National Character Area profile:

108. Upper Thames Clay Vales

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Introduction

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

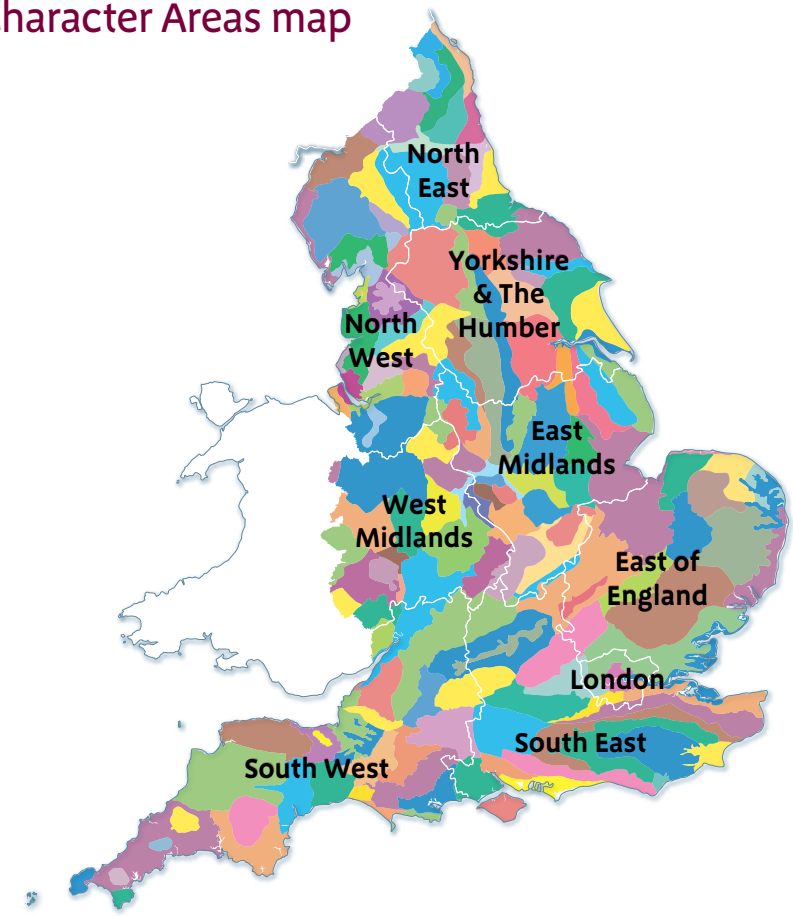
NCA profiles are guidance documents which can help communities to inform their decision-making about the places that they live in and care for. The information they contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and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

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

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

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

National Character Areas map



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

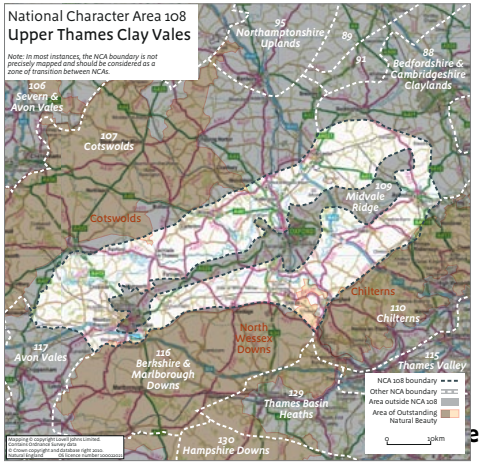
Summary

The Upper Thames Clay Vales National Character Area (NCA) is a broad belt of open, gently undulating lowland farmland on predominantly Jurassic and Cretaceous clays. Blenheim Palace World Heritage Site falls within the NCA, along with around 5,000 ha of the North Wessex Downs Area of Outstanding Natural Beauty (AONB) and smaller areas of the Chilterns AONB and the Cotswolds AONB. Two of its Special Areas of Conservation (SAC) are designated for their lowland meadow vegetation communities, while Little Wittenham SAC has one of the most studied great crested newt populations in the UK. There are contrasting landscapes, including enclosed pastures of the claylands with wet valleys, mixed farming, hedges, hedge trees and field trees and more settled, open, arable lands. Mature field oaks give a parkland feel in many places.

The area encircles the Midvale Ridge NCA and covers an extensive area of low-lying land extending from Wiltshire and Gloucestershire to the west of Swindon through to Aylesbury in Buckinghamshire in the east. It comprises two separate sub-character areas: the Wiltshire, Oxfordshire and Buckinghamshire Vales to the north; and the Vales of White Horse and Aylesbury to the south. The area is dominated by watercourses, including the Thames and its tributaries, and there are also lakes associated with mineral extraction areas, such as the Cotswold Water Park. Watercourses and lakes provide important areas for wildlife and recreation. There are a number of major transport routes and patches of intensive industrial influence, including Didcot Power Station. There is little woodland cover (around 3 per cent) but hedgerows and mature field and hedgerow trees are a feature, and many watercourses are fringed with willow or poplar.

The area's internationally important lowland meadows require enhanced management alongside improved care of adjacent land, and its wetland habitats require appropriate hydrological regimes to be secured and an ecological network that is resilient to climate change. Wet grassland and wetland habitats also offer opportunities to manage floodwaters and improve water quality.

Potential growth of urban areas, particularly around Oxford and Swindon, may provide opportunities for creation of significant areas of accessible natural greenspace as part of comprehensive green infrastructure planning.



Click map to enlarge; click again to reduce

Statements of Environmental Opportunities:

- **SEO 1:** Along the Thames and its tributaries, promote sustainable farming and best practice mineral working in order to conserve and restore semi-natural habitats, historic features, geodiversity, soil quality and soil carbon stores and also to regulate water flow in this area and downstream. Ensure conservation of Oxford Meadows Special Area of Conservation and North Meadow and Clattinger Farm Special Area of Conservation. Engage the public in river heritage and maintain traditional land management practices where appropriate.

- **SEO 2:** Manage farmland across the Upper Thames Clay Vales to produce food sustainably and to maintain sense of place. Taking a catchment approach, improve filtration of pollutants and regulation of water flow by realising a farmland habitat mosaic that incorporates strategic areas of wet grassland, reedbed, wet woodland and ponds as well as ditches and hedgerows.

- **SEO 3:** Ensure that heritage assets, especially characteristic features such as ridge and furrow, abandoned medieval villages, Roman roads, canals and historic parkland, including Blenheim Palace World Heritage Site, are maintained in good condition. Integrate conservation of these features with sustainable food production and provide public access to key examples. Seek opportunities to restore the wider historic setting of a feature, particularly in relation to the historic Royal Hunting Forests of Bernwood, Braydon and Wychwood.

- **SEO 4:** Realise sustainable development that contributes positively to sense of place and built heritage. Ensure adequate greenspace in association with all development and most importantly in growing settlements such as Aylesbury and Swindon. Create and manage greenspace to provide benefits for biodiversity, floodwater management, filtration of pollutants, tranquillity and recreation, and secure strategic access routes between town and country.

Rural and urban areas are at high risk of flooding. There are opportunities to slow and store water run-off across the NCA.

Description

Physical and functional links to other National Character Areas

The Upper Thames Clay Vales National Character Area (NCA) covers an extensive area of low-lying land extending from west of Swindon through to Aylesbury in the east, and completely encircles the Midvale Ridge NCA.

Around 3 per cent falls within North Wessex Downs Area of Outstanding Natural Beauty (AONB), with smaller areas falling within the Chilterns and Cotswolds AONBs. To the north, Wiltshire, Oxfordshire and Buckinghamshire Vales adjoin Cotswolds NCA, while the Vales of White Horse and Aylesbury border the Berkshire and Marlborough Downs and Chilterns NCAs to the south. Avon Vales is to the west; Bedfordshire and Cambridgeshire Claylands lies to the north-east.

The Oolitic Limestone of the Cotswolds is a significant aquifer and gives rise to the rivers that cross into the NCA, including the Windrush, the Churn, the Coln and the Thames itself. Farmoor Reservoir relies on the Cotswolds for 60 per cent of its water. Principal aquifers associated with chalk bedrock in the Chilterns and Berkshire Downs also extend a little into this NCA. Main surface water abstractions are for the public water supply. To the east, the majority serves London, while Farmoor Reservoir provides for Oxford, Banbury and Swindon in neighbouring NCAs. The catchments of the rivers Ock and Thame in the south and the tributaries in the north (including the Evenlode, Windrush, Leach, Cherwell and Colne) all drain south-west into the Thames.

The Chalk scarp of the Chilterns and the Berkshire and Marlborough Downs forms a backdrop for many views from the Vales to the south.

The area is crossed by many transport corridors, including the M40, M4, A419 (M4–M5 link), Oxford and Grand Union canals and railway lines linking to the Midlands, and to the north and west of England. Cycle routes such as National Cycle Route 45 and The Ridgeway and Thames Path National Trails also pass through the area.

Distinct areas

- Wiltshire, Oxfordshire and Buckinghamshire Vales to the north and west of the Midvale Ridge
- Vales of White Horse and Aylesbury to the south of the Midvale Ridge

People enjoy the views of the Vales from the high ground of adjacent NCAs, including the escarpment of the North Wessex Downs Area of Outstanding Natural Beauty.

Key characteristics

- Low-lying clay-based flood plains encircle the Midvale Ridge. Superficial deposits, including alluvium and gravel terraces, spread over 40 per cent of the area, creating gently undulating topography. The Upper Jurassic and Cretaceous clays and the wet valley bottoms give rise to enclosed pasture, contrasting with the more settled, open, arable lands of the gravel.
- The large river system of the River Thames drains the Vales, their headwaters flowing off the Cotswolds to the north or emitting from the springline along the Chilterns and Downs escarpments. Where mineral extraction takes place, pits naturally fill with water, and limestone gravels from the Cotswolds give rise to marl formation. There are a high number of nationally important geological sites.
- Woodland cover is low at only about 3 per cent, but hedges, hedgerow trees and field trees are frequent. Watercourses are often marked by lines of willows and, particularly in the Aylesbury Vale and Cotswold Water Park, native black poplar.
- Wet ground conditions and heavy clay soils discourage cultivation in many places, giving rise to livestock farming. Fields are regular and hedged, except near the Cotswolds, where there can be stone walls. The Vale of White Horse is made distinct by large arable fields, and there are relict orchards on the Greensand.
- In the river corridors, grazed pasture dominates, with limited areas of historic wetland habitats including wet woodland, fen, reedbed and flood meadow. There are two areas of flood meadow designated for their importance at a European level as Special Areas of Conservation (SAC). There are also rich and extensive ditch systems.
- Gravel extraction has left a legacy of geological exposures, numerous waterbodies and, at the Cotswold Water Park, a nationally important complex of marl lakes.
- Wetland habitat attracts regionally important numbers of birds including snipe, redshank, curlew and lapwing and wintering wildfowl such as pochard. Snake's head fritillary thrives in the internationally important meadows. The area also supports typical farmland wildlife such as brown hare, bats, barn owl, tree sparrow and skylark.
- Blenheim Palace World Heritage Site, including its Capability Brown landscape, is the finest of many examples of historic parkland in this NCA. There are many heritage features, including nationally important survivals of ridge and furrow, Roman roads, deserted medieval villages and historic bridges.
- Brick and tile from local clays, timber and thatch are traditional building materials across the area, combined with limestone near the Cotswolds and occasional clunch and wichert near the Chilterns.
- Settlement is sparse on flood plains, apart from at river crossings, where there can be large towns, such as Abingdon. Aylesbury and Bicester are major urban centres, and the outer suburbs of Oxford and Swindon spread into this NCA. Market towns and villages are strung along the springlines of the Chilterns and Downs. Major routes include mainline rail, canals, a network of roads including the M40 and M4 and The Ridgeway and Thames Path National Trails.

Upper Thames Clay Vales today

The area is situated between the Chalk and limestone plateaux of the Cotswolds to the north and the Marlborough Downs, Berkshire Downs and Chilterns to the south and east. In the centre is the Midvale Ridge NCA, a low ridge of sandy Corallian Limestone. Either side of this ridge are river valley landscapes of flood plains, which form this NCA. Due to its size, and the different character of the Vales, this NCA has two distinct areas: Wiltshire, Oxfordshire and Buckinghamshire Vales to the north and west of the Midvale Ridge; and the Vales of the White Horse and Aylesbury to the south. The unifying feature is the Thames (or Isis) and its flood plains and tributaries.

The Wiltshire, Oxfordshire and Buckinghamshire Vales form part of a belt of clay lowland linking Cambridgeshire Claylands to the Avon Vales. This area consists of open, gently undulating lowland farmland bounded by the limestone scenery of the Cotswolds to the north and the narrow limestone outcrop of the Midvale Ridge to the south. It is underlain by an expanse of heavy blue-grey Oxford Clay and Kimmeridge Clay. In many places, the clay is covered locally by gravel deposits marked by extensive workings and flooded pits. The rivers Coln, Ray and Cherwell flow through the area, and the associated open flood plain landscapes consist of a regular and well-ordered field pattern, with willow pollards and reedbeds along the watercourses. Cotswold Water Park, a wetland area that includes the country's largest marl lake system, was created over the last 50 years by mineral extraction and lies to the west near Cricklade. Farmoor Reservoir lies to the west of Oxford, supplying much of the water for the surrounding areas.

The Vale of White Horse is a belt of heavy blue-grey Lower Cretaceous Gault Clay with exposures of underlying Jurassic Kimmeridge Clay, drained by the rivers Ock and Thame. South of Swindon, the Vale slopes down from the Berkshire and Marlborough Downs forming a clay plain, occasionally broken by minor hills of Greensand or Portland Limestone. Notable outliers of Chalk rise as hills near Dorchester and Cholsey. The area supports mainly arable farming with some pasture, producing a field pattern of large, regular fields with few hedgerows or trees. Villages such as Baulking and Goosey built around distinctive greens are located along the Ock Valley. Fruit orchards around Harwell thrive on light, fertile, sandy soils developed over the Greensand bench at the foot of the Chalk escarpment.

Otmoor is a large area of reedbed supporting a diversity of birds and other wildlife. Open water and semi-natural wetland habitats are characteristic of this area.

The Upper Thames drains the Vale to the west before cutting south at the confluence with the lower reaches of the Cherwell through the Midvale Ridge at Oxford. Wide expanses of terraced river gravels of limestone and wide alluvial flats dominate the Oxfordshire Vale. At the confluence of the Thames with the Windrush, Evenlode and Cherwell, distinctive hillocks form low, isolated features where patches of more ancient pebbly drift rest on the underlying Oxford Clay. Soils are generally yellowish brownearth, gleyed in lower-lying areas. West of Oxford, soils are dominantly calcareous with good drainage. The River Ray joins the Cherwell at Islip and drains the wide basin of Otmoor, where the soils are covered by a layer of peaty alluvium formed before the land was drained. The gently rising land along the northern rim to the east forms a watershed between the Ray and the Ouse.

The Vale of White Horse passes eastwards into the Aylesbury Vale. Here, the valley is dissected by alluvial flats and low river gravel terraces around the confluence of the Ock and the Thame. Farther east into the narrower Aylesbury Vale, sandy brownearths, developed from the ledge of Greensand below the Chalk scarp of the Chilterns, provide some of the most productive soils in the area. Aylesbury Vale is drained by the River Thame and numerous independent streams that flow south-west into the Thames. Where drainage is impeded, underlying waterlogged brown earths give rise to wet meadows. Predominantly an agricultural landscape, arable fields, dairy herds, hedges, hedgerow trees and field trees are frequent and characteristic. In places, mature field oaks give a parkland feel. The Chalk scarp of the Chilterns and the Berkshire and Marlborough Downs is prominent in many views from the Vales to the south.

In the north, the Wiltshire, Oxfordshire and Buckinghamshire Vales form a mainly pastoral landscape dominated by stock rearing, with some arable and areas of old unimproved hay meadows north of Oxford. Wetter areas are usually under grass such as ley grassland and unimproved pasture or meadows. Larger arable fields tend to be restricted to the elevated gravel terraces with better drainage. Woodlands are generally scarce, although watercourses are often marked by lines of willows or native black poplar.

The Oxfordshire and Wiltshire Vales are characterised by 18th- and early 19th-century enclosure landscapes of small woods and thorn hedges. Former and current gravel workings along the Upper Thames flood plain are characteristic. Many are now open water and used for recreation. Rivers and watercourses, particularly where tree lined, are important landscape features – including the springlines, which emerge from the base of the Chalk escarpment.

Aylesbury Vale is a continuation of the Vale of White Horse's agricultural landscape, with a geometric enclosure of farms set among large hedged fields with regularly spaced hedgerow trees. Around villages the fields are generally smaller and more irregular. Black poplar tree stands are distinctive features. Bankside willows and flat, open watermeadows fringe the River Thame, which drains towards the Thames in the south-west.

Woodland was already scarce by the 11th century, and the NCA now has only 3 per cent woodland cover. Watercourses are often tree lined, and there are remnants of ancient Royal Hunting Forests and concentrations of orchards on the Greensand. However, nearly 2,000 ha of historic parkland and mature hedgerow trees can give an impression of a more wooded landscape. Important wetland habitats are associated with the waterbodies, watercourses and flood plains, including internationally designated calcareous flood meadows north of Oxford. Some river valley meadows and pastures are

regionally important for wading birds such as curlew and lapwing, including breeding populations and large wintering numbers. Nationally important numbers of breeding and wintering wildfowl are associated with the water-filled gravel pits and reservoirs. In addition, the area's arable habitats support nationally important assemblages of farmland birds.

A line of settlements developed along the natural springlines at the base of the Chilterns Chalk scarp. Today, they include historic and distinctive market towns. Parkland and fine houses are also notable features.

Brick-built buildings with tiled roofs reflect the widespread use of the local clay. The southern vales have many buildings plastered with 'wichert', a traditional chalky marl mixed with straw, and are often colour-washed. Villages on the ledge of Greensand were rarely built of the local sandstone. However, use of chalk blocks, or 'clunch', quarried from the chalk hills, with some thatch, adds variety. Settlement follows the rim of the northern vales, with villages on rising ground or raised gravel spreads within the flood-prone lowlands. Isolated 19th-century farmhouses are characteristic, and older stone-walled and stone-slated buildings, particularly in the Oxford Vale, reflect the Cotswolds influence.

Although the NCA retains many tranquil spaces, the overwhelming impression is of an area criss-crossed by transport routes including motorways, major roads, canals and railway lines, dominated by Didcot Power Station and industrial activities around Abingdon in the south and Oxford Airport in the north, with the large towns of Swindon and Aylesbury to the west and east. Activity from military airbases such as Fairford and Brize Norton outside the NCA also impacts on the tranquillity of the area.

Snake's head fritillary grows in the historic meadows of North Meadow and Clattinger Farm SAC. Other characteristic species include brown hare, native black poplar and brown hairstreak butterfly.

The landscape through time

The Upper Thames Clay Vales NCA is predominantly underlain by clay rocks deposited on ancient sea floors between 165 and 100 million years ago. The Oxford Clay and Kimmeridge Clay were deposited during the Jurassic Period, and contain fossils laid down in a marine environment. At the end of the Jurassic Period and the start of the Cretaceous Period, shallow marine estuarine conditions prevailed and sands and limestones of the Portland Group and Purbeck Limestone were laid down. The Cretaceous Period then saw the return of a marine environment in which more clay – the Gault Clay – was deposited, followed by the Upper Greensand and then the Chalk. More recent Quaternary ice-age events (over the last 2 million years) are represented by river terrace gravels, some of which have yielded rich fossil faunas of large mammals and molluscs.

There is widespread evidence of Neolithic settlement of the river terraces downstream from Radley, and ancient field systems are visible as cropmarks in the Thames gravels. Many of these settlements survive beneath Medieval market towns along the ancient route of the Lower Icknield Way; much of the prehistoric trackway runs along the Greensand ledge. There is significant prehistoric and Roman archaeology throughout the Upper Thames gravels. A network of Roman roads connected the frontier post of Dorchester with wider areas and acted as trade routes after the conquest. Roman farms were concentrated on the better draining loams of the gravel terraces along the river valleys, particularly the Thames. These are no longer visible, but routes of Roman roads such as the Ermine Way remain significant features in modern-day road patterns.

Most of the area's towns have significant time depth. There are Saxon remains, such as defences at Wallingford and Cricklade, and a concentration of Anglo-Saxon burial sites in the south of the area. Domesday survey showed the narrow belt of springline villages on the Greensand at the foot of the Chilterns in Aylesbury Vale as the most densely populated area. Significant archaeological features remain visible, including ancient field systems evident as cropmarks and remnant embankments and ditches associated with royal hunting grounds. Around Aylesbury, deserted villages such as Quarrendon, Fleet Marston and Creslow are also significant medieval features. Ridge and furrow survives across the area, with nationally important survivals at West Hanney, Denchworth, Lodgershall, Hogshaw and Creslow. Straight-sided large fields enclosing the northern Vales are typical of a 'planned countryside'. Domesday records little woodland cover, with scarcely any placenames relating to woodland.

The sparse settlement pattern within the Vales was more or less established by the 11th century, with the Upper Thames area generally more populated than the Vale to the east. Otmoor was, as now, largely devoid of any buildings or settlement and was used for summer and autumn grazing. Contrast existed between the pattern of pastures and hedgerows of the clays, pollarded willows on alluvium and the hedgeless arable fields and villages confined to gravel spreads within river valleys. Generally older, smaller fields surround riverine areas, while larger fields dominate higher, drier ground. Evidence of reclamation of the wetter lands exists in the occurrence of 'moor' placenames such as Otmoor. Otmoor was a wet, open landscape before enclosure, at which point it was divided up. Some of the earliest regional Parliamentary enclosures were in the Vale of White Horse, reaching a peak in the second half of the 18th century as new ideas of farm husbandry spread. Dairy farming developed

rapidly as new methods increased productivity from the rich clay soils. The still predominant field pattern of large hedged fields dates from this time. Historically most Buckinghamshire orchards were located in the south of the county around High Wycombe and south of Aylesbury, with cherry orchards the county's speciality. The Aylesbury prune, a black plum or damson, was widely grown and principally used for cooking and making jam.

Villages that were slow to develop have remained small and retained their early settlement layout and old buildings. Aylesbury is the only town of any size, growing partly from its trade in Aylesbury ducks as the breed was refined and popularised during the 18th century. The Thames and Severn Canal and the Oxford Canal, completed in 1789 and 1790 respectively, were important trade routes between London and the East Midlands, and the Wilts and Berks Canal linked the Thames at Abingdon to the Kennet and Avon Canal. The arrival of the railway in 1839 had a powerful impact and boosted other industries; for example, up to a ton (1,000 kg) of ducks a night were being shipped from Aylesbury to London by 1850. Swindon Railway Works opened in 1843 and transformed Swindon into a busy industrial town, employing over 12,000 people in its heyday in the early 20th century.

The introduction of hardier Peking ducks in 1873 eventually led to the decline of the duck-rearing industry, and the Aylesbury duck is now a rare breed. Changes in agriculture reduced the area's characteristic cherry, plum and apple orchards by over 90 per cent by 1994, and they continue to decline. The County Council's Survey of Orchards in Southern Buckinghamshire revealed a 39 per cent loss in orchards between 1975 and 1995 in one of the areas that was previously extremely important for fruit production. The condition of the remaining orchards is generally poor.

The switch from steam to electric in the 1950s, and later from rail to road transport, resulted in the decline and eventual closure of the Swindon Railway Works. Didcot Power Station was completed in 1968 and its infrastructure dominates the area south of Oxford. The original Didcot A was decommissioned in 2013, replaced by Didcot B, a gas-fuelled station on the same site. The area's motorways (M40 and M4) were built in the early 1970s, although the final section of the M40 north of Oxford was not completed until 1991, the route being altered to avoid Otmoor following local objections. During the late 20th century, the population of the area increased dramatically, partly because families moved out of the capital from the 1960s as part of the London overspill policy and also because commuters were attracted by the area's excellent rail and road links.

Pump drainage allowed wet land on Otmoor to be drained to enable arable farming from the 1960s. The Royal Society for the Protection of Birds (RSPB) bought the first of these fields in 1997 and began to return them to grassland. Some sand and gravel had been sourced from this area since Roman times but was only exploited on a large commercial scale during the 20th century. Mineral extraction on the Wiltshire/Gloucestershire border over the past 50 years has resulted in the formation of a series of wetlands, recognised as a country park, the Cotswold Water Park in 1967 and now managed for wildlife and recreation.

The population of Aylesbury had more than doubled by 2011, and this change is reflected across the area.

Ecosystem services

The Upper Thames Clay Vales 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 Upper Thames Clay Vales NCA is contained in the 'Analysis' section of this document.

Provisioning services (food, fibre and water supply)

- **Food provision:** Around 75 per cent of the land in this NCA is farmed, with 16 per cent classed as Grade 1 or Grade 2 land. Around 50 per cent of farmed land is cultivated – mostly cereals and other arable crops, with some horticulture, including orchard fruit. The rest is grazed or uncropped; this land is mainly used for sheep, with some beef. It was formerly a major dairy farming area but dairy now accounts for only 6 per cent. Pig rearing remains significant, although numbers of pigs fell by nearly 45 per cent between 2000 and 2009.

- **Water availability:** There is no significant underlying aquifer, but aquifers associated with the Chalk bedrock in the Chilterns and the Berkshire Downs extend a little into this NCA; the Oolitic Limestone of the Cotswolds gives rise to many of the rivers in this NCA, including the Windrush, the Churn, the Coln and the Thames itself. Farmoor Reservoir relies on the Cotswolds for 60 per cent of its water. It draws most of its water from the Thames and contributes to the public water supply, particularly for Banbury (outside the NCA), Oxford and Swindon. Main abstractions are from rivers and are for public water supply. To the east, the majority serves London. The NCA is classified as having 'no water available' for additional abstraction, with several areas that are over-licensed. A Restoring Sustainable Abstraction Programme has been put in place for sites that are adversely affected by abstractions (four sites within the Cherwell catchment).[4] Demands placed on the water supply will increase further with the significant identified growth of urban areas, with abstractions likely to be made up by water from outside the NCA.[5]

- **Genetic diversity:** The Aylesbury duck is now a rare breed, with only one pure-bred flock in the country, just outside the NCA. The Aylesbury prune, a historic Buckinghamshire plum widely grown throughout the county for centuries, is found in some hedgerows. Small numbers of Oxford Sandy and Black pigs are kept. Some of the ancient oak pollards of Blenheim Park may be direct lineal descendants of those recorded in Domesday.

  There is an ongoing study of the clonal genetic diversity of black poplars in the Cotswold Water Park, along with an active propagation and conservation programme.

[4] Cherwell, Thame and Wye Catchment Abstraction Licensing Strategy, Environment Agency (December 2012; URL: http://publications.environment-agency.gov.uk/pdf/GETH0705BJHS-E-E.pdf)

[5] Kennet and Vale of the White Horse Catchment Abstraction Licensing Strategy, Environment Agency (December 2012; URL: http://publications.environment-agency.gov.uk/pdf/GETH0306-E-E.pdf)

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

- **Climate regulation:** Soil carbon content is generally slightly higher in the east of the NCA. Some of the loamy and clayey flood plain soils with naturally high groundwater (8 per cent) are peaty at depth or include small areas of peaty soils, and are likely to be associated with the large areas of wetlands (flood plain grazing marsh, fens and reedbeds); these form important stores of carbon, making their conservation a priority.

- **Regulating soil erosion:** Soils at risk of erosion cover 41 per cent of the NCA, including freely draining lime-rich loamy soils (16 per cent) and shallow lime-rich soils over chalk or limestone (8 per cent). These are at risk on sloping land where cultivated or bare soil is exposed (such as along footpaths and tracks or as a result of outdoor pig rearing in the case of the soils over chalk or limestone). This can be exacerbated where organic matter levels are low after continuous arable cultivation or where soils are compacted. Wind erosion is possible on some coarse-textured cultivated variants of the freely draining slightly acid loamy soils.

- **Regulating water quality:** Most of the rivers in the NCA are of good chemical quality, although a few are failing to achieve good chemical conditions. The ecological quality of the rivers is mixed: the River Thames/Isis and a few others are of bad quality in this NCA; a few are of good quality; but most are of moderate to poor quality. Causes of water pollution include channel modification and overshading, and point-source and diffuse agricultural pollution.[6]

- **Regulating water flow:** The risk of flooding is high throughout much of the NCA, as it forms the flood plain of many rivers, including the Thames. With large areas of undeveloped flood plain within this NCA, winter flooding is regular, and the flood plain provides a large area to store water, reducing risk within urban areas downstream. Nevertheless, settlements lying on the flood plain are susceptible to both river and surface water flooding. Generally the rivers flow in natural channels, but in areas around Oxford, Swindon and Aylesbury, urban growth has meant that many are modified, which has sometimes led to flash flooding.

Rivers, water-filled gravel pits and wetlands provide a range of ecosystem services. Water attracts wildlife and people and in this NCA where there is high flood risk, wetlands usefully hold water and intercept flow.

[6] Water for Life and Livelihoods: River Basin Management Plan – South West River Basin District, Environment Agency (December 2009; URL: http://wfdconsultation.environment-agency.gov.uk/wfdcms/en/southwest/Intro.aspx)

Cultural services (inspiration, education and wellbeing)

- **Sense of history:** A sense of history is evident in the wealth of visible archaeological remains, which include Roman roads such as the Ermine Way, a prehistoric trackway running along the foot of the Chalk scarp, ancient field systems, deserted villages such as Quarrendon, pre-Christian burial sites to the south and remnant embankments and ditches associated with royal hunting grounds. There are also numerous country houses, parks and gardens, including Blenheim Palace, a designated World Heritage Site.

- **Recreation:** The NCA offers an extensive network of rights of way totalling 3,369 km at a density of nearly 2 km per km2, as well as open access land covering 400 ha, or just over 0.2 per cent of the NCA. In addition, 117 km of the Thames Path and 5 km of The Ridgeway National Trails cross through the area, while the Great Western Community Forest surrounding Swindon (covering 14 per cent of the NCA) is where new open spaces are being developed. Woodland grant schemes support public access to a significant proportion of the NCA's woodland. The Cotswold Water Park and other restored gravel workings such as in the Lower Windrush Valley offer significant opportunities for activities such as bird watching, walking and water-based recreation, and the River Thames/Isis is important for competitive rowing. The Oxford Canal Walk links with the Oxfordshire Way and is part of European long-distance path E2. The area has many geocache sites. [7]

- **Biodiversity:** Oxford Meadows SAC and North Meadow and Clattinger Farm SAC include vegetation communities that are possibly internationally unique, reflecting the influence of long-term grazing and hay-cutting on lowland hay meadows. Little Wittenham SAC is one of the most studied great crested newt sites in the UK. Within the NCA, 2,500 ha of land is designated as Sites of Special Scientific Interest (SSSI – 1.3 per cent of the NCA). This NCA has 7,000 ha of flood plain grazing marsh, 2,500 ha of woodland (wet woodland, lowland mixed deciduous and lowland beech and yew) and just over 1,000 ha of lowland meadows. There are also 600 ha of fens and 400 ha of reedbeds. The area's wetlands, including gravel pit restoration schemes, are important for breeding and overwintering birds, for example in the Lower Windrush Valley, Cotswold Water Park and Dorchester areas. Flood plain grazing marsh alongside the rivers Ray (including Otmoor), Cherwell and Thame support important breeding populations of waders (curlew, snipe, redshank and lapwing). The area is a national stronghold for brown and black hairstreak butterflies, associated with blackthorn, while arable habitats such as those in the Vale of White Horse, Upper Thames and Ray valleys support important numbers of farmland birds such as tree sparrow.

- **Geodiversity:** There are a high number of sites designated for their geological interest: 11 geological SSSI; and another 27 Local Geological Sites. Faringdon is home to the famous Faringdon Sponge Gravel, a Cretaceous unit filled with spectacular fossil sponges, other invertebrates, a few vertebrate bones and teeth, and wonderful examples of bioerosion. Wootton Bassett Mud Spring is a geological SSSI featuring oozing springs of cold, grey mud which blister up under a thin layer of vegetation. It is an example of a hydrogeological phenomenon represented by few other examples in Britain, the mechanism of which has been studied in detail at this site.

[7] Geocache sites: http://www.geocaching.com/guide

Statements of Environmental Opportunity

SEO 1: Along the Thames and its tributaries, promote sustainable farming and best practice mineral working in order to conserve and restore semi-natural habitats, historic features, geodiversity, soil quality and soil carbon stores and also to regulate water flow in this area and downstream. Ensure conservation of Oxford Meadows Special Area of Conservation and North Meadow and Clattinger Farm Special Area of Conservation. Engage the public in river heritage and maintain traditional land management practices where appropriate.

For example, by:

- Making reference to the Water Framework Directive, catchment management plans, local Landscape Character Assessments and other strategy documents. Draw on best practice developed by initiatives such as the Catchment Sensitive Farming Programme, the Nature After Minerals Programme and the Payments for Ecosystem Services (PES) pilot developed in this National Character Area (NCA).
- Working across administrative and landownership boundaries to co-ordinate management along the length of watercourses and ditches. Co-ordination is relevant to ecological and physical processes, including the management of water levels. Restore and create habitats and corridors in order to improve resilience, ecosystem function and connectivity of the ecological network at a landscape scale.
- Where compatible with management of flood risk, continuing to restore or enhance as appropriate engineered watercourses to improve habitats, restore a more natural hydrological regime and re-connect watercourses with their flood plains.
- Identifying potential floodwater storage areas, including maximising opportunities around the restoration of mineral workings, and securing land uses that are flood compatible, including wet grassland.
- Considering and managing for climate change impacts on water levels. Identify those features that are sensitive to water level, including habitats, plant species and archaeology that are prone to drought or long-term submergence. Maintain and, where necessary, restore or create ditches and water level control structures.
- Managing improved and semi-natural grasslands and wetlands such as reedbed and wet woodland to slow run-off and filter pollutants. Also manage and create linear features such as hedgerows, ditches and grass strips to manage water flow and filter pollutants.
- Engaging communities in addressing sources of pollution and polluting practices in the rural and urban environment.
- Identifying areas of peat and deep soils that have higher carbon storage capacity. Manage these areas to minimise or avoid damage to soils, in some cases changing land use or restoring wetland habitat such as fen where appropriate.
- Conserving, restoring and creating wet grassland, reedbeds, ponds, species-rich ditches, lowland meadow and other semi-natural habitats. Focus creation and restoration around extending and linking existing areas of habitat in order to improve the function of ecological networks and secure management efficiencies.
- Identifying locations where arable farming is not sustainable in the

Continued on next page

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long term and where arable reversion would increase benefits for biodiversity, regulation of water flow, regulation of water quality and conservation of soils. Support arable reversion by exploring and supporting markets for products of grasslands, including sustainable energy as developed in this area by the PES pilot.

- Where possible, making use of green hay and seeds from species-rich grasslands in the NCA to create and restore additional areas of species-rich grassland. Draw on best practice developed in the meadows in the Special Areas of Conservation and elsewhere to inform management of other meadows in the area.
- Providing suitable habitat for wildlife, particularly the area's characteristic species and rare species, including breeding waders. Tackle problems associated with non-native species such as crassula and mink.
- Conserving veteran trees, including pollarded willow and black poplar. Conserve suckering elm as vestiges of a tree that was once widespread in this area. Ensure that there are successors to veteran trees and guard against pests and diseases. Draw on best practice developed in Aylesbury Vale and Cotswold Water Park around black poplar.
- Managing and restoring active extraction sites to benefit geodiversity, biodiversity, recreation and all the water ecosystem services where possible.
- Creating habitats through restoration schemes for mineral workings in a way that contributes to a coherent and resilient ecological network. Where environmental conditions allow, seek to realise more complex or ambitious restoration options such as reedbed. Ensure that the long-term, sustainable management of habitats is secured along with recreational benefits engaging the public in learning about local geodiversity and biodiversity.
- Maintaining traditional management where this conserves distinctive landscape characteristics, biodiversity and cultural heritage, for example lowland meadow and willow pollards. Engage the public in these traditions and associated heritage.
- Ensuring that recreation activities are appropriately managed across the NCA in order to avoid disturbance of breeding birds, poor experiences of tranquillity and potential conflict between user groups. Securing sustainable recreation is particularly important on ecologically fragile sites or where the negative impact would be significant.
- Conserving heritage assets along rivers, including Scheduled Monuments, historic buildings, bridges and historic watermeadows. Survey historic features and riverine landscapes to inform conservation and public engagement activities.
- Continuing to engage people in the cultural heritage of the Thames through events, interpretation and education. Secure an overview of the artistic and literary work associated with the Thames which contributes to sense of place.
- Engaging the public in the geodiversity of the River Thames, including fossils found in the river gravels. Ensure the conservation of such geodiversity, in particular geological Sites of Special Scientific Interest (SSSI), and facilitate public access where possible.
- Along key sections of the Thames Path National Trail and associated key rights of way, seeking to maximise accessibility and to engage the public in the natural and cultural heritage. Review accessibility and interpretation of the Thames tributaries and make improvements where there is greatest opportunity.
- Conserving tranquillity as appropriate along the rivers and promoting rivers and lakes as places in which to experience tranquillity. People living in areas of low tranquillity will be target audiences for promoting river and lake recreation.

SEO 2: Manage farmland across the Upper Thames Clay Vales to produce food sustainably and maintain sense of place. Taking a catchment approach, improve filtration of pollutants and regulation of water flow by realising a farmland habitat mosaic that incorporates strategic areas of wet grassland, reedbed, wet woodland and ponds as well as ditches and hedgerows.

For example, by:

- Making reference to the Water Framework Directive, catchment management plans, Area of Outstanding Natural Beauty (AONB) management plans, local Landscape Character Assessments and other strategy documents. Draw on best practice developed by initiatives such as the Catchment Sensitive Farming Programme, the Nature After Minerals Programme and the PES pilot developed in this NCA.
- Identifying locations prone to run-off, including access routes, sloping land and cultivated land, and seeking to impede run-off. Convert strategic areas of arable to grassland where possible.
- Adopting efficient chemical application methods such as precision farming. Where compatible with food production, encourage minimal use of chemicals and enhance biodiversity.
- Where arable reversion is sought in order to secure improved or alternative ecosystem services, exploring and supporting markets for products of grasslands, including sustainable energy as developed in this area by the PES pilot.
- Along watercourses, ditches and waterbodies, maintaining buffers to filter pollutants from run-off, which affects water quality and aquatic biodiversity. Create wet grassland, wet woodlands and reedbeds to filter pollutants and secure additional biodiversity benefits.
- Conserving soils to maximise filtration, thereby reducing rapid run-off and loss of soil. It is important to avoid compaction. Soil conservation will benefit plant growth and consequently food provision.
- Creating short- and long-term water storage to secure improved water availability but also to manage water flow so as to avoid flash flooding, for example, reservoirs can secure water supply at any scale over any period, including at the farm scale and ditches with control structures can be restored or created for managing water levels in a flood meadow or fen. Short-term floodwater storage applies to seasonally flooded grasslands and seasonal ponds and scrapes.
- Maintaining and enhancing the farmland habitat mosaic, restoring habitats such as fen, reedbed, wet grassland, ponds and wet woodland in historic locations where possible.
- Avoiding creation or expansion of woodland where there are benefits in retaining an open landscape, particularly in relation to breeding waders and valued views. Use tree stock of local provenance to guard against pests and diseases and conserve local species such as native black poplar and small leaved lime. Manage deer pressure.
- Providing and managing sufficient habitat for wildlife across farmland that is characteristic of this area, including brown hare, tree sparrow, curlew, otter, water vole, brown hairstreak butterfly, and barn owl.
- Providing nectar-rich habitats adjacent to insect-pollinated crops. Manage these habitats to support local biodiversity.
- Managing the farmland mosaic to regulate pests and diseases that affect food production and to support biodiversity. Achieve this by maximising heterogeneity of land use, providing habitat for natural predators and seeking genetic diversity. Incorporate features such as beetle banks and uncultivated field corners and strips into arable fields.

SEO 3: Ensure that heritage assets, especially characteristic features such as ridge and furrow, abandoned medieval villages, Roman roads, canals and historic parkland, including Blenheim Palace World Heritage Site, are maintained in good condition. Integrate conservation of these features with sustainable food production and provide public access to key examples. Seek opportunities to restore the wider historic setting of a feature, particularly in relation to the historic Royal Hunting Forests of Bernwood, Braydon and Wychwood.

For example, by:

- Using historic characterisation of the area's landscape and heritage features, improve understanding and management of historic features and their condition, significance and setting. Also draw on local Landscape Character Assessments and AONB management plans.
- Continuing to conserve and provide sustainable recreation in the Blenheim Palace World Heritage Site to maintain sense of history, sense of place and recreation interests. Assist the World Heritage Site Committee in delivering the Management Plan in support of the site's Outstanding Universal Value.
- Improving the condition of heritage assets and features, including those on the Heritage at Risk register, and locally characteristic features such as ridge and furrow through appropriate measures and seeking to reduce conflicting or unsympathetic management regimes, while recognising the high potential in this landscape for undiscovered remains.
- Working with land managers to identify how to conserve historic features while also producing food in a sustainable way. Avoid ploughing damage to heritage assets, ideally by reversion to grass. Grassed monuments in the landscape can also conserve soils, filter pollutants from run-off and increase the heterogeneity of land use for the benefit of biodiversity.
- Engaging local communities and visitors in the historic landscape through a high-quality public access network, interpretation and education involving examples of key historic features. Draw on best practice visitor engagement and management developed at Blenheim Palace World Heritage Site. Further enhance people's engagement with the heritage of canals.
- Working at the appropriate landscape scale to restore the setting of key features, including the historic Royal Hunting Forest landscapes of Bernwood, Braydon and Wychwood. Draw on work already carried out in these areas.
- Seeking to restore the mosaic of land uses (or habitats) of the ancient Royal Hunting Forests where this will maintain sustainable food provision and boost biodiversity, sense of history and recreation. Protect parkland trees from plough damage and manage deer pressure in order to support conservation and creation of woodland.
- Restoring Plantations on Ancient Woodland Sites, particularly in the ancient Royal Hunting Forest areas. Secure management of woodland by supporting markets for woodland products.
- Maintaining public access to woodlands within the historic boundaries of the ancient Royal Hunting Forests and improving the accessibility of key rights of way in the area.
- Managing canals to conserve important heritage features, maximising sustainable recreation opportunities and providing corridors and habitat for wildlife.

SEO 4: Realise sustainable development that contributes positively to sense of place and built heritage. Ensure adequate greenspace in association with all development and most importantly in growing settlements such as Aylesbury and Swindon. Create and manage greenspace to provide benefits for biodiversity, floodwater management, filtration of pollutants, tranquillity and recreation, and secure strategic access routes between town and country.

For example, by:

- Drawing on local Landscape Character Assessments, AONB management plans and historic landscape characterisation to define settlement pattern and local building materials and techniques.
- Ensuring that development outside urban and urban fringe settings is monitored and understood, as it is nationally significant in this NCA. Manage such development to avoid negative impacts – particularly impacts on the AONB, including their settings.
- Seeking to ensure that future development is designed to contribute positively to landscape character, focusing on local distinctiveness and being sensitive to setting. Ensure that design reflects an understanding of historic settlement pattern and traditional building materials and conserves significant heritage features. Reflect traditional building styles and incorporate traditional building materials into new development where possible. Identify the local sources of traditional building materials and establish sustainable extraction where possible. Conserve SSSI and Local Geological Sites through this work, including maintenance of access to exposures for research.
- Securing enhancements where possible, where existing development detracts from sense of place and other ecosystem services.
- Considering physical and functional links between settlements or development and the wider landscape, such as views and water flow. Manage the urban–rural fringe to contribute positively to landscape character.
- Incorporating new woodlands and tree screens into development as appropriate, taking care not to detract from the open landscape character of this NCA.
- Ensuring that there are green infrastructure links between town and country, providing access links for walkers, cyclists, less-able-bodied people and other user groups, particularly where greenspace is lacking and/or community health is poor.
- Managing canals in Aylesbury, Oxford and Swindon to provide sustainable recreation opportunities and habitat for wildlife. Integrating them into the wider network of access routes and green spaces and securing them as key corridors in the ecological network.
- Creating and managing green spaces so that they are accessible and tranquillity is maximised through for example, incorporating water features. Prioritise the creation and enhancement of greenspace where there is inadequate provision, for example in Aylesbury.
- Ensuring that development is water efficient and incorporates features such as sustainable urban drainage systems. Create and manage green spaces to store water, incorporating features such as seasonal ponds and reedbeds, which also have biodiversity interest and filter pollutants.
- Providing sufficient habitat in green spaces for local species, including nectar-rich habitat for pollinating insects. Manage these green spaces as part of an ecological network that links to gardens across a settlement.
- Engaging the public in settlement history, including guided walks to view historic buildings that use traditional building materials. Explore ideas with the public about how best to accommodate new development.

Supporting document 1: Key facts and data

Upper Thames Clay Vales National Character Area (NCA): 189,000 ha

1. Landscape and nature conservation designations

3 per cent of the NCA is designated as an Area of Outstanding Natural Beauty (AONB). The Upper Thames Clay Vales NCA includes 2 per cent of the North Wessex Downs AONB, <1 per cent of the Chilterns AONB and <1 per cent of the Cotswolds AONB).

Management plans for the protected landscape can be found at:

- www.chilternsaonb.org/
- www.cotswoldsaonb.org.uk/
- www.northwessexdowns.org.uk/

Source: Natural England (2011)

1.1 Designated nature conservation sites

The NCA includes the following statutory nature conservation designations:

Tier	Designation	Designated site(s)	Area (ha)	% of NCA
International	n/a	n/a	0	0
European	Special Protection Area (SPA)	n/a	0	0
	Special Area of Conservation (SAC)	Little Wittenham SAC, North Meadow and Clattinger Farm SAC, Oxford Meadows SAC	440	<1
National	National Nature Reserve (NNR)	Chimney Meadows NNR, North Meadow NNR	91	<1
National	Site of Special Scientific Interest (SSSI)	A total of 77 sites wholly or partly within the NCA	2,443	1

Source: Natural England (2011)

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

Land covered by international and European nature conservation designations totals 440 ha (<1 per cent of the total land area); national designations cover 2,443 (1 per cent). All the SAC and the NNRs lie within a SSSI designated area. There are 355 local sites in Upper Thames Clay Vales NCA covering 5,311 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 at: http://www.lnr.naturalengland.org.uk/Special/lnr/lnr_search.asp
- Maps showing locations of Statutory sites can be found at: http://magic.defra.gov.uk/website/magic/ – select 'Rural Designations Statutory'

1.1.1 Condition of designated sites

Condition category	Area (ha)	% of SSSI land in category condition
Unfavourable declining	193	8
Favourable	1,262	52
Unfavourable no change	88	3
Unfavourable recovering	901	37

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 39 m to 206 m, with a mean of 81 m. The height is provided by thick drift deposits or bedrock outcrops.

Source: Natural England (2010)

2.2 Landform and process

The Upper Thames Clay Vales are a low-lying and undulating clay vales landscape, contrasting with elevated landforms in bordering NCAs and with Midvale Ridge NCA in its midst. The NCA is the central section of a huge belt of low-lying land running through south central England from Somerset to Lincolnshire. Erosion and deposition by rivers sculpted drift during the Quaternary, determining the topography of deposits blanketing almost 40 per cent of the area. Particularly extensive terraces of river gravels can be found along the Thames, cataloguing the evolution of the river's course and down-cutting. Minor hills of thick superficial deposits and outcropping bedrock overlying the clay can be prominent, for example, Sinodun Hills near Dorchester, low ridge in the Vale of White Horse. Surface water features are prominent, with extensive river systems including a large proportion of the upper Thames catchment and numerous waterbodies resulting from mineral extraction. Natural river and flood plain function is today restricted due to several rivers being artificial or heavily modified (River Basin Management Plan: Thames Basin). The juxtaposition of chalk/limestone in neighbouring NCAs gives rise to springline watercourses and the largest marl lake system in Britain - Cotswold Water Park.

Source: Upper Thames Clay Vales Countryside Character Area Description, Thames and Avon Vales Natural Area Profile, River Basin Management Plan: Thames Basin, Environment Agency (2009)

2.3 Bedrock geology

Upper and Middle Jurassic clays (160 to 150 million years) of Oxford Clay and Kimmeridge Clay dominate the area and yield abundant fossils. The top of the Jurassic succession is found over the clay, south of the Midvale Ridge and west of Swindon, as low intermittent hills composed of limestones and sands of the Portland Group and the thin limestones of the Purbeck Limestone. Cretaceous (65 to 142 million years): Early Cretaceous rock was largely eroded away. The Whitchurch Sands are evidence of large rivers flowing across the area. Gault Clay floors the vale to the south of the Midvale Ridge, overlain in patches by Greensand and by a Greensand ledge protruding from beneath the Chilterns and Lambourn Downs.

Source: Natural England County Geology Profiles

2.4 Superficial deposits

Clay, silt, sands and gravels are present over almost 40 per cent of NCA as extensive river terraces and, around Oxford, alluvium spreads. Limestone gravels are found nearest to the Cotswolds. Rich ice-age mammal remains have been obtained.

Source: Upper Thames Clay Vales Countryside Character Area Description, Thames and Avon Vales Natural Area Profile

2.5 Designated geological sites

Designation	Number
Geological Site of Special Scientific Interest (SSSI)	11
Mixed interest SSSI	0

There are 27 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

Largely mixed and pastoral farming, with poorly drained heavy clay soils largely under grass, while arable fields are restricted to the better drained soils on the gravel terraces. Soils are gleyed in lower lying areas. Some of the most productive soils are sandy brownearths in Aylesbury Vale, developed from the ledge of Greensand below the Chalk scarp of the Chilterns. In the Vale of White Horse, orchards grow on this ledge. At Otmoor the soils are covered by a layer of peaty alluvium.

Source: Upper Thames Clay Vales Countryside Character Area Description, Thames and Avon Vales 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	1,399	1
Grade 2	29,412	16
Grade 3	85,221	45
Grade 4	61,686	33
Grade 5	983	1
Non-agricultural	3,477	2
Urban	6,822	4

Source: Natural England (2010)

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

Mineral extraction and water-filled pits are concentrated in the Cotswold Water Park and Lower Windrush Valley. Restoration schemes will shape the landscape in the longer term.

3. Key water bodies and catchments

3.1 Major rivers/canals

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

Name	Length in NCA (km)
River Thames or Isis	77
River Thame	45
River Thames	31
River Ock	30
River Ray	23
River Windrush	22
River Cherwell	21
Oxford Canal	14
River Evenlode	10
River Leach	6
River Churn	5
River Avon	4
Grand Union Canal	4
River Glyme	2
Clifton Cut	1
River Coln	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 Upper Thames catchment dominates, with the northern tip falling into the River Great Ouse (East Anglian) catchment and the southern tip into the River Avon (Bristol) catchment.

The Thames and its numerous tributaries drain the land north of the Midvale Ridge NCA before a final confluence at Oxford where the Thames passes through the ridge to meet the Thame and Ock to the south of the ridge.

The NCA includes parts of two canal systems: the Oxford and the Grand Union. Other canals formerly linked Abingdon to Melksham and Lechlade to Stroud.

There are substantial areas of water-filled gravel pits near Witney, Lechlade and Cricklade.

3.2 Water quality

The total area of Nitrate Vulnerable Zone is 189,000 ha, 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 at: **http://maps.environment-agency.gov.uk/wiyby/wiybyController?ep=maptopics&lang=_e**

4. Trees and woodlands

4.1 Total woodland cover

The NCA contains 10,141 ha of woodland (5 per cent of the total area), of which 2,501 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 26,478 ha of this NCA, which is 14 per cent.

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

4.2 Distribution and size of woodland and trees in the landscape

Woodlands are small, scattered and predominantly on higher ground. Wet woodland notably absent in the floodplains. Concentrations are remnants of ancient royal hunting forests (from north to south: Bernwood around Brill, Wychwood east of Witney and Braydon near Swindon). The Great Western Community Forest is not particularly wooded. There are notable concentrations of orchards on the Greensand. Willow pollards are distinctive of floodplains and also black poplar in Aylesbury Vale. South of the Midvale Ridge, mature field oaks are characteristic.

Source: Upper Thames Clay Vales Countryside Character Area Description, Thames and Avon Vales Natural Area Profile

4.3 Woodland types

A statistical breakdown of the area and type of woodland found across the NCA is detailed in the following table.

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

Woodland type	Area (ha)	% of NCA
Broadleaved	7,278	4
Coniferous	1,169	1
Mixed	497	<1
Other	1,197	1

Source: Forestry Commission (2011)

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

Type	Area (ha)	% of NCA
Ancient semi-natural woodland	1,492	1
Ancient re-planted woodland (PAWS)	1,009	<1

Source: Natural England (2004)

Bluebells at Pinsley Wood.

5. Boundary features and patterns

5.1 Boundary features

In this farmed landscape, boundaries are significant features. There are limited hedgerows to the south of the Midvale Ridge, particularly in the arable areas of the Vale of White Horse. Hedgerows are largely blackthorn and hawthorn, with elm sometimes as a shrub component. Hedgerow trees are frequent in Buckinghamshire. Ditches and waterside vegetation such as reedbed provide boundaries in wetter areas north of the Midvale Ridge. Willow pollards are common in boundaries, especially along watercourses, across the wetter areas of the NCA. Dry stone walls are found north of the Midvale Ridge.

Source: Upper Thames Clay Vales Countryside Character Area Description; Countryside Quality Counts (2003)

5.2 Field patterns

Resulting from parliamentary enclosure, a regular and well-ordered field pattern dominates. Less enclosed landscapes can be found in the floodplains. Smaller and irregular fields are limited to riverside and village localities and particularly to Otmoor. Larger fields are on the higher, drier ground.

Source: Upper Thames Clay Vales Countryside Character Area description; Countryside Quality Counts (2003)

The regular field pattern dates back to Parliamentary enclosure. There are nationally important areas of ridge and furrow and frequent hedgerow trees in Buckinghamshire, as shown here.

6. Agriculture

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

6.1 Farm type

In 2009, the predominate farm types were grazing livestock (especially sheep) and cereals, but the area also supported a range of other farm types: 430 grazing livestock lowland (27 per cent), 401 cereals (25 per cent), 101 mixed (6 per cent), 97 dairy (6 per cent), 42 specialist poultry (3 per cent), 39 horticulture (2 per cent), 26 general cropping (2 per cent) and 16 specialist pigs (1 per cent). Several farm types had decreased in holdings between 2000 and 2009, including dairy, mixed farming, grazing livestock, cereals and horticulture. Dairy farming lost the most proportionately (46 per cent) as well as the most holdings (84) followed by mixed farming which was down by 38 per cent or 62 holdings. Other types, specialist poultry, general cropping and specialist pigs all saw an increase in numbers of holdings, the largest being in other types with 77 holdings.

Source: Agricultural Census, Defra (2010)

6.2 Farm size

In 2009, farms over 100 ha were the most common with 416 holdings (26 per cent), followed by farms sized between 5 ha and 20 ha with 397 holdings (25 per cent).The numbers of holdings in all size brackets fell quite steeply between 2000 and 2009, apart from those between 20 and 50 ha. The largest fall was in farms between 5 and 20 ha which fell by 40 holdings, followed by farms over 100 ha which fell by 38 holdings. Farms between 20 and 50 ha rose by 13 holdings.

Source: Agricultural Census, Defra (2010)

6.3 Farm ownership

Owned land made up 68 per cent of total farm area in 2009, while the remainder is tenanted. There was a decrease in both owned land (1 per cent) and land held in tenancy (8 per cent) over the 2000 to 2009 period.

2009: Total farm area = 137,837 ha; owned land = 94,355 ha
2000: Total farm area = 143,157 ha; owned land = 95,248 ha

Source: Agricultural Census, Defra (2010)

Sheep grazing by the Thames near Farmoor Reservoir.

6.4 Land use

Grass and uncropped land had the highest land use cover (69,475 ha covering 50 per cent of the farmed area), followed by cereals (42,063 ha covering 31 per cent of the farmed area). Between 2000 and 2009 the area of land use decreased for most farm types with the largest decrease by area being in cereals by 7,719 ha or 16 per cent. However, there was a dramatic rise in other arable crops by 2,040 ha. Oil seeds also increased by 851 ha over this period.

Source: Agricultural Census, Defra (2010)

6.5 Livestock numbers

Sheep were by far the most numerous livestock (121,100), followed by cattle (80,700) then pigs (24,500). There was a decline in the numbers of all livestock between 2000 and 2009, with pigs decreasing by 44,800 (65 per cent), sheep by 54,200 (31 per cent) and cattle by 14,400 (15 per cent).

Source: Agricultural Census, Defra (2010)

6.6 Farm labour

The great majority of holdings were run by owner farmers (2,111) as compared to salaried managers (125). There are more full-time workers (496) than part-time workers (321), with fewer still casual/gang workers (224). Trends from 2000 to 2009 were a decrease across all job types, with the number of principal farmers down by 291 and salaried managers by 8. The number of full-time workers had decreased by 282 as had the number of part-time workers by 55 and casual/gang workers had decreased by 73.

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.

Field pattern in the Didcot area.

7. Key habitats and species

7.1 Habitat distribution/coverage

The total area of recognised semi-natural habitat is under 10 per cent of NCA (excludes watercourses and waterbodies). Around the northern tip from Winslow south to Watlington, there is almost no semi-natural habitat. Clusters of varied semi-natural habitats exist north of Oxford, around the Cotswold Water Park, around the River Ray including Otmoor and along the border with the Berkshire Downs in the south.

The predominance of flood plain grassland is associated with the river courses. Grasslands are small and isolated, except along the Thames where there are occasional clusters from north Oxford upstream to Cricklade. The upper River Ray catchment, including Otmoor, also has concentrated grassland interest.

Strongholds for a very distinctive calcareous flood meadow grassland type are found in north Oxford and at Clattinger Farm and North Meadow. Characteristic species include adder's-tongue fern, meadow rue, snake's head fritillary and greater burnet.

Some river valley meadows and pastures are regionally important for wading birds, including small breeding numbers of lapwing, snipe, curlew and redshank, and large wintering numbers of lapwing and golden plover. Nationally important numbers of breeding and wintering wildfowl are associated with water-filled gravel pits and reservoirs.

Mineral extraction has created significant wetland habitat in the river valleys, including marl lakes which are nationally scarce and including the Cotswold Water Park as the most extensive marl lake system in Britain.

Ponds are commonly found in grazed fields. The nature conservation value of the river, canal and ditch systems is restricted to a good diversity of coarse and salmonid fishes including brook lamprey and bullhead and some rich and extensive ditch systems around Otmoor, the upper River Ray, the River Thames near Wallingford and in the lower Windrush Valley. Wet woodland is notably absent. The ancient hunting forest areas of Bernwood and Braydon provide the two concentrations of woodland habitat parcels. Small-leaved lime is characteristic in some parts of Braydon. Boundaries in the farmed landscape are important including hedgerows and, north of Oxford, mud-capped stone walls supporting moss flora. Nationally significant populations of black hairstreak butterfly and native black poplar occur in Aylesbury Vale.

In addition, the NCA contains important arable habitats. These support nationally important assemblages of arable birds.

Source: Thames and Avon Vales Natural Area Profile Natural Area Profile (Natural England 2011)

7.2 Priority habitats

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

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

Priority habitat	Area (ha)	% of NCA
Coastal and flood plain grazing marsh	6,467	3
Broadleaved mixed and yew woodland (broad habitat)	3,338	2
Lowland meadows	1,265	1
Reedbeds	68	<1
Lowland calcareous grassland	38	<1
Fens	29	<1
Purple moor grass and rush pasture	16	<1
Lowland dry acid grassland	1	<1

Source: Natural England (2011)

Maps showing locations of priority habitats are available at

- http://magic.defra.gov.uk/website/magic/ select 'Habitat Inventories'

7.3 Key species and assemblages of species

- Maps showing locations of priority habitats are available at: http://magic.defra.gov.uk/website/magic/
- Maps showing locations of S41 species are available at: http://data.nbn.org.uk/

Wet meadows support breeding curlew, making this area one of only two lowland breeding areas in England. There are also nationally important numbers of wintering wildfowl.

8. Settlement and development patterns

8.1 Settlement pattern

Springline settlements at the foot of the Chalk scarps on the southern boundary are characteristic and include historic and distinctive market towns. Elsewhere, flood risk has dictated settlement patterns so that valley bottoms are uninhabited except at river crossing points. Nucleated settlements are found on rising ground or raised gravel spreads above the rivers. In the wider landscape, settlement is isolated farmsteads dating back to parliamentary enclosure and country estates. Oxford, Dorchester, Abingdon and Wallingford are Thames crossing points. Dorchester's modern day road network reflects Roman routes. Some villages have retained their early settlement layout and old buildings. To the south of the Midvale Ridge, villages on the gravels often surround distinctive greens. Otmoor remains devoid of settlement and is fringed by linear development of distinctive villages. Aylesbury is a growing large town and there is marked expansion of smaller settlements including Carterton, Witney and Faringdon, Bicester, Didcot, Abingdon and Benson. Development around Oxford and Swindon enters this NCA.

Source: Upper Thames Clay Vales Countryside Character Area Description; Countryside Quality Counts (2003)

8.2 Main settlements

The main settlements within the NCA are Swindon, Aylesbury, Abingdon, Bicester, Witney, Didcot, Kiddlington, Carterton, Thame and Wootton Bassett. The total estimated population for this NCA (derived from ONS 2001 census data) is 563,220.

Source: Upper Thames Clay Vales Countryside Character Area Description; Countryside Quality Counts (2003) , Natural England (2012)

8.3 Local vernacular and building materials

To the north of the Midvale Ridge, local clay allowed construction of brick-built buildings and pan tiled roofs. There is a moderate occurrence of cruck buildings. Stone was sourced from the Cotswolds to the north and from the chalk hills to the south. Cotswold stone walls and slates are particularly evident in the Oxford Vale, whilst chalk blocks or 'clunch' have limited use near the Chilterns. To the south of the Midvale Ridge, traditional construction used 'wichert', a chalky marl mixed with straw or earth, to plaster walls which were then often colour-washed. Haddenham and Cuddington are examples. Timber-framing and brick are typical building materials. Straw thatch for roofing is also characteristic. Villages located on the broad ledge of Greensand below the Chilterns were rarely built of the local sandstone.

Source: Upper Thames Countryside Character Area description; Countryside Quality Counts (2003), Draft Historic Profile

Historic settlements are located at river crossings, such as at Wallingford on the Thames. People today enjoy riverside green spaces and the Thames Path National Trail.

9. Key historic sites and features

9.1 Origin of historic features

Neolithic tribes colonised the river terraces downstream from Radley and ancient field systems are visible as cropmarks in the Thames gravels. Virtually no Palaeolithic or Mesolithic remains exist due to the difficulty of cultivating the heavy clay soils before the advent of crude tools. The Lower Icknield Way is a prehistoric trackway along the Greensand ledge on the southern boundary.

Numerous settlements on gravel spreads date from the prehistoric through to the Roman and Saxon periods as evidenced by visible archaeological features, for example, Wallingford Saxon defences.

Royal hunting grounds first created in Saxon times are evidenced by embankments, ditches and ancient semi-natural woodland, for example, Bernwood and Braydon. Anglo-Saxons have also created pagan burial sites in the south of the area.

The area is crossed by several major Roman roads, such as Ermine Way. Ridge and furrow dating back to medieval times survives across the area, with nationally important survivals at West Hanney, Denchworth, Lodgershall, Hogshaw and Creslow. Around Aylesbury the deserted villages, such as Quarrendon, Fleet Marston and Creslow, are significant historic landscape features from medieval times.

Predominant field pattern and isolated farmsteads date from the parliamentary enclosures of the 18th and 19th centuries. Some of the earliest enclosures were in the Vale of the White Horse and there was a peak in the late 18th century. There is a medium-high concentration of pre-1750 farmstead buildings.

Source: Countryside Quality Counts, Draft Historic Profile, Upper Thames Clay Vales Countryside Character Area Description

9.2 Designated historic assets

This NCA has the following historic designations:

- 38 Registered Parks and Gardens covering 1,849 ha.
- 1 Registered Battlefield covering 95 ha.
- 245 Scheduled Monuments.
- 8,422 Listed Buildings.

Source: Natural England (2010)

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

In the floodplains, settlement has long been focused at river crossing points, as illustrated by the castle remains at Wallingford beside the Thames.

10. Recreation and access

10.1 Public access

- 1 per cent of the NCA 2,785 ha is classified as being publically accessible.
- There are 3,369 km of public rights of way at a density of 1.8 km per km2.
- There are 2 National Trails (The Ridgeway and the Thames Path) covering 5 km and 116 km within the NCA respectively.

Source: Natural England (2010)

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

Access designation	Area (ha)	% of NCA
National Trust (accessible all year)	20	<1
Common Land	318	<1
Country Parks	43	<1
CROW Access Land (Section 4 and 16)	827	<1
CROW Section 15	219	<1
Village Greens	112	<1
Doorstep Greens	0	0
Forestry Commission Walkers Welcome Grants	397	<1
Local Nature Reserves (LNR)	67	<1
Millennium Greens	7	<1
Accessible National Nature Reserves (NNR)	91	<1
Agri-environment Scheme Access	125	<1
Woods for People	1,844	1

Sources: Natural England (2011)

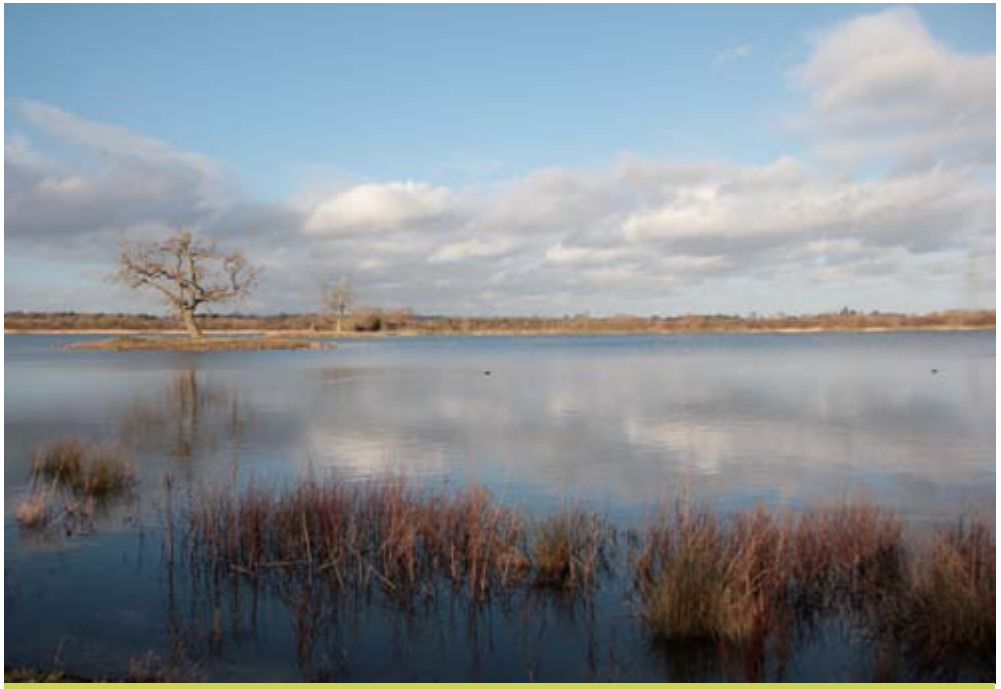
Please note: Common Land refers to land included in the 1965 commons register; CROW = Countryside and Rights of Way Act 2000; OC and RCL = Open Country and Registered Common Land.

Thames Path National Trail.

11. Experiential qualities

11.1 Tranquillity

Based on the CPRE map of tranquillity (2006) the NCA is undisturbed away from the main towns (Abingdon, Aylesbury, Didcot, Swindon) and transport links (Oxford airport, the M4 and M40). The greatest areas of tranquillity are to the far west (around and to the south of the Cotswold Water Park) and east (Aylesbury Vale) of the NCA.



Nature after minerals - Rushy Common Nature Reserve on former sand and gravel workings in the lower Windrush Valley.

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

Category of tranquillity	Score
Highest	48
Lowest	-84
Mean	-<1

Sources: CPRE (2006)

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

11.2 Intrusion

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

Intrusion category	1960s (%)	1990s (%)	2007 (%)	Percentage change (1960s-2007)
Disturbed	26	47	57	31
Undisturbed	71	50	37	-35
Urban	3	3	7	4

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are the huge increase in disturbance.

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

12. Data sources

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

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

Supporting document 2: Landscape change

Recent changes and trends

Trees and woodlands

- There is evidence of an increase in the area covered by woodland grant schemes between 1999 and 2003, from 13 to 22 per cent and an equivalent increase from 15 to 27 per cent on ancient woodland sites, which suggests a slight recent improvement.

- Designation of the Great Western Community Forest, in the most sparsely wooded area, covers 14 per cent of the NCA. New woods have been planted in this area. However beyond this a limited area of new woodland has been planted, including woodlands near Eynsham and Kidlington and wet woodland beside the Thames near Dorchester.

- A continuing decline in the extent of coppice management, the consequence of poorly managed small woodlands, along with the sustained impact of a large deer population, continues to depress the biodiversity value of woodlands, particularly for butterflies like some fritillary species that were once common.

- Non-native poplar plantations have changed the open character of many riverside landscapes.

- Pollarded riverside willows, and native black poplars in the Aylesbury Vale and Cotswold Water Park, are aging and there are few successors. Willows collapse can be seen into watercourses and onto access routes including the Thames Path.

Boundary features

- Between 2003 and 2011 the length of boundary features maintained under stewardship agreements increased from 542 km (4 per cent) to 2,177 km (16 per cent), suggesting that the condition of boundaries will be improving in some areas.

Hedgerows and margins across farmland provide habitat for wildlife and intercept surface water run-off. Hedges and hedgerow trees also contribute to sense of place.

Agriculture

- The mix of farm types has stabilised after post Second World War expansion of arable farming, so the mosaic character of the geometric field pattern, with grass land and arable juxtaposed, remains largely intact.
- Stewardship agreements supporting agricultural activities that maintain semi-natural neutral pasture and lowland hay meadows continue to increase marginally.
- There has been removal of old field barns and conversion of many to housing.

Traditional building materials include brick, tile, timber and thatch. In addition, limestone is found near the Cotswolds and occasional clunch and wichert near the Chilterns.

Settlement and development

- The area is ranked eighth nationally in terms of its share of development outside urban or urban fringe areas. These pressures continue with significant planned expansion north of Oxford and Aylesbury, market towns like Bicester, Didcot and Abingdon, and the Southern Development Area of Swindon, all having an impact on landscape character.
- Many rural villages are also experiencing significant expansion.
- The visual and noise impact of the M40 is increasing, while other major roads are being upgraded.

Semi-natural habitat

- In addition to around 52 per cent of SSSI area being in 'favourable' condition, the condition of semi-natural habitat in an additional 40 per cent of SSSI area is in 'unfavourable recovering' condition. This includes the large Wytham Woods SSSI where a woodland grant scheme is supporting management activities in order to improve condition. Nationally significant areas of lowland meadow continue to be maintained under agri-environment scheme agreements.
- Over the past ten years, landscape-scale conservation work has targeted the tributaries of the Upper Thames. This has involved creation of permanent and seasonal ponds, restoration and creation of lowland meadow and habitat management for wildlife such as lapwing, curlew, water vole, otter and brown hare.[8]

[8] BBOWT's Recovery Plan for Nature: Living Landscapes for All, Berkshire, Buckinghamshire and Oxfordshire Wildlife Trusts (undated)

- As indicated by SSSI assessments, deer continue to negatively impact woodland habitat and semi-natural grassland habitats are deteriorating due to inappropriate grazing regimes.

- Around 5 per cent of SSSI area in the NCA is in 'unfavourable declining' condition. For example, poor water quality and non-native species are negatively impacting the Cotswold Water Park SSSI. Just under 5 per cent of SSSI area is in neither improving nor declining condition, being assessed as 'unfavourable no change'.

Historic features

- Of the remaining historic parkland in the area, 43 per cent is covered by a Historic Parkland Grant and a further 20 per cent is in stewardship agreements. This suggests that the quality of this feature, as part of the landscape character, is being maintained.

Oxford Canal at Thrupp.

- 67 per cent of historic farm buildings are unconverted and 92 per cent of them are structurally intact.

- Canals have benefitted from restoration and public access improvements, including the Wiltshire and Berkshire Canal.

- Ridge and furrow suffers from destruction and damage from farming activities.[9]

Rivers

- Over the past ten years, water quality has benefitted from conservation work targeting the Thames tributaries around the Cotswold Water Park, between Lechlade and Northmoor and from the upper reaches of the River Ray downstream to Otmoor.

Minerals

- Gravel extraction and consequent restoration has brought change in the landscape along the Thames and the Windrush, for example, as determined by restoration schemes. Such changes are localised, with the Cotswold Water Park being the largest example. In 2007, planning permission for extraction affecting 370 ha of the Cotswold Water Park had been secured and additional areas were being proposed.[10]

[9] Turning the Plough Update Assessment 2012, English Heritage (2012)
[10] Strategic Review and Implementation Plan for The Cotswold Water Park (May 2007; URL: www.waterpark.org/wp-content/uploads/2013/03/CWP-Stage-1-Summary_FinalMASTER-271108.pdf)

Drivers of change

Climate change

- Wetter winters and drier summers may impact on the flow regimes of the area's watercourses, namely the Upper Thames and numerous Thames tributaries that drain the area, including the Ray and Cherwell.

- There is potentially a higher frequency of storms and heavier downpours. Flooding has significant implications for settlements both within and downstream of the NCA. Flash flooding is likely due to the underlying clay geology and, particularly in flat areas, land may be underwater for long periods before drainage partly to restrict flooding of settlements further downstream. Human responses to flood risk will range from attempts to store water to engineering watercourses and ditches to channel water quickly through an area.

- Drought may place the area's semi-natural wetland habitats under further stress (including reed beds and wet meadows), ultimately leading to a deterioration in both quality and extent of this important resource (alongside the further pressures of a reduced water supply).

- The treecover and hedgerow composition within the area could be affected through changes in temperature. Warmer winters could promote increased tree growth and favour non-native species, while distinctive veteran trees such as oak and black poplar may become susceptible to increased wind-throw and drought, and the increased likelihood of disease.

- Longer growing seasons and different crop timings could result in the introduction of new crops into the arable landscape, while increased arable cropping as a result of drier conditions could threaten remaining areas of pasture within fertile river valleys and plains.

River Cherwell in flood.

Other key drivers

- Settlement expansion, associated infrastructure development and mineral extraction are key drivers in this area.
- Future mineral extraction is planned in the area, including the Cotswold Water Park and the Windrush Valley. In the Cotswold Water Park there is sufficient extractable resource at current levels of production for a further 20 years of activity and a further 10–15 years at a lesser level until the resource is effectively exhausted. Restoration opportunities include creation of wetlands and spaces for recreation. Future restoration at the Cotswold Water Park will favour wetland over open water habitats, helping to guard against bird strike affecting flying aircraft.
- Further development pressure in the flood plains may result in increased difficulties in water flow management and pollution.
- The decommissioning of the old Didcot Power Station and building of its replacement may present opportunities for landscape enhancement and biodiversity improvements.
- Flooding of rural and urban environments will remain a key challenge on the flood plain. Land use and the management of watercourses and ditches will be influenced by flood risk. Wet woodland may be encouraged in the flood plain to intercept and slow run-off. Demand for increased provision for floodwater storage will potentially give rise to greater areas of wet grassland, ponds, scrapes, reedbeds and ditches and sustainable urban drainage systems.
- Demand for renewable energy will give rise to new land uses. Land-based solar arrays are predicted around Swindon and biomass may drive management of existing woodlands and woodland creation.
- Ongoing threats from non-native invasive species, both those already present in the Thames such as signal crayfish, crassula and mink and future pests, can be exacerbated by irresponsible recreational river use.
- Demand for water may give rise to reservoirs at the farm scale and larger scale.

Didcot power station.

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.

Stanton Harcourt church.

Statement of Environmental Opportunity	Ecosystem Service																	
	Food provision	Timber provision	Water availability	Genetic diversity	Biomass provision	Climate regulation	Regulating water quality	Regulating water flow	Regulating soil quality	Regulating soil erosion	Pollination	Pest regulation	Regulating coastal erosion	Sense of place/ Inspiration	Sense of history	Tranquillity	Recreation	Biodiversity	Geodiversity
SEO 1: Along the Thames and its tributaries, promote sustainable farming and best practice mineral working in order to conserve and restore semi-natural habitats, historic features, geodiversity, soil quality and soil carbon stores and also to regulate water flow in this area and downstream. Ensure conservation of Oxford Meadows Special Area of Conservation and North Meadow and Clattinger Farm Special Area of Conservation. Engage the public in river heritage and maintain traditional land management practices where appropriate.1 Along the Thames and its tributaries,	↔ **	↔ **	↗ **	↔ ***	↔ **	↗ **	↑ ***	↑ ***	↗ ***	↗ ***	↗ ***	↔ ***	n/a	↑ ***	↑ ***	↗ **	↗ **	↑ ***	↗ **
SEO 2: Manage farmland across the Upper Thames Clay Vales to produce food sustainably and to maintain sense of place. Taking a catchment approach, improve filtration of pollutants and regulation of water flow by realising a farmland habitat mosaic that incorporates strategic areas of wet grassland, reedbed, wet woodland and ponds as well as ditches and hedgerows.	↗ *	↗ **	↗ **	↔ ***	↔ ***	↗ **	↑ ***	↑ ***	↗ ***	↗ **	↗ **	↗ ***	n/a	↑ **	↗ **	↔ **	↔ ***	↗ **	↔ ***
SEO 3: Ensure that heritage assets, especially characteristic features such as ridge and furrow, abandoned medieval villages, Roman roads, canals and historic parkland, including Blenheim Palace World Heritage Site, are maintained in good condition. Integrate conservation of these features with sustainable food production and provide public access to key examples. Seek opportunities to restore the wider historic setting of a feature, particularly in relation to the historic Royal Hunting Forests of Bernwood, Braydon and Wychwood.	↔ **	↗ **	↔ ***	↔ ***	↔ ***	↔ ***	↔ ***	↔ ***	↗ **	↗ **	↔ ***	↔ ***	n/a	↑ ***	↑ ***	↔ *	↑ ***	↗ ***	↔ **
SEO 4: Realise sustainable development that contributes positively to sense of place and built heritage. Ensure adequate greenspace in association with all development and most importantly in growing settlements such as Aylesbury and Swindon. Create and manage greenspace to provide benefits for biodiversity, floodwater management, filtration of pollutants, tranquillity and recreation, and secure strategic access routes between town and country.	↔ ***	↔ ***	↗ *	↔ ***	↗ *	↔ **	↑ ***	↑ ***	↔ **	↔ **	↗ **	↔ ***	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.

National Importance; Regional Importance; Local Importance

Landscape attributes

Landscape attribute	Justification for selection
Low-lying clay-based flood plains coursed by the River Thames and its dense network of tributaries and ditches, often lined by willow, reed and, in the Aylesbury Vale and Cotswold Water Park, native black poplar.	■ Lowest elevation is 39 m AOD. Rivers such as the Thame have shallow gradients.[11] ■ River Thames and its tributaries drain the Vales, their headwaters flowing off the Cotswolds to the north or emitting from the springline along the Chilterns and Downs escarpments. ■ Numerous upper tributaries of the Thames flow off the Cotswolds dipslope into a vale bounded by the Midvale Ridge. The Midvale Ridge constrains the river network within a narrow corridor, giving rise to a high density of watercourses and ditches. The Thames breaks through at Oxford to pass into a wider vale to the south where watercourses and ditches are at a lesser density than the northern vales. ■ Willows have historically been pollarded. Ditches full of reeds are particularly characteristic in the wetter areas north of the Midvale Ridge. ■ Native black poplars are distinctive of the Aylesbury Vale and Cotswold Water Park.
Long and wide views across open fields, small and occasional woods. High ground in adjacent NCAs provides a backdrop and there are strong linear features in the form of hedgerows, tree belts, ditches and roads.	■ Woodland cover is only 3 per cent of the NCA. Historically, the area was more wooded, with more extensive wet woodland and mature elm trees. ■ The Great Western Community Forest is a focus area for sustainable regeneration although not particularly well wooded. ■ The Chilterns, Berkshire and Marlborough Downs and Midvale Ridge rise up abruptly from the Vales in adjacent NCAs. The Midvale Ridge is a much smaller feature than the Chilterns and Downs. ■ Parliamentary enclosure determined much of the field pattern in this NCA. As a result, boundaries are straight and defined strongly by hedgerows and roads.
Superficial deposits create undulating topography across much of the area. Better drained land on higher ground is often settled and cultivated. A legacy of mineral extraction gives rise to geological exposures, numerous waterbodies supporting wildfowl and a nationally important complex of marl lakes.	■ Superficial deposits cover 40 per cent of the NCA including alluvium and gravel terraces. ■ Arable land is concentrated on higher ground, away from the wetter flood plain where soils are heavy to cultivate. ■ SSSI and Local Geological Sites aim to conserve important geological exposures in redundant quarries and small pits. ■ Where mineral extraction takes place, pits naturally fill with water. There are over 100 lakes comprising the Cotswold Water Park, creating a distinctive landscape and popular with bird-watchers. Limestone gravels from the Cotswolds give rise to marl formation.

[11] Thames Corridor Catchment Abstraction Management Strategy, Environment Agency (2004)

Landscape attribute	Justification for selection
In the river corridors, grazed pasture dominates with limited areas of historic wetland habitats including wet woodland, fen, reedbed and flood meadow. Wet grassland supports breeding birds. Snake's head fritillary flowers in internationally important meadows.	■ Wet ground conditions and heavy clay soils discourage cultivation in many places, giving rise to livestock farming. Most grassland is improved or semi-improved. ■ This NCA has around 7,200 ha of flood plain grazing marsh, 1,700 ha of wet woodland and 1,300 ha of lowland meadows and 600 ha of fens. There are also rich and extensive ditch systems around Otmoor, the upper River Ray, and the River Thames near Wallingford and in the Lower Windrush Valley. ■ Some river valley meadows and pastures are important for wading birds, including regionally important breeding numbers of lapwing, snipe, curlew and redshank, and large wintering numbers of lapwing and golden plover. Scrapes have been created in some areas to encourage such birds, as for example around the River Ray in Buckinghamshire. ■ Limited fields have retained their species-richness, including traditional flood meadows where soil fertility has been sustained by seasonal flooding. There are two areas of flood meadow designated for their importance at a European level as Special Areas of Conservation (SAC). ■ North Meadow and Clattinger Farm SAC supports over 90 per cent of the country's fritillary population.
A mosaic of mixed agriculture, ponds and small woods. Relict orchards remain on the Greensand.	■ Supports typical farmland wildlife such as brown hare, bats, barn owl and skylark. ■ Fertile soils associated with the limited area of Greensand adjacent to the Chilterns and Berkshire and Marlborough Downs have historically been a focus for orchards. ■ The Aylesbury Vale was known for its plums known as Aylesbury prune.
A regular, planned field pattern defined by boundaries of thorn hedgerows, often with mature hedgerow trees, stone walls near the Cotswolds and straight roads. Smaller fields are found around villages while large arable fields are particular to the Vale of White Horse.	■ Field pattern was largely set out by Parliamentary enclosure and is well-ordered and defined by straight boundaries and roads. Earlier smaller, irregular fields persist around villages. ■ Large arable fields with a less dense hedgerow network characterise the Vale of White Horse. This field pattern resulted from the enclosure of medieval strip fields. ■ Mature hedgerow trees, including veterans, are found in many hedges. Elm was once a mature hedgerow tree characteristic of this area but now it is a shrub component only. ■ Blackthorn and hawthorn were the typical hedge species of Parliamentary enclosure. ■ Near the Cotswolds, the availability of Cotswold stone has led to stone walls in this locality.

Landscape attribute	Justification for selection
Relict features of ancient Royal Hunting Forests of Bernwood, Braydon and Wychwood include embankments, veteran trees and clusterings of small ancient woods. Designed parkland landscapes are sparsely scattered, including Blenheim Palace World Heritage Site.	■ Historic Royal Hunting Forests comprised a mosaic of open grassland and woodland. Small ancient woodlands, veteran trees and embankments are relict features of these Royal Hunting Forests. Mature field oaks are a feature south of the Midvale Ridge. Bernwood lay around Brill, Wychwood east of Witney and Braydon near Swindon. ■ Braydon Forest supports a patchwork of broad-leaved woodland blocks (often ancient semi-natural or replanted) and small fields delineated by mature, species-rich hedgerows. Woodland cover is locally high here compared with the wider NCA. ■ There are 38 Registered Parks and Gardens (many are associated with the Oxford Colleges). Buscot, Claydon and Hartwell are examples. These large estates most likely evolved from the ancient Royal Hunting Forests. ■ Part of Blenheim Palace World Heritage Site lies in this NCA. It was designated in 1987 in recognition of the international significance of the architecture of its buildings and the landscaped grounds. The famous landscape designer Lancelot 'Capability' Brown worked at Blenheim to create 'one of the greatest examples of naturalistic landscape design'.[12] Blenheim influenced designs elsewhere in England and abroad.
Pasture preserves historic earthworks, including ridge and furrow and, concentrated in the Aylesbury Vale, deserted medieval villages. Roman roads, castles and historic bridges are striking features.	■ Nationally important survivals of ridge and furrow include those at West Hanney, Denchworth, Lodgershall, Hogshaw and Creslow. ■ Deserted medieval villages include those at Quarrendon, Fleet Marston and Creslow. ■ There are 245 Scheduled Ancient Monuments. ■ Roman roads include Ermine Way and Akeman Street. ■ Castles include Shirburn and Wallingford. ■ River crossing points have long been a focus for settlement and there is a rich history around bridges in this NCA. Wallingford and Abingdon are noted for historic bridges.
Brick, tile, timber and thatch are traditional building materials across the area, combined with Cotswold stone near the Cotswolds and occasional clunch and wichert near the Chilterns.	■ Local clay enabled bricks and tiles to be made for local use. ■ Stone available from the Cotswolds was used to construct buildings and walls in that locality. Near the Chilterns, clunch (a chalk rock) was occasionally used. ■ Wichert was a plaster made by mixing chalky marl with straw or earth. It was often colour-washed, as seen at Haddenham and Cuddington. ■ Thatch is seen across the area and characteristic of many villages such as Stanton Harcourt and Sutton.
Historic settlement is found sparsely dispersed on higher ground and exceptionally at river crossing points such as Abingdon. Large urban areas comprise Aylesbury and outskirts of Oxford and Swindon, plus growing towns dispersed across the NCA such as Didcot, Bicester, Witney and Thame. A web of A roads connects major settlement, while the M4 and M40 pass through.	■ Settlement has mostly been avoided in areas liable to flooding, except at river crossing points such as Standlake. Large towns of Abingdon and Wallingford are historic crossing points. ■ Aylesbury and Swindon are major urban centres, having been a focus for recent growth. ■ Industrial uses include Didcot Power Station and car factories at Swindon and Oxford. ■ The dispersed nature of settlement means that there are A roads connecting large towns. Numerous A roads emanate from Oxford, Swindon and Aylesbury.

[12] Nominations to the World Heritage List (WHC-08/32.COM/8B.Add), UNESCO (2008)

Landscape opportunities

- Conserve historic features in the flood plains, including traditional flood meadow, pasture, pollarded willows, historic bridges and Scheduled Monuments.
- Conserve wetland habitat in the flood plains, from species-rich ditches to lowland meadow to wet grassland supporting breeding birds including waders.
- Restore and create wet grassland, ponds and fens in the flood plains. Create new woodlands in places where enclosure of the landscape does not negatively impact upon valued views and does not impinge upon open habitats such as wet grassland providing for breeding waders.
- Manage and restore extraction pits to avoid negative impacts upon the landscape. Create wetland habitat as hydrological conditions sustainably allow, providing for a range of wildlife and contributing positively to the wider mosaic of habitats in the landscape.
- Maintain hedgerows, hedgerow trees and stone walls as strong landscape features which also contribute to the ecological network. Maintain characteristic native black poplars in the Aylesbury Vale and Cotswold Water Park.
- Conserve veteran trees in fields, hedgerows and woods. Ensure there are successor trees and retain deadwood where possible.
- Conserve small woodlands, particularly ancient woodlands and semi-natural woodlands. Explore opportunities to restore woodland within the historic Royal Hunting Forests and consider new woodlands and tree screens as part of development. Avoid new woodlands and overgrowth of hedgerows where they will obstruct valued views or otherwise enclose an open landscape, including grasslands supporting waders.
- Maintain the mix of agriculture and the mosaic of farmland habitats. Consider ways to increase heterogeneity of the arable landscape of the Vale of White Horse, for example ponds, grass strips, beetle banks and non-cultivated field corners. Restore and create orchards and restore semi-natural habitats associated with historic Royal Hunting Forests in order to enhance the farmland habitat mosaic and conserve historic land use.
- Conserve the built and natural heritage of Registered Parks and Gardens, including Blenheim Palace World Heritage Site. Assess non-registered parklands to determine the need for conservation and designation.
- Encourage continued use of traditional building materials. Where possible, integrate with conservation of geological exposures at extraction sites.
- Conserve historic settlement pattern and historic buildings. Manage the expansion of settlements such as Swindon and Aylesbury.

Ecosystem service analysis

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Food provision	Grade 1 and 2 agricultural land Orchards Livestock	A range of food is produced in this NCA. Grade 1 and 2 agricultural land is found over 16 per cent of the NCA and allows for growing of cereals and, near Harwell for example, orchard fruit. Grade 3 land accounts for 45 per cent and Grade 4 for 33 per cent giving rise to considerable areas under grass managed largely for sheep. Dairy accounts for only 6 per cent of farms. Quaternary and alluvial deposits around the upper tributaries of the Thames, as for example in the west Oxfordshire district, and around the confluence of the Thame and Thames in south Oxfordshire make these areas fertile, freely draining and easily cultivated. Where these deposits are absent and consequently farming is directly on clay, agricultural land is not easily cultivated and is Grade 4. Grade 4 land is particularly concentrated in Aylesbury Vale and Cherwell districts.	Regional	Some of the most productive soils are sandy brownearths developed from the Greensand, which protrudes from beneath the Chalk scarp of the Chilterns. This is an important area for farming, contributing to employment, economy and maintenance of farmland habitats and landscape character. Waterlogging and flooding of farmland is a significant impediment to farming in this NCA. Agricultural activities and their sustainable management are closely linked to many of the cultural aspects of the area; the sense of place, biodiversity, sense of history and heritage assets. Inappropriate agricultural activities can result in soil erosion and diffuse pollution, and reductions in soil quality and soil carbon storage. In some locations, well-managed production may have the capacity to increase outputs and given the close association between soil quality, water quality and stock rates and production.	Continue to work with the local farming community through environmental stewardship and other mechanisms to ensure sustainable production, avoiding adverse impacts on other ecosystem services such as soil and water quality. Conserve soils and manage water storage in order to guard against widespread waterlogging and compaction. This will maintain productivity and also better regulate water flow. Manage high-grade agricultural land under sustainable farming practices in order to maintain production in the long term and avoid negative impacts upon the environment. Identify areas where reduced stocking rates or changed management techniques would positively influence water quality and reduce potential soil erosion along riverbanks, while maintaining viable levels of productivity. Explore opportunities for arable reversion where this will increase the sustainability of food provision and secure benefits for regulating water flow and conserving soils. Conserve traditional orchards in the interests of food provision, sense of place and nature conservation.	**Food provision** **Regulating water flow** **Biodiversity** **Genetic diversity** **Regulating soil quality** **Regulating soil erosion** **Water availability**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Timber provision	Woodland Hedgerow trees Historic coppice	Woodland cover amounts to 3 per cent or 6,300 ha of the NCA, although there is additional resource in the form of small woodlands or copses. Only 0.4 per cent or 670 ha is coniferous plantation. Non-native poplar plantations are a feature in some parts of the NCA. Hedgerow trees are a distinctive feature of Aylesbury Vale, for example, and so represent a potential timber resource.	Local	Timber provision is limited by existing woodland cover and, in 2003, only 22 per cent of woodland was managed under a woodland grant scheme. The timber resource is likely to be neglected as a minor land use. Remaining coppice stands are likely to be in poor condition. Designation of the Great Western Community Forest across 14 per cent of the NCA may stimulate tree planting in this area to boost timber provision.	There may be limited opportunities for woodland creation, helping to manage flows of water and limit soil erosion; however, their use for timber production will be limited. Sites supporting other semi-natural habitats, important species and heritage assets will need to be avoided. Plant small woodlands as a connected network to realise opportunities relating to efficiency of forestry activities, to control of pests and diseases and to improve biodiversity. Conserve trees of local provenance and encourage natural regeneration rather than planting in order to maximise resilience against pests and diseases. This will secure the timber resource and associated biodiversity and sense of place attributes.	**Timber provision** **Biodiversity** **Pest regulation**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Water availability	Rivers and streams Chalk aquifers Aquifers based upon superficial deposits Reservoirs	There is a high density of watercourses and ditches and also reservoirs managed for public water supply, for example at Farmoor. Across the clay, watercourses, ditches and associated wetland habitats are fed by surface water[13] and there is no baseflow supported by groundwater. Principal aquifers associated with Chalk bedrock in the adjacent Chilterns and Berkshire Downs extend a little into this NCA. There are springlines along the base of the Chilterns and Berkshire Downs escarpments for example. The source of the NCA's watercourses also originates from these aquifers and also the Cotswolds. Secondary aquifers relating to deposits overlying the clays associated with watercourses are characteristic. Deposits are particularly widespread around the upper reaches of the Thames river system. There are interconnections between the River Cherwell and the Oxford Canal.[14] Water levels in these waterways are therefore interdependent. Abstraction is predominantly for public water supply, with smaller volumes for agriculture. Surface water abstraction is dominated by supply to Farmoor Reservoir, which provides for Oxford, Banbury and Swindon in neighbouring NCAs.[15] Farmoor Reservoir relies on the Cotswolds aquifer for 60 per cent of its water. Water was also taken from the Thames for Didcot Power Station, but this has since closed. Elsewhere, abstraction is from groundwater. Abstraction demands upon the Thames river system downstream of the NCA, including London, means that there is no water available for licensing at low flows in this NCA.	National	Principal aquifers are largely absent, so groundwater is not stored within the NCA and rainwater flows out of it as surface water. Any type of reservoir, including the large reservoir at Farmoor, is important for storing water locally. Growth of settlements within the NCA such as Aylesbury and in adjacent NCAs such as Swindon will place new demands upon water availability. The Thames Region is one of the driest regions in the UK. It receives an average of 690 mm of rainfall each year compared to a national average of 897 mm.[16] Public water supply demands across the wider Thames Region require that water use in the upper reaches takes account of supply needs downstream. Storage or transfers of water into this NCA have been considered by the water companies to secure adequate water supply locally and further downstream, including a proposal for a new reservoir near Abingdon. Superficial deposits which function as secondary aquifers are also a focus of mineral extraction. Mineral operators have to manage against negative impacts upon hydrology. Across the clay, rainfall has a direct and immediate impact upon surface waters, with 'flash' flooding possible. Water availability is of significance to wetland habitats and species, including designated sites and legally protected species. Plant communities will alter where there is a change in water regime towards drier, wetter or more disturbed conditions. The Oxford Meadows SAC comprises grasslands that are seasonally flooded; a habitat which is very restricted nationally. Habitats are made more vulnerable by a history of drainage and their small size, for example, small fragments of fens.	Seek opportunities to store, hold and retain water for slower release and manage reservoirs and watercourses to allow sustainable water abstraction. Encourage efficient water use and storage of water, for example farm reservoirs and water butts, among the general public and across the business sector within and beyond the NCA. Work with land managers to promote good farming practices to improve the structure of soils, thereby improving infiltration of rainwater and reducing surface flow. For example, manage and create landscape features to slow flows of surface water, such as wet woodland and flood plain grassland. This guards against flash flooding, manages pollutants and enhances biodiversity. Monitor and manage water levels in relation to water-dependent features, including Oxford Meadows SAC.	**Water availability** **Regulating water flow** **Biodiversity** **Regulating water quality**

[13, 14] Cherwell, Thame and Wye Catchment Abstraction Management Licencing Strategy, Environment Agency (2012)
[15, 16] Thames Corridor Catchment Abstraction Management Strategy, Environment Agency (2004)

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Genetic diversity	Oxford Sandy and Black pig Aylesbury duck Aylesbury prune Native black poplar	There are low numbers of the Oxford Sandy and Black pig in this NCA. The area around Aylesbury has a history of duck rearing. Aylesbury prune is included in the National Fruit collections at Brogdale. Ancient oaks are found in Blenheim Park. Native black poplars growing in Aylesbury Vale and the Cotswold Water Park Black are important for the genetic diversity and survival of this species.	Regional	The Oxford Sandy and Black pig is one of the oldest British pig breeds in the country.[17] The breed originated and developed in the Oxfordshire region. It is likely that there are Aylesbury duck kept and bred in the NCA but the only commercial flock is located in the Chilterns, outside the NCA. Local nurseries stock Aylesbury prune (a plum) and trees are found in remnant traditional orchards and hedgerows. Some of the ancient, oak pollards of Blenheim Park may be direct lineal descendants of those recorded in the Domesday survey. Work to conserve national populations of native black poplar centres upon the Aylesbury Vale.	Conserve traditional local breeds, including the Oxford Sandy and Black pig and Aylesbury duck for the benefit of genetic diversity, food provision and sense of place. Conserve and restore traditional orchards and ancient hedgerows in order to secure local genetic material, particularly in relation to Aylesbury prune. Seek biodiversity, sense of place, food provision and recreation benefits. Conserve native black poplars for biodiversity and for sense of place.	**Genetic diversity** **Food provision** **Sense of place/ inspiration** **Biodiversity**
Biomass energy	Remnant coppice Existing woodland	This area has a woodland cover of 3 per cent, meaning potential biomass from existing woodland sources is limited. Coppice is found in some woods, but is often neglected.	Local	As a result of the varying underlying geology, potential miscanthus yield varies greatly across the area between medium and high. The potential yield for short rotation coppice is largely medium, but high in north-eastern areas between Oxford and Milton Keynes. Planting short rotation coppice along watercourses and ditches may be feasible where this also contributes to managing floodwaters and enhances biodiversity. The restoration of gravel extraction areas may also allow for landscaping which accommodates short rotation coppice and miscanthus. Planting short rotation coppice or miscanthus in those parts of the NCA where there are uninterrupted long views would alter sense of place. A long history of livestock farming and associated grassland management in many areas of the NCA makes planting of crops incongruous. Visual impacts from high ground in neighbouring NCAs should also be considered.	Explore opportunities to establish short rotation coppice in locations where it also manages floodwaters and enhances biodiversity, including mineral extraction areas, but does not impact negatively on sense of place or upon open habitats, including wet grassland supporting breeding waders. Restore neglected coppice and introduce coppice management where this provides biomass and enhances biodiversity.	**Biomass energy** **Regulating water flow** **Biodiversity**

[17] RBST Fact Sheet: Oxford Sandy and Black, Rare Breed Survival Trust (2012)

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Climate regulation	Peat soils Long-term undisturbed/ uncultivated soils Wetland habitats Woodland	There are around 25 ha of peat in the NCA, comprising small areas of deep peat soils around Thame and a single area of deep peat near the River Evenlode. Across almost all of the NCA there is a relatively low proportion of carbon stored in the top soil horizon (0–10 per cent), with soil carbon content being generally slightly higher to the east of the NCA than to the west. Soils that have not been cultivated, including areas of flood plain grassland, reedbed, fen and wet woodland, are long-standing carbon stores. There are approximately 7,200 ha flood plain grazing marsh, 1,700 ha wet woodland, 1,300 ha lowland meadow, 700 ha fen and 400 ha reedbed. There are 6,300 ha of woodland or 3 per cent cover. This low cover means that woodland carbon stores are limited.	Local	The predominance of mineral soils limits carbon content, particularly where it is cultivated over the long term. Storage capacity of soils is maximised where soils are undisturbed or uncultivated. Flood plain grasslands and other non-cultivated areas such as reedbed and wet woodland represent relatively intact carbon stores. Drainage of wet soils, including peat soils and fen, leads to loss of carbon and a reduction in storage capacity. The change in land use can also lead to deterioration of carbon stores. Woodland cover was higher in the past so woodland carbon stores have been lost.	Conserve areas of semi-natural wetland habitat, including flood plain grasslands, in order to maintain carbon stores, biodiversity and sense of place. Maximise carbon content by conserving and boosting organic content in soils. Protect peat soils and associated semi-natural habitat from damage. Create new woodlands where it will increase carbon sequestration and storage capacity. Avoid new woodlands where it will impact negatively upon sense of place, valued views and open habitats such as wet woodland supporting breeding waders.	**Climate regulation** **Biodiversity** **Sense of place/ inspiration**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water quality	Vegetated landcover, including grass strips and reedbed Low input grassland Semi-natural habitats including woodland, flood plain grazing marsh, and hedgerows	Features that potentially filter pollutants from run-off before they reach watercourses include pasture, grass strips, hedgerows and woodlands, and more localised areas of reedbed (400 ha) and wet woodland (1,700 ha). Water quality across the catchments is generally good but phosphates show high concentrations.[18] Phosphates are from diffuse and point sources. Cotswold Water Park SSSI is negatively impacted by pollution, including run- off from agriculture.[19] The River Ray, in the Cherwell catchment, has been assessed as having bad ecological status. In the Cotswold catchment, the Rivers Evenlode, Glyme and Ampney Brook are suffering from phosphates, as is the Thame in the Thame catchment.[20]	Regional	With a clay-based geology, there is limited percolation of water into soils and so filtration of pollutants from surface water is also limited. Vegetation such as reedbed and wet woodland can trap pollutants in run-off. Bare cultivated areas and access tracks provide no filter. In particular, heavy rainfall will give rise to significant run-off. There is potential to greatly strengthen the ability of semi-natural habitats to filter run-off by linking or expanding existing fragmented habitat. The entire NCA is a nitrate vulnerable zone. Water quality is regionally significant because the surface waters provide public water supply to major urban centres outside the NCA including Oxford, Swindon and downstream into London. Pollution of groundwater is a concern around Lechlade and along the southern border of the NCA in relation to principal aquifers of the Chilterns and Berkshire Downs. In the wider NCA, the nitrate vulnerable zone relates to surface waters. In a nitrate vulnerable zone, land managers time their chemical applications carefully and avoid excessive use. Low input grasslands are beneficial to water quality in this NCA. Despite features and land management practices to guard against water pollution, phosphates remain a problem. A large chlorinated solvents plume is also present in the groundwater body in the Vale of White Horse.[21] There is also a bathing water beach at the Cotswold Water Park.	Implement catchment-wide water management plans to ensure a coordinated approach to reducing the impacts of pollution on water quality. Maintain and create a network of features which slow and filter run-off, such as wet grassland, grass strips and reedbeds. Create and manage buffer strips beside watercourses and ditches. This will regulate water quality and water flow, with consequent benefits for soils and biodiversity. Encourage wider use of low input and efficient approaches relating to phosphate use such as precision farming. This will bring benefits for biodiversity. Encourage adoption of sustainable land management practices to improve the soil structure through increasing organic matter, reducing compaction and promoting sustainable management to minimise the loss of sediments.	**Regulating water quality** **Regulating water flow** **Regulating soil erosion** **Biodiversity**

[18, 19, 20, 21] River Basin Management Plan – River Thames Basin District, Environment Agency (2009)

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating water flow	Flood plain Ditches Locks and sluices Traditional flood meadows Monitoring stations Vegetated land cover Mineral extraction areas	Flood risk occurs along the course of the River Thames and its tributaries, and winter flooding is a regular event. Settlements in the flood plain and therefore at risk of flooding include Lechlade and Abingdon. Flood defences have been constructed to protect places such as Lechlade and Kidlington. Watercourses have been modified across the NCA to regulate water flow. Water level management structures include locks, sluices and ditches. The few remaining traditional flood meadows retain historic water level management features. The Thames has a long history of monitoring stations. Surface run-off is slowed by features such as hedgerows, grass strips, woodland and reedbed. There are approximately 7,200 ha flood plain grazing marsh, 6,300 ha woodland, 1,300 ha lowland meadow, 700 ha fen and 400 ha reedbed. Mineral workings offer opportunities to store and manage water.	National	This is an area of low to medium flood risk. There is high potential for flooding from surface and river water but the density of settlement is low. Roads and railways are affected when adjacent ditches reach capacity. However, impact can be considerable as illustrated when widespread flooding occurred in 2007 and 2014.[22] The Thames Catchment Flood Management Plan proposes guarding against flood damage by storing water and managing run-off, rather than creating large-scale flood defences.[23] Management of water flow in this NCA has implications downstream into London. This is significant as the River Thames corridor becomes more densely populated downstream, for example at Reading and Maidenhead. In Aylesbury, urban growth has meant that many rivers are modified and straightened to improve their capacity to convey water. Aylesbury is also a focus for further development and there are properties at risk of flooding. Features to slow run-off are important in this NCA where the clay-based geology facilitates rapid run-off. Management of run-off will be particularly important where it protects significant numbers of properties and key infrastructure including roads. Restoring river channels, creating and managing riparian habitats as well as engineered schemes that store floodwater can provide long-term benefits for the regulation of water flow as well as river environment and wetland habitats. Mineral workings modify local hydrology and can involve significant activities such as de-watering. Best practice guidance emphasises the importance of understanding and managing hydrological impacts. There are opportunities for storing water.	Encourage a catchment management approach through working with landowners, farmers, the Internal Drainage Boards, statutory agencies and conservation bodies to best manage the flow of water across the landscape. Ensuring floodwater is accommodated in areas where there is minimal impact on food production and maximum benefit for biodiversity is essential. Review and realise flood-compatible land uses in the flood zone, seeking benefits for biodiversity and recreation where possible. Maintain and create a network of semi-natural features which slow run-off. These features should also regulate water quality by filtering pollutants. Conserve and restore historic flood meadows, locks and ditches so that water levels can be managed for the benefit of water flow, sense of history and biodiversity. Continue to monitor water flow to understand change over time. Manage mineral workings and restoration schemes to avoid negative impacts upon local hydrology. Seek to regulate water flow in a way which also provides wildlife habitat and safe recreation opportunities.	**Regulating water flow** **Biodiversity** **Regulating water quality** **Sense of history**

[22] Environment Agency, Thames Catchment Flood Management Plan – Summary Report, 2009
[23] Thames Catchment Flood Management Plan – Summary Report, Environment Agency (2009)

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil quality	Grade 1 and 2 agricultural land Lime-rich soils Undisturbed soils, including established fen soils Permanent grassland Traditional flood meadows	There are nine main soilscape types in this NCA: ■ Slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils, covering 45 per cent of the NCA. ■ Freely draining lime-rich loamy soils (16 per cent). ■ Loamy and clayey flood plain soils with naturally high groundwater (8 per cent). ■ Shallow lime-rich soils over limestone (8 per cent). ■ Loamy soils with naturally high groundwater (6 per cent). ■ Lime-rich loamy and clayey soils with impeded drainage (5 per cent). ■ Freely draining slightly acid but base-rich soils (5 per cent). ■ Freely draining slightly acid loamy soils (4 per cent). ■ Slightly acid loamy and clayey soils with impeded drainage (3 per cent). Grade 1 and 2 agricultural land is found over 16 per cent of the NCA and allows for growing of cereals and, near Harwell for example, orchard fruit. Grade 3 land accounts for 45 per cent.	Local	Soil damage associated with compaction is particularly relevant in this NCA since slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils cover approximately 45 per cent and are prone to compaction and/or capping when wet. Compaction also leads to increased run-off, leading to erosion and sediment transport. The freely draining lime-rich loamy soils (16 per cent) are typically of moderate depth and droughty, but due to their calcareous nature they have a degree of natural resilience. Drainage of fen has occurred in the past, leading to shrinkage of the resource. Drying of fen soils releases carbon and a change in land use may cause soil quality to deteriorate. Keeping some soils wet is important to retain their carbon content especially those with a high peat content in the river valleys. Management that help to maintain a good soil structure such as increasing soil organic matter levels and the use of minimum tillage such as direct drilling will help improve soil quality, as well as reducing the potential for soil erosion in freely draining soils. Much of the NCA is in agricultural use where maintaining and improving the soil quality will safeguard and retain productive food provision in the long term and increase the soils resilience to climatic change and extreme weather events. Retaining and increasing the amount of semi-natural habitat and tree cover in this NCA would help keep and improve soil condition. Well managed permanent grassland will also conserve soils where compaction is avoided. Compared with other farming methods, traditional management of flood plain grassland and wetland habitats is low intensity and involves limited input of artificial chemicals – this supports natural soil processes. Such management continues on land designated the Oxford Meadows SAC which totals 276 ha.	Practice sustainable farming techniques so that soil quality is conserved while also maintaining food provision and other services. Conserve permanent grassland and semi-natural habitat, including fen, in order to maintain soil quality and biodiversity and also guard against soil erosion and water pollution. Maintain traditional management of historic grasslands in order to conserve soil quality, biodiversity and sense of history. Promote cultivation with soils in mind – adopting Defra's Code of Good Agricultural Practice (2009) and the Environment Agency's Think Soils initiative (2008) to avoid compaction and maintain good soil structures. Increase where possible the areas under woodland or permanent vegetation to stabilise the soil, increase quality with organic matter and soil fauna.	**Regulating soil quality** **Food provision** **Regulating soil erosion** **Biodiversity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Regulating soil erosion	Soils with high moisture content Semi-natural wetland habitat Well-managed pasture soils Woodland, hedgerows and areas of permanent pasture	Soils across approximately 60 per cent of the NCA have a low risk of soil erosion. These soils are the slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (45 per cent), loamy and clayey flood plain soils with naturally high groundwater (8 per cent) and loamy soils with naturally high groundwater (6 per cent). Undisturbed and vegetated soils associated with semi-natural habitats such as reedbed and wet woodland are associated with low erosion risk. Permanent grassland also retains a long-term protective vegetation cover reducing soil erosion as opposed to cultivate areas which have a higher risk. The freely draining lime-rich loamy soils (16 per cent), the shallow lime-rich soils over chalk or limestone (8 per cent) and the freely draining slightly acid loamy soils (4 per cent) are at risk of erosion only on sloping land where cultivated or bare soil is exposed (such as along footpaths and tracks or as a result of outdoor pig rearing in the case of the soils over chalk/limestone). Drainage is impeded across nearly 10 per cent of the NCA, with these soils being susceptible to compaction. These are the slightly acid loamy and clayey soils with impeded drainage (3 per cent) and the lime-rich loamy and clayey soils with impeded drainage (5 per cent).	Local	There is a predominance of soils with intrinsic low erosion risk in this NCA and there are also considerable areas where soils are protected by vegetation, including permanent grassland. There are few steep slopes in the NCA to increase erosion risk but practices such as avoiding ploughing down a slope and managing run-off on access tracks remain relevant in this NCA. Slopes should be vegetated where possible to guard against erosion and rapid run-off. Wet conditions are common across this NCA due to the high density of watercourses and clay-based geology. Compaction by machinery or livestock on wet soils may result in increased surface water run-off which leads to further damage. Where soil loss is likely, whether by run-off or wind, the incorporation of organic matter will maintain or increase soil depth and improve soil structure, both of which combat soil loss. Guarding against soil erosion will also regulate pollution of water by sediment.	Work with farmers and landowners to choose options within agri-environment schemes or adopt best practice that will help to regulate soil erosion by avoiding exposure of soils (for example by introducing and incorporating green cover crops, fallow rotations, overwintering stubble or reversion to permanent grassland). Avoid activities causing compaction to conserve soils and consequently maintain food provision. Careful timing of operations is essential to avoid damage under wet conditions. Retain vegetation cover across slopes to guard against soil erosion and pollution of water by sediments. Seek and realise opportunities for introducing permanent grassland, woodland and restoring field boundaries along valley sides in areas particularly prone to soil erosion or adjacent to main rivers and their tributaries. Incorporate organic matter into soils that have a low organic content in order to combat soil erosion and boost carbon stores.	**Regulating soil erosion** **Regulating water quality** **Food provision** **Climate regulation**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Pollination	Flower-rich grasslands Hedgerows Orchards Flower-rich farmland strips	Nectar sources and habitat for pollinating insects include 1,300 ha of species-rich lowland meadow, a few remnant orchards, a network of hedgerows incorporating flowering thorn species and limited areas of flower-rich margins across farmland.	Local	Hedgerows and margins provide flower-rich habitat across the wider NCA. Insect pollinated crops grown in this NCA include rape.	Manage flower-rich habitats for the benefit of pollination, food provision and biodiversity. Maintain a habitat network for pollinators across the NCA, recognising hedgerows and margins as key links in the network.	**Pollination** **Food provision** **Biodiversity**
Pest regulation	Beetle banks Field corners Hedgerows Mixed land use Self-generated tree stock	Farmland incorporates features such as beetle banks, field corners and hedgerows, which can harbour natural predators of pests affecting crops. At a landscape scale, the mixed agricultural landscape increases heterogeneity. Local genetic diversity among tree species such as the ash as a result of self-generation increases resistance against pests and diseases.	Local	The mixed agricultural landscape combined with the network of hedgerows and watercourses offers considerable heterogeneity that guards against widespread infection. However, the connectivity of this mosaic may facilitate spread of disease and pests.	Conserve local genetic stock of tree species for pest regulation, timber provision and biodiversity benefits. Maintain mixed agricultural land uses and a network of hedgerows and watercourses to regulate pests affecting food provision.	**Pest regulation** **Biodiversity** **Timber provision** **Food provision**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of place/ inspiration *Continued on next page*	Wide flood plain landscape Straight field boundaries and routes Open water – watercourses, ditches, water-filled gravel pits Black poplars, willow River Thames Locks Pasture and traditional flood meadow Wet habitats – reedbed, fen, wet woodland Waders, particularly curlew Wintering wildfowl Snake's head fritillary Settlements at river crossing points	A relatively flat flood plain landscape with long views, large skies and water as a predominant feature. The straight lines of field boundaries and access routes emphasises long views. High ground of adjacent NCAs, such as the Chilterns, provides a backdrop. Numerous watercourses, ditches, ponds and water-filled gravel pits exist around the upper reaches of the Thames tributaries. Reeds are often found growing in ditches and wet fields. Willows and, to the east in the Aylesbury Vale, black poplars, line the waterways. The most significant watercourse is the Thames, with associated historic settlements, locks and bridges. The Thames Path mostly follows the watercourse and the river itself is popular for boating and fishing. More than 300 events are held on the Thames each Year mostly in the downstream sections, the upstream areas being relatively quiet. Famous writings are associated with the Thames including Jerome K. Jerome's Three Men in a Boat. Historic flood plain grasslands are restricted in number across the country and this NCA holds	Regional	Superficial deposits and resistant bedrock lie upon typically level clay bedrocks, giving rise to a gently undulating to flat landscape. Aylesbury Vale is largely absent of superficial deposits and so it is the least undulating. The small knoll of Wittenham Clumps rising out of the Vale is particularly well known since it inspired the painter Paul Nash as well as prehistoric man before him, in the building of a hill fort. Waterside vegetation including trees and reeds emphasise the line of waterways. Thorn hedgerows define the straight boundaries of most fields and access routes as a result of planned enclosure. Some watercourses are relatively straight having been modified to improve conveyance of water and, when combined with drainage ditches, they dissect the landscape into regular shapes. Lewis Carroll was said to be inspired by the 'chequerboard' of Otmoor that existed when he was writing Alice in Wonderland. Hedges, hedgerow trees, field trees, small woodlands and tree clumps create a more wooded feel in the Aylesbury Vale than elsewhere in the NCA, with numerous mature field oaks giving a 'parkland' feel to the landscape. The loss of hedgerow elms across this NCA has affected its once-wooded character. The Thames is associated with a rich culture, history and archaeology. This river and the numerous other watercourses and wetlands attract wildlife and visitors. The Wildlife Trust, local authorities and others provide access to various places of natural and cultural interest. Visitors to the countryside can enjoy the sights and distinctive calls of curlew and lapwing as well as flower-rich grasslands and archaeology. Snake's head fritillary is a striking flower growing in a minority of meadows	Retain grassland as a distinctive land use and manage to minimise inputs, avoid soil disturbance, store floodwater and provide for flora and fauna. In doing so, seek to regulate water quality and flow and conserve soils, biodiversity and archaeology. Conserve and restore traditional flood plain features such as ditches, semi-natural wetland habitat, historic flood meadows, black poplar, willow pollards and historic bridges to conserve sense of place and conserve biodiversity and sense of history. Continue to promote and manage the River Thames as a nationally important corridor for people and wildlife and as a culturally significant landscape feature. Incorporate benefits across all ecosystem services. Review and conserve nationally important examples of ridge and furrow and deserted villages. Engage the public in this heritage.	**Sense of place/ inspiration** **Regulating water flow** **Biodiversity** **Sense of history** **Geodiversity**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of place/ inspiration *Continued from previous page*	Historic buildings including castles and bridges Earthworks including ridge and furrow Traditional building materials including Cotswold stone and wichert Minerals extraction restoration	examples that are protected at a European level as SAC. The grasslands as well as other wetland habitats and watercourses attract birds, including snipe, curlew and lapwing. This area is one of only two lowland areas in England with a breeding curlew population. There are also nationally important numbers of wintering wildfowl. Livestock grazing pasture is a common sight. Many settlements retain historic buildings. Wallingford is rich in historic remains in the form of city walls and a castle. Deserted medieval villages and nationally important examples of ridge and furrow are found in the countryside. Cotswold stone, 'clunch' and 'wichert' are traditional building materials that vary in use across the NCA. Brick, tile and thatch are used relatively consistently. The availability of gravels and sands makes parts of this NCA a focus for mineral extraction. The Cotswold Water Park is a major feature, with over 100 lakes. Haulage vehicles drive through the area.		in the area and is celebrated in an annual festival at Ducklington near Witney. Visitor pressure is relatively limited, except around major urban centres such as Wallingford. Across the immediate flood plain and where there is a high density of watercourses, pasture dominates. Pasture preserves archaeological earthworks such as ridge and furrow and deserted medieval villages. The NCA is therefore nationally important for such archaeology. Local clays give rise to historic brick buildings. In addition, the availability of different building materials from neighbouring NCAs has given rise to a variety of building materials being used across the NCA. Near to the Cotswolds, stone is a traditional building material while 'clunch' (chalk blocks) from the Chilterns was a rare building stone in the south-east. Traditional buildings in the south are distinguished by a type of colour-washed plaster known as 'wichert' (a chalky marl mixed with straw or earth). Haddenham and Cuddington are examples of wichert. Thatch, both reed and straw, is found across the NCA. Continued demand for aggregates will stimulate ongoing extraction of minerals in places such as the Lower Windrush and Cotswold Water Park. These areas are places of landscape change and their restoration schemes are significant in determining the landscape in the longer term.	Promote ongoing use of traditional building materials. Draw on best practice examples from neighbouring AONB, seeking to strengthen sense of place and benefit geodiversity. Manage and restore mineral extraction areas to positively reflect local landscape character, conserve biodiversity and provide a range of ecosystem services.	

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history *Continued on next page*	Blenheim Palace World Heritage Site Scheduled Ancient monuments Registered Parks and Gardens Archaeology of medieval villages Ridge and furrow Canals and locks Historic flood meadow River Thames settlements Historic rural settlement pattern 8,442 listed buildings	Blenheim Palace World Heritage Site is internationally recognised as being one of the greatest examples of naturalistic landscape design. The site is managed to conserve its Outstanding Universal Value and it has been open to visitors since at least 1950. There are 245 Scheduled Monuments, ranging from prehistoric ditches and enclosures to medieval villages to bridges, abbeys and castles. Monuments on the At Risk Register include several Roman villas, a Second World War airfield, ring ditches and the castle mound at Abingdon. There are no Scheduled Monuments at risk in Aylesbury Vale, Oxford or North Wiltshire. 38 Registered Parks and Gardens, many associated with Oxford Colleges, and including Blenheim Palace World Heritage Site. There are four parks over 200 ha, with the largest being Eynsham at nearly 340 ha. There are vestiges of parks dating back to Saxon times, such as Bernwood, with veteran trees and ancient semi-natural woodland. There are no Registered Parks and Gardens on the At Risk Register although the condition of semi-natural interest such as veteran trees is not known.	International	A sense of history is evident in the wealth of visible archaeological remains including major features such as Roman roads, castle remains and designed landscapes such as Blenheim. Blenheim is managed according to a management plan agreed with partners including English Heritage. Visitors are managed to avoid negative impacts. Scheduled monuments cluster noticeably around the River Thames and its upper tributaries near Lechlade, Standlake and Dorchester. Pasture management has served to preserve earthworks including nationally important examples of ridge and furrow, enclosures and deserted villages. Nationally important examples of ridge and furrow include those at West Hanney, Denchworth, Lodgershall, Hogshaw and Creslow. Deserted medieval villages include those at Quarrendon, Fleet Marston and Creslow. Continuity of large estates has helped maintain at least the core of historic parkland and designed landscapes, including those at Blenheim and the Oxford colleges. At a large scale, there are embankments, ditches, ancient semi-natural woodland and veteran trees that are the vestiges of ancient Royal Hunting Forests (from north to south: Bernwood around Brill, Wychwood east of Witney and Braydon near Swindon).	Conserve and provide sustainable recreation to the Blenheim Palace World Heritage Site to maintain sense of history, sense of place and recreation interests. Avoid ploughing damage to heritage assets, ideally by reversion to grass which helps conserve soils and increases the heterogeneity of land use for the benefit of biodiversity. Review historic structures such as bridges and canals to secure management of water levels while also conserving sense of history. Along the length of the Thames and canals, engage people in the historic and natural heritage of the area. Conserve historic flood plain landscapes in order to preserve Scheduled Monuments located there and conserve species-rich historic flood plain grasslands. Manage water levels to avoid damage to natural and historic interests and soils, including during flood events and drought.	**Sense of history** **Sense of place/ inspiration** **Recreation** **Biodiversity** **Regulating water flow** **Regulating soil erosion**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Sense of history *Continued from previous page*		Archaeology dates as far back as the Neolithic, with ancient field systems visible as cropmarks in the Thames gravels. Significant visible archaeological features include Roman roads such as Ermine Way and Saxon city defences at Wallingford and Cricklade. There are Saxon cemeteries and settlement at Fairford. Ridge and furrow dating back to medieval times survives across the area and includes nationally important examples. Around Aylesbury, deserted medieval villages are significant historic landscape features. On the upper reaches of the River Thames, at Sandford and Iffley, there are early examples of the first Pound Locks ever constructed in the British Isles. Radcot Bridge, north of Faringdon, is thought to be one of the oldest on the river and the site of a Civil War battle.[24] Other historic bridges include Wallingford, Abingdon and Dorchester. Historic flood meadows and ditch systems remain in some areas. Canal heritage includes locks and bridges, some of which have been restored.		Ploughing affects some scheduled monuments, including three Roman Villas in the Vale of White Horse and Cherwell districts as well as several ring ditches and settlement sites in South Oxfordshire and West Oxfordshire. Visitor erosion is a problem on the castle mound at Abingdon. Animal burrowing is affecting unmanaged monuments such as the airfield near Bicester and Dike Hills near Dorchester. Despite the proximity of archaeology in Port Meadow to Oxford, this Scheduled Monument is not on the At Risk Register. There are several Scheduled Monuments in the vicinity of the Cotswold Water Park where mineral extraction continues to take place. Canals are a focus for restoration as part of urban regeneration. Navigability remains an issue. As a rural area with limited development pressure, modern development has had little impact upon settlement pattern except near growth areas such as Aylesbury and Swindon.	Conserve the natural and historic features of historic parklands. Seek to restore the mosaic of land uses of the ancient Royal Hunting Forests where this will maintain sustainable food provision and boost biodiversity, sense of history and recreation. Protect parkland trees from plough damage.	

[24] Thames Corridor Catchment Abstraction Management Strategy, Environment Agency (2004)

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Tranquillity	Sparsely settled countryside Open water, including canals, rivers and water-filled gravel pits Urban green spaces	There has been significant decline in tranquillity since the 1960s – undisturbed areas have decreased from 71 per cent in the 1960s to 37 per cent in 2007. Experience of tranquillity is low near major urban centres such as Witney, Bicester and Aylesbury but also where settlements in adjacent NCAs extend such as Swindon and Oxford. The M4 and M40 are clearly corridors of noise but there are places where a dense network of A roads is negatively impacting upon tranquillity such as the Oxford-Kindlington-Bicester-Witney and Abingdon-Didcot-Wallingford-Thame-Aylesbury roads. Air traffic from Oxford Airport and military airfields just outside the NCA, for example Brize Norton and Fairford are also a source of noise. Beyond the major roads and urban centres, North Wiltshire and Aylesbury Vale provide the largest continuous areas of high tranquillity. The countryside offers opportunities to experience relative tranquillity for people living nearby in major urban centres such as Swindon, Oxford and Aylesbury. Within urban centres, green spaces including canals can offer relative tranquillity. Recreation activities can detract from experiences of tranquillity on rivers and lakes, such as water-skiing.	Local	Relative tranquillity is significant in this NCA, where the countryside and major urban centres such as Swindon and Oxford and motorway corridors are juxtaposed. There are recognised tourist destinations which increase vehicle and people traffic, for example, Thames and riverside settlements, Oxford Meadows, and Blenheim. Long views, sparse settlement patterns and flowing water are likely to enhance feelings of tranquillity in this NCA. Large areas are not recognised or promoted as tourist or recreation destinations, offering experiences of solitude.	Provide tranquil green spaces and recreation routes, particularly for people in major urban centres. Where possible, conserve the tranquillity of the river valleys and wetland as these are valuable tranquillity resources. Manage recreation activities on rivers and lakes to avoid negative impacts upon tranquillity, particularly in relation to noisy activities and busy locations. Ensure new development including transport infrastructure incorporates measures to minimise negative impact on tranquillity.	**Tranquillity** **Biodiversity** **Recreation** **Regulating water flow**

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Recreation	Rights of way National Nature Reserves Watercourses and waterbodies including the Thames Thames Path and The Ridgeway National Trails Common land and village greens Woodlands Canals	There are around 3,400 km of rights of way, at a density of 1.78 km per km^2. The Thames Path passes through this NCA over nearly 120 km and also a small part of The Ridgeway National Trail. The Oxford Canal Walk links with the Oxfordshire Way and is part of European long-distance path E2. There are two accessible NNRs – Chimney Meadows and North Meadow, Cricklade. The total area of open access land is1,000 ha. Most is accessible to many people due to its location near Oxford. Around 320 ha of the NCA is common land and another 110 ha is designated village green. While not extensive, these green spaces are conveniently near to settlements. 43 ha is recognised a country park. Forestry Commission funded agreements make a substantial contribution to publicly accessible greenspace, with around 2,000 ha being under Woods for People or Walkers Welcome agreements. The Great Western Community Forest plays a role in this. There are informal access arrangements to many of the Oxford college grounds. Private estates open their grounds to paying visitors, for example Blenheim, which can also be accessed by public rights of way through it. The non-tidal River Thames is one of the most intensively used waterways in Europe. It is a prime recreation and leisure resource with large populations living nearby and many visitors. It is home to many recreation and leisure clubs. Canoeing, rowing, fishing, walking and cruising are particularly popular.[25] The Oxford Canal and Grand Union Canal are recreation corridors providing for walkers, cyclists, anglers and boat users. The Wiltshire and Berkshire Canal is a focus for restoration and public access improvements. There are also many geocache sites. Water-filled gravel pits such as those in the Cotswold Water Park and in the Lower Windrush Valley offer a range of recreational opportunities	Regional	There is a wide range of recreation opportunities available, with the rivers, canals and water-filled gravel pits providing numerous water-based leisure opportunities. For example, over 500,000 people a year visit the Cotswold Water Park to enjoy a range of activities including bird watching, angling, water sports, walking and cycling. The Thames is a particular focus, drawing visitors from great distances. The grounds of the Oxford colleges and Blenheim Palace are also key attractions. Due to much of the countryside being managed for agriculture, there are few accessible green spaces and so recreation is very much restricted to linear routes, including footpaths and canals, which can offer a variety of opportunities. Woodland greenspace is significant in this NCA despite there being limited woodland cover. The distribution and proximity of greenspace in relation to major settlements varies across the NCA. Aylesbury and Bicester, for example, have large populations not well-served by green spaces. Oxford benefits from the grounds of the Oxford colleges and Oxford Meadows is a within short walking distance of the city centre. Major urban settlements such as Oxford, Swindon and Aylesbury as well as growing smaller towns such as Didcot, Witney and Bicester means that there is potential for high numbers of recreation users. This may give rise to deteriorating tranquillity, disturbance of wildlife and unsustainable erosion or trampling, for example, recreation has to be managed on the Oxford Meadows to avoid any negative impacts upon the SAC interest features.	Create green spaces within and around major urban centres, particularly where this dissipates visitor pressure away from the Oxford Meadows SAC. Design these to deliver multiple ecosystem services. Maintain the diversity of recreation opportunities available, from walking to water sports. Engage people in their heritage to enhance sense of place and sense of history, particularly in relation to Blenheim Palace, Oxford colleges, canals and the Thames Path. Continue to restore extraction pits to provide for sustainable recreation as well as geodiversity and biodiversity interests. Continue to restore canals and maximise sustainable public access to them, particularly in the proximity of urban centres.	**Recreation** **Biodiversity** **Sense of place/ inspiration** **Sense of history**

[25] Thames Corridor Catchment Abstraction Management Strategy, Environment Agency (2004)

Service	Assets/attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal services offered by opportunities
Biodiversity	Designated sites Lowland meadow Snake's head fritillary Wetland waders and waterfowl Marl lakes Native black poplar Black and brown hairstreak	Around 2,500 ha of the NCA is designated SSSI, comprising 1.3 per cent of the NCA. Of this, 52 per cent is in favourable condition and another 38 per cent is unfavourable recovering. 400 ha are also designated at a European level as three Special Areas of Conservation (SAC), while two National Nature Reserves provide access to rich biodiversity across approximately 90 ha. In addition, there are 355 Local Wildlife Sites amounting to 3 per cent of NCA area. 67 ha is designated Local Nature Reserve. This NCA has around 7,200 ha of flood plain grazing marsh, 1,700 ha of wet woodland and 1,300 ha of lowland meadows. Such habitats are restricted nationally. The reedbed at Otmoor is one of only 50 in the country greater than 20 ha. Rarer still are fens, of which this NCA contains 600 ha. There are also rich and extensive ditch systems around Otmoor, upper River Ray, and River Thames near Wallingford and in the Lower Windrush valley. There are significant pond complexes, for example in meadows adjacent to Farmoor Reservoir. North Meadow in Oxford is considered to be one of the best examples of lowland hay meadows and has the largest concentration of snake's head fritillary in the UK. Wetland habitat attracts regionally important numbers of breeding and wintering birds including snipe, redshank, curlew, golden plover and lapwing. Nationally important wintering wildfowl are associated with water-filled gravel pits, such as pochard and smew at the Cotswold Water Park. Nationally scarce marl lakes at the Cotswold Water Park support distinctive plant communities. The park provides a mosaic of open water, wetland and farmland habitats and supports a rich charophyte (stonewort) flora. The Cotswold Water Park and Aylesbury Vale are national strongholds for native black poplar. The Vale is also a stronghold for black and brown hairstreak butterflies.	National	In total, around 4 per cent of the NCA is designated for its nature conservation interest. There are 77 SSSI with an average size of 33 ha including numerous fens and meadows that are small and fragmented across productive farmland, legacy of a history of agricultural improvement, including drainage. Continued traditional management is carried out by the minority, including conservation organisations. There are, however, clusters of traditionally managed semi-natural grasslands along the river corridors which form the basis for a well-connected ecological network. Woodlands are also small and scattered across the landscape. These function in association with hedgerows and as part of the farmland mosaic of habitats. Water levels are more critical to wading birds than grassland species-richness so improved grasslands can have some biodiversity value if they are appropriately wet. The clusters of semi-natural habitat; the corridors of hedgerows, watercourses and ditches, and the farmland habitat mosaic can support a range of wildlife. Flowering meadows, particularly where the plants incorporate striking plants such as snake's head fritillary, readily engage people in their local greenspace.	Manage the three SAC and National Nature Reserves according to best practice. Secure multiple ecosystem services where they are compatible with the SAC and NNR designation. Manage historic grasslands, wetland and ancient woodlands to conserve soil structure and carbon content. Create a resilient and connected ecological network or habitat mosaic, beginning with the clusters of habitats along the river corridors. Manage these networks to regulate water flow through the landscape and manage features to filter pollutants and conserve soils. Manage recreation across green spaces so that people can engage sustainably with nature, especially in relation to avoiding disturbing breeding birds. Restore mineral extraction sites to boost biodiversity, strengthen sense of place and deliver other ecosystem services.	**Biodiversity** **Climate regulation** **Regulating water flow** **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
Geodiversity	Designated sites Low-lying flood plains Extensive river system Undulating topography River gravel terraces Extraction pits Springline Marl lakes Traditional building materials	There are 11 geological SSSI and 27 Local Geological Sites. Low-lying clay flood plains are drained by a dense network of shallow gradient watercourses and ditches. Superficial deposits upon the clay create an undulating topography and comprise extensive river gravel terraces that evidence the evolution of the river system and contain ice age mammal remains and human artefacts. These deposits also represent a key minerals resource and there is a legacy of extraction pits, including over 100 lakes at the Cotswold Water Park. There are springlines where the Chalk of the Chilterns, Berkshire Downs and Marlborough Downs meets the clay vale. Limestone gravels from the Cotswolds also give rise to nationally scarce marl lakes at the Cotswold Water Park. Traditional building materials include Cotswold stone, 'clunch', brick and tile.	Regional	Geological SSSI include extraction pits. Exposures in abandoned pits are vulnerable to scrubbing over. There are community groups and landowners working to conserve designated sites and engage the public in geodiversity in this NCA. Wootton Bassett Mud Spring is a hydrogeological phenomenon represented by few other examples in Britain. The mechanism of the phenomenon has been studied in detail at this site. Fossil hunting activities are offered at the Cotswold Water Park. Local clay has given rise to brick as a local building material. Chalk and limestone in neighbouring NCAs gives rise to springlines, a marl lake system and building materials of Cotswold stone and Chilterns 'clunch'.	Manage and restore historic and new extraction pits to conserve geodiversity and provide traditional building materials, while also seeking to regulate water flow and enhance biodiversity. Create publicly accessible greenspace which allows people to engage with geodiversity and realise a sense of place. Support continued use of traditional building materials in order to celebrate local geodiversity and maintain sense of place.	**Geodiversity** **Regulating water flow** **Biodiversity** **Recreation** **Sense of place/ inspiration**

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