some northern parts such as Keasden, Clapham and Goodber. Field boundaries at this time were predominantly earthen banks, with hedges or drystone walling in areas where the bedrock is close to the surface.

Post-medieval enclosure (1600–1850) accounts for a large proportion of the fieldscapes rising from the Hodder Valley and extending further up the northern fellsides. There are also speculative moorland enclosures that reverted to moorland after 1840–50.

Settlements within the Bowland Fells are restricted to villages, hamlets and isolated farmhouses. These are largely scattered but are occasionally quite densely concentrated, as in the valley of the Keston Beck on the eastern side of Burn Moor. Constructed predominantly out of local gritstone they complement the natural features of the landscape and contribute to the aesthetic quality. The unity afforded by building materials, building style and village form provides a common identity throughout Bowland. Narrow streets, duckstone pavements, village greens, cottage gardens and stone boundary walls are characteristic features of the many picturesque villages. The variety of architectural detail using consistent gritstone and the combination of large houses and modest cottages give each village its particular identity and unique charm. The isolated stone-built farmhouses are often backed by a small copse and set within stone walls. The typical style is a two-storey structure with thick gritstone walls, commonly with a barn or byre under the same roof line.

There are ongoing positive changes to the landscape including improved stock management, blanket bog restoration through blocking of grips and more sensitive heather burning management for grouse shooting. There has also been significant restoration of boundary features and hay meadows.

The availability of access provisions within the NCA continues to provide visitors with increasing opportunities to reach wild and remote settings, giving them the chance to feel inspired by their surroundings and allowing them to participate in a range of physical activities, whatever their ability. The popularity of outdoor pursuits has brought with it a need to provide for the requirements of participants, including catering and accommodation, and has expanded related businesses that support the leisure industry, all of which contribute to the local economy.

Wyresdale. The Bowland Fells are important for rearing sheep and cattle.

Ecosystem services

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

Provisioning services (food, fibre and water supply)

- **Food provision**: The Bowland Fells are important for rearing livestock. Many traditional farming practices are still employed here, providing a food resource from the sustainable rearing of sheep and cattle. Locally sourced food also plays an increasingly important role in supporting tourism in the area, and in the process helps to encourage Bowland's green economy.

- **Timber provision**: Extensive conifer plantations occur to the south-east of the area, the largest being Gisburn Forest. The dominant species is Sitka spruce. There are opportunities for local small-scale woodland products from the small under-managed broadleaved woodlands.

- **Water availability**: Principal surface water resources within the NCA are the catchments of the rivers Lune, Wyre and Ribble, as well as Stocks Reservoir on a tributary of the Ribble. High rainfall combined with impervious rock in this area supports abstraction, mainly for public water supply.

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

- **Climate regulation:** In this NCA carbon levels in the soil are generally high (20–50 per cent), reflecting the large bodies of deep peat and peat-rich soils associated with extensive tracts of wet-heath and blanket bog habitat. These soils enable this NCA to store significant volumes of carbon dioxide and other greenhouse gases. Degraded peat bogs release these stored gases into the atmosphere and through water run-off. Sustainable management of blanket bog and other moorland habitats provides opportunities to safeguard existing stores of greenhouse gases while sequestering increased volumes of carbon dioxide from the atmosphere. Soil carbon is also high under areas of woodland, and carbon storage and sequestering is also provided by the woodland itself.

- **Regulating soil erosion**: A significant proportion of the peatland soils covering this NCA are in an unfavourable condition and prone to erosion. The slowly permeable wet, very acid upland soils with a peaty surface and the blanket bog peat soils often found on the plateau tops are at risk of gullying/hagging (and loss of particulate organic matter) where surface vegetation is damaged, highly modified or lost. The blanket bog peat soils are also vulnerable to occasional mass flow events and can be affected by wind erosion where the soil is bare. Erosion is equally prevalent in the very acid loamy upland soils with a wet peaty surface, often found on steep slopes, where a combination of rapid run-off and easily damaged peat layers results in soil erosion. In addition bracken spraying and rabbit populations on steep slopes are associated with some large-scale soil erosion.

- **Regulating soil quality**: Blanket bog peat soils and the slowly permeable wet, very acid upland soils with a peaty surface are at risk of loss of organic matter through climate change and soil erosion. Equally, the peat of the very acid loamy upland soils with a wet peaty surface has low strength when wet and is easily damaged by grazing and trafficking. The slowly permeable, seasonally wet, acid loamy and clayey soils may suffer compaction and/or capping, as they are easily damaged when wet. In turn this may lead to increasingly poor water infiltration and diffuse pollution as a result of surface water run-off.

- **Regulating water quality**: Bowland Fells form the headwaters of many river systems, which discharge high volumes of clean water from the NCA in all directions. The high rates of rainfall coupled with the extensive areas of semi-natural habitat mean that the ecological river water quality is generally good across the NCA's rivers. This falls to moderate, however, in the upper reaches of the rivers Calder and Hindburn and the River Hodder upstream of Stocks Reservoir. The chemical status of groundwater is poor in the north and west of the NCA but good in the south and east.

- **Regulating water flow (flooding):** This NCA has steep topography, impervious rock and narrow flood plains, which combine with high rainfall to produce watercourses that respond rapidly to rainfall. The resultant increased fluvial flood risk occurs in adjacent downstream NCAs, since this upland NCA is sparsely populated, with little cultivated land. When in good biological condition, blanket bog and wet-heath can play a part in intercepting rainfall and attenuating peak flow rates, mitigating flood risk in many situations by retaining water in situ for longer.

Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration**: A sense of place is provided by the long, uninterrupted views from the plateau and hills across to neighbouring NCAs, as well as the distinctive sculpted escarpments, exposed moorland tops, wooded valleys and woodlands. It is a quiet, sparsely settled landscape, maintaining the open and large-scale feel of the uplands but with a more hospitable feel due to its topographic compactness and its proximity to surrounding settlements. These tranquil and sensory environments assist relaxation and meditation, and in turn have a calming and restorative effect, providing health and wellbeing benefits to visitors.

- **Sense of history**: The history of the landscape is most notably evident in its archaeological features dating from the Roman period and earlier, which have remained intact due to low-intensity farming. Field enclosures bounded by drystone walls vary from regular patterns on higher ground, where commons were systematically subdivided, to older, more irregular enclosures on the slopes. Buildings are unified by materials, styles and form, constructed in sandstone grit with stone flag and from mid-19th-century Welsh slate roofs. The area formed part of the Royal Forest of Lancaster and an important hunting ground; large blocks of ancient woodland that remain include Roeburndale to north-west.

- **Tranquillity**: With its long-distance views, low levels of traffic, dark night skies and extensive farming this NCA is important for the tranquillity it provides. Some 99.4 per cent of the area was classified as 'undisturbed' by the Campaign to Protect Rural England in 2007. Contact with these tranquil and sensory environments has a calming and restorative effect on visitors, leading to improvements in health and wellbeing.

- **Recreation**: The NCA offers a network of rights of way totalling 314 km at a density of just over 0.8 km per km^2. There is a wealth of open access land, covering 22,550 ha, or just over 60 per cent of the area. Cycling is continually popular, with increasing opportunities for off-road cycling in Gisburn Forest. Road cycling is also a popular pursuit, especially on the officially designated 'quiet lanes' and long-distance challenge routes and sportives. Other popular activities include birdwatching, gliding, fishing and shooting. Volunteering activities such as drystone walling and hedgelaying are becoming increasingly popular.

- **Biodiversity**: This NCA contains a significant extent and concentration of biodiversity. Biodiversity Action Plan priority habitats cover 14,000 ha (37 per cent) of the area, and include 10,000 ha of upland heathland and 3,000 ha of blanket bog. The NCA contains two Special Areas of Conservation and one SPA, and 14,600 ha are nationally designated as SSSI, covering 40 per cent of the NCA. The hen harrier, the area's iconic bird of prey, breeds in very few other places in the country. Wading birds such as lapwing, snipe, curlew and redshank arrive in spring to nest and rear their young on the open farmland and moors. Many fish species are present year round, and the upper tributaries provide important spawning habitat for fish such as trout and salmon.

- **Geodiversity**: The Bowland Fells are important for their fluvial geomorphology, showing the recent development of alluvial fans, river bank erosion and channel changes since deglaciation. The Langden Brook catchment is part of the Bowland Fells SSSI. There are nine locally designated geological sites, including stream sections, meltwater channels, ancient coal workings and rock outcrops.

Botton Head Fell. The NCA offers a wealth of open access land.

Statements of Environmental Opportunity

SEO 1: Safeguard, manage and enhance the large areas of open, expansive blanket bog and wet-heath habitats and the important species they support, to ensure a strong network of habitats as well as for the benefits this brings to climate regulation, water quality and availability.

For example, by:

- Seeking opportunities to restore, expand and improve ecological links between upland habitats to improve the condition of the vegetation and achieve a strong, resilient ecological network.
- Enhancing the full range of fell habitats to ensure that they support the important assemblages of bird species, allowing population sizes to be maintained and where possible increased, including the area's iconic bird of prey, the hen harrier, which breeds in very few other places in the country.
- Maintaining and where necessary restoring degraded areas of blanket bog to active sphagnum-dominated bog, to promote peat formation and carbon sequestration and to prevent erosion and oxidation.
- Seeking opportunities to retain water or manage run-off by re-wetting to bring blanket bog back into favourable ecological and hydrological condition; and improving downstream water quality.
- Maintaining and where necessary restoring degraded heathland communities to dwarf shrub communities; achieving sustainable grazing regimes to avoid poaching of soils and to aid water infiltration; and ensuring that burning and cutting programmes promote structural and biological diversity, as well as avoiding loss of peaty soils through erosion or oxidation.
- Seeking opportunities to ensure that commercial forestry operations do not damage sensitive peatland systems and other Quaternary landforms and deposits.
- Ensuring that archaeological sites, and the potential for them, are considered as an integral part of these habitats.

Blanket bog on Staple Oak Fell.

SEO 2: Manage and enhance the landscape character and biodiversity of the moorland fringes, with their mosaic of pastures and meadows and their strong field patterns defined by drystone walls and hedgerow, to improve ecological networks and strengthen landscape character.

For example, by:

- Establishing and maintaining connectivity between habitats by protecting land in between pockets of habitat from intensification and maintaining the ability of species to move through the landscape.
- Protecting, expanding and linking areas for wildlife within and between the areas of highest biodiversity resource, including statutory and local wildlife sites.
- Conserving, enhancing and creating species-rich in-bye pastures and hay meadows on the moorland fringe (particularly the limestone areas to the east), which provide important small-scale landscape interest and habitats for wildlife.
- Conserving, maintaining and restoring the area's valued and distinctive hedgerows and stone walls, respecting differences in local styles.
- Promoting the maintenance and restoration of traditional farm buildings, where appropriate using local stone and vernacular building styles.
- Maintaining the field pattern of in-bye land, with its network of drystone walls and hedges, retaining local differences in the style of boundary features.

SEO 3: Manage and enhance the watercourses and catchments for nature conservation, public enjoyment, recreation, water supply and flood management.

For example, by:

- Promoting the management of nutrient inputs to farmland, targeting applications to maximise uptake and minimise run-off.
- Managing fells, river banks, flood plains and wetlands for a robust vegetation cover that reduces soil erosion and water run-off, through appropriate grazing regimes.
- Restoring blanket bog and other wetlands through extensive grazing and re-wetting (including grip blocking), to ensure resilience to climate change.
- Seeking opportunities for sustainable river management that works with natural processes and allows space for rivers within connected flood plains, to increase resilience to extreme weather events while enhancing water quality, biodiversity and recreation and mitigating downstream flood risk.
- Ensuring that future development and land use planning is sustainable in terms of impacts on water quality, water resources and flood risk.
- Encouraging appropriate access for the public enjoyment of recreational activities, and promoting an understanding of both the importance of water to the fabric of the NCA and the need for its sustainable management.

SEO 4: Increase the significance of woodland and trees, and manage existing tree cover to provide a range of benefits, including helping to assimilate new infrastructure, restore lost habitats and landscape features, store carbon, reduce soil erosion, enhance water quality and provide timber, fuel and recreational opportunities.

For example by:

- Exploring opportunities to modify the overall structure of conifer plantations to create softer outlines, a more organic shape that responds to topography, and a higher broadleaved content.
- Exploring opportunities to plant new native woodlands on the lower hills and moorland fringes without compromising the area's character; ensuring that woodland expansion avoids bodies of deep peat and avoids impacting on other sites of biodiversity value; and ensuring that new woodlands enhance the local landscape character in terms of typical scale, type and location and avoid impacting on features of historic interest.
- Supporting the natural regeneration and appropriate planting of new small-scale native woodlands, the expansion of existing woodlands (particularly small areas of ancient, semi-natural woodland) and the planting of non-woodland trees, especially within moorland cloughs and river valleys.
- Exploring opportunities to get existing woodland into management for local woodland products and wood fuel supplies.
- Conserving, restoring and enhancing existing woodland boundary walls, banks and hedges, giving priority to those that are important for stock control, landscape value and habitat.
- Stockproofing the area's important clough woodlands and encouraging natural regeneration and linking of existing sites.
- Expanding the potential for plantation-type forestry to be managed to accommodate recreational interests, including improvements to the rights of way network, to allow public participation, understanding and enjoyment of the natural environment.

Roeburndale upland oak wood.

SEO 5: Manage the development of and support sustainable tourism to minimise its impact on the cultural heritage, landscape character and tranquillity of the area, and increase opportunities for visitor engagement, enjoyment and understanding of the natural environment.

For example by:

- Maintaining the tranquil and wild character of the uplands and upland fringes through protection from encroachment by commercial forestry and avoiding visual intrusion by large-scale developments.
- Controlling development within the surrounding landscape to retain the openness of the upland landscape and uninterrupted views.
- Managing development within the built environment and encouraging sensitive restoration of existing buildings to maintain historic features and the distinctive character of the area's settlements.
- Protecting and maintaining traditional farm buildings and visible archaeological features, which are key elements of the landscape.
- Supporting high-quality management of, and access to, open access land and other accessible countryside, to provide a quality visitor experience and greater public enjoyment.
- Managing visitor pressure sensitively, to avoid damage to soils, habitats and species; to maintain tranquillity by promoting alternative destinations; and to provide enhanced opportunities for visitors to reconnect with nature.
- Recognising the value to the local economy that visitors to the NCA bring, and working with commerce to support initiatives to promote sustainable tourism and grow a local green economy.

Additional opportunity

1. Protect the strong relationship between the landscape and the underlying geology, the land use it supports and its significance to the cultural identity of the area.

For example by:

- Maintaining key views of landform and geological features and using semi-natural land cover to enhance and support biodiversity without obscuring landform features.
- Keeping important geological exposures such as quarry faces, cuttings, outcrops and stream sections visible and, where appropriate, accessible.
- Providing opportunities for interpretation of the landscape, its features and its rich history and heritage, for the understanding and enjoyment of all.

Supporting document 1: Key facts and data

Total area: 37,395 ha

1. Landscape and nature conservation designations

Over 99 per cent (37,353 ha) of the NCA falls within the Forest of Bowland Area of Outstanding Natural Beauty (AONB). The Forest of Bowland AONB Management Plan provides a policy framework and identifies a 5-year programme of actions (April 2009 - March 2014) to help guide the work of the AONB partnership organisations towards achieving the purpose of this plan - to conserve and enhance the natural and cultural beauty of the Forest of Bowland landscape.

- The management plan can be downloaded at: **www.forestofbowland.com/cons_managementplan**

Source: Natural England (2011)

1.1 Designated nature conservation sites

The NCA includes the following statutory nature conservation designations:

Tier	Designation	Name	Area (ha)	Percentage of NCA
International	n/a	n/a	0	0
European	Special Protection Area (SPA)	Bowland Fells SPA	14,549	39
	Special Area of Conservation (SAC)	North Pennine Dales Meadows SAC; Calf Hill and Crag Woods SAC	24	<1
National	National Nature Reserve (NNR)	n/a	0	0
National	Site of Special Scientific Interest (SSSI)	A total of 7 sites wholly or partly within the NCA	14,628	39

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.

Bowland Fells SPA and Bowland Fells SSSI comprise the same area; the majority being within the NCA (91 per cent). The North Pennine Dales Meadows SAC comprises 3 SSSI meadow sites, two of which are mostly within the NCA (Myttons Meadow SSSI and the majority of Bell Sykes Meadows).Calf Hill & Crag Woods SAC/SSSI is mostly outside the NCA. Only the southern tip of Calf Hill Wood is within the NCA.

There are 125 Local sites in the Bowland Fells NCA covering 3,951 ha which is 11 per cent of the NCA.

Source: Natural England (2011)

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

1.1.1 Condition of designated sites

SSSI condition category	Area (ha)	Percentage of SSSI land in category condition
Unfavourable declining	11	<1
Favourable	3,313	23
Unfavourable no change	0	0
Unfavourable recovering	11,304	77

Source: Natural England (March 2011)

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

Langden Brook, Trough of Bowland.

2. Landform, geology and soils

2.1 Elevation

The NCA is an upland area with deep valleys thus the elevation ranges from 19 m above sea level to a maximum of 561 m. The mean elevation is 296 m.

Source: Natural England 2010

2.2 Landform and process

The Bowland Fells form a distinct and almost circular upland dome of moorland, with gritstone outcrops and deep wooded river valleys. The Trough of Bowland, a pass connecting the valleys of the Marshaw Wyre and Langden Brook, divides the upland core into two main blocks. To the north of the Trough, an east-west ridge of moorland rises to over 560 m at Ward's Stone, the highest point within the NCA. To the south of the Trough, a more deeply incised hill mass rises to a summit of 510 m at Fair Snape Fell on the southern most part of an escarpment edge.

Source: Bowland Fells Countryside Character Area description

2.3 Bedrock geology

The character of Bowland is dominated by the Millstone Grit, laid down by rivers and deltas in the Carboniferous period. This occurs as alternating thick beds of coarse-grained sandstone ('gritstone') separated by layers of more easily eroded mudstone shales. The core of Bowland is hard sandstone, which forms the fell tops, while the softer beds of shale have eroded to form lower undulating areas broken by low scarps and valleys. The smooth broad fell tops are interrupted only by sporadic outcrops of sandstone at Ward's Stone and Clougha Pike.

Source: Bowland Fells Countryside Character Area description

2.4 Superficial deposits

The moorland summit is predominately raw peat soils (blanket bog) which infill hollows and produce a smooth undulating land surface. The remaining uplands are soil from the Belmont series and are typically acid, coarse and loamy. The lower slopes of the fells are covered in slightly calcareous glacial till derived from Carboniferous parent material. Bowland Fells is important for its fluvial geomorphology, showing the recent development of alluvial fans, river bank erosion and channel changes since de-glaciation, such as those which are conspicuous in the Langden Valley.

Source: Bowland Fells Countryside Character Area description

2.5 Designated geological sites

Tier	Designation	Number
National	Geological Site of Special Scientific Interest (SSSI)	0
National	Mixed interest SSSIs	0
Local	Local Geological Site	9

Source: Natural England 2011

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

2.6 Soils and Agricultural Land Classification

The moorland summit is predominately raw peat soils (blanket bog) which infill hollows and produce smooth undulating land surface. The remaining uplands are soils from the Belmont series and are typically acid, coarse and loamy. The lower slopes of the fells are covered in slightly calcareous glacial till derived from Carboniferous parent material, giving rise to more fertile soils. This NCA has 5 main soilscape types: blanket bog peat soils (34 per cent); slowly permeable wet very acid upland soils with a peaty surface (28 per cent); slowly permeable seasonally wet acid loamy and clayey soils (19 per cent); very acid loamy upland soils with a wet peaty surface (16 per cent); loamy and clayey floodplain soils with naturally high groundwater (1 per cent).

Source: Bowland Fells Countryside Character Area description; Natural England 2010

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

Agricultural Land Classification	Area	Percentage of NCA
Grade 1	0	0
Grade 2	0	0
Grade 3	497	1
Grade 4	7,878	21
Grade 5	27,582	74
Non-agricultural	1,428	4
Urban	0	0

Source: Natural England (2010)

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

3. Key waterbodies and catchments

3.1 Major rivers/canals

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

Name	Length (km)
River Brock	<1
River Calder	3
River Conder	<1
River Hindburn	<1
River Hodder	16
River Wyre	3
Tosside Beck	<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.

This NCA has steep topography and narrow floodplains which combine with waterlogged moorland soils and high rainfall to produce watercourses that respond rapidly to rainfall.

The northern slopes of the Bowland Fells are drained by streams which flow to the rivers Wenning and Hindburn, tributaries of the River Lune which flows through Lancaster before entering the sea on the southern side of Morecambe Bay.

The western and south-west slopes of the Bowland Fells are drained by the headwaters of the River Wyre and its tributaries the rivers Calder and Brock as well as the River Conder which flows directly to the Irish Sea. The River Wyre enters the sea at Fleetwood on the southern entrance to Morecambe Bay.

The southern and eastern slopes of the Bowland Fells are drained by streams flowing to the River Ribble and by the headwaters of its tributary the River Hodder. The Ribble flows through Preston before entering the Irish Sea at Lytham St Annes.

3.2 Water quality

The total area of Nitrate Vulnerable Zone is 17,938 ha, 48 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 3,080 ha of woodlands over 2 ha (8 per cent of the total NCA area), of which 258 ha is ancient woodland.

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

4.2 Distribution and size of woodland and trees in the landscape

Trees are generally absent from the central core. Steeply incised cloughs and wooded valleys link the exposed moorland with the lush green pastures and woodland at lower levels. Large blocks of ancient woodland survive here most notably Roburndale to the north-west. Extensive coniferous plantations occur to the south-east and east of the area, the largest of which is Gisburn Forest which is associated with the large water body at Stocks Reservoir. Small copses shelter the area's isolated farmhouses.

Source: Bowland Fells Countryside Character Area description; Countryside Quality Counts 2003

4.3 Woodland types

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

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

Woodland type	Area (ha)	Percentage of NCA
Broadleaved	1,014	3
Coniferous	1,592	4
Mixed	68	<1
Other	406	1

Source: Forestry Commission (2011)

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

Woodland type	Area (ha)	Percentage of NCA
Ancient semi-natural woodland	231	1
Ancient re-planted woodland (PAWS)	28	<1

Source: Natural England (2004)

Small copses shelter the areas isolated farmhouses.

5. Boundary features and patterns

5.1 Boundary features

The estimated boundary length for the NCA is about 2,109 km. The majority of the area is unenclosed moorland fell. The fells are fringed by extensive areas of piecemeal ancient pre-1600 enclosure with irregular small to medium scale patterns defined by a mixture of stone walls, banks, hedgerows and fragments of ancient woodland.

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

5.2 Field patterns

The majority of the area is unenclosed moorland fell. The fells are fringed by extensive areas of piecemeal ancient pre-1600 enclosure with irregular small to medium scale patterns. Post-medieval enclosure (1600-1850) accounts for a large proportion of the fieldscapes rising from the Hodder Valley and extending further up the northern fellsides. These are distinguished by relatively large rectilinear field patterns defined by dry stone walls. They include some speculative moorland enclosures which reverted to moorland after 1840-50. These relict fields are particularly notable around Salter to the north-west, on Lamb Hill Fell above Stocks Reservoir to the east, and to the south on Easington and Wolf Fells. Small areas of these upland enclosures were created through Parliamentary Act, for example above Claugton, near Newton and on Catlow Fell, but the majority were created informally or through private agreements.

Source: English Heritage Historic Profiles; 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

This is predominantly a livestock grazing NCA and is characteristically a sheep grazing area. In 2009 there were 98 commercial livestock grazing in the LFA (70 per cent), 20 Dairy farms (14 per cent) and 20 other types (14 per cent). Survey data from 2000 to 2009 shows a 26 per cent decrease in the number of dairy farms, while livestock grazing farms have increased by 15 per cent.

Source: Agricultural Census, Defra (2010)

6.2 Farm size

Farms over 100 ha in size are the most numerous, accounting for 62 out of 141 commercial holdings in 2009 (44 per cent). Between 2000 and 2009 the number of holdings decreased overall by 9 per cent from 155 to 141. This decrease was across all size bands with the exception of farms over 100 ha in size which increased by 29 per cent from 48 to 62 holdings (note: these figures do not include the access that many farms have to common grazing on the moors).

Source: Agricultural Census, Defra (2010)

6.3 Farm ownership

2009: Total farm area = 26,745 ha; owned land = 10,433 ha
2000: Total farm area = 23,900 ha; owned land = 8,965 ha

Source: Agricultural Census, Defra (2010)

6.4 Land use

The predominant land use in this NCA (97 per cent) is grass and uncropped land mainly for sheep and some cattle rearing. There was a 10 per cent increase in the total farmed area between 2000 and 2009.

Source: Agricultural Census, Defra (2010)

6.5 Livestock numbers

Sheep are the most numerous livestock type in this landscape (a total of 112,300 in 2009). Between 2000 and 2009 sheep numbers have decreased by 17,100 (13 per cent), and cattle numbers have decreased by 1,400 (12 per cent).

Source: Agricultural Census, Defra (2010)

6.6 Farm labour

In 2009 the majority of holdings were run by Principal Farmers (232) with only 6 salaried managers. Between 2000 and 2009 the number of salaried managers decreased slightly from 9 to 6, full time workers decreased from 35 to 22, part time workers increased from 35 to 37 and casual/gang workers decreased from 30 to 15.

Source: Agricultural Census, Defra (2010)

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

7. Key habitats and species

7.1 Habitat distribution/coverage

Expansive open rolling heather moorland and blanket bogs are the dominant feature of the NCA. The area is a mix of unimproved acid grassland, localised flushes and patches of rush, extensive areas of heather moorland and blanket bog, and sphagnum mosses, cranberry, crowberry, cotton grass and the scarce cloudberry. These are important habitats for red grouse, hen harrier, merlin, golden plover and peregrine. On the periphery of the moorland, areas of reclaimed pasture, often dominated by rush, provide important breeding grounds for waders such as lapwing, redshank, curlew, snipe and oystercatcher.

Steeply incised cloughs and wooded valleys are particular features that link the exposed mosaics of moorland and blanket bog vegetation with the lush green pastures and woodlands at lower levels. Occasional oak, rowan, alder and ash are present within the steeply incised cloughs of the moorland plateau. These are the favourite haunt of the ring ouzel and whinchat, especially where there are also areas of bracken. Areas of acid oak and birch woodland are also present in some areas, notably on the northern side of the Fells where they are important for their rich assemblage of bryophytes, and birds such as pied flycatcher, redstart, wood warbler and tree pipit. Rapid flowing streams and rivers provide a habitat for dipper, grey wagtail, common sandpiper, oystercatcher and kingfisher.

Steeply sloping escarpments, crags, quarries and rock scree support a mixture of semi-natural moorland vegetation on the upper slopes with bracken and unimproved acid grassland favoured by nesting whinchat, wheatear and twite. Many species favour the transitional zone with semi-improved grassland enclosed by drystone walls on lower ground.

Coniferous plantations are particularly extensive in the south east of the area. Gisburn forest adjacent to Stocks Reservoir, which is important for wintering wildfowl and breeding birds such as red breasted merganser, black headed gull and ringed plover, is one of the largest examples of its kind in Lancashire. It also supports small but locally important populations of crossbill, black grouse, nightjar and goshawk.

Herb-rich hay meadows occur in the limestone areas of the east around Slaidburn, and along the river valleys of Tarnbrook and the Hindburn. Pignut, yellow rattle, great burnet, lady's mantle, ox-eye daisy and meadow buttercup adorn such meadows, which attract large numbers of butterflies and other insects, along with breeding curlews.

Source: Bowland Fells Countryside Agency Summary Statements; Forest of Bowland Natural Area Profile

Merlin.

Ring ouzel.

7.2 Priority habitats

The Government's new strategy for biodiversity in England, Biodiversity 2020, replaces the previous Biodiversity Action Plan (BAP) led approach. Priority habitats and species are identified in Biodiversity 2020, but references to BAP priority habitats and species, and previous national targets have been removed. Biodiversity Action Plans remain a useful source of guidance and information. More information about Biodiversity 2020 can be found at; www.naturalengland.org.uk/ourwork/conservation/biodiversity/protectandmanage/englandsbiodiversitystrategy2011.aspx

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

Priority habitat	Area (ha)	Percentage of NCA
Upland heathland	9,707	26
Blanket bog	6,260	17
Broadleaved mixed & yew woodland (broad habitat)	433	1
Lowland meadows	268	1
Upland hay meadow	156	<1
Fens	144	<1
Lowland calcareous grassland	119	<1
Lowland dry acid grassland	80	<1
Purple moor-grass and rush pasture	78	<1
Coastal and floodplain grazing marsh	27	<1
Upland calcareous grassland	14	<1

Source: Natural England (2011)

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

7.3 Key species and assemblages of species

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

8. Settlement and development patterns

8.1 Settlement pattern

There is a scattered settlement pattern, with picturesque stone villages and strong unity of building materials, styles and village form. Vaccaries (cattle stock farms) founded in the 12th and 13th centuries had a large impact on settlement patterns, developing into farmsteads and hamlets. The main settlements are positioned around the edge of the NCA on lower ground within the valleys.

Source: English Heritage Historic Profiles; Countryside Character Area description; Countryside Quality Counts (2003)

8.2 Main settlements

Settlements within the Bowland Fells are restricted to villages, hamlets and isolated farmhouses. The main villages include: Dunsop Bridge, Slaidburn, Newton, Salter, Tosside and Claughton. The total estimated population for this NCA (derived from ONS 2001 census data) is: 2,873.

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

8.3 Local vernacular and building materials

Constructed predominantly out of local 'gritstone' buildings in the Bowland Fells complement the natural features in the landscape and contribute to the aesthetic quality. The unity afforded by building materials, building style and village form provide a common identity throughout the NCA. Narrow streets, duckstone pavements, village greens, cottage gardens and stone boundary walls are characteristic features of the many picturesque villages.

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

9. Key historic sites and features

9.1 Origin of historic features

Archaeological features are mainly from the Iron Age and have largely remained intact due to low intensity farming. These include prehistoric settlements and associated land use highly visible on unenclosed moorland and low intensity rough pasture. Field enclosures bounded by dry stone walls vary from regular patterns on higher ground, where commons were systematically subdivided, to older, more irregular enclosures on the slopes where these is also a complex system of narrow lanes with occasional wide historic drove roads. Vaccaries (cattle stock farms) founded in the 1th2 and 13th centuries had a large impact on settlement patterns, developing into farmsteads and hamlets. There is low survival of pre-1750 farmstead buildings. Some lime kilns remain from the increased arable exploitation of the margins of the area from the late 18th to mid 19th century.

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

9.2 Designated historic assets

This NCA has the following historic designations:

- 0 Registered Parks and Gardens covering 0 ha.
- 0 Registered Battlefield/s covering 0 ha.
- 6 Scheduled Monuments.
- 180 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/

10. Recreation and access

10.1 Public access

- 60 per cent of the NCA 22,550 ha is classified as being publically accessible.
- There are 315 km of public rights of way at a density of 0.8 km per km2.
- There are 0 national trails within the Bowland Fells NCA.

Sources: Natural England (2010)

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

Access designation	Area (ha)	Percentage of NCA
National Trust (Accessible all year)	0	0
Common Land	4,889	13
Country Parks	0	0
CROW Access Land (Section 4 and 16)	22,550	60
CROW Section 15	1,222	3
Village Greens	1	<1
Doorstep Greens	0	0
Forestry Commission Walkers Welcome Grants	0	0
Local Nature Reserves (LNR)	0	0
Millennium Greens	0	0
Accessible National Nature Reserves (NNR)	0	0
Agri-environment Scheme Access	0	0
Woods for People	15	<1

Sources: Natural England (2011)

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

11. Experiential qualities

11.1 Tranquillity

Based on the CPRE map of tranquillity (2006) the lowest scores for tranquillity occur around the villages and road network and the highest scores are on the open fell tops. Overall it is a very tranquil area.

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

Tranquillity	Score
Highest value within NCA	132
Lowest value within NCA	-16
Mean value within NCA	53

Sources: CPRE (2006)

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

11.2 Intrusion

The 2007 Intrusion Map (CPRE) shows the extent to which rural landscapes are 'intruded on' from urban development, noise (primarily traffic noise), and other sources of visual and auditory intrusion. This shows that Waddington Fell and Caton Moor are the only disturbed areas within the NCA. A breakdown of intrusion values for this NCA is detailed in the table below.

Intrusion category	1960s (%)	1990s (%)	2007 (%)	Percentage change (1960s-2007)
Disturbed	1	1	1	0
Undisturbed	99	99	99	0
Urban	0	0	0	0

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are the fact that disturbance has remained relatively unchanged over the last 50 years.

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

12. Data sources

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

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

Newton Hall, a Grade ii listed Georgian manor house.

Gisburn Forest, a popular destination to explore by foot, horse or bike.

Supporting document 2: Landscape change

Recent changes

Trees and woodlands

- Extensive conifer plantations occur to the south-east of the NCA - Gisburn Forest contains some of the largest areas. The main species is Sitka spruce which has generally been planted in uniform, close-ranked, single species blocks. These are being clear felled and replaced according to forest design plans which will not only add diversity in terms of landscape but also species diversity and wildlife interest. A sizable proportion of the forest has already been restocked with native broadleaved species.

- The area's stock of broadleaved woodlands, particularly the unfenced upland woods which provide shelter for stock, is vulnerable to damage by grazing. Countryside Quality Counts data indicates that levels of management of these woodlands are extremely low (4 per cent) and fragmentation is a serious issue.

- 258 ha of the NCA's woodland is ancient woodland, of this 8 per cent is plantation on ancient woodland sites. The proportion of these sites covered by a Woodland Grant Scheme agreement increased between 1999 and 2003 from 7 per cent to 18 per cent.

Boundary features

- There are many stone walls and field patterns in disrepair. Associated features such as gateposts, sheep folds, stone troughs and parish boundary markers are also at risk.

- The estimated boundary length for the NCA is about 2,109 km. Total length under Environmental Stewardship agreements as at March 2011 is 408,056 m (19.3 per cent of the total).

- The most frequent Environmental Stewardship agreements in the area are for stone wall restoration (303,282 m) and hedgerow planting and restoration (60,753 m).

Agriculture

- Agriculture is dominated by grass and uncropped land, and there was a 10 per cent increase in this land use between 2000 and 2009.

- Survey data from 2000 to 2009 shows a 26 per cent decrease in the number of dairy farms, while livestock grazing farms have increased by 15 per cent; however both total sheep and cattle numbers have decreased over this time.

- Overgrazing, drainage and recreational erosion have resulted in loss and degradation of moorland vegetation. However there are extensive areas under agri-environment schemes for management of upland habitats; for example, between 1999 and 2003 Countryside Stewardship uptake for annual area features consistently exceeded the national average. Most agreements in 2003 were for management of heather moorland habitat (8,122 ha), enhancing heather moorland (4,637ha) and management of hay meadows (97 ha).

Settlement and development

- Sale and change in management of land held by water authorities and large estates, which forms an integral part of the Bowland Fell moorland fringe landscape, have impacted on character.

- Villages and farmsteads on the moorland fringe have experienced some suburbanisation, through commuting, home-working, conversion of farm and industrial/retail buildings to residential use, associated car parking, traffic and road improvements, and diversification to tourism related uses. However, pressures for new build are limited due to AONB status.

Semi-natural habitat

- Overgrazing of heather, continuing pressures for drainage of blanket bog and footpath erosion are resulting in damage to heather moorland in some areas. However the majority of moorland SSSIs and commons are reported to be in favourable or recovering condition so the priority is maintenance and restoration.

- Agricultural improvement through fertilizer and herbicide application has led to former herb-rich meadows and pastures losing their species diversity and conservation value. Lack of traditional management often caused by abandonment of small hill farms due to ongoing economic pressures is also affecting the management of species-rich upland grasslands. This trend is confirmed by a reported increase in rough grazing in the NCA between 1990 and 1998 according to Countryside Quality Counts. In recent years Countryside Stewardship agreements have encouraged management and restoration of in-bye pastures and hay meadows.

Historic features

- Distinctive stone laithe houses and barns as well as the area's visible archaeological features are at risk and where the farming economy is marginal, lack of maintenance of buildings and management of archaeological sites is a key threat.

- About 83 per cent of historic farm buildings remained unconverted in 2003, about 80 per cent of which were intact structurally.

Rivers

- The Bowland Fells is a major water catchment area. The steep topography and narrow floodplains combine with high rainfall to produce watercourses that respond rapidly to rainfall. The resultant increase in fluvial flood risk occurs in downstream NCAs.

- Principal surface water resources within the NCA are the catchments of the rivers Lune, Wyre and Ribble as well as Stocks Reservoir on a tributary of the Ribble. The tributaries of the River Lune within the NCA have 'no water available'. The upper reaches of the River Wyre and its tributaries within the NCA are classified as 'over abstracted' or 'over licensed'.

- Ecological river water quality is generally good across the NCA's rivers but falls to moderate in the upper reaches of the Calder, Hindburn and Hodder. The chemical status of groundwater is poor in the north and west of the NCA but good in the south and east.

Drivers of change

Climate change

- Evidence from UK Climate Impacts Programme (UKCP09) shows that over the coming century the climate in north-west England is expected, on average to become warmer and wetter in winter and hotter and drier in summer. Under the medium emissions scenario by 2080: mean winter temperatures will increase by 2.6°C, mean summer temperatures will increase by 3.7°C, winter precipitation will increase by 16 per cent, summer precipitation will decrease by 22 per cent and there will be an increase frequency of extreme events (floods/droughts).

- Prolonged periods of drought could lead to reduced ground water and drying out of peat habitats making them more prone to soil erosion and wildfire events.

- Smaller, fragmented and poor quality habitat patches are vulnerable due to changes in rainfall and temperature.

- Periods of heavy rain may lead to an increase in flooding downstream and an increased risk of soil erosion or weakened soil structure due to flash flooding. There is also an associated greater likelihood of pollution of watercourses downstream. There is also a potential increased risk of landslides during times of increased rainfall.

- Threat to trees from changing pests and diseases and extreme weather events.

- Possible expansion of arable or energy crops into areas currently under permanent grassland but also possibility of more meadows replacing pastures at higher altitudes.

- There will be pressures for renewable energy development.

Forestry in the Brennand Valley.

Other key drivers

- Abandonment of hill farming in the face of economic pressure will affect species mix and character of upland habitats.
- Lack of management of semi-natural clough woodland and lack of restoration of plantation on ancient woodland sites may reduce wildlife value.
- Agricultural specialisation, intensification, and farm amalgamation may result in a loss of semi-natural habitat and cultural features.
- Heavy fertiliser use and diffuse pollution can lead to loss of biodiversity both on and off agricultural land as well as affecting water quality.
- The negotiation of appropriate moorland management regimes, to achieve good condition of the vegetation and water quality, including the restoration of bare peat and degraded blanket bog remains a key issue.
- There is an opportunity to increase tree and woodland cover to provide multiple benefits including reconnecting fragmented habitats increasing resilience and improving water quality.
- Pressure on key destinations can result in erosion and potential damage to archaeological sites, loss of habitat, tranquillity and diminished visitor experience.
- Development, traffic and lighting outside the NCA will increasingly intrude on the quality of the landscape.
- Pressure for new development and building conversion in open exposed landscapes can be visually intrusive.
- There will be increased pressure for commercial scale renewable energy infrastructure, such as windfarms.
- There are opportunities for the sensitive management of access provision to minimise visitor pressures, and enhance visitor experiences and benefits. Positive visitor experiences are likely to benefit the local economy through increased number of visits, longer stays and recommendations to others, with the promotion of the Bowland brand and other sustainable initiatives being an increasingly important part of a growing green economy.

Byre at Gilberton Farm, Tarnbrook.

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.

Bell Sykes Meadow. Part of the North Pennine Dales SAC.

Statement of Environmental Opportunity	Ecosystem Service																	
	Food provision	Timber provision	Biomass provision	Water availability	Genetic diversity	Regulating climate change	Regulating soil erosion	Regulating soil quality	Regulating water quality	Regulating water flow	Pollination	Pest regulation	Regulating coastal erosion	Sense of place/ inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
SEO 1: Safeguard, manage and enhance the large areas of open, expansive blanket bog and wet-heath habitats and the important species they support, to ensure a strong network of habitats as well as for the benefits this brings to climate regulation, water quality and availability.	↔ ***	↔ ***	↔ ***	↑ ***	↔ **	↑ ***	↑ **	↗ ***	↑ ***	↑ ***	↗ *	n/a	n/a	↑ **	↗ **	↑ ***	↗ *	↑ ***	↗ **
SEO 2: Manage and enhance the landscape character and biodiversity of the moorland fringes, with their mosaic of pastures and meadows and their strong field patterns defined by drystone walls and hedgerow, to improve ecological networks and strengthen landscape character.	↔ **	↔ **	↔ **	↔ **	↔ **	↗ **	↗ **	↗ **	↔ ***	↔ ***	↗ *	n/a	n/a	↑ ***	↗ ***	↗ **	↗ **	↑ ***	↔ ***
SEO 3: Manage and enhance the water courses and catchments for nature conservation, public enjoyment, recreation, water supply and flood management.	↔ ***	↔ **	↔ **	↑ ***	↔ ***	↑ ***	↑ ***	↑ *	↑ **	↑ ***	↔ ***	n/a	n/a	↗ **	↔ **	↔ **	↗ **	↗ ***	↔ ***
SEO 4: Increase the significance of woodland and trees, and manage tree cover to provide a range of benefits, including helping to assimilate new infrastructure, restore lost habitats and landscape features, store carbon, reduce soil erosion, enhance water quality and provide timber, fuel and recreational opportunities.	↔ **	↑ **	↑ **	↔ **	↔	↔ **	↔ **	↔ **	↔ **	↔ **	↔ *	n/a	n/a	↑ **	↔ **	↔ **	↑ **	↗ **	↔ **
SEO 5: Manage the development of and support sustainable tourism to minimise its impact on the cultural heritage, landscape character and tranquillity of the area, and increase opportunities for visitor engagement, enjoyment and understanding of the natural environment.	↔ **	↔ **	↔ **	↔ **	↔	↔ **	↔ **	↔ ***	↔ **	↔ **	↔ *	NA	NA	↑ ***	↑ **	↑ *	↑ ***	↗ **	↗ **

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
The large-scale, sweeping landform of the Bowland Fells has a strong sense of place and forms part of the Forest of Bowland AONB.	■ Elevation ranges from 19.34 m to 561.29 m above sea level. ■ Large scale exposed open moorland with a sense of remoteness and grandeur. ■ High tranquillity scores with minimal visual and auditory intrusion. ■ Over 99 per cent of the NCA falls within the Forest of Bowland AONB. ■ Strong physical and visual association with the surrounding Bowland Fringe and Pendle Hill NCA and strong visual links with many of the surrounding NCAs affording views out and providing a backdrop to views looking towards the NCA. ■ The area is incised by narrow, wooded, intimate valleys and cloughs. Steeply sloping, sculptural escarpments and exposed moorland tops contrast with the surrounding lush green valleys of the Lune, Ribble, Hodder and Wyre.
The central upland core of Millstone Grit fells, with extensive tracts of heather moorland and blanket bog.	■ Clear evidence of underlying geology and its contribution to subsequent land use and development, in particular building stone. ■ 39 per cent of the NCA is under European or national nature conservation designation. ■ 26 per cent of the NCA is upland heath and 17 per cent is blanket bog.
Extensive coniferous plantations occur to the south-east and east of the area.	■ 4 per cent of the NCA is coniferous woodland. ■ The largest of the conifer plantations is Gisburn Forest which is associated with the large water body at Stocks Reservoir.
Enclosed, reclaimed moorland pasture with an attractive mosaic of woodland, unimproved meadows, pasture, marshes and streams.	■ 125 locally designated wildlife sites within the NCA. ■ Most of the NCA is low grade (4 or 5) agricultural land. ■ 8 per cent of the NCA is under woodland cover. ■ 303,282 m of stone wall under Environmental Stewardship as at March 2011.
High quality species-rich grassland found in the limestone areas to the east.	■ North Pennine Dales Meadows SAC encompasses the range of variation exhibited by mountain hay meadows in the UK and contains the major part of the remaining UK resource of this habitat type. ■ This nationally scarce and highly vulnerable habitat has been almost completely destroyed by agricultural improvement. ■ A wide range of rare and local meadow species are contained within the meadows, including globeflower, the lady's-mantles and spignel.

Landscape attribute	Justification for selection
Rare and endangered species, associated with the mosaic of habitats.	■ The fells provide breeding habitat for a diverse upland breeding bird community of international importance, which includes three protected species: hen harrier, merlin and peregrine, and a large colony of lesser black-backed gulls. ■ Wet flushed grassland around the moorland fringe is important for breeding wader populations including redshank, lapwing and snipe. ■ A wide range of upland plant communities are present including some plants which are nationally scarce (bog rosemary, pale forget-me-not) and others which are rare in Lancashire (chickweed wintergreen, cloudberry). ■ Important populations of many insect species including large heath and small pearl-bordered fritillary.
Regular enclosures on higher ground where the majority of commons were systematically subdivided, with more irregular enclosures found on the slopes	■ Large scale enclosure occurred from the 1550s to 1630 and had a profound effect on the landscape with the conversion of moorland and woodland waste to meadow and permanent pasture. ■ A complex system of narrow lanes with occasional wide historic drove roads.
Traditional farmhouses, generally of gritstone and typically sheltering a barn under the same roof line (laithe houses).	■ Buildings are unified by materials, styles and form constructed in sandstone grit with stone flag and from mid 19th century Welsh slate roofs. ■ The isolated farmhouses are often backed by a small copse and set within stone walls. They are typically two-storey structures with thick gritstone walls.
The area is sparsely populated with the scattered settlements restricted to villages, hamlets and isolated farmhouses. There is a strong unity of building materials, styles and village form.	■ Little impact from the industrial revolution with traditional patterns of rural life being maintained by a small number of landowners. ■ Colonisation of the area is reflected in place names such as gill derived from the Norse for narrow valley as well as other terms including fell, moss, thwaite or beck. ■ Narrow streets, duckstone pavements, village greens, cottage gardens and stone boundary walls are characteristic features of the picturesque villages.
Large areas are managed for game hunting, primarily red grouse on the heather moors and pheasant rearing in plantations below the fells.	■ Large blocks of ancient woodland remain including Roburndale to the north-west. ■ Much of the land still belongs to the British Crown as part of the Duchy of Lancaster.
Large areas of open access land enable access to and enjoyment of the many natural and cultural features of the landscape.	■ 60 per cent of the NCA is classified as being publically accessible. ■ 315 km of public rights of way.

Landscape opportunities

- Maintain the tranquil and wild character of the uplands and upland fringes through protection from encroachment and visual intrusion from large-scale developments including energy and mining/quarrying development.
- Seek opportunities to ensure that commercial forestry operations do not damage sensitive peatland systems and other Quaternary landforms and deposits which have the potential to affect both the biodiversity and landscape character of the area.
- Explore opportunities to modify the overall structure of conifer plantations to create softer outlines, a more organic shape that responds to topography, and higher broadleaved content.
- Stockproof the area's important clough woodlands and encourage natural regeneration and linkage of existing woodland sites. Ensure woodland expansion does not damage archaeological remains and the visible historic environment.
- Maintain and where necessary restore the valuable mosaic of wet heath and other moorland habitats where they are adversely affected by overgrazing, drainage or erosion and burning practices.
- Manage and restore species-rich in-bye pastures and hay meadows, maintaining the contrast between enclosed grasslands in valleys and open moorlands.
- Manage development within the build environment and encourage sensitive restoration of existing buildings to maintain historic features.
- Control development within the surrounding landscape to retain the openness of the upland landscape and uninterrupted views.
- Maintain and restore the area's valued and highly distinctive stock of stone walls, respecting differences in local styles.
- Establish and maintain connectivity between habitats by protecting land in between pockets of habitat from intensification and maintaining the ability of species to move through the landscape.
- Sensitively manage visitor pressures associated with recreational activities to avoid damage to soil, habitats and species, with alternative destinations being promoted to maintain tranquillity and to provide enhanced opportunities for visitors to reconnect with nature.
- Provide opportunities to interpret the landscape, its features, and its rich history and heritage, for the understanding and enjoyment of all.

Ecosystem service analysis

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

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

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Food provision	Sheep and cattle grazing	This is an important area for rearing livestock. Soils are poor and there is little opportunity for arable crops. 95 per cent of the land is Agricultural Grade 4 or 5.	Regional	Livestock production systems prevail over the majority of the NCA and have strong associations with the area's cultural services. In many locations well managed livestock production systems have the potential to increase the overall food provision of this NCA while benefiting many of the other key ecosystem services that the Bowland Fells support. Inappropriate stocking regimes, with insufficient stock management, may have significant detrimental effects on many key environmental services including biodiversity, soil erosion, water quality and climate regulation.	Work with the local farming community to achieve appropriate grazing regimes to produce food and other multiple benefits. Encourage the development and promotion of supply chains and markets for high quality local produce.	**Food provision** **Biodiversity** **Climate regulation** **Regulating soil erosion** **Sense of place/ inspiration**
Timber provision	Existing woodland and forestry estates	8 per cent of the NCA is under woodland cover. Much of the broadleaved woodland is within steeply incised cloughs and wooded valleys. Extensive conifer plantations occur to the south-east of the area some areas of which are managed for productive timber.	National	Most of the broadleaved woodland is within steep valley sides or in cloughs. Gisburn Forest contains the largest areas of conifer plantation in the NCA. The main species is Sitka spruce which has generally been planted in uniform, close-ranked, single species blocks. These are now clear felled and replaced according to forest design plans which, not only adds diversity in terms of landscape but also increases species diversity and wildlife interest. A sizable proportion of the forest has already been restocked with native broadleaved species.	There is scope for some woodland creation on some slopes, but this needs to avoid bodies of deep peat, and to avoid impacting on other sites of biodiversity value. Also need to ensure that new woodlands are located to enhance the local landscape character in terms of typical scale, type and location and avoid impacting on features of historic interest. There is scope to continue the restructuring of conifer plantations to create softer outlines, a more organic shape that responds to topography and higher broadleaved content. There are opportunities for woodland management and restoration.	**Timber provision** **Regulating soil erosion** **Climate regulation** **Regulating water quality** **Recreation** **Biodiversity** **Regulating water flow**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biomass energy	Existing woodland and forestry estates	The existing woodland cover (8 per cent) offers moderate potential for the provision of biomass, both through bringing unmanaged woodland under management and as a by-product of commercial timber production.	Local	Supply chains and markets for local wood fuel are currently limited. Development of these is required to maximise the potential for wood fuel as a by-product of commercial forestry. Sensitive management of existing unmanaged broadleaved woodland, also offers potential for wood fuel, although access can restrict management. Biomass production in the area is currently low, however the area has a high potential yield for short rotation coppice (SRC) on lower land at the periphery of the NCA. Increased provision of SRC for fuel has the potential to increase climate regulation, but must ensure not to have a negative impact on provision of other ecosystem services, for example food, biodiversity, sense of place There is low potential yield for SRC in the centre of the NCA but high potential yield on the lower land at its periphery. For information on the potential landscape impacts of biomass plantings within the NCA, refer to the tables on the Natural England website at: www.naturalengland.org.uk/ourwork/farming/funding/ecs/sitings/areas/default.aspx	There is an opportunity to increase production of biomass as a bi-product of commercial timber production and through introducing management in currently unmanaged woodlands.	**Biomass energy** **Biodiversity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability	Reservoirs Upland Streams Blanket Bog High levels of precipitation Rain Impervious rock	The NCA does not overlay any major aquifers although the Millstone Grit forms minor (Secondary A) aquifers in this area. Principal surface water resources within the NCA are the catchments of the rivers Lune, Wyre and Ribble as well as Stocks Reservoir on a tributary of the Ribble. The tributaries of the River Lune within the NCA have 'no water available'. The upper reaches of the River Wyre and its tributaries within the NCA are classified as 'over abstracted' or 'over licensed'. The upper reaches of the River Ribble catchment within the NCA are 'over licensed'.	Regional	High rainfall combined with impervious rocks makes the area important for providing clean drinking water as well as industry, aquaculture, energy generation and topping up the Lancaster Canal. Land management practices are key to improving infiltration and storing surface water. For example United Utilities' Sustainable Catchment Management Programme (SCaMP) applies an integrated approach to catchment management across all of their water catchment land.	Opportunities to block moorland grips to increase holding capacity of the moorland habitats Ensure that moorland habitats, especially blanket bog are well vegetated and under good environmental management, increasing the capacity of habitats to retain water	**Water availability** **Regulating water quality** **Biodiversity** **Climate regulation** **Regulating soil erosion** **Regulating water flow**
Genetic diversity	Rare sheep and cattle breeds	The Lonk is a hardy hill breed native to Lancashire and well established in Bowland.	National	Rare breeds in this area provide meat, high quality local produce and hardy breeding ewes to lowland areas.	Encourage the promotion and development of supply chains and markets for high quality local produce.	**Genetic diversity** **Food provision** **Sense of place/ inspiration** **Sense of history**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation	Soils, including upland peaty soils and organic soils Existing woodland and other vegetation	In this NCA soil carbon levels are generally high (20-50 per cent), likely to be associated with the large tracts of wet heath and blanket bog found across the upland fells and with the NCA's blanket bog peat soils, slowly permeable wet very acid upland soils with a peaty surface and very acid loamy upland soils with a wet peaty surface, together covering 78 per cent of the NCA. Soil carbon will also be high under areas of woodland (8 per cent of NCA area) and carbon storage is also provided by the woodland itself.[4]	National	Much importance is attached to conserving peat based soils in the Bowland Fells due to significant volumes of CO_2 and other greenhouse gasses stored within it. Bare and eroded areas of peat need to be re-vegetated, and management to protect and expand areas of active blanket bog should be put in place. In addition any activities might damage blanket bog should be restricted, for example creating tracks, planting trees soil compaction and unsustainable burning regimes. Grip blocking would help to maintain the condition of upland peat soils and help it to retain its ability to store carbon. It is important to ensure that the existing woodlands are under good management so that their role in sequestering and storing carbon is enhanced. Area of woodland cover could be expanded where appropriate.	Ensure that all areas of blanket bog are under good environmental management, promoting active sphagnum moss growth, which improves the habitat's ability to actively sequester carbon from the atmosphere, while ensuring that it retains the significant volumes in storage. Prioritise the restoration of bare and eroded peatland habitats. Encourage sustainable grazing regimes on permanent pasture with a low input of artificial fertiliser. Create new native woodland and scrub where this sits well alongside landscape, biodiversity or historic environment interests.	**Climate regulation** **Regulating water quality** **Water availability** **Biodiversity** **Regulating soil quality** **Regulating water flow** **Regulating soil erosion**
Regulating soil erosion	Blanket bog peat soils Slowly permeable wet very acid upland soils with a peaty surface Very acid loamy upland soils with a wet peaty surface	A significant proportion (78 per cent) of the soils covering this NCA is peaty and prone to erosion. The slowly permeable, wet very acid upland soils with a peaty surface (28 per cent) and the blanket bog peat soils (34 per cent) often found on the plateau tops are at risk of gullying/ hagging (and loss of particulate organic matter) where surface vegetation is damaged or lost. Drainage of these soils (for example through gripping) may also result in increased oxidation of carbon and soil wastage. The blanket bog peat soils are also vulnerable to occasional mass flow events and can be affected by wind erosion where the soil is bare. Erosion is equally prevalent in the very acid loamy upland soils with a wet peaty surface (16 per cent) often found on steep slopes, where a combination of rapid runoff and easily damaged peat layers results in soil erosion.	Regional	Critical issues in the NCA include ensuring that the peaty soils retain water in situ, have good vegetative cover and are not overgrazed, unsustainably burned, subject to trampling, poached or subject to mechanised activities. Securing robust semi-natural vegetation on steep slopes and river banks could help reduce soil erosion.	Restore bare or eroded peat. Manage the moorland to ensure good vegetative cover and reduce run-off rates by restoring the hydrology and ecology of peatland habitats. Seek opportunities to establish permanent grassland and woodland along cloughs, steep valley sides and near watercourses.	**Regulating soil erosion** **Regulating water quality** **Regulating water flow** **Water availability** **Regulating soil quality** **Biodiversity** **Climate regulation**

[4] See also Forest Of Bowland Area of Outstanding Natural Beauty Climate Change Adaptation Plan, 2011

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil quality	Blanket bog peat soils Slowly permeable wet very acid upland soils with a peaty surface Very acid loamy upland soils with a wet peaty surface Slowly permeable seasonally wet acid loamy and clayey soils	Blanket bog peat soils (34 per cent) and the slowly permeable wet very acid upland soils with a peaty surface (28 per cent) are at risk of loss of organic matter (carbon) through climate change and soil erosion. Equally, the peat of the very acid loamy upland soils with a wet peaty surface (16 per cent) has low strength when wet and is easily damaged by grazing and trafficking for much of the year; as a consequence, poaching is common The slowly permeable seasonally wet acid loamy and clayey soils (19 per cent) may suffer compaction and/ or capping as they are easily damaged when wet. In turn this may lead to increasingly poor water infiltration and diffuse pollution as a result of surface water run-off.	Local	Vegetation growth, on the areas of semi-natural habitat, can significantly contribute to soil organic content and structure, if sustainably managed. With high rainfall levels, damaged deep and shallow peat soils are at risk of losing significant organic content. In certain areas, high grazing levels and visitor trampling on popular paths results in compaction of soils, damaging soil structure, reducing aeration and increasing run-off, leading to increased soil erosion. For the wet and peaty soils, measures should be centred on those that retain water in situ and potentially raise water levels (water storage will also aid flood attenuation); ensure good vegetative cover; and avoid over-grazing/ trampling or damage by mechanised activities. Catchment Sensitive Farming promotes targeted management of nutrient applications following soil analysis of individual fields.	Manage moorland habitats to safeguard the carbon rich soil and encourage peat forming plants Ensure that the management of the pastures and meadows on the moorland fringe will encourage the build up of organic matter through, for example, extensive grazing regimes, which will also reduce the level of poaching and compaction by livestock. Avoid carrying out mechanised activities such as trafficking that will cause compaction of soils especially in wet conditions.	**Regulating soil quality** **Regulating water quality** **Climate regulation** **Regulating water flow** **Regulating soil erosion** **Water availability** **Biodiversity**
Regulating water quality	The many fast flowing streams and rivers Extensive areas of moorland, rough grazing and woodland associated with low inputs of agro chemicals	Ecological river water quality is generally good across the NCA's rivers but falls to moderate in the upper reaches of the rivers Calder (tributary of the River Wyre), Hindburn (tributary of the River Lune) and the River Hodder (tributary of the River Ribble) upstream of Stocks Reservoir which is also of moderate quality. The chemical status of groundwater is poor in the north and west of the NCA but good in the south and east.[5]	Regional	Steep water courses result in high levels of run-off especially after heavy rainfall, with consequent impacts of erosion and increased sediment load impacting on areas downstream. Degradation of peat can be closely associated with water colouration issues which may then have to undergo costly treatment processes by water supply companies before it enters the drinking water supply. Natural river erosion is exacerbated in places by stock access to river banks. Run-off from farm land, particularly improved grassland is a key source of nutrients. United Utilities' Sustainable Catchment Management Programme (SCaMP) addressed many of these issues by applying an integrated approach to catchment management across all of their water catchment land.	Re-vegetate bare peat and improve the management of degraded peatland habitats, managing existing moorland vegetation to enhance its biological condition, reducing the degree of water colouration within associated water courses. Ensure appropriate grazing for a well vegetated sward. Seek opportunities to establish permanent grassland (non intensive) scrub and woodland along cloughs, steep valley sides and near water courses. Manage riverbanks and flood plains for a robust cover of vegetation, including woodland and scrub in places. Manage nutrients on farmsteads and on improved pastures.	**Regulating water quality** **Regulating soil erosion** **Regulating water flow** **Climate regulation** **Regulating soil quality** **Biodiversity** **Water availability**

[5] River Basin Management Plan, North West River Basin District, December 2009 (Environment Agency), accessed from http://www.environment-agency.gov.uk/research/planning/33106.aspx

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow	Rivers Floodplains Trees, woodland and scrub (increasing surface roughness, infiltration and evapo-transpiration) Other semi-natural habitats	This NCA has steep topography and narrow floodplains which combine with waterlogged moorland soils and high rainfall to produce watercourses that respond rapidly to rainfall. The resultant increased fluvial flood risk occurs mainly in downstream NCAs since this upland NCA is sparsely populated with little cultivated land. However there are areas within the NCA which are prone to flooding for example Dunsop Bridge. The northern slopes of the Bowland Fells are drained by streams which flow to the rivers Wenning and Hindburn, tributaries of the River Lune which flows through Lancaster before entering the sea on the southern side of Morecambe Bay. Flood hazard in the Lune catchment exists along the River Wenning in Wennington, Wray, Hornby and Caton Halton and Lancaster on the lower Lune, as well as to low lying agricultural land.[6] The western and south-west slopes of the Bowland Fells are drained by the headwaters of the River Wyre and its tributaries the rivers Calder and Brock as well as the River Conder which flows directly to the Irish Sea. The River Wyre enters the sea at Fleetwood on the southern entrance to Morecambe Bay. The southern and eastern slopes of the Bowland Fells are drained by streams flowing to the River Ribble and by the headwaters of its tributary the River Hodder. The Ribble flows through Preston before entering the Irish Sea at Lytham St Annes.	Regional	Improving the management and control of flood waters in this NCA will benefit the many urban areas and settlements downstream, in other NCAs. Much can be done to address the condition of moorland habitats and upland pasture management but there is limited scope within this NCA for allowing rivers to reengage with their flood plains.	Reduce the degree of overland flow associated with moorland habitats by blocking grips and restoring the bryophyte community to increase storage capacity and reduce run off rates. Seek opportunities to expand areas of wetland habitats e.g. reedbeds, wet pastures and woodlands along valley bottoms Seek opportunities which allow rivers to follow natural courses and reengage with their floodplains Increasing vegetation cover and surface roughness to reduce run-off rates, including through creation of new native woodland and scrub	**Regulating water flow** **Regulating soil erosion** **Regulating water quality** **Water availability** **Regulating soil quality** **Climate regulation** **Biodiversity**
Regulation of coastal flooding and erosion	N/A	N/A	N/A	N/A	N/A	**N/A**
Pollination	Extensive semi-natural habitats	The blanket bog, upland heathland, meadows and species-rich grasslands provide a major nectar source for pollinating insects. However with limited crops and orchards requiring pollination, this service is of limited importance for food production in this NCA.	Local	Of value largely to biodiversity rather than food production in this NCA. Need to ensure the habitats are in good condition and look for ways to expand them.	Maintain the extensive resource of semi-natural habitat. Seek opportunities to expand areas of species rich grassland on the moorland fringes and within valleys; also road verge management and small sites within villages.	**Pollination** **Food provision** **Biodiversity**

[6] Lune Catchment Flood Management Plan Summary Report, December 2009 (Environment Agency), accessed from http://www.environment-agency.gov.uk/research/planning/33586.aspx

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of place/ inspiration	Open and expansive moorland landscape Strong patterns of upland pastures Contrasts with enclosed narrow valleys with wooded sides Time depth of evident historic interest	This NCA falls within the Forest of Bowland AONB. 39 per cent of the area is of international biological importance. An important area for recreation with 60 per cent of the NCA being open access land. An area of high tranquillity with 99 per cent of the NCA being classified as undisturbed in 2007. A landscape rich in heritage (see a sense of history below).	National	The Bowland fells have a very strong and distinctive landscape character and form part of the Forest of Bowland AONB. A sense of place is provided by the wild, windswept, distinctive and large-scale almost circular plateau of central Bowland and Easington Fell rising up to 300 m with steep sculptural escarpments, extensive areas of heather moorland and blanket bog. The uplands are incised by a series of fast flowing rivers resulting in narrow, steep sided intimate valleys and semi-natural clough woodlands which form a key feature and transition between the exposed moorland uplands, and rural lowlands and lush valleys of the Lune, Ribble, Hodder and Wyre. The lowlands encircling the uplands consist of enclosed reclaimed moorland pasture dissected by dry stone walls with an attractive mosaic of woodland, unimproved meadows, rush dominated pastures, marshes and streams at the lower levels with high quality species-rich in-bye pastures and hay meadows largely in limestone areas to the east around Slaidburn, and along the river valleys of Tarnbrook and the Hindburn. While woodland is scarce on the high plateau there are extensive areas of broadleaved and coniferous plantations elsewhere particularly to the south-east and east of the area including Gisburn Forest.	There is scope to protect the contrast between the open expansive moorlands, walled pastures of the moorland fringe and enclosed wooded valleys. Opportunities exist to retain and restore patterns of drystone walls and the vernacular architecture of farmsteads and field barns. There are opportunities to ensure that development respects local settlement patterns and building materials, and to avoid the loss of historic evidence through insensitive development. There is scope to support upland farming that underpins the land uses of the area. Opportunities exist to promote the calming and restorative effect that contact with tranquil and sensory environments have on visitors' health and wellbeing. See also opportunities for biodiversity, tranquillity, recreation, geodiversity and food provision.	**Sense of place/ inspiration** **Recreation** **Sense of history** **Biodiversity** **Tranquillity** **Food provision**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history	Archaeological features, particularly from the Iron Age Field enclosures bounded by drystone walls and associated landscape features such as gateposts, sheepfolds, stone troughs and parish boundary markers Complex system of narrow lanes with occasional wide historic drove roads Scattered settlement pattern Picturesque stone villages with village greens, stone boundary walls, narrow streets and duckstone pavements Distinctive stone laithe houses with the barn under the same roof line	Archaeological features include prehistoric settlements and land use highly visible on unenclosed moorland and low intensity rough pasture. Field enclosures bounded by dry stone walls vary from regular patterns on higher ground, where commons were systematically subdivided, to older, more irregular enclosures on the slopes where there is also a complex system of narrow lanes with occasional wide historic drove roads. Colonisation of the area is reflected in place names such as 'gill' derived from the Norse for narrow valley as well as other terms including 'fell', 'moss', 'thwaite' or beck. Settlement pattern is scattered with picturesque stone villages with village greens, stone boundary walls, narrow streets and duckstone pavements, isolated hamlets and farmhouses in gritstone, typically with a distinctive stone laithe house or barn under the same roof line and commonly backed by a small copse. Buildings are unified by materials, styles and form constructed in sandstone grit with stone flag and from mid 19th century Welsh slate roofs. The area formed part of the Royal Forest of Lancaster and an important hunting ground - large blocks of ancient woodland that remain include Roeburndale to north-west.	Regional	The area is well known for its many layers of visible history resulting in a range of structures and features. This history of the landscape is most notably evident in its archaeological features, largely from the Iron Age which have remained intact due to low intensity farming. Aspects of history likely to be most evident to the general public are the dry stone walls and associated landscape features such as gateposts, sheepfolds, stone troughs and parish boundary markers. The main emphasis will be on protecting features but also on interpreting them to a wider public audience.	There are opportunities to protect, manage and interpret the many layers of historic evidence. There are opportunities to ensure that the restoration of vernacular buildings is carried out using local styles and appropriate materials, and that land management practices and developments such as tracks do not damage archaeological evidence or historic features. Promote traditional upland farming and forestry systems that maintain and restore the farmed landscape and full range of habitats. Interpret the historical features to provide information and education to increase public engagement, enjoyment and understanding.	**Sense of history** **Food production** **Sense of place/ inspiration** **Recreation**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Tranquillity	Open moorland Rolling upland farmland Historic villages Network of narrow country lanes Mosaic of woodland, unimproved meadows and pastures	Tranquillity is a significant feature of the NCA, with 99.4 per cent classified as 'undisturbed' remaining very similar to the situation in the 1960s (CPRE Intrusion Map, 2007) - the area remains largely unaffected by development and is remote from large settlement and transportation routes, excluding a small portion of the B6478 south of Newton.	National	A sense of tranquillity is likely to be particularly associated with the open moorland of the plateau and hills as well as the softer, rolling upland farmland with long distance views, historic villages, a network of narrow country lanes and mosaic of woodland, unimproved meadows and pastures.	There are opportunities to retain the sense of remoteness and wildness in the moorlands and fringes by protecting them from inappropriate development. Opportunities exist to provide suitable access for visitors to a landscape where they can be inspired and experience the feeling of escapism.	**Tranquillity** **Sense of place/ inspiration** **Biodiversity**
Recreation	A network of public rights of way A wealth of open access land	The NCA offers a network of rights of way totalling 314 km at a density of just over 0.8km per km^2. There is a wealth of open access land covering 22,550 ha or just over 60 per cent of the area. Cycling is popular; with increasing opportunities for off-road cycling in the Gisburn Forest. Road cycling is also a popular pursuit, especially on the officially designated 'quiet lanes' and long distance challenge routes and sportives. Other popular activities include bird-watching, gliding, fishing and shooting. Volunteering activities such as drystone walling and hedgelaying are becoming increasingly popular.	National	Access areas/routes, recreation facilities and sites associated with cultural and historical heritage require maintenance, promotion and management, as a key attraction for visitors. Recreation also depends on maintenance and enhancement of habitats, traditional farmed landscape and other attributes contributing to sense of place.	There are opportunities to improve access by ensuring that paths are maintained and well signposted, and that some surface paths are provided for use by all levels of ability and interest at key locations. There are opportunities to provide interpretation of the landscape and its many features, especially historic features such as boundary stones, tracks, farms etc Opportunities exist to work with commerce to support initiatives promoting sustainable tourism and that help grow a local green economy, recognising the value to the local economy that recreational visitors bring to the NCA.	**Recreation** **Sense of place/ inspiration** **Sense of history** **Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Biodiversity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity	1 SPA 2 SAC 14,600 ha designated as SSSI 125 local wildlife sites Important habitats including blanket bog, upland heathland, woodlands and species-rich hay meadows Important species including hen harrier, wading birds, such as lapwing, snipe, curlew and redshank, and a number of rare or important plant species	A significant extent of priority habitats exists within the NCA, covering 14,000 ha (37 per cent) of the area, and including 10,000 ha of upland heathland and 3,000 ha of blanket bog. The NCA contains 2 SAC, 1 SPA and 14,600 ha are nationally designated as SSSI, covering 40 per cent of the NCA. The hen harrier, the area's iconic bird of prey, breeds in very few other places in the country. Wading birds, such as lapwing, snipe, curlew and redshank arrive in Spring to nest and rear their young on the open farmland and moors. The area is also home to a number of rare or important plant species	National/ International	Improving the biological condition of the biodiversity resource is likely to involve land management activities that will improve other services. This will be achieved principally through an increase in coverage of semi-natural habitat, restoration of natural hydrological systems and sustainable grazing regimes. These in turn have the potential to help increase regulating services such as regulation of water quality and soil erosion, while also contributing to sense of place.	Improve the area of designated habitat in favourable biological condition. Stockproof the area's important clough woodlands and encourage natural regeneration and linkage of existing woodland sites. Maintain and where necessary restore the valuable mosaic of heather moorland and other upland habitats where they are adversely affected by overgrazing, drainage or erosion. Manage and restore species-rich in-bye pastures and hay meadows Maintain connectivity between habitats by protecting land in between pockets of habitat from intensification and maintaining the ability of species to move through the landscape.	**Biodiversity** **Sense of place** **Regulating soil erosion** **Regulating water quality** **Climate regulation** **Regulating soil quality** **Regulating water flow** **Water availability** **Pollination**
Geodiversity	Langden Brook Catchment, part of Bowland Fells SSSI 9 locally designated geological sites	The Bowland Fells is important for its fluvial geomorphology, showing the recent development of alluvial fans, river bank erosion and channel changes since deglaciation, such as those which are conspicuous in the Langden Valley.	Regional	Designated sites provide important and accessible sections allowing the interpretation, understanding and continued research into the geodiversity of the area. Exposure of these areas also makes a positive contribution to sense of place and sense of history.	Safeguard and maintain exposures in man-made quarries and cuttings. Promote the geological heritage of the area. Avoid afforestation where it could obscure landscape features of particular conservation interest.	**Geodiversity** **Sense of place /inspiration** **Sense of history**

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