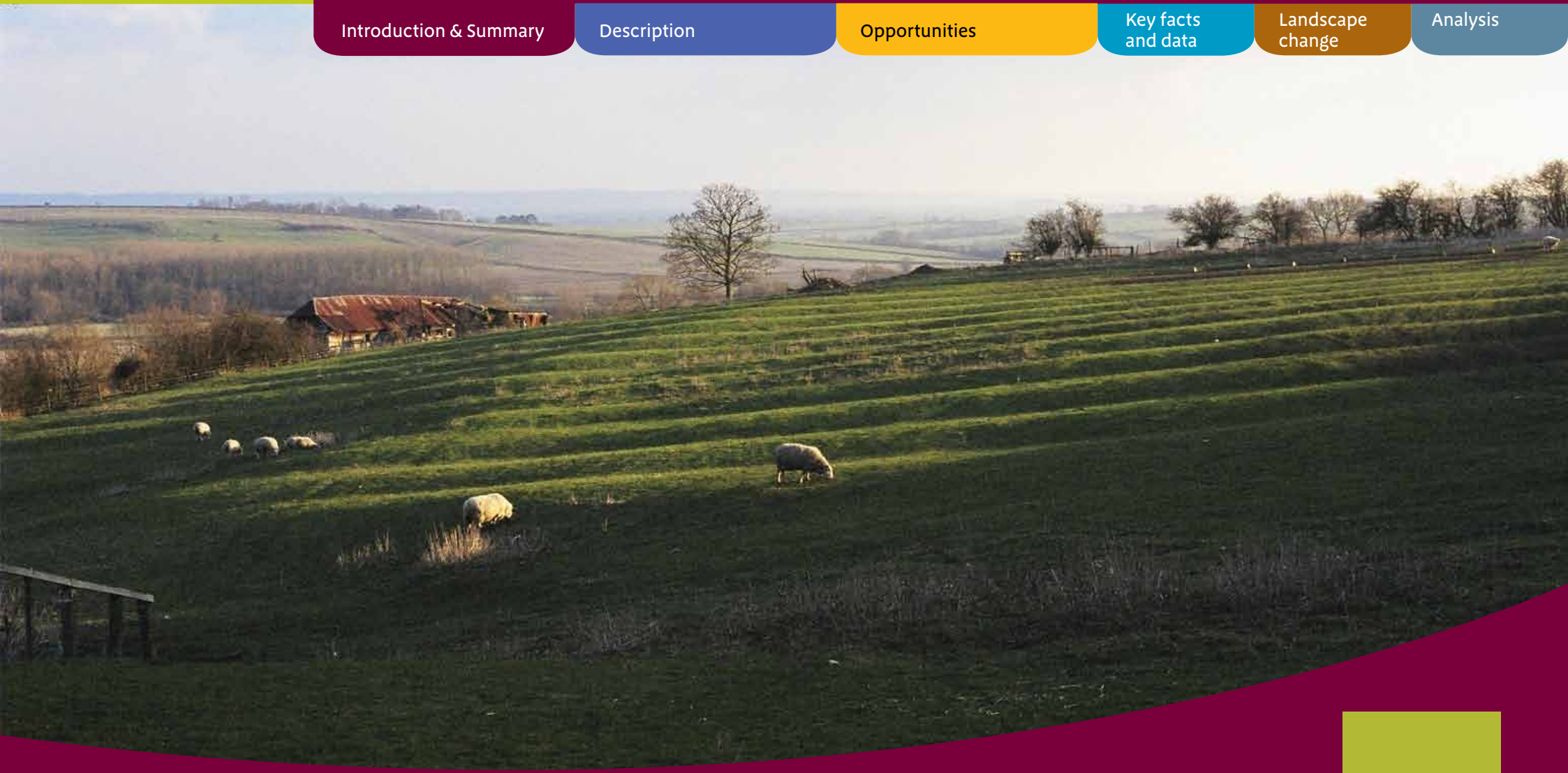
National Character Area profile:

109: Midvale Ridge

Supporting documents

Introduction & Summary | Description | Opportunities | Key facts and data | Landscape change | Analysis



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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.

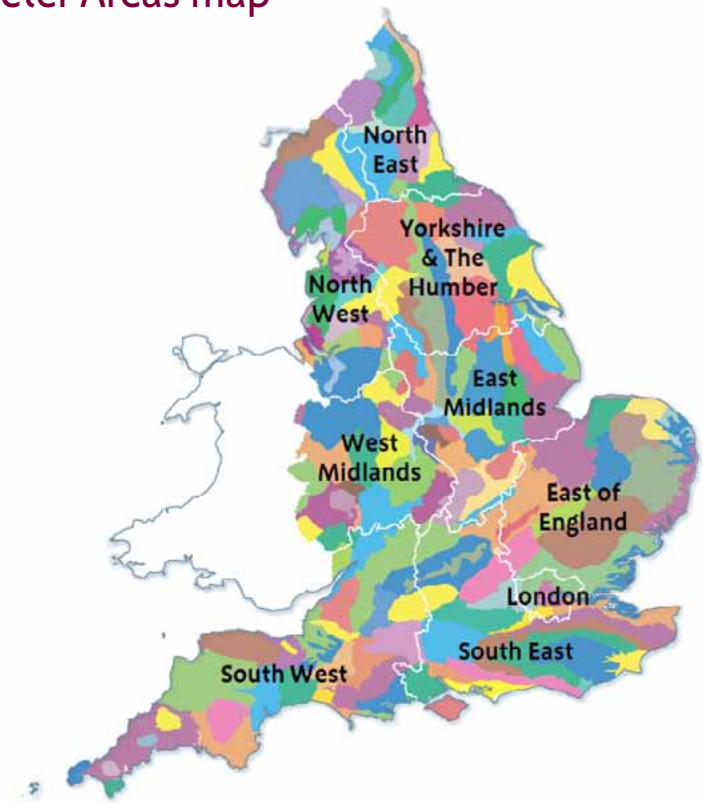
NCA profiles are guidance documents which can help communities to inform theirdecision-making about the places that they live in and care for. The informationthey contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and encourage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

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

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

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

National Character Areas map



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

Summary

The Midvale Ridge National Character Area (NCA) is a band of low-lying limestone hills stretching east–west from the Vale of Aylesbury in Buckinghamshire to Swindon. It is surrounded by the flat lands of the Oxfordshire clay vales, giving extensive views across the surrounding countryside. It is a predominantly agricultural area with a mixed arable/ pastoral farming landscape, cereals being the most important arable crop. The main towns are Swindon, at the western end, and Oxford, which lies across the centre of the area, but otherwise the settlement pattern is characterised by small nucleated villages along the top of the ridge and along the springline. The soils types are a mix of heavy rendzinas, stagnogleys and lighter sandy brown earths with small patches of sandy soils.

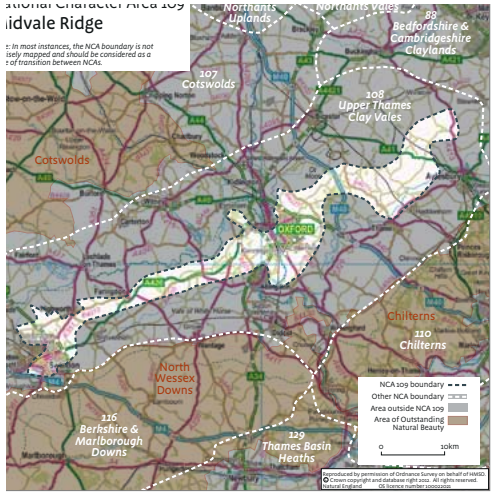
The area is significant for its geological sites and has been a focus for study since the 19th century. It has yielded fossils of international importance, including the holotypes for several ammonite species and several species of prehistoric sponges known only from the Faringdon area.

The unusual geology gives rise to habitats that are uncommon in the south of England, such as calcareous flushes and fens, calcareous heath and calcareous grassland. These in turn support a variety of rare plants and invertebrates. The narrowleaved marsh orchid, southern damselfly and many scarce wetland flies can be found in the wetlands while the heathland is home to several species of solitary bees. Although the NCA is small, it is also host to other key habitats such as lowland dry acid grassland and acid heath. One of the largest remaining populations of the snakeshead fritillary can be found in the area.

The NCA is notably more wooded in character than the surrounding Upper Thames Clay Vales NCA with about 9 per cent woodland coverage. To the north-east of Oxford lies Shabbington Wood, the largest remnant of the former Royal Forest of Bernwood, which supports an important population of the nationally rare black hairstreak butterfly. Today, about a third of the woodland in the NCA is designated as ancient woodland.

Evidence of previous land use is still clearly visible across the area from iron-age and Romano-British settlements and nationally important examples of ridge and furrow to the remains of quarries. The continued expansion of Swindon and Oxford will present challenges for preserving the landscape character and biodiversity of the ridge but also opportunities for improving the provision of green infrastructure and access. The NCA is dependent for potable water on neighbouring areas such as the Upper Thames Clay Vales NCA[4] and it is expected that, with increasing population, demand will become more acute. Changes in agriculture and continued mineral extraction are also likely to intensify pressure on the area's soil, water and biodiversity resources.

There are many opportunities for recreation within Oxford itself, the Thames Path National Trail passes through the NCA and two national cycle routes cross the ridge. Some 29 per cent of the NCA is designated as greenbelt around the edge of Oxford.



Click map to enlarge; click again to reduce.

[4] Water for Life and Livelihoods: River Basin Management Plan, Thames River Basin District, Environment Agency (December 2009)

Statements of Environmental Opportunities:

SEO 1: Maintain the historic environment and cultural character of the Midvale Ridge by ensuring that permitted development is well integrated to preserve local distinctiveness and sense of place and providing green space and recreational opportunities for the health and wellbeing of residents and visitors.

SEO 2: Manage, enhance and expand the valuable semi-natural habitats of the Midvale Ridge such as fens, grassland and calcareous heathland to benefit biodiversity, prevent soil erosion, improve water regulation and quality, support pollinators and protect and enhance wildlife corridors.

SEO 3: Manage and enhance the woodland cover and expand areas of native broadleaved woodland to benefit landscape character and biodiversity, for carbon sequestration, to prevent soil erosion, improve water quality, supply renewable fuel and to provide access and recreation opportunities.

SEO 4: Maintain and enhance the National Character Area's internationally important geological heritage for the educational benefits it provides, its contribution to a sense of place and history and to increase recreational opportunities.

Old clay pits at Brill Common.

Description

Physical and functional links to other National Character Areas

Midvale Ridge National Character Area (NCA) is completely enclosed by the surrounding Upper Thames Clay Vales NCA and offers wide views across the adjacent countryside from many points. In places it is possible to see the hills of the Chilterns NCA to the south-east, the Berkshire and Marlborough Downs NCA to the south-west and the Cotswolds NCA to the north-west.

At Oxford, the Thames cuts through the ridge to flow south from its source in Gloucestershire on towards Reading and London. The Thame, a tributary of the Thames, flows along the lower reaches of the ridge in the south-eastern half of the area and joins the Thames just south of Dorchester. Much of the ridge functions as a minor aquifer, eventually feeding into the rivers Thames, Thame and Ock, also a tributary of the Thames.[5]

To the east, several major transport links between London, Oxford and the Midlands, including the M40, A40 and the Chiltern Railways line, cross the area. Although part of the city of Oxford lies within the NCA, the historical centre is in the neighbouring Upper Thames Clay Vales NCA. Many of Oxford's most notable buildings, for instance the Radcliffe Camera, are built from stone quarried on the ridge. To the west, the Great Western Community Forest stretches from Royal Wootton Bassett in the Upper Thames Clay Vales NCA to Faringdon.

Brill Windmill, a popular visitor destination for both local residents and visitors alike.

[5] Groundwater Quality Review: The Corallian, Environment Agency (April 2004)

Key characteristics

- Low, irregular wooded limestone ridge giving way to a series of isolated steep-sided tabular hills in the east which rise from the surrounding clay vales.
- Contrast between the moderately elevated limestone hills and ridges and the surrounding low-lying clay vales.
- Drained mostly by small springs and streams which run into the Thames, Thame and Ock.
- Well wooded – a third of the woodland is designated ancient woodland.
- Mixed pastoral and arable landscape with large, geometric fields divided by hedges and regularly spaced hedgerow trees punctuated by blocks of woodland.
- Fragmented but rare and important semi-natural habitats, including acid grassland, calcareous fens and flushes, wet woodland and calcareous grass heaths particularly around Frilford and Cothill.
- Evidence of previous land use such as iron-age and Romano-British settlements and ridge and furrow through to old quarries still visible in the landscape.
- Locally quarried limestone commonly used as building material for local houses.
- Settlement pattern of nucleated villages on the hill tops and along the springline with low density of dispersed settlement.
- Recreational opportunities include the Thames Path National Trail.

Southern damselfly at Cothill Fen SSSI, one of the many rare invertebrates found there.

The Midvale Ridge today

The Midvale Ridge is a low-lying, irregular outcrop of limestone rising as a distinctive feature above the surrounding flat clay vales, running westwards from the Vale of Aylesbury to Swindon. Tabular hills at its eastern end give way to a thin ridge that in some places is low and narrow, but in others stands out as a striking feature. In all directions there are sweeping views across the adjacent countryside.

The Thames cuts a steep valley at Oxford to flow south across the ridge and the Thame flows along its south-east edge. Springs and streams rising on the ridge drain into the rivers Ock and Thame. The bedrock of the NCA is very porous and much of the ridge is a minor aquifer.

The area is mainly agricultural and the landscape is one of arable fields or pasture interspersed with woodland and many small settlements. Fields are generally large and rectilinear, mostly resulting from late 18th- and 19th-century enclosure and re-organisation as well as later agricultural changes, with boundaries of hedgerows and regularly spaced hedgerow trees. A mix of heavy rendzinas, stagnogleys and lighter sandy brown earths with small areas of sandy soils form the main soil types.

The ridge has good tree cover. On moister soils, particularly around Oxford, ash, oak, hazel and field maple are common. Elsewhere, on the drier soils across the ridge, the characteristic tree types are oak and birch with significant plantations of conifers. To the east of Oxford lies Shabbington Wood, the largest surviving remnants of the former Royal Forest of Bernwood, important for the rare black hairstreak butterfly. While significant parts were managed as conifer plantations, most are now being managed to gradually return them

13th-century Great Barn at Great Coxwell owned by the National Trust.

to predominantly broadleaved woodland. Around Swindon, several new plantations of woodland have been established as part of the Great Western Community Forest project, one of 12 Community Forest projects set up across the country with the aim of regenerating areas of land in the urban fringe for recreation, biodiversity, forestry and socio-economic benefits.

On the lower slopes, where the permeable limestone meets the impermeable clay of the surrounding clay vales, water percolating through the limestone emerges in a series of springs and flushes. These support several large fens which are home to a number of rare plant and invertebrate species such as the

narrowleaved marsh orchid and the southern damselfly – both nationally rare. The largest fen, Cothill Fen, has been designated a Special Area of Conservation (SAC) for its alkaline fen vegetation.

To the south-west of Oxford, around Frilford and Cothill, are areas of calcareous grassy heaths comprising one of the most characteristic and important semi-natural habitats of the Midvale Ridge. These were once more extensive but are now greatly diminished and fragmented in character but still provide a home for several rare species of solitary bees including the girdled mining bee and the six-banded nomad bee as well as uncommon plant species such as the grass of Parnassus. Although small, the NCA is host to other areas of uncommon habitat including dry acid grassland and the only area of heathland known in Oxfordshire.

Hill top villages are a distinctive feature of the ridge. They are often clustered round a village green and are linked by small sunken lanes enclosed by low hedges. To the east, houses are built of the local limestone or sometimes red brick and timber frame with thatch or tiled roofs. In contrast, to the west houses are typically of local limestone, either Cornbrash or Corallian, with stone slate roofs. Settlements have also grown up along springlines. Isolated farmsteads mostly result from late enclosure.

The past is reflected in the landscape with the remains of Roman settlements still visible and the nationally important examples of ridge and furrow ploughing at Ashendon, Dorton, Quainton and North Marston. Windmills are a characteristic feature of the area and can be found throughout the ridge top.

Notable buildings include the barn at Great Coxwell, built at the height of the arable expansion and population growth of the 13th century, and the 19th-century manor house at Waddesdon designed by the French architect Gabriel-Hippolyte Destailleur.

The Landscape through time

The Midvale Ridge was laid down mainly during the Upper Jurassic, about 157–146 million years ago, when sands and limestones were deposited in what was then an area of coral reefs in a shallow tropical sea. Fossils found locally are evidence for an abundance of marine life in the area at that time, including many species of ammonites and marine reptiles such as plesiosaurs and ichthyosaurs. Over time the softer clay of the surrounding Upper Thames Clay Vales NCA eroded more quickly than the limestone of the ridge, leaving it today as a prominent feature. Watercourses have since laid down layers of clays, silts, sands and gravels and small areas of peat developed around the fens.

Evidence for the first significant occupation of the area during the Bronze Age is seen, for instance, in possible bronze-age round barrows found across the area, including those at Buckland. Occupation continued into the Iron Age and the Romano-British period with settlements such as the Romano-British temple complex, villa and amphitheatre at Frilford,

Oxford first developed during the Anglo-Saxon period as a fording place. From the 6th to 9th centuries the area was disputed between the Anglo-Saxon kingdoms of Mercia and Wessex with the Thames eventually forming the boundary between the two. In the early 10th century, the town was fortified to resist the attacks of Danish invaders, becoming part of the burh system established to defend Wessex.[6] From the 13th century onwards, the university colleges were established and Oxford's international reputation as a place of learning grew.

[6] *A History of the County of Oxford: Volume 4 - The City of Oxford*, Alan Crossley and C.R. Elrington (eds), Victoria County History (1979)

Throughout the region in the Middle Ages the open field system of agriculture was widespread and ridge-and-furrow earthworks can still be seen, particularly in the eastern half of the region. Enclosures and reorganisation of farmland during the 18th and 19th centuries saw the introduction of large regular fields. The area is described in Domesday Book as being well forested but in a national context the extent of woodland cover was probably low at that time. Bernwood Forest, remnants of which are still extant in the eastern half of the NCA, was a popular hunting spot for Anglo-Saxon royalty and following the Norman Conquest attained the status of a Royal Forest. The area subject to forest law was reduced over time and Bernwood Forest finally lost its legal status in 1632. The removal of legal protection also saw the reduction in forest cover.[7] A number of windmills, such as that at Brill, provide distinctive landmarks throughout the area.

Industry has also played an important part in the area's history. The clay deposits at Brill provided the material for a pottery, brick-making and tile industry.[8] Corallian Limestone was quarried at Wheatley from the 12th century and at Headington from the 15th century. In the 16th and mid-17th centuries, Oxford was famous for its tanning and woollen industries. In 1624, an Act of Parliament allowed navigation to be improved on the Thames between Burcote and Oxford and by 1790 the Oxford Canal was opened, linking the city to the rest of the canal network. During the 19th century, Oxford developed as a centre for light engineering, particularly for agricultural tools. The first steam rollers and ploughs were invented by John Allen of Oxford. The association with engineering continued with the founding of Morris Motors at Cowley in the early 20th century. The motor industry continued to be an important employer.[9]

Prior to the 19th century, Swindon had been a small market town. It was boosted by the opening of the Wiltshire and Berkshire Canal in 1810 and the North Wiltshire Canal in 1819 but the arrival of the Great Western Railway in 1840 and the subsequent decision to site the company's works there provided a spur for rapid growth. Until the early 20th century, it remained the city's largest employer.[10]

Views across to the Chilterns AONB near Ashendon.

The M40 was constructed between 1967 and 1974, later being extended to link London and Birmingham.

[7] Buckinghamshire County Council website (URL: http://apps.buckscc.gov.uk/eforms/medieval_life/history1.htm)

[8] Brill: Historic Town Assessment Report, Consultation Draft, English Heritage (undated)

[9] *A History of the County of Oxford: Volume 4 - The City of Oxford*, Alan Crossley and C.R. Elrington (eds), Victoria County History (1979)

[10] *A History of the County of Wiltshire: Volume 9*, Elizabeth Crittall (ed.),Victoria County History (1970)

Ecosystem Services

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

Provisioning services (food, fibre and water supply)

- **Food provision:** The Midvale Ridge supports a mixed pastoral/arable (mostly cereals and oil seed rape) farming system. It has historically been considered a good grain-growing area and today cereals are still the main arable produce. Sheep are the most important livestock.

- **Water availability:** The main rivers are the Thames and the Thame, but for most of its potable water the NCA is dependent on supplies from neighbouring areas including the Upper Thames Clay Vales NCA, for instance from Farmoor Reservoir. Much of the ridge is underlain by a minor aquifer and groundwater is important for supplying the fens and flushes which are notable features of the area. The rivers and groundwater within the NCA are not deemed to be over-abstracted, although the Thames catchment area as a whole is in deficit due to the shortage of supply for London in dry years.

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

- **Regulating soil erosion:** More than a third of the NCA is covered by shallow, lighter and freely draining lime-rich and slightly acid soils which are at risk of both wind- and water-borne erosion, particularly where the ground is subject to continuous arable cultivation.

- **Regulating soil quality:** The heavier loamy and clayey soils which cover nearly half of the area are liable to compaction when wet. The far eastern end of the NCA, around Oving and North Marston, is in the Upper Ouse Catchment Sensitive Farming Programme area. This has the aim of improving the water quality of the Ouse (in the nearby Bedfordshire and Cambridgeshire Claylands NCA).

- **Regulating water quality:** Groundwater quality in the north-eastern half of the NCA meets the target for good chemical status under the Water Framework Directive, but in the south-western half it fails to meet this standard. The ecological status of the rivers in the NCA (which include part of the Thame, Thames and some tributaries) varies between poor and moderate as assessed under the Water Framework Directive. High phosphate levels are the main reason for this.[11] The entire NCA is within a nitrate vulnerable zone designated to protect groundwater and surface water for public water supply.[12]

Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration:** Although the NCA is surrounded by the Upper Thames Clay Vales NCA and has many links with it, it maintains its own character. Its elevation allows wide views across the flatter surrounding countryside to the hills of the Chilterns Area of Outstanding Natural Beauty (AONB) and the Cotswolds AONB beyond. The past use of the landscape, such as the quarries at Headington and the kilns at Brill, is also evident across the NCA. It has a characteristic vernacular architecture with some buildings constructed from locally quarried stone.

[11] *Water for Life and Livelihoods: River Basin Management Plan, Thames River Basin District*, Environment Agency (December 2009)
[12] *Groundwater Quality Review: The Corallian*, Environment Agency (April 2004)

- **Sense of history**: This is provided by the evidence for medieval and earlier settlement and land use from ridge and furrow to iron-age hill forts and the rich vernacular architecture.

- **Recreation:** There are some good recreational opportunities on offer within the NCA with a range of access routes enabling visitors to explore the countryside as well as allowing residents to enjoy green spaces near where they live. However, in some parts of the NCA, such as the city of Oxford, green space is limited. The Thames Path National Trail runs through the NCA near Oxford and is well connected with other local walking routes; open access woodland is available at Shabbington Woods further east along the ridge; and there are several small but interesting nature reserves with high geological and biological interest in the vicinity of Oxford. There are also two large country parks for people to enjoy: Shotover in Oxford and Stanton Park in Swindon

- **Biodiversity:** Although only 2 per cent of the NCA is designated as a Site of Special Scientific Interest for its biodiversity interest, the NCA hosts a number of rare and important habitats including calcareous fens, calcareous heath, calcareous grassland, ancient woodland and acid grassland. The snakeshead fritillary enjoys one of its last strongholds here as does the black hairstreak butterfly. A third of the area's woodland is designated as ancient and supports important populations of uncommon and rare butterflies. There is one European designated site, Cothill Fen SAC, part of which is also a National Nature Reserve.

- **Geodiversity:** The Midvale Ridge is extremely geologically important with 16 nationally designated sites and 14 Local Geological Sites. It has provided stratigraphic evidence for the geological history of the region showing that during the Jurassic it was covered by a shallow tropical sea. Noteworthy fossils of international importance, including the holotypes for several ammonite species and prehistoric sponges, have been found here. The local limestone has been used as a source of building material since the Middle Ages, providing the stone for some of the Oxford colleges.

Volunteers cleaning a rockface at Dry Sandford Pits SSSI.

Statements of Environmental Opportunity

SEO 1: Maintain the historic environment and cultural character of the Midvale Ridge by ensuring that permitted development is well integrated to preserve local distinctiveness and sense of place and providing green space and recreational opportunities for the health and wellbeing of residents and visitors.

For example by:

- Using an understanding of the area's traditional and historic architecture, and its distinct patterns of village-based settlement, to inform appropriate conservation and use of historic buildings, and to plan for and inspire any environmentally beneficial new development which makes a positive contribution to local character.
- Preserving the characteristic network of winding sunken lanes and significant historic hedgerows by working with landowners to sustainably manage these features for their contribution to landscape character and also as wildlife corridors.
- Encouraging the use of traditional building materials such as locally quarried limestone or brick and red tile or thatch on the eastern ridge, and local Cornbrash or Corallian Limestone with stone slate roofs in the west.
- Protecting historic earthworks and monuments, such as iron-age and Romano-British settlement sites and nationally important ridge and furrow, by encouraging reversion from arable to grassland where appropriate.
- Encouraging better management and raising awareness of the area's heritage assets.
- Encouraging the restoration and management of historical parklands for their biodiversity and cultural interest.
- Promoting the restoration and maintenance of historic buildings such as windmills.
- Ensuring that the extensive views across the surrounding countryside are maintained.
- Promoting the vision of the Great Western Community Forest plan to enhance recreational and biodiversity opportunities.
- Encouraging the use of the Accessible Natural Greenspace Standard and community engagement in the planning of new developments and green infrastructure strategies to ensure that people have places to enjoy nature and experience the health, wellbeing and educational benefits that green space brings.
- Promoting green space for landscape setting as well as other benefits such as water regulation and local provision of wood fuel.
- Promoting sustainable development principles for new development associated with transport corridors and other urban and industrial expansion which make provision for green infrastructure, address flood risk mitigation, avoid any damaging impact on biodiversity and are considerate towards the character of the Midvale Ridge.
- Ensuring that development is well designed to minimise visual intrusion and noise and light pollution upon the wider landscape.

SEO 2: Manage, enhance and expand the valuable semi-natural habitats of the Midvale Ridge such as fens, grassland and calcareous heathland to benefit biodiversity, prevent soil erosion, improve water regulation and quality, support pollinators and protect and enhance wildlife corridors.

For example by:

- Managing the semi-natural habitats of the Midvale Ridge to maintain and enhance their conservation interest so that species of national and regional significance are safeguarded and where possible increased.
- Seeking to reduce habitat fragmentation by linking, re-creating and extending semi-natural habitats wherever possible and working with local planning authorities to minimise further fragmentation.
- Promoting awareness of the importance of the habitats and rare species of the Midvale Ridge among landowners and the wider public and providing advice to landowners on appropriate management.
- Promoting research and interpretation of flushes and fens and the species that they support to identify the most appropriate management practices.
- Working with farmers and landowners to establish sustainable land management practices in the areas surrounding important semi-natural habitat such as fen to regulate water quality, prevent soil erosion and encourage pollinators, such as providing flower-rich wide buffer strips, beetle banks and infield grass areas.
- Advising the Environment Agency, local authorities and landowners to ensure that water abstraction has the minimum impact on designated wetland habitat, minimising its effect on biodiversity and water quality.
- Working with local authorities and extraction companies to ensure that mineral extraction is considered and managed sustainably to avoid detrimental impacts on semi-natural habitats, for example through interruption of groundwater flows. Where possible, encourage the linking and extension of semi-natural habitats through the restoration of exhausted minerals sites.

SEO 3: Manage and enhance the woodland cover and expand areas of native broadleaved woodland to benefit landscape character and biodiversity, for carbon sequestration, to prevent soil erosion, improve water quality, supply renewable fuel and to provide access and recreation opportunities.

For example by:

- Ensuring that all woodlands particularly those of high conservation value, including wet woodland and ancient woodland sites, are managed appropriately to maintain and enhance their wildlife value, for example by restoring rotational coppice management where suitable to provide a source of biomass fuel and good habitat for woodland butterflies.
- Promoting opportunities for biomass energy provision with local markets, particularly wood fuel, to support the local economy while improving biodiversity.
- Supporting the Forestry Commission and other land managers in developing a co-ordinated approach to deer management to enhance biodiversity, sense of place and tranquillity.
- Encouraging the planting of new native woodland where this fits in with local character and will extend or link existing woodlands to prevent fragmentation, provide ecological networks, aid the prevention of soil erosion by reducing overland flows and improve water quality (by absorbing nutrients and particulates).
- Promoting the gradual restoration of Plantations on Ancient Woodland Sites with indigenous species, where possible.
- Strengthening ecological networks by linking patches of woodland with hedgerows, where possible, especially where the woodland is on an ancient woodland site.
- Promoting the restoration and expansion of woodland within the Great Western Community Forest, managed through community involvement to contribute especially to the sustainable development of Swindon, providing a local recreational, educational, wildlife and biomass resource.
- Maximising the opportunities for people to increase their knowledge and understanding of local woodlands, to take part in their management and to enjoy visiting them for recreation and health purposes while at the same time safeguarding biodiversity.

SEO 4: Maintain and enhance the National Character Area's internationally important geological heritage for the educational benefits it provides, its contribution to a sense of place and history and to increase recreational opportunities.

For example by:

- Promoting awareness of the National Character Area's significant Cretaceous and Jurassic geological heritage among educational establishments and the wider public to link the local community to their geological heritage.
- Linking the rights of way network, particularly from Oxford, to geological sites to increase health and educational opportunities and to promote a sense of place and sense of history.
- Working with landowners to ensure that important geological sites are appropriately managed, for instance keeping the faces of important exposures clear of vegetation so that they can be easily studied.
- Working with landowners to encourage access for geologists to working quarries.
- Identifying opportunities to promote geological sites as visitor destinations.
- Seeking to ensure that access to important exposures for research is maintained once quarries are no longer in use.
- Planning for the restoration of quarries and mineral workings for educational use and biodiversity benefit once they are no longer in use.
- Working with quarry owners, operators and local geology groups to record features of interest during mineral extraction and quarrying.

The "dreaming spires" of Oxford from Boars Hill.

Supporting document 1: Key facts and data

1. Landscape and nature conservation designations

There are no Areas of Outstanding Natural Beauty (AONBs) or National Parks within the 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)	Cothill Fen SAC	43	<1
National	National Nature Reserve (NNR)	Cothill NNR	2	<1
National	Site of Special Scientific Interest (SSSI)	A total of 33 sites wholly or partly within the NCA	929	2

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.

Both the SAC and the NNR are within the SSSI area. The NNR lies within the SAC.

There are 74 local sites in the Midvale Ridge NCA covering 1,253 ha which is 3 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: 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

A breakdown of SSSI condition as of March 2011 is as follows:

SSSI condition category	Area (ha)	% of SSSI land in category condition
Unfavourable declining	660	71
Favourable	198	21
Unfavourable no change	7	1
Unfavourable recovering	63	7

Source: Natural England (March 2011)

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

2. Landform, geology and soils

2.1 Elevation

Elevation ranges from 50 m to 196 m, with a mean elevation across the NCA of 93 m. The escarpment reaches up to 130 m in the west. Hills in the east include Muswell Hill (196 m) and Brill (187 m).

Source: Natural England (2010)

2.2 Landform and process

The Midvale Ridge is a low, irregular outcrop forming an escarpment in the west and a series of isolated steep-sided tabular hills in the east, contrasting with the river flood plains and the surrounding low lying clay vales of the Upper Thames Clay Vales NCA. The scarp faces north with a dip slope falling, almost imperceptibly in places, to the south. The ridge is low and narrow in places, particularly between Cothill and Buckland, but otherwise stands out as a distinctive landscape feature. The River Thames has cut a steep valley through the ridge at Oxford, but otherwise the ridge is little dissected by rivers. Small valleys and basins lie between the hills in the east, with the Thame flood plain to the south. At the base of the escarpment and the eastern hills, springs, flushes and springline watercourses arise upon surrounding impervious bedrocks.

Source: Midvale Ridge Countryside Character Area Description, Midvale Ridge Natural Area Profile

2.3 Bedrock geology

The ridge comprises coarse and rubbly-textured Upper Jurassic Corallian limestones and sands, overlain in places by Kimmeridge Clay. These rocks form a distinct escarpment rising from the clay vales with a low and irregular north-facing scarp (100 m - 110 m AOD) and a very gentle dip slope that gradually falls, almost imperceptibly in places, to the Vale of the White Horse to the south. Lower Greensand caps many of the higher parts of the ridge such as Boars Hill near Oxford which stands proud of the Corallian Limestone at more than 150 m AOD. To the east, where the ridge becomes more broken, a discontinuous outcrop of Portland sand and limestone overlies the clay and is in turn capped locally by Purbeck limestones and younger sand beds. Along parts of its boundary as it merges into the clay vales the ridge is associated with impervious bands of Lower Greensand and Kimmeridge Clay. This change in geology gives rise to numerous springs, flushes and small streams. The ridge is low and narrow in places, particularly between Cothill and Buckland, but stands out as a distinctive landscape feature in other places. Particularly prominent are the hills to the west of Oxford where Wytham Woods occupy a ridge above the Thames and the series of hills around the Oxfordshire/ Buckinghamshire border at Brill, Quainton and Waddesdon.

Source: ??

2.4 Superficial deposits

Small extent of clays, silts, sands and gravels associated with watercourses. Cothill Fen is a unique resource in southern England with its remarkable depth of peat (over 4 m). Pollen record dates back to last ice age.

Source: Midvale Ridge Natural Area Profile

2.5 Designated geological sites

Designation	Number of Sites
Geological Site of Special Scientific Interest (SSSI)	13
Mixed Interest SSSIs	3

There are 14 Local Geological Sites within the NCA.

Source: Natural England (2011)

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

2.6 Soils and Agricultural Land Classification

In contrast to typical chalk or limestone, Corallian limestone is very sandy and free draining producing soils which are similar to East Anglia's Brecks. Soils in the area are prone to leaching and acidification. Soils are predominantly heavy rendzinas and sandy brown earths with areas of acidic soils.

Source: Midvale Ridge Countryside Character Area Description, Midvale Ridge Natural Area Profile

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

Agricultural Land Classification	Area (ha)	% of NCA
Grade 1	0	0
Grade 2	8,630	19
Grade 3	22,709	51
Grade 4	7,157	16
Grade 5	178	<1
Non-agricultural	1,413	3
Urban	4,413	10

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.

River Name	Length (km)
River Thame	13
River Thames and Isis	6
River Thames	5
River Ock	1

Source: Natural England (2010)

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

The River Thames and its tributaries drain the clay vales to the north of the Midvale Ridge before the Thames flows south through the ridge at Oxford to meet the Thame and Ock. The Thame and its tributaries drain the hills in the east, while watercourses flowing off the dip slope in the west enter the Ock. The eastern tip of the ridge falls into the Great River Ouse (East Anglian) catchment. The Oxford Canal connects Oxford to Coventry.

3.2 Water quality

The total area of Nitrate Vulnerable Zone (NVZ) is 44,501 ha or 100 per cent of the NCA.

Source: Natural England (2010)

3.3 Water Framework Directive

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

4. Trees and woodlands

4.1 Total Woodland Cover

The NCA contains 4,217 ha of woodland, 9 per cent of the total area, of which 1,406 ha is ancient woodland. The Great Western Community Forest, one of twelve Community Forests established to demonstrate the contribution of environmental improvement to economic and social regeneration, covers 8,725 ha of this NCA, which is 20 per cent of the area.

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

4.2 Distribution and size of woodland and trees in the landscape

Woodland cover tends to be most extensive along the Corallian Limestone ridge in Oxfordshire while in contrast the Portland Limestone hills of Buckinghamshire have few large woods. Here, isolated trees and small woodlands are more typical. There is extensive woodland cover, particularly in the west, including blocks of ancient woodland, mainly oak, ash and birch, and coniferous plantation, mainly larch, along the ridge. The NCA has significant blocks of coniferous woodlands on the plateau gravel soils. Characteristic tree types include oak, ash, birch and larch many of which occur within ancient semi-natural woodlands such as the oak-dominated Bagley Wood. Coppice with standards occurs to the west together with forest woodlands such as Shotover. Of greatest wildlife interest is wet woodland associated with the larger fens; a habitat which has undergone a massive decline in lowland England. These are generally dominated by alder, grey willow and birch. On drier, but still moist soils the characteristic woodland type is dominated by ash, oak, hazel and field maple. The woods of the dry, sandy soils are generally dominated by oak and birch. Some of these woods have developed relatively recently on former heaths as a result of abandonment of grazing. However, the woods on drier soils have often been modified to varying degrees by replanting or inter-planting with conifers. Many ash-maple woods and some of the alder woods were formerly coppiced but this practice has now all but ceased in the area.

Source: Midvale Ridge Countryside Character Area Description, Midvale Ridge Natural Character 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	3,092	7
Coniferous	617	1
Mixed	186	<1
Other	322	1

Source: Forestry Commission (2011)

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

Woodland type	Area (ha)	% of NCA
Ancient semi-natural woodland	757	2
Ancient re-planted woodland (PAWS)	650	1

Source: Natural England (2004)

5. Boundary features and patterns

5.1 Boundary features

Hedgerows are the most common, with limestone walls in some parts. Few boundaries are present in arable areas.

Source: Mid Vale Ridge Countryside Character Area description; Countryside Quality Counts (2003)

5.2 Field patterns

Fields are typically defined by a regular pattern of hedgerows and trees that enclose characteristically large and geometrically organised fields. The area has generally large geometric fields divided by regular pattern of hedgerows and hedgerow trees, although a local pattern of small fields surrounds hilltop villages.

Source: Midvale Ridge 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 predominant farm types are cereals, 28 per cent and grazing livestock, 23 per cent. The area contains a range of other farm types: 25 mixed (9 per cent); 8 dairy (3 per cent); 8 horticulture (3 per cent); 5 general cropping (2 per cent); 5 specialist pigs (2 per cent); 5 specialist poultry (2 per cent). All farm types apart from 'other' types decreased by numbers of holdings between 2000 and 2009. Grazing livestock (lowland) lost 20 holdings and dairy 13. Other types increased by 8 holdings.

Source: Agricultural Census, DEFRA (2010)

6.2 Farm size

The most common farm size in terms of number of holdings are those over 100ha with 86 units, covering an area of 22,847 ha followed by farms between 5 to 20 ha with 74 units and covering an area of 772 ha. Between 2000 and 2009 there was a fall in the number of holdings across all farm sizes apart from those between 5 and 20 ha which remained constant. The greatest reduction was amongst farms under 5 ha which lost 18 holdings followed by farms over 100 ha which lost 14 holdings.

Source: Agricultural Census, DEFRA (2010)

6.3 Farm ownership

In 2009 owned land made up 57 per cent of the total farm area, while the remainder is tenanted. There was a decrease in owned land by 9 per cent over the 2000 to 2009 period, while land held in tenancy decreased by 1 per cent.

2009: Total farm area = 28,599 ha; owned land = 16,424 ha
2000: Total farm area = 32,287 ha; owned land = 18,139 ha

Source: Agricultural Census, DEFRA (2010)

6.4 Land use

Grass and uncropped land provide the highest crop cover, 12,998 ha covering 45 per cent of the farmed area, followed by cereals, 9,202 ha covering 32 per cent of the farmed area. During the period 2000 to 2009 land use cover fell for most crop types, particularly for grass and uncropped land (down by 2,541 ha) and cereals (down by 1,882 ha). Only two crop types saw an increase; oilseeds and other arable crops which increased by 739 ha and 282 ha respectively.

Source: Agricultural Census, DEFRA (2010)

6.5 Livestock numbers

Sheep are the most numerous livestock (26,000), followed by cattle (17,000) and pigs (12,000). There has been a steep reduction in the numbers of all livestock between 2000 and 2009 especially in sheep (down by 18,000) and pigs (down by 15,000). Cattle numbers declined by 6,000 over the same period.

Source: Agricultural Census, Defra (2010)

6.6 Farm labour

Most farms are run by owner farmers. There were only 30 salaried managers employed in the NCA in 2009. Between 2000 and 2009, the number of owner-farmers fell by 58, full time workers by 78 and casual/gang workers by 26. The numbers of salaried managers rose by 3 and the numbers of part time workers rose by 23.

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

Habitat is scattered across the area except in the eastern hills and Swindon area which have almost no recognised areas of semi-natural habitat. Woodland is widespread while other habitats are limited in extent and largely associated with watercourses. Notably, there are several areas of fen located in the shallow valleys of minor watercourses on the gentle dip slope above Abingdon, for example Cothill Fen.

Soils are calcium rich but prone to leaching and acidification and so can support the contrasting plant communities of calcareous fen and grassland (lime-loving plants) and of heathland (lime-hating plants). The Greensand can also support heathland and acid grassland. This diversity is significant in the context of a small NCA. However, calcareous grasslands, grassy heaths and heathlands exist only as small fragments around Cothill, Wytham, Shotover and Hurst Hill.

Woodland is found on dry, moist and wet soils, with good examples being in the Cothill and Oxford areas. Woods associated with springs and flushes have enhanced species diversity, such as rare moss flora. Very rich ground floras are found in woodlands on moist soils including wood anemone and ramsons.

The concentration of fens is significant in southern England (around 60ha). Small fens and flushes are widespread, including in intensive farmland. There are several relatively large fens including the internationally important Cothill Fen. The fens are also a unique intermediary between the other main calcareous fenland areas in north Wales and East Anglia. Remarkably high numbers of rare plants and insects including numerous wetland flies, Desmoulin's whorl snail, narrow-leaved marsh orchid, fen pondweed, mosses and liverworts.

Numerous springs, flushes and small streams occur. Ponds are rare.

In addition the NCA contains important arable habitats. These support nationally important assemblages of arable birds. Arable weed communities are also favoured by the light soils and many rapidly declining plants are present.

Source: Midvale Ridge Natural Area Profile

7.2 UK Biodiversity Action Plan (BAP) priority habitats

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

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

UK BAP priority habitat	Area (ha)	% of NCA
Broadleaved mixed and yew woodland (broad habitat)	1,311	3
Coastal and flood plain grazing marsh	202	<1
Lowland meadows	61	<1
Lowland dry acid grassland	23	<1
Fens	23	<1
Lowland calcareous grassland	19	<1
Reedbeds	6	<1
Lowland heathland	1	<1

Source: Natural England (2011)

7.3 Key species and assemblages of species

- Maps showing locations of UK BAP Priority Habitats are available at: http://magic.defra.gov.uk/website/magic/ – select 'Habitat Inventories'
- Maps showing locations of S41 species are available at: http://data.nbn.org.uk/

8. Settlement and development patterns

8.1 Settlement pattern

The densely built-up City of Oxford sits on the Thames flood plain in a steep valley cutting through the centre of the Midvale Ridge. Swindon is a dominant urban feature at the western end. Numerous villages perch high up on spurs, hilltops and ridges connected by sunken lanes. They have distinctive village greens and churches that provide local landmarks. Windmills and parklands are also a feature. At the foot of the ridge in Oxfordshire, spring-line settlements associated with blocks of ancient woodland are found.

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

8.2 Main settlements

The main settlements are Swindon and Oxford. The total estimated population for this NCA (derived from ONS 2001 census data) is: 280,214.

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

8.3 Local vernacular and building materials

To the east, there are stone buildings, typically of local limestone with red tiles or thatch common as roofing materials. In the west, stone walls are derived either from the local rubbly Cornbrash or Corallian limestone, with roofs generally of stone slates. The stone buildings are often of a simple and straight forward design in comparison with their counterparts in the nearby Cotswolds.

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

9. Key historic sites and features

9.1 Origin of historic features

The Midvale Ridge exhibits very little archaeological evidence of the Palaeolithic or Mesolithic period. The first significant settlement of the area occurred during the Bronze Age with further occupation during the Iron Age in places such as at Faringdon Folly and Boars Hill.

From the 6th to the mid-9th centuries the area was fought over by the West Saxon/Wessex and Mercia kingdoms with the river Thames eventually forming the boundary between the two. During this period, Oxfordshire's oldest recorded community was built at St Frideswide in 735 and fortifications were built in Oxford to defend the kingdom against the invading Danes.

Reference is made in Domesday Book to the good cover of 'Forests' in the area, such as Bernwood Forest, although it is unclear as to what proportion was woodland. Remnant ancient woodland from the Forests of Shotover and Bernwood dominate the ridge to the east and west of Oxford. Corallian Limestone was quarried at Wheatley during the 12th century and also from 1400 onwards at Headington. Oxford was noted for its tanning and woollen industries from the 16th to the mid-17th century.

Historic evidence shows that field sizes on the hills in the east were generally small-scale with larger open fields to the west. By the early 19th century, much of the area was considered good quality corn land although perhaps slightly too sandy in places.

Although difficult, navigation of the Thames was enhanced in 1624 by an Act of Parliament that opened up the river from Burcote to Oxford. In 1790 the Oxford Canal was completed allowing the transport of coal and providing an important link to the wider canal network. The area is closely associated with light engineering in general and agricultural machines in particular. The first steam rollers and ploughs were invented locally by a John Allen of Oxford in 1868. Swindon is renowned as the centre of the railway industry, with the development of the town closely associated with the growth of the Great Western Railway.

Notable buildings include the Oxford Colleges, which grew from the 14th century onwards, and Waddesdon which is owned by the Rothschilds and designed by the French architect Destailleur.

The area is important for the survival of medieval ridge and furrow and the associated remains of deserted settlements. There are strong associations with the City of Oxford, notably the views to the 'dreaming spires' for example from Boars Hill. There are visual and historical associations with a number of designed parklands.

Visible archaeological features dating from early Roman settlement of the area are a prominent feature on areas of higher ground. Parkland is a common feature within Oxfordshire, while windmills are distinctive landmarks throughout the area.

Source: Draft Historic Profile, Midvale Ridge Countryside Character Area description

9.2 Designated historic assets

This NCA has the following historic designations:

- 11 Registered Parks and Gardens covering 1,445 ha
- 0 Registered Battlefields covering 0 ha
- 41 Scheduled Monuments
- 1,698 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

- Two per cent of the NCA, 962 ha, is classified as being publically accessible.
- There are 840 km of public rights of way at a density of 1.9 km per km2.
- There is 1 National Trail within the NCA, the Thames Path, running for 10 km within the NCA boundaries.

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)	2	<1
Common Land	28	<1
Country Parks	113	<1
CROW Access Land (Section 4 and 16)	318	1
CROW Section 15	10	<1
Village Greens	21	<1
Doorstep Greens	1	<1
Forestry Commission Walkers Welcome Grants	79	<1
Local Nature Reserves (LNR)	74	<1
Millennium Greens	9	<1
Accessible National Nature Reserves (NNR)	1	<1
Agri-environment Scheme Access	47	<1
Woods for People	777	2

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), much of the NCA experiences disturbance, especially around Oxford and Swindon and the main transport links; the A420 and M40. The most tranquil area can be found to the far east of the NCA in the Vale of Aylesbury.

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

Tranquillity	Tranquillity Score
Highest Value within NCA	38
Lowest Value within NCA	-99
Mean Value within NCA	-7

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 NCA suffers considerable intrusion. A breakdown of intrusion values for this NCA is detailed in the table below.

Intrusion category	1960s (%)	1990s (%)	2007 (%)	Percentage change (1960s-2007)
Disturbed	29	55	58	+29
Undisturbed	64	37	30	-34
Urban	7	8	12	+5

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are the considerable increase in areas subject to disturbance.

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

12 Data sources

- British Geological Survey (2006)
- Natural Area Profiles, Natural England (published by English Nature 1993-1998)
- Countryside Character Descriptions, Natural England (regional volumes published by Countryside Commission/Countryside Agency 1998/1999)
- Joint Character Area GIS boundaries, Natural England (data created 2001)
- National Parks and AONBs GIS boundaries, Natural England (2006)
- Heritage Coast Boundaries, Natural England (2006)
- Agricultural Census June Survey, Defra (2000,2009)
- National Inventory of Woodland & Trees, Forestry Commission (2003)
- Countryside Quality Counts Draft Historic Profiles, English Heritage (2004)*
- Ancient Woodland Inventory, Natural England (2003)
- 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)Detailed River Network, Environment Agency (2008)

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

Wytham Woods near Oxford, used for environmental research and adjacent land under environmental stewardship.

Supporting document 2: Landscape change

Recent changes and trends

Trees and woodlands

- Trees and woodland are an important element of the Midvale Ridge landscape. It is significantly more heavily wooded than the surrounding Upper Thames Clay Vales NCA and a high proportion is designated ancient woodland.

- Between 1999 and 2003, 141 ha of new woodland were planted. During the same period, the proportion of established eligible National Inventory of Woodland and Trees woodland stock covered by the Woodland Grant Scheme increased from 18 per cent to 27 per cent.

- Over the past 20 years, large blocks of woodland have been established as part of the Great Western Community Forest project which has a target to increase woodland coverage from its current 3 per cent to 30 per cent. About a third of the woodland cover is designated ancient woodland. The proportion of these sites covered by a Woodland Grant Scheme has increased since 1999 from 30 per cent to 43 per cent.

Grass of Parnassus at Frilford Heath.

Boundary features

- The expansion of arable farming in the area has led in places to a reduction or complete loss of hedgerows. The estimated boundary length for the NCA in 2003 was about 3,079 km of which about 4 per cent was under Countryside Stewardship Agreements.

- The position improved with 416 km of hedgerow in environmental stewardship boundary management in 2011. During the same period 18 km of woodland and 11 km of ditch were also in environmental stewardship boundary management schemes.

Agriculture

- The farmed landscape in the Midvale Ridge is a mixed one of pastoral and arable. According to Defra agricultural census data, between 2000 and 2009 the total farmed area declined by around 11 per cent. During the same period the area of grass and uncropped land saw a reduction of 2,541 ha and the area farmed for cereals a decrease of 1,882 ha but the area farmed for oilseeds saw an increase of about 739 ha.

Settlement and development

- There is considerable pressure for development around Swindon, which has led to extension of the city into the surrounding area. Elsewhere growth has not been so significant. Much of the area between Oxford and Abingdon is designated as greenbelt; 29 per cent of the NCA as a whole is designated greenbelt.

Semi-natural habitat

- Only around 2 per cent of the NCA is designated for its nature conservation interest, but this includes some very rare semi-natural habitat such as calcareous fens and calcareous heathland. 21 per cent of the NCA's SSSI are in favourable condition with 71 per cent in unfavourable recovering condition (Feb 2010).

- Up to 2003, Countryside Stewardship uptake for the area was consistently above the national average. The largest annual Countryside Stewardship agreements in 2003 were for lowland pastures on neutral/acid soils (803 ha) and regeneration of grassland/semi-natural vegetation (334 ha). Key species in the NCA include snakeshead fritillaries and the black hairstreak butterfly.

Walkers on the Thames Path National Trail at Sandford-on-Thames.

Historic features

- The area is important for ridge and furrow earthworks and the remains of deserted settlements. In 2003 Countryside Stewardship agreements for managing the historic landscape covered about 50 ha of the NCA. About 50 per cent of the remaining parkland is covered by a Historic Parkland Grant, and about 38 per cent is included within an agri-environmental scheme. Only around 57 per cent of historic farm buildings remain unconverted but nearly all, 94 per cent, are structurally intact.

Rivers

- The rivers and groundwater within the NCA are not deemed to be over-abstracted, although the Thames catchment area as a whole is in deficit due to the shortage of supply for London in dry years.

- Water quality in the Thames catchment has generally improved but the Water Framework Directive provides more exacting ecological and physico-chemical targets. Groundwater quality in the north-eastern half of the NCA meets the target for 'good' chemical status under the Water Framework Directive, but fails to meet this standard in the south-west.

- The ecological status of the rivers in the NCA including the Thame and the Thames varies between poor and moderate as assessed under the Water Framework Directive. The chemical quality of the Thames has improved and is now judged to be good.[13] The Thame is not assessed for its chemical quality within the NCA. The entire NCA is within a nitrate vulnerable zone designated to protect surface water for public use.[14]

Minerals

- There are deposits of soft sand within the NCA, some of which are currently being extracted for use in the construction industry for instance for mortar, the majority locally or within surrounding NCAs. In addition, there is crushed rock to the south-east of Faringdon also used for the construction industry.

Drivers of change

Climate change

- Climate change is expected to bring drier summers and wetter winters. The fenlands and other wetlands of the region would be extremely susceptible to drought or diminution of water quality from pollution run-off due to intense rainfall.

- The agricultural landscape may change as farmers adapt to changes in weather or water availability by producing new crops. A longer growing season may lead to winter cropping and a loss in winter stubble with a consequent loss of food sources for farmland birds.

- The semi-natural grassland and heathland of the NCA might be susceptible to increasing periods of drought with possible change in species composition as a consequence. In addition warmer winters might make acid grassland and heathland prone to invasion by bracken.

- The area's woodlands particularly those on drier soils may be at increasing risk of fire. Species change may occur as trees that are more tolerant of drought conditions outcompete those that are not.

[13] *Water for Life and Livelihoods: River Basin Management Plan, Thames River Basin District*, Environment Agency (December 2009)
[14] *Groundwater Quality Review: The Corallian*, Environment Agency (April 2004)

- In addition climate change may make trees more vulnerable to disease. Warmer winters may allow pathogens and their vectors to increase their range.

- Swindon and Oxford both contain significant numbers of properties at risk of flooding and have experienced a number of flood events in the last decade or so as a result of more frequent heavy rainfall events.

Other key drivers

- Development pressure around Swindon and Oxford is likely to continue to be high. The need for further expansion into the peri-urban area around Swindon has been accepted in Swindon's Local Plan. This will present a challenge to ensure that the current character of the area is not lost but also an opportunity to plan for augmented and improved green infrastructure and access opportunities.

- The NCA has several rare and uncommon habitats. Their highly fragmented state makes them more vulnerable to damage.

- Future mineral extraction may put pressure on the area's semi-natural habitats for instance affecting the hydrology of wetland sites.

- Greater demands on agriculture to produce higher yields could put pressure on the remaining areas of semi-natural grassland and other semi-natural habitats. It may also lead to deterioration in water quality, through the runoff of soil nutrients and increased use of herbicides and pesticides.

Traditional stone built cottages at Marsh Baldon, Oxfordshire.

Supporting document 3: Analysis supporting Statements of Environmental Opportunity

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

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

Radcliffe Camera, Oxford, built in part from stone quarried on the Midvale Ridge.

Statement of Environmental Opportunity	Ecosystem service: Food Provision	Timber Provision	Water Availability	Genetic Diversity	Biomass Energy	Climate Regulation	Regulating Water Quality	Regulating Water Flow	Regulating Soil Qulaity	Regultating Soil Erosion	Pollination	Pest Regulation	Regulating Coastal Erosion	Sense of Place / Inspiration	Sense of history	Tranquility	Recreation	Biodiversity	Geodiversity
SEO 1: Maintain the historic environment and cultural character of the Midvale Ridge by ensuring that permitted development is well integrated to preserve local distinctiveness and sense of place and providing green space and recreational opportunities for the health and wellbeing of residents and visitors.	↔ ***	↔ ***	○	n/a	○	○	○	○	↔ ***	○	○	○	n/a	↑ ***	↑ ***	↗ *	↗ ***	↔ **	↔ ***
SEO 2: Manage, enhance and expand the valuable semi-natural habitats of the Midvale Ridge such as fens, grassland and calcareous heathland to benefit biodiversity, prevent soil erosion, improve water regulation and quality, support pollinators and protect and enhance wildlife corridors.	○	↔ ***	↗ **	n/a	↔ ***	↗ ***	↗ ***	↗ ***	↔ ***	↗ ***	↗ ***	↗ ***	n/a	↗ ***	↔ ***	↗ *	○	↑ ***	↔ ***
SEO 3: Manage and enhance the woodland cover and expand areas of native broadleaved woodland to benefit landscape character and biodiversity, for carbon sequestration, to prevent soil erosion, improve water quality, supply renewable fuel and to provide access and recreation opportunities.	○	○	○	n/a	↗ ***	↗ ***	↗ ***	↗ ***	↔ **	↗ ***	↗ **	↗ **	n/a	↗ ***	↔ ***	↗ **	↗ **	↑ ***	↔ ***
SEO 4: Maintain and enhance the National Character Area's internationally important geological heritage for the educational benefits it provides, its contribution to a sense of place and history and to increase recreational opportunities.	↔ ***	↔ ***	↔ ***	n/a	↔ ***	↔ ***	↔ ***	↔ ***	↔ ***	↔ ***	↔ ***	↔ ***	n/a	↗ ***	↗ **	↔ ***	↗ ***	↔ ***	↑ ***

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

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

Landscape attributes

Landscape attribute	Justification for selection
Long thin ridge with great variation in geology and biodiversity and extensive views across the neighbouring clay vales.	■ Sweeping views across the surrounding flatter countryside.
Rich geodiversity, the result of deposition of limestone and sandstones particularly during the Upper Jurassic.	■ Nationally and internationally important sites for fossils, such as at Wicklesham and Coxwell Pits with some assemblages, such as the sponges at Great Coxwell known only from this area. ■ Provides stratigraphic evidence for the geological history of the region. ■ Local quarries provided some of the building stone for Oxford's historic city centre.
Ancient semi-natural woodland with patches of wet woodland.	■ 3 per cent of the area and 33 per cent of the total woodland resource is designated ancient woodland. ■ Woodland stock includes patches of wet woodland, a valuable wildlife habitat. ■ The former royal hunting forest of Bernwood is mentioned in Domesday Book.
Fragmented but important and unusual semi-natural habitats including acid grassland, calcareous grassland, calcareous heath and calcareous fens.	■ Possibly the most important region in southern England for calcareous fens with an associated assemblage of rare plants and insects.
Distinctive settlement pattern of hill top and springline villages.	■ Buildings are often made from locally quarried stone and are typically grouped around a village green.
Historical landscape.	■ Ridge and furrow particularly in the eastern half of the region. ■ Romano-British settlement remains. ■ Historic parklands. ■ Past industrial use of the landscape such as quarrying or brick kilns at Brill.

Landscape opportunities

- Maintain, restore and consolidate areas of semi-natural grasslands that have an Conserve and promote the area's geological heritage including designated sites and abandoned quarry sites where appropriate.

- Protect the historic environment of the area including the nationally important remnants of ridge and furrow, Romano-British remains, remnants of the local industry such as brick making at Brill, the historic parklands, historic buildings such as the windmills.

- Protect and appropriately manage calcareous grassland, calcareous heathland, ancient woodland sites (in particular wet woodland and moist ash woodland) and calcareous flushes and plan to link fragmented habitat wherever possible through new habitat creation.

- Manage large-scale development impacts (where possible obtaining improvements to biodiversity, access and greenspace) so that the structure of the area is maintained and the impacts of development on tranquillity and the landscape quality of the area are maintained.

- Conserve the character of the villages by using local materials in building or repairs and maintain the network of sunken lanes.

Ecosystem service analysis

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

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

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Food provision	Predominantly grade 3 soils Mixed pastoral and arable farming	Midvale Ridge supports a mixed pastoral/ arable (mostly cereals and oil seed rape) farmed landscape. East of Oxford, the soil types tend to be heavier and clayey while to the west soils are a mix of sandier and shallow brashy calcareous clays. According to the Defra, 45 per cent of the farmed area is uncropped grassland while 32 per cent is cereals and 11 per cent is oilseed rape. The predominant livestock is sheep.	Local	The mixed pastoral and arable landscape is important for food production and the farmed landscape is likely to continue to be influenced by changes in the market. Expected population change is likely to drive the pressure for increased yields and this will place further demands on ecosystem services such as regulation of soil erosion, soil quality and water quality. The lighter sandy soils provide ideal conditions for uncommon arable weed assemblages but changes in agricultural practice are putting pressure on these and other wildlife such as farmland birds.	Work with the local farming community through agri-environment schemes to promote best practice land management principles such as establishing wide buffer strips, in-field grassy areas and tall hedgerows to address issues of soil erosion, soil quality, water quality and water availability. Encourage sustainable farming methods to support and enhance biodiversity such as the reduction in herbicide/ pesticide use, uncultivated strips around arable field margins and the retention of winter stubble.	**Food provision** **Biodiversity** **Regulating soil quality** **Regulating soil erosion** **Regulating water quality** **Water availability** **Pollination**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Timber provision	Areas of existing woodland Soils	Woodland cover is approximately 9 per cent of the NCA. Some commercial timber production is undertaken by the Forestry Commission in Shabbington Woods.	Local	There is scope to increase timber production within the NCA. The areas of drier sandy soils are good for conifer plantations. However any expansion would need to be carefully considered against the potential impacts on food production, landscape and biodiversity.	Stimulate the local market for wood products and biomass from native trees to support sustainable timber production. Explore opportunities to bring unmanaged woodland into management promoting benefits for biodiversity and contribute to climate regulation.	**Timber provision** **Biodiversity** **Biomass energy** **Sense of place** **Recreation** **Climate regulation** **Regulating water flow** **Regulating soil quality** **Regulating soil erosion**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability	Aquifers Reservoirs Rivers Thames and Thame	Due to the porous nature of the limestone bedrock, much of the ridge acts as a minor aquifer. Groundwater is important for supplying the fens and flushes. The main rivers of the NCA are the Thames and the Thame but most of the potable water comes from neighbouring areas such as Farmoor Reservoir in the Upper Thames Clay Vales.[15]	Local	Groundwater availability is good across the region. The Thame has water available and locally the Thames is not over-abstracted but the Thames catchment area as a whole is considered to be over-abstracted because of the shortage of supply for London during dry years. There is little capacity to extend water availability within the NCA itself other than by using the current resource more carefully. The growth of Swindon and Oxford will place additional pressure on the local water resources both within and outside the NCA. Water demands for Swindon and Oxford are likely to increase and appropriate measures will need to address this. A change in rainfall patterns, due to climate change, is likely to impact on water resources. Some of the most important areas of conservation interest such as the calcareous fens and wet woodland within the NCA are hydrologically sensitive. **Continued over...**	Promote sustainable use of water resources amongst the local farming community, businesses such as golf courses and the wider public. Encourage water efficiency for new developments throughout the NCA but particularly within Oxford and Swindon. Advise the Environment Agency and the water industry to ensure that abstraction in particular of groundwater does not damage or cause loss of designated wetland habitats such as the fens at Cothill, Dry Sandford Pit and Frilford. Ensure that the renewal of licenses or proposed new boreholes will have minimal impact on semi-natural habitats. Encourage the extension and improved connectivity of semi-natural habitats to increase their resilience to water shortages.	**Water availability** **Food provision** **Biodiversity**

[15] *Water for Life and Livelihoods: River Basin Management Plan, Thames River Basin District*, Environment Agency (December 2009)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability continued				**...continued from previous.** As the fen dries out, more vigorous species such as nettles and willowherb invade, crowding out the fen vegetation, and allowing it eventually to revert to woodland. Protecting the water supply to fens such as that at Cothill is therefore extremely important. Encouraging the linking and enlargement of semi-natural habitats including wetlands will help to be more resilient to periods of reduced rainfall.		
Genetic diversity	Not applicable to this NCA					

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biomass energy	Existing woodland plantations	There is limited biomass provision in the NCA at present. The greatest potential lies with bringing existing woodlands back into management for example re-establishing a coppicing regime.	Local	There is scope to increase biomass production by bringing existing woodlands into appropriate management and as a by-product of timber production. Miscanthus/ short rotation coppice (SRC) plantations have the potential to aid climate regulation and help regulate soil erosion but they would need to be carefully sited to avoid landscape and biodiversity impacts. In addition a high number of miscanthus/ SRC plantations could impact on food provision. The potential miscanthus yield has been identified as high in the south west of the NCA south of Oxford and medium in the north east. The potential yield of SRC meanwhile, is high in the north east, but medium in the south west of the NCA.	Encourage the increase in provision of biomass crops especially where it would improve the management of woodland. Explore and promote opportunities for biomass energy provision with local markets. Ensure that where any biomass crops are established they will not adversely impact on landscape or biodiversity assets.	**Biomass energy** **Climate regulation** **Regulating soil erosion** **Regulating soil quality** **Regulating soil erosion** **Biodiversity** **Regulating water flow**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation	Woodland Semi-natural grassland Soils	The limestone bedrock acts as a store of carbon which was locked into the carbonate (limestone) rocks of the NCA on their formation. However the ability of Midvale Range to make a significant contribution to climate regulation now is reduced because of the continuous cultivation of parts of the NCA. Semi-natural habitats, in particular woodland and grassland, act as a carbon store although only to a limited extent because of their small and fragmented coverage.	Local	The ability to increase the carbon storage capacity of the NCA is limited due to the importance of arable farming. However the restoration of certain semi-natural habitats such as grassland and wetlands would improve their ability to sequester and store carbon.	Encourage the use of sustainable farming methods that help support the capacity of soils to retain their stored carbon, for example, a reduction in the frequency of ploughing and the addition of organic matter where appropriate. Encourage the extension of woodland cover and promote the management of existing woodland for biomass. Extend where possible and improve the condition of semi-natural habitats to increase their capacity to sequester carbon. Ensure that waste material from mineral extraction or quarrying is kept to a minimum.	**Climate regulation** **Biodiversity** **Regulating soil erosion** **Biomass energy**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality	Woodland Limestone bedrock Soils Semi-natural grassland Hedgerows Aquifer	Groundwater quality in the north-eastern half of the NCA meets the target for 'good' chemical status under the Water Framework Directive, but in the south-western half it fails to meet this standard. The ecological status of the rivers in the NCA (which include part of the Thame, Thames and some tributaries) varies between poor and moderate as assessed under the Water Framework Directive. The water quality in the Thames catchment has generally improved but the Water Framework Directive provides more exacting ecological and physico-chemical targets. High phosphate levels are the primary reason for not achieving 'good' ecological status in this area. Phosphate is likely to be derived from a range of sources, including discharges from sewage treatment works and runoff from agricultural land. The entire NCA is within a nitrate vulnerable zone designated to protect groundwater and surface water for public water supply. There is a catchment sensitive farming scheme in place at the very eastern edge of the NCA but this has been designated to protect the water quality of the River Ouse (outside the NCA).	Local	It is thought that groundwater quality in the NCA is in large part affected by the leaching of agricultural products into the aquifer. Some semi-natural habitats such as woodland and grassland have the potential to filter out pollutants and sediment. This ability could be greatly strengthened by linking or expanding existing fragments. Many wetland habitats are sensitive to poor water quality; fens require calcareous, clean water. The addition of nitrates and phosphates allows other more vigorous species to outcompete the fen vegetation. For instance reeds, which often have a small presence in fens, increase in abundance to shade out other fen vegetation with the addition of nutrients.	Work with farmers and land managers in partnership with water companies to reduce surface and groundwater pollution at a catchment scale by the more strategic use of fertilisers. Where possible expand grassland and woodland habitat that has the potential to filter sediments and pollution and provide benefits for biodiversity. Improve the soil structure through increasing organic matter, reducing compaction and promoting sustainable management to minimise the loss of sediments. Encourage the use of wider buffer strips and planting of tall hedgerows where these will afford protection to sensitive wetland habitats, to collect sediments and runoff and provide benefits for biodiversity. Encourage the reversion from arable to species-rich acid grassland where appropriate close to fens and other sensitive semi-natural habitats.	**Regulating water quality** **Biodiversity** **Regulating soil quality**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow	Woodland Hedgerows Soils Limestone bedrock	At Oxford (outside the NCA), the Thames is joined by the Cherwell and the gap through which the enlarged river then has to flow is very narrow.[16] There has also been considerable development across the city's floodplain. This puts Oxford at risk of flooding when water levels are raised. Swindon also experiences regular flooding events as a result of development. The expected changes in rainfall pattern due to climate change with more rainfall in winter and more intense rainfall in summer could exacerbate the problem.	Local	Solutions to the flooding problems experienced by Oxford will lie in sensitively improving water flow through the city to counteract the impact of barriers to flow and in upstream storage. Incorporating features into the design of the built environment for instance using porous surfaces for paving could also help mitigate the problem for both Oxford and Swindon. Semi-natural habitats within the NCA can also suffer the effects of flooding for example the erosion of stream beds from flash-flooding from surface water drainage has been a serious problem for Lye Valley SSSI, where the stream has eroded more than 1.5 m below its natural level, thereby lowering the water table in the associated fen.	Seek out opportunities for the extension and linking of the area's semi-natural habitats to assist in absorbing water flow and provide benefits for biodiversity. Encourage the restoration of hedgerows and establishment of wide buffer strips to protect vulnerable areas of semi-natural habitat. Promote green infrastructure within urban areas to help mitigate the impact of flooding. Encourage the use of sustainable urban drainage schemes (SUDS) such as permeable surfacing within urban areas to reduce run-off and increase water flow. Promote the capture of rainwater from urban and agriculture roofs both in new and existing buildings, for use as grey water in for example, toilets and irrigation.	**Regulating water flow** **Biodiversity** **Regulating soil erosion**

[16] *Consultation for the Oxford Flood Risk Management Strategy*, Environment Agency (Spring 2009)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil quality	Vegetation Semi-natural habitats Unimproved pasture Loamy, clayey soils	Nearly half (45 per cent) of the ridge is covered by heavier loamy and clayey soils which are liable to compaction when wet. This may reduce rates of water infiltration and be a source of diffuse pollution due to high rates of surface run-off. The extreme edge of the eastern end of the NCA, around Oving and North Marston, is in the Upper Ouse catchment sensitive farming scheme area whose aim is to improve the water quality of the River Ouse (outside the NCA).	Local	Improving soil structure with organic matter will help to minimise soil compaction. Sustainable land management practices will help to reduce the risk of adverse impacts on wetland habitats.	Promote management techniques that will prevent compaction and improve water infiltration such as the careful use of machinery and the avoidance of or careful management of grazing. Add organic matter where this is low to improve the soil structure for instance through the use of grass leys. Promote the minimal use of tillage operations where possible. Encourage the use of crops which break up the soil such as rape or beans.	**Regulating soil quality** **Regulating water quality** **Regulating water flow** **Food production**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion	Woodland Hedgerows Grassland Soils	Nearly 40 per cent of the NCA is covered by shallow, lighter and freely draining lime-rich and slightly acid soils which are at risk of wind as well as water-borne erosion. The problem is greatest on bare soil where organic matter levels are low after continuous arable cultivation.	Local	Preventing soil erosion would greatly benefit food production but would also help semi-natural wetland habitats such as the fens in the areas which are sensitive to sediment run-off.	Promote the use of agricultural practices that help prevent erosion such as improving the soil structure with organic matter, better management, of maize crops including earlier harvesting, undersowing with grass/legumes, and establishing cover crops over winter. Encourage the use of wide buffer strips, beetle banks and in-field grass areas across the farmed landscape especially for buffering wetland habitats such as fens which will also provide benefits for wildlife. Consider laying tall hedgerows in areas prone to erosion to restrict the transport of sediment by wind and water and reinstate hedgerows where appropriate in keeping with the character of the landscape. Encourage woodland planting where it will not impact on grassland or semi-natural habitats. Encourage adoption by farmers of the Environment Agency's "Think soils" manual.	**Regulating soil erosion** **Regulating soil provision** **Regulating water quality** **Food provision** **Biodiversity** **Climate regulation** **Geodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pollination	Heathland Calcareous heathland Grassland Gardens Field margins	The NCA has some fragments of heathland as well as calcareous and acid grassland which provide a nectar source for pollinators as do local gardens. In particular the heathland around Frilford and Shotover supports a number of solitary bee species.	Local	Maintaining a healthy population of pollinators is important for food provision as well as biodiversity. Oil seed rape, an important crop of the area, is insect pollinated. Encouraging the provision of flower-rich grasslands/ pasture, field margins and headlands through agri-environment schemes will be of great benefit to many pollinating insects including bumblebees. Around Oxford, the sandy soils in the remaining areas of acid grassland and calcareous heath at Frilford and Shotover provide an important habitat for solitary bees. Enlarging, linking and improving the habitat will help them maintain and increase their range. Elsewhere measures within the farmed environment such as the planting of hedgerows and wide field margins will most help pollinators.	Improve the condition of calcareous heathland and acid grassland habitats especially those at Frilford and Shotover and where possible seek to expand them. Encourage the minimum use of herbicides and pesticides to minimise impacts on pollinators. Work with the farming community to encourage pollinators for instance by the planting of hedgerows, use of field margins and in-field grassy areas particularly where oilseed rape and other insect pollinated plants are significant.	**Pollination** **Biodiversity** **Food production**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pest regulation	Existing Semi-natural habitat Agricultural field margins Woodland	The woodlands at Bagley and Shabbington as well as the field margins of the NCA provide good habitat for species that aid pest regulation.	Local	The existing areas of semi natural habitats within the NCA are very fragmented. Extending and linking them.	Improve the condition of semi-natural habitats and where possible seek to expand them to provide a range of niches to support pest regulating species. Encourage the use of field margins, beetle banks and headlands in arable land, to encourage pest regulating species.	**Pest regulation** **Biodiversity** **Food production**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of place/ inspiration	Geodiversity Active and disused quarries Early settlements Vernacular building materials and styles Biodiversity Views Windmills Woodland Thames Path National Trail	The NCA is surrounded by the Upper Thames Clay Vales NCA but maintains its own character. Its elevation over the surrounding countryside allows for wide-ranging views across to the neighbouring Cotswolds, Chilterns and North Wessex Downs AONB. Windmills perched on top of the ridge are a notable feature. The vernacular architecture, particularly in the western half of the NCA, uses limestone quarried locally. There is evidence across the area of past landscape use such as the kilns at Brill, old quarries and early settlements such as the Roman villa at Boars Hill.	Regional	Promoting and maintaining the character of the ridge will help integrate new development into the existing landscape and foster community cohesion.	Promote the restoration of historic buildings such as windmills, to maintain tradition character within the area. Maintain where possible the current settlement pattern of nucleated villages along the hilltop or springline. Encourage, where possible, the use of local building materials both in new buildings as well as in renovation and conversion projects. Promote the use of the Thames Path National Trail and encourage walking in the area's woodland locations. Maintain the views across the surrounding countryside particularly of the historic centre of Oxford and protected landscapes such as the Chilterns and the Cotswolds by for example seeking the undergrounding of electricity cables to enable removal of the pylons that run from Didcot power station to Oxford.	**Sense of place/ inspiration** **Sense of history** **Recreation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history	Romano-British settlements Ridge and furrow Surviving remnants of local industry such as Brill kilns, quarries, Windmills Great Western Railway Forest of Bernwood	The NCA has 41 scheduled monuments including nationally important examples of ridge and furrow and the remains of iron-age and Romano-British settlements.	National	Some of the area's most important historical heritage such as the ridge and furrow plough marks is highly fragile and needs careful management to ensure it is protected and maintained. Ridge and furrow is now so rare across Europe that it has been argued any remaining examples can be considered to be of international importance.[17]	Protect and promote sensitive management of archaeological features. Where appropriate encourage reversion from arable to grass pasture to maintain heritage assets. Encourage the restoration and sustainable management of historic parklands. Promote the restoration and good management of historic buildings, including distinctive windmills. Individual sites currently at risk may benefit by being incorporated into new development as areas of greenspace or to add heritage value. Encourage greater awareness of the area's heritage by improving access to heritage assets and promoting appreciation of their local distinctiveness.	**Sense of history** **Sense of place / inspiration** **Recreation**

[17] *Turning the Plough: Loss of a Landscape Legacy*, English Heritage (2005)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Tranquillity	Woodland	The NCA has experienced a significant decline in tranquillity since the 1960s according to CPRE data. During the 1960s, 64 per cent of the landscape was considered to be undisturbed. By 2007 that had decreased to 30 per cent.	Local	The growth in road traffic and the expansion of Swindon, Oxford and Abingdon (outside the NCA) since the 1960s have contributed to the increase in the visual and auditory intrusion experienced in the region. The most tranquil areas can be found in east of the NCA and in the region's woodlands and semi-natural habitats.	Work with local planning authorities to ensure that development is appropriately designed to minimise the impacts of noise and light pollution as well as other auditory and visual intrusions on the area. Encourage the use of shelter belt planting to mitigate the intrusive effects of road noise.	**Tranquillity** **Sense of place / inspiration** **Recreation** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation	Woodland Thames Path National Trail	The NCA has a total of 840 km of rights of way a density of 1.89 km per km2. This includes 10 km of the Thames Path National Trail.	Regional	There are some good recreational opportunities on offer here, with a range of access routes enabling visitors to explore the countryside as well as enjoy green spaces near to where they live, however the availability of these local spaces is very limited in some parts of the NCA, particularly the southern parts of Oxford City, around Blackbird Leys for example. The Thames Path National Trail runs through the NCA near to Oxford, which is well connected with other local walking routes. Bridleways, however, are infrequent and often poorly connected. Outside the major settlements, cycle routes are limited within the NCA itself, but there are two national cycle routes crossing the ridge, linking with local routes around Oxford City. Historic, open access woodland is available at Bernwood further east along the ridge, and there are several small but interesting nature reserves often with high geological and biological interest in the vicinity of Oxford. There are also two large country parks for people to enjoy, Shotover in Oxford, and Stanton Park in Swindon.	Maintain and improve the opportunities for access throughout the area through a network of green spaces and linear rights of way network including the Thames Path National Trail while ensuring that sites of biodiversity value are not damaged by increased access. Promote improved access for nearby urban centres particularly Oxford, to the sites of interest such as accessible woodlands and geological sites where appropriate. Promote the use of non-motorised means of transport such as cycling routes to provide benefits such as improvements to health and tranquillity.	**Recreation** **Sense of place / inspiration** **Tranquillity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity	Calcareous grass heath Calcareous grassland Calcareous fens and flushes Wet woodland Semi-natural ancient woodland Acid grassland	2 per cent of the NCA is designated as SSSI for its biodiversity interest. There is one European site, Cothill Fen SAC, designated for its alkaline fen vegetation, part of which is also a National Nature Reserve. There are 74 local sites representing nearly 3 per cent of the NCA. Other priority habitats include lowland woodland (lowland mixed deciduous woodland, lowland beech and yew woodland, wet woodland), fens, reedbeds, coastal and floodplain grazing marsh, lowland heathland, lowland meadows and lowland calcareous grassland.	National	As a result of its unusual geology, the Midvale Ridge is host to several rare habitats such as calcareous fens, wet woodland and calcareous heath. Many of these are very fragmented. The fen habitats, mainly situated around Cothill and Frilford, are considered to be unique to the area. They are home to several rare species of wetland flies, including a soldier fly, Stratiomys chamaeleon, only found at Cothill Fen. Many species of dragonfly, some uncommon or rare, such as the southern damselfly have been recorded at Cothill fen. The fen vegetation at Cothill shows succession from open water, through to fen, scrub and carr. Fens are extremely sensitive to changes in water availability and water pollution, needing calcareous, clean water. Recent abandonment of traditional grazing practices has allowed tall fen vegetation and scrub to encroach on the more biodiverse short, open fen habitat. The acid grassland and calcareous heath found at Frilford, Cothill and Shotover are a significant habitat for insects particularly solitary bees, wasps and ants. The Midvale Ridge is the only place in Oxfordshire where heathland occurs. Heathland develops where soils are nutrient poor and drought prone and as a result can be affected by the addition of nutrients or watering. **Continued over...**	Promote awareness of and provide advice to landowners on managing habitats of biodiversity interest. Ensure that semi-natural habitats are managed in a way which will maintain and enhance their wildlife interest. Increase the connectivity of fragmented semi-natural habitats and where possible seek to link and extend them to strengthen their resilience. Encourage traditional grazing management of fens to encourage the short open fen habitat. In the absence of grazing, consider mechanical removal of scrub. Ensure that water abstraction and poor water quality does not threaten important wetland habitat. Ensure that current and planned mineral extraction does not have a detrimental impact on semi-natural habitat particularly fens. **Continued over...**	**Biodiversity** **Climate regulation** **Regulating water quality** **Regulating soil quality** **Sense of place/ inspiration**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity continued				**...continued from previous.** A high percentage of the woodland cover is designated ancient woodland. Shabbington Woods provide a habitat for an important colony of the rare black hairstreak butterfly. The brown hairstreak butterfly, a priority species, is also found across the NCA Wet woodland in the NCA is particularly notable for its mosses. Hedgerows can serve as links between patches of woodland providing a valuable ecological network. Over-browsing by deer is having a damaging impact on the woodland understory and the associated biodiversity such as woodland birds. In light of the expected wetter winters and more intense rainfall due to climate change, woodland may have a key role in helping manage the severity of the run-off from heavy rainfall. An important colony of snakeshead fritillary survives in one of the few flood meadows to be found in the NCA. Key to maintaining the rare invertebrate and plant species on all semi-natural habitats within the Midvale Ridge is the linking and better management and where possible expansion of the habitat.	**...continued from previous.** Restore coppice management to woodland where appropriate. Encourage the restoration of ancient woodland sites where possible by planting with trees indigenous to the NCA. Promote awareness amongst landowners of the location of particularly important uncommon arable weed communities and their management requirements. Encourage the restoration of hedgerows where these will link patches of woodland. Develop a co-ordinated approach to deer management with the Forestry Commission and other landowners to enhance biodiversity, sense of place and tranquillity.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Geodiversity	Quarries Designated sites Limestone buildings	The geological importance of the Midvale Ridge is underlined by 16 nationally designated sites and 14 Local Geological sites. Most deposits date from the Upper Jurassic but there are also sites dating from the Lower Cretaceous at Wicklesham and Coxwell.	National	The Midvale Ridge is a highly significant area for geology and has been the subject of study since 19th century. It has provided important examples of prehistoric marine fauna particularly ammonites but also marine reptiles. At Hurst Hill the skeleton of Camptosaurus prestwichii was recovered, one of only two Upper Jurassic ornithopod skeletons known from Europe. This is thought to show the existence of a link across the proto-Atlantic in the late Jurassic period to what is now North Africa. The Lower Cretaceous sponge beds at Wicklesham and Coxwell Pits contain examples of fossil sponges, bryozoa, brachiopods and echinoids many of which are only known from these sites. The area has also provided information key to explaining the geological and biological history of the region, showing that during the Jurassic, part of the area was under a shallow tropical sea. Peat deposits at Cothill Fen SSSI hold a record of the vegetation of the last ten thousand millennia. In addition the Midvale Ridge has long been used to provide building material for local houses as well as many of the grander Oxford buildings including the colleges. **Continued over...**	Promote awareness of the area's geodiversity heritage. Develop access links where appropriate and integrate sites where possible into the local green infrastructure network. Explore the possibility of promoting sites where suitable as visitor destinations for instance by connecting them to long distance paths. Ensure that designated sites are maintained in good condition to protect and maintain their distinctiveness. Encourage quarry operators to allow access to geologists at working quarries. Seek to maintain access to quarry sites with important exposures at the end of their working life. Promote the use of local limestone in local buildings.	**Geodiversity** **Sense of place/ inspiration** **Sense of history** **Recreation**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Geodiversity continued				**...continued from previous.** Many of the quarries are no longer in use but the area is still an important provider of aggregates such as soft sand and gravel for the construction industry. Access to some exposures is being lost as quarries at end of their working life are being developed particularly for housing, golf courses and landfill sites.		

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