



## Introduction

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

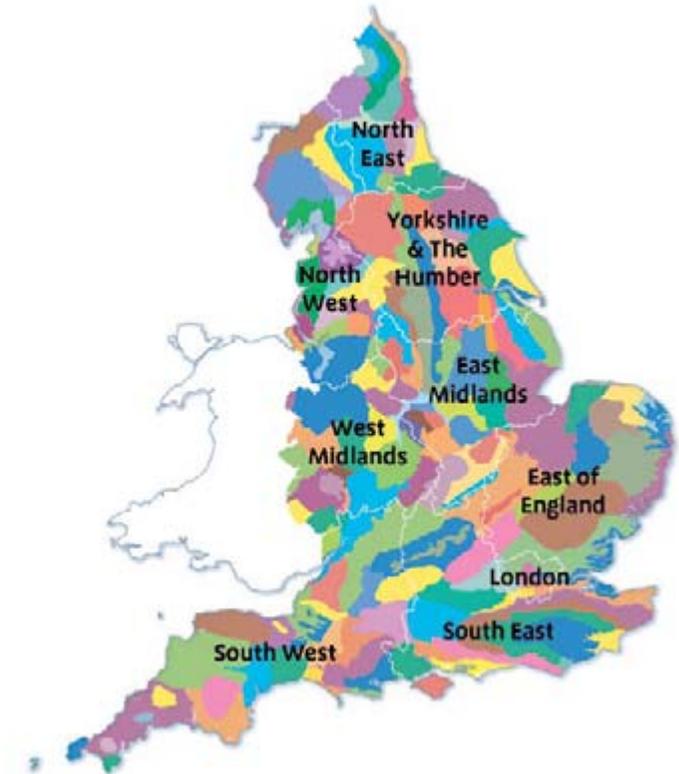
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and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

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

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

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

## National Character Areas map



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

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

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

## Summary

The Eden Valley National Character Area (NCA) in north-east Cumbria encompasses the broad valleys of the River Eden and its tributaries. The river contracts between wide flood plain areas to the steep, wooded Eden Gorge. It contrasts markedly with the scarp face of the North Pennines to the east, the Orton Fells to the south and the rugged upland fells of the Lake District to the west, and the NCA includes a small part of the North Pennines Area of Outstanding Natural Beauty.

The undulating landform is largely the result of material deposited at the end of the last ice age, moulded into the characteristic mounds of drumlins and eskers, and giving rise to fertile soils. This gives the valley its characteristic intimate blend of undulating mixed farmland with significant areas of woodland, farm copses, mature hedgerow trees, stone walls and historic villages. This sense of shelter and containment is enhanced by the juxtaposition with its 'wilder' upland neighbours. The NCA is characterised by high levels of tranquillity.

The River Eden is one of England's finest large river systems on limestone and sandstone. This fast-flowing river is of European importance for its habitats and wildlife, and flows northwards through the NCA, forming an important aquatic habitat corridor connecting to the Solway Firth. Strategically, this is also an important corridor: the valley hosts major transport routes between north and south, and historically was much fought-over borderland between England and Scotland. The remains of defensive structures from these turbulent medieval times are still evident in today's landscape.

As a broadly catchment-based NCA, many of the ecosystem services which are supplied within the NCA are related to management of the Eden catchment: management of soils and water within the whole catchment is critical to food provision, soil and water quality, water flow and carbon storage; restoring a network of wetland habitats around the core fragments of ecologically important mires within the flood plain affords opportunities to regulate peak water flows, store carbon and strengthen resilience to the effects of climate change, while enhancing the sense of place and tranquillity of the Eden Valley.

[Click map to enlarge](#); [click again to reduce](#).

## Statements of Environmental Opportunity

**SEO 1:** Work at landscape scale to protect the soils and water quality of the Eden Valley catchment, thereby ensuring a sustainable future for farming, contributing towards Water Framework Directive objectives by improving the condition of the internationally important River Eden Special Area of Conservation and associated wetland and woodland habitats within the flood plain, increasing their capacity to regulate peak water flows, and enhancing a key feature of this tranquil rural landscape.

**SEO 2:** Manage, restore and expand the area of woodland within the Eden Valley and its tributaries, restoring a network of woodland habitat to enhance timber supply, biodiversity, water quality, carbon storage and tranquillity, while regulating soil erosion and peak water flow.

**SEO 3:** Protect and enhance the geodiversity and historic landscape of the Eden Valley, its geological exposures and river processes, and history of human occupation and innovation, optimise their contribution to delivering wider environmental benefits and raise public awareness, understanding and enjoyment of this heritage.

**SEO 4:** Protect and enhance the cultural heritage of the Eden Valley, reinforcing the vernacular building style and settlement pattern in the design and location of new developments, protecting tranquillity, enhancing green infrastructure and habitat networks, and improving opportunities for public enjoyment of the area.



View northwards across the permanent pastures of the upper reaches of the Eden Valley near Soulby.

## Description

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

The Eden Valley National Character Area (NCA) in north-east Cumbria encompasses the broad valleys of the River Eden and its tributaries, most notably the Petteril, with the wider Eden catchment extending into neighbouring NCAs. The Eden is a wide south–north orientated valley, located between the scarp of the North Pennines NCA to the east, the rugged Orton Fells NCA and Cumbria High Fells NCA to the west, and the Solway Basin NCA to the north. The valley stretches from the village of Brough in the south, northwards via Appleby-in-Westmorland and Penrith, to the fringes of Carlisle. It includes a small part of the North Pennines Area of Outstanding Natural Beauty.

The soft lowland landscape of this NCA contrasts markedly with surrounding rugged upland landscapes as the improved agricultural land of the valley yields to the semi-improved grasslands of the steep slopes. The land use in the valley developed in close association with these upland areas, with many farms in the Eden Valley sending livestock to graze on their commons in the summer months, and upland stock overwintering in the valley. The valley provides a strongly contrasting setting to these uplands and is visible from them – the visual relationship between the North Pennines escarpment and the Eden Valley is particularly strong. To the north, the boundary is not as easily defined on the ground where the NCA merges into the coastal plain around Carlisle and the Solway Basin.

The drainage and orientation of the Eden Valley are north-westerly, towards the Solway Basin. The linear nature of the NCA is defined by the River Eden which, originating in the Yorkshire Dales, links the Eden Valley to surrounding NCAs.



**Rolling farmland of the Upper Eden Valley above Appleby, looking east towards High Cup Nick in the North Pennines.**

The Eden drains half the county of Cumbria and is fed by rivers originating in the uplands of the Orton Fells, Cumbrian High Fells and North Pennines and flows into the Solway Firth through the Solway Basin NCA. Severe flooding events experienced downstream in Carlisle, thus have their origins upstream. The high-quality environment of the River Eden forms an important aquatic corridor through Cumbria, encompassing extensive semi-natural habitats along its route.

The Eden Valley is an important transport corridor through this predominantly upland region. The M6 motorway and West Coast Main Line railway run through the western edge of the NCA from Carlisle to Penrith, a strategic link between Scotland and England. The A66 provides a link westward to the Cumbria High Fells NCA and south-east to the North Pennines NCA and Yorkshire Dales NCA. In the north-east of the area, the A69 leads to the head of the Tyne Valley and the Border Moors and Forests NCA.

## Key characteristics

- An undulating valley landscape of Permo-Triassic sandstones, mudstones and shales covered by a thick layer of glacial till, bordered by and contrasting sharply with surrounding uplands: the prominent Pennine escarpment rises to the east; to the west are the fells of the Lake District and to the south, the Orton Fells.
- Distinctive features of glacial deposition including eskers, deltas and meltwater channels, drumlins and kettle holes, the last now forming a series of small basin mires of high ecological importance.
- The fast-flowing River Eden cuts south–north, joined by tributary rivers and gills; north of Penrith, separating the Eden from its tributary the Petteril, lies a range of prominent red sandstone hills, through which the Eden has in places eroded distinctive gorges.
- Managed estate and farm woodlands characterise the valley floor, with numerous shelterbelts, copses and mature hedgerow trees giving a well-wooded character.
- Rich, fertile soils in the valley support mixed agriculture including arable cultivation. The poorer soils of the sandstone ridge and the foothills of the Pennine escarpment give rise to rough grassland, heath and plantations.
- Medium to large rectilinear fields are enclosed by mature hedgerows and hedgerow trees, walls, or, more commonly to the east, wire fences and thin and relict hedges. Limestone walls are a feature of the Pennines and Orton fringes, while red sandstone walls are a feature of the Penrith Sandstone Ridge.
- The River Eden and its tributaries support internationally important aquatic habitats and species communities, and important fisheries. Semi-natural native woodlands, including oak/ash/birch hangers and wet woodland,



Lazonby Bridge, a classic River Eden bridge of local New Red Sandstone.

## Key characteristics continued

line the river valleys forming good woodland habitat networks. Coastal and flood plain grazing marsh are associated with the river valleys – wetland habitats supporting important numbers of breeding and wintering waders and wildfowl.

- The higher ground supports patches of heath forming the core of a heathland network, and small but important areas of lowland calcareous grassland, upland hay meadow and lowland meadow, including important species-rich roadside verges on the Orton fringes from Penrith to Kirkby Stephen.
- Visible archaeological or historic legacy: prehistoric stone circles, Roman forts, medieval castles and parkland are important features of the historic environment.
- Stone buildings reflect the underlying geology across the NCA: red sandstone is the predominant building material, for example in the area around Penrith, a unifying feature across much of the NCA, used in buildings, walls and gateposts; limestone is used in the east on the Pennine foothills and in Appleby-in-Westmorland near to the Orton Fells.
- Nucleated and linear stone-built villages are often planned around greens. Outside these villages, settlement is characterised by scattered hamlets and farms. The towns, Penrith and Appleby-in-Westmorland are the area's traditional market centres.
- Intricate network of narrow minor roads, with tall hedgerows and walls.
- Important transport corridor in predominantly upland region: Settle–Carlisle railway line, West Coast Main Line railway, and the M6 motorway and A66 trunk road.



**Typical Eden valley vernacular building style dating from the 18th Century: Westmorland slate roof and dressed New Red Sandstone walls, window and door surrounds, with a date stone over the front door.**

## Eden Valley today

The Eden Valley is a gently undulating, lowland agricultural landscape which contrasts markedly with the scarp face of the North Pennines to the east, the Orton Fells to the south and the rugged upland fells of the Lake District to the west. The undulating landform is largely the result of material deposited at the end of the last ice age, moulded into the characteristic mounds of drumlins and eskers, this glacial material giving rise to fertile soils. The valley is characterised by an intimate blend of undulating mixed farmland with significant areas of woodland, farm copses, mature hedgerow trees, stone walls and historic villages, giving a sense of shelter and containment, enhanced by the juxtaposition with its 'wilder' upland neighbours.

The fast-flowing River Eden, of European importance for its habitats and wildlife, rises at Hell Gill in the Yorkshire Dales. The Eden supports a diverse aquatic flora, Atlantic salmon, bullhead, lampreys and white-clawed crayfish, among its many features of interest. This important wildlife resource is recognised in the river being designated a Special Area of Conservation (SAC) along its course through the NCA. The River Eden flows through an ecologically rich and varied landscape corridor including small but important areas of semi-natural riparian willow and alder woodland and flood plain pastures; however, sections of the River Eden SAC are characterised by modifications, straightened and bounded by hard engineering. The rare river jelly lichen is found on the banks of the Eden, there are important whooper swan and sand martin populations, otters are also found, and the gravel exposures within the river are important habitat for exposed river sediment invertebrates.

The convergence of the rivers and streams within the Eden Valley, drained from the surrounding uplands, creates the potential for severe flooding events. Much



**Boroughgate in Appleby-in-Westmorland, a small market town, once the county town of Westmorland, with a range of houses dating from the 15th-19th century and built in a mix of local vernacular materials.**

of the flooding is of the farmed flood plain; however, Carlisle and Appleby-in-Westmorland have flooded regularly in recent years, and Appleby has its own flood defence system.

The river narrows to a gorge where it cuts through an isolated sandstone ridge north of Kirkoswald and at Wetheral and Armathwaite. The Cleveland-Armathwaite Dyke forms a chain of low, linear hills and a natural weir on the River Eden at Armathwaite – supporting oak, birch and ash hanger woodlands. Here,

the rich red of the exposed sandstone creates visual unity with the sandstone-built villages and other stone features such as walls and gateposts. The Eden is joined by many tributary streams and gills from the surrounding higher ground, their courses marked by bands of broadleaved woodland, including the ash-dominated limestone woodlands of the Pennine foothills, contributing to the landscape's well-wooded appearance.

Blocks of conifers, regular in shape, have been planted on the sandstone ridge between the rivers Eden and Petteril and the eastern foothills of the Pennine escarpment, some over 100 ha in size. Managed farm and estate woodlands, consisting of both broadleaved (including ancient woodland and ancient replanted woodland) and coniferous trees, occupy large blocks of the broader valley floor. Small copses and shelterbelts are frequent and have often been planted beside farmsteads or as game cover for shooting interests. Remnant stands of black poplar – rare in northern England – are also found in places. The NCA is an important managed red squirrel stronghold, and the upper Eden Valley is an important area for black grouse, berry-producing scrub woodland being a vital part of their ecology.

The majority of the land is pasture with significant coverage of arable crops on the richer soils associated with the better drained glacial landforms on the valley floor. Small farm fruit orchards are located within the valley and the area supports farmland birds such as grey partridge and tree sparrow. Mature hedgerows and drystone walls typically form the boundaries between the rectilinear, medium-large patchwork of farmed fields. Towards the fringes of the area, particularly on the edges of the main settlements, hedgerows become thinner and are replaced by fences, with pony paddocks a feature close to Carlisle.

The lowland heath in the Eden Valley is an important remnant of a once more extensive habitat, now persisting in fragments across the chain of low

sandstone hills between the River Eden and River Petteril. The largest and best examples are at the Wan Fell and Lazonby Fell Sites of Special Scientific Interest (SSSI). Much of the original heath was planted up with conifers; however, a heath understory persists in places, and much of this has been brought into restoration management in recent years, supported through the Higher Level Stewardship scheme.

The Cumbrian Marsh Fritillary SAC consists of Skelton Pasture SSSI and an area of Middlesceugh Woods and Pastures SSSI in the west of the NCA. The area has been designated for the marsh fritillary, although only Middlesceugh currently supports a population of this nationally declining butterfly, now extinct from much of its former range and confined to western and northern parts of the UK. The larval food plant, Devil's-bit scabious, occurs in the mosaic of damp purple moor-grass and scrub habitat. The Eden Valley's population and those of Bassenthwaite moss at River Derwent and Bassenthwaite Lake SAC comprise a north-western set of populations which are genetically different from the other English populations.

Semi-natural habitat in the Eden Valley tends to be small and fragmented, with the notable exception of woodlands associated with the River Eden and the heath of the sandstone ridge. Basin mires in the Eden Valley are scattered, mostly between Appleby-in-Westmorland and Penrith and to the east of Carlisle, typically formed in kettle holes within the undulating topography of drift deposits. These wetland sites are fragmented and small, having been affected by past management, predominantly peat cutting or drainage. They are seasonally inundated and used by wintering wildfowl and waders, for example golden plover and lapwing. From autumn to spring, large flocks of lapwing feed on the arable fields between Penrith and Appleby. The Solway Firth's tidal influence on the River Eden impacts on the way in which these and other birds use the valley's habitats for feeding and roosting.

Much of the grassland in the Eden Valley has historically been improved for agriculture, which has led to the loss of riparian habitats and species-rich grassland and associated fauna. The Skelton–Penrith–Lamonby area and Orton fringes between Kirkby Stephen and Penrith still have wide, species-rich road verges and fields with hay meadow communities; however, elsewhere these habitats are isolated and fragmented, in small fields or verges and on the steep banks of the Eden and its tributaries. The scarp foot slopes in the east form a transitional zone between the Eden Valley and the North Pennines, with unimproved acid and neutral grassland, patches of heath habitat and geometric blocks of coniferous plantation imparting a more upland character in this part of the NCA.

The historic settlement pattern of stone-built nucleated and linear villages with substantial churches, village greens and scattered farmsteads is a key element of the Eden Valley's landscape character. Penrith, Appleby-in-Westmorland and Kirkby Stephen (on the fringe of the NCA) are the main market towns serving this largely agricultural community. Earthworks of early settlements and linked field systems are common across the landscape, reflecting the contraction of villages since medieval times. A number of villages were established in the valley bottom in association with the river, while others have developed along the springline of the North Pennines fellside. Red sandstone is the dominant building material of the Eden Valley, with limestone used on the margins of the area reflecting the underlying geology, for example at Appleby (due to the proximity of the Orton Fells) and along the footslopes of the North Pennines.

The Eden Valley has experienced significant surface quarrying and mining of gypsum, for use in the plaster and plasterboard industry, and used in its anhydrous form in the production of Portland cement. Historically this was the basis of a number of local companies, working as early as 1790 at Acorn Bank, and eventually forming one of the largest manufacturing organisations in the world, British Gypsum. This mineral extraction was strongly linked to the development of the local transport network. There was also significant working at Little Salkeld where the villages benefited from the development of these quarries. Today, gypsum working in the Eden Valley is confined to the Kirkby Thore area, feeding the plant which also processes gypsum from around the world.

The valley provides an important transport corridor through this otherwise upland region: the West Coast Main Line railway, M6 motorway and A66 trunk road intersect the area, supplementing a network of rural roads bounded by walls, hedgerows and mature trees. The valley also provides much of the route for the Settle to Carlisle Railway, which provides significant visitor interest within the NCA and with it support for the local economy.



Rolling, mixed arable and pasture farmland on drumlin formations near Kirkby Thore, mid Eden Valley, looking towards Cross Fell, the highest point of the Pennines.

## The landscape through time

The underlying bedrock of the NCA is dominated by sandstones from the Permo-Triassic Period, the oldest being the more resistant Penrith Sandstone which forms a prominent ridge within the broad valley landscape. These sandstones were deposited as a series of large, windblown dunes in a desert which covered the area during the Permo-Triassic Period.

The Pennine escarpment to the east of the NCA was formed by movement along the Pennine Fault, and is composed of Carboniferous rocks, mainly limestone. Mudstones and volcanic rocks of Ordovician age crop out along the foot of the scarp, with erosion producing striking conical hills such as Knock Pike. These eastern foothills give rise to a mosaic of unimproved acid and neutral grassland with woodland and small areas of lowland heath. The 60-million-year-old Cleveland–Armathwaite Dyke igneous intrusion cuts across the NCA from east to west, forming a low linear feature and a natural weir across the River Eden south of Armathwaite.

The relatively soft rocks of the Eden Valley had been eroded to a low relief before the onset of glaciation; nonetheless, the action of ice sheets which subsequently moved across the area has substantially influenced the physical landscape and land use of today. The ice sheets deposited a thick layer of glacial debris, worked into features such as drumlins during the process of deposition. The distinctive, softly rounded drumlins occur across large areas – for example around Warwick, Wetheral, Hayton and Brampton – and there are extensive deposits of sand and gravel. The glacial till has given rise to rich, fertile soils supporting some of the best agricultural land in Cumbria. In some locations, overdeepened hollows or 'kettle holes', left in the ice's retreat, developed into small basin mires, some of which are of considerable ecological



**The almshouses built in local New Red Sandstone by Lady Anne Clifford in 1651, Boroughgate, Appleby-in-Westmorland.**

interest although isolated within the landscape. The sand and gravels have been extracted in recent decades, leaving a legacy in the landscape of sites which, although restored, are now open and treeless.

The dull salmon pink sandstone, sparkling with high quartz content, has long been used as a building material, along with the St Bees Sandstone also found in the area. The poor sandy soils associated with the sandstone ridge support patches of heathland, poorly drained neutral grassland and plantation conifer blocks. This geodiversity is reflected in the predominant local building materials of stone and slate.

The fertile soils and relative shelter afforded by the valley's topography have long created favourable conditions for agriculture. The Eden Valley has a long history of human occupation dating back to prehistoric times – the flint tools of Mesolithic and Neolithic people have been found across the valley. Some of the most significant Neolithic monuments include Long Meg and Her Daughters stone circle near Little Salkeld, and the henges of Mayburgh and King Arthur's Round Table at Eamont Bridge, with the latter suggesting later links with Arthurian legend. Eamont Bridge stands on the former boundary of



**Long Meg and her daughters; a Neolithic/bronze-age stone circle near Little Salkeld, the third largest stone circle in the UK. 59 stones remain, the largest of which is marked with rock art including cup and ring markings. It is the subject of several local legends and was immortalised in a poem by William Wordsworth.**

Cumberland and Westmorland, and probably also stood on the 10th-century border between the emerging kingdoms of England and Scotland.

Numerous forts and marching camps, including Voreda, were constructed along the route of the main Roman road from Carlisle to Penrith, and then eastwards to Brough, attesting to the valley's importance, to this day, as a transport corridor. The medieval castles at Brougham and Brough, now ruins, were built on the sites of Roman forts, with the medieval castle and town of Appleby-in-Westmorland between them, demonstrating the longstanding strategic importance of the valley.

The Eden Valley has very strong associations with the redoubtable Lady Anne Clifford, Countess of Pembroke, Dorset and Montgomery (1590-1676), long famed for her determined legal battle to inherit her extensive family estates. She eventually owned, restored and regularly travelled between, a string of castles along the Eden valley and on into the Yorkshire, including Brough, Brougham and Appleby, as well as building almshouses and restoring local churches. She is buried in Appleby church, and is commemorated in Lady Anne's Way, a long distance walking route which runs from her castle at Skipton, through the Eden valley to Penrith.

The productive soils and gentle slopes of the Eden Valley have been extensively farmed and 'improved' over centuries, leaving only small areas of less intensively managed rough ground on the Penrith ridge and Pennine fringe to the east. The pattern of agriculture, like that of settlement, is more akin to the lowland Midlands than the adjacent uplands of Cumbria and the Pennines: an increase of pasture and grazing over arable from the 14th century, then a concentration on livestock fattened for slaughter and growing corn began to outweigh dairying and grazing in the late 18th century, resulting in a proliferation of farm buildings and yards to house stock and to store and process cereals.

Many villages developed at the foot of the Pennine scarp were part of extensive estates that stretched from the lowland vales to the upper fells, used for seasonal livestock grazing, and this pattern remains broadly intact today. Other settlements developed adjacent to or in association with the river itself. Many of the smaller settlements have contracted since medieval times, and the earthworks of early settlements are common in the landscape. The market towns of Penrith and Appleby-in-Westmorland grew significantly from the 18th century, to become, along with the city of Carlisle, the dominant settlements today. The landscape of parts of the Eden Valley, particularly the sections of wooded gorge between Wetheral and Staffield, has attracted tourists since Victorian times, although the neighbouring uplands, which include protected landscapes of national importance, remain the principal destination of tourists to the wider area. The Eden Valley itself remains an important recreational resource for local people and the less mobile, and is well used, particularly at weekends.

Over the past 70 years, evolution of this landscape has seen subtle changes in agricultural land use, with a consolidation of farm holdings, a general trend of conversion of permanent pasture to arable, though with some reversion of arable to grassland, and an increase in fenced boundaries with corresponding decline in hedgerows and stone walls and loss of landscape structure. Agri-environment scheme grants have reversed some of the loss of traditional boundary features. Grants for woodland management have encouraged an increase of woodland under active management in the area, with restructuring and regeneration of ancient woodland sites previously under plantations as well as new woodland creation, strengthening the landscape's traditional wooded character.

Recent years have seen development on the edge of settlements, and an increase in traffic on the M6 motorway and A66 trunk road that run the length of the valley, with a corresponding decrease in the proportion of the NCA which is classed by the Campaign to Protect Rural England as 'undisturbed'.



**Brougham Castle and the River Eamont, near Penrith, one of several Eden Valley castles restored by Lady Anne Clifford during the 17th Century.**

## Ecosystem services

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

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

- **Food provision:** The Eden Valley supports many highly productive farming systems with 70 per cent of the total land area forming Grade 2 or 3 prime agricultural land. This NCA is a major producer of lamb, beef, pork, dairy, cereals and other crops. This locally sourced food plays an important role in supporting tourism in the area, with the Eden Valley and Penrith food trails helping to encourage a locally sustainable, green economy.
- **Timber provision:** The main sources of commercial timber are the larger coniferous blocks on the sandstone ridge and eastern foothills of the Pennine escarpment, some exceeding 100 ha in size. Collectively, these conifer woodlands cover over 4 per cent of the NCA. There is good potential to restructure these conifer woodlands to support multiple ecosystem services and extend the area of woodland, boosting long-term provision of hardwoods and softwoods for production.
- **Biomass energy:** The NCA has moderate potential for biomass energy crops, with careful siting required to optimise multiple ecosystem benefits and minimise adverse effects on local landscape, biodiversity and historic features. There are opportunities for wood fuel biomass from the under-managed woodland resource. There is also good potential to develop anaerobic digestion to create biogas from excess farm wastes/slurries.

- **Water availability:** Waters drain into the River Eden from the fells of the Lake District to the west and the Pennines to the east, and the catchment is a major source of potable water, including supply for the city of Carlisle. This water supply is thus influenced by land management in the catchment.

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

- **Regulating soil erosion:** The River Eden and its tributaries are a priority catchment under the Department for Environment, Food and Rural Affairs' (Defra's) England Catchment Sensitive Farming Programme. All of the Eden catchment is at high risk of soil loss. Arable areas, especially on slopes or in areas susceptible to flooding, present a high risk of soil erosion. This risk can be regulated through land management practice that minimises the exposure of bare soil and achieves good levels of organic matter in soils, and by creating woodland and other vegetation barriers such as permanent grassland strips and hedgerows to hold soil on the land.
- **Regulating water quality:** Generally the Eden is meeting its Natura Protected Area (SAC) targets under the Water Framework Directive, however there are specific tributaries that fail due to diffuse pollution problems from agriculture and from non-mains sewer discharges from hamlets and villages. The River Eden SAC is a Defra priority catchment where advice and grants are offered for land management practices that will reduce or prevent sediment and nutrients washing into the watercourses, thereby protecting this important asset and ecosystem service.
- **Regulating water flow:** The flood plain of the River Eden floods regularly. Carlisle, immediately to the north of this NCA, and Appleby-in-Westmorland are at risk from major flood events, and the River Eden is a significant source of the floodwaters that converge there. Land and river management within the Eden Valley – which is designed to absorb the energy of high water, enhance

infiltration, increase surface roughness through expanding woodland and other semi-natural habitats, and create vegetation 'buffers' to watercourses – will improve the landscape's capacity to hold on to peak flows and thus enhance this service downstream.

## Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration:** The Eden Valley's location, a sheltered valley nestled within surrounding rugged uplands, gives it a particularly strong sense of place and, in its juxtaposition with these uplands, serves to accentuate their own sense of place too. Within the valley, features such as the widespread use of red sandstone in buildings and other structures (a unifying feature across much of the NCA) provide a direct link with the geology of the area.
- **Sense of history:** This is a landscape with a very strong sense of history associated with its strategic position and favourable conditions for agriculture: stone circles and earthworks of early settlements attest to its long history of human use. This was a defensive border location with fortified castles, many of these now ruined but remaining as conspicuous features of the landscape. The industrial and architectural heritage of the railways is also particularly evident within the Eden Valley.
- **Tranquillity:** A landscape with a strong sense of tranquillity and calm, heightened by the river and surrounding fells. The Campaign to Protect Rural England maps classify 71 per cent of the NCA as 'undisturbed'.
- **Recreation:** The area attracts many visitors due to its high landscape value and wildlife interest. It is a popular destination for walking, horse riding, cycling/ mountain biking and water-based activities such as angling, kayaking and canoeing, together with other activities including bird/wildlife watching.



Near Great Salkeld: the River Eden and its tributaries support internationally important aquatic habitats and species. Coastal and flood plain grazing marsh is associated with the river valleys, wetland habitats supporting important numbers of breeding and wintering waders and wildfowl.

- **Biodiversity:** Six internationally important wildlife sites and 31 SSSI lie partly or wholly within the Eden Valley, including the River Eden SAC and the Cumbrian Marsh Fritillary SAC. The NCA contains important populations of marsh fritillary butterfly, whooper swan, wading birds, black grouse, red squirrel and otter, and remnant stands of the native black poplar.
- **Geodiversity:** There are 11 SSSI within Eden Valley NCA which are notified at least in part for their geological interest – these tend to be stream sections, cuttings or quarry exposures of Permo-Triassic and Ordovician geology and significant fossil exposures. These are complemented by 25 Local Geological Sites, providing an educational and research resource which help in understanding how this landscape developed.

## Statements of Environmental Opportunity

**SEO 1: Work at landscape scale to protect the soils and water quality of the Eden Valley catchment, thereby ensuring a sustainable future for farming, contributing towards Water Framework Directive objectives by improving the condition of the internationally important River Eden Special Area of Conservation and associated wetland habitats within the flood plain, increasing their capacity to regulate peak water flows, and enhancing a key feature of this tranquil rural landscape.**

**For example by:**

- Working with land managers, authorities, agencies and third sector organisations in this and in neighbouring National Character Areas (NCAs) to address water quality and water flow issues in a co-ordinated way at whole catchment scale.
- Working with the farming community in a co-ordinated way, through initiatives such as Catchment Sensitive Farming, to ensure good soil, nutrient and pesticides management – for example, adopting techniques for informed infield nutrient applications that more precisely meet requirements and extending use of green manure crops within arable systems.
- Working with the farming community, businesses and small settlements to improve sustainable use of water, waste management, and sympathetic land management practices, including crop selection, water harvesting, and improvements to farm infrastructure and rural waste management, developing the use of technologies such as anaerobic digestion where this can benefit both the environment and rural businesses.
- Taking opportunities to restore and reconnect a resilient network of high quality riparian habitats, managing grazing to prevent livestock accessing banksides, and encouraging the creation of permanent grassland strips, ensuring that suitable habitat is in place to enable the expansion of the water vole population.
- Promoting best practice in soil management to improve the structure and quality of soils, using low-pressure machinery and managing stock and vehicle movements in wet conditions to avoid poaching and compaction of soils.
- Minimising transport of sediment into watercourses through measures such as restoring and expanding hedgerows, riparian trees and woodland shelterbelts, creating grass buffer strips across cultivated slopes to prevent soil erosion, and creating wide grassland strips and reedbeds adjacent to rivers.
- Maintaining mixed farming with sustainable grazing levels on grasslands and heath, preventing soil compaction and aiding water infiltration and recharge of the sandstone aquifer.
- Seeking opportunities within the farmed landscape to restore a network of species-rich hay meadows and increase pollinator habitat, for example by restoring and managing species-rich road verges to maintain this interest and to produce wild flower seed source for meadow restoration in the wider farmed landscape, and by restoring dense flowering hedgerows.

## SEO 1 continued

- Protecting and enhancing the nationally important aquatic habitats of the River Eden and its tributaries by restoring and enhancing, where possible, a more dynamic river system with natural morphology in modified sections of the channel, controlling invasive species, minimising low-flow conditions through careful abstraction management, and minimising point source and diffuse discharges.
- Retaining and appropriately managing the ecologically important wetlands within the Eden Valley, working with the farming community to protect the valley and basin mires from effluent discharge and diffuse pollution.
- Restoring and creating wetland habitats – particularly those associated with the kettle hole mires network, wet woodland and the wet pastures that support the important marsh fritillary population – to achieve a diverse and coherent wetland network which can help to regulate peak water flows.
- Extending and creating woodlands within the catchment where this will aid water infiltration, prevent soil loss and reduce cross-land water flows.



Towards Bowscar, one of the low sandstone ridges running along the middle of the Eden Valley. Much of the valley's remnant heathland is now being restored under the Higher Level Stewardship Scheme.

**SEO 2: Manage, restore and expand the area of woodland within the Eden Valley and its tributaries, restoring a network of woodland habitat to enhance timber supply, biodiversity, water quality, carbon storage and tranquillity, while regulating soil erosion and peak water flow.**

**For example by:**

- Expanding native woodland cover, in keeping with local landscape character, namely on vale slopes and tributary valleys, in mosaic with heath on the sandstone ridge and in the riparian zone, focusing on locations where tree planting will reduce soil erosion and protect watercourses from sedimentation.
- Seeking opportunities to restore plantations on ancient woodland sites to native species, reinstating woodland management practices such as coppicing (where appropriate), and supporting the development of a local supply chain for wood fuel and other woodland products.
- Managing, restoring and expanding areas of semi-natural woodland to create a coherent and resilient network, including hedgerows, riparian woodland (swamp woodland of alder and willow), the hanging woodlands of the gorge and the restoration of semi-natural woodland on past ancient woodland sites, including the ash-dominated limestone woodlands of the Pennine foothills. Seeking opportunities to expand native scrub woodland in black grouse areas.
- Developing a strategy in response to the threats from tree diseases to build resilience into the Eden Valley's woodlands, enabling the contribution of these wooded areas to ecological networks and the delivery of multiple ecosystem services to be maintained and enhanced.
- Restructuring conifer plantations as they reach maturity, to enable the management and expansion of a structurally diverse lowland heath network on the sandstone ridge and other semi-natural habitats of the Pennine fringe, and supporting red squirrel conservation in the Whinell Forest reserve and buffer area, while maintaining timber provision. Managing the felling of mature plantations using best practice guidance to minimise sediment losses, helping to protect water quality.
- Managing and restoring designed parkland and important trees in the landscape, and seeking to extend, where appropriate, opportunities for public access and enjoyment for all ability levels.
- Managing and reinforcing, through restoration, the established pattern of estate shelterbelts and the rectilinear pattern of hedgerows with frequent hedgerow trees, expanding the remaining stands of the rare native black poplar and protecting them from hybridising. Ensuring that information on the native black poplar is made available to the Cumbria Biodiversity Data Centre.
- Working with the farming community to identify suitable opportunities to increase wood fuel biomass from under-managed woodland and increase areas of miscanthus and short rotation coppice, where these may be accommodated within local landscape character, to enhance biodiversity and provide enhanced regulation of soil erosion, soil quality, water flow, water supply and water quality.

**SEO 3: Protect and enhance the geodiversity and historic landscape of the Eden Valley, its geological exposures and river processes, and history of human occupation and innovation, optimise their contribution to delivering wider environmental benefits and raise public awareness, understanding and enjoyment of this heritage.**

**For example by:**

- Protecting from damage and appropriately managing the NCA's rich cultural heritage, including prehistoric stone circles, earthworks of early settlement, Roman forts, early medieval castles, estate parkland and the industrial railway heritage.
- Reducing the number of 'at risk' heritage sites, supporting the preparation of management advice for these sites, and seeking (where appropriate) to interpret features and facilitate public access, enjoyment and education.
- Protecting and managing the important river sections, natural outcrops and quarry exposures, providing opportunities for continued learning, research and improved public access and enjoyment where this is appropriate.
- Protecting and, where possible, enhancing natural features and processes, particularly those associated with the rivers and flood plain, promoting the importance of these features through partnerships with geologists, schools and colleges.
- Strengthening the pattern of historic field systems in the landscape (for example by restoring hedgerows where they have been lost or degraded), protecting the earthworks of early settlement and protecting sub-surface remains under permanent pasture or shallow plough.
- Managing and restoring designed parkland and important trees in the landscape.
- Seeking opportunities for educational access to historic farm buildings and opportunities to interpret and enjoy the farmed and historic environment.



View south-east towards Kirkoswald village.

**SEO 4: Protect and enhance the cultural heritage of the Eden Valley, reinforcing the vernacular building style and settlement pattern in the design and location of new developments, protecting tranquillity, enhancing green infrastructure and habitat networks, and improving opportunities for public enjoyment of the area.**

**For example by:**

- Protecting the distinct topography and mixed agricultural character of the Eden Valley in contrast to its neighbouring upland landscapes.
- Protecting the historic settlement pattern of stone-built linear and nucleated villages around greens and encouraging the use of local red sandstone (or limestone in the Pennine foothills and around Appleby-in-Westmorland), to create a unifying character to the valley's built environment.
- Seeking ways to protect intact pre-20th-century farmsteads from demolition, ensuring that alternatives are considered, particularly where redundant farm buildings are prominent features in the local landscape.
- Maintaining the physical and visual links between the valley and surrounding uplands, seeking to improve quiet recreational access links to the Pennine Bridleway National Trail and the Pennine Way.
- Supporting the use of water conservation measures in new developments and promoting sustainable drainage systems which will improve water infiltration and protect the underlying aquifer; looking for opportunities to retrofit these measures to enhance green infrastructure within existing developments.
- Promoting local produce to support local and sustainable farming practices, reinforcing local culture and sense of place, and supporting the visitor economy.
- Seeking opportunities to expand and link habitat networks through the creation of linear areas of habitat for birds and invertebrates around transport corridors, incorporating public access and providing screening and absorption of noise and light.
- Ensuring that new developments and changes in land use are successfully integrated into the landscape, and that they respect historic settlement and field patterns, make a positive contribution to ecological networks and do not compromise the rural character of the landscape.
- Protecting from further intrusion areas classified on the Campaign to Protect Rural England maps as 'undisturbed', including minimising light spill through careful lighting design.

## Supporting document 1: Key facts and data

Total area: 80,956 ha

### 1. Landscape and nature conservation designations

6,125 ha (8 per cent) of the NCA falls within the North Pennines Area of Outstanding Natural Beauty (AONB). Less than 4 ha lay within the Lake District National Park.

Management plans for the protected landscapes can be found at:

- <http://www.northpennines.org.uk>
- <http://www.lakedistrict.gov.uk/>

Source: Natural England (2011)

#### 1.1 Designated nature conservation sites

The NCA includes the following statutory nature conservation designations:

Tier	Designation	Name	Area (ha)	% of NCA
International	n/a	n/a	0	0
European	Special Protection Area (SPA)	North Pennine Moors SPA;	227	<1
	Special Area of Conservation (SAC)	River Eden SAC; Moor House-Upper Teesdale SAC; Cumbrian Marsh Fritillary Site SAC; North Pennine Moors SAC; Helbeck and Swindale Woods SAC	1,009	1
National	National Nature Reserve (NNR)	Cilburn Moss NNR	26	<1
National	Site of Special Scientific Interest (SSSI)	A total of 31 sites wholly or partly within the NCA	2,143	3

Source: Natural England (2011)

Please note: Designated areas may overlap.

There are 89 local sites in the Eden Valley NCA covering 1,207 ha which is 1 per cent of the NCA.

- Further information on local/County sites is available from the Cumbria Biodiversity Data Centre: [www.cbdc.org.uk](http://www.cbdc.org.uk)

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: [http://www.lnr.naturalengland.org.uk/Special/lnr/lnr\\_search.asp](http://www.lnr.naturalengland.org.uk/Special/lnr/lnr_search.asp)
- Maps showing locations of Statutory sites can be found at: <http://magic.defra.gov.uk/website/magic/> – select 'Rural Designations Statutory'.

#### 1.1.1 Condition of designated sites

SSSI condition category	Area (ha)	% of SSSI land in category condition
Unfavourable declining	78	4
Favourable	714	34
Unfavourable no change	377	18
Unfavourable recovering	917	44

Source: Natural England (March 2011)

Details of SSSI condition can be searched at:

<http://www.sssi.naturalengland.org.uk/Special/sssi/reportIndex.cfm>

## 2. Landform, geology and soils

### 2.1 Elevation

Elevation ranges from 18 m above sea level to a maximum of 394 m as the hills rise up between the rivers Eden and Petteril north of Penrith. The average elevation of the landscape is 151 m.

Source: Natural England (2010)

### 2.2 Landform and process

The Eden Valley is a wide south-north orientated valley, stretching from the Lake District Fells to the west, the Pennines to the east and the limestone country of Orton, Asby and the Yorkshire Dales to the south. To the north it merges into the coastal plain around Carlisle and the Solway. The rivers sit in broad flood plains as well as rocky gorges (notably at Wetheral, Armathwaite and north of Kirkoswald).

Source: Natural England (2010)

### 2.3 Bedrock geology

The bedrock geology is dominated by Permian and Triassic sandstones, mudstones and shales. The hard red sandstones (Penrith Sandstone) form a prominent ridge of hills between the rivers Eden and Petteril north of Penrith, with gorges where the River Eden has cut down through the sandstone near Kirkoswald and at Wetheral. The Permian rocks are important for interpreting changes in the semi-arid desert environments of the Permian, showing that much of the sandstone originated as giant desert dunes. Desert storms and flash floods produced water-lain sandstones with thick lenses of angular material known as brockram. Overlying these sandstones are the shallow coastal lake and lagoon Eden Shales and Belah Dolomite and the river lain Bees Sandstone Formation. The Belah Dolomite contains fossils of marine bivalves, indicating localised flooding of the desert from a rise in sea level. Ordovician

Mudstones and volcanic rocks outcrop along the foot of the Pennine escarpment in the east, with erosion producing striking conical hills such as Knock Pike.

Source: Natural England (2010)

### 2.4 Superficial deposits

Thick glacial boulder clay with moulded drumlins covers much of the bedrock geology. Depressions or kettle holes form a series of small basin mires, important in interpreting the succession process of peat development. There are alluvial deposits along flood plains, particularly extensive along the River Eden. Extraction of sand and gravel has left a legacy of restored open sites in the landscape.

Source: Natural England (2010)

### 2.5 Designated geological sites

Designation	Number of sites
Geological Site of Special Scientific Interest (SSSI)	8
Mixed interest SSSI	3

There are 25 Local Geological Sites within the NCA.

Source: Natural England (2011)

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

### 2.6 Soils and Agricultural Land Classification

Most of the area has good quality fertile soils (Grade 3) owing to the rich conditions produced by the glacial and alluvial drift deposits. This supports mixed farming including significant areas of arable production on the Grade 2 land, in better drained areas. Grades 4 and 5 occur on the foothills of the Pennines escarpment and on the poorer, less free draining soils of the sandstone hills.

This NCA has 9 main soilscape types; slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils, covering 39 per cent of the NCA; freely draining slightly acid loamy soils (24 per cent); freely draining slightly acid sandy soils (20 per cent); slightly acid loamy and clayey soils with impeded drainage (5 per cent); freely draining very acid sandy and loamy soils (4 per cent); slowly permeable seasonally wet acid loamy and clayey soils (3 per cent); loamy and clayey flood plain soils with naturally high groundwater (2 per cent); freely draining flood plain soils (2 per cent); and naturally wet very acid sandy and loamy soils (1 per cent).

Source: Natural England (2010)

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

Agricultural Land Classification	Area (ha)	% of NCA
Grade 1	n/a	n/a
Grade 2	6,974	3
Grade 3	54,190	67
Grade 4	13,826	17
Grade 5	3,289	4
Non-agricultural	2,035	3
Urban	671	<1

Source: Natural England (2010)

Maps showing locations of Statutory sites can be found at:

<http://magic.defra.gov.uk/website/magic/> – select 'Landscape' (shows ALC classification and 27 types of soils)

## 3. Key water bodies and catchments

### 3.1 Major rivers/canals

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

Name	Length (km)
River Eden	82
River Petteril	29
River Eamont	13
River Lyvennet	11
Crowdundle Beck	9
River Gelt	8
Croglin Water	8

Source: Natural England (2010)

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

The NCA is centred on the River Eden (and its tributaries) which drains from the south to the Solway Estuary in the north.

### 3.2 Water quality

The total area of Nitrate Vulnerable Zone is 39,762 ha or 49 per cent of the NCA.

Source: Natural England (2010)

### 3.3 Water Framework Directive

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

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

## 4. Trees and woodlands

### 4.1 Total woodland cover

The NCA contains 7,667 ha of woodland (9.5 per cent of the total area), of which 2,122 is ancient woodland.

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

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

Broadleaved semi-natural woodland is a prominent feature of the Eden Valley, following the principal river valleys. Managed estate and farm woodland occupies large blocks of the broader valley floor and both small copse and shelter belts frequently accompany farmsteads. Hanging oak/ash woods are found on the incised sections of the River Eden corridor – most are less than 50 ha in size. Some of the beck systems running into the Eden have small but important examples of wet alder/willow woodland. Blocks of coniferous plantation are found on the sandstone ridge and eastern foothills of the escarpment, some more than 100 ha. Lower lying areas are characterised by farm, estate and parkland woodlands made up of broadleaved (including ancient woodland and PAWS) and coniferous woodlands, generally less than 50 ha in size. Shelterbelts and small farm copses, along with a high density of hedgerow trees, give the landscape a well-wooded character.

Source: Eden Valley Countryside Character Area Description

### 4.3 Woodland types

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

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

Woodland type	Area (ha)	% of NCA
Broadleaved	2,967	4
Coniferous	3,518	4
Mixed	479	1
Other	703	1

Source: Forestry Commission (2011)

Area and proportion of Ancient Woodland and Planted Ancient Woodland within the NCA.

Woodland type	Area (ha)	% of NCA
Ancient semi-natural woodland	702	1
Ancient re-planted woodland (PAWS)	1,420	2

Source: Natural England (2004)

## 5. Boundary features and patterns

### 5.1 Boundary features

Mature hedgerows (including species-rich) and frequent hedgerow trees bound fields across much of the landscape. Drystone walls form boundary features in places, particularly on the Pennine fringe, with red sandstone walls a feature of the sandstone hills. Wire fences and thin hedgerows are associated with the poorer land on the margins of the Valley especially on the edge of settlements. Uptake of Countryside Stewardship agreements for restoration of hedgerows and walls was significant in 2003. By September 2011 a total of 667 km of hedgerow and 649 km of stone wall were restored/maintained under Environmental Stewardship.

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

## 5.2 Field patterns

The landscape predominantly contains medium- to large-scale rectilinear fields. Former common fields are sometimes visible in the long curving boundaries of later enclosures fixed on the lines of earlier strips.

Source: **Eden Valley 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

The landscape's pastoral and mixed farming character is supported by its breakdown of farm types in 2009: from a total of 905 holdings, 66 per cent were for grazing livestock (594 holdings), 21 per cent dairy farms and 6 per cent cereal farms. There has been an increase in the number of farms where cereals are the predominant farming activity (55 in 2009 from 14 in 2000) and mixed farms (82 in 2009 from 37 in 2000) with a decrease in the number of dairy farms (194 in 2009 from 228 in 2000).

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

### 6.2 Farm size

Farms in the largest size bracket (over 100 ha) account for 292 holdings, or 32 per cent. Holdings over 100 ha make up 74 per cent of the total farmed area. The largest size bracket (over 100 ha) saw an increase from 191 holdings in 2000 to 292 holdings in 2009. In 2009 20 per cent of holdings were between 50 and 100 ha, 16 per cent 20 to 50 ha, 18 per cent 5 to 20 ha and 13 per cent less than 5 ha.

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

### 6.3 Farm ownership

2009: Total farm area = 78,202 ha; owned land = 50,395 ha

2000: Total farm area = 53,673 ha; owned land = 37,345 ha.

There has been a general increase in the area of tenanted holdings from 16,982 ha in 2000 to 22,754 ha in 2009.

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

### 6.4 Land use

The dominant land use is grassland, 62,414 ha (80 per cent). This is followed by cereals, 11,361 ha (15 per cent). Between 2000 and 2009 there was an increase in the area of grassland (by 17,808 ha) and an increase in the area of cereals (by 5,426 ha).

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

### 6.5 Livestock numbers

In 2009 there were 101,000 cattle (77,600 in 2000), 266,300 sheep (268,900 in 2000) and 6,700 pigs (8,100 in 2000). Total sheep numbers have remained relatively static for the period 2000 to 2009. There has been an increase of 30 per cent in the number of cattle during the same period. Pig numbers decreased by 18 per cent.

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

### 6.6 Farm labour

The majority (71 per cent) of farm employment is as the "principal" farmer (1,515 in 2009) with less farm managers (28), full-time (289), part-time (175) or casual (134) workers. Between 2000 and 2009 the number of people working in agriculture increased by 30 per cent, from 1,649 in 2000 to 2,142 in 2009.

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

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

## 7. Key habitats and species

### 7.1 Habitat distribution/coverage

The River Eden is of international importance for high quality aquatic habitats and the rich species communities they support, including migratory fish. It forms an important aquatic habitat corridor connecting with the Solway. Wetland habitats are associated with the river and its tributaries, including flood plain grazing marsh, and wet woodland.

Native woodland, particularly upland oak and upland ash woodlands, is found along the course of the River Eden, its tributaries and surrounding hillsides, forming good woodland habitat networks in places.

Important areas of lowland heath (intermediate in character between upland and lowland heath) are found on the drift-free sandstone hills between the River Eden and River Petteril, where they form part of a heathland habitat network.

Wetland habitats including small areas of lowland raised bog are found within kettle holes, formed in the glacial drift, around Penrith and to the east of Carlisle.

Small but important areas of lowland calcareous grassland, upland hay meadow and lowland meadow are found on the lower slopes of the Pennines to the south and east, and the fells to the west. North of Penrith a series of purple moor-grass pastures, support marsh fritillary butterfly.

Overall, apart from the woodland habitat networks associated with the River Eden and the small heathland network on the sandstone ridge, biodiversity habitats are small and fragmented.

Source: Eden Valley Natural Area Profile

### 7.2 Priority habitats

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

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

Priority habitat	Area (ha)	% of NCA
Broadleaved mixed and yew woodland (broad habitat)	3,089	4
Lowland heathland	692	1
Upland heathland	389	<1
Coastal and flood plain grazing marsh	279	<1
Upland calcareous grassland	55	<1
Lowland meadow	48	<1
Lowland calcareous grassland	40	<1
Fens	38	<1
Lowland dry acid grassland	24	<1
Lowland raised bog	19	<1
Upland hay meadow	15	<1
Blanket bog	7	<1
Limestone pavement	5	<1
Reedbed	4	<1

Source: Natural England (2011)

- Maps showing locations of Priority Habitats are available at: <http://magic.defra.gov.uk/website/magic/> – select ‘Habitat Inventories’

### 7.3 Key species and assemblages of species

- Maps showing locations of Priority Habitats are available at: <http://magic.defra.gov.uk/website/magic/> – select ‘Habitat Inventories’
- Maps showing locations of S41 species are available at: <http://data.nbn.org.uk/>
- Information on Key Species Interest Zones is available from the Cumbria Biodiversity Data Centre: [www.cbdc.org.uk](http://www.cbdc.org.uk)

## 8. Settlement and development patterns

### 8.1 Settlement pattern

The market towns of Penrith and Appleby provide important centres for the farming community. The settlement pattern is generally of nucleated and linear villages, surrounded by scattered hamlets and isolated farms. Villages often have substantial churches, and are planned around rectilinear greens. Settlements are frequently sited on the rivers, such as Penrith at the confluence of the River Lowther and River Eamont. There are a number of villages along the base of the Pennine slopes. Settlement pattern has similarities with the lowlands of more central areas of England.

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

### 8.2 Main settlements

Penrith: population in 2001 of 14,471. Appleby-in-Westmoreland: population in 2001 of 2,862. The total estimated population for this NCA (derived from ONS 2001 census data) is: 49,636.

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

### 8.3 Local vernacular and building materials

Predominant building materials are local stone and slate, mostly red sandstone with some limestone along the Pennine fringes. Most domestic building stock, including farmhouses, dates from extensive rebuilding in 1650 to 1750 and later.

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

## 9. Key historic sites and features

### 9.1 Origin of historic features

There are prehistoric and bronze-age stone circles (for example, ‘Long Med and her Daughters’ near Croglin) and henges (such as ‘King Arthur’s Round Table’ at Eamont Bridge). Roman forts occur at strategic locations along the Roman road from Carlisle to Penrith, as at Kirkby Thorpe. Medieval castles (for example Appleby, Brough and Brougham), now mainly ruined, are a legacy of the area’s 10th century location on the Scottish border. Fragments of field systems associated with settlement earthworks (as at Dolphenby, King’s Melton, and Great Musgrave) are important evidence for the development of the medieval landscape. 12th and 13th century village development probably supersedes an earlier, more dispersed pattern. Many villages developed along the foot of the Pennines to the east as part of extensive estates that stretched to the upper fells, for seasonal livestock grazing. There are medium to high concentrations of pre-1750 farmstead buildings, and linear farmsteads, (mostly late 17th century). Parklands occur around Nunnery House and Staffield Hall, and the Grade I listed Corby Castle is set in formal grounds and parkland.

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

## 9.2 Designated historic assets

This NCA has the following historic designations:

- 4 Registered Parks and Gardens covering 254 ha
- No Registered Battlefields
- 119 Scheduled Monuments
- 1,330 Listed Buildings

Source: Natural England (2010)

More information is available at the following address:

- <http://www.english-heritage.org.uk/caring/heritage-at-risk/>
- <http://www.english-heritage.org.uk/professional/protection/process/national-heritage-list-for-england/>

## 10. Recreation and access

### 10.1 Public access

- Three per cent of the NCA, 2,265 ha, is classified as being publically accessible.
- There are 789 km of public rights of way at a density of 1 km per km<sup>2</sup>.
- There is one National Trail within the NCA; The Pennine Way (5 km).

Sources: Natural England (2010)

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

Access designation	Area (ha)	% of NCA
National Trust (Accessible all year)	8	<1
Common Land	518	<1
Country Parks	62	<1
CROW Access Land (Section 4 and 16)	1,549	2
CROW Section 15	43	<1
Village Greens	62	<1
Doorstep Greens	<1	<1

Access designation	Area (ha)	% of NCA
Forestry Commission Walkers Welcome Grants	95	<1
Local Nature Reserves (LNR)	5	<1
Millennium Greens	<1	<1
Accessible National Nature Reserves (NNR)	26	<1
Agri-environment Scheme Access	9	<1
Woods for People	546	<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 are at Penrith and Appleby-in-Westmorland, as well as along the linking transport corridors including the M6 and A66. The highest scores for tranquillity are on the western and eastern edges of the NCA – away from the main settlement and transport corridors.

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

Tranquillity	Tranquillity Score
Highest value within NCA	55
Lowest value within NCA	-72
Mean value within NCA	6

Sources: CPRE (2006)

More information is available at the following address:

<http://www.cpre.org.uk/what-we-do/countryside/tranquil-places/in-depth/item/1688-how-we-mapped-tranquillity>

## 11.2 Intrusion

The 2007 Intrusion Map (CPRE) shows the extent to which rural landscapes are 'intruded on' from urban development, noise (primarily traffic noise), and other sources of visual and auditory intrusion. This shows a similar pattern to the Tranquillity Map, with areas of disturbed land associated with the urban areas of Penrith and Appleby-in-Westmorland, as well as the major road corridors of the M6, A6 and A66. A breakdown of intrusion values for this NCA is detailed in the table below.

Intrusion category	1960s (%)	1990s (%)	2007 (%)	Percentage change (1960s-2007)
Disturbed	6	26	27	21
Undisturbed	94	74	71	-23
Urban	<1	<1	1	1

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are a 23 per cent reduction in undisturbed areas, mainly to disturbed areas, and a 1 per cent increase in areas classified as urban for their level of intrusion.

More information is available at the following address:

<http://www.cpre.org.uk/resources/countryside/tranquil-places>

## 12 Data sources

- British Geological Survey (2006)
- Natural Area Profiles, Natural England (published by English Nature 1993-1998)
- Countryside Character Descriptions, Natural England (regional volumes published by Countryside Commission/Countryside Agency 1998/1999)
- Joint Character Area GIS boundaries, Natural England (data created 2001)
- National Parks and AONBs GIS boundaries, Natural England (2006)

- Heritage Coast Boundaries, Natural England (2006)
- Agricultural Census June Survey, Defra (2000,2009)
- National Inventory of Woodland & Trees, Forestry Commission (2003)
- Countryside Quality Counts Draft Historic Profiles, English Heritage (2004)\*
- Ancient Woodland Inventory, Natural England (2003)
- 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)Detailed River Network, Environment Agency (2008)

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

## Supporting document 2: Landscape change

### Recent changes and trends

#### Trees and woodlands

- Grants for woodland management have encouraged an increase in the area of woodland under active management, with restructuring and regeneration of woods with broadleaves taking place to strengthen the landscape's traditional wooded character.
- The Forestry Commission assess that much of the woodland resource remains under-managed and not fully utilised for economic, environmental or social outcomes.

#### Boundary features

- Deterioration of hedgerows and introduction of wire fences has slowed and is reversing, supported through agri-environment schemes.
- Between 1999 and 2003, only 2 per cent of boundaries were managed under agri-environment agreements.
- By 31 March 2011, 667.2 km of hedgerow, 649 km of stone wall and 96 km of woodland field boundaries were managed under Environmental Stewardship options.
- Extraction of sand and gravel and removal of sandstone has led to loss of hedgerows and hedgerow trees.



Rolling, mixed farmland and woodland, fields enclosed by a mix of walls and hedges, in the mid Eden Valley, near Kirkby Thore.

## Agriculture

- The agricultural landscape continues to change towards a more intensively managed character, with a 53 per cent increase over the period 2000 to 2009 in the number of holdings of 100 ha or larger.
- Loss of permanent pasture has continued and there has been some increase in number of holdings classified as cereals, 'mixed' and 'general' cropping since 1999. There has been some increase in grassland cover. Between 2000 and 2009 the number of farms where cereals are the predominant farming activity increased threefold.
- Dairy and beef herds have expanded between 2000 and 2009, with a 30 per cent increase in cattle numbers. Total sheep numbers over the period have remained static.
- There has been good uptake of the Entry Level of the Environmental Stewardship Scheme on farms in the area since 2006, and involvement in the Higher Level Stewardship to manage areas of semi-natural habitats, such as heaths.

## Settlement and development

- Recent years have seen expansion of some towns and villages, and the use of modern building materials in new and refurbished dwellings have impacted on local character particularly around Penrith, Appleby-in-Westmorland and outskirts of Carlisle. Recently there has been development on the edge of settlements, an increase in traffic on main roads (including the M6 motorway and A66 trunk road that run the length of the Valley).

- There has been pressure for development at motorway intersections within open countryside and for intensive tourism enterprises, which has impacted on the local character of the western part of this area.
- There has been a proliferation of new large scale farm buildings which have a visual impact on the surrounding area.
- Loss of tranquillity due to the influence of the M6 motorway, the A66 trunk road and 400 KV overhead power lines, gypsum plant, Warcop MoD base and range, and quarrying.
- Increasing through-traffic pressure leading to bypass construction, e.g. A695 Kirkby Stephen bypass and bypass at A66 Temple Sowerby.

## Semi-natural habitat

- Around 12 per cent of the area is classed as semi-natural, with lowland heath being the predominant (non woodland) semi-natural habitat, and there are also mosaics of neutral grassland, heather and unimproved acid grassland in different parts of the area. The area of SSSI is small (3 per cent of the NCA area) mostly in unfavourable but recovering condition at March 2011.
- Semi-natural land cover, such as heath, wetlands and riparian habitats, are reported to have declined in condition through a lack of appropriate management and by improvement for agriculture in recent years, including loss of hedgerows and tree cover, drainage of mires and wetlands, and loss of heath and herb-rich hay meadows. Extraction of sand and gravel and removal of sandstone has also led to loss of hedgerows and hedgerow trees, heathland and other characteristic landscape features.

- Over the past five years, many of the remnant heath areas have been brought into restoration management, supported by the Higher Level Stewardship scheme. The heath is present or returning well, both within the SSSI of Lazonby Fell and Wan Fell, and immediately outside these areas.

## Historic features

- Visitor pressure is affecting vulnerable monuments and associated traffic congestion is affecting the character of the market towns – particularly Appleby-in-Westmorland and Penrith.
- Historic farm buildings appear to be declining slowly – about 76 per cent of historic farm buildings remain unconverted. Most are intact structurally.

## Coast and rivers

- The high ecological qualities of the rivers and other wetlands have been under some threat from effluent discharges and from nutrient and sediment run-off.
- The Catchment Sensitive Farming and other similar initiatives operate in the Eden Valley: The River Eden SAC has been identified as a priority catchment for addressing the diffuse pollution which impacts on water quality and 'failure' of the Natura Protected Area targets.

## Minerals

- Gypsum, sandstone, sand and gravels are quarried in this NCA. Gypsum and anhydrite mining is now confined to the Kirkby Thore area, where two beds 'A' bed and 'B' bed are worked for plaster, plasterboard and cement manufacture. The 'A' bed is worked at the Birkshead Mine and anhydrite forming the 'B' bed is extracted at the Newbiggin Mine. The Kirkby Thore

processing plant takes gypsum from around the world, accessing Kirkby Thore via the Settle–Carlisle Railway, this traffic being a major factor in the continuing operation of that line.

## Drivers of change

### Climate change

Climate change is likely to result in:

- Warmer wetter winters, hotter drier summers, changes in precipitation patterns and increased storminess and frequency of extreme events.
- Increased flooding of small towns, villages and transport infrastructure within the Eden Valley.
- Changes to the pattern of river flows with increased number of flood events and droughts. Reduced river flows in summer months may pose risk to water quality.
- Longer growing season, potentially leading to double cropping and greater demands on soil and water resources, with risk of soil erosion; intensification of agriculture, as conditions more favourable for arable produce including wheat for animal feed.
- Changes to the pattern of field capacity with increased periods of water logging and drought; changes to field patterns may result of from changes to farming patterns.

- Increased growth rates and productivity of timber species – but may be countered by increased drought stress, increased likelihood of windblown losses and threats from tree disease.
  - Increased erosion rates of soft sand and mud stones and till, leading to increased siltation in river courses and degradation of salmonid spawning grounds.
  - Potential for wetland sites to dry out in periods of prolonged drought, and loss of small or isolated habitats.
  - Generally expect to see a general shift northwards in species range bringing new species into the NCA, and the loss of others. Changes to phenology and climate space, resulting in mismatches. This is likely to result in community changes to species abundance and presence.
  - Competition with invasive species and with pests and diseases, for example Phytophthora and Chalara, already affecting populations of alder and European larch, and ash respectively. This is likely to result in species loss and community change.
  - Loss of habitats, losses to functioning networks, changes to landscape character. Impacts on food chain from decline in sand eel population could result in significant decline in migratory and overwintering birds.
- Other key drivers**
- The European Habitats Directive and Water Framework Directive place clear obligations on member states to address water quality and other issues to achieve favourable condition of Natura sites such as the River Eden SAC. The Eden Catchment Based Partnership has been established to promote the catchment approach and delivery of the Eden Catchment Plan to help to implement these obligations.
  - There is likely to be increased pressure for food production in the future as a result of a national drive for greater self-sufficiency in food. This may drive change in land use, flood risk management, tourism and woodland expansion.
  - Potential growth of biomass crops (Defra's maps show potentially high miscanthus yields in this area).
  - A requirement for increasing renewable energy generation could result in increased pressure for onshore windfarms and hydro power generation. Upgrading of national grid infrastructure may result in visual impacts, including settings of designated landscapes. This same drive for renewables creates opportunity for reinstating woodland management for wood fuel.
  - Further potential upgrades of trunk roads may result in impacts on archaeology, visual impacts and loss of tranquillity.
  - There is likely to be continued demand for resources of gypsum, sandstone, sand and gravel that are located in this area.

## Supporting document 3: Analysis supporting Statements of Environmental Opportunity

The following analysis section focuses on a selection of the key provisioning, regulating and cultural ecosystem goods and services for this NCA. These are underpinned by supporting services such as photosynthesis, nutrient cycling, soil formation and evapo-transpiration. Supporting services perform an essential role in ensuring the availability of all ecosystem services.

Biodiversity and geodiversity are crucial in supporting the full range of ecosystem services provided by this landscape. Wildlife and geologically-rich landscapes are also of cultural value and are included in this section of the analysis. This analysis shows the projected impact of Statements of Environmental Opportunity on the value of nominated ecosystem services within this landscape.



View south-east along the Eden Valley, near Staffield.

Statement of Environmental Opportunity	Ecosystem service																		
	Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place / Inspiration	Sense of history	Tranquillity	Recreation	Biodiversity	Geodiversity
<b>SEO 1:</b> Work at catchment scale to protect the soils and water quality of the Eden Valley catchment, thereby ensuring a sustainable future for farming, contributing towards Water Framework Directive objectives by improving the condition of the internationally important River Eden Special Area of Conservation and associated wetland habitats within the flood plain, increasing their capacity to regulate peak water flows, and enhancing a key feature of this tranquil rural landscape.	↑ **	↗ **	↗ **	○	↗ **	↑ **	↑ **	↑ **	↑ **	↑ **	↗ **	↗ **	○	↗ **	↗ **	↗ **	↗ **	↑ ***	↑ ***
<b>SEO 2:</b> Manage, restore and expand the area of woodland within the Eden Valley and its tributaries, restoring a network of woodland habitat to enhance timber supply, biodiversity, water quality, carbon storage and tranquillity, while regulating soil erosion and peak water flow.	↔ **	↗ **	↗ **	○	↗ **	↑ **	↑ **	↑ **	↑ **	↑ **	↗ **	↗ **	○	↑ **	↗ **	↑ **	↗ **	↗ **	↔ **
<b>SEO 3:</b> Protect and enhance the geodiversity and historic landscape of the Eden Valley, its geological exposures and river processes, and history of human occupation and innovation, optimise their contribution to delivering wider environmental benefits and raise public awareness, understanding and enjoyment of this heritage.	↔ **	↔ **	↗ **	○	↔ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	○	↑ **	↑ ***	↗ **	↑ **	↗ **	↑ ***
<b>SEO 4:</b> Protect and enhance the cultural heritage of Eden Valley, reinforcing the vernacular building style and settlement pattern in the design and location of new developments, protecting tranquillity, enhancing green infrastructure and habitat networks, and improving opportunities for public enjoyment of the area.	↔ **	↔ **	↑ ***	○	↔ **	↗ **	↑ ***	↗ **	↗ **	↗ **	↗ **	↗ **	○	↑ ***	↑ ***	↑ ***	↗ **	↗ **	↗ **

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

Dark plum =National Importance; Mid plum =Regional Importance; Light plum =Local Importance

## Landscape attributes

Landscape attribute	Justification for selection
A distinctive, undulating valley topography, enclosed by the North Pennines scarp to the east and the rugged fells of the Lake District to the west and the Orton Fells to the south.	<ul style="list-style-type: none"> <li>■ The surrounding highland is a defining characteristic of the area: the Pennine escarpment to the east is a very distinctive landscape feature, and lies within the North Pennines AONB; the western side of the valley is framed by the Lake District fells and the Orton Fells. These surrounding uplands serve to emphasise the sheltered and settled character of the Valley.</li> <li>■ The undulating floor of the Eden Valley is formed of an extensive blanket of drift deposits, supporting fertile soils and agriculture.</li> </ul>
Distinctive ridge of low sandstone hills extending from Penrith towards Carlisle between the rivers Eden and Petteril, through which the Eden has eroded and exposed geologically important sandstone rocks of Permian age, and on which important remnant heath habitat persists in mosaic with conifer woodland.	<ul style="list-style-type: none"> <li>■ Important river-associated exposures of the sandstone rocks of the Permian age, especially in gorge sections north of Kirkoswald and at Wetheral and Armathwaite.</li> <li>■ These exposures are important for interpreting changes in the palaeo-environments of the Permian. The rich colour of the exposed sandstone brings visual unity with the villages and other landscape features such as stone walls and gateposts built from the same stone throughout the NCA.</li> <li>■ The areas of remaining heathland in the Valley occur along the low chain of sandstone hills (about 200 m altitude) between the rivers Eden and Petteril. Heathland was once more extensive but most is now lost to improved grassland or plantation woodland, the remaining area on the sandstone ridge is of national importance.</li> <li>■ The conifer plantations are habitat for red squirrel.</li> </ul>
Distinct features of glacial deposition, such as drumlins and eskers, and overdeepened hollows ('kettle holes') in the glacial till that have developed into small basin mires.	<ul style="list-style-type: none"> <li>■ Deposition of drift deposits during glacial retreat, and subsequent erosion of these has created a distinctive undulating landscape of drumlins, eskers, and water filled hollows (kettle holes) that over time accumulated peat. These formed both basin mires, at least partly fed by drainage from the surrounding land, and raised mires where rainwater is the predominant nutrient input. Raised mires tend to be more acidic, or nutrient-poor, than basin mires.</li> <li>■ Most of the mire sites are scattered around Penrith and to the east of Carlisle. There are also a few sites associated with the heathland of the sandstone outcrops. The majority of these mires are SSSI, and of high ecological importance.</li> </ul>

Landscape attribute	Justification for selection
<p>The fast-flowing River Eden with its adjoining tributaries and many gills flowing off higher ground.</p>	<ul style="list-style-type: none"> <li>■ The River Eden lies at the heart of the area and with its tributaries is a defining feature of its character, supporting characteristic wetland habitats and associated riparian woodland.</li> <li>■ The River Eden is one of England's finest examples of a limestone and sandstone river, with nationally and internationally important assemblages of aquatic plants, wetland habitats and valley woodlands and with one some of the highest diversity of aquatic plants and animals in England: the river supports salmon spawning areas, Atlantic salmon, sea lamprey, brook lamprey, river lamprey, white-clawed crayfish, bullhead, and common otter, and is an important fishery.</li> </ul>
<p>A productive mixed agricultural landscape, dominated by a medium-large patchwork of rectilinear arable and improved pasture fields surrounded by sandstone walls, mature hedgerows and hedgerow trees, with estate shelterbelts.</p>	<ul style="list-style-type: none"> <li>■ Glacial and alluvial soils in the valley are some of the richest in Cumbria, giving rise to productive, mixed farming in medium to large rectilinear fields.</li> <li>■ The eastern Pennine foothills that run up to the escarpment support less intensively managed rough pasture and moor, with rectilinear conifer shelterbelts. This area retains the earthwork evidence of prehistoric and later settlement undamaged by later cultivation or pasture improvement.</li> <li>■ The most dominant historic landscape feature is ancient enclosure, closely followed by post-medieval enclosure, emphasising the time depth of the agricultural landscape. In some instances the medieval open fields have been fossilised within the present-day field systems, in others the intensity of use has led to loss of archaeological features.</li> <li>■ Parts of the upper River Eden and its tributaries are grazed intensively to the river edge, with consequent lack of semi- natural, undisturbed riparian habitats.</li> <li>■ Field boundaries form strong patterns and are a mix of sandstone walls and hedges, the latter being particularly species-rich towards the parts of the NCA which are underlain by limestone.</li> </ul>
<p>Outstanding remnant wetland habitats associated with the River Eden and its tributaries, including remnant mires and species-rich meadow and pasture, supporting wildfowl, waders and farmland birds.</p>	<ul style="list-style-type: none"> <li>■ At one time the Eden and its inflowing streams would have been fringed by extensive transitional habitats seasonally inundated riparian woodland, swamp and carr, and latterly extensive species-rich meadows – very important for farmland birds and overwintering wildfowl and waders. These birds are now associated with the few remaining areas of wet grassland and marsh on the flood plain. Near Ormside there is a large surviving flood plain of wet grassland, marsh and pools of great significance within the valley for both wintering and breeding wildfowl and waders.</li> </ul>

Landscape attribute	Justification for selection
<p>Semi-natural woodlands lining the rivers and the many gills flowing into the Eden from the surrounding uplands, with managed estate and farm woodlands across the valley floor alongside frequent mature hedgerow trees, giving the valley a well-wooded character.</p>	<ul style="list-style-type: none"> <li>■ Woodland of all types totals 9.5 per cent of the NCA, made up of large woodlands, farm copses, mature hedgerow trees (some very old) and shelterbelts, all contributing to the intimate and well-wooded character of the valley, one of its defining features.</li> <li>■ Riparian woodlands of willow and alder following the line of the river and its tributaries are still common in the Eden Valley and form remnants of a once common habitat across the flood plain, while also comprising a number of priority habitats, including a SAC.</li> <li>■ The hanging woodlands on gorge sections are a distinctive feature and of ecological value.</li> <li>■ Rectilinear conifer blocks and shelterbelts on elevated ground on the sandstone ridge and Pennine foothills provide habitat for red squirrel.</li> </ul>
<p>A long history of human occupation evidenced in numerous remains, including prehistoric stone circles, earthworks of early settlements and surrounding field systems, Roman forts, 10th-century castles and parkland, and an impressive railway heritage of bridges and viaducts.</p>	<ul style="list-style-type: none"> <li>■ Historical continuity is a key feature in this landscape, a result of its suitability for agriculture, proximity to the Scottish border and use as a transport corridor. Where they survive, visible archaeological features enable us to connect with the historical development of this landscape.</li> <li>■ There are numerous Neolithic monuments within the valley, such as Long Meg and Her Daughters stone circle, and King Arthur's Round Table and Mayburgh henges. These imply that the valley was an important early focus and/or communication line.</li> <li>■ Some of the largest concentrations of native Romano-British settlements in the county are found on the raised margins above the valley floor.</li> <li>■ The topography of valley has encouraged its use as a primary line of communication, both north-south and east-west. There are numerous defensive sites within the valley to protect this communication route, including a line of Roman forts at Brough, Kirkby Thore, Brougham, Old Penrith, and Carlisle, which follow the lines of Roman roads from the Stainmore Gap through to Carlisle. Some of these important defensive points were reoccupied in the medieval period, with castles at Brough, Brougham and Carlisle.</li> <li>■ Bridges, many of which are listed, are notable features in this valley NCA.</li> </ul>

Landscape attribute	Justification for selection
<p>An historic settlement pattern of stone-built nucleated and linear villages with substantial churches often planned around greens and surrounded by scattered hamlets and farms.</p>	<ul style="list-style-type: none"> <li>■ The principal settlements are the market towns of Penrith and Appleby-in-Westmorland, the latter renowned for its annual horse fair.</li> <li>■ Towns and villages tend to be located along the river and at the foot of the Pennine scarp, their origins and development reflecting the long history of occupation in the Valley; settlements tend to be locally distinctive and visually attractive, constructed using the local new red sandstone and roofed with green Westmorland slate.</li> <li>■ The NCA contains a large number of farmhouses dating from the 17th century or earlier, many of which carry date stones.</li> <li>■ Considerable numbers of ancient field systems remain around the mainly medieval historic nucleated settlements.</li> </ul>
<p>Distinctive vernacular buildings reflect the underlying sandstone and limestone geology.</p>	<ul style="list-style-type: none"> <li>■ The predominance of New Red Sandstone (both the Penrith Sandstone and the other local Permo-Triassic Sandstone, the St. Bees Sandstone) is reflected in local buildings and boundary walls and stone-faced banks and is a distinctive characteristic of the area, further enhanced by its visibility in the natural landscape, where exposed along the course of the Eden.</li> <li>■ The exception is the eastern foothills of the Pennines and in the southern part of the NCA where the underlying limestone geology of the scarp is reflected in local construction materials.</li> </ul>
<p>A landscape of significant tranquillity, accentuated by extensive views from within, of adjoining uplands, particular from the sandstone ridges, contrasting with the farmed landscape of the valley itself.</p>	<ul style="list-style-type: none"> <li>■ The lowland agricultural landscape of this NCA acts as a foil for its neighbouring uplands which are nationally designated landscapes.</li> <li>■ The upland areas are viewed from the lowlands and vice versa; the sandstone ridges, together with roads and railway provide the most frequent viewpoints from within the NCA.</li> <li>■ Some 72 per cent of the area is still classified as undisturbed in CPRE's intrusion map, despite the impacts of major roads and the expansion of towns, with the sense of tranquillity and calm heightened by the river and the surrounding fells.</li> <li>■ The areas of dark night skies have shrunk considerably since 1990, largely due to expanding settlement on the valley floor, especially around Penrith and Appleby-in-Westmorland.</li> <li>■ Tourism is increasingly important to the local economy.</li> </ul>

## Landscape opportunities

- Protect the distinct topography and mixed agricultural character of the Vale as contrast and emphasis to the neighbouring upland protected landscapes of the North Pennines AONB, the Lake District National Park, and the Orton Fells.
- Protect and appropriately manage the important river-associated exposures of the red sandstone rocks of the Permian age and those of the sandstone quarries.
- Protect and appropriately manage the nationally important aquatic habitats of the River Eden and its tributaries and the valley and basin mires, achieving necessary improvements in water quality, and restoration of a more natural morphology to modified sections of river channel; manage and significantly extend wetland habitats of flood plain wet grassland, marsh and pools, and the unimproved acidic and neutral grasslands, including remnant hay meadows, and lowland heath, ensuring that they are in favourable condition, aiding the resilience of these habitats to climate change.
- Manage, restore and expand areas of semi-natural woodland to create a coherent and resilient network, including hedgerows, riparian woodland (swamp woodland of alder and willow), and the hanging woodlands of the gorge and the restoration of semi-natural woodland on past ancient woodland sites including the ash dominated limestone woodlands of the Pennine foothills.
- Manage and extend areas of lowland heathland on the sandstone ridge (including through the restructuring of conifer plantations as they reach maturity) and other upland semi-natural habitats of the Pennine fringe.
- Manage and reinforce, through restoration, the established pattern of thick hedgerows and frequent hedgerow trees, the few remaining black poplar (*Populus nigra* ssp. *betulifolia*) stands (very rare in northern England), shelterbelts and distinctive local stone-faced banks, earth banks and stone walling, characteristic of this mixed agricultural landscape. Maintain legibility and pattern of ancient and post-medieval enclosure, and ensure that new boundaries are consistent with traditional boundaries, avoiding post and wire fencing unless temporary.
- Protect the historic settlement pattern of stone-built linear and nucleated villages often planned around greens, with their distinctive unifying red sandstone (or limestone in the Pennine foothills to the east and towards the Orton Fells in the south) reflecting the underlying geology and also reflected in building materials in the wider landscape such as gate stoops and field barns.
- Protect from damage and appropriately manage the area's rich cultural heritage, including prehistoric stone circles, earthworks of early settlements, Roman forts and associated settlements, medieval castles, ridge and furrow and estate parkland, as well as the impressive railway heritage of cuttings, bridges and viaducts.
- Protect intact pre-20th-century farmsteads from excessive rates of demolition, ensuring that alternative uses of redundant farm-buildings that are significant in the landscape are fully considered.
- Plan for sensitive and sustainable use of the NCA's mineral resources, mainly gypsum, sandstone, sand and gravel, and for small scale quarrying of local building stone for restoration and repair of vernacular stone buildings,

ensuring that features that make an important contribution to landscape character are protected, restored or re-created. Plan for new economic development that is low-impact, based on renewable resources, and compatible with the predominantly rural character.

- Plan for the development of sustainable transport methods which enhance existing communications corridors, and do not further erode tranquillity, and where upgrading of transport and energy infrastructure is necessary, plan for sensitive design which respects the existing landscape, and maximises opportunities to develop linear habitat networks associated with transport corridors.
- Plan for enhanced public access between Eden Valley and surrounding uplands, including suitable provision for all ability levels, in ways which will increase engagement of local communities and visitors with the natural environment while maintaining its predominant rural and tranquil nature.
- Provide opportunities to interpret the landscape, its features, and its rich history and heritage, for the understanding and enjoyment of all.



Acorn Bank, Temple Sowerby, a typical Eden Valley country house and parkland.

## 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 analysis and opportunities may change upon publication of further evidence and better understanding of the inter-relationship between services at a local level.

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Food provision</b>	<p>Fertile soils</p> <p>Water availability</p> <p>Sustainable farming practice</p> <p>Semi-natural pollinator habitat</p>	<p>70 per cent land area is prime agricultural land (mostly Grade 3 with 3 per cent Grade 2).</p> <p>A rich and productive agricultural area that is a major producer of lamb, beef, milk and pork. In 2007 there was a total breeding ewe flock of 120,000 and a dairy herd of 29,800 breeding females as well as 9,850 breeding beef females. Cereals and other crops are also produced in this area of productive mixed farming.</p>	Regional	<p>The fertile soils support livestock production, including the overwintering of upland stock from adjoining NCAs, with cereals and other crops. Future ability to maintain or increase food production will be influenced by the soil quality, and water availability, which in turn will be influenced by their current management.</p> <p>Poor soil and nutrient management can lead to deterioration and loss of a valuable resource to farming, and increased costs of inputs, in addition to diffuse pollution and sedimentation which impacts on water quality and the ecology of the Eden and its tributaries.</p> <p>Sustainable, local food production can be at the heart of the local economy, reinforcing sense of place and benefiting the area's tourist industry, for example the Eden Valley and Penrith food trails.</p>	<p>Continue working with the farming community to ensure good soil, nutrient and pesticides management, thereby securing the sustainable management of soil and water resources and services, essential to farming, and protecting and enhancing other services such as regulating water flow, and protecting the internationally important waters and wildlife of the River Eden.</p> <p>Maintain mixed farming with sustainable grazing on grasslands, preventing soil compaction and aiding water infiltration and recharge of the sandstone aquifer.</p> <p>Promote local produce to support local and sustainable farming practices, reinforcing sense of place and supporting the visitor economy.</p>	<p><b>Food provision</b></p> <p><b>Water availability</b></p> <p><b>Climate regulation</b></p> <p><b>Regulating water quality</b></p> <p><b>Regulating water flow</b></p> <p><b>Regulating soil quality</b></p> <p><b>Regulating soil erosion</b></p> <p><b>Recreation</b></p> <p><b>Biodiversity</b></p>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Timber provision</b>	Woodland cover  Soils	Main sources of commercial timber are the larger coniferous blocks on the sandstone ridge and eastern foothills of the Pennine escarpment, some over 100 ha; conifer woodlands cover 4.8 per cent of the NCA.	Local	<p>There are opportunities in the Eden Valley to expand woodland cover, bring woodlands into sustainable management, introduce short rotation coppice.</p> <p>Restoration of plantations on ancient woodland sites (PAWS) offers opportunity to convert to hardwood species with additional benefits in carbon storage and biodiversity.</p> <p>Restoring riparian and flood plain woodland would improve carbon storage, biodiversity and water flow regulation.</p>	<p>Expand woodland cover, in keeping with local landscape character, namely on vale slopes and tributary valleys, the sandstone ridge, and in riparian zone, focusing on locations where tree planting will reduce soil erosion and protect watercourses from sedimentation.</p> <p>Seek opportunities to restore plantations on ancient woodland sites and where appropriate, reinstate traditional woodland management practices such as coppicing.</p>	<p><b>Timber provision</b></p> <p><b>Biomass energy</b></p> <p><b>Water availability</b></p> <p><b>Climate Regulation</b></p> <p><b>Regulating soil erosion</b></p> <p><b>Regulating soil quality</b></p> <p><b>Regulating water quality</b></p> <p><b>Regulating water flow</b></p> <p><b>Sense of place / inspiration</b></p> <p><b>Biodiversity</b></p>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Water availability</b>	River Eden and tributaries  Groundwater  Aquifer recharge rates	Waters drain into the River Eden from the Lake District fells to the west and Pennines to the east. The catchment is a major source of potable water. Outside the NCA there are major impoundments and abstractions on the west side of the Eden catchment as part of the water supply network. These include provision for compensation flows into the River Eden. Water is also abstracted directly from the Eden near Wetheral and from a reservoir at Castle Carrock, near Brampton, for Carlisle and district water supply (both at the downstream end of the river within this NCA).	Regional	<p>The Permo-Triassic sandstones underlying the area are a significant store of groundwater although not considered a major aquifer for potable abstraction, and there are numerous boreholes in the catchment with the likelihood of future increase in numbers of these.</p> <p>Abstractions can increase low flows affecting the river's ability to support animals and plants.</p> <p>Sustainable resource use, careful land management and water capture and recycling on farms and by other businesses, can optimise the amount of both potable and non potable water available for use within Eden Valley, while protecting the river ecology.</p>	<p>Seek opportunities to increase area of semi-natural habitat, and sustainable grazing of all grasslands, thus increasing ground permeability and infiltration of rainfall to recharge groundwater supplies and reduce surface flooding.</p> <p>Work with the farming community and businesses to improve sustainable use of water and sympathetic land management practices, including crop selection and water harvesting, and that water conservation measures and sustainable drainage is designed in to new development.</p>	<p><b>Water availability</b></p> <p><b>Food provision</b></p> <p><b>Regulating soil erosion</b></p> <p><b>Regulating water flow</b></p> <p><b>Biodiversity</b></p>
<b>Genetic diversity</b>	Native black poplar	The Eden Valley contains stands of the rare black poplar, which hybridises with other tree species.	Regional	Black poplar readily hybridises with other tree species and can be an important contributor to timber provision. The genetic resource in the Eden Valley is therefore potentially of importance if new hybrids are sought to help increase resilience to tree diseases.	Seek opportunities to expand and protect from hybridising, the remaining stands of the rare native black poplar; ensure that information on native black poplar is made available to the Cumbria Biodiversity Data Centre.	<p><b>Genetic diversity</b></p> <p><b>Timber provision</b></p> <p><b>Biodiversity</b></p>

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<b>Biomass energy</b>	Woodland Soils	The NCA generally has high potential yields for short rotation coppice and medium potential yields for miscanthus throughout the area. There is also potential to bring under-managed woodlands into active management for wood fuel.	Local	<p>In terms of landscape character biomass planting (miscanthus and short rotation coppice) is best suited to valley floors where there is mixed or arable farming, and where there are existing woodlands and hedges. The North Pennines foothills, part of the North Pennines AONB, are higher, more open and more visible, and should be avoided, as should the slopes up to the Orton Fells, which share these characteristics.<sup>4</sup></p> <p>There is potential in the Eden Valley to develop anaerobic digestion to create biogas from excess farm wastes/slurries, reducing potential sources of contaminated run-off, and to develop a wood fuel supply chain to create a market for coppice products from semi-natural woodlands – there may be local opportunities for increased production of firewood and wood chip from the largely unmanaged hanging oak and ash woods of the valley, and also small farm woodlands that collectively cover 4 per cent of the area.</p>	<p>Work with the farming community to identify suitable opportunities to increase area of miscanthus and short rotation coppice, where this may be accommodated within local landscape character and provide enhanced regulation of soil erosion, soil quality water flow, water supply and water quality.</p> <p>Look for suitable opportunities to bring under-managed woodlands into management for wood fuel, where this also protects local landscape character and biodiversity.</p> <p>Support development of local supply chain for wood fuel products.</p> <p>Develop and use technologies such as anaerobic digestion for on-farm generation of biomass energy from farm waste.</p>	<p><b>Biomass energy</b></p> <p><b>Timber provision</b></p> <p><b>Climate regulation</b></p> <p><b>Regulating water quality</b></p> <p><b>Regulating water flow</b></p> <p><b>Biodiversity</b></p>

<sup>4</sup>[www.defra.gov.uk/foodfarm/growing/crops/industrial/energy/opportunities/jca/009.htm](http://www.defra.gov.uk/foodfarm/growing/crops/industrial/energy/opportunities/jca/009.htm)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Climate regulation</b>	<p>Small areas of soils containing high peat or organic content</p> <p>Semi-natural vegetation, particularly woodland, heath and wetland</p> <p>Permanent grassland</p>	The soils of the NCA generally have a low carbon content, reflecting that 93 per cent of its area is covered by mineral soils.	Regional	<p>The intensively managed soils that characterise this area contain low levels of organic carbon, while releases of greenhouse gases nitrous oxide and methane are likely to be relatively high. It will be important to conserve the isolated carbon-rich soils with a high peat or organic content.</p> <p>Land use practices should seek to enhance the carbon storage potential of soils and vegetation, through careful management of organic inputs to soils, reducing the frequency of cultivation, and expanding areas of permanent vegetation, particularly woodlands, heath and wetlands, and reverting some cultivated areas to permanent grassland.</p>	<p>Expand native woodland into appropriate locations, such as valley sides, tributary valleys, and in mosaic with heath on the sandstone ridge.</p> <p>Restore and create wetland habitats, particularly those associated with the kettle hole mires network, and elsewhere in the flood plain, to increase take-up and storage of carbon while achieving a diverse and coherent wetland network which can help regulate peak water flows.</p> <p>Seek opportunities to revert areas to permanent grassland, adopt minimum tillage, increase use of green manure crops within rotations, and create uncultivated margins to arable fields and along watercourses.</p>	<p><b>Climate regulation</b></p> <p><b>Water availability</b></p> <p><b>Regulating soil erosion</b></p> <p><b>Regulating soil quality</b></p> <p><b>Regulating water quality</b></p> <p><b>Regulating water flow</b></p> <p><b>Sense of place/ inspiration</b></p> <p><b>Biodiversity</b></p>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Regulating water quality</b>	River Eden and tributaries	Groundwater quality is classified as poor throughout most of the NCA, only being classified as good along the western edge of the area.	Regional	<p>There are a number of principal pathways for the valuable inputs and resources of land management to end up in watercourses, incurring costs to land managers and reducing the environment's capacity to continue providing and regulating these resources. Where slurry storage is inadequate, field applications may exceed the land's nutrient requirements, or be applied at inappropriate times, creating conditions for nutrient run-off and enrichment of waters.</p> <p>Phosphate from fertilisers enters watercourses and wetlands both through leaching into under-drainage and when bound to sediment particles, through soil erosion.<sup>6</sup> Coarse sediment delivered from landslips in poorly vegetated uplands and finer sediment from exposed or eroded soils, and from livestock accessing riverbanks, is readily washed into watercourses, creating problems in water quality but also, with the coarser sediment, in the capacity of rivers to accommodate peak flows.</p> <p>Nutrient and sediments drain into the basin and valley mires which act as nutrient sinks, threatening their biological interest. This is exacerbated where farm and other drains are directed into the mires.</p> <p>Hamlets and villages which are not connected to the mains sewer system can be a source of effluent entering watercourses.</p> <p>Defra's Catchment Sensitive Farming Initiative and similar initiatives provided by Eden Rivers Trust, offer advice and grants in the Eden Valley and Tributaries area to support land management practice which protects its valuable resources thereby reducing nutrient and sediment load to watercourses, protecting water quality and soils.</p>	<p>Work with farmers to adopt techniques for informed infield nutrient applications that more precisely meet nutrient requirements, and manage riparian grazing to prevent livestock accessing banksides or by protecting under permanent grassland strips.</p> <p>Over the sandstone significantly increase areas of extensively grazed permanent semi-natural grasslands and heathlands to reduce compaction and increase water infiltration and groundwater recharge.</p> <p>Ensure that excess slurry is diverted to anaerobic digestion to reduce nutrient run-off and that reedbeds/wetlands are created where surface water enters the main watercourses.</p> <p>Continue to promote improvements in farm infrastructure and waste management and improvements to waste water storm overflows; work with farming community to protect important mires from farming and other effluent.</p> <p>In new developments, promote sustainable drainage systems which will improve water infiltration and protect the underlying aquifer. Promote best practice measures to prevent effluent leakage from septic tanks.</p>	<p><b>Regulating water quality</b></p> <p><b>Food provision</b></p> <p><b>Climate regulation</b></p> <p><b>Water availability</b></p> <p><b>Regulating soil erosion</b></p> <p><b>Regulating soil quality</b></p> <p><b>Biodiversity</b></p> <p><b>Regulating water quality</b></p> <p><b>Regulating water flow</b></p>
	<p>Semi-natural vegetation cover</p> <p>Buffer strips</p> <p>Land management</p>	<p>Surface water of the River Eden and its tributaries tends to be of good ecological quality, generally meeting the Water Framework Directive and Natura Protected Area targets, with areas of poor or bad ecological quality in the upper reaches of the Eden (outside the NCA) and on the lower Petteril<sup>5</sup>. The River Eden SAC is one of Defra's Priority Catchments in response to the Natura Protected Area requirements, where nutrient run-off from slurry and silage, sedimentation, and leakage from septic tanks, are threats to water quality.</p>				

<sup>5</sup>The River Basin Management Plan for the Solway Tweed River Basin District, 2009–2015, Environment Agency and Scottish Environment Protection Agency (2009)

<sup>6</sup>Defra Catchment Sensitive Farming Initiative

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<b>Regulating water flow</b>	<p>River Eden and tributaries</p> <p>Semi-natural vegetation cover, particularly woodland and wetlands</p> <p>Land use and farming practice</p>	<p>The flood plain of the River Eden floods regularly and extensively, and localised flash flooding is frequent in settlements along the river such as Appleby-in-Westmorland. The river is a main source of the floodwaters that converge on Carlisle to the north (immediately outside the NCA), which is at risk from major flood events.</p>	Regional	<p>Land management practices and vegetation cover within the Eden Valley and upstream in neighbouring NCAs will influence the extent to which heavy rainfall is intercepted and the rate at which this is stored and released. Protecting soils under permanent vegetation cover, improving infiltration by expanding woodland cover, restoring flood plain wetland habitats and buffering watercourses with grassland strips, and managing grazing densities and machinery movements to minimise soil compaction, will all help to increase absorption, and regulate release, thus regulating peak water flows.</p>	<p>Work with land managers and authorities in neighbouring NCAs to address water flow issues at whole catchment scale.</p> <p>Increase the permeability of soils within the wider catchment, and hence rainfall interception rates, through extensive grazing regimes to reduce soil compaction and extend and create woodlands in the catchment of the tributaries where this will aid water infiltration and reduce cross-land flows.</p> <p>Significantly increase the area of wetland habitats, including wet woodland, in the valley of tributary streams and within the flood plain of the Eden and Petteril to store floodwaters.</p>	<p><b>Regulating water flow</b></p> <p><b>Timber provision</b></p> <p><b>Water availability</b></p> <p><b>Climate regulation</b></p> <p><b>Regulating soil erosion</b></p> <p><b>Regulating water quality</b></p> <p><b>Biodiversity</b></p>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Regulating soil quality</b>	Geology Soil types Semi-natural vegetation cover Farming practice	<p>This NCA has nine main soilscape types:</p> <ul style="list-style-type: none"> <li>■ Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils, covering 39 per cent of the NCA;</li> <li>■ Freely draining slightly acid loamy soils (24 per cent);</li> <li>■ Freely draining slightly acid sandy soils (20 per cent); slightly acid loamy and clayey soils with impeded drainage (5 per cent);</li> <li>■ Freely draining very acid sandy and loamy soils (4 per cent);</li> <li>■ Slowly permeable seasonally wet acid loamy and clayey soils (3 per cent);</li> <li>■ Loamy and clayey flood plain soils with naturally high groundwater (2 per cent);</li> <li>■ Freely draining flood plain soils (2 per cent); and</li> <li>■ Naturally wet very acid sandy and loamy soils (1 per cent).</li> </ul>	Regional	<p>The slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (39 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. Management measures that increase organic matter levels can help reduce these problems.</p> <p>The freely draining slightly acid loamy soils (24 per cent) and the freely draining slightly acid sandy soils (20 per cent) have potential for increased organic matter levels through management interventions. They may be valuable for aquifer recharge requiring the maintenance of good soil structure to aid water infiltration and the matching of nutrients to needs to prevent pollution of the underlying aquifer.</p>	<p>Continue working with the farming community to encourage best practice in soil management to improve structure and quality of soils, particularly where this can assist aquifer recharge. This may be achieved using low pressure machinery and managing stock and vehicle movements, particularly in wet conditions, to avoid poaching and compaction.</p> <p>Increase areas of woodland, employ minimal tillage and incorporate organic matter and 'green manure' legume crops to increase soil organic matter and also relieve soil compaction.</p> <p>Sustainable grazing levels and minimise machinery movements in wet conditions.</p>	<p><b>Regulating soil quality</b></p> <p><b>Food provision</b></p> <p><b>Water availability</b></p> <p><b>Climate regulation</b></p> <p><b>Regulating water quality</b></p> <p><b>Regulating water flow</b></p>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Regulating soil erosion</b>	<p>Soil types</p> <p>Vegetation cover, particularly semi-natural habitat</p> <p>Land use and farming practice</p>	<p>The River Eden and its tributaries is a priority catchment under the England Catchment Sensitive Farming Initiative. All of the Eden catchment is at high risk of soil loss. Arable areas, especially on slopes or areas susceptible to flooding present a high risk of soil erosion. Stock access to river banks exacerbates soil erosion.<sup>7</sup></p>	Regional	<p>The soils that cover just over half (54 per cent) of this NCA are susceptible to erosion.</p> <p>The freely draining slightly acid loamy soils (24 per cent), the freely draining slightly acid sandy soils (20 per cent), and the freely draining very acid sandy and loamy soils (4 per cent) can erode easily, especially on steep slopes, where vegetation is removed or where organic matter levels are low after continuous cultivation.</p> <p>The first two of these soil types are light and at risk of wind erosion, especially where coarse textured variants (freely draining slightly acid loamy soils), are cultivated or left bare. The naturally wet very acid sandy and loamy soils (1 per cent) are also light and susceptible to wind erosion and some are also easily eroded by water if heavily trafficked or after heavy rain.</p> <p>The slightly acid loamy and clayey soils with impeded drainage (5 per cent) are easily compacted by machinery or livestock if accessed when wet and are prone to capping or slaking, increasing the risks of soil erosion by surface water run-off, especially on steeper slopes.</p>	<p>Continue working with the farming community through Catchment Sensitive Farming and other initiatives to promote good soils management including use of green manure crops within arable systems and minimising vehicle and stock movements in wet conditions.</p> <p>Strengthen hedgerows, plant shelterbelts and create grass buffer strips running at right angles to the slope across steeper slopes under arable cultivation to prevent soil erosion from wind and water; create buffer strips across the flood plains of the Eden and Petteril to filter out soils in suspension in times of flood.</p> <p>Provide wide grass buffer strips and reedbeds adjacent to river banks, preventing livestock access to the water's edge.</p>	<p><b>Regulating soil erosion</b></p> <p><b>Food provision</b></p> <p><b>Climate regulation</b></p> <p><b>Regulating soil quality</b></p> <p><b>Regulating water quality</b></p> <p><b>Regulating water flow</b></p>

<sup>7</sup>Defra - England Catchment Sensitive Farming Initiative

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Pollination</b>	Semi-natural habitat, particularly species-rich grasslands and verges, and heath	<p>Areas of upland and lowland heath are important nectar sources for pollinating insects, as are the remnants of species-rich grassland.</p> <p>Hedgerows will provide some nectar sources for pollinators within the farmed landscape.</p>	Local	<p>There is an opportunity to increase food security by increasing the areas and connectivity of suitable habitat for pollinators. Road verges, hedgerows and linear transport corridors provide obvious opportunities for this. This also contributes to climate adaptation in both food production and biodiversity.</p> <p>Crops such as oilseed rape and field beans and orchard fruits are the main agricultural beneficiaries of pollination.</p>	<p>Seek opportunities within the agricultural landscape to increase the area of semi-natural habitats, especially lowland heathland, hay meadows, wet meadows and woodland with a good ground flora. Also dense flowering hedgerows and species-rich verges to increase the diversity of flowering plants and increase the area and range of habitat mosaics in close proximity to crops that benefit from pollination, for example in farm orchards.</p> <p>Promote the inclusion of nectar-rich margins to arable fields.</p> <p>Seek opportunities to create linear areas of habitat for birds and invertebrates, in particular using linear transport corridors.</p>	<p><b>Pollination</b></p> <p><b>Food provision</b></p> <p><b>Regulating soil erosion</b></p> <p><b>Sense of place/ inspiration</b></p> <p><b>Biodiversity</b></p>
<b>Pest regulation</b>	Structurally diverse semi-natural vegetation, such as heath, wetland, grassland and hedgerows	Structurally diverse, semi-natural habitat interspersed within productive agricultural areas may provide habitat for beneficial species.	Local	<p>Semi-natural habitat within productive agricultural landscapes may support species which prey on pest species, thereby regulating the potential damage of these to food production.</p> <p>Hedgerows are the most common field boundary, providing some habitat for beneficial predators. Structurally diverse vegetation including heath, grasslands and scrub/woodland, in proximity to arable crops, can provide habitat for beneficial predators.</p>	<p>Increase the area of land under semi-natural habitats in proximity to arable crops, and improve the structural diversity of these habitats.</p> <p>Manage and restore the network of hedgerows.</p>	<p><b>Pest regulation</b></p> <p><b>Food provision</b></p> <p><b>Pollination</b></p> <p><b>Biodiversity</b></p>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Sense of place/ inspiration</b>	<p>Landform (including the sandstone ridges and neighbouring upland areas)</p> <p>River Eden and tributaries</p> <p>Landcover, particularly woodland and heath</p> <p>Sandstone building stone</p>	<p>Sense of place largely defined by the distinct valley landform and framing views of the 'fells' beyond.</p> <p>Valued features of this landscape are the juxtaposition of the fertile settled valley against the imposing fells which surround it, the River Eden, the Eden Sandstone Gorge at Lazonby, the fertility of the land, the stone wall field boundaries, the towns and villages of the valley, and its rich history and heritage.<sup>8</sup></p>	Regional	<p>A strongly inspirational landscape responding to 'borrowed' views to the surrounding higher ground, changes in colour through the seasons and a constant change in the views in response to the weather.</p> <p>The Eden Gorge provides drama in contrast to the perceived gentle character of the valley.</p>	<p>Maintain the contrast between the rugged fells to east and west and the managed farmed landscape of the Eden Valley with its well-wooded character, hedgerows, estate shelterbelts and riparian woodland, and red sandstone walls over the sandstone ridge.</p> <p>Maintain long views to the fells from the main settlements and main vantage points within the Eden Valley.</p> <p>Protect and where possible enhance natural features and processes, particularly those associated with the rivers and flood plain.</p> <p>Ensure that new developments and changes in land use are successfully integrated into the landscape, that they respect historic settlement and field patterns and vernacular features, make a positive contribution to ecological networks, and do not compromise the rural character of this landscape.</p> <p>Opportunities exist to promote the calming and restorative effect that contact with tranquil and sensory environments have on health and wellbeing.</p> <p>Protect areas classified on Campaign to Protect Rural England (CPRE) maps as 'undisturbed' from further intrusion.</p>	<p><b>Sense of place/ inspiration</b></p> <p><b>Sense of history</b></p> <p><b>Tranquillity</b></p> <p><b>Biodiversity</b></p> <p><b>Geodiversity</b></p>

<sup>8</sup>'Capturing the cultural services and experiential qualities of landscape', Research Box and LUC (2009)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Sense of history</b>	<p>Prehistoric artefacts and sites</p> <p>Fortified castles of border lands</p> <p>Settlement and field patterns</p> <p>Strong farming history with adjoining uplands</p> <p>Estates with designed parklands</p> <p>Industrial heritage of the railways</p>	<p>A landscape with a very strong sense of history, dating from prehistoric stone circles, such as Long Meg and Her Daughters, near Little Salkeld and later associated with its defensive border location with Roman forts, fortified castles, many of these now ruined but remain conspicuous features of the landscape at Appleby-in-Westmorland, Brough and Brougham.</p> <p>The earthwork remains of early settlements and the strong links with upland farming are important local historical connections; the architectural heritage of the rural settlements and an impressive railway heritage of bridges and viaducts give a strong sense of history in the landscape – the Settle to Carlisle Railway runs through the Valley providing a living history of the industrial heritage of the railway that visitors can experience.</p>	Regional	<p>Aspects of history likely to be particularly evident to the general public are the area’s ruined fortified castles which hint at the turbulent borderlands history of the Eden Valley. Traditional buildings and settlement patterns, designed parklands, established field patterns, and the railway bridges and viaducts, are also notable features.</p> <p>Prehistoric henges are an important legacy of early occupation of the Eden Valley.</p>	<p>Reduce the number of ‘at risk’ heritage sites and positively manage for important historic structures such as henges, fortified castles and railway structure, through targeted management and advice.</p> <p>Seek opportunities where appropriate to interpret features to increase public engagement, enjoyment and understanding.</p> <p>Strengthen the pattern of historic field systems in the landscape and earthwork evidence of early settlement, protecting under appropriate management above ground and sub-surface remains, and restoring hedgerows where they have been lost, for example on the valley edges.</p> <p>Manage and restore designed parkland and important trees in the landscape.</p> <p>Maintain and promote the established vernacular of the settlements and buildings of the NCA with the use of red stone (or limestone where relevant) in restoration and new building, together with Westmorland slate for roofing.</p>	<p><b>Sense of history</b></p> <p><b>Regulating soil erosion</b></p> <p><b>Sense of place/ inspiration</b></p> <p><b>Recreation</b></p>

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<b>Tranquillity</b>	<p>Landform, including surrounding fells</p> <p>River Eden and tributaries</p> <p>Woodland</p>	<p>According to the CPRE Intrusion Map (2007) 71 per cent of the area is classed as 'undisturbed'. Notably, there has been a 23 per cent decline in the undisturbed area between the 1960s and 2007.</p>	Regional	<p>A landscape with a strong sense of tranquillity and calm, heightened by the river and surrounding fells. The area of disturbance on the CPRE maps are associated with the urban areas of Penrith and Appleby-in-Westmorland, and the major road corridors of the M6, A6 and A66 which follow the line of the valley.</p>	<p>Seek to contain further disturbance associated with the main transport corridors and settlements through enhanced screening by semi-natural vegetation, particularly where the main roads cross the valley, enhancing habitat networks and strengthening landscape structure and character.</p> <p>Minimise light spill through careful lighting design, particularly in areas classed as 'undisturbed' on the CPRE intrusion maps.</p> <p>Manage woodlands and parklands, extending and linking these to enhance local sense of enclosure and tranquillity within the valley.</p> <p>Make suitable provision for visitors to access a landscape where they can be inspired and experience the feeling of escapism.</p> <p>Work with land managers to improve the quality of the River Eden and restore semi-natural riparian habitat.</p>	<p><b>Tranquillity</b></p> <p><b>Regulating water quality</b></p> <p><b>Sense of place/ inspiration</b></p> <p><b>Biodiversity</b></p>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Recreation</b>	<p>Rights of way network including the Pennine Way National Trail and Lady Ann's Way long distance route</p> <p>Open access land</p>	Just under 2 per cent of the NCA (1,446 ha) is open access/registered common land. There are just less than 777 km of public rights of way, at a density of 0.96 km per km <sup>2</sup> . 4.5 km of the Pennine Way fall within the NCA.	Regional	<p>Eden Valley is a landscape whose association with leisure and recreation tends to be eclipsed by that of its neighbours in the Lakes and the Pennines.</p> <p>However, it is much used for recreation by local people, particularly the elderly and less mobile, and dog walkers avoiding the loose sheep of the open fell. Woods and streams such as at Kings Meaburn and Little Salkeld are popular local destinations.</p> <p>The area generally is a popular destination for walking, horse riding, cycling, mountain biking and water-based activities such as angling, kayaking and canoeing, together with other activities including bird/wildlife watching.</p>	<p>Maintain current opportunities for access and enjoyment of the countryside, and identify opportunities to create new circular routes or links to existing rights of way, particularly to the Pennine Way, and between Eden Valley and its surrounding fells and provide suitable opportunities for different user groups and abilities to access and enjoy their local area.</p> <p>Work with business to support initiatives promoting sustainable tourism that help grow a local green economy, recognising the economic value of recreational visitors to the NCA.</p> <p>Seek opportunities for educational access to historic farm buildings and opportunities to interpret and enjoy the farmed and historic environment.</p>	<p><b>Recreation</b></p> <p><b>Sense of history</b></p>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Biodiversity</b>	<p>Sites designated/ protected for their nature conservation interest, including European Sites, SSSI and County Wildlife Sites</p> <p>Priority habitats and species</p>	<p>Six internationally important wildlife sites lie partly or wholly within the Eden Valley, including the River Eden SAC and the Cumbrian Marsh Fritillary SAC. 31 SSSI lie wholly or partly within the NCA, 78 per cent of these are assessed (2011) as in favourable or recovering condition, the remaining area is in unfavourable or declining condition. There are 89 locally designated (County) sites within the NCA.</p> <p>The NCA contains important populations of marsh fritillary butterfly, and remnant stands of the native black poplar. It supports otter, water vole and is a managed stronghold for red squirrel in and around the Whinfell reserve.</p> <p>The valley is used by wintering wading birds, and whooper swans, bird populations here being influenced by the nearby presence of the Solway Firth.</p>	National	<p>The River Eden is one of England's finest large river systems on limestone and sandstone. This fast-flowing river is of European importance for its habitats and wildlife, including a diverse aquatic flora, Atlantic salmon, bullhead, lampreys and white-clawed crayfish. It and flows northwards through the NCA, forming an important aquatic habitat corridor connecting to the Solway Firth.</p> <p>Semi-natural woodlands are an important element of the Eden Valley's biodiversity and landscape character, particularly those associated with the Eden and its tributary valleys.</p> <p>Other semi-natural habitats tend to be small and fragmented, offering opportunities for restoration across the landscape of resilient habitat networks. The basin mires formed in glacial kettle holes are of high ecological importance.</p> <p>Small but important areas of lowland calcareous grassland, upland hay meadow and lowland meadow are found on the lower slopes of the Pennines to the south and east and the Orton Fells to the west, and in the species-rich roadside verges on the Orton fringes, designated as wildlife sites by Cumbria County Council. The sandstone outcrops support remnant heath. North of Penrith a series of Purple moor-grass pastures, support marsh fritillary butterfly.</p>	<p>Work with land managers in the catchment to improve the water quality of the Eden, and seek opportunities to restore a more natural river morphology and restore or create flood plain habitats strengthening the wetland habitat network around ecologically important basin mires.</p> <p>Utilise educational opportunities to study river ecosystems and processes in the Eden.</p> <p>Improve the long term condition of designated wildlife sites, including SSSI/SAC and County Wildlife Sites and core areas of priority habitat by ensuring that underlying contributors to site condition are understood and managed appropriately, and that these are also considered in light of anticipated environmental change –seek opportunities to expand and buffer these sites, building more robust ecological networks, particularly for woodland, wetlands, heath and species-rich grasslands.</p> <p>Seek opportunities to utilise linear transport corridors to create semi-natural habitat and strengthen the habitat networks in the Eden Valley.</p>	<p><b>Biodiversity</b></p> <p><b>Regulating water quality</b></p> <p><b>Regulating water flow</b></p> <p><b>Sense of place/ inspiration</b></p> <p><b>Tranquillity</b></p>

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
<b>Geodiversity</b>	Sites designated or identified for their geological or	There are 11 SSSI within Eden Valley NCA which are notified at least in part for their geological interest. There are 25 locally designated geological sites in the area.	National	<p>The geological SSSI of the Eden Valley tend to be stream sections, cuttings or quarry exposures of Permo-Triassic and Ordovician geology and significant fossil exposures, including at Melmerby Road Section SSSI the only occurrence of the strata known as the melmerby beds, and at George Gill clasts of Whin Sill dolerite making this site of national importance for interpreting Permian palaeogeography and palaeoenvironments. Moorhouse and Cross Fell SSSI contain periglacial features and active fluvial processes.</p> <p>Many of these sites are currently (2011) in favourable condition, and where there are threats to sites this tends to be from vegetation obscuring exposures, and potentially from recreational activity such as climbing and caving. The SSSI and local sites networks provide an important educational and research resource that helps us better understand the geological history of the NCA and development of the landscape.</p>	<p>Working with land managers and user groups, maintain the long-term condition of geological and geomorphological sites and features through their appropriate management and the natural functioning of geomorphological processes. Protect and manage the important river sections, natural outcrops and quarry exposures.</p> <p>Identify and promote the importance of such features through local partnerships with geologists, schools, colleges and other interested parties, increasing their educational use and providing suitable opportunities for visitors to access, interpret and enjoy them.</p>	<p><b>Geodiversity</b></p> <p><b>Sense of place/ inspiration</b></p> <p><b>Recreation</b></p> <p><b>Biodiversity</b></p>

## Photo credits

Front cover: Watersmeet, the confluence of the rivers Eden and Eamont, looking west towards the peaks of the Lake District across the Settle-Carlisle Railway. © Susannah England/Natural England

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