National Character Area profile:

155. Carnmenellis

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Introduction

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

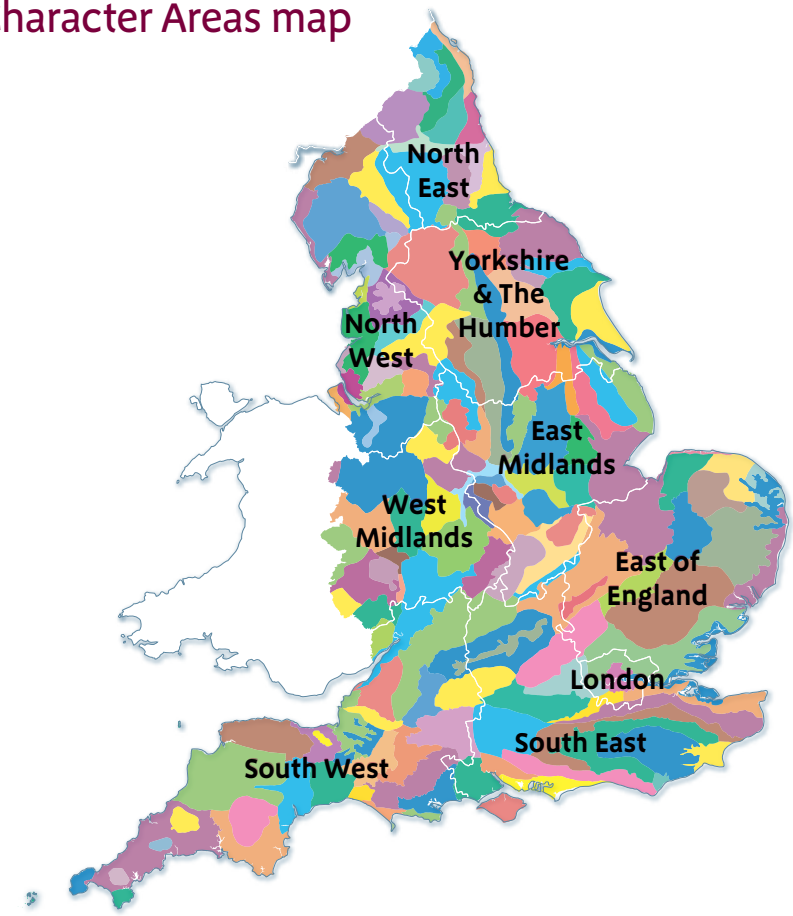
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and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

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

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

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

National Character Areas map



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

Summary

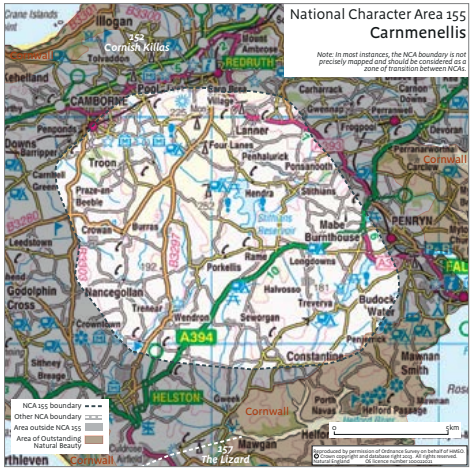
Carnmenellis is a small landlocked National Character Area (NCA), near the south-western-most tip of mainland Britain. Its proximity to the sea creates a mild climate although the hills are exposed and wind-swept. The area gets its name from its highest point, Carnmenellis hill. The area is bounded by the Cornish Killas NCA and lies close to The Lizard NCA. Carnmenellis is primarily an agricultural landscape of rolling hills divided by regular fields bounded by Cornish hedges. In the spring and summer, the Cornish hedges are covered in wild flowers which, combined with the scattered areas of heath, woodland and moor, lend a picturesque quality to the area. The southern edge of the NCA includes 45 ha of Cornwall Area of Outstanding Natural Beauty.

Carnmenellis is one of the great granite bosses forming part of the spine of Cornwall. The granite is cut through with rich veins and lodes of minerals including silver, copper and tin. During the 18th and 19th centuries this area was one of the foremost tin and copper producing areas in the world and so the landscape has been shaped partly by mining. Some 2,062 ha of the Cornwall and West Devon Mining Landscape World Heritage Site fall within Carnmenellis NCA, covering 14 per cent of the area.

Carnmenellis contains one of Cornwall's most important archaeological sites – the remains of Neolithic settlement, dramatically located on top of the detached granite boss of Carn Brea. The area is host to many other historical assets including the remains of prehistoric field boundaries, bronze-age barrows, granite crosses, Cornish hedges and all of the structures and workings related to mining.

Small cottages and farmsteads are scattered throughout the area, reminders of the many tin miners who once supplemented their earnings by subsistence farming on smallholdings. Over 96 per cent of the NCA is now part of a farmed environment. While traditional materials of granite and slate are used in many buildings, more recently brick and tiles have been used for new developments.

The area is not a busy tourist destination but it does attract visitors, especially to Stithians Reservoir where camping is available as well as bird watching opportunities and activities such as sailing, windsurfing, canoeing and climbing. There are 343 km of public rights of way and 669 ha of open access land providing opportunities for walking, horse riding and cycling. Opportunities for recreation are also provided by the mineral tramways which run between the historic mining sites.



Click map to enlarge; click again to reduce

Statements of Environmental Opportunities:

- **SEO 1:** Conserve, manage and increase the understanding of the unique historic landscape and its geological and heritage assets, including the internationally important mining legacy, the distinctive granite tors, the prehistoric and later settlements and ritual remains, and the unique Cornish hedges and field patterns.

- **SEO 2:** Manage, restore, link and improve the area's rich mosaic of heathland, moorland and rough grassland, enhancing and extending its range, while encouraging sustainable agricultural practices which contribute to the soil quality, water quality and habitat condition, as well as to the local economy.

- **SEO 3:** Encourage the development of sustainable tourism linked to the World Heritage Site. This should focus on sensitively increasing access to and interpretation of the area, which will encourage the strong local sense of identity.

Basset Mines.

Description

Physical and functional links to other National Character Areas

The Carnmenellis National Character Area (NCA) is bounded on all sides by the Cornish Killas NCA. To the south, there are views out across the River Helford to The Lizard NCA. Bodmin Moor and Hensbarrow NCAs are clearly visible to the east, as is West Penwith NCA to the west. These areas are visible from Carnmenellis hill and are part of the same granite batholith, supporting similar high-quality heathland habitats.

Stithians Reservoir and several other smaller reservoirs supply water to the NCA and the surrounding area. The streams and rivers (most notably the Cober and the Hayle) rise on the granite bosses and wind their way to both the north and south coasts, crossing into the Cornish Killas NCA as they do so.

Agriculture links Carnmenellis with the surrounding NCAs as many of the farms straddle the boundary between it and Cornish Killas NCA. There are also farming links with market towns such as Helston.

The main link between this NCA and surrounding areas is the A394 between Falmouth and Helston. The B3297 acts as the main route between Helston and Redruth, bisecting the NCA. The mainline railway runs along the upper boundary of the NCA and there are train stations at the towns of Cambourne, Redruth and Penryn which sit just outside the northern and eastern boundary of the NCA.

The Carnmenellis NCA is linked to the rest of Cornwall through its rich historic industrial heritage. The Great Flat Lode, a mineral-rich seam stretching through the area, was at the heart of the mining revolution in Cornwall and Carnmenellis supports three areas of the Cornwall and West Devon Mining Landscape World Heritage Site.

The position of Carnmenellis in The Cornwall and West Devon World Heritage Site.

Key characteristics

- Carnmenellis is an area of exposed granite hill tops offering long views over the surrounding landscape, rising to a maximum elevation of 252 m at Carnmenellis hill and the prominent Carn Brea monument overlooking Redruth.
- The acidic soils are of poor quality and predominantly gravelly and peaty but with patches of brown earths in the lower-lying parts of the area.
- Small streams radiate in all directions from the highest points of granite. The centre of the granite mass is an irregular plateau with poor surface drainage where water collects in bogs and mires. Stithians Reservoir and a number of smaller reservoirs are distinctive features in the landscape.
- Granite quarrying has influenced the landscape in the south and east, leaving a legacy of rock, waste tips and sheer rock faces.
- Woodland is generally uncommon in the area. The hill tops are treeless but there are small patches of willow carr in damp valleys and deciduous woodlands occur on the deeper valley sides on the western and eastern fringes of the NCA.
- Livestock rearing and dairy are the most common farm types. A large portion of the agricultural land is turned to grazing/uncropped land. There are small amounts of cereal and root crop growing in the NCA. Horticulture focuses on the richer soils and gentler slopes in the south and west.
- The central open moorland is surrounded by patterns of irregular ancient fields and very distinct regular 18th- and 19th-century enclosures dominated by Cornish hedges constructed from moorland boulders. Prominent remains of prehistoric field patterns are present.
- A network of narrow lanes criss-crosses the area, often along the valley bottoms, and there are few main roads.
- Fragments of treeless heathland, wet moorland and mires punctuated by exposed granite outcrops are common on the bleak uplands.
- Cornish hedges form wildlife corridors and are an important habitat in their own right.
- The landscape is rich in historical assets such as the Neolithic settlement at Carn Brea. Granite walls, crosses, standing stones and stone stiles are other characteristic landscape features.
- Remnants of the 19th-century mining industry abound. Engine houses and mining warehouses, processing buildings, terraced houses and Methodist chapels are major characteristics of the industrial areas. Large areas of bare spoil heaps and surface working dominate, some slowly being colonised by heathland and some supporting internationally rare bryophytes. Hundreds of former mine shafts occur throughout the area. This mining landscape is now recognised as internationally important, reflected by the designation of the Cornwall and West Devon Mining Landscape as a World Heritage Site.
- The NCA has a dispersed settlement pattern of hamlets and farmsteads of medieval origin, with villages mainly of recent, industrial origin. The scattered farmhouses, hamlets and village centres normally consist of granite-built houses with slate roofs, whereas newer dwellings from the 1970s and 1980s are often covered with pebbledash.

Carnmenellis today

Carnmenellis is one of the granite outcrops that make up the spine of the south-west peninsula. The higher ground is a mix of moorland and rough pasture with a rugged and remote character. It has a simple land use pattern of wind-swept, rock-strewn heaths, ancient field systems and settlements, with remains of the bygone mining industry clearly evident. Carnmenellis has views across the River Helford to The Lizard NCA and is bounded on all sides by the Cornish Killas NCA, with which it has the most links.

Rough moorland once dominated this landscape, but now only fragments remain on the highest, most exposed hills such as Crowan Beacon and Carnmenellis. Most of the land is undulating and dissected by small streams radiating from the highest points of the granite. Fields are small, some following irregular ancient boundaries but more often they are regular, clearly part of the 18th- and19th-century intake, often associated with the mining industry. These are enclosed by Cornish hedges, granite-faced banks made from moorland boulders and covered with wild flowers. The vegetation on the later boundaries often reflects the former heathland upon which they were created, being covered in gorse and heather. Today most of the fields are grassland used by dairy cattle, although there is also widespread rough grazing.

There is little settlement on the higher ground. Older buildings are nearly all built of local granite with slate roofs and some slate hanging tiles. These are located around the edge of the area or in the shallow valleys. Granite is a unifying theme throughout the landscape, visible in walls, crosses, standing stones, stone stiles, quarries and rock exposures.

The rivers Cober and Hayle both rise in the Carnmenellis NCA and descend from the granite the short distance to Loe Pool and to the sea at Hayle respectively, all within the Cornish Killas NCA. Stithians Reservoir was constructed in 1964, creating a 270 ha water body providing water for most of west Cornwall.

There are areas of wet willow woods in the shallow valleys and deciduous woods lower down where the valleys become deeper. Fragments of heathland and wet moorland are important on the plateau and often occur adjacent to old mining sites. The network of semi-natural habitats includes 867 ha of priority habitats, including lowland heath, broadleaved woodland, and purple moor-grass and rush pasture. Thirteen hectares are designated as a Site of Special Scientific Interest (SSSI). The ground of the SSSI is contaminated with copper-rich spoil which provides highly specialised conditions for lower plants, many of which are very rare, including several species of liverwort and also copper moss.

The farming pattern is overlain by groups of miners' cottages and small villages, some of medieval origin with buildings clustered around the square-towered granite churches. On the more sheltered sites and better land to the south, large modern farm buildings tend to dominate the older dwellings. Within the mining areas of Camborne and Redruth, and Wendron, Methodist chapels are prominent. The traditionally dispersed settlement pattern has been augmented by roadside development and the enlargement of hamlets and small villages. The pattern of simple granite buildings remains visible but is rather masked by recent developments in non-local materials such as grey pebbledash. Many of the villages retain local amenities such as village halls, shops and pubs.

Towards the south, the landscape becomes a little gentler. The soils are richer, the climate less extreme and the influences of mining are much reduced. This has allowed the development of larger farms and some horticulture in the more sheltered valleys. In place of mining, granite quarrying has influenced the landscape in the south and east leaving a legacy of rock, waste tips and sheer rock faces.

Carnmenellis contains one of Cornwall's most important archaeological sites – the remains of a Neolithic tor enclosure, dramatically located on top of the detached granite boss of Carn Brea. Nevertheless, Carnmenellis is a landscape shaped partly by mining. The most apparent reminders of the tin and copper mining industry are in the north, towards Camborne and Redruth. It is here that 2,062 ha of the Cornwall and West Devon Mining Landscape World Heritage Site fall within the NCA. Here there are the characteristic remains of mine engine houses, the rough ground of mine 'burrows' (spoil heaps) and old shafts, and old tramways. The Wendron lode in the southern part of the NCA also includes many industrial sites including Poldark Mine and Porkellis Moor.

The NCA also includes 45 ha of Cornwall Area of Outstanding Natural Beauty along its southern edge.

Mining was so widespread in Carnmenellis that there are still areas, such as the woods at Carharrack, which are closed to the public due to unmarked, open mine shafts. It is also not unknown for roads or other land to start to sag and disappear into collapsed mine shafts.

Local visitors who enjoy walking, horse riding or cycling along some of the NCA's rights of way use the area. The public rights of way network consists of miners' track ways linking settlements and a low density of small country lanes. Visitor attractions associated with the industrial heritage include the King Edward Mine Museum and the Poldark Mine. Stithians Reservoir is also an attractive spot for visitors as it offers many activities such as windsurfing, for which it is famous, kayaking and archery lessons. There are also several bird hides at the lake which is home to many different bird species as well as being a stop-off point for various migratory birds including ducks and warblers.

Riding at Carn Brea.

The landscape through time

The granite outcrop that forms the Carnmenellis NCA is one of a series of mainland granite intrusions stretching to Dartmoor 160 kilometres to the east. These are linked at depth to the Cornubian Batholith. During the Devonian and Carboniferous periods this area formed part of a marine gulf where sand and mud deposits accumulated. These were intruded by dolerite sills which sometimes reached the sea floor where they formed pillow lavas. This gulf closed during the Carboniferous–Permian Variscan Orogeny, the mountain building period 320 to 280 million years ago. Burial, compression, folding and the propagation of low-angle faults resulted in the formation of slates and greenstones from the sands, muds and dolerites; these are found along the south-eastern edge of the area and along the north-west coast.

The Carnmenellis granite was intruded towards the end of this period. The granite forms a high ridge or plateau with boulder-strewn moorlands; it is widely used as a building material throughout the area. At the margins of the granite intrusion, the heat generated produced rich mineral veins of principally tin and copper, with some lead and silver.

Carnmenellis contains one of Cornwall's most important archaeological sites: Carn Brea is the remains of a Neolithic settlement, dramatically located on top of the detached granite boss towering above Redruth. The area was densely populated in the Bronze Age, when the climate was much milder than it is today. Neolithic farmer/hunters and bronze-age settlers were responsible for much of the woodland removal in the area. Many settlements were abandoned around 1000 bc. During the Iron Age the ramparts on Carn Brea were repaired and re-used and a small settlement of round houses was

Carnmenellis granite - used as a vernacular building material in Stithians village.

constructed on the site. There was some Roman activity in the region but there is little evidence of further activity until after the Norman Conquest in the 11th century. However, settlements continued to be developed between these periods and some are still visible in today's farmsteads.

Although there are many prehistoric irregular field patterns, most of the area was open grazing land and the history of the landscape since the later prehistoric times has been one of piecemeal enclosure and the exploitation of mineral resources.

The Carnmenellis NCA is a landscape significantly changed by mining during the 18th and 19th centuries. Rich veins and lodes containing tin, copper, silver, lead, tungsten and uranium were emplaced by circulating fluids within the granite and surrounding rocks. Of these minerals, tin and copper have been the most extensively worked, probably since the Bronze Age. Around Redruth and Camborne, on the northern edge of the Carnmenellis area, lies the heartland of Cornish mining. During the 18th and 19th centuries this area was one of the foremost tin and copper producing areas in the world; and it was a major centre of invention and engineering during the Industrial Revolution. The resultant wealth financed the growth of centres such as Redruth and many small mining villages in areas that were formerly open heath and moorland. In the mid to late 19th century, however, foreign competition hit the Cornish mining trade and many mines were forced to close, leaving a legacy of ruined buildings and waste tips in the landscape. Many of the skilled miners relocated around the world and the techniques they pioneered are still in use today. Even at its height, the mining industry was part of a mixed economy with most miners having smallholdings. This accounts for the dispersed and complex pattern of settlement and piecemeal enclosure.

On the north-eastern edge of the NCA is Gwennap Pit, an open-air amphitheatre made famous by John Wesley, the founder of Methodism, who preached there on 18 occasions between 1762 and 1789. Possibly created by mining activities, it has remarkable acoustic properties. Wesley, who first saw it in 1762, described it as "a round green hollow"." and as "an amphitheatre".

To the east, near Ponsanooth, the gunpowder works at Kennall Vale provides a remarkable and atmospheric series of powder mills set in a heavily wooded steep valley dominated by the River Kennall, which was so vital for the working of the mills.

In recent years, the area has hit difficult economic times, due in part to the loss of the mining industry, but also the inability to produce large quantities of food, few employment opportunities and high levels of social deprivation.

Many farms have expanded and diversified into offering accommodation and recreational activities such as horse riding, mountain biking and camping. This has been further boosted by the development of a water sports centre at Stithians Reservoir. More recently, diversification into renewable energy (solar and wind) in the area is further diversifying land-based businesses.

The Cornwall and West Devon Mining Landscape World Heritage Site, inscribed in 2006, has also added a focus for tourism to the area through the development of self-guided tours and cycle routes including the Great Flat Lode Trail and other sections of mineral tramways. Many visitor attractions illustrate the important role that the area played in the Industrial Revolution.

Ecosystem services

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

Provisioning services (food, fibre and water supply)

- **Food provision**: Beef and dairy farming are the main livestock industries of the NCA. The more fertile soils to the south support arable farming with cereals and root crop production that has increased in recent years. Small areas of horticulture are also present on the areas of richer soil in the valleys along the NCA's southern edge. Agricultural soil classification in the NCA is Grade 3–5.

- **Water availability:** While the area has high rainfall, a combination of the hard granite and the short streams and rivers means that much flows straight out of the NCA. Some water is abstracted and this is stored in Stithians Reservoir for public water supply and agriculture.

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

- **Regulating soil erosion:** All the soil types within the NCA are susceptible to erosion from water, wind and inappropriate agricultural techniques. However, much of the area is either semi-natural habitat or pasture and so is protected against soil erosion to a certain degree. Part of the NCA falls within the West Cornwall priority catchment for the Catchment Sensitive Farming Project.

- **Regulating water quality:** While some streams have a 'good' ecological status, a number are classified as 'moderate' owing to pollution from mining and from through flow from the naturally acidic bedrock. Watercourses running south are more likely to be vulnerable to nitrates due to arable and horticultural farming in this section of the NCA.

- **Regulating water flow:** The impermeable nature of the granite bedrock means that water flows swiftly to reservoirs or the sea. However, semi-natural habitats, pasture and Cornish hedges can help to slow the flow of surface water.

Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration:** The area has a strong sense of place derived from its mining legacy and supported by patches of heathland, moor, and tree-filled valleys. This is further complemented by the pattern of ancient fields, bounded by Cornish hedges.

- **Sense of history:** Human occupation of the area since before the Bronze Age provides a wealth of information and records about how people have used the landscape and adapted to changes in climate. The sense of history is enhanced by the many heritage assets, varying from ancient earthworks and standing stones to the extensive ruined mining structures. The pattern of many scattered granite farmhouses, hamlets and small villages and the visibility of Carn Brea and engine houses and stacks provide further links with the area's heritage and add to its sense of history.

- **Tranquillity:** Levels of tranquillity vary within the area; some places are very tranquil but the number of these is decreasing. Light pollution from the Camborne, Pool and Redruth conurbation is also affecting the area's tranquillity as is the increasing volume of traffic along the A394 between Helston and Falmouth.

- **Biodiversity:** The NCA contains part of the West Cornwall Bryophytes SSSI, and 867 ha of priority habitat which includes broadleaved woodland (659 ha), lowland heathland (134 ha), purple moor-grass and rush pasture (73 ha) and reedbeds (<1 ha). These areas are all connected by a dense network of sunken lanes and Cornish hedges that provide commuting routes for bats, breeding and nesting sites for birds and important nectar sources for insects.

- **Geodiversity:** The geological processes that underpin the area have generated much of its industrial and now cultural heritage. Part of the area is within the Gwennap and Wendron section of the Cornwall and West Devon Mining Landscape World Heritage Site. Despite being almost entirely underlain by granite, a diversity of soils has developed through the interplay of climate, topography, vegetation and human influence, which in turn support the characteristic habitats and land uses across the area.

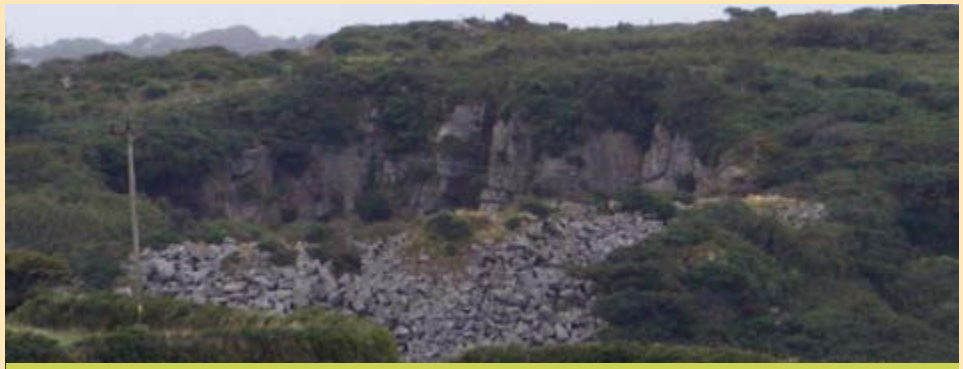
The entrance to King Edward Mine, a former tin mine and now hosts a museum.

Statements of Environmental Opportunity

SEO 1: Conserve, manage and increase the understanding of the unique historic landscape and its geological and heritage assets, including the internationally important mining legacy, the distinctive granite tors, the prehistoric and later settlements and ritual remains, and the unique Cornish hedges and field patterns.

For example, by:

- Protecting and appropriately managing ancient evidence of human habitation such as barrows and the Neolithic ramparts and subsequent fortifications and settlement associated with Carn Brea.
- Maintaining and restoring Cornish hedges, stone walls, hedgerows and other boundary features while respecting the varying pattern of ancient field systems and reflecting local variations in style and composition through careful research and using locally sourced granite.
- Replacing lost Cornish hedges, stone walls and hedgerows where they can help impede cross-land water flows within the valleys, help prevent soil erosion and agricultural run-off, especially in the south where there is more arable.
- Protecting against insensitive development/alterations that impact on rural character, ensuring that buildings reflect traditional materials and styles, including the use of local granite and slate.
- Instigating a programme of scrub removal on important historic features to enhance their settings, especially Scheduled Ancient Monuments and those that enhance the understanding of the World Heritage Site.
- Providing interpretation of and sustainable access to the outcrops and geology of the area; these underpin all aspects of the landscape and have significantly influenced the human history of the area, especially the important tin mining industry and the miners' smallholdings.
- Protecting built features and areas containing the extensive mining heritage which is now part of the Cornwall and West Devon Mining Landscape World Heritage Site.
- Maintaining the distinctive granite landscape features of Cornish hedges, walls, crosses, standing stones and stone stiles.
- Considering opportunities to identify and promote Local Geological Sites which add further to an understanding of the history of the area.



Granite quarrying in the south of the NCA.

SEO 2: Manage, restore, link and improve the area's rich mosaic of heathland, moorland and rough grassland, enhancing and extending its range, while encouraging sustainable agricultural practices which contribute to the soil quality, water quality and habitat condition, as well as to the local economy.

For example, by:

- Consolidating, expanding and re-linking fragmented areas of heathland, moorland and mire, where appropriate, preventing further loss to scrub invasion and, again where appropriate, encouraging less intensive grazing in these areas.
- Maintaining and protecting areas of permanent and rough grassland in enclosed farmland to enhance the wildlife value and protect archaeological features.
- Managing and restoring the valleys' broadleaved woodlands to improve their value for biodiversity and timber.
- Managing existing carr woodlands, particularly to improve biodiversity and aid water filtration and storage.
- Guiding locations for any new woodlands to filter views of development including pylons, electricity lines and industrial works, reduce noise levels, support biodiversity adaptation to climate change, enhance climate regulation, aid strategic flood management, and enhance recreation opportunities close to where people live.
- Seeking opportunities to maximise the availability of water by increasing the retention of the water flows through the area by the reinstatement of natural, meandering drainage patterns and channels, and reinstating wet habitats to intercept and retain increased volumes of water within the landscape.
- Retaining expansive open views from both within and out of the National Character Area (NCA), in particular views of prominent church towers and mining features typical of this area.
- Reducing the visual impact of pylons, electricity lines and obtrusive industrial features, and preventing further visually intrusive skyline development.
- Increasing the understanding of the ecological value of bare/contaminated ground on mining sites as a vital component of the World Heritage Site and of the area's biodiversity.

The close proximity between the moorland and the villages.

SEO 3: Encourage the development of sustainable tourism linked to the World Heritage Site. This should focus on sensitively increasing access to and interpretation of the area, which will encourage the strong local sense of identity.

For example, by:

- Generating new opportunities for recreation in key sites through permissive access agreements linking sites with adjacent settlements.
- Encouraging physical and business links with visitor attractions both outside and within the NCA.
- Creating permissive access links to further link up rights of way and open access land.
- Encouraging the use of local products, for example beef and dairy, within suitable businesses such as pubs, restaurants and tourist markets, and ensuring that links are made to the landscape from which the product is sourced.
- Ensuring that local folklore associated with the mining landscape is not lost, for example using online resources and storytelling events at venues such as Gwennap amphitheatre.
- Working with partners and organisations supporting volunteering in the natural and historic environment to provide opportunities for people to increase their knowledge and understanding of biodiversity while benefiting habitats and species.

Carn Brea Castle.

Supporting document 1: Key facts and data

Carnmenellis National Character Area (NCA): 14,328 ha

1. Landscape and nature conservation designations

2,062 ha of the Cornwall and West Devon Mining Landscape World Heritage Site fall within the Carnmenellis NCA, covering 14 per cent of the area. The NCA also includes 45 ha of the Cornwall Area of Outstanding Natural Beauty (AONB) along the southern edge of the NCA (<1 per cent of the NCA).

Management Plans for the protected landscape can be found at:

- www.cornwall-aonb.gov.uk/

Source: Natural England (2011)

1.1 Designated nature conservation sites

The NCA includes the following statutory nature conservation designations:

Tier	Designation	Designated site(s)	Area (ha)	% of NCA
International	Ramsar	0	0	0
European	Special Protection Area (SPA)	0	0	0
	Special Area of Conservation (SAC)	0	0	0
National	National Nature Reserve (NNR)	0	0	0
National	Site of Special Scientific Interest (SSSI)	A total of 1 site wholly or partly within the NCA	13	<1

Source: Natural England (2011)

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

There are 37 local sites in the Carnmenellis NCA covering 1,321 ha, which is 9 per cent of the NCA.

Source: Natural England (2011)

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

1.1.1 Condition of designated sites

Condition category	Area (ha)	% of SSSI land in category condition
Unfavourable declining	0	0
Favourable	7	54
Unfavourable no change	0	0
Unfavourable recovering	6	46

Source: Natural England (March 2011)

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

2. Landform, geology and soils

2.1 Elevation

The area rises to a maximum elevation of around 247 m at Carnmenellis, falling to a minimum of just under 31 m.

Source: Natural England 2010

2.2 Landform and process

The presence of the underlying granite has been the main influence on the form of this landscape. An undulating landform dissected by small streams radiates from the highest points of granite. The centre of the granite mass is an irregular plateau with poor surface drainage where water collects in bogs and mires.

Source: Carnmenellis Countryside Character Area description, Cornish Killas and Granites Natural Area profile

2.3 Bedrock geology

The granite rock of Carnmenellis is part of the Cornubian Batholith, a pluton of igneous magma which was intruded after the Carboniferous Variscan Orogeny (mountain-building episode). Rich veins and lodes containing tin, copper, silver, lead, tungsten and uranium were emplaced by circulating fluids within the granite and surrounding rocks. The surrounding Devonian rocks consist of mainly slate which has been "baked" by the granite intrusion. Relatively less-resistant overlying rocks have been eroded to expose the granite and periglacial action has shaped the granite outcrops of the higher ground.

Source: Carnmenellis Countryside Character Area description, Cornish Killas and Granites Natural Area profile

2.4 Superficial deposits

Small areas of alluvium have been deposited along river courses.

Source: Carnmenellis Countryside Character Area description, Cornish Killas and Granites Natural Area profile

Engine houses and stacks.

2.5 Designated geological sites

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

There are 3 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

The acidic soils are predominantly gravelly and peaty but with patches of brown earths capable of cultivation in the lower-lying parts, especially towards the south of the area.

Source: Cornish Killas and Granites Natural Area profile

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

Agricultural Land Classification	Area (ha)	% of NCA
Grade 1	0	0
Grade 2	2	<1
Grade 3	8,292	58
Grade 4	5,407	38
Grade 5	73	1
Non-agricultural	346	2
Urban	209	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 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 in NCA (km)
River Hayle	2

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.

Stithians Reservoir and a number of smaller reservoirs are distinctive features in the landscape while the southern slopes of the area are drained by small rivers and streams, forming long, gentle valleys.

3.2 Water quality

The total area of Nitrate Vulnerable Zone is 8,483 ha, or 59 per cent of the NCA.

Source: Natural England (2010)

3.3 Water Framework Directive

Maps are available from the Environment Agency showing current and projected future status of water bodies at: http://maps.environment-agency.gov.uk/wiyby/wiybyController?ep=maptopics&lang=_e

4. Trees and woodlands

4.1 Total woodland cover

The NCA contains 921 ha of woodlands over 2 ha (6 per cent of the total area), of which 19 ha is ancient woodland.

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

4.2 Distribution and size of woodland and trees in the landscape

Trees and woodland are generally uncommon, reflecting the exposure and use of timber by the mining industry. Wet willow woods are characteristic of the shallow valleys on higher ground while semi-natural deciduous woodlands occur on the deeper valley sides off the higher ground.

Source: Countryside Quality Counts, (2003)

4.3 Woodland types

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

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

Woodland type	Area (ha)	% of NCA
Broadleaved	803	6
Coniferous	16	<1
Mixed	10	<1
Other	92	1

Source: Forestry Commission (2011)

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

Type	Area (ha)	% of NCA
Ancient semi-natural woodland	4	1
Ancient re-planted woodland (PAWS)	15	<1

Source: Natural England (2004)

5. Boundary features and patterns

5.1 Boundary features

Characteristic Cornish hedgerows are stone walls built from great granite blocks, with an earth core and commonly topped by a growth of scrub.

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

5.2 Field patterns

The central open moorland is surrounded by patterns of both irregular ancient fields and rectilinear 18th and 19th century enclosures. Small enclosures within the moorlands and around their edges contain poor quality pasture or rough grassland supporting dairy farming. There is some horticultural land on the gentler more fertile lower slopes towards Falmouth.

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

6. Agriculture

The following data has been taken from the Agricultural Census linked to this NCA.

6.1 Farm type

Farm numbers decreased by 15 per cent between 2000 and 2009. Livestock farms declined by 35 per cent with this seemingly made up mostly of dairy farms which fell by more than 50 per cent and horticulture farm numbers also dropped 35 per cent. During the same period, arable farm numbers increased.

Source: Agricultural Census, Defra (2010)

6.2 Farm size

Farm size within the NCA increased between 2000 and 2009. The number of smaller farms (under 50 ha) fell significantly both in number and as a proportion of the total farmed area between 2000 and 2009. Larger farms increased with the greatest increase of 38 per cent in farms over 100 ha which, by 2009, represented 30 per cent of total farmed area as opposed to 19 per cent in 2000. Overall, total farmed land increased slightly by around 860 ha.

Source: Agricultural Census, Defra (2010)

6.3 Farm ownership

2009: Total farm area = 11,093 ha; owned land = 7,349 ha
2000: Total farm area = 10,231 ha; owned land = 7,779 ha

Source: Agricultural Census, Defra (2010)

6.4 Land use

Although the amount of land turned to grazing and uncropped land fell by 25 per cent between 2000 and 2009, it remains by far the most common land use, covering 78 per cent of agricultural land. Cereal and cash root crop growing increased by 95 per cent and 147 per cent respectively over this period, but together only make up 6 per cent of total land use in 2009.

Source: Agricultural Census, Defra (2010)

6.5 Livestock numbers

Livestock numbers within the NCA dropped by 24 per cent between 2000 and 2009. Cattle remain the most abundant type of livestock at 73 per cent of all livestock despite a fall of more than 4,000 animals. Sheep numbers fell by 7 per cent and pigs by 5 per cent.

Source: Agricultural Census, Defra (2010)

6.6 Farm labour

Total farm labour fell by 13 per cent between 2000 and 2009 with 648 employees in agriculture being registered in the NCA.

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

Fragments of treeless heathland and wet moorland are important on the plateau and adjacent to the old mining sites. Trees and woodlands are uncommon apart from in sheltered valleys which have wet willow and deciduous woods through which fast-running streams flow.

Source: Cornish Killas and Granites Natural Area profile

Dense valley woodlands.

7.2 Priority habitats

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

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

Priority habitat	Area (ha)	% of NCA
Broadleaved mixed and yew woodland (broad habitat)	659	5
Lowland heathland	134	1
Purple moor grass and rush pasture	73	<1
Reedbeds	1	<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/
- Maps showing locations of S41 species are available at: http://data.nbn.org.uk/

8. Settlement and development patterns

8.1 Settlement pattern

The traditional settlement pattern of dispersed hamlets and farmsteads on lower ground is overlain by miners' cottages and small mining villages. This dispersed pattern has been augmented by recent developments, often out of keeping with the local vernacular style. Settlements are linked by narrow, winding lanes or straight lanes which follow field boundaries. There is little settlement on the higher ground.

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

8.2 Main settlements

There are no large or medium settlements with the villages of Stithians, Porkellis, Carharrack and Four Lanes being the most prominent settlements. The northern boundary of the area contains parts of Cambourne and Redruth. The total estimated population for this NCA (derived from ONS 2001 census data) is 21,723.

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

8.3 Local vernacular and building materials

Older buildings are constructed of local granite with slate roofs and some slate hangwalls. In the more fertile areas modern farm buildings dominate.

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

A typical road lined by Cornish Hedges.

9. Key historic sites and features

9.1 Origin of historic features

There is a Neolithic settlement at Carn Brea. Granite walls, crosses, standing stones and stone stiles are other characteristic historical landscape features. Remnants of the 19th century mining industry abound. Prominent remains of prehistoric field patterns are present. Terrace houses and Methodist chapels are notable characteristics of the industrial areas.

Source: Countryside Quality Counts Draft Historic profile, Carnmenellis Countryside Character Area description

9.2 Designated historic assets

This NCA has the following historic designations:

- No Registered Parks and Gardens
- No Registered Battlefields
- 43 Scheduled Monuments
- 471 Listed Buildings

Source: Natural England (2010)

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

10. Recreation and access

10.1 Public access

- Five per cent of the NCA, 669 ha, is classified as being publically accessible.
- There are 343 km of public rights of way at a density of 2.4km per km2.
- There are no National Trails within the Carnmenellis NCA.

Source: Natural England (2010)

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

Access designation	Area (ha)	% of NCA
National Trust (accessible all year)	0	0
Common Land	106	<1
Country Parks	0	0
CROW Access Land (Section 4 and 16)	597	4
CROW Section 15	58	<1
Village Greens	<1	<1
Doorstep Greens	0	0
Forestry Commission Walkers Welcome Grants	15	<1
Local Nature Reserves (LNR)	0	0
Millennium Greens	0	0
Accessible National Nature Reserves (NNR)	0	0
Agri-environment Scheme Access	<1	<1
Woods for People	57	<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 areas with the higher tranquillity index are the areas along the ridge that separates the Cambourne and Redruth areas from Falmouth and The Lizard. The exception to this is the area adjacent to (within 2 km) of the A394.

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

Category of tranquillity	Score
Highest	46
Lowest	-72
Mean	5

Sources: CPRE (2006)

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

11.2 Intrusion

The 2007 Intrusion Map (CPRE) shows the extent to which rural landscapes are 'intruded on' from urban development, noise (primarily traffic noise), and other sources of visual and auditory intrusion. This shows that disturbance is concentrated around the routes of the A30 and A394 with disturbance from the towns of Camborne and Redruth, Helston and Penzance encroaching into the NCA boundary on the edges. A breakdown of intrusion values for this NCA is detailed in the following table:

Intrusion category	1960s (%)	1990s (%)	2007 (%)	Percentage change (1960s-2007)
Disturbed	18	26	46	28
Undisturbed	81	73	52	-29
Urban	1	2	2	1

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are a significant loss of undisturbed land since the 1960s, though this remains more than half of the NCA. Urban land has also increased but remains a very small proportion at barely 2 per cent.

- More information is available at the following address: **www.cpre.org.uk/campaigns/planning/intrusion/our-intrusion-map-explained**

Sailing on Stithians Reservoir.

12. Data sources

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

Please note all figures contained within the report have been rounded to the nearest unit. For this reason proportion figures will not (in all) cases add up to 100 per cent. 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

- While woodland cover is only six per cent of the NCA, it has an important role locally in landscape character and habitat connectivity especially in the southern part of the area.

- On the hill tops, single wind-sculpted trees are often considered a poignant reminder of the extreme weather experienced by the area. Unlike in many areas of Cornwall, there are no large areas of commercial forestry plantation and in recent years there has been very little change in woodland area.

Boundary features

- Cornish hedges form the significant boundary features in this landscape with some dating back 3,000 years. Through history a number have been removed to allow more intensive use of fields. Their conservation has been an important part of agri-environment schemes within the area and this has slowed the rate of loss.

- Distinctive post medieval smallholdings are equally at potential threat from hedge removal and many have no protection through hedge regulations due to their exposed, former heathland locations.

Agriculture

- In recent years, there has been a decline of land classified as grazing/ uncropped land; it fell by 25 per cent between 2000 and 2009. However this remains by far the most important land use, covering 78 per cent of agricultural land.

- Cereal and root crop growing have increased by 95 per cent and 147 per cent respectively over this period, but together only make up 6 per cent of total land use in 2009. Linked to the decline in the area of pasture had been a drop in dairy livestock numbers by 24 per cent. Cattle remain as the most abundant type of livestock at 73 per cent.

Small fields bounded by low Cornish hedges.

Settlement and development

- Development pressure is currently low, with local housing development focused on the towns of Camborne, Pool and Redruth on the northern boundary of the NCA.
- There has been limited development scattered through the open countryside and smaller settlements, mainly from barn conversions.
- To the south of the area many of the farms have been enlarged through the construction of large barns, which are out of keeping with the local landscape.
- Emerging planning policy suggests there will be an increase in the number of new homes over the next 20 years across Cornwall with a proportion of these being located in existing small towns and villages, with some of these linked to small business development opportunities such as reduced price units of office space.

South Crofty Mine, the last working tin mine in England.

Semi-natural habitat

- Only 13 ha, less than 1 per cent of the NCA, are designated as SSSI but a further 867 ha of land, 7 per cent, are designated as priority habitat. The one SSSI was notified in 1999. Currently it is in an unfavourable improving condition with operations identified to ensure that favourable condition is achieved. This site is special for its population of rare and scarce bryophytes (mosses and liverworts) which are adapted to growing on copper-rich substrates.

Historic features

- Carnmenellis is rich in archaeological and historic features. Of particular note are the remains of the Neolithic settlement atop Carn Brea and the extensive mining remains. The visible remains of human occupation, Neolithic through to the 19th century, provide a significant depth to the landscape of the area. Many of these sites have remained unaltered for many centuries, although in places neglect is starting to affect the legibility of sites through scrub growth and bracken invasion.
- The notification of the Cornwall and West Devon Mining Landscape World Heritage Site in 2006 has further enhanced the links between the landscape and historic features.

Rivers

- Currently the total area of nitrate vulnerable zone is 8,483 ha, 59 per cent of the NCA. Some watercourses are also affected by past mining activities as well as by acidic bedrock. Part of the NCA falls within the West Cornwall priority catchment. This has identified the problem of soil erosion and nitrogen enrichment of watercourses caused by surface run-off.

Drivers of change

Climate change

- An increased frequency of drought conditions in the summer months may result in the drying out of wet heath and blanket bog, affecting their functions for water availability and carbon storage. These conditions may also lead to soil erosion causing damage to archaeological sites.
- Increased autumn and winter precipitation levels could lead to higher water levels in streams, mires and tracts of blanket bog, resulting in more frequent downstream flooding. There could be an increase in poaching on river banks leading to waterlogged ground.
- Climate change could lead to a longer growing season and enhanced growth rates of vegetation including bracken and gorse resulting in a decrease in the area of open heather moorland.
- Increased rainfall and a change in intensity may lead to more washing of mine shafts which may lead to greater risk from pollution by mineral-saturated water into the Hayle and Cober rivers.
- A potential increase in the frequency of long, hot summers would change the nature of the semi-natural habitats present, probably leading to the loss of much of the wet moorland and other damp habitats as well as changing the community dynamics of other habitats.

Other key drivers

- Given the generally sparse population, exposed nature of the area and southerly location, pressure to erect renewable energy developments, wind farms and solar farms, may increase. Conserving and enhancing the character and special qualities of the landscape, will remain a priority and present a challenge.
- Maintaining pastoral farming activity by encouraging extensive low input livestock production. This will maintain and extend the amount of semi-natural habitat. However, maintaining an agricultural economy that can sustain a labour force big enough to manage the farmed landscape may be a challenge.
- The integrated management of semi-natural habitats, heritage and cultural features, and geological assets at a landscape scale, may result in beneficial ways of working with a wider group of interested parties.
- The possibility of an increase in visitor numbers presents both a challenge to limited and restricted resources, but also an opportunity to engage a wider range of communities and support the local economy. Making valued habitats, geological features and heritage assets available to a wider audience may need to be balanced against increased rates of erosion, consumption of local resources and economic benefits.

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.

Basset Stamps.

Statement of Environmental Opportunity	Ecosystem Service: Food provision	Timber provision	Water availability	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Sense of place / Inspiration	Sense of history	Tranquillity	Recreation	Biodiversity	Geodiversity
SEO 1: Conserve, manage and increase the understanding of the unique historic landscape and its geological and heritage assets, including the internationally important mining legacy, the distinctive granite tors, the prehistoric and later settlements and ritual remains, and the unique Cornish hedges and field patterns.	↔ *	↔ **	↗ **	↗ **	↔ **	↔ **	↗ *	↗ ***	↗ *	↔ *	↗ **	↗ **	↗ **	↗ **	↗ *	↗ *
SEO 2: Manage, restore, link and improve the area's rich mosaic of heathland, moorland and rough grassland, enhancing and extending its range, while encouraging sustainable agricultural practices which contribute to the soil quality, water quality and habitat condition, as well as to the local economy.	↗ **	↗ **	↗ **	↗ *	↗ **	↗ **	↗ **	↗ **	↗ **	↗ *	↗ **	↔ **	↔ ***	↔ **	↗ **	↗ *
SEO 3: Encourage the development of sustainable tourism linked to the World Heritage Site. This should focus on sensitively increasing access to and interpretation of the area, which will encourage the strong local sense of identity.	↗ *	↔ **	↔ **	↔ **	↔ *	↔ *	↔ *	↔ *	↔ *	↔ *	↗ **	↗ **	↗ **	↗ **	↗ *	↗ *

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

National Importance; Regional Importance; Local Importance

Landscape attributes

Landscape attribute	Justification for selection
Fragments of treeless heathland and wet moorland with exposed granite outcrops.	■ The openness of the higher moorland areas allow for long views across the Cornish peninsula. This creates a sense of elevation, remoteness, and removal from modern hustle and bustle. ■ The pockets of heathland are an excellent habitat for pollinating insects because of the heather and gorse species which continue to flower late into the year. ■ Increased biodiversity, providing habitats for species such as bats, marsh orchids and common linnet.
The network of small watercourses that cut their way down from the highest points of the granite including the rivers Hayle and Cober. This is complemented by the open water of Stithians and other smaller reservoirs.	■ The sound of running water adds another dimension to the landscape, contributing to the tranquillity and sense of place. ■ Stithians Reservoir is important for birds, especially migratory species such as widgeon and osprey. It provides water for many of the properties in west Cornwall and also has high recreational use, drawing visitors to the area.
A long history of human occupation is evident in the numerous heritage assets to be found across the landscape.	■ Carnmenellis contains part of the Gwennap, Camborne and Redruth and Wendron section of the Cornwall and West Devon Mining Landscape World Heritage Site. 43 scheduled monuments, 471 listed buildings and historical remains showing evidence of human habitation since Neolithic times. ■ The story of human occupation is visible in the assets to be found; tumuli, granite crosses, hill-top enclosures, and more recently abandoned mine workings and buildings. ■ Incised track ways flanked by Cornish hedges. ■ A dispersed settlement pattern of granite hamlets and farmsteads with villages mainly of recent, industrial origin, associated with mining heritage.
A rural landscape with dark night skies.	■ Sense of place and biodiversity are encouraged by the pattern of small, regular fields enclosed by Cornish hedges. ■ There are areas of great tranquillity within the landscape and dark night skies.
A distinctive and varied pattern of field, enclosures and settlements reflecting a long and ongoing history of agricultural activity and a dispersed settlement.	■ The moorland at the top of the highest hill tops and the network of small to medium sized irregular fields create an atmosphere that tells a tale of long-term occupation ■ Cornish hedges are a distinctive feature contributing to the sense of place, as well as providing wildlife corridors allowing species movement and migration ■ The dispersed pattern of settlement that has at its core granite buildings with slate roofs and hanging tiles located close to mine workings.

Landscape opportunities

- Conserve the local distinctiveness of the landscape, with its open granite hill tops, patches of heath, moor, wooded valleys, Cornish hedge boundaries and scattered settlements.
- Pressure to develop within the area is generally low, but with higher demands in localised areas. Given the overall sensitivity of the landscape and natural environment, great attention needs to be applied to ensure the enhancement of both their character and quality resulting from any development.
- Protect from damage and appropriately manage the area's rich cultural heritage, most notably Neolithic enclosures, Romano-British remains, listed buildings, ancient and post-medieval Cornish hedges, granite crosses and the significant industrial heritage linked to the area's mining history.
- Appropriately manage the open rough ground to increased water retention and improve the species diversity. Reconnect remnant areas of heather moorland with extensively grazed rough grassland to maintain the open character of the landscape.
- Specific consideration is required to management works within the World Heritage Site to ensure biodiversity, landscape, culture and economic prosperity can be realised in a sympathetic and integrated way.

Carn Brea.

Ecosystem service analysis

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Food provision	Small farms producing a range of meat and dairy products Specialist arable crops including vegetables – mainly potatoes	78 per cent of registered land is classified as used for grazing predominantly cattle. Limited horticultural production of vegetables occurs in the southern part of the NCA. Cereal and root crop growing only make up 6 per cent of total land use and is focused mainly on more fertile land to the south.	Regional	The wet and warm Atlantic climate provides a long growing season which is reflected in the stock husbandry regime of animals being 'out' for a much greater proportion of the year. A relatively small farm size and mixed agriculture system predominantly beef, dairy means that margins are very low and expansion is difficult. Food production from the rough pastoral farming landscape is a key service in this area. Increased arable production for high value vegetable crops has increased within the southern part of the area. If this continues it may have a significant impact on the landscape of the area.	Work with the local farming/rural community to consider how to increase the overall productivity of agricultural systems. This should seek to increase the commercial value of associated foodstuffs while avoiding adverse impacts within the NCA and on other ecosystem services. It will also help to retain the existing network of economically viable small farms. Work with local farmers and growers' groups to develop Carnmenellis specific products that can be promoted to the tourist industry within and outside the area.	**Food provision** **Biodiversity** **Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Sense of place/ inspiration** **Sense of history**
Timber provision	Small copses of willow carr in damp valleys Small deciduous woods in the south	Only 6 per cent of the NCA is wooded. The woodland is managed by local landowners who use various management methods – coppicing, thinning and clear fell.	Local	The area is not known for its timber resource and woodland is not a significant feature of the NCA. The NCA has limited opportunity for woodland creation due to the poor soils, although planting on existing farmland may be possible.	Opportunities should be considered to maximise the biodiversity and economic values of these small areas of woodland through the introduction of sympathetic management including coppicing. An increase in woodland would contribute to soil quality and carbon storage, but opportunities may be limited in the NCA. Appropriately placed woodland may be planted to screen developments and reduce their visual impact. Investigate the opportunity for very small-scale locally led biofuel schemes, utilising thinings and clearance from willow and scrub.	**Timber provision** **Biodiversity** **Regulating water quality** **Regulating water flow** **Sense of place/ inspiration** **Regulating soil quality** **Climate regulation**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability	Stithians Reservoir and several smaller reservoirs Small streams The River Hayle and River Cober Small areas of wetland Damp mire areas	The NCA has a very good water supply, especially since the construction of the Stithians Reservoir. Small streams rise on the granite plateau and radiate down to the sea through narrow valleys. There are small areas of wetland in some of the valleys and damp mire areas on the higher ground.	Regional	The mainly pastoral farming type, as well as a sparse population and lack of any major industry, all mean there is little pressure on the water supply. There are no major building projects planned within the NCA that are likely to greatly increase the population of the area and put more demand on the water supply, however proposals for other areas of Cornwall may impact on water availability from Stithians Reservoir. Although nearby areas (The Lizard and coast) have high visitor pressure during the summer, this is not the case in this NCA although facilities for visitors are increasing for example at Stithians Reservoir, which attracts a larger number of people into the area. The many watercourses that flow from the higher granite plateau could suffer from increased frequency of drought events caused by climate change and this would also lead to lower water levels in the reservoirs.	Encourage good environmental management of semi-natural habitats, and in particular wetland/mires, willow carr and unimproved permanent grasslands, increasing the capacity of habitats to retain water. Where possible, increase the ability of soil to retain water, and reduce the rate of water loss from the area through establishment of more rough vegetation including permanent grassland.	**Water availability** **Regulating water quality** **Food provision** **Biodiversity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biomass energy	Woodlands Hedgerows	Biomass is available from some of the small woodlands as a result of forestry operations such as thinning although this is restricted in some areas due to access problems. This could be supplemented with arisings from hedgerow maintenance.	Local	Re-instatement of traditional woodland management may lead to the removal of areas of scrub and secondary woodland to expose grassland habitats. The management of hedges, willow carr and scrub clearance may generate material for local wood fuel. This management would enhance the ecological network and connectivity of the area. Management of vegetated Cornish hedgerows can supply a certain amount of wood for local use while enhancing the longevity of these features in the landscape. Biomass crop production, such as miscanthus and short rotation coppice, should only be considered where the impact on landscape and water can be suitably mitigated.	Ensure that opportunities are pursued which enhance the biodiversity of the area through appropriate management of scrub. Arisings from woodland and hedgerow management should be considered as an economic resource.	**Biomass energy** **Food provision** **Biodiversity** **Sense of place/ inspiration** **Sense of history**
Climate regulation	Woodland and heathland Wet moorland habitats Permanent and rough grassland	Carbon-rich peat soils are present within the NCA. These are associated with fragments of wet moorland and heathland on the granite plateau. There are small areas of woodland and heathland including wet moorland habitats and significant areas of permanent and rough grassland. Valleys contain small pockets of woodland and wet grassland habitat. These features all contribute to the regulation of climate.	Local	The limited amount of peat soils have an important role to play in the storage of carbon. Areas of permanent grassland and woodland maintain higher levels of carbon storage than regularly cultivated soils. Where permanent grassland occurs, appropriate application of organic matter will result in higher levels of carbon storage and improved soil condition. High levels of poaching by livestock can lead to loss of organic structure reducing the soil's ability to retain carbon. Careful management of existing habitats and development of new habitats could enhance the ecological network and play a role in climate regulation.	Prevent drainage, disturbance or liming on peat-topped soils and prevent damage by stock around access points such as gateways. Encourage sustainable grazing regimes on permanent pasture and rough land. Implement changes that provide economic benefits such as reducing inorganic fertiliser use, reducing the intensity of tillage and encouraging use of additional sources of organic matter on intensively managed soils. This can be achieved by using over/catch crops. Manures would help increase soil carbon and improve soil structure. This, along with careful use of fertilisers, should help to reduce nitrous oxide emissions.	**Climate regulation** **Regulating water quality** **Regulating water flow** **Biodiversity** **Regulating soil quality**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality	Wet moorland Heathland Permanent and rough pasture Willow carr	59.4 per cent of the NCA falls within a nitrate vulnerable zone. Some watercourses are also affected by past mining activities as well as by acidic bedrock.	Regional	Water quality is important to this area as it supports much of the heath and moorland biodiversity. Careful management of livestock including; controlling access to watercourses and waste management, is essential to maintaining good water quality. The area has been identified as a nitrate vulnerable zone due to the combination of acidic bed rock and the use of fertilisers which leach into the water systems.	Increase areas of permanent pasture managed in an extensive way using low fertiliser inputs particularly around the upper catchment for the River Cober. Increase amounts of farmland managed under principles established under the Catchment Sensitive Farming initiative. Opportunities for enhancements such as, infrastructure improvements, crop type, fencing watercourses and introducing cross-field hedges and buffer strips should be considered.	**Regulating water quality** **Food provision** **Biodiversity** **Regulating soil erosion**
Regulating water flow	Woodland Heathland and wet moorland Network of Cornish hedges Permanent pasture	The NCA is deemed to be an area of low to moderate flood risk. The valley woodlands catch and slow precipitation before it becomes surface water. The extensive network of Cornish hedges slow the rate at which surface water reaches rivers and streams. Heath and moorland act as natural sponges, holding and storing precipitation and reducing the quantity that reaches the area's watercourses.	Regional	Major flood events are not a risk in the NCA although flooding has historically occurred in adjoining Camborne and Helston due to rainfall within the NCA. The network of Cornish hedges remains fairly intact as they are seldom removed or replaced by fencing. There has been an increase in the area of land used for arable crops and if this trend were to continue, it could possibly increase water flow.	Continue to manage heath and moorland to allow slow percolation of water through the peaty soils. Create new semi-natural habitats. Increase the amount of farmland managed under principles established by the Catchment Sensitive Farming initiative. Protect Cornish hedges and build new hedges where they can slow cross-flow of water.	**Regulating water flow** **Regulating water quality** **Biodiversity** **Sense of place/ inspiration** **Food provision** **Regulating soil erosion**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil quality	Slowly permeable wet, acidic, peaty soils Free and poor draining soils Permanent pasture Semi-natural habitats	The acidic soils are predominantly gravelly and peaty but with patches of brownearths capable of cultivation in the lower-lying parts, especially towards the south of the area.	Local	Peaty soils have low strength when wet and are easily damaged by unsustainable practices such as overgrazing, compaction and loss of vegetation. Management of the freely draining acid soils over rock is difficult on what is often stony land. There is generally a low risk of livestock poaching, but organic topsoil can be poached when wet. The freely draining slightly acid loamy soils have potential for increased organic matter levels through management interventions. Organic matter may be being lost through tillage across more intensively farmed arable areas to the south. Lack of organic matter makes soils more susceptible to compaction and erosion. Improving soil quality through increasing organic matter will have potential benefits in regulating soil erosion by making it more stable and able to withstand heavy rainfall. It may also contribute towards climate change regulation, storing more carbon, though the capacity of these soils to make a significant contribution is limited.	'Re-wetting' of areas of degraded peat can improve structure and stability of the soils, particularly when combined with careful and appropriate stock management. Ensure levels of organic matter are maintained in all soils, minimising tillage operations where possible. Manage with extensive, appropriate, mixed grazing regimes to reduce stocking densities and avoid soil compaction.	**Regulating soil quality** **Regulating water quality** **Climate regulation** **Regulating water flow** **Regulating soil erosion**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion	Woodlands Pasture Cornish hedges Heath and moor	Soil erosion occurs principally locally in association with livestock regimes such as overwintering stock and fodder production.	Local	The freely draining slightly acid loamy soils have an enhanced risk of soil erosion on moderately or steeply sloping land where cultivated or bare soil is exposed. This is exacerbated where organic matter levels are low after continuous arable cultivation or where soils are compacted. There is also the potential for wind erosion on some coarse-textured cultivated variants. The slowly permeable wet very acid soils with a peaty surface are at risk of gullying/hagging (and loss of particulate organic matter) from rapid run-off and/or where surface vegetation is damaged or lost. They are vulnerable to occasional mass flow events and can be affected by wind erosion where the soil is bare. The intensive management of stock (dairy and beef) leads to soil compaction, especially on tracks and around gateways which provides a higher risk of soil erosion.	Reverse or remove drainage in appropriate areas to re-wet peaty soils making them less prone to desiccation, oxidation and subsequent wind and water erosion. Increase sward diversity to increase lying down of organic matter on improved grasslands and a wider variety of species to help knit together substrate. Manage grazing regimes to reduce or minimise soil compaction and poaching. Retain and enhance the network of Cornish hedges and give careful consideration to the relocation of gateways to ensure soil is not lost from fields into water courses. Where appropriate, introduce buffer strips across fields to help reduce soil migration on slopes.	**Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Regulating water flow**
Pollination	Heathland and moorland Species-rich grassland Cornish hedges	The patchworks of semi-natural habitats provide a food source for pollinating insects. However due to the lack of horticulture in the NCA the main benefactor is biodiversity rather than food supply. Cornish hedges are often flower-rich and provide movement corridors between habitats.	Local	A range of habitats support a significant number and variety of important plants, providing an important and widespread base for pollination. Heathland is particularly good due to the late flowering heathers and gorse. Pollination opportunities can be enhanced through increasing the diversity of vegetation and habitats.	Increase the area of land covered by semi-natural habitats, to increase the diversity and quantity of flowering plants. Increase the area and range of habitat mosaics where different habitats lie in close proximity.	**Pollination** **Biodiversity** **Food provision**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of place/ inspiration	Carn Brea Stithians Reservoir Remains of industrial landscape A network of Cornish hedge-bound fields and interspersed by small settlements Streams cutting down through tree-filled valleys Open heathland on hill tops Small section of AONB and Cornwall and Devon World Heritage Site	2,062 ha of Cornwall and West Devon Mining Landscape World Heritage Site fall within Carnmenellis NCA, covering 14 per cent of the area. The NCA also includes 45 ha of Cornwall Area of Outstanding Natural Beauty (AONB) along the southern edge of the NCA (<1 per cent of the NCA). A quiet, intensely rural quality contrasting with past industrial heritage and ancient features. The villages and towns have developed that strong sense of local identity and community almost universal in mining areas but are generally little visited by outsiders. Cornish hedges are generally covered in herbs or, particularly in the south, are topped by large trees which make green tunnels of the country lanes. A fairly high density of single houses, hamlets and villages which vary from traditional and scenic to modern. Carn Brea, a detached granite boss is the site of the remains of a Neolithic settlement and a 14th-century castle is a well known landmark to locals.	International	The area has a strong sense of place, resulting from the rural pattern of small fields. The scattered small settlements contain traditional houses of granite and slate. The reminders of human heritage such as granite gateposts and granite crosses, ruined mine buildings and waste tips, are all common within the NCA. In some places there is a sense of economic deprivation caused by low employment and poor public transport links across the area. The area is not currently a major visitor destination apart from on one day a year when the Stithians Show is held. The show also helps to bring the local community together.	Ensure that the important aspects and features that make up the unique character of the area are conserved and enhanced, while maintaining a vibrant, viable future use and occupation of the landscape. Ensure that development respects local settlement patterns and style. Care should be taken to avoid the loss of historic evidence during redevelopment and expansion of existing settlements.	**Sense of place/ inspiration** **Biodiversity** **Sense of history** **Tranquillity** **Recreation**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history	Neolithic remains and 14th-century castle atop incorporated into an 18th-century hunting lodge at Carn Brea Burial mounds, standing stones, granite crosses, granite gateposts and ancient field boundaries Internationally important mining heritage	Continued human occupation of the area since before the Bronze Age provides a wealth of important information about how people who have occupied and used the landscape. Carnmenellis contains one of Cornwall's most important archaeological sites – remains of the Neolithic settlement on top of Carn Brea. The mining heritage illustrates technological evolution and the exploitation of natural resources, which had wide-reaching implications, and is now recognised as part of a World Heritage Site.	International	World Heritage Site status conferred on the mining heritage and landscapes of the area seeks to enhance the conservation, access and interpretation of the surviving assets. The heritage assets of the area contribute to tourism in the NCA as well as to the sense of place. Continued protection and enhanced interpretation of the wealth of heritage present is essential.	Use traditional, locally sourced materials and vernacular design to inform new development will reinforce the character and locally distinctive nature of the area. Continue to conserve and enhance both the physical remains; access to and interpretation of the internationally important historic mining environment will further complement and contribute to the diversification of business opportunities across the area.	**Sense of history** **Sense of place/ inspiration** **Recreation** **Biodiversity** **Tranquillity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Tranquillity	Reservoirs, streams and the rivers Hayle and Cober A largely rural, pastoral landscape Small areas of woodland, willow carr, heath and wet moor Dark night skies	Based on the CPRE map of Tranquillity (2006) The areas with the higher tranquillity are along the ridge line that separates the Camborne and Redruth areas from Falmouth and The Lizard. The exception to this is the area adjacent (within 2 km) to the A394. The 2007 Intrusion Map (CPRE) shows the extent to which rural landscapes are 'intruded on' from urban development, noise (primarily traffic noise), and other sources of visual and auditory intrusion. This shows that disturbance is concentrated around the routes of the A30 and A394 with disturbance from the towns of Camborne and Redruth, Helston and Penzance encroaching into the NCA boundary on the edges.	Regional	The lack of many major roads within the NCA helps to create areas which feel remote and highly tranquil. This is reinforced by the picturesque, rural quality of much of the area. The number of visitors is not particularly high for the NCA compared with other nearby NCAs and this helps to add to tranquillity. The landscape has a few touches of modern intrusion such as electricity pylons and communications towers.	Ensure that the sense of tranquillity is maintained by encouraging only appropriate levels of development. Enhance the natural environment around the southern edge of the town of Redruth to minimise impacts on tranquillity and light pollution.	**Tranquillity** **Sense of place/ inspiration** **Sense of history** **Biodiversity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation	Public rights of way network Open access land Attractions such as the King Edward Mine Museum, Gwennap Pit open air amphitheatre and Carn Brea Stithians Show Outdoor activities at Stithians Reservoir Horse riding, including riding holidays Stithians Reservoir	The area has an extensive network of trackways and lanes which provide access between both settlements and the farming communities and the heathland areas. There is some open access land covering about 5 per cent of the NCA. There are also 343 km of public rights of way. There are many outdoor activities available at Stithians Reservoir include sailing, windsurfing, kayaking, climbing, camping and archery. Stithians Show is Cornwall's biggest one day agricultural show. It has been held annually since the early 1800s on the Feast Day of St Stithians and has thousands of visitors each year.	Local	The NCA is mainly used by local residents. However the activities available at Stithians Reservoir as well as at riding stables, do bring in some visitors. The exception is in July on the day that the Stithians Show is held. This brings in thousands of visitors as well as traders, competitors and exhibitors. The network of rights of way and generally quiet nature of most lanes and areas of open land such as that at Carn Brea, provide routes for walking, cycling and horse riding.	Maintain and improve the quality of recreational assets, ensuring that rights of way remain passable and support opportunities to connect and link up with new multi-user routes and sustainable transport schemes. This should be focused close to where people live, to give more opportunities to more people to access the environment. Maintain and expand links between tourist attractions such as the King Edward Mine Museum and Carn Brea Castle Restaurant and local recreational suppliers such as riding stables.	**Recreation** **Sense of place/ inspiration** **Sense of history** **Tranquillity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity	A mosaic of habitats: Wet moorland Heathland Unimproved and semi-improved grassland Woodland Lakes and streams A significant amount of habitat connectivity through the network of lanes, and scrub valleys	7 per cent of the area is designated as priority habitat. There is one SSSI in the area which covers less than 1 per cent of the total NCA. The NCA has a variety of semi-natural habitats of varying quality. Heath/ moorland habitats in particular tend to be small and fragmented and lack somewhat in connectivity. Stithians Reservoir provides a large area of water and wetland habitat. Abandoned mine buildings provide habitat for bats with associated mine 'burrows' (spoil heaps) providing unique habitat for metaliferous bryopyhtes.	Local	Areas of priority habitat without designation are often degraded due to past attempts to improve the area for agricultural production. Stithians Reservoir is a popular birding spot and is managed with wildlife in mind. It is visited by many species including migrants such as goldeneye and osprey.	Explore opportunities to improve the condition of all important sites and habitats including those containing priority habitats and species as well as those that provide wildlife corridors across the area. Further action should be taken to increase the area of habitats where possible, increase the connectivity of sites and habitats, and create more habitats where appropriate. Provide opportunities for increased access and recreation, learning and research and appropriately managed and enhanced biodiversity interest.	**Biodiversity** **Sense of place/ inspiration** **Regulating water quality** **Regulating water flow** **Climate regulation** **Pollination**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Geodiversity	The granite tor of Carn Brea Mineral deposits underpinning the Gwennap Redruth and Wendron of the UNESCO Cornwall and West Devon Mining Landscape World Heritage Site	The predominantly granite geology of the area underpins all aspects of the landscape. The geology is clearly expressed both in natural formations such as tors and through its use as a building material, for Cornish hedges as well as for buildings. There are three Local Geological Sites within the NCA.	International	This NCA provides the centre of the Cornish mining industry with many of the most significant locations and people working to provides examples of how mineral deposits have been won (streaming, mining and open cast). The impact of this work has had an impact globally, which is now recognised as a UNESCO World Heritage Site. The area provides a record of the earliest occupation of the landscape by man, and the use of and response to natural resources, particularly mineral deposits, stone and soils.	Identify and realise opportunities for enhanced access to, study and increased understanding of the internationally important geodiversity across the area to allow further information to be gained and interpreted. Opportunities should be explored to continue to use local stone in building development.	**Geodiversity** **Biodiversity** **Regulating soil quality** **Sense of place/ inspiration** **Sense of history**

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