National Character Area profile:

73. Charnwood

Supporting documents

NATURAL ENGLAND

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Introduction

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

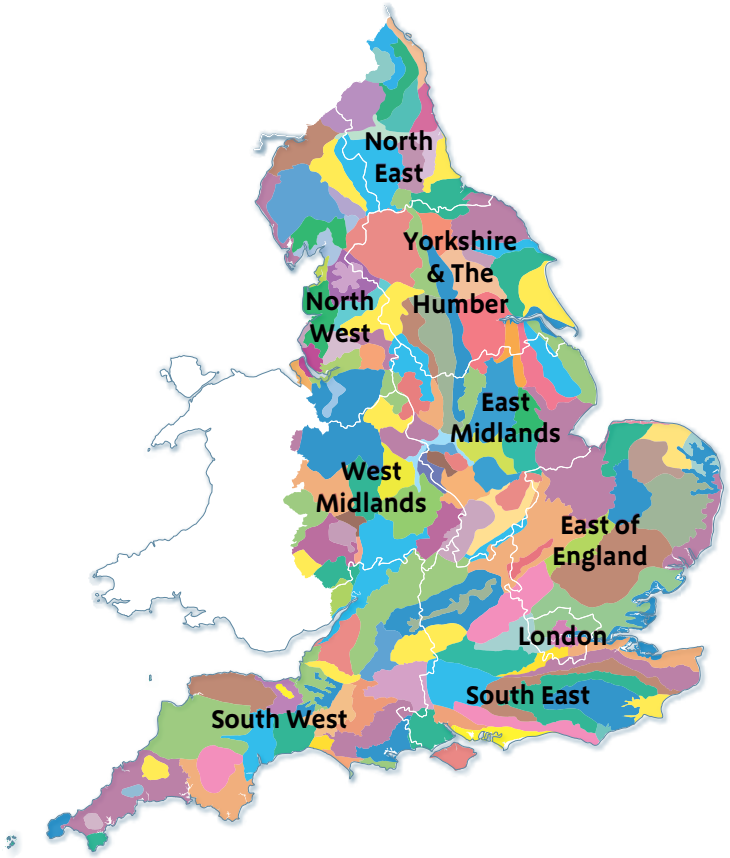
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and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

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

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

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

National Character Areas map



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

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

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

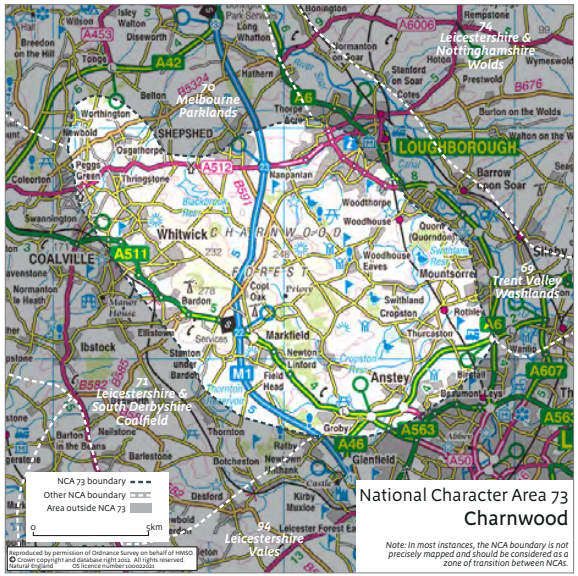
Summary

Charnwood is a unique landscape, marked out by its geology and upland qualities, which contrast with the surrounding gentle lowlands. It is formed by a mosaic of heathland, farmland, parkland and woodland. The underlying Precambrian geology has given rise to the distinct area of land characterised by exposures of rugged, rocky outcrops. It is a relatively well wooded landscape, with many areas of mixed, deciduous and coniferous woodlands. The western part of Charnwood lies within The National Forest, which offers people extensive access, environmental education and volunteering opportunities, and the chance to become involved with local community projects.

Situated between Coalville, Loughborough and Leicester, Charnwood is surrounded by large, urban areas, but retains a rural character. Larger villages lie on the southern, western and eastern fringes, with small, linear villages in the central area. Many buildings in the central part of the area are characterised by local Charnian rocks and Swithland Slate.

Key ecosystem services provided by Charnwood include its internationally important geology – which provides fossilised evidence of the earliest forms of multi-cellular life in Britain – and its internationally and nationally important wildlife, such as the unique Charnwood spider. Recreation is also a key service: Bradgate Park and Beacon Hill Country Park are both places where local communities can enjoy the health benefits of recreation, and the reservoirs (Blackbrook, Cropston, Thornton and Swithland) provide opportunities for walking and birdwatching, as well as water supplies.

The area is facing key challenges around how to protect and enhance its unique natural assets while accommodating the pressure for modern growth and development, and significant mineral extraction. There is great scope to build on and support the partnership work of the Charnwood Forest Regional Park to protect and enhance this area, and the work of The National Forest in promoting sustainable woodland management and extending woodland (where appropriate).



Click map to enlarge; click again to reduce.

Statements of Environmental Opportunity

- **SEO 1**: Protect, manage and promote the important geology and cultural interests of Charnwood, including the internationally significant Precambrian geology, the characteristic rocky outcrops, the unique country parks, the manor houses and the medieval monastic buildings, to ensure access and interpretation, and for people to enjoy and understand these important resources.

- **SEO 2**: Conserve the strong settlement character of the inner Charnwood villages and ensure that development is sympathetic to the character of this rural NCA, surrounded by large and expanding urban areas. Maximise the green infrastructure and sustainable recreation opportunities.

- **SEO 3**: Protect and significantly increase the extent and quality of the unimproved grasslands, heathlands, open waterbodies and streams, to enhance biodiversity, ecological networks, water availability and quality, climate regulation and sense of place.

- **SEO 4**: Where appropriate, manage and expand the native woodlands throughout Charnwood to reinforce the wooded character, to increase the potential for biomass, access and recreation, and to regulate climate change and water quality.

Following the discovery, in 1957, of the Charnian fossil *Charnia masoni* and *Charniodiscus concentricus* and more recent new discoveries, Charnwood Forest has been established as having one of the best Precambrian fossil assemblages in the world.

Description

Physical and functional links to other National Character Areas

Charnwood rises abruptly out of the Leicestershire Vales NCA to the south and the Melbourne Parklands NCA to the north. To the west, it rises less steeply from the Leicestershire and South Derbyshire Coalfield NCA. To the east, the Charnwood NCA is shaped by the flood plain of the Soar, which runs through the narrow Trent Valley Washlands NCA, beyond which rises the Leicestershire and Nottinghamshire Wolds NCA.

There are expansive views to the surrounding lowland plain and distant horizons from the more elevated open areas of Charnwood.

Clear and fast-flowing streams that rise in Charnwood drain north-westwards and eastwards towards the River Soar, and south-eastwards to the River Sence. They eventually drain into the Trent Basin, providing links with the Trent Valley Washlands, and then out to the North Sea via the Humber Estuary. Four reservoirs (Blackbrook, Cropston, Thornton and Swithland) supply water to surrounding areas and provide important opportunities for walking and birdwatching.

The National Forest is creating new woodland within both this and adjoining NCAs, and is providing strong woodland linkage with neighbouring Leicestershire and South Derbyshire Coalfield and Melbourne Parklands NCAs. Some 58 per cent of Charnwood lies within The National Forest: the area represents 20 per cent of it.

There are expansive views to the surrounding lowland plain and distant horizons from the more elevated open areas of Charnwood. On clear days it is possible to see the Shropshire Hills, the Cotswolds, distant Lincoln Cathedral and the Boston Stump from both Beacon Hill and Bardon Hill. In contrast, at lower elevations, views are contained by the intricate pattern of woodlands and farmland, which convey a secluded and intimate character.

Three working quarries lie within the NCA, supplying stone both locally and nationally. The M1 cuts almost midway through Charnwood, providing a strong functional link between the south and the north.

Key characteristics

- Upland qualities, including extensive open summits and distinctive rocky outcrops, rising from the surrounding lowland undulating farmland.
- Outcrops of ancient Precambrian rocks, with Mercia Mudstones in the vales; a significant proportion of the NCA is covered with superficial deposits of the Anglian ice age, as well as more recent deposits.
- Thin, acidic, infertile soils are found on upland slopes; mudstones in the valley bottoms produce a deeper, fertile soil.
- A well wooded character, with many areas of mixed, deciduous and coniferous woodlands. Large, ancient, pollarded oaks are a feature of country parks.
- Rectilinear patterns of Parliamentary enclosure fields, bounded by a mixture of drystone walls and hedges. Many of the country parks are also bounded by drystone walls. Enclosure has created a distinctive road pattern.
- Land use is a distinctive mixture of woodland, predominantly pastoral farmland, heathland and parkland.
- A diverse variety of habitats (including woodlands, acidic grassland and heathland) support a large range of characteristic and rare species.
- Clear, fast-flowing watercourses and significant, large, open waterbodies and reservoirs.
- Historic parks and country parks such as Bradgate and Beacon Hill, large manor houses and the remains of medieval monastic buildings like Ulverscroft Priory are all prominent cultural heritage features that attract many visitors from the surrounding urban areas.
- Local Charnian rocks, Swithland Slate roofs, thatched roofs and some timber-framed buildings characterise the Charnwood villages. Occasional linear villages and scattered farmsteads through the heart of Charnwood contrast with larger settlements, which ring the elevated areas. A number of large quarries and some busy roads have an urbanising influence in places.

Charnwood today

Charnwood includes a unique and distinctive area of elevated land, with rugged, rocky outcrops that rise above the surrounding lowland plain. These rocks are unique in the East Midlands and rare internationally as well. The elevated core of the area follows a broadly north-west–south-east orientated spine. The area has been established as having one of the best Precambrian fossil assemblages in the world. The Precambrian rocks have been folded to form a series of outcrops, interrupted by faulting, and partially obscured by later Mercia Mudstone strata. The southern edge of the area is intruded by igneous rocks, notably the pink South Charnwood diorites found around Markfield and the granodiorite found around Mountsorrel. Charnwood has a unique geology. The Precambrian rocks, which heavily influence the character of the area, characteristically surface as isolated outcrops. The older rocks give rise to the thin, infertile soils that support the heathland at the heart of Charnwood. The mudstones and superficial deposits of the valleys and lowland areas give rise to deeper, more fertile soils.

On the lower land surrounding the elevated core, Charnwood has a wooded character of mixed deciduous and coniferous woodlands, including ancient wet woodlands. The western part of Charnwood Forest lies within The National Forest, so woodland cover is likely to increase over time – but not to the detriment of the unique Charnwood landscape character. Pockets of ancient woodland remain, such as at Buddon Wood and Swithland Wood. The country parks are characterised by large, ancient, pollarded oaks.

The predominantly pastoral agricultural land is divided up by a regular field pattern of medium to large fields, with low, clipped hedgerows and stone walls. The planned appearance of the landscape is emphasised by straight, wide-verged enclosure roads.

Beacon Hill Country Park is on the site of an ancient hill fort.

The variety of semi-natural habitats in Charnwood is derived from its acidic soils and geology, resulting in heathland and acid grassland. Heather is a particularly important habitat for rare invertebrates such as the Charnwood spider. Nationally important birds such as the nightjar also rely on this habitat. Many of these areas are now encroached by bracken and scrub.

Fast, clear, well-oxygenated streams support an abundance of wildlife, including rare species such as crayfish and brook lamprey. The Charnwood caddis fly is found in both Burleigh Brook and Wood Brook, but nowhere else in the country.

Swithland, Blackbrook Thornton and Cropston reservoirs are large and important water and recreation resources for the surrounding urban areas, and important for breeding and wintering wildfowl. Swithland Reservoir supports a nationally important population of shoveler. Groby Pool may originally have been constructed as a medieval millpond.

Beacon Hill Country Park is on the site of an ancient hill fort, and Bradgate Country Park contains the substantial ruins of a 15th-century brick mansion (the birthplace of Lady Jane Grey) and Old John Tower, a folly or prospect tower built in 1784 by the 5th Earl of Stamford. The circular stone tower replaced a former wooden windmill, and stands on Bradgate Park's tallest hill – and one of Leicestershire's highest points – some 210 m above sea level. The tower offers views across the area, and of the red and fallow deer that still graze the park. Several other mansions are set within parkland, including Roecliffe Manor and Beaumanor Hall. Remains of medieval monastic buildings like Ulverscroft Priory contribute to the area's heritage, as do the isolated churches, like that at Copt Oak, which were built in the 1830s as a result of the Enclosure Acts.

The area also offers a network of rights of way totalling 257 km, at a density of nearly 1.5 km per km2, with a small proportion of open access land covering 88 ha (or 0.5 per cent of the NCA). In addition, further recreation opportunities are being offered through some of the reservoirs, such as Thornton, and through The National Forest. The abandoned quarries are of geological and nature conservation interest, with some being used for activities such as rock climbing.

The ancient settlement pattern is still apparent. A number of small, linear villages, such as Newtown Linford, lie at the heart of Charnwood Forest, and larger settlements ring the central elevated core of the landscape. These larger settlements are now surrounded by extensive modern housing developments. Charnwood is surrounded by several large settlements on its peripheries, which include Shepshed, Loughborough, Coalville and Leicester.

Older dwellings are built of local dark stone, either Charnwood Stone or the pink/purple Mountsorrel Granodiorite. Swithland Slate, with its colouring of blue-grey tinged with green, is a locally distinctive roofing material. There is a mixture of timber-framed and stone buildings. Swithland Slate and thatch are used for roofing in many villages, including new developments.

The tranquil, rural character of the area is sometimes interrupted by urbanising infrastructure, including transmission lines along the Rothley Brook, prominent adjacent telecommunications masts, localised wind turbines, and the A50 and M1.

The landscape through time

The Precambrian rocks, which heavily influence the character of the area, characteristically surface as isolated outcrops. The Charnian rocks comprise volcaniclastic sediments (mainly tuffs) that were produced in an island arc setting, with volcanoes forming a series of islands. Two volcanic centres have been identified, at Bardon Hill and Whitwick. A modern analogue for this is the island of Montserrat in the Caribbean. The Precambrian rocks have been folded to form a series of outcrops forming a broadly north-west–south-east orientated spine, interrupted by faulting, and largely obscured by later Mercia Mudstone strata and superficial deposits. The southern edge of the area is intruded by igneous rocks, the coarse-grained, pinkish granitic rocks found around Markfield (originally known as Markfieldite but now called the South Charnwood Diorites). They were intruded in the latest Precambrian times. Following the discovery, in 1957, of the Charnian fossils Charnia masoni and Charniodiscus concentricus, more recent discoveries have established Charnwood Forest as having one of the best Precambrian fossil assemblages in the world. These soft-bodied creatures represent some of the oldest multi-cellular organisms so far known to science.

Major quarrying activity in this NCA started in the 19th century and continues today. Mountsorrel Quarry initially quarried for granite setts, but soon focused on roadstone aggregate.

The Cambrian-age Swithland Slate crops out in Swithland Wood and around Groby. These former marine mudstones were metamorphosed to slate during earth movements at the end of the Silurian period. They were once extensively worked for roofing slate and headstones, which can be seen in many local buildings and churches within 50 miles of Charnwood Forest. The industry rapidly declined in the mid-19th century due to cheap imports of Welsh slate. The younger igneous intrusion of Ordovician age (495 to 443 million years ago) forms the intrusion at Mountsorrel. (This is worked for aggregate: Buddon Wood, one of the largest quarries in Europe, produces around five million tonnes of aggregate a year. The floor of the quarry is currently 110 m below sea level, and is expected to reach 150 m below sea level by the end of its working life.) In the Silurian period, earth movements pushed the rocks up into a major mountain range that formed Charnwood Forest.

In the north-west of Charnwood Forest, at Grace Dieu, Osgathorpe and Barrow Hill, there are four inliers of the Carboniferous Peak Limestone Group. These shallow marine limestones have largely been altered to the mineral dolomite, forming dolostones, and have been worked in the past for lime, building stone and aggregate. In the north of the NCA, the Triassic Bromsgrove Sandstone, including the Shepshed Sandstone (a member of the Sherwood Sandstone Group), crops out. This has been extensively worked as a building stone in neighbouring NCAs, but not in Charnwood Forest.

The Mercia Mudstone Group is the principal bedrock in the NCA. It is a red-brown mudstone that overlies the Precambrian rocks with a marked unconformity that can be seen in many of the quarries. This represents a time gap of around 300 million years; it is very irregular, owing to marked erosion in Carboniferous to Early Triassic times, with many wadis forming. The Mercia Mudstone Group is the deposit of a dist desert and includes interbedded thin beds of greenish-grey siltstone that were deposited by flash floods following periodic heavy rainstorms.

Superficial deposits extensively cover much of the Charnwood Forest landscape area. They comprise tills of Anglian age (around 440,000 years old) and more recent head and alluvium. The head deposits are extensive and are formed by a downslope movement of the surface deposits, much of which was precipitated by the permafrost conditions at the end of the Devensian glaciation around 12,000 years ago. This ice sheet did not cross Charnwood Forest.

There is evidence of occupation of Charnwood and exploitation of the natural resources since Neolithic times. The exceptionally hard stone provided the resources for making hand-axes and other finds dating from this period. The discovery of a late bronze-age hoard provides further evidence of prehistoric occupation, although this is likely to have been limited to localised focal points. An iron-age hill fort dating from 600 BC to 43 AD is located at Beacon Hill, one of the highest points in Charnwood Forest, and is attributable to the Coritani tribe, which occupied this area at the time of the Roman invasion.

Use of the area's resources continued in the Roman period, with quarrying of both the local Mountsorrel granodiorite and Swithland Slate for roofing. There is evidence of these materials in local Roman remains, including the military outpost of Ratae Corieltauvorum, the site now occupied by the city of Leicester. Anglo Saxons also continued to exploit these resources.

The forested character of the area is recorded in *Domesday Book*, identified as the woodland tract of Hereswode. The area remained generally uninhabited, with only one small settlement recorded at Charley. It was not until the 12th and 13th centuries that the woodland began to be cleared and settled. As new villages were created, principally in the lower and more fertile valleys, each took substantial areas of land out of Charnwood Forest for agricultural use. A secluded location and cheaply available land for cultivation favoured the establishment of monastic settlements in the medieval period. These included Garendon Abbey and Ulverscroft Priory. A number of medieval hunting parks were established around the core of the forested upland area, making use of land that was too poor for agriculture. Examples include Groby, Bradgate, Quorndon, Beaumanor and Bardon. A number of larger priories (such as Grace Dieu priory), country houses and associated parklands were established towards the end of the medieval period.

Bradgate House was built between 1499 and 1520, and was home to the ill-fated Lady Jane Grey, queen of England for just nine days in 1553.

From 1600 to the early 19th century there was very little change or colonisation, and the area remained largely unenclosed. By this stage, the woodland cover that once extended across much of the area was depleted, and many of the hunting parks had also gone, leaving large areas of moorland, heathland and pasture. A relative newcomer to Charnwood Forest was Mount Saint Bernard Abbey, established in the 1830s.

The combination of the effects of early 19th century enclosure and the establishment of commercial quarrying of granite brought significant changes to the landscape. The Enclosure Act was the final stage in the gradual piecemeal enclosure of the forest lands. The remaining unenclosed woodland, moorland, heathland and open farmland was divided up into many privately owned farming units marked out using hedges or stone walls, and there was a rationalisation of the roads and trackways within the forested areas.

Major quarrying activity started in the 19th century and continues today, with three main quarries currently operating at Bardon Hill, Cliffe Hill and Mountsorrel. Several other quarries are mothballed, and there are many abandoned pits. Mountsorrel initially quarried for granite setts, but soon focused on roadstone aggregate. The rivers Soar and Wreake, and the Charnwood Forest Canal (now defunct), enabled the aggregates to be transported countrywide. Swithland Slate was quarried commercially from the mid-18th century. Competition from roofing tiles and Welsh slate quarries forced the decline of the Swithland Slate industry at the end of the 19th century. The quarrying activity has left a significant industrial heritage footprint on the landscape, as have the effects of the industrial revolution, with the construction of Swithland, Cropston, Blackbrook and Thornton reservoirs, and the introduction of railways with branch lines to serve the quarries. Other quarries once existed in the Carboniferous Limestone, working for lime, building stone and aggregate, possibly with some production of mortar. Lime production dates back to medieval times at Grace Dieu. Small quarries also opened for the making of bricks.

In recent years the lack of appropriate grazing, and the process of agricultural improvement and intensification, have led to a decline in the extent and quality of heathland. The characteristic drystone walls are falling into a state of disrepair in many places, although these (and heathland management) are occasionally being improved through stewardship agreements. Many woodlands have been invaded by rhododendron and sycamore, which has diminished their nature conservation interest.

Large-scale modern development is having an impact on the intrinsic rural landscape character, by creating visual intrusion and increasing the risk of the coalescence of outlying villages. This trend looks set to continue, with more homes likely to be built in and around Leicester, Coalville and Loughborough. In inner Charnwood, population change and increasing affluence have led to minor suburbanising influences, through farm-building conversions and the enclosure of large gardens by railings. The National Forest, which covers 58 per cent of the Charnwood NCA, was established with great public support just over 20 years ago, to show the benefits of woodlands near to where people live and work. There is an overall aim of blending new and maturing woodland within a wide variety of landscapes.

Ecosystem services

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

Provisioning services (food, fibre and water supply)

- **Food provision**: The area is dominated by pasture, with dispersed patches of arable fields in a few areas of more fertile land. Between 2000 and 2009 there was a small reduction in grazing livestock units, but the number of both dairy farms and cereal farms increased slightly. Grassland covers 59 per cent of the area – the most prevalent land use – and cereals are grown on 23 per cent of the land. Cattle are the most numerous livestock within this landscape. The pasture farmland supports an important dairy industry. Traditional animal breeds, such as Hebridean sheep and English Longhorn cattle, are a feature of some farms.

- **Timber provision**: Conifer plantations provide some timber, but this is a limited one-off source resulting from post-Second World War planting. The western part of Charnwood is within The National Forest and associated woodland creation is occurring. Woodland already forms a significant component of this landscape: further woodland planting would be in keeping with the character of the area, and would make an increased contribution to timber provision. Caution is needed however, to ensure that there is no loss of the other land uses that give Charnwood its distinctive, mixed character.

- **Water availability**: The water from the reservoirs is supplied to Leicester and the surrounds. There are some water pollution pressures from pesticides and nutrients from agriculture and rural land management.

- **Biomass energy**: The existing woodland cover (16 per cent – which doesn't include the extensive areas of young plantation created as part of The National Forest) offers relatively high potential for the provision of biomass, both through bringing unmanaged woodland under management and as a by-product of commercial timber production. Additionally, the plantations created as part of The National Forest enhance the future provision of biomass. Generally, the NCA has medium potential for short rotation coppice, but with some areas of high potential around Coalville and in the area between Markfield and Swithland. The potential miscanthus yield is generally medium, although there is an area of high-potential yield in the east of the NCA, to the south of Loughborough and north of Leicester. For information on the potential landscape impacts of biomass plantings within the NCA, refer to the tables on the Natural England website (www.naturalengland.org.uk/ourwork/farming/funding/ecs/sitings/areas/default.aspx).

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

- **Climate regulation**: More woodland planting is occurring as a consequence of The National Forest, and this is helping to integrate development and increase carbon storage. The mineral soils covering much of the NCA have low carbon levels (generally 0 per cent to 5 per cent); carbon sequestration and storage can therefore be improved by increasing the levels of organic matter, and by reducing the frequency and total area of cultivation. Soil carbon is likely to be higher under areas of permanent woodland, grassland and heathland.

- **Regulating water quality**: Water quality is particularly important in the reservoirs that provide water for the surrounding area. Buffering watercourses and reservoirs, thereby slowing the pathway of run-off, could have a significant impact on regulating soil erosion and subsequent sedimentation, biodiversity and soil quality.

Charnwood NCA has clear, fast flowing watercourses and significant, large open water bodies and reservoirs.

Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration**: Feelings of inspiration and escapism are likely to be associated with the upland qualities of this landscape. The unique country parks, with their many heritage assets, attract many visitors, and the heathlands, stone outcrops and woodlands contrast with the surrounding gentle lowlands, as well as with the area's strong field pattern. The National Forest extends into Charnwood and aims to enhance the existing historic and upland landscape, mixing farm woodlands with woods planted for nature conservation. The National Forest's proposal is to use woodland to 'frame' the existing landscape of open country, towns and villages, which would strengthen the sense of place further and offer people more opportunities to experience and enjoy the countryside. The Charnwood Forest Regional Park also aims to manage and promote the unique natural and cultural heritage features of Charnwood. It is working to manage and promote landscape and settlement character (including biodiversity, geodiversity, and cultural and industrial heritage features), and sustainable leisure and tourism, and is striving to support agricultural diversification, as well as woodland and rural economy uses that respect local character.

- **Sense of history**: Evidence of early clearance and cultivation is reflected in place names and characteristic small, irregular enclosed pasture fields, with mature woody hedgerows. Fragmented remains of open field system ridge-and-furrow earthworks are common surrounding villages, and contrast with the more dominant pattern of 19th-century Parliamentary enclosures. Earlier winding tracks and lanes, leading from villages on the edge of Charnwood to the central woods and heathlands, are overlain by this grid pattern. The historic character is further reinforced by a number of large parks (such as at Garendon and Bradgate) with ancient, pollarded oaks,

manor houses (such as Roecliffe Manor and Beaumanor Hall), the remains of medieval monastic houses (including Ulverscroft Priory), and isolated churches and Methodist chapels.

- **Recreation**: Charnwood Forest is a popular leisure destination, particularly serving the populations of nearby Leicester and Loughborough, as well as visitors from further afield. The area contains a number of highly valued access amenity areas including The National Forest, country parks (such as Bradgate and Beacon Hill), green corridors, local nature reserves (such as Billa Barra) and accessible woodlands (such as the Outwoods). There is also public access around the reservoirs for the quiet enjoyment of birdwatching, walking and fishing. The NCA has 257 km of rights of way (including the Leicestershire Round long-distance route), as well as parts of the National Cycle Network. There are many active local conservation volunteer groups.

- **Biodiversity:** There are over 1,614 ha of Biodiversity Action Plan (BAP) priority habitats within the NCA, covering 9 per cent of the area: this includes 629 ha of wet woodland, 494 ha of lowland heathland and 164 ha of lowland mixed deciduous woodland. Some 1,417 ha are nationally designated as Sites of Special Scientific Interest (SSSI). The NCA is notable for upland and calcifuge species rarely found elsewhere in the Midlands.

- **Geodiversity:** The discovery in 1957 of the Charnian fossils in the ancient volcaniclastic rocks was of international importance, as it provided evidence that primitive life forms existed in the Precambrian period. More recent discoveries have established Charnwood as having one of the best Precambrian fossil assemblages in the world. The geology in Charnwood Forest is varied, with many Local Geological Sites and SSSI designated for both geology and biodiversity. The uniqueness of the underpinning geology also offers great potential for geomorphological features, for scientific research and for education at all levels. As well as the Precambrian rocks, many of the quarries expose a spectacular unconformity with the overlying Triassic rocks and Pleistocene sediments.

Parks such as Bradgate are prominent cultural heritage features that attract many visitors from the surrounding urban areas.

Statements of Environmental Opportunity

SEO 1: Protect, manage and promote the important geology and cultural interests of Charnwood, including the internationally significant Precambrian geology, the characteristic rocky outcrops, the unique country parks, the manor houses and the medieval monastic buildings, to ensure access and interpretation, and for people to enjoy and understand these important resources.

For example, by:

- Protecting and promoting understanding of the Charnwood Forest geology for the contribution it makes as a historical, scientific and educational resource.
- Protecting the distinctive rocky outcrops by ensuring that they remain unobscured and visually accessible – as they are crucial to Charnwood's sense of place.
- Recognising that aggregate from the Charnwood quarries is an important national resource, but continuing to make wise use of the mineral resource and effectively screening the impacts of quarrying.
- Where appropriate, restoring previous mineral sites to open access sites, ensuring good and safe access. This will benefit education, scientific research, geodiversity and biodiversity, will increase public access to interesting geological features and will allow people to view (and possibly climb) the exposed outcrops and rockfaces.
- Working in partnership to implement the Local Geodiversity Action Plan.
- Encouraging the use of local building stone to reinforce local distinctiveness and to maintain historic buildings.
- Providing the necessary recreational infrastructure to meet the significant demand without detriment to the landscape.
- Maintaining and improving the distinctive drystone walls that bound the parks, as well as those found in the wider landscape.
- Protecting (through management) the open and elevated views across the upland landscape, which provide a sense of inspiration and a tranquil recreational resource.
- Protecting the historic designed parklands and their settings.
- Supporting and promoting participation in the Charnwood Forest Regional Park.

SEO 2: Conserve the strong settlement character of the inner Charnwood villages and ensure that development is sympathetic to the character of this rural NCA, surrounded by large and expanding urban areas. Maximise the green infrastructure and sustainable recreation opportunities.

For example, by:

- Protecting the distinctive inner Charnwood villages, with their local building materials and linear settlement pattern, recognising that large-scale development would be severely detrimental to their character.
- Protecting the character of the larger villages surrounding Charnwood Forest, and ensuring that new development and expansion are sensitively designed and located.
- Protecting the remnant ridge-and-furrow earthworks from modern agricultural practices and development pressure. Enhancing historic landscapes by working with land managers to alter any cultivation practices that could damage the historic landscape patterns.
- Planning to limit the visual impact of any new development by locating it on previously developed land or close to existing settlements.
- Carrying out additional tree and woodland planting around settlement fringes to help integrate new development into the landscape, and to enhance existing well wooded village peripheries.
- Enhancing green infrastructure links between Leicester, Loughborough and Coalville, to promote the excellent recreational opportunities offered in Charnwood and to enhance ecological corridors which will encourage the spread of species and thus enhance adaptation to climate change impacts. A good example of this is the 6Cs Strategy Green Infrastructure work[4] .
- Planning to limit (where possible) the encroachment of urbanising influences into areas with a high tranquillity rating, and where light pollution is presently limited.
- Ensuring that designs for the conversion of traditional buildings maintain their original scale and character.
- Ensuring that local plans and policies recognise and support the Charnwood Forest Regional Park.

[4] www.rivernereregionalpark.org/default.asp?PageID=184&n=Home+286C+Home29?

SEO 3: Protect and significantly increase the extent and quality of the unimproved grasslands, heathlands, open waterbodies and streams, to enhance biodiversity, ecological networks, water availability and quality, climate regulation and sense of place.

For example, by:

- Managing heathland in favourable condition by controlling the encroaching bracken and scrub. This will ensure that the habitat of rare invertebrates (such as the Charnwood spider) and important birds (such as the nightjar) are maintained.
- Seeking opportunities to re-create heathland and grassland by increasing their quality and extent, and by strengthening the interconnectivity of the networks.
- Protecting the surviving ridge-and-furrow from modern agricultural practices and development pressures.
- Promoting the management of traditional field boundaries, including drystone walls and species-rich enclosure hedgerows.
- Creating a habitat mosaic of heathland, woodland and semi-natural grassland, creating structural diversity and a variety of flowering plants. This will provide breeding sites and a food source for pollinators.
- Maintaining the fast, clear, well-oxygenated streams that support an abundance of wildlife, including rare species such as crayfish and brook lamprey. The Charnwood caddis fly is found in both Burleigh Brook and Wood Brook, but nowhere else in the country.
- Preventing the introduction of signal crayfish to unaffected waterbodies.
- Conserving and extending riparian habitats such as bogs, marshes, reedbeds and wet alder woodland along the streams and surrounding the reservoirs.
- Promoting the extensive management of agricultural land within key waterbody catchments, to improve the water quality of streams and to increase biodiversity.
- Supporting the appropriate management of semi-natural Biodiversity Action Plan (BAP) habitats for the benefits this brings to biodiversity networks, as well as to facilitate the build-up of soil carbon, thereby improving soil quality and benefiting climate regulation.

SEO 4: Where appropriate, manage and expand the native woodlands throughout Charnwood to reinforce the wooded character, to increase the potential for biomass, access and recreation, and to regulate climate change and water quality.

For example, by:

- Extending and creating native woodlands where appropriate, through creation and restoration schemes in areas where this will not undermine the existing and future biodiversity resource or the mixed land-use character of Charnwood.
- Promoting sustainable woodland management techniques (such as coppicing, pollarding and wood fuel production) to increase carbon sequestration and the resilience of tree species to climate change and disease.
- Supporting The National Forest incentives to increase appropriate woodland creation and restoration, and to open up woodland access routes to the public.
- Extending woodland around settlements and infrastructure developments to filter light pollution, reduce sound pollution and reduce the visual impacts of further urbanisation.
- Protecting and managing veteran trees, to maintain this resource throughout Charnwood.
- Increasing woodland creation and restoration, and strengthening hedgerow networks to aid in the capture of chemicals and nutrients before they enter the groundwater. This will also filter sediments and organic matter, preventing them from travelling into open waterbodies.
- Creating woodland sensitively so as not to reduce the limited arable land, or obscure valued views and rock exposures.

Supporting document 1: Key facts and data

Area of Charnwood
National Character Area (NCA): 17,463 ha

1. Landscape and nature conservation designations

There are no national landscape designations within this NCA.

Source: Natural England (2011)

1.1 Designated nature conservation sites

The NCA includes the following statutory nature conservation designations:

Tier	Designation	Name	Area (ha)	% of NCA
International	n/a	n/a	0	0
European	Special Protection Area (SPA)	n/a	0	0
	Special Area of Conservation (SAC)	n/a	0	0
National	National Nature Reserve (NNR)	Charnwood Lodge	81	<1
	Site of Special Scientific Interest (SSSI)	A total of 22 sites wholly or partly within the NCA	1,417	8

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 143 local sites in Charnwood covering 1,416 ha, or 8 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

SSSI Condition Category	Area (ha)	Percentage of NCA SSSI Resource
Unfavourable declining	91	6
Favourable	291	21
Unfavourable no change	476	34
Unfavourable recovering	558	39

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 elevation ranges from 40m at the lowest point in the Trent Valley to 272m above sea level at Bardon Hill. The average elevation of the landscape is 122m above sea level.

Source: Natural England 2010

2.2 Landform and process

The irregular ridges of the Precambrian and Ordovician igneous rocks are separated by deep valleys, in which Mercia Mudstone strata are found. Recent river erosion has cut wide valleys through the softer Mercia Mudstone and narrow gorges through the more resistant Precambrian rocks which also have formed tors on a number of the Charnwood summits. These tors, a prominent feature in the Charnwood landscape, were formed during the Quaternary Period. They provide evidence of the periglacial geomorphological processes that were shaping the landscape during this tundra-like period.

Source: Charnwood Countryside Character Area Description

2.3 Bedrock geology

Precambrian rocks have been folded to form a series of semi-elliptical outcrops, interrupted by faulting and partially obscured by later Mercia Mudstone strata. The rocks comprise a complex mixture of slates, volcaniclastic sandstones, breccias and tuffs. Plutonic igneous rocks, notably the purple granite of Ordovician age are found around Mountsorrel. Triassic age Mercia Mudstone Group rocks are mainly red in colour and were deposited under arid, desert conditions, the mudstones probably being wind-blown dust that settled in shallow salt-lakes.

Source: Charnwood Countryside Character Area Description

2.4 Superficial deposits

Over the last two million years the climate of Britain has varied tremendously with periods of temperate climate interrupted by repeated advances and retreats of glaciers and ice sheets. About 440,000 years ago ice sheets completely enveloped the region and left deposit of boulder clays or tills. As recently as 30,000 years ago, ice did get as far as Derbyshire and Charnwood's climate was extremely cold. More recent times have seen the development of rivers with flood plains floored by clay and silt (alluvium).

Source: Charnwood Countryside Character Area Description

2.5 Designated geological sites

Tier	Designation	Number
National	Geological Site of Special Scientific Interest (SSSI)	5
National	Mixed Interest SSSIs	6
Local	Local Geological Sites	28

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

Precambrian rocks were overlaid by red marl – desert sediment – during the Triassic period. This contains few calcareous types of sediment and the resulting soil is acidic clay, although there is an outcrop of Carboniferous Limestone in the extreme north-west corner of Charnwood Forest at Grace Dieu, and some isolated patches of chalky boulder clay deposits around The Brand. Deep, nutrient rich, free-draining soils are found in the valley bottoms. The soils of the slopes and hill tops are shallower, poor draining and nutrient poor.

Source: Natural England (2010); Charnwood Countryside Character Area Description; Charnwood Natural Area Profile

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

Grade	Area (ha)	% of NCA
Grade 1	0	0
Grade 2	1,139	7
Grade 3	13,133	75
Grade 4	1,177	7
Grade 5	0	0
Non-agricultural	587	3
Urban	1,427	8

Source: Natural England (2010)

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

3. Key water bodies and catchments

3.1 Major rivers/canals

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

- Grace Dieu Brook n/a
- Ulverscroft Brook n/a
- Buddon Brook n/a

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.

3.2 Water quality

The total area of Nitrate Vulnerable Zone is 17,463 ha, or 100 per cent of NCA.

Source: Natural England (2010)

3.3 Water Framework Directive

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

http://maps.environment-agency.gov.uk/wiyby/wiybyController?ep=maptopics&lang=_e

4. Trees and woodlands

4.1 Total woodland cover

The NCA contains 2,379 ha of woodland, or 16 per cent of the total area, of which 74 ha is ancient woodland.

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

4.2 Distribution and size of woodland and trees in the landscape

Charnwood Forest has extensive woodlands, some of which are remnants of medieval parks. The woodlands are either pedunculate, sessile or mixed oak woods with occasional pockets of small-leaved lime. Nationally important species include the spreading bellflower and species of dead wood beetle. After the First and Second World Wars there was a huge demand for wood. Native broadleaved woodlands were cleared and replanted with faster growing single species conifer plantations. The ancient woods of Martinshaw, Lea, Benscliffe, Blakeshay and parts of Outwoods all suffered substantial losses. Fifty-seven per cent, or 9,873ha of the National Forest lies partly within Charnwood. The aim for The National Forest is to increase woodland cover to about a third of all the land within its boundary and the planting is now becoming mature enough to make a significant contribution to the landscape.

Source: Charnwood Countryside Character Area Description; Charnwood Natural Area Profile

4.3 Woodland types

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

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

Woodland type	Area (ha)	% of NCA
Broadleaved	1,971	11
Coniferous	302	2
Mixed	142	1
Other	342	2

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	379	2
Planted Ancient Woodland (PAWS)	362	2

Source: Natural England (2004)

5. Boundary features and patterns

5.1 Boundary features

Stone walls are characteristic of Charnwood and common on the more elevated land, for example, surrounding the country parks. Older patterns of enclosed pasture – smaller scale, with mature woody hedgerows and fossilised ridge and furrow earthworks – tend to surround the villages. To a large extent the persistence of pastoral farming has limited the effects of 20th century mechanised arable farming although there are local examples of hedgerow and stone wall removal to create larger arable fields.

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

5.2 Field patterns

The landscape is dominated by regular patterns of medium- to large-scale general enclosure with wide enclosure roads, low clipped hedgerows and stone walls developed in the late 18th and 19th centuries to support the expansion of livestock and dairy farming.

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

6. Agriculture

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

6.1 Farm type

The area is dominated by pasture, with isolated arable fields on a few areas of more fertile land. The landscape's mixed farming character is supported by figures on farm type: 35, or 26 per cent grazing livestock farms, 30, or 22 per cent cereal farms. Thirty-five per cent are classified as 'other' – likely to be smallholding – totalling 47 in number. The total number of holdings has fallen by 19 since 2000 to 135 holdings. Survey data from 2000 to 2009 show a reduction of 9 grazing livestock units, 20 per cent, and 9 dairy farms, 40 per cent. The number of cereal farms has increased during this time to 30, up by 7 holdings or 30 per cent.

Source: Agricultural Census, DEFRA (2010)

6.2 Farm size

Holdings between 5 and 20 hectares are the most common, accounting for 48 units, or 36 per cent, but covering less than 8 per cent of the total farmed area. Holdings of more than 100 hectares account for 23 holdings and cover nearly 60 per cent of the total farmed area. Trends from 2000 to 2009 show a reduction in the number of holdings less than 5 ha, down from 22 to 12 in 2009.

Source: Agricultural Census, DEFRA (2010)

6.3 Farm ownership

2009: Total farm area = 8,081 ha; owned land = 5,068 ha
2000: Total farm area = 8,795 ha; owned land = 5,828 ha

Source: Agricultural Census, DEFRA (2010)

6.4 Land use

Grassland covers 4,749 ha, at 59 per cent of the area this is the most prevalent land use. Cereals are grown on 1,833 ha, or 23 per cent of the area. Between 2000 and 2009 there was a decrease in the area of land used to grow cereals, down by 778 ha.

Source: Agricultural Census, DEFRA (2010)

6.5 Livestock numbers

Cattle are the most numerous livestock within this landscape, a total of 7,500 animals. This compares to a total of 5,100 sheep and 4,400 pigs. The numbers of all livestock have fallen significantly since 2000, with the numbers of pigs falling by 3,500, or 45 per cent, sheep by 3,310, 39 per cent, and cattle by 1,400, 16 per cent.

Source: Agricultural Census, DEFRA (2010)

6.6 Farm labour

The number of principal farmers fell between 2000 and 2009 by 86 to 116, a fall of 43 per cent. Although few in number, the amount of casual labourers fell by nearly half to just 12 during this time.

Source: Agricultural Census, DEFRA (2010)

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

7. Key habitats and species

7.1 Habitat distribution/coverage

The deep free-draining soils of the valley bottoms are generally maintained as grasslands while the nutrient poor, thin acidic soil of the slopes provides good conditions for heathland and woodland. Charnwood Forest has extensive woodlands which provide valuable habitat, especially lowland mixed deciduous woodland habitat. Nationally important species found here include the spreading bellflower and species of dead wood beetle. The hills of Charnwood Forest provide ideal conditions for acid grassland and lowland heath. Encroaching scrub and bracken are now threatening to overrun some of the few remaining pockets of acid grassland/lowland heath. Hay meadows and pastures rich in wildlife can be found on the fertile soils of the valley bottoms. They are particularly important for wild flowers and for the butterflies and moths they support. Locally rare flowers include the fragrant orchid found in only one site.

Source: Charnwood Natural Area Profile

7.2 Biodiversity Action Plan (BAP) priority habitats

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

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.

Habitat	Area (ha)	% of NCA
Broadleaved mixed and yew woodland (Broad habitat)	1,167	7
Lowland heathland	49	3
Reedbeds	161	1
Fens	121	1
Lowlands meadows	121	1
Lowland calcareous grassland	29	<1
Purple moor grass and rush pastures	24	<1

Source: Natural England (2011)

- Maps showing locations of UK BAP priority habitats are available at: http://magic.defra.gov.uk/website/magic/ select 'Habitat Inventories'

7.3 Key species and assemblages of species

- Maps showing locations of S41 species are available at: http://data.nbn.org.uk/

8. Settlement and development patterns

8.1 Settlement pattern

The ancient settlement pattern of Charnwood is still apparent. Larger settlements ring the higher ground and there are a small number of villages within Charnwood itself. At the southern edge, Markfield, Groby and Anstey have extensive modern housing around their ancient cores as do Shepshed, Quorndon, Mountsorrel and Rothley on the northern and eastern edges. The larger settlements of Loughborough, Coalville and Shepshep lie on the northern boundary. Leicester lies to the south-east and is visible in views from higher ground, although it is not within the boundary of the NCA. The inner Charnwood villages are small and linear and have a strong character due to the obvious use of local building materials of Swithland slate and Mountsorrel granodiorite. Thatch and timber are also common. Woodhouse Eaves and Newtown Linford are the larger of these villages.

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

8.2 Main settlements

The main towns/cities within the NCA are: Loughborough, Shepshed and Coalville. The total estimated population for this NCA, derived from ONS 2001 census data, is: 108,967.

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

8.3 Local vernacular and building materials

Building materials are characterised by a mix of timber frame, local Charnwood stone or the pink/purple Mountsorrel Granodiorite with both Swithland Slate, with its polychromatic colouring of blue-grey tinged with green, and thatch for roofing.

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

9. Key historic sites and features

9.1 Origin of historic features

Charnwood remained sparsely populated, open to grazing or enclosed within a number of large medieval deer parks until the medieval period. Earthworks and other boundary features signifying the former presence of medieval deer parks are present in the landscape. Monastic houses are a feature in more remote areas, such as Ulverscroft Priory. The nucleated villages operated variations on open field arable, although the growing market value of dairying and cheese manufacture saw many areas of ridge and furrow cultivation laid to grass and enclosed from the 15th century onwards. Ridge and furrow earthworks remain common, if fragmentary, in the small pastures surrounding villages. Larger estates, including those released through the Dissolution, country houses and landscape parks emerged in the 16th century. The upland heaths were largely enclosed for the first time in the later 18th and early 19th centuries, a practise reflected in the regular rectilinear fieldscapes and the presence of isolated farmsteads.

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

9.2 Designated historic assets

This NCA has the following historic designations:

- 2 Registered Parks and Gardens covering 522 ha
- 0 Registered Battlefield/s covering 0 ha
- 29 Scheduled Monuments
- 350 Listed Buildings

Source: Natural England (2010)

- More information is available at the following address:
  http://www.english-heritage.org.uk/caring/heritage-at-risk/

  http://www.english-heritage.org.uk/professional/protection/process/national-heritage-list-for-england/

10. Recreation and access

10.1 Public access

- Six per cent of the NCA, 1,128 ha, is classified as being publically accessible.
- There are 257 km of public rights of way at a density of 0.5 km per km2.
- There are 0 National Trails within Charnwood.

Sources: Natural England (2010)

The table below 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	3	<1
Country Parks	503	3
CROW Access Land (Section 4 and 16)	88	<1
CROW Section 15	1	<1
Village Greens	3	<1
Doorstep Greens	0	0
Forestry Commission Walkers Welcome Grants	27	<1
Local Nature Reserves (LNRs)	30	<1
Millennium Greens	1	<1
Accessible National Nature Reserves (NNRs)	80	<1
Agri-environment Scheme Access	2	<1
Woods for People	600	3

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) it appears that while there are some pockets of genuine tranquillity in the heart of Charnwood Forest, for example the Ulverscroft Valley, overall the tranquillity rates are lower than in neighbouring areas. This is likely to be due to the large settlements on the periphery of Charnwood, the popularity of the area for tourism and recreation and the intrusion from the busy roads, the M1 passes through the area, and numerous quarries.

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

Category of tranquillity	Score
Highest value within NCA	18
Lowest value within NCA	-87
Mean value within NCA	-19

Sources: CPRE (2006)

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

11.2 Intrusion

The 2007 Intrusion Map (CPRE) shows the extent to which rural landscapes are 'intruded on' from urban development, noise (primarily traffic noise), and other sources of visual and auditory intrusion. This shows that most of the intrusion comes from the road network like the M1. A breakdown of intrusion values for this NCA is detailed in the table below.

Category of intrusion	1960s (%)	1990s (%)	2007 (%)	% change (1960s-2007)
Disturbed	42	69	79	37
Undisturbed	52	25	7	-45
Urban	5	6	14	9

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are that there has been a massive reduction in the amount of undisturbed land. The amount of disturbed land has almost doubled and the amount of urban land has more than doubled.

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

12. Data sources

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

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

Supporting document 2: Landscape change

Recent changes

Trees and woodlands

- Woodland cover has significantly increased, thanks to The National Forest initiative: 58 per cent of the NCA now falls within it. Some 11 per cent of the woodland in the NCA is broadleaved. In recent years, alien species such as rhododendron have begun to encroach on the area.

- A lack of woodland management in some areas is leading to a decline in the characteristic mosaic of woodland, pasture and heathland. The loss of roadside oak trees and ancient trees in the country parks due to old age is adding to the erosion of character.

Boundary features

- Drystone walls and hedgerows have been lost as a result of field enlargement and lack of maintenance throughout this area. There is a need for a proactive programme for the management and reinstatement of stone walls, which contribute to the distinctive field pattern of this characteristic upland landscape. Priority should be given to the management and restoration of walls and hedges alongside roads and public rights of way.

Agriculture

- Commercial agriculture and forestry have resulted in the loss of or damage to many typical landscape features, including pasture, heathland and field boundaries (although, thanks to effective agri-environment schemes, the maintenance of field boundaries has improved). This has weakened patterns of mixed land use and has contributed to a more homogenous landscape.

- In the past, permanent pasture has been ploughed up and converted to arable and short-term ley. The amount and proportion of grassland continues to decline, but more recently at a reduced rate, as the number of environmental stewardship schemes in the area has increased.

- There is a proliferation of new, large-scale agricultural buildings as a result of commercial agriculture. These need to be integrated into the landscape as much as possible. Farmstead design guidance could help to reduce their impact.

Settlement and development

- Continuing demand for large-scale, mixed-use development is eroding intrinsic landscape character on the fringes of larger settlements. This is creating visual intrusion into the countryside, resulting in the loss of surrounding landscape features and increasing the risk of the coalescence of outlying villages.

- The conversion of farm buildings to residential use needs to be done sensitively to reduce any negative impacts on the intrinsic landscape character.

Semi-natural habitat

- There are over 1,614 ha of Biodiversity Action Plan (BAP) priority habitats within the NCA (covering 9 per cent of the area), including 629 ha of wet woodland, 494 ha of lowland heathland and 164 ha of lowland mixed deciduous woodland. Some 1,417 ha are nationally designated as Sites of Special Scientific Interest (SSSI).

- The management of parkland and heathland is being achieved at a number of sites across the area, although a lack of appropriate grazing and agricultural improvement has led to a decline in the extent and quality of heathland.

- The streams, streamside vegetation, reservoirs and waterbodies, including Groby Pool, are all vulnerable to damage and eutrophication.

Historic features

- Historically, Charnwood contained several large, designed parklands. Some of these, such as Bradgate Park, survive today, containing heathland and large, ancient, pollarded oaks. Historic parkland is a key factor in the diversity of landscape character, and yet nearly 60 per cent was lost, principally to agriculture, in the 20th century. Historic parkland grant schemes and agri-environment schemes now assist in the protection of this resource.

- The National Forest Company provides grants for tree planting that can include the planting of scattered trees and parkland.

- The historic character of the area is further reinforced by a number of large parks (such as at Garendon and Bradgate) with ancient, pollarded oaks, manor houses (such as Roecliffe Manor and Beaumanor Hall), the remains of medieval monastic houses (including Ulverscroft Priory), and isolated churches and Methodist chapels.

- The planned appearance of the landscape is emphasised by the straight enclosure-roads with wide grass verges, which are overlaid on the earlier winding tracks and lanes leading from villages on the edge of Charnwood to the central woods and heathlands.

Rivers

- The biological and chemical water quality of the streams and rivers is consistently good. The streams, streamside vegetation, reservoirs and waterbodies, including Groby Pool, are all vulnerable to damage and eutrophication.

- There are some issues with sedimentation, particularly at Cropston Reservoir.

Minerals

- There is high demand nationally for aggregates, and Charnwood Forest is a major commercial source of hard-rock aggregate for central and southern England. Pressure for expanded quarries is likely to continue, creating further visual intrusion and reducing the sense of tranquillity and remoteness.

Drivers of change

Climate change

- Drier summers may lead to an increase in outdoor recreation, adding further to the pressure on Charnwood's country parks.
- An increase in extreme weather events, drier summers and heavier winter rainfall in the could all contribute to increased grass and woodland fires during dry summers, and increased soil erosion. This would have an impact on the sedimentation of the reservoirs, reduce soil quality and could lead to the deterioration of the upland heathland areas.
- An increased focus on sustainability may lead to new and innovative designs for any new development, resulting in the use of less water, energy and raw materials.
- Changing weather conditions could lead to longer growing seasons and the ability to grow different types of crops, which – combined with an increasing demand for energy crops – could bring landscape pressures.
- Drier summers and increased wind blow could lead to the loss of veteran trees in the parkland landscapes.
- Exotic pests and diseases pose a potential threat.

Other key drivers

- The Charnwood Forest Regional Park aims to manage and promote the unique natural and cultural heritage features of Charnwood. The Regional Park will be recognised as an essential part of the growing communities in the Derby, Leicester and Nottingham areas, both now and in the future. It is working to manage and promote landscape and settlement character (including biodiversity, geodiversity, cultural and industrial heritage features, and sustainable leisure and tourism) and is striving to support agricultural diversification, and woodland and rural economy uses that respect local character.
- Expansion of the commuter villages within Charnwood, and the large urban areas surrounding it (such as Loughborough, Coalville and Leicester), is likely to result in increased development, but this could bring opportunities to improve green infrastructure links and to improve the design of the urban fringe.
- The distinct character and special qualities of the Charnwood landscape are recognised by the Charnwood Forest Regional Park initiative, and there is provision for its protection and enhancement within the local planning policy framework. There are opportunities for any further developments to be of the highest standard, in order to make a positive contribution to Charnwood's distinctive landscape character.
- Recreation, access and tourism demand is high, bringing with it opportunities for improved facilities for the enjoyment of nature, but also pressure on the landscape and biodiversity. This is especially apparent in the country parks such as Bradgate and Beacon Hill.

- Population change and increased affluence are leading to a rise in developments and property improvements. These have an urbanising impact on some of the rural settlements and dwellings, but could also bring opportunities to improve design standards.

- Mineral extraction will continue to be a challenge, as the supply of aggregate from Charnwood is nationally significant. This could, however, bring opportunities for increasing awareness of the importance of Charnwood's geological resource and its geodiversity. It could also bring opportunities for improving interpretation of and access to geological exposures.

- Sedimentation of the reservoirs is a challenge, and is leading to adverse water quality (for example at Cropston Reservoir).

- The growing percentage of woodland cover in the area brings an increased risk of the spread of disease (for example chalara dieback of ash trees).

Cropston Reservoir.

Supporting document 3: Analysis supporting Statements of Environmental Opportunity

The following analysis shows the projected impact of Statement of Environmental Opportunity on ecosystem service provision:

Statement of Environmental Opportunity	Ecosystem Service: Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place/inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
SEO 1: Protect, manage and promote the important geology and cultural interests of Charnwood, including the internationally significant Precambrian geology, the characteristic rocky outcrops, the unique country parks, the manor houses and the medieval monastic buildings, to ensure access and interpretation, and for people to enjoy and understand these important resources.	↔ *	↗ *	↔ **	↔ ***	↗ *	↗ *	↗ *	↔ *	↗ *	↗ *	↗ *	↗ *		↑ ***	↑ ***	↗ **	↑ ***	↗ **	↑ ***
SEO 2: Conserve the strong settlement character of the inner Charnwood villages and ensure that development is sympathetic to the character of this rural NCA, surrounded by large and expanding urban areas. Maximise the green infrastructure and sustainable recreation opportunities.	↔ *	↗ *	↘ **	↔ **	↗ *	↗ **	↗ *	↗ *	↗ *	↗ *	↗ *	↗ *		↗ *	↔ **	↔ **	↗ **	↗ **	↔ **

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

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

Statement of Environmental Opportunity	Ecosystem Service: Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place/inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
SEO 3: Protect and significantly increase the extent and quality of the unimproved grasslands, heathlands, open waterbodies and streams, to enhance biodiversity, ecological networks, water availability and quality, climate regulation and sense of place.	↗ *	↗ **	↔ **	↗ *	↗ *	↗ *	↗ *	↗ *	↗ *	↗ *	↗ *	↗ *		↗ **	↔ **	↗ *	↗ **	↑ ***	↗ ***
SEO 4: Where appropriate, manage and expand the native woodlands throughout Charnwood to reinforce the wooded character, to increase the potential for biomass, access and recreation, and to regulate climate change and water quality.	↔ *	↑ ***	↔ **	↔ **	↑ ***	↗ *	↗ *	↔ **	↗ **	↗ **	↗ *	↗ *		↗ **	↔ *	↗ *	↗ **	↗ ***	↔ **

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

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

Landscape attribute	Justification for selection
Open, upland landscape with exposed summits and expansive views.	■ This quality is key to the public image of and sense of place in Charnwood. ■ High visitor numbers exert considerable pressure on the upland landscape. This needs to be managed to prevent deterioration of the character, quality and condition of the landscape. ■ The open views across the NCA are characteristic and need to be protected from encroaching scrub. ■ The upland areas of Charnwood provide valuable habitats, otherwise rare in the surrounding area.
Outcrops of ancient Precambrian rocks with thin, infertile soils on the high ground, and deeper, more fertile soils in the valley bottoms.	■ Charnwood has one of the best Precambrian fossil assemblages in the world. ■ The Precambrian rocks have been folded to form a series of outcrops, interrupted by faulting and partially obscured by later Mercia Mudstone strata and superficial deposits. They form one of Charnwood's most distinctive and important features. ■ The rocks should be protected from the pressure exerted by visitors, and managed to ensure that they are preserved and yet publicly accessible, for the contribution they make to educational resources, scientific research, and to creating a sense of place and history. ■ These rocky outcrops, which occur throughout the area but are most notable in the open, upland landscape, are iconic symbols of Charnwood. ■ The older rocks give rise to the thin, infertile and stony, acidic soils that support heathland and acid grassland, which in turn support a variety of rare species. ■ The fertile soils in the valleys provide productive farmland that is important for agriculture.
A well wooded character, with many areas of mixed, deciduous and coniferous woodland.	■ Following the First and Second World Wars, native broadleaf woodlands were cleared to make space for conifer plantations for timber, and Charnwood's ancient woodlands suffered. There is potential to restore native broadleaved woodland through new planting in the future. ■ Pockets of ancient woodland remain, such as at Buddon Wood and Swithland Wood, and these provide habitat for a range of species such as the spreading bellflower and species of deadwood beetle. The carpets of bluebells are particularly notable in the deciduous Charnwood woodlands.

Landscape attribute	Justification for selection
Rectilinear patterns of Parliamentary enclosure fields, bounded by a mixture of drystone walls and hedges.	■ The field pattern forms part of the landscape history of the area, with evidence of Parliamentary enclosure patterns and previous ridge-and-furrow farming practices. ■ Drystone walls are distinctive to Charnwood in the wider Leicestershire landscape, and form a key component of the character of this NCA. They are in a poor state of repair in some places, and are in need of improvement. ■ Older, smaller field patterns are found around the villages, and some contain fossilised ridge-and-furrow earthworks, which are an important historic feature. Hedgerows tend to be more mature in these areas, and should be protected as they support valuable habitats and species, and contribute to biodiversity networks.
The popular and well used country parks, with their important habitats and historic landscape features.	■ The country parks are characterised by large, ancient, pollarded oak trees, which offer insights into the landscape history of the area, and contribute to its biodiversity. ■ The variety of semi-natural habitats in Charnwood is derived from its acidic soils and geology, resulting in both heathland and acid grassland. ■ Heather is a particularly important habitat for several rare invertebrates, such as the Charnwood spider. Nationally important and rare birds such as the nightjar also rely on this habitat. ■ Bracken and scrub encroachment over the heathland is an issue, and a management priority for the future is to restrict this encroachment. ■ Bradgate Park contains the substantial ruins of a 15th-century brick mansion. Drystone walls surround the parks – evidence of the medieval hunting-estate heritage of the area.
Clear, fast-flowing watercourses and significant reservoirs.	■ Fast, clear, well-oxygenated streams support an abundance of wildlife, including rare species such as crayfish and brook lamprey. ■ The Charnwood caddis fly is found in both Burleigh Brook and Wood Brook, but nowhere else in the country. The kingfisher and grey wagtail are also a characteristic sight in these brooks. ■ Swithland, Blackbrook, Thornton and Cropston reservoirs are important water resources for the surrounding urban areas. ■ The reservoirs and other waterbodies support varied marginal aquatic plant communities, including the rich reed swamps found at Groby Pool. ■ The rock type makes the streams acidic, which is a perfect habitat for many types of algae that are highly sensitive to liming and agri-chemicals.

Landscape attribute	Justification for selection
Local granite, Swithland Slate roofs, thatched roofs and some timber-framed buildings characterise the distinctive Charnwood villages.	■ Swithland Slate, with its almost polychromatic colouring of blue-grey tinged with green, is completely different from the uniform greyness of imported Welsh slate, and is strongly characteristic of the area. ■ Most of the older dwellings are built of local dark stone, either Charnwood Stone or the pink/purple Mountsorrel Granodiorite. ■ Any new developments should respect the distinctive character of the villages, and be designed appropriately. ■ Where possible, new development should make use of local building materials and styles.
Despite its close proximity to numerous urbanising influences, Charnwood retains remote areas of high tranquillity and a rural character.	■ Proximity to large urban centres, a number of large quarries and some busy roads have an urbanising influence. Careful development management, screening these structures where possible, and the high woodland content all help to reduce the impact of these developments.

Landscape opportunities

- Conserve and manage the open, exposed character of the upland heathland and the iconic rocky outcrops, from scrub encroachment and visitor pressure, for the valuable contribution they make to Charnwood's sense of place.
- Protect internationally important fossil assemblages and improve opportunities for public enjoyment of the geodiversity interest, given the extensive natural and manmade exposures.
- Conserve the character of the distinctive inner Charnwood villages, with their local building materials and linear settlement pattern. Protect the character of the larger villages surrounding Charnwood, and ensure that new development and expansion are sensitively designed and located.
- Manage the encroachment of urbanising influences into areas with a high tranquillity rating, and where light pollution is presently limited.
- Plan to conserve the natural environment, while enhancing Charnwood as a recreational and educational resource. This is especially important in the country parks, where an open and 'untamed' character should be maintained, while also providing the necessary infrastructure to manage visitor pressure.
- Limit the visual impact of any new development. Additional tree and woodland planting around settlement fringes will help to integrate new development into the landscape, and will enhance existing well wooded village peripheries.
- Reduce the impact of quarrying in the area through well designed screening. Plan to maximise the geodiversity benefits of exposed rockfaces in mineral restoration plans by making provision for public access (where appropriate).
- Manage field boundaries, including replanting where necessary, to ensure that any contribution made to the landscape pattern or biodiversity networks is maximised. Maintain and improve the area's characteristic drystone walls and hedgerows – especially in areas away from the country parks, where their condition is sometimes poor.
- Retain the woodland pattern throughout the well wooded area, increasing woodland where appropriate (for example in The National Forest), and retaining the open character of the landscape in the country parks.
- Manage the reservoirs and fast, well-oxygenated streams for the riparian habitats they provide and the rare species they support, and for their contribution to character. Manage farming practices to ensure that there is no negative impact on the watercourses.
- Protect and manage the ageing specimen trees in Bradgate Country Park, and the large, ancient trees in the hedgerows. Replant to ensure continuity of this feature where possible.

Ecosystem service analysis

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

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

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Food provision	Arable fields. Dairy farms. Pasture. Soils.	Between 2000 and 2009 there was a small reduction in grazing livestock units. The numbers of dairy farms and cereal farms increased slightly. Cattle are the most numerous livestock within this landscape. The pasture farmland supports an important dairy and livestock industry. Some 75 per cent of the area is classified as Grade 3, with only 7 per cent classified as Grade 2 and another 7 per cent as Grade 4. Slightly acid, loamy and clayey soils with impeded drainage cover 35% of the NCA. Slowly permeable, seasonally wet, acid, loamy and **Continued on next page...**	Regional	The landscape is mainly pastoral and supports an important dairy industry. This industry, along with arable farming, provides multiple benefits in terms of maintaining the level of food production, preserving the historic landscape character and for biodiversity. The numbers of livestock could potentially put pressure on the watercourses and soil quality.	Working with land managers and farmers to support pastoral food production and the multiple benefits it brings for biodiversity, soil quality, carbon storage, water quality, water availability and landscape. Enhancing historic landscapes by working with land managers to alter cultivation practices to avoid damaging historic landscape patterns and buried archaeology, while maintaining levels of food production. Promoting the management of traditional field boundaries including drystone walls, Parliamentary enclosure patterns and species-rich hedgerows.	**Food provision** **Biodiversity** **Sense of place** **Sense of history** **Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Regulating water flow** **Climate regulation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Food provision		**... continued from previous page** clayey soils with impeded drainage cover 4% and freely draining, slightly acid, loamy soils cover 1%.			Working with livestock farmers to avoid or minimise impacts on watercourses.	
Timber provision	Conifer plantations. National Forest area. Woodlands. Soils.	Existing woodland cover represents 16% of the NCA. Area of conifer plantation: 302 ha (2%). Area of broadleaf woodland: 1,971 ha (11%). Some 58% of Charnwood is within The National Forest. Woodland planting is taking place within the NCA thanks to The National Forest.	Regional	Existing woodland cover within the NCA is high (16%), however the area of conifer plantation (primary timber source) is fairly low (2%). Much of the conifer woodland is on ancient sites, which means that this will only be a one-off resource. The area of broadleaf woodland is high (11%), so there is scope for lots of low-grade timber such as firewood. Thanks to initiatives like The National Forest, woodland cover (particularly broadleaved) is likely to increase. This will not only be beneficial for biodiversity, soil quality, soil erosion and water quality, but also for recreation and as a potential local source of wood fuel.	Extending and creating native woodlands throughout Charnwood through the use of planting, regeneration and the restoration of previous ancient woodland sites. This could take place in areas where it will not undermine other existing and future biodiversity resources, or compromise the distinctive land use mosaic that gives the area its unique character. Promoting sustainable woodland management practices, such as coppicing, pollarding, and rotational wood fuel production, to increase carbon storage and sequestration, and to improve the resilience of woodlands to climate change. **Continued on next page...**	**Timber provision** **Recreation** **Climate regulation** **Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Regulating water flow** **Biomass energy** **Sense of place**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Timber provision					**... continued from previous page** Supporting The National Forest incentives to increase appropriate woodland creation and restoration, and open up woodland access routes to the public. Extending woodland around settlements and infrastructure developments, to reduce light pollution, sound pollution and the visual impacts of further urbanisation. Using the by-products of timber as a local source of wood fuel. Sensitively designing woodland creation so as not to reduce the limited arable land, or obscure valued views and rock exposures.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability	Blackbrook, Swithland, Thornton and Cropston reservoirs. The reservoirs are supplied by the River Lin.	There are some issues with sedimentation. Cropston and Swithland reservoirs are fed by the River Lin. Abstraction can also take place from the Rothley Brook to supply Cropston Reservoir. Blackbrook Reservoir is fed by Black Brook.	Regional	At Cropston Reservoir the pressures affecting water quality are pesticides, such as metaldehyde (a molluscicide), and nutrients from agriculture and rural land management. Supply of water to Leicester and surrounding locations is required. This will only increase, as expansion is taking place in Leicester and the surrounding towns.	Protecting and managing the supply of water to the reservoirs that provide water for Leicester and surrounding areas. Managing present siltation problems, which are contributing to the reduced capacity of Cropston Reservoir. Continuing to manage Cropston Reservoir, aiming to protect and enhance catchments.	**Water availability** **Biodiversity** **Regulating water quality** **Climate regulation**
Genetic diversity	Rare breed cattle, sheep and pigs.	Traditional animal breeds (such as Hebridean sheep, English Longhorn cattle, and other cattle and pigs) are a feature of some farms.	Local	Maintaining rare breeds is important for food security and for maintaining genetic diversity. Hardy, adaptable rare breeds can also aid future land management through conservation grazing. This will help to maintain a sense of place and increase biodiversity.	Supporting both existing and new rare and ancient breed farms, for local food production and conservation grazing.	**Genetic diversity** **Food production** **Biodiversity** **Sense of place**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biomass energy	Soils. Woodlands.	The soils in the east lend themselves to high yields of miscanthus. The existing woodland cover is at 16%.	Local	High potential for the provision of biomass, both through bringing unmanaged woodland under management, and as a by-product of commercial timber production. Generally, the NCA has medium potential for short rotation coppice, but there are some areas of high potential around Coalville and in the area between Markfield and Swithland. Potential miscanthus yield is generally medium, although there is an area of high yield in the east of the NCA, to the south of Loughborough and north of Leicester. This needs to be done sensitively so as to maintain Charnwood's characteristic land-use mix,and not to reduce the already-limited arable land, or obscure valued views ,and rock exposures, or cause detriment to buried archaeology.	Where appropriate, working with The National Forest and others to develop the potential for coppice and/or pollard management to produce a supply of biomass material. Growing renewable energy crops adjacent to existing woodland, to reduce the visual impacts and concentrate sources of supply. Supporting The National Forest Company in promoting wood fuel as a source of renewable green energy.	**Biomass energy** **Climate regulation** **Regulating soil erosion** **Regulating soil quality** **Biodiversity** **Timber provision**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation	Existing woodlands. New woodland planting – The National Forest. Permanent pasture. Soils.	16% of the area is woodland and 11% of that is broadleaved. The mineral soils covering much of the NCA have low carbon levels (generally between 0% and 5%). Permanent pasture, found throughout much of the area, provides improved soil carbon storage capacity.	Local	While, at present, 16% of Charnwood is covered by mature woodland, a significant area of new woodland has been created as part of The National Forest. This will mature to make a large contribution to climate regulation, as it improves soil structure. Carbon sequestration and storage in mineral soils can be raised by improving soil structure, steadily increasing organic matter inputs, and by reducing the frequency/ area of cultivation. Soil carbon and soil carbon storage will be higher under areas of woodland, permanent pasture and heathland.	Increasing woodland and maintaining heathland in good condition to benefit carbon storage in soils. Increasing woodland planting to provide carbon sequestration. Increasing woodland management (such as coppicing and pollarding) to increase both sequestration and the resilience of woodlands to climate change. Ensuring that any new woodland planting is generally appropriate, making a contribution to increasing the overall woodland coverage in the region and integrating new development into the landscape, as well as boosting carbon storage. Encouraging the maintenance of permanent pasture to increase soil carbon storage, with a subsequent improvement in soil quality. Encouraging minimum tillage to limit the release of carbon.	**Climate regulation** **Biodiversity** **Sense of place**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality	Woodlands, hedgerows, buffer strips. Rivers, streams and reservoirs. Soils.	The current ecological potential of Cropston Reservoir is poor.	Regional	Water quality is particularly important in Cropston Reservoir, which provides water for the surrounding area. Buffering watercourses and reservoirs, slowing the pathway of run-off, could have significant impacts on regulating soil erosion and subsequent sedimentation, biodiversity and soil quality. At Cropston Reservoir the pressures affecting water quality are pesticides, such as metaldehyde (a molluscicide), and nutrients from agriculture and rural land management.	Woodland planting, increasing the amount of riparian vegetation and strengthening hedgerow networks (particularly cross-slope hedgerows), will all aid in the capture of chemicals and nutrients before they enter the groundwater. They will also filter or slow sediments and organic matter, preventing them from travelling into the watercourses feeding the main reservoirs. Managing agricultural land through extensive grazing (where possible) – particularly adjacent to watercourses. Reducing fertiliser inputs to improve the quality of the water flowing into the streams. Providing buffer strips of semi-natural vegetation around the reservoirs, and increasing the quantity of reedbeds to naturally filter the water. Targeting the use of agri-environment schemes to deliver water framework directive priorities.	**Regulating water quality** **Biodiversity** **Water availability** **Sense of place** **Recreation** **Climate regulation** **Regulating soil erosion** **Regulating soil quality** **Regulating water flow** **Biomass energy**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow	Reservoirs, rivers, streams and ponds. Woodlands and hedgerows. Permanent pasture. Soils.	The main catchment within the NCA is that of the River Trent. The Environment Agency flood risk map indicates that, for much of the NCA, flood risk is minimal. This is because of the elevation of the NCA and the general lack of major watercourses, although there is some localised risk of flooding associated with Cropston Reservoir.	Regional	The suggested approach to flood risk management includes investigating land use changes that will reduce run-off rates. This may also lessen soil erosion on cultivated land, and identify locations where flood attenuation ponds or wetland areas could be developed. There would be associated habitat improvement and potential sites for Biodiversity Action Plan (BAP) habitat creation. The acid, loamy and clayey soils with poor drainage also contribute to the increased run-off rates. The existing network of hedgerows, extensive areas of woodland and permanent pasture can also contribute to the reduction in water flow rates and increased water infiltration.	Conserving and extending riparian habitats such as bogs, marshes, reedbeds and wet alder woodland along the streams and surrounding the reservoirs. Increasing woodland creation and restoration, and strengthening hedgerow networks. Maintaining areas of permanent pasture. Reducing water infiltration, encouraging good soil management and reducing poaching and compaction.	**Regulating water flow** **Regulating soil quality** **Regulating soil erosion** **Regulating water quality** **Biodiversity** **Sense of place** **Climate regulation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil quality	Soils, woodlands, heathlands and hedgerows.	This area has five main soil types. Slightly acid, loamy and clayey soils with impeded drainage cover 35% of the NCA. Slowly permeable, seasonally wet, acid, loamy and clayey soils also cover 35%. Slowly permeable, seasonally wet, slightly acid but base-rich loamy and clayey soils cover 23%. Lime-rich, loamy and clayey soils with impeded drainage cover 4% and freely draining, slightly acid, loamy soils cover 1%.	Local	The slightly acid, loamy and clayey soils with impeded drainage (covering 35%) are easily poached by livestock and compacted by machinery when the soil is wet. Weak topsoil structures can easily be damaged. Careful timing of activities is required to reduce the likelihood of soil compaction. The slowly permeable, seasonally wet, acid, loamy and clayey soils (35%) and the slowly permeable, seasonally wet, slightly acid but base-rich loamy and clayey soils (23%) are at risk of diffuse pollution and flooding, as a result of poor water infiltration. Soils are easily damaged when wet, and therefore it is important to minimise compaction and/or capping risk, which will tend to exacerbate run-off problems. These soils may have limited potential for increasing organic matter levels through management interventions.	Increasing woodland/heathland cover, ensuring appropriate grazing levels to prevent erosion and compaction. Encouraging best farming practices – reducing stocking rate and machinery operations on more vulnerable soils during protracted wet periods, encouraging permanent leys to improve soil structure, minimising cultivation, and steadily increasing organic matter content.	**Regulating soil quality** **Regulating soil erosion** **Regulating water quality** **Biodiversity** **Water availability**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion	Woodlands. Hedgerows. Wet woodlands. Reedbeds. Pasture.	Some soil types found in the NCA are at risk of erosion, particularly the loamy soils with impeded drainage, and those on steeper slopes and adjacent to watercourses.	Local	Soils are easily compacted by machinery or livestock if accessed when wet, increasing the risks of soil erosion by surface water run-off, especially on steeper slopes. The potential for soil erosion is exacerbated where organic matter levels are low after repeated and frequent arable cultivation, or where soils are compacted. There is the potential for wind erosion on some coarse-textured cultivated variants.	Increasing woodland and shelterbelts, and restoring 'gappy' hedgerows and drystone walls that are in poor condition, to act as wind breaks and bind the soil. Managing and increasing riparian habitats (including reedbeds and wet woodland) to reduce soil erosion rates and to capture migrating soils before they enter the reservoirs and streams. Working with farmers and landowners to choose options within agri-environment schemes that will help to regulate soil erosion.	**Regulating soil erosion** **Biodiversity** **Water quality** **Water availability** **Regulating water flow** **Regulating soil quality** **Sense of place**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pollination	Lowland heath. Species-rich hedgerows. Arable margins.	There are 494 ha of lowland heath, producing both early (gorse) and late (heather) nectar sources. An extensive network of species-rich hedgerows is found throughout the area.	Local	The hedgerows and heathland provide good corridors and habitats for pollinators. Species-rich hedgerows, managed to maintain a diversity of structure and maturity, provide the best sources and networks for pollinating invertebrates to move through and between food crops. Over-management and uniformity of structure diminish the benefits provided. Heathland will support a diverse range of pollinating invertebrates and, where it is adjacent to certain food crops, can assist with pollination.	Managing the heathland in favourable condition to encourage the greatest diversity of plants that will attract pollinating invertebrates. Exploring the potential to re-create heathland (and other BAP habitats that are beneficial to pollinating invertebrates), by increasing its quality and extent, and by strengthening the interconnectivity of habitat networks. Creating a habitat mosaic of heathland, woodland, semi-natural grassland, and arable margins, to bring a structural diversity and a variety of flowering plants that can provide breeding sites and a food source for pollinators. Managing hedgerows to maintain a diverse range of flowering species, hedge age and structure. Strengthening the hedgerows and habitats to contribute to soil quality, reduce erosion and add to the storage of carbon.	**Pollination** **Biodiversity** **Sense of place** **Regulating soil erosion** **Regulating soil quality** **Climate regulation** **Food provision**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pest regulation	Semi-natural habitat. Heathland. Hedgerows. Grass margins. Woodlands.	The semi-natural and most long-standing habitats in the area support a variety of predatory species, such as beetles, which can contribute to the regulation of populations of pests. Ancient, semi-natural woodland, wood pasture and parkland containing ancient and veteran trees. Some 494 ha of lowland heath. Permanent pasture and semi-improved grassland.	Local	This NCA provides a wide range of habitats for species that contribute to the regulation of pests. Fragmentation and breaks in the network of habitats may limit the movement and effectiveness of predatory species.	Enhancing and expanding the network of semi-natural habitats that aid the movement of predatory species and bring benefits for pest regulation, as well as pollination and biodiversity.	**Pest regulation** **Pollination** **Biodiversity** **Regulating soil erosion** **Regulating soil quality** **Regulating water quality**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
A sense of place/ inspiration	Rocky outcrops and crags. Elevated position affording extensive views. The National Forest, woodlands, parks. Pastoral landscape. Stone buildings. Charnwood Forest Regional Park.	The elevated landform of Charnwood, with its exposed rocky outcrops and crags, hedged and walled pastoral fields, and dispersed settlement, provides a strong sense of place and identity that distinguishes it from the surrounding lower-lying plain and adjacent conurbations. The National Forest extends into Charnwood and aims to 'enhance the existing historic and upland landscape, mixing farm woodlands with woods planted for nature conservation'. The proposal is to use woodland to 'frame' the existing landscape of open country and towns and villages, which would strengthen the sense of place further. Pasture and grazing animals, mainly cattle, are the principal land use, with occasional arable interspersed with substantial areas of woodland to create a diverse, heterogeneous landscape. **Continued on next page...**	National	Management to maintain locally distinctive features and elements is also likely to increase the sense of history, with many of them having deep-rooted cultural associations. Conserving and enhancing the distinct landscape character is also likely to benefit biodiversity, by enhancing or expanding the range of habitats such as woodlands and heathlands. Reinforcing the sense of place has the potential to further increase the attractiveness of the area to visitors. Pressure on the distinctiveness of the area and its sense of place comes from expanding urban areas at the periphery, and from increased infrastructure development. The pastoral and upland qualities remain little changed.	Protecting the key landscape attributes that define landscape character, including the rocky outcrops, the ancient pollarded oaks, the areas of heathland, the linear villages, the local building materials and the spectacular views. Protecting and managing veteran trees to maintain this resource throughout Charnwood. Offering high-quality interpretation at key sites, and encouraging opportunities for education about the natural environment (landscape, biodiversity, wildlife, geology and heritage) by working with schools and capitalising on other educational opportunities. Supporting and implementing the vision and objectives of the Charnwood Forest Regional Park.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
A sense of place/ inspiration		**... continued from previous page** Linear settlement and older buildings of distinctive Mountsorrel Granodiorite stone.		The Charnwood Forest Regional Park aims to manage and promote the unique natural and cultural heritage features of Charnwood. The Regional Park will be recognised as an essential part of the growing communities in the Derby, Leicester and Nottingham areas, both now and in the future. It is working to manage and promote landscape and settlement character (including biodiversity, geodiversity, cultural and industrial heritage features, and sustainable leisure and tourism), and is striving to support agricultural diversification and woodland and rural economy uses that respect local character.		

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history	Rocks, fossils, earthworks, villages, tracks, heathlands, drystone walls, field patterns. Churches, historic buildings. Historic parks, manors, monastic houses, fossilised open field systems, quarrying. Industrial heritage.	Oldest rocks in England that contain fossils that are around 560 million years old. Two 'registered' parks and gardens (identified by English Heritage's Register of Historic Parks and Gardens of Special Historic Interest in England), covering 522 ha. Some 29 scheduled monuments and 350 listed buildings. Earthworks, and other boundary features signifying the former presence of medieval deer parks, are present in the landscape. Monastic houses, such as Ulverscroft Priory, are a feature in more remote areas. Ridge-and-furrow earthworks remain common, if fragmentary, in the small pastures surrounding villages.	National	Historically, Charnwood has contained several large, designed parklands. Some of these, such as Bradgate Park, survive today, containing heathland and large, ancient, pollarded oaks. Historic parkland is a key factor in the diversity of landscape character. Historic parkland grant schemes and agri-environment schemes now assist in the protection of this resource. This could, in turn, lead to increased recreational opportunities and more of a sense of place by reinforcing the historic character of the landscape.	Protecting and promoting features that contribute to the landscape history – from the drystone walls and field patterns, to the churches, mansions and historic buildings. Protecting the valuable fossil assemblages found in Charnwood. Agreeing management strategies to protect buried archaeology.	**Sense of history** **Sense of place** **Recreation** **Geodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Tranquillity	Woodlands. Undisturbed views. Upland qualities and elevated position.	Remnant pockets of undisturbed landscape and tranquillity can be found in the upland areas, around the reservoirs and in the well wooded areas. The M1 and urban expansion intrude into the area. Only 7% of the area remains undisturbed (Campaign to Protect Rural England (CPRE) noise and visual intrusion maps, 2007).	Local	Despite the appearance of an undisturbed upland character, the NCA has experienced a dramatic decline in tranquillity since the 1960s: undisturbed areas have decreased from 52% in the 1960s to just 7% in 2007, according to the CPRE map, reflecting the influence of the M1 corridor. Nevertheless, many parts of Charnwood have a feeling of remoteness, especially in the well wooded areas, around the reservoirs and in the upland landscape. Increasing tranquillity through expanding areas of woodland could increase biodiversity and natural beauty, and enhance the sense of place and the settings of the numerous heritage assets.	Increasing woodland to filter sound and light pollution from the busy roads, surrounding urban areas and commuter settlements. Protecting the elevated views and the open nature of the country parks, which provide a sense of connection with nature and a tranquil recreational resource. Enhancing the wooded peripheries of the settlements and increasing tree planting around new developments to filter light pollution and enhance 'undisturbed' views from the surrounding countryside.	**Sense of tranquillity** **Biodiversity** **Sense of place** **Recreation** **Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Regulating water flow** **Climate regulation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation	Country parks. Rights of way network. The National Forest. Old quarries. Reservoirs.	A number of popular country parks, including Bradgate Park, a 340-ha ancient deer park that is one of Leicestershire's largest and most popular recreational areas. The NCA offers a network of rights of way totalling 257 km, at a density of nearly 1.5 km per km2. A small proportion of open access land covering 88 ha, or 0.5% of the NCA. The National Forest and abandoned quarries are of both geological and nature conservation interest and some areas are used for rock climbing. Swithland, Cropston, Thornton and Blackbrook reservoirs provide water-based and other recreational opportunities, including birdwatching, walking and cycling.	Regional	It is likely that recreational opportunities could be increased without significant effects on other services. However, increased recreation could have minor negative effects on tranquillity and biodiversity. Some of these sites experience considerable visitor pressure already. The area around Anstey, Groby and Ratby is probably underused (except perhaps for Martinshaw Wood – a Woodland Trust site).	Protecting, promoting and managing Charnwood's many recreational opportunities. Increasing green infrastructure links to connect the large surrounding conurbations of Leicester, Loughborough and Coalville with Charnwood, via sustainable methods. This will benefit health, recreation and the landscape. Channelling visitors to the less well-used areas, to relieve the pressure on the 'honeypot' sites. Encouraging the use of the disused quarries for geological interpretation and recreational use (for example climbing). Managing and enhancing the reservoirs – not only to maintain water availability, but also to maintain and enhance recreational opportunities.	**Recreation** **Sense of place** **Biodiversity** **Regulating water quality** **Regulating soil erosion** **Climate regulation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity	BAP priority habitats.	There are over 1,614 ha of BAP priority habitats within the NCA, covering 9% of the area. These include: 629 ha of wet woodland, 494 ha of lowland heathland, and 164 ha of lowland mixed deciduous woodland. Some 1,417 ha are nationally designated as Sites of Special Scientific Interest (SSSI). The NCA is notable for upland and calcifuge species rarely found elsewhere in the Midlands. The country parks have a stock of hedgerows, and ancient and veteran trees.	National	The rolling hills, with extensive woodlands, heathlands and reservoirs, are outstanding for wildlife. Some species, such as the Charnwood spider, are nationally and even internationally important. By managing and extending the area of these habitats, there can be benefits for soil and water quality, climate regulation and recreation. In recent years, alien species such as rhododendron have begun to encroach on the area. In some areas, a lack of woodland management is leading to a decline in the characteristic mosaic of woodland, pasture and heathland. The loss of roadside oak trees and ancient trees in the country parks due to old age is adding to the erosion of character.	Maintaining in favourable condition the heathland, controlling the encroaching scrub through grazing and building infrastructure to provide for recreational demands. Managing to conserve the longevity of ancient trees, and replacing the stock of ageing ancient trees in the country parks and hedgerows. Supporting appropriate connection and expansion of areas of heath, woodland and permanent pasture – particularly adjacent to rivers and watercourses. This has benefits for biodiversity networks, as well as facilitating the build-up of soil carbon, improving soil quality and benefiting climate regulation. Advocating permanent landcover to reduce disturbance to soil biodiversity.	**Biodiversity** **Sense of place** **Regulating water quality** **Regulating soil erosion** **Recreation** **Climate regulation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Geodiversity	Rocks, fossils. Local building stones. Geological SSSI. Local Geological Sites. Local stone used in headstones. Industrial heritage.	The discovery, in 1957, of a Charnian fossil in the ancient volcaniclastic rocks was of international importance: it provided evidence that primitive life forms existed in the Precambrian period. More recent discoveries have established Charnwood Forest as having one of the best Precambrian fossil assemblages in the world. Five geological SSSI and 28 Local Geological Sites. Most of the older dwellings are built of local dark stone, either Charnwood Stone or the pink/ purple Mountsorrel Granodiorite. Swithland Slate (previously thought of as Precambrian) was dated as being from the younger Cambrian period thanks to the discovery of trace fossils in Swithland Slate headstones.	National International	Protecting and enhancing the geology will allow the interpretation and understanding of, and continued research into, the geodiversity of the NCA. Exposing these features (through the protection of existing sites and through creating appropriate new sites) also makes a positive contribution towards the sense of place and of history. Local building stone is still available, and is used for building, enhancing local distinctiveness.	Protecting internationally important fossil assemblages and realising opportunities for the public enjoyment of the geodiversity interest with the extensive natural and manmade exposures. Work in partnership to put in place a Local Geodiversity Action Plan and raise awareness of Charnwood's unique geology and access to it. Encourage the continued use of local stone in buildings to build on the sense of place and history.	**Geodiversity** **Sense of place** **Sense of history** **Recreation** **Water availability**

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Catalogue Code: NE391

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