National Character Area profile:

142: Somerset Levels and Moors

Supporting documents

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Introduction

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

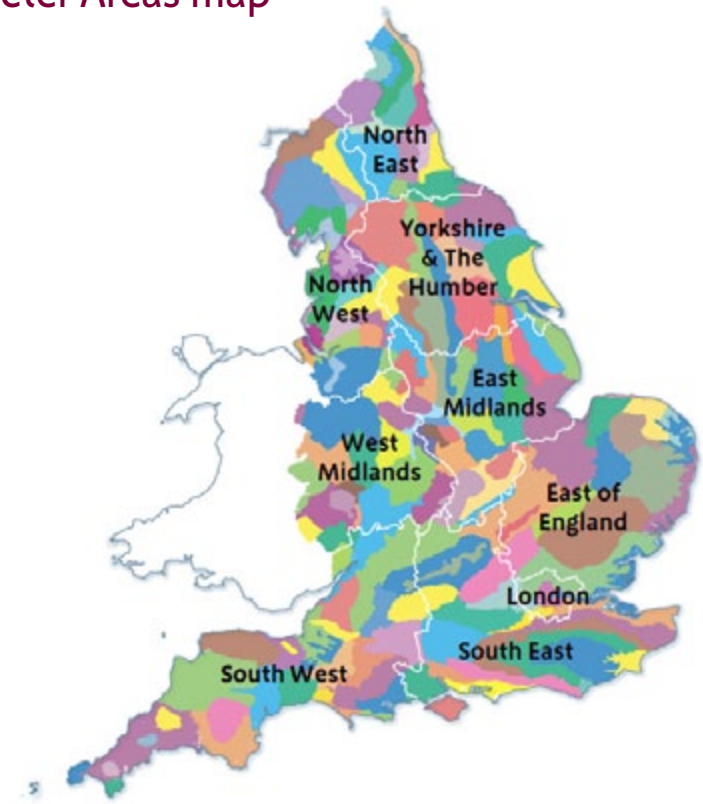
NCA profiles are guidance documents which can help communities to inform theirdecision-making about the places that they live in and care for. The informationthey contain will support the planning of conservation initiatives at a landscape scale, inform the delivery of Nature Improvement Areas and encourage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

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

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

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

National Character Areas map



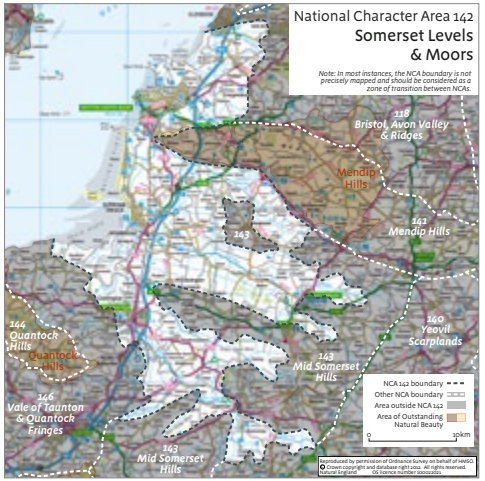
[1] The Natural Choice: Securing the Value of Nature, Defra (2011; URL: www.official-documents.gov.uk/document/cm80/8082/8082.pdf)
[2] Biodiversity 2020: A Strategy for England's Wildlife and Ecosystem Services, Defra (2011; URL: www.defra.gov.uk/publications/files/pb13583-biodiversity-strategy-2020-111111.pdf)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

Summary

The Somerset Levels and Moors National Character Area (NCA) is a flat landscape extending across parts of the north and centre of the historical county of Somerset, reaching from Clevedon near Bristol in the north to Glastonbury in the east and Ilchester and Langport in the south. The Somerset Levels and Moors NCA is dissected by the Mendip Hills NCA and the Mid Somerset Hills NCA, notably the limestone ridge of the Polden Hills. The western boundary is formed by Bridgwater Bay and the Bristol Channel beyond. The landscape blends almost seamlessly into the Vale of Taunton in the south-west and into the Yeovil scarplands to the south. This is a landscape of rivers and wetlands, artificially drained, irrigated and modified to allow productive farming. The coastal Levels were once mostly salt marsh and the meandering rhynes and irregular field patterns follow the former courses of creeks and rivers. They contrast with the open, often treeless, landscape of the inland Moors and their chequer-board-like pattern of rectilinear fields, ditches, rhynes, drains and engineered rivers, and roads. Today, the Levels and Moors have many similarities but their histories are quite distinct. The Levels landscape was probably established by the time of the Norman Conquest while the Moors remained an open waste until enclosure and drainage between 1750 and 1850. Water is an ever-present element in the NCA; water from a catchment area four times the size of the Levels and Moors flows through the area, often above the level of the surrounding land. Much of the area lies below the level of high spring tides in the Bristol Channel.

The biodiversity of the area is of national and international importance, reflected in the designation of 13 per cent of the NCA as Sites of Special Scientific Interest, a Special Protection Area (SPA) and a Ramsar site. The Severn Estuary Special Area of Conservation, SPA and Ramsar site lie immediately adjacent. More than 43,000 ha, two-thirds of the area, is classified as flood plain and coastal grazing marsh priority habitat; the largest lowland grazing marsh system in Britain. Wildlife abounds, most notably large assemblages of wetland and wading birds; more rare and scarce birds, such as the bittern, great white egret and recently reintroduced cranes; and both common and rare invertebrates and aquatic and wetland plant life, such as the greater water parsnip.

The area is a popular destination for both traditional seaside visits, to places such as Weston-super-Mare and Burnham-on-Sea, and to access the abundance of wildlife in the many nature reserves, including four National Nature Reserves. Coastal realignment at the Steart peninsula – the largest project of its type in Europe – has created extensive new areas of habitat. The area also contains a wealth of archaeological and heritage assets of national and international importance, much within the waterlogged soils across the area, illustrating the environmental history of human occupation and management of a wetland landscape extending over more than 6,000 years. The deep peat deposits and wetland habitats, as well as the coastal and estuarine muds, soils and habitats



Click map to enlarge; click again to reduce.

[4]Preliminary Nature Conservation Objectives for Natural Areas – Woodland and Forestry, Reid, C.M. and Kirby, K.J., English Nature Research Report 239 (1997)

store and sequester large quantities of carbon. Exhausted peat workings have been converted to create nature reserves rich in biodiversity. Peat continues to be extracted. The area also has a rich geodiversity of national importance, including classic preserved sequences of 350-million-year-old volcanic rocks of Early Carboniferous age as well as the 125,000-year-old 'Burtle Beds'.

As a result of the soil quality, favourable climate and the availability of water, the area produces lush grasslands and, subsequently, notable volumes of meat and dairy produce; however, much agricultural activity is dependent on the management of water levels and flooding and a fragile balance between water and farming exists. Seasonal and unseasonal flooding, affected by the changing climate, presents a challenge to the agricultural productivity of the area, to some of the species and habitats present and to some homes and livelihoods. Conversely, drought sometimes also challenges farming and the wildlife that depends on the presence of water. Addressing the challenges of flood risk and the environmental and economic consequences requires consensus and partnership working from those most likely to benefit from the long-term sustainability of the area. Most of this NCA is a deeply rural, pastoral landscape.

Reed bunting.

Statements of Environmental Opportunity

SEO 1: Manage and plan for change in the function of the network of watercourses, water management infrastructure and wetland habitats across the Levels and Moors to provide benefits in improved flood management, water and soil quality, viable agricultural futures, protection of sub-soil archaeology and to increase the range and extent of habitats and species and their resilience to climate change.

SEO 2: Manage the predominantly pastoral agricultural landscape to ensure and enhance the future of sustainable farming, strengthening landscape character, protecting soils, particularly peat soils, and water, and enhancing biodiversity through improved integration of activity, creating more, better and more resilient habitats and ecological networks.

SEO 3: Safeguard and manage the geodiversity and geomorphological processes, particularly those influencing rivers and their flood plains, and the internationally important coastline and associated habitats and species. Where appropriate, allow the unimpaired operation of natural coastal processes, resulting in the creation of new habitats, protecting existing habitats, conserving and enhancing landscape character, and benefiting biodiversity.

SEO 4: Protect the open views and distinctive character of the landscape of the area and seascape of Bridgwater Bay, enhancing access to and interpretation of the wealth of natural, cultural and heritage assets, and recreational opportunities throughout the area, in particular its significant concentration of nature reserves.

Bridgwater Bay from Brean Down - a stretch of 'protected' coastline backed by holiday and caravan parks.

Description

Physical and functional links to other National Character Areas

The Somerset Levels and Moors National Character Area (NCA) is closely linked, both geographically and historically, with the adjacent Mid Somerset Hills NCAs and Mendip Hills NCA. The hills surround and divide the Levels and Moors from the east and to the north, and form a distinctive part of the skyline. Communities living on the higher ground have utilised – and continue to use – the natural fertility of the Somerset Levels and Moors since prehistoric times, as evidenced by ancient trackways and causeways leading from the higher ground, which is less prone to flooding. Maintaining and reinforcing the longstanding relationship between farm and livestock management on the hills and lower-lying areas will secure opportunities for future flexibility and more extensive, sustainable farming systems. The name Somerset comes from this relationship between the two areas – the Saxon Sumersaeta, meaning 'summer man's land'.

Several rivers flow into the Levels and Moors from surrounding NCAs, creating a strong physical link. The catchment of rivers from an area four times the size of the Levels and Moors flows through the area, often above the level of the surrounding land, so that at times large volumes of water are moving through the NCA en route to the Severn estuary.

There are wide panoramic views both from inside the area looking out and from outside the area looking in. The area is overviewed from surrounding hills: from the Mendip Hills, Blackdown Hills and Quantock Hills, all Areas of Outstanding Natural Beauty; from the Mid Somerset Hills, including the Polden Hills and the low rounded hills at the foot of the Blackdowns; and the Yeovil scarp.

King's Sedgemoor Drain - water and the management of water are defining aspects of the area.

There are dynamic processes of sediment accretion and erosion along the coastline – much influenced by the extremely high tidal range and sediment load of the Severn estuary – helping to create intertidal and subtidal mudflats, sand flats and salt marsh around the fringe of Bridgwater Bay. Waterborne sediment and nutrients flowing into Bridgwater Bay and the Severn estuary significantly influence coastal processes and water quality, potentially affecting the Severn Estuary Ramsar site, Special Area of Conservation (SAC) and Special Protection Area (SPA). Greater horseshoe bats from internationally designated sites in the adjacent Mendip Hills are known to fly into the area to feed on the large quantities of invertebrates associated with the wetlands and livestock farms found here.

Nearly 1,500 ha of National Nature Reserve (NNR) over six sites, and more than 8,000 ha of Sites of Special Scientific Interest (SSSI) contribute in part to the provision of access to the wealth of natural history and educational opportunities for a wide population, most coming from outside the area. This also functions as a major species resource, or 'bank', capable of expanding to surrounding areas.

Distinct areas

The north Levels and Moors beyond Weston-super-Mare and the Mendip Hills.

Simple vernacular architecture using local 'blue' Lias limestone in the burtle village of Chedzoy.

Large flocks of starlings create an autumn spectacle attracting many visitors to the area.

Key characteristics

- This is a flat open landscape of wet pasture, arable and wetland divided by ditches and rhynes, often forming a chequer-board pattern, that clearly illustrate the reclaimed, planned nature of the landscape.
- The area includes the largest lowland grazing marsh system in Britain.
- The landscape is surrounded, divided and punctuated by a diverse geology of hills, ridges and islands, such as the Mendip and Polden hills, and Brent Knoll, Burrow Mump and Glastonbury Tor, which form distinctive skylines.
- The centres of individual moors are often treeless, with a gradation to an increasingly 'bushy' appearance towards their edges created by occasional hedgerows and lines of pollard willows associated with ditches and rhynes.
- Rivers draining into the Levels and Moors include the Axe, Brue, Parrett, Yeo and Isle. Most of the area is susceptible to flooding, lying below high tide level and the water level of the main, embanked river systems.
- Semi-natural unimproved grasslands, wet meadows, fen, mire and reedbeds underline the area's wetland character, which is internationally important for assemblages of wetland and wading birds, invertebrates, amphibians, wetland mammals, and the aquatic vegetation of the rhynes and ditches.
- The historical landscape illustrates continuous human occupation since prehistory with a vast array of features, including some of the oldest archaeological remains, of international and national importance, contained within peat deposits and other waterlogged soils across the area.
- Extensive peat extraction in the Brue Valley gave rise to a complex landscape of excavation which, along with the reclaimed land of the nature reserves and woodland, contrasts with the rectilinear planned landscape of the Moors.
- There is a strong planned aspect to some towns and villages, with buildings running along single streets, for example at Langport. Buildings on the open Levels and Moors are scarce, with a few farmsteads, mainly in brick or Blue Lias limestone with clay pantile roofs and occasional thatch.
- Reflecting the history of reclamation, roads on the Levels are often sinuous, following the line of rhynes that were once salt marsh creeks; others are straight droves, causeways and flood embankments, slightly raised and related to the drainage channels of the 18th-century landscape of the inland Moors.
- The coast fringing Bridgwater Bay is complex and various: dunes extend from Brean Down southwards to Burnham-on-Sea, embankments hug the coastline south of Highbridge, and either side of the Parrett estuary there are mudflats, sand flats, storm shingle beaches and salt marsh. Manmade defences have been created to keep high tides at bay and are a dominant feature of the coastal scene.
- The M5 motorway and railway lines run north–south, linking several of the larger towns, including Weston-super-Mare and Bridgwater. Incremental development and industrialisation from the towns is evident, especially on the western side of the motorway.

A raft spider; one of the many rare invertebrates to be found in the wetlands of the Levels and Moors.

A flat, open, pastoral landscape divided by ditches and drains.

Somerset Levels and Moors today

The Levels and Moors is a flat landscape much influenced by the underlying geodiversity and water. Expansive views, with the surrounding, often wooded higher ground as a backdrop, contrast with local enclosure and small-scale features such as pollard trees, ditches, flood banks and expanses of winter floodwater.

The Moors to the west of the area lie within inland basins formed by the Mid Somerset Hills. While some parts are largely treeless, others are more enclosed by overgrown hedgerows and pollard willows. The open middles of the Moors are dominated by the strong rectilinear pattern of rhynes (larger ditches) linking field ditches to major rivers. Several rivers, including the Axe, Brue and Parrett, flow through the Levels and Moors to Bridgwater Bay. The watercourses in the area are notable for the fish populations they support, particularly eels, although eel numbers have declined significantly in recent years. The watercourses have been substantially reshaped, straightened and embanked by drainage operations, which also created new waterbodies such as the Huntspill River. The sense of a transformed landscape created over many hundreds of years of management, often in a piecemeal unplanned way responding to prevailing problems and requirements, is all pervading. The history of the area is characterised by periods of decline and flooding, followed by bursts of intense drainage improvements.

Near the islands and ridges of the Mid Somerset Hills, and particularly northwards from the Poldens, there is more tree and shrub cover, notably of pollard willow, with a slow transition to a landscape of hedgerows, farmsteads, villages and orchards as the land rises. Species-rich, sometimes colourful meadows remain on several Moors, containing characteristic wetland plants such as marsh marigold, purple loosestrife, ragged robin and meadowsweet.

The many reserves provide access for all to nature, landscape and heritage.

Peat extraction has also changed the landscape of the Moors. The deepest deposits and most extensive workings are in the Brue Valley. Here, shelterbelts, drifts or scrub and the long strips of the excavations result in a more complex pattern than the simple chequer-board of much of the agricultural landscape. Nature reserves give further variety in texture. Former peat workings now managed for wildlife complement the wetland landscape with reedbeds, scrub and patches of open water and fen.

Low hills or 'burtles' (the 'fossilised' sand banks of marine deposits) punctuate the area of Moors east of Bridgwater. It is mainly on these, providing some protection from flooding, that the few modest-sized old settlements such as Chedzoy and Burtle are based. Otherwise there are few buildings; these are mainly 19th-century farms of brick or occasionally Blue Lias limestone, with clay pantile roofs and occasional thatch. There are also a few more recent buildings.

The Levels is a low belt of marine clay which runs parallel to the coast. It holds back the water draining from the surrounding hills, and this has resulted in the formation of the Moors. With its intermittent areas of irregular fields and sinuous lanes, the Levels is an older landscape than the reclaimed Moors, and more densely populated.

The Levels abuts a coastline of extensive mudflats, rich in wildlife, around the Parrett estuary and the edge of Bridgwater Bay. Sand dunes extend northwards to Brean Down. Coastal tourism has resulted in a strip of caravan parks and camp sites centred on Burnham-on-Sea and Weston-super-Mare. From a number of vantage points there are views across the Bristol Channel to the islands of Steep Holm and Flat Holm and the coast of south Wales

It is a pastoral landscape. Dairy and beef farming are the economic mainstay of the population, and the primary land use pattern is one of summer grazing with hay or silage production. There is an outstanding expanse of two primary habitats: lowland wet grassland and species-rich flood plain meadows and pastures.

The Somerset Levels and Moors NCA comprises a unique manmade wetland landscape of international importance for nature and archaeology. At its heart is the largest lowland grazing marsh system in Britain which is, consequently, of outstanding environmental interest. An important number and range of birds over-winter or breed in the area. Bittern breed in ever increasing numbers, and cranes have been reintroduced. On autumn evenings, vast flocks of starlings provide a glorious spectacle as they wheel over the flat landscape to their roosting sites.

Particularly within the Brue Valley and associated with the complex of wetland sites found in its numerous reserves, specialist wetland animals and insects can be seen in significant numbers, for example otter, water vole, bats and grass snake, many species of fly, beetle and dragonfly, and rarer species such as the lesser silver diving beetle, argent and sable moth and raft spider. Many predators, such as the hobby, also benefit from this rich, lush landscape. Similarly, both rare and common aquatic and wetland plant life, such as the greater water parsnip, can be found. The reedbed, fen and swamp habitats in this area evoke an ancient, wild landscape

The wealth and importance of wildlife and habitats found in the area are reflected in the fact that nearly 7,000 ha, or 10 per cent, are covered by international nature conservation designations and protection as SSSI; a further 3 per cent of the area beyond the international designations is also protected as SSSI; and a total of six NNRs extend over nearly 1,500 ha.

Remarkable archaeological finds have been made in the peat deposits of the Moors, telling us much about their past management and the interactions between people and the environment. The sediments contain a record of ancient landscapes and climates with the peat containing ancient tracks, preserved for thousands of years – the lake villages at Glastonbury and Meare dating from the first millennium BC are perhaps the best-known examples.

The extension of settlement has been linked to the construction of embankments and sea walls, and the digging of drainage ditches; for example, settlement

extended to the coastal clay belt in the Romano-British period. The drained medieval field system of the Levels and Moors comprises one of the best-preserved medieval enclosure landscapes in England. Areas of medieval and earlier enclosure are characterised by irregular patterns with raised droves and evidence of oval infields bordered or girdled by pioneer farmsteads.

Settlement is often sparse and historically much influenced by the avoidance of flood risk, being located on slightly raised ground. Highbridge, Burnham-on-Sea, Weston-super-Mare and Bridgwater are the main settlements. Residential and industrial development now extends across the open landscape to the M5 motorway.

The wildlife and heritage, local food and sense of remoteness have now become significant attractions for increasing numbers of visitors and tourists. A sense of mysticism exists, much enhanced in the Brue Valley – the Avalon Marshes – by its proximity to Glastonbury. This is a landscape formed and sustained by the management of water: 'paradoxically the landscape owes its wild and desolate atmosphere to an environment that is almost entirely man-made'.[4]

[4] *The English Landscape* – Bill Bryson, et al. (2001)

Settlement takes advantage of the slightly higher ground adjacent to the River Parrett at Athelney.

The landscape through time

The Quaternary muds, sands and peats of the Levels and Moors, formed over the preceding 11,500 years, are underlain by the Mesozoic Central Somerset Basin comprised of Jurassic and Triassic strata. At times during the Quaternary, it is possible that the Bristol Channel was blocked by ice, forming a large lake over much of the area. During warmer, interglacial periods the area was dominated by rivers depositing terrace sediments and flood plain alluvium, as well as higher sea levels depositing estuarine sediments. The surrounding hills are predominantly underlain by late Triassic and early Jurassic grey clays and limestones which overlie red Mercia Mudstone. Along the coast there are areas of sand dunes and storm gravel beaches which protect the hinterland from incursions by high tides.

The Levels and Moors originated as broad estuaries after the last ice age. A belt of slightly raised marine clay running parallel to the coast – the Levels – impeded the flow of water out of the area resulting from rising sea levels and, augmented by run-off due to high rainfall on the surrounding Mendip and Blackdown hills, formed inland areas of groundwater peat fen. The resulting peat moors – the Moors – have provided a variety of resources since prehistory: valuable common pasture between surrounding settlements; a source of peat; pollard willows; and material from osier beds for making fish traps and basketwork. The withy industry continues to produce baskets and artists' charcoal.

The landscape of prehistory was one of swamp and mere. The ridges of the Mid Somerset Hills and the few knolls provided higher ground where Neolithic people could live during winter floods. During summer months they would move down on to the Moors and make use of the marsh resources. Tracks and causeways crossed the wetland, linking it to higher, drier land. The best known of these is the 'Sweet Track', rediscovered in 1970 and dating from 3,807 or 3,806 BC. Tracks continued to be built for millennia and, along with lake villages established during the Iron Age, such as those found at Glastonbury and Meare, were at the heart of the marshland economy.

Roman influence extended across the area, with settlement focused principally on Ilchester and the surrounding hills, with management and exploitation of the resources offered by the Levels and Moors such as good grazing, fish, fowl and, notably, salt. Evidence of numerous Roman saltings can be found in the coastal Levels between Brent Knoll and the Polden Hills.

By the time the Saxons arrived, it is likely that all of the marshlands were being exploited by the surrounding populations. The numerous ton and ey settlements, mainly on the surrounding hills, but sometimes on the Levels and Moors themselves, are evidence of Saxon influence and consolidation. During the Viking incursions, Athelney, isolated in the centre of the marshes, became King Alfred's refuge and is now marked by a memorial, although the monastery he founded has long since disappeared. The subsequent peace treaty with the Danes, agreed on the edge of the levels at Wedmore, marked the crowning of Alfred as the first King of England.

It was the abbots of Glastonbury Abbey – founded or re-founded by King Ine of Wessex around 700 AD – who were the driving force behind marshland reclamation in the 13th century when raised causeways were laid out across the wetland areas. A new course was cut for the River Brue and the land around the higher ground reclaimed. However, following floods and the population decline of the 14th century, reclamation activity declined and it was not until the 1770s that major reclamation recommenced. Work had been substantially completed by 1849. Severe flooding from both the sea and rivers was an ever-present danger well into the 20th century, much reduced by the creation of a new outfall for the

Brue at Highbridge. An artificial river was created to link the Brue to this outfall. Much later, the Huntspill River was dug to connect the South Drain directly to the coast instead of draining into the Brue. Pumping stations were also installed at this time. The present water management regime depends on gravity drainage at low tide with pumps to remove excess and to drain agricultural land, since much of the Moors is below high tide level. Flooding remains an ever-present element of the area, and in the 21st century high summer rainfalls have resulted in perceived 'unseasonal' flooding; however, it is not unusual for flooding to occur in summer.

In 1685 the Battle of Sedgemoor saw the quelling of the Duke of Monmouth's rebellion, a Jacobin uprising challenging the Hanoverian succession. The subsequent 'bloody' assizes overseen by Judge Jeffreys had a lasting legacy. The full-scale night time engagement was ultimately doomed to failure, in large part due to the wetland nature of the landscape. This was the last major battle to be fought on English soil. The battlefield and memorial remain an evocative place.

The highly modified nature of the Levels and Moors landscape is also evident in the towns and villages, which by the 11th century had emerged as the dominant element of the area's settlement pattern. Langport, for instance, is laid out along a single street and many villages are surrounded by strip fields. Most of the inland towns and villages have grown only gradually in recent times, but Bridgwater, on the edge of the area, expanded rapidly as a coal port and industrial centre in the 19th century and continued to expand in the 20th century.

A number of Second World War defensive structures of note can be found around Bridgwater Bay and along the Parrett estuary in particular. The defences link to a string of pillboxes and other anti-invasion defences along the Bridgwater to Taunton canal, together making up a 'stop line', nationally significant for its degree of preservation, running along the edge of the Levels and several moors to the south.

The landscape around Athelney, King Alfred's refuge during the Viking incursions, with Burrow Mump in the distance.

Peat is known to have been extracted from the area since at least Roman times. In the 1950s, with the advent of plastic packaging which prevented the peat from rotting, and increased horticultural demands, the process was 'industrialised' and activity increased. Many of the former workings have been reclaimed as nature reserves and support internationally important habitats and wildlife. Peat continues to be extracted in commercial, but much reduced, volumes. Arable farming on peat has locally lowered land levels and ultimately made some areas unproductive for agriculture. Many of these areas are now nature reserves, for example West Sedgemoor, Catcott Lows and Greylake. Intensive agriculture and the drainage of peat soils has had an impact on their structure, value and land level and resulted in some very significant and ongoing changes across wide areas.

Most 20th-century development can be found on the coastal strip and alongside the M5 motorway. Bridgwater, Highbridge, Burnham-on-Sea and Weston-super-Mare have all experienced substantial growth with housing and commercial and industrial units expanding further eastwards towards the motorway.

In 1987, a large proportion of the area (27,678 ha) was designated as an Environmentally Sensitive Area (ESA) in order to conserve and enhance landscape, wildlife and historic interests. This scheme closed in 2012.

Between 1990 and 1998, there were agricultural changes which led to modifications in the character of the area. Many of these changes were the result of lack of management of common elements, such as the pollarding of willows, and the management of woodlands and orchards. There was a marked loss of permanent grassland and increased cereal production. Maize production to support livestock numbers and a significant dairy industry have also resulted in a marked change in character. From 1999 to 2003, the characteristic elements in the farming landscape once again began to be maintained, although development

The M5 motorway and railway line corridor have attracted increasing levels of development.

pressure in some areas remains. The end of the ESA scheme for many farmers in 2012 has increased the pressure for intensification of farming practices in some parts of the Levels and Moors. At the same time, some fields have been neglected.

Ecosystem Services

The Somerset Levels and Moors 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 Somerset Levels and Moors NCA is contained in the 'Analysis' section of this document.

Provisioning services (food, fibre and water supply)

- **Food provision:** The area primarily produces beef, milk and other dairy products, with some arable products. Lamb produced in the Levels and Moors is recognised for its quality of finish, particularly lamb associated with the traditional extensive grazing of the salt marshes of the Parrett estuary. Traditional orchards of apples and pears are found on the periphery. Locally produced food attracts a premium and is often marketed under the 'Levels' Best' brand.

- **Water availability:** The majority of the area is underlain by a post-Carboniferous aquifer and is considered at low risk or no risk in terms of ground water and surface water availability. All the river catchments are considered as having water available for abstraction, apart from the few sections of the River Yeo that are over-licensed (for example, the upper Yeo, above Thornford, which lies outside the NCA). The abundance of water is key to maintaining the character and function of the area. The main abstractions are for public water supply; other abstractions are for industry and agriculture. The Cheddar reservoir stores water filtered and captured from the Mendip Hills and contributes to the supply of water to the city of Bristol. The Congresbury Yeo and Cheddar Yeo rivers contribute to the Blagdon and Cheddar reservoirs, limiting further opportunities for abstraction.

- **Biomass energy:** There is potential for some biomass production from both miscanthus and short rotation coppice; willow coppice and pollarding have a longstanding tradition throughout the area. However, this potential will be limited by the underlying archaeological remains and competing land use. Reed and rush harvesting from the large areas of nature reserve may be a source of both biofuels and peat alternatives.

Dairy farming is an economic mainstay of the local community.

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

- **Climate regulation:** There is high carbon storage in the Levels and Moors, predominantly in the peat soils of the Moors. The centre and west of the area has soils with a carbon content of up to 10 per cent, the north up to 20 per cent, and areas in the south-east between 20 and 50 per cent.

- **Regulating water quality:** The Somerset Levels and Moors NCA falls within two Department for Environment, Food and Rural Affairs (Defra) catchment sensitive farming priority catchments, both of which suffer from soil erosion and associated nutrient leaching, with high rates of sedimentation of watercourses. Both catchments are affected by phosphate pollution while the Congresbury Yeo and Land Yeo, within the North Somerset Moors catchment, also suffer from nitrogen leaching. The ecological status of the rivers in the Levels and Moors is moderate to poor; the ecological quality of the estuarine waters is considered moderate; while the groundwater has areas of good chemical status in the central and inland areas, but further north is classified as poor. As such, better regulation of water quality is a necessary service.

- **Regulating water (flooding):** The area is formed by the flood plains of eight major rivers or drains. The river catchment systems of the surrounding NCAs are influential in controlling water flows within the area. The river network across the Levels and Moors has been artificially modified over several centuries to increase the flow of water to the sea; the whole area is influenced to some degree by the artificial regulation of water. Many rivers, drains and embanked channels are unable to retain fluvial floodwaters, leading to a risk of extensive flooding across most of the Levels and Moors; in the case of the Tone and Parrett rivers, this is exacerbated in high tidal conditions. Floodwater storage in the wetlands during periods of high or prolonged rainfall is a function of the manmade system. The maintenance of raised water levels supports nature conservation interests, buried archaeological remains and soil carbon levels.

- **Regulating soil quality:** The condition of peat soils can be adversely affected by over-abstraction of water and excessive drainage, resulting in desiccation. Intensive and repeated cultivation and arable cropping increase the stress placed upon soils, particularly those with high peat content, and may lead to a reduction in soil quality and condition.

- **Regulating soil erosion:** Consideration given to the regulation of soil erosion has historically been low, although it is now recognised as a problem within the Defra catchment sensitive farming priority catchments in the area. Much of the area suffers from damaged soil structure, notably compaction and impeded drainage in areas with clay soils, which accelerates run-off. This leads to increased erosion rates and sedimentation of watercourses. Exposed peat soils are also highly vulnerable to both wind and water erosion.

- **Regulating coastal processes:** The majority of the NCA is only a few metres above mean sea level (and some areas are below it at high tides). Across the Severn estuary, areas of the tidal flood plain have been developed with the construction of flood defences or engineered embankments reducing natural interaction with the flood plain. Climate change is likely to increase tidal flood risk; this will be exacerbated in low-lying areas where increased sea levels inhibit pumped land drainage. Tidal inundation within coastal areas could result in saline intrusion into freshwater bodies, many of which are designated for their nature conservation interest and depend on fresh water. Coastal processes throughout the estuary, and particularly within Bridgwater Bay, are dynamic and of considerable importance, both within the estuary and to the

low-lying adjacent land. A tidal surge barrier to protect Bridgwater is predicted as being necessary before 2030 and is being planned.

Cultural services (inspiration, education and wellbeing)

- **Sense of place/inspiration:** The area has a clear identity created by the open landscape of wet pastoral grassland and natural flood plain – the largest remaining in England. The geometric pattern of drains and rhynes highlighted by pollard willows give the landscape a distinctive rhythm. Large dramatic skies, broad horizons, skylines and features, often with associated heritage or wildlife, stimulate the imagination. The area around Glastonbury is closely associated with the Isle of Avalon and the Arthurian legend.

- **Sense of history:** The NCA contains a wealth of remains, including prehistoric wooden trackways, such as the 'Sweet Track'; lake villages from the Iron Age; saltings and other early industrial processes; medieval enclosures and land drainage; peat workings; and Second World War defences. The area also has strong associations with the history of Christianity, for example Glastonbury Abbey. The sediments contain a record of ancient landscapes and climates. Human occupation is apparent and contributes to the wealth of heritage to be found in the area. In combination, they are of international importance. On the Levels and Moors, settlement is generally sparse. Where larger settlements exist, such as Langport, they are constructed along old sea walls and embankments, further illustrating the close and sometimes perilous relationship between human occupation and water in this area. Locally sourced building materials are often a visual expression of the underlying geodiversity.

- **Tranquillity:** Across most of the larger open moors and along the undeveloped stretches of coast, there are extensive areas without human development or occupation, complemented by long expansive views. Intimate, secluded and quiet areas are often found in close proximity to vast open areas of seeming wilderness.

- **Recreation:** The many accessible nature reserves provide opportunities for close contact with a vast wealth of wildlife and nature. They provide and supply many educational opportunities and activities. Opportunities for birdwatching draw many people to the area from across the country and from abroad. The coast provides for more traditional tourist and recreational activities as well as access to marine and coastal wildlife. Wildfowling and fishing are also common and popular activities pursued in the area.

Birdwatching attracts large numbers of people to the many nature reserves in the area.

- **Biodiversity:** The Somerset Levels and Moors, once part of the Severn estuary, is now the largest area of lowland wet grassland and natural flood plain remaining in England. The semi-natural habitats, predominantly wetlands with coastal and flood plain grazing marsh, fens, lowland meadows, lowland raised bog and reedbeds, are of local, national and international importance. Some 13 per cent of the NCA is designated as SSSI and much is also designated as an SPA and a Ramsar site. The adjacent Severn estuary is an SAC, SPA and Ramsar site. Much of the associated and accompanying flora and fauna beyond these areas are of equal importance.

- **Geodiversity:** Geodiversity helps define the wider landscape and character of the NCA, from the topography to the soils. Locally, the Carboniferous limestone contains a significant sequence of volcanic rocks. The Quaternary deposits contain important records of climate and environmental change. These provide a context and insight into the potential impacts and effects of future climate change and global warming. Several SSSI have been notified for their buried Quaternary sediments.

Bittern - a secretive inhabitant of the wetland nature reserves.

Statements of Environmental Opportunity

SEO 1: Manage and plan for change in the function of the network of watercourses, water management infrastructure and wetland habitats across the Levels and Moors to provide benefits in improved flood management, water and soil quality, viable agricultural futures, protection of sub-soil archaeology and to increase the range and extent of habitats and species and their resilience to climate change.

For example by:

- Restoring and maintaining a functioning flood plain, where flooding forms a normal part of land management, which also serves to enhance flood mitigation, protect peat soils from desiccation, increase biodiversity and preserve archaeological and geological evidence. Also, reducing pumping with engines driven by fossil fuels, increasing the use of gravity drainage and restoring natural processes in strategically important places.
- Maintaining and restoring water management infrastructure – pumps, sluices and other control mechanisms, ditches, rhynes and drains – to minimise the impact of flooding on people and property.
- Considering and applying more sustainable farming practices better suited to prolonged periods of inundation on those moors where flooding is most frequent.
- Researching and exploring innovative approaches and options to address water management that potentially benefit both the natural environment and agriculture. Also, exploring mechanisms that release land to make space for more water storage and gravity drainage, including land purchase, land swaps, payment for ecosystem services schemes and farmer early retirement schemes.
- Mapping and quantifying ecosystem services at a holding scale, particularly in the lowest-lying parts of the area, to identify and stimulate initiatives that release land from agriculture in exchange for other benefits, principally biodiversity through the expansion of wetland habitats such as fen, bog, swamp and reedbed, water regulation, protection of heritage assets and provision of access and recreation.
- Restoring over-drained or damaged wet grasslands, and reinstating traditional water management techniques and groundwater levels, where appropriate.
- Resisting field enlargement that would result in the loss of watercourses, leading to the erosion of the strong geometric pattern in the landscape, and the abandonment of traditional channel management practices.
- Creating, within arable and grass ley fields, grassland buffer strips alongside watercourses to reduce soil erosion and run-off, and minimise nutrient leaching.
- Employing best practice in soil management, use of low-pressure machinery, and careful management of livestock near watercourses and bank sides, using grassland buffer strips and semi-natural habitats to enhance infiltration and protect watercourses from nutrient and sediment input.

SEO 1 continued

- Identifying, and resisting intrusion into, areas of historical, archaeological and geological interest and sensitivity; particularly areas associated with prehistoric and iron-age activities, early Christian sites and the Battle of Sedgemoor battlefield. Conserving and interpreting archaeological earthworks and sub-surface archaeology, while recognising the potential for undiscovered remains.
- Managing the historical network of field boundaries, including drains, ditches, rhynes and dykes, providing significant semi-natural habitats, improving water quality and preserving key landscape features.
- Contributing to the planning and execution of the remaining excavation of peat in the Brue Valley, to minimise carbon losses and the loss of buried heritage assets and geological interest, and improving opportunities for biodiversity, soil quality and food provision in restoration plans.
- Working in collaboration with landowners to realise the potential for restoration schemes on former peat works that will contribute to increasing areas of wetland habitat and improved water storage and management.
- Maximising opportunities for integrating wetland restoration – raised bog and wet heath – with flood attenuation and water storage initiatives, adopting a 'whole moor' approach to landscape-scale flood management.
- Resisting development proposals, particularly in flood plains, that increase areas of hardstanding, increasing run-off rates and reducing soil water storage capacity, while encouraging schemes that maximise sustainable drainage techniques.
- Mapping ecosystem services at a landscape scale and modelling the effects of drought and flood to aid the identification of opportunities and shortfalls resulting from predicted levels of investment in the water management system.

Managing water - the sluice at the end of the Huntspill River. Beyond is Bridgwater Bay and the Bristol Channel.

SEO 2: Manage the predominantly pastoral agricultural landscape to ensure and enhance the future of sustainable farming, strengthening landscape character, protecting soils, particularly peat soils, and water, and enhancing biodiversity through improved integration of activity, creating more, better and more resilient habitats and ecological networks.

For example by:

- Supporting the local farming community, where possible through agri-environment grants, encouraging flexibility in land management, where appropriate maintaining the existing mixed farming systems, and increasing the floristic diversity of pasture.
- Identifying opportunities for changing and enhancing farm businesses through mechanisms such as premium brand marketing, use of traditional premium value hardy breeds, payment for ecosystem services, and linking the management of flood plain land to hillside land.
- Aiming to develop a more diverse range of habitats, vegetation types and structures within holdings, enabling habitats and as a consequence, species to respond to the effects of climate change, while maintaining viable farming businesses, cultural associations and traditions and the overall character of the area.
- Where appropriate, moving towards more extensive and sustainable land management (by means of appropriate stocking ratios and the use of hardy traditional beef breeds of cattle), reducing the risk of soil compaction and poaching, increasing opportunities for floristic diversity, promoting the sensitive uses of pesticide and fertiliser, and implementing manure management plans, reducing nutrient enrichment of watercourses and improving overall water quality.
- Helping farmers and landowners in the lowest-lying, wettest areas to move away from farming, researching and mapping where the best opportunities exist. Land taken out of primarily agricultural use should realise other benefits such as an improved range of ecosystem services, including floodwater storage, reduced dependency on pumping of water, carbon storage, recreation, extensive fish production and increased biodiversity.
- Maintaining, extending and improving the connectivity and area of permanent grassland and other semi-natural habitats on peat soils, seeking and realising opportunities to revert to arable farmland. Re-creating wet grassland and bogs, reedbeds and fens, especially on the peat, while continuing to recognise the need for the ongoing viability of agricultural activity within the area.
- Encouraging the management, restoration and creation of withy beds, flood plain and wet woodland, particularly around the Curry Moor, Whitmoor, Stan Moor, North Moor, Hay Moor, Aller Moor, Salt Moor and West Sedgemoor areas, for their contribution to landscape character, cultural associations, enhanced habitat mosaic and for small-scale, localised basket-making.
- Retaining and restoring to management pollard willows, and planting locally sourced and grown specimens suitable for future pollarding along drains, ditches, rhynes, drove roads and tracks to reinforce traditional landscape character, enhance habitat connectivity, while contributing to the regulation of water temperature and providing small-scale, localised sources of wood fuel.

SEO 2 continued

- Maintaining the diversity of vegetation and enclosure pattern found around the fringes of the Moors, contrasting with the open character at the centre of each moor and increasing opportunities for a wide range of biodiversity and local distinctiveness.
- Working with farmers and landowners to improve farm infrastructure and waste management, encouraging crops which require lower chemical input and minimising the use of nutrients and pesticides to avoid the leaching of soil nutrients into watercourses.
- Working through co-ordinated and collaborative management with existing projects, and specifically across the suite of nature reserves, as well as through emerging initiatives, to deliver enhanced land and water management and habitat connectivit y, as well as informed and continuing engagement with local communities and user groups.

White Admiral.

SEO 3: Safeguard and manage the geodiversity and geomorphological processes, particularly those influencing rivers and their flood plains, and the internationally important coastline and associated habitats and species. Where appropriate, allow the unimpaired operation of natural coastal processes, resulting in the creation of new habitats, protecting existing habitats, conserving and enhancing landscape character, and benefiting biodiversity.

For example by:

- Responding to rising sea levels by making the best short-term use of existing flood defences, effectively realigning flood defences in the medium to long term and allowing natural, soft flood defences to develop. The development of new intertidal habitats should, where possible, compensate for any losses arising from coastal squeeze.
- Maintaining the role of coastal and estuarine habitats in storing carbon and ensuring that new sites are managed to enhance the geodiversity and biodiversity value of the coast and estuaries and the internationally important species and habitats associated with them, and contribute to their expansive landscape character.
- Seeking opportunities to increase the extent of intertidal habitats – including salt marsh, reedbeds and mudflats – to provide effective defences against wave energy and to protect and enhance biodiversity and geodiversity interest and value, as seen in the Steart peninsula realignment project.
- Enabling the natural and dynamic coastal and estuarine geomorphological processes to continue, so that the coastline and estuaries can respond to changing patterns of accretion and erosion.
- Raising awareness of the importance of the roosting and feeding areas for birds around the coast and estuaries, and the relationship to the inland wetlands of the Levels and Moors, ensuring that they are adequately protected, managed and enhanced in accordance with their internationally important status.
- Sustainably managing the area's visitor and tourist activities to conserve and maintain the distinctive coastal landscape, quality of beaches and high-quality wildlife present, providing interpretation and ensuring that the local community and economy continue to enjoy and benefit from the unique resources contained within the landscape.
- Incorporating coastal heritage sites into adaptation plans, wherever possible, recording, promoting, understanding and recognising their historical significance and their contribution to local culture and coastal landscape character.
- Retaining and integrating remaining Second World War structures and features into future land management proposals and particularly into flood management and coastal realignment proposals, where possible.
- Where appropriate, setting back river embankments to reduce the long-term maintenance and current constraints of narrow, steep-sided river embankments.

SEO 4: Protect the open views and distinctive character of the landscape of the area and seascape of Bridgwater Bay, enhancing access to and interpretation of the wealth of natural, cultural and heritage assets, and recreational opportunities throughout the area, in particular its significant concentration of nature reserves.

For example by:

- Promoting access to the natural environment across the area by making the natural, historic, inspirational and tranquil places available to all; further raising awareness of the work and influence of the many National Nature Reserves and other reserves within the area; supporting and encouraging sustainable visitor initiatives, education programmes and research; and ultimately working to ensure that the internationally important natural and cultural assets of the area are fully appreciated and reflected in appropriate levels of access and investment.
- Exploring further opportunities to work with partners and organisations supporting volunteering in the natural environment, such as can be seen in the reserves network in the Avalon Marshes, to increase people's knowledge of biodiversity and to maintain, enhance and promote biodiversity.
- Incorporating and extending educational and access facilities, such as the development of a visitors' centre at the heart of the Avalon Marshes, across a wider range of landholding types to improve understanding of functional wetland systems and provide access to managed, farmed and natural places.
- Promoting the important role played by water, soils and drainage in the development of the landscape through a network of interpretation sites, particularly on the coast, and in the clay levels and peat moors, where existing roads and rights of way make them readily accessible.
- Realising the opportunities presented by a level landscape for increasing the extent and connectivity of cycle routes, providing a low-impact form of access to sensitive sites for local people and visitors.
- Working with developers and the local planning authorities to minimise the risk of visually intrusive development that encroaches on distinctive skylines and interrupts clear, open views, views into Bridgwater Bay and views along the coast.
- Promoting the use of the strong pattern of the landscape and the wealth of its natural and heritage assets as tools to inform and influence new development; protecting the remote and sparsely settled character of much of the area; creating opportunities for nature and maintaining the legibility of the historical development of the landscape; and using access to the landscape, nature and heritage to underpin design solutions.
- Accommodating existing and making space for new coastal recreation and shoreline access.
- Encouraging access to, and interpretation and understanding of, cultural, natural and heritage assets by all sections of the community, leading to better planning and management of the environment.

Supporting document 1: Key facts and data

Total area: 65,797 ha

1. Landscape and nature conservation designations

180 ha of the Mendip Hills Area of Outstanding Natural Beauty (AONB) falls within Somerset Levels and Moors accounting for less than 1 per cent of NCA.

Management plans for the protected landscape(s) can be found at:
www.mendiphillsaonb.org.uk/

Source: Natural England (2011)

1.1 Designated nature conservation sites

The NCA includes the following statutory nature conservation designations:

Tier	Designation	Name	Area (ha)	% of NCA
International	Ramsar	Somerset Levels and Moors, Severn Estuary	6,777	10
European	Special Protection Area (SPA)	Somerset Levels and Moors SPA, Severn Estuary SPA	6,777	10
	Special Area of Conservation (SAC)	Severn Estuary SAC, Mendip Limestone Grasslands SAC	651	1
National	National Nature Reserve (NNR)	Shapwick Heath NNR, Somerset Levels NNR, Bridgwater Bay NNR, Huntspill River NNR, Westhay Moor NNR, Ham Wall NNR	1,437	2
National	Site of Special Scientific Interest (SSSI)	A total of 36 sites wholly or partly within the NCA	8,385	13

Source: Natural England (2011)

Please note: (i) Designated areas may overlap, designations that span coastal areas/views below this line will not be included.

There are 149 local sites in the Somerset Levels and Moors NCA covering 3,722 ha which is 6 per cent of the NCA.

Source: Natural England (2011)

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

1.1.1 Condition of designated sites

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

SSSI condition category	Area (ha)	% of SSSI land in category condition
Unfavourable declining	87	1
Favourable	2,458	30
Unfavourable no change	641	8
Unfavourable recovering	5,133	62

Source: Natural England (March 2011)

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

2. Landform, geology and soils

2.1 Elevation

The Somerset Levels and Moors form a broad area of low lying farmland divided by low hills and ridges forming the Mid Somerset Hills. The lowest point within the NCA is 0.2 m; the highest point is 127 m above sea level.

Source: Somerset Levels & Moors Countryside Character area description

2.2 Landform and process

Mercia Mudstone (previously known as Keuper Marl) is the product of the migration of desert dunes across the area. The Mercia Mudstone is calcareous clay laid down in ephemeral lakes on the floor of the desert. The original floor of the desert between the Mendip Hills and the Polden Hills lies some 35 metres below the present land surface.

Source: Somerset Levels Countryside Character area description

2.3 Bedrock geology

The Somerset Levels and Moors is underlain by Triassic rocks which represent a period of mountainous desert conditions which existed around 240 million years ago. The most common of these rocks is the Mercia Mudstone.

Source: Somerset Levels Countryside Character area description

2.4 Superficial deposits

Mercia Mudstone forms a thick and extensive deposit but the special character is given by the post-glacial accumulation of Quaternary alluvium, peats and marine clays which have created the low-lying fenland landscape during the last 10,000 years.

The thick blanket of Quaternary deposits is only broken by more resistant rocks, such as the Lias outlier at Brent Knoll, and Mercia Mudstone around Sedgemoor which forms ridges and knolls extending into or arising within the moor.

The origin of the Quaternary deposits lies in fluctuating climates and sea levels, with marine clays settling out at times of high sea level and peat formation during times of low sea level. Alluvial deposits have filled the extensive valley system, up to mean high water mark (about 6 m above OD), but the depth of deposits vary. The deepest deposits lay some 7 km inland, south-west of Brent Knoll where the base of the succession lies some 30 m below OD. A peat layer is usually found at 20 m below OD, often associated with tree stumps in situ. Similar tree stumps are exposed from time-to-time at low tides along the coast. Radiocarbon dating shows this basal peat to be about 8,500 years old.

As the sea level rose, the forest died and gave way to swamp, now represented by the basal peat, before being finally overwhelmed by the sea. In the thickest alluvial successions, the basal peat is usually followed by sands which are succeeded by intertidal, laminated grey silty clay and fine sand and, finally, up to about Ordnance Datum level, by grey clay or peaty clay representing saltmarsh.

Around the villages of Middlezoy and Kenn occur a series of shelly sands and gravels known as Burtle Beds, which are generally considered to represent littoral or sub-littoral deposits formed during a period of high sea level. The fossils present in these beds include common and widely distributed temperate marine shells. Bones and teeth of elephant, rhinoceros, aurochs and other mammals have also been found and are presumed to have been washed in from the surrounding land area. These Burtle Beds are considered to be geological features of national importance.

After the last ice age, the sea level rose and valleys filled with soft blue-grey marine clay, deposited in brackish water. The sea had receded from the Moors by 4,300 BC and transition to freshwater occurred about 3,500 BC. As freshwater accumulated on the almost level clay surface a reed swamp evolved, building up a coarse, loose textured peat varying in thickness between one and three metres.

At times the reed swamps were invaded by alder, birch and willow, resulting in a layer of wood peat. In the Brue Valley, bog moss dominated the vegetation, forming a raised bog and a deposit of moss peat, gently domed and rising a metre or so above the surrounding land. Sedgemoor appears to have been much wetter due to fluvial floods and the occasional incursion of the sea. This wet environment resulted in the formation of a series of peats with deposits of reed peat underlying sedge fen, fen carr and ultimately fen wood as the land level gradually rose and became drier.

Source: Somerset Levels & Moors Countryside Character area description, Somerset Levels Natural Area Profile, British Geological Survey maps

2.5 Designated geological sites

Designation	Number of Sites
Geological Site of Special Scientific Interest (SSSI)	3
Mixed interest SSSI	2

There are 3 Local Geological Sites within the NCA.

Source: Natural England (2011)

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

2.6 Soils and Agricultural Land Classification

The coastal Levels are dominated by soils of the Newchurch 2 association. These soils, deriving from estuarine clay, often exhibit early attempts at drainage in the form of ridge and furrow features. The largest area of the inland peat moors comprises soils of the Altcar 1 association, in which deep deposits of peat may be overlain by a thin (up to c.230 mm) cap of clay or humose clay. Marginal to the Altcar association are soils of the Midelney association in which the peats are overlain by clays approximately 230 to 760 mm thick. Soils derived from the remnant raised bog in the Brue Valley are designated on the soil map as the Turbary Moor Complex. Where the peat deposit is less than 400 mm thick and overlies silty clay, such as in parts of the valleys of the Rivers Brue and Axe, a soil known as the Downholland 1 association has formed. Riverine clay soils of the Fladbury association occur most extensively in the Vale of Ilchester, the easterly extensions of Sedgemoor and the Brue Valley where rivers flow down to moorland level.

Source: Somerset Levels & Moors Countryside Character Description

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	1,483	2
Grade 2	10,326	16
Grade 3	37,647	57
Grade 4	11,811	18
Grade 5	154	<1
Non-agricultural	675	<1
Urban	2,958	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 classification and 27 types of soils)

3. Key water bodies and catchments

3.1 Major rivers/canals

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

Name	Length (km)
River Axe	27
River Brue	27
River Parrett	24
River Cary	18
River Yeo	16
River Whitelake	13
River Kenn	9
River Tone	9
River Isle	1
Bridgwater and Taunton Canal	7

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.

Rivers draining into the Levels and Moors include the Axe and Brue (draining the central levels), the Parrett (southern levels) and the Kenn and Congresbury Yeo (northern levels). These have been substantially reshaped, straightened and embanked by drainage operations – including for example the 13th century diversion of the Brue towards a new outfall at Brue, and the 20th century excavation of the Huntspill River.

The majority of the area is only a few metres above mean sea level and drains via a large network of ditches, rhynes and rivers.

Source: Natural England (2010)

3.2 Water quality

The total area of Nitrate Vulnerable Zone is 6,374 ha or 10 per cent of NCA.

Source: Natural England (2010)

3.3 Water Framework Directive

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

4. Trees and woodlands

4.1 Total woodland cover

The NCA contains 1,181 ha of woodland (2 per cent of the total area), of which 185 ha is ancient woodland. Forest of Avon Community Forest, one of twelve community forests established to demonstrate the contribution of environmental improvement to economic and social regeneration, covers 60 ha of this NCA.

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

4.2 Distribution and size of woodland and trees in the landscape

Woodland cover on the Levels and Moors is characteristically light. Orchards are a particular feature of the land at the edge of the levels, such as the Polden Hills. Pollard willows follow the banks of „rhynes" and on higher ground, especially to the north of Polden Hills. Shelterbelts are present around farmsteads and decoy ponds.

Source: Countryside Quality Counts, Natural England (Countryside Agency 2003)

4.3 Woodland types

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

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

Woodland type	Area (ha)	% of NCA
Broadleaved	1,027	2
Coniferous	17	<1
Mixed	12	<1
Other	125	<1

Source: Forestry Commission (2011)

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

Woodland type	Area (ha)	% of NCA
Ancient semi-natural woodland	141	<1
Ancient re-planted woodland (PAWS)	45	<1

Source: Natural England (2004)

5. Boundary features and patterns

5.1 Boundary features

A distinctive form of 17th century enclosure is the mudbank formed around a stone wall or brushwood core – for example, along the northern levels coastline, and the Parrett. Boundaries on the Levels and Moors are generally bounded by deep, wide, wet 'rhynes'.

Source: Somerset Levels & Moors Countryside Character Area description; Countryside Quality Counts (2003)

5.2 Field patterns

Areas of medieval and earlier enclosure are concentrated along the coastal strip but extend into large parts of the Moors and Levels. These are characterised by irregular patterns of Formatted: Right, Right: 1.24 cmFormatted: Right, Right: 1.24 cm enclosure with raised droveways and evidence for oval infields bordered or girdled by pioneer farmsteads. Other areas of large-scale and small-scale rectilinear enclosure associated with drainage and enclosure from late 18th century, a process often complicated by the complexity of small-scale ownership and tenancy and often enforced by Parliamentary and Drainage Acts.

Source: Draft Historic Profiles, English Heritage (2004), Countryside Character Area description; Countryside Quality Counts (2003)

6. Agriculture

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

6.1 Farm type

Despite a 33 per cent fall in the number of dairy farms between 2000 and 2009, livestock farms remain the most numerous type at 59 per cent of total farms.

Source: Agricultural Census, Defra (2010)

6.2 Farm size

While the number of farms under 100 ha dropped between 2000 and 2009, the number of large farms (over 100 ha) increased by around a third.

Source: Agricultural Census, Defra (2010)

6.3 Farm ownership

2009: Total farm area = 47,224 ha; owned land = 32,838 ha
2000: Total farm area = 42,143 ha; owned land = 32,178 ha

Source: Agricultural Census, Defra (2010)

6.4 Land use

Most significant changes between 2000 and 2009 were marked declines in

land turned to vegetables, cash roots and oilseeds (falls of 72 per cent, 61 per cent and 36 per cent respectively). Land used for 'other' arable crops increased by 58 per cent. However, grass and uncropped land continues to be by far the most popular use at around 86 per cent of the total area.

Source: Agricultural Census, Defra (2010)

6.5 Livestock numbers

Cattle and sheep numbers both increased by around 2 per cent between 2000 and 2009 with cattle forming 58 per cent of livestock. The number of pigs dropped by 38 per cent, leaving pigs representing only 5 per cent of total livestock.

Source: Agricultural Census, Defra (2010)

6.6 Farm labour

There has been a marked drop in the number of full-time workers whereas all other categories show an increase since 2000.

Source: Agricultural Census, Defra (2010)

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

7. Key habitats and species

7.1 Habitat distribution/coverage

The Somerset Levels and Moors is the largest area of lowland wet grassland and associated wetland habitat remaining in Britain, covering about 35,000 hectares and supporting internationally important numbers of waterfowl in winter. Breeding birds includes significant populations of waders associated with lowland wet grassland and the area is regarded as one of the best in lowland Britain for breeding waders.

Source: Somerset Levels and Moors Natural Area Profile

7.2 UK Biodiversity Action Plan (BAP) priority habitats

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

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

UK BAP priority habitat	Area (ha)	% of NCA
Coastal and floodplain grazing marsh	43,393	66
Fens	1,790	3
Lowland meadows	884	1
Purple moor grass and rush pasture	392	<1
Lowland raised bog	271	<1
Maritime cliff and slope	253	<1
Reedbeds	226	<1
Coastal sand dunes	186	<1
Lowland calcareous grassland	143	<1
Mudflats	100	<1
Lowland heathland	8	<1
Coastal vegetated shingle	14	<1
Saline lagoons	1	<1

Source: Natural England (2011)

7.3 Key species and assemblages of species

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

8. Settlement and development patterns

8.1 Settlement pattern

The area has a low level of survival of pre-1750 farmstead buildings, the principal exception being the medieval barns of Glastonbury Abbey in and around Glastonbury. Dispersed farmstead plans are predominant. Cider houses, often integrated into combination ranges, from the late 17th and more commonly the 19th century. Most 20th century development can be found around the edge of the area. Along the coastal strip, holiday caravans and chalets extend southwards from Brean. Highbridge, Burnham-on-Sea and Bridgwater
are substantial settlements and residential and industrial development extends across the open landscape.

Source: Somerset Levels & Moors Countryside Character Area description; Countryside Quality Counts (2003)

8.2 Main settlements

The main settlements within the Somerset Levels and Moors are: Weston-super-Mare, Burnham-on-Sea and Bridgwater.

Source: Somerset Levels & Moors Countryside Character Area description; Countryside Quality Counts (2003)

8.3 Local vernacular and building materials

There is a diverse mixture of building materials found across the area. Timber framing is rare and confined to urban areas, principally Bridgwater. Predominant building stones are Blue Lias, and also a mix of oolitic limestone, sandstone and conglomerate. Brick was increasingly used from late 17th century, and is now predominant, as also is the use of pantiles for roofing.

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

9. Key historic sites and features

9.1 Origin of historic features

Medieval and earlier settlements and associated field systems can be found, notably the oval enclosures of Saxon and earlier periods, for example at Puxton. The drained medieval field systems of the Levels and Moors comprise one of the best-preserved medieval enclosure landscapes in England. There are iron-age villages at Glastonbury and Meare of European significance. At least 50 Romano-British pottery mounds have been identified. Considerable drainage and land reclamation schemes were in place from the 11th century onwards. Glastonbury Abbey was a major influence on land use in the area during the medieval period.

There are low levels of dispersed settlement in the form of villages and hamlets, associated with ancient enclosure of the coastal strip, and with 17th century and mostly 19th century enclosure of peat fens. Major active peat extraction sites are in the Brue Valley where former peat works are now being developed as nature reserves. Bridgwater was a trading port from the medieval period, rebuilt in the 17th and 18th centuries as a significant industrial centre served by Bridgwater-Taunton canal and later railway. Some coastal resorts developed with the railway in the 19th century, notably Weston-Super-Mare. Nationally important assemblage of pillboxes, machine gun emplacements and other obstacles, forming the northern end of the Taunton Second World War stop line are still recognisable in the landscape defended.

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

9.2 Designated historic assets

This NCA has the following historic designations:

- 2 Registered Parks and Gardens covering 67 ha
- 1 Registered Battlefield covering 230 ha
- 83 Scheduled Monuments
- 1,100 Listed Buildings

Source: Natural England (2010)

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

10. Recreation and access

10.1 Public access

- 3 per cent of the NCA or 2,226 ha, is classified as being publically accessible.
- There are 892 km of public rights of way at a density of 1.4 km per km^2.
- There are no national trails within the NCA.

Sources: Natural England (2010)

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

Access designation	Area (ha)	% of NCA
National Trust (Accessible all year)	138	<1
Common land	246	<1
Country parks	0	0
CROW Access Land (OC and RCL)	395	<1
CROW Section 15	5	<1
CROW Access Land (Section 16 Dedicated)	0	0
Village greens	10	<1
Doorstep greens	<1	<1
Forestry Commission Walkers Welcome grants	126	<1
Local Nature Reserves (LNR)	239	<1
Millennium greens	<1	<1
Accessible National Nature Reserves (NNR)	1,437	2
Agri-environment Scheme access	2	<1
Woods for People	249	<1

Sources: Natural England (2011)

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

11. Experiential qualities

11.1 Tranquillity

Based on the CPRE map of tTranquillity (2006) the levels of highest tranquillity are located to the east, with the lowest levels of tranquillity associated with the M5 motorway and the settlements of Weston-super-Mare and Bridgwater.

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

Tranquillity	Tranquillity Score
Highest value within NCA	46
Lowest value within NCA	-75
Mean value within NCA	3

Sources: CPRE (2006)

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

11.2 Intrusion

The 2007 Intrusion Map (CPRE) shows the extent to which rural landscapes are 'intruded on' from urban development, noise (primarily traffic noise), and other sources of visual and auditory intrusion. This shows that there is very little undisturbed land in the west of the NCA around Bridgwater and Burnham. The east, around Glastonbury is also intruded upon but there are still large areas of undisturbed land in the central area of the north of the NCA and in the southern section.

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

Intrusion category	1960s (%)	1990s (%)	2007 (%)	Percentage change (1960s-2007)
Disturbed	22	44	54	32
Undisturbed	72	49	39	-33
Urban	5	5	7	2

Sources: CPRE (2007)

Notable trends from the 1960s to 2007 are an increase by 40 per cent in the area classed as disturbed, up to nearly 60 per cent in 2007, and a decrease of 40 per cent, down to 40 per cent, of the undisturbed area.

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

12 Data sources

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

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

Supporting document 2: Landscape change

Recent changes and trends

Trees and woodlands

- New planting through Woodland Grant Schemes has been limited, reflecting the area's limited woodland cover and woodland potential, but take up of management measures, especially on ancient woodland sites has been high, as well as agri-environment schemes including willow pollarding and shelter belt re-creation.

Boundary features

- The second half of the 20th century saw a decline in the extent and condition of boundary features. Stewardship agreements have brought about a positive change in ditch ('wet hedge') and hedgerow management; the introduction of fencing to protect hedges and watercourses from livestock; hedge and tree planting; and general restoration. Nearly 125 km of ditches and 381 km of hedgerow are now managed by land managers under environmental stewardship.

Agriculture

- Change in the agricultural character of the area has been ongoing in recent years with a slight reduction in the rate of permanent grassland loss, fluctuations in dairy cattle numbers and the growing of maize as a fodder crop. There has been some loss of agricultural land to development and there has been a shift from dairy to lowland cattle and sheep (meat) production.
- The most extensive uptake of agri-environment options both inside and outside the Environmentally Sensitive Area up to 2003 was for; grassland management on neutral/acid soils and calcareous soils; schemes for buffer strips; raised water level areas/supplements; linear features; and agreements for the restoration/re-creation of orchards.

Settlement and development

- Weston-super-Mare and Bridgwater are the two most significant settlements within the NCA; both have seen significant expansion and development in recent years.
- Since its construction in the late 1960s and early 1970s the M5 motorway has had a significant impact on the west of the area. A number of major regional distribution facilities have been developed in association with the motorway within the NCA notably between Highbridge and Bridgwater.
- Tourism related development along the coast has seen a steady increase, particularly around Weston-super-Mare and Burnham-on-Sea.
- The east of the area has seen little in the way of development and remains essentially rural in character.

Semi-natural habitat

- At 2011 over 91 per cent of SSSI in the area were in favourable or favourable-recovering condition.
- Planning permission was granted in 2012 by Sedgemoor District Council for the Environment Agency to proceed with a habitat creation scheme at Steart near Bridgwater, realigning the coast. This means that the Steart peninsula will be one of the UK's largest areas of new intertidal and freshwater wildlife habitat.
- Open water, reedbed and other wetland habitats continue to be created as a result of reclamation of former peat workings, particularly in the Brue Valley.
- The extent and condition of semi-natural habitats has been maintained in recent years notably through Environmentally Sensitive Area (ESA) payments. In 2003 the extent of agreements for permanent grassland was 11,165 ha, and wet permanent grassland was 2,902 ha.
- Flood plain and coastal grazing marsh, at over 43,000 ha or 66 per cent of the total area, remains the most significant priority habitat.

Historic features

- The area contains a wealth of heritage assets many of international significance illustrating past landscapes and climates as well as some of the earliest occupation. Further discoveries continue to be made both through controlled excavations in relation to permitted development and as a result of 'accidental' exposure.
- The extent of damage to archaeological sites by arable conversion and deep ploughing is estimated to be high; however, the loss of pasture has slowed. It is likely that the integrity of buried archaeology is probably being maintained.

Snipe - many waders and wetland birds are dependent on the positive mangement of the landscape.

- About 71 per cent of listed historic farm buildings remain unconverted and about 92 per cent are intact structurally (Countryside Quality Counts data).

Coast and rivers

- At 2006 nearly 10 per cent of the area was considered a nitrate vulnerable zone (NVZ).
- Approximately a third of watercourses in the area are considered as having 'good' ecological status and ecological potential. Approximately two-thirds of watercourses are considered to have 'good' chemical status.[5]
- The main reasons for less than good status are high levels of phosphate affecting fish communities, physical modification of watercourses and low levels of dissolved oxygen.[6]
- Coastal defences from the Parrett estuary northwards, have been maintained with the management aim of 'holding the line'.
- In May 2012 the Environment Agency began construction work to create one of the UK's largest new reserves for wildlife. Over 400 ha of the Steart peninsula are being turned into wildlife-rich habitats including salt marsh and freshwater wetland.

Minerals

- Peat extraction still occurs along the Brue Valley and continues to alter the character of the landscape. Opportunities for maximising the benefits of post-extraction restoration have been limited, but in places very successful.

Drivers of change

Climate change

- Intense rainfall in summer months is likely to occur resulting in summer flooding events, as seen in 2012, with resultant impacts on fodder crops, grass ley and wildlife, notably ground nesting birds, invertebrates and soil flora and fauna. While not the product of single intense summer storms, as predicted in many climate change models, increased unpredictability of weather patterns will challenge the planning and management of this landscape.

Great white egret - a recent arrival to the wetland reserves of the Brue Valley.

- Winter and summer flooding are longstanding events in the Levels and Moors; however, prolonged periods of high rainfall will result in longer periods of floodwater coverage and associated impacts on towns, villages and transport infrastructure. Among other impacts, increased soil erosion and reduction in soil quality may result.

[5] *River Basin Management Plan: South West River Basin District*, Environment Agency (December 2009)

[6] *River Basin Management Plan: South West River Basin District*, Environment Agency (December 2009)

- Conversely summer droughts may lead to demands for increased water abstraction for irrigation of crops, and desiccation, oxidisation and erosion of peat soils.

- Sea level rise will make the continued drainage of the area increasingly difficult. Combined with increased storminess, storm-surges and intense rainfall events, existing pumping mechanisms may be unable to maintain current drainage levels.

- Species migration and range expansion of species may bring both increases in biodiversity and returning species, as seen with the successful breeding of great white egret in 2012, and more pests, diseases and some loss of marginal habitats.

Other key drivers

- Coastal realignment at the Steart peninsula will result in one of the UK's largest areas of new intertidal and freshwater wildlife habitat.

- Increased pressure for food production as a result of a motivation for greater national food self-sufficiency may create opportunities to explore the balance of payments for environmental features and ecosystem services against production within a distinct geographic area.

- Significant new housing growth is planned both within Weston-super-Mare and to the south-east of the town, along with 34 ha of employment land in the Weston-super-Mare travel to work area.

- Moderate growth is planned for Bridgwater and in an urban extension to the north of the town, as well as 54 ha of land in the Bridgwater travel to work area, resulting in significant pressure on these parts of the NCA.

- Potential capacity enhancements are identified along the M5 motorway corridor, and both increasing amounts of and the scale of development in the vicinity of the M5 motorway are altering the character of the area.

- The demand for increasing renewable energy generation could result in increased pressure for onshore wind farms, landfall and grid connection for off-shore wind and tidal energy schemes, growth of biomass crops and increased areas of solar farms.

- Potential to restore a matrix of wetland habitats at the historical location of Meare Pool or on Queen's Sedgemoor, leading to the restoration of many hectares of high quality habitat and providing continued protection of botanically rich wet meadows, has been identified by the Somerset Wildlife Trust's Brue Valley Living Landscape initiative. Meare Pool could also be recreated seasonally or even permanently.

- A new reservoir is proposed at Cheddar to support increasing demands for water from the city of Bristol.

- The Marine and Coastal Access Act 2009 provided opportunities to protect the marine environment and ensure access to all parts of the coast; the scheme for continuous coastal access from the west of the area to Brean Down was being prepared in 2012/13.

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.

Water vole.

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: Manage and plan for change in the function of the network of watercourses, water management infrastructure and wetland habitats across the Levels and Moors to provide benefits in improved flood management, water and soil quality, viable agricultural futures, protection of sub-soil archaeology and to increase the range and extent of habitats and species and their resilience to climate change.	↗ **	↔ **	↑ **	↗ *	↔ **	↗ **	↑ **	↑ ***	↑ **	↗ **	↗ **	↗ **	↗ *	↗ **	↑ ***	↔ **	↔ **	↑ ***	↗ **
SEO 2: Manage the predominantly pastoral agricultural landscape to ensure and enhance the future of sustainable farming, strengthening landscape character, protecting soils, particularly peat soils, and water, and enhancing biodiversity through improved integration of activity, creating more, better and more resilient habitats and ecological networks.	↑ ***	↔ **	↗ **	↗ **	↗ **	↗ **	↑ **	↗ **	↑ **	↗ **	↗ **	↗ **	↗ *	↑ ***	↗ **	↗ **	↔ **	↑ ***	↗ **
SEO 3: Safeguard and manage the geodiversity and geomorphological processes, particularly those influencing rivers and their flood plains, and the internationally important coastline and associated habitats and species. Where appropriate, allow the unimpaired operation of natural coastal processes, resulting in the creation of new habitats, protecting existing habitats, conserving and enhancing landscape character, and benefiting biodiversity.	↘ **	↘ **	↔ **	↔ **	↘ **	↑ **	↘ **	↗ **	↗ **	↗ **	↔ **	↔ **	↑ ***	↗ **	↘ **	↗ **	↗ **	↑ ***	↑ ***
SEO 4: Protect the open views and distinctive character of the landscape of the area and seascape of Bridgwater Bay, enhancing access to and interpretation of the wealth of natural, cultural and heritage assets, and recreational opportunities throughout the area, in particular its significant concentration of nature reserves.	↗ **	↔ **	↔ **	↗ **	↔ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↗ **	↔ ***	↑ ***	↑ ***	↑ ***	↑ ***	↗ ***	↗ ***

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

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

Landscape attributes

Landscape attribute	Justification for selection
A flat, open landscape contrasted and punctuated by surrounding and bordering low hills, ridges and islands forming distinctive skylines.	■ This is a very low lying landscape with relatively little woodland and open views across flat fields within the centre of moors, often graduating in character to more enclosed edges with overgrown hedgerows, small shelterbelts and lines of riparian willows. The surrounding NCAs – the Mid Somerset Hills and the Mendip Hills – provide distinctive skylines, enclosing the NCA to the north and east as well as internally. ■ The link with the surrounding higher land is close, both geographically and historically, as communities moved between the higher ground of the hills and the lower marshland of the moors. ■ The low horizon and level topography creates an impression of broad skies, often augmented by dramatic cloudscapes, sunsets and sunrises.
Strongly rectilinear and geometric pattern of enclosure, drainage and roads, contrasting with occasional natural meandering watercourses, lanes and historic route-ways.	■ A chequer-board pattern of canalised rivers, drains, 'rhynes' and ditches, accentuated by lines of pollard willows, define a closely planned and often reclaimed landscape. ■ Levees and banks, often carrying roads, or droves between farms and villages, relate to and reinforce the pattern of enclosure, often forming the only upstanding feature of the landscape.
A predominantly pastoral, wetland landscape producing luxuriant summer grasslands and watercourse vegetation.	■ The Levels and Moors do not support a diverse range of habitats, but do have an outstanding extent of two primary habitats; lowland wet grassland and species-rich flood plain meadows and pastures. ■ Other important elements of this pastoral landscape are withy beds and occasional orchards in proximity to farmsteads and villages.

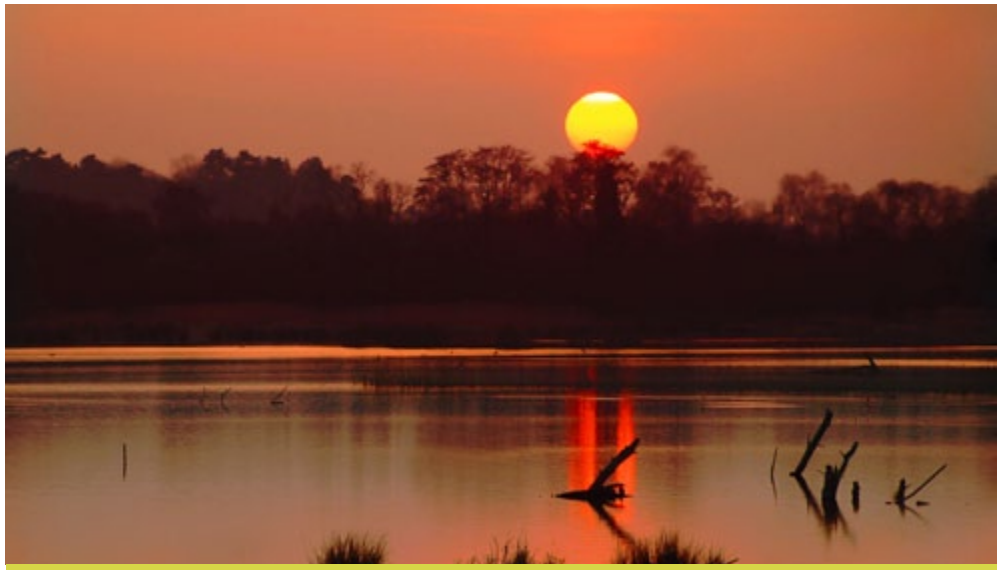
Landscape attribute	Justification for selection
A coastal landscape of mudflats, salt marsh, occasional dunes and storm gravel beaches, and an inland landscape of wetlands, grazing marsh and wet grasslands.	■ Important coastal and flood plain grazing marsh covers a substantial portion of the area, reflected by national and international designation (Somerset Levels and Moors, and Severn Estuary SPAs and Ramsar sites; Severn Estuary SAC; Shapwick Heath, Somerset Levels, Bridgwater Bay, Huntspill River, Westhay Moor, and Ham Wall NNRs) ■ The peat fen produced after the end of the last glaciation has been a major resource, as well as protecting important historical artefacts and sites. Nature reserves containing mosaics of semi-natural habitats – lakes, mires, and reedbeds, fen and wetlands – developed after peat production ceased are features around the Brue Valley, supporting important populations of birds, dragonflies and fish. ■ Coastal mudflats, sand dunes and gravel beaches, partially sheltered in Bridgwater Bay, provide a rich and rare source of molluscs, invertebrates, and aquatic flora and fauna, subsequently supporting important assemblages of wading birds.
Important flora and fauna including significant populations of birds, aquatic invertebrates and plants, and fish.	■ Large flocks of wading and other wetland birds visit the marshes, wet grasslands and coastal mudflats benefitting from a rich food supply, including lapwing, golden plover, wigeon and teal. Bittern and a number of other rare species are also present, and recently re-introduced cranes may soon become a familiar sight. ■ Lakes, mires, marshes and watercourses supporting communities and networks of rare aquatic plants and invertebrates also link inland communities with coastal and tidal populations. They support a wide range of fish species and important numbers of eel. ■ Vast flocks of starlings can gather on the Levels and Moors in autumn, forming dramatic aerial displays. ■ Distinctive and rare vegetation and invertebrates can be found in ditches and rhynes; for example, greater water parsnip, shining ramshorn snail and lesser silver diving beetle. ■ Colonies of water vole are being encouraged across the area and otters are a popular attraction at some reserves.

Landscape attribute	Justification for selection
Rivers and coast, and an ever present association with water.	■ The rivers and drains that flow through the NCA are defining elements of the character of the landscape – they reflect the active processes, natural elements and the planned elements of the landscape and provide the close link between the NCA and surrounding landscapes and coast. ■ Water is ever present in the NCA, creating the luxuriant growth of vegetation while presenting challenges to settlement and occupation of the landscape. ■ A strong contrast exists between the planned network of ditches and drains and canalised rivers, and the natural channels of rivers and streams; although all are connected and managed to a greater or lesser degree.
Archaeological remains are well preserved and a sense of history pervades the landscape.	■ Peat and anaerobic soil conditions have preserved, and continue to preserve important remains including the Neolithic 'Sweet Track' as well as remains of Neolithic communities that lived on the edge of the marshes. ■ The peace treaty with the Danes, agreed on the edge of the Levels at Wedmore, established Alfred as the first King of England. ■ Drainage patterns, medieval settlements and field patterns comprise one of the best-preserved planned, medieval enclosure landscapes in England. ■ There is an important assemblage of pillboxes and other Second World War remains, again indicative of the vulnerable and close relationship between land and sea. ■ The Battle of Sedgemoor, where in 1685 the Duke of Monmouth's rebellion saw total defeat leading ultimately to the 'Glorious Revolution' and the Hanoverian succession – a turning point in British history – still retains many original features and characteristics, and a strong sense of history. An event determined by watercourses and wetlands.

Landscape attribute	Justification for selection
Sparse settlement closely related to subtle topographical variations or river crossings.	■ There is little settlement on the Moors; the majority is on the Levels on the western side of the NCA. The few modest sized settlements are based around the small hills and 'burtles' – the sand banks of former marine deposits – which provide protection against flooding. ■ There is a strong planned element to the villages and towns; for example, Langport, which is laid out along a single street. Many villages are surrounded by strip fields. ■ Buildings tend to be simple and utilitarian, utilising locally made bricks, occasionally local Blue Lias limestone, with pantile roofs and occasional reed or long-straw thatch. The simplicity of buildings often reflects the functional and planned nature of the landscape.
A place of tranquillity, remoteness and wildness, but fertile and productive.	■ In summer, a lush, verdant and fertile landscape with luxuriant vegetation across meadows and along rivers and watercourses. In winter, an often wild, bleak and sense of remoteness is experienced. In contrast, vibrant towns and brash coastal holiday development reinforce the sense of tranquillity away from human occupation.

Landscape opportunities

- Protect the pattern and function of drains, ditches and rhynes, wetland habitats and wet grassland supporting large and characteristic populations of birds and invertebrates, and other biodiversity.
- Preserve for future interpretation the area's archaeological resources, historic features and geological interests from damage and loss, directly and by maintaining high ground-water levels reducing soil desiccation and further benefitting wetland ecology.
- Maintain the strong sense of tranquillity, wildness and remoteness, traditional grazing and hay production, and distinctive skylines and sky-spaces; an undeveloped, pastoral landscape underpinned by a viable and vibrant agricultural community and economy.
- Promote and maintain the extensive management of wetland habitats and grasslands to allow for greater floristic diversity and biodiversity, particularly alongside drains and ditches and in the vicinity of former peat extraction sites.
- Maintain the diverse character and vegetative structure within individual moors particularly the transition from open moor at their centre to increasingly vegetated and enclosed fringes.
- Manage and plan for a changing coastline, maintaining and increasing areas of intertidal habitat, marshes and inland lagoons increasing the diversity of landscape, providing opportunities for biodiversity and making the coast more resilient to flooding from the sea.



Sunset at Shapwick Heath National Nature Reserve.

- Plan for rising water levels, both tidal and fluvial, developing robust networks of semi-natural wetland habitats with potential to reinforce landscape character, increase biodiversity, and reduce risk from flooding.
- Create new landscapes on the fringes of major settlements – Bridgwater, Weston-super-Mare and Burnham-on-Sea – which draw on and reflect the existing positive landscape character features and elements to more effectively integrate new development.
- Work towards a new, positive landscape along the corridor of the M5 drawing on existing landscape character features and elements to better integrate new and existing development and infrastructure.

Ecosystem service analysis

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

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

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal service offered by opportunities
Food provision	Fertile soils and high water levels producing lush and plentiful vegetation Dairy products Beef Lamb	Eighty-six per cent of the area is under pasture or is uncropped. This supports the principal food producing activity; livestock farming. Almost two-thirds of farms are engaged in livestock farming, mainly dairy and beef production. Maize is widely grown as a winter feed crop for livestock supplementing hay and silage crops. Lamb, and particularly salt marsh lamb reared in the west, is a notable output from the area. The soils are fertile and versatile; 57 and 16 per cent Grade 3 and Grade 2 agricultural soils respectively.	Regional	The fertile soils, high water levels and a mild climate are conducive to the growth of lush summer vegetation and pasture and subsequent livestock production; the longstanding land use extending back to the Neolithic period. The balance between high water levels and catastrophic flooding is delicate and increasing heavy and often unseasonal rainfall jeopardises that balance. The period 2000 to 2009 saw a slight rise in the total numbers of livestock found across the area, but a dramatic reduction by one third, in the number of dairy farms. A consolidation and amalgamation of small farms has taken place. As a result dairy yields have remained constant or risen. **Continued over...**	Work with farmers and land managers to maintain a balance between profitability and the long-term viability of food production levels and the protection and enhancement of the natural and historic environment. Work with the farming community to ensure good soil and nutrient management, thereby securing a sustainable future for farming, protecting environmental features within the Levels and Moors, and supporting the supply of other ecosystem services. Support sustainable expansion of food production; develop and realise opportunities for diversification and high-value local and specialist products which strengthen the sense of place within the Levels and Moors.	**Food provision** **Regulating soil quality** **Regulating soil erosion** **Climate regulation** **Regulating water quality** **Sense of place / inspiration** **Sense of history** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal service offered by opportunities
Food provision continued				**... continued from previous.** The area remains highly productive, but margins between supplementary feed costs – hay, silage and maize – affected by flooding events, and returns on produce challenge the current balance. As a result, the trend to consolidate activity and move to more intensive management regimes may continue. Ensuring appropriate and beneficial soil and nutrient management, avoiding sedimentation and diffuse pollution is minimised, will be essential both for the maintenance of food production levels and other services, notably soil quality, water quality, biodiversity and buried archaeology. Particular consideration should be given to the management of farmed areas with peat soils and soils with high carbon content for their ongoing contribution to carbon storage and capture.		

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal service offered by opportunities
Timber provision	Pollards and withy beds Small farm woods	Some commercial material is harvested from pollard willows and withy beds, mainly for basket weaving and charcoal burning. Existing woodland coverage is very low at only 1 per cent. Little or none of the timber in the area is managed for commercial timber production.	Local	A wetland landscape not conducive to the growing of trees for commercial timber production. There remains a commercial interest in the production of pollard and coppice material, which has the potential to be expanded. Most woodland occurs around the periphery of the area and is often dominated by willows, alder and birch with some oak and ash, and does not produce commercially viable material. Current land use and regular flooding significantly restrict the potential for expansion of commercial timber production.	There is little opportunity for timber provision from this area. Small-scale expansion of local woodland in appropriate locations would support increased biodiversity, reinforce landscape character around the fringes of the area, reduce rates of water flow and sedimentation from adjacent hills and potentially provide a local source of low-grade timber.	**Timber provision** **Sense of place / inspiration** **Regulating water flow** **Regulating soil erosion**
Water availability	Main rivers and drains flowing through the area transporting water received on surrounding hills Cheddar Reservoir	The main rivers in the area are the Axe and Brue draining the central levels, the Tone and Parrett the southern levels and the Kenn and Congresbury Yeo the northern levels, as well as the Huntspill and King's Sedgemoor Drains and a series of smaller interconnecting drains, rhynes and ditches. Cheddar Reservoir, managed by Bristol Water, is fed by springs rising off the Mendip Hills. It has a 614,000 cubic metre capacity and supplies the surrounding areas, with some water also pumped to supply Bristol. The main abstractions within the area are for public water supply; other abstractions are for industry and agriculture. **Continued over...**	Regional	All of the river catchments are considered to have water available for abstraction, apart from some sections of the Congresbury Yeo that are over licensed.[8] However, maintaining the abundance of water across the area is also fundamental to its character, nature and function. Abstraction licenses are still granted but on a case by case basis and often have conditions that limit or stop abstraction when river flow is low. In areas that have plenty of water available restrictions may not be strictly applied. The Congresbury Yeo and Cheddar Yeo are heavily influenced by abstraction into the Cheddar and Blagdon reservoirs (Blagdon is outside the NCA but affects downstream flows in the NCA). **Continued over...**	Seek opportunities to further increase areas of semi-natural habitats, especially flood plain grazing marsh to improve water infiltration and targeted water storage. Encourage the restoration and expansion of fen to increase water storage capacity. Work with Internal Drainage Boards, landowners and managers to maintain watercourses and control structures to allow water table levels to be maintained so as to best protect fodder crops, hay and silage leys**...continued over...**	**Water availability** **Food provision** **Climate regulation** **Regulating water flow** **Regulating water quality** **Regulating soil quality** **Continued over...**

[8] Brue, Axe and North Somerset stream Catchment Abstraction Management Strategy http://publications.environment-agency.gov.uk/pdf/GESW0506BKVI-E-E.pdf

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal service offered by opportunities
Water availability continued		**...continued from previous.** In certain stretches of the Tone, there are a number of abstractions that are not licensed because of exemptions under the Water Resources Act 1991; these feed Stanmoor and part of North Moor.[9] [10]		**...continued from previous.**Both rivers are over licensed and over abstracted significantly influencing future abstraction potential. For much of the year there are excesses of water available in this area. Periods of drought may become increasingly common and prolonged placing new stresses on water resources. Further research into the likely impacts and effects of drought are needed. This should include extending the understanding of the interrelations between available water, food production, habitat management, preservation of peat and the conservation of buried archaeology.	**...continued from previous.** while contributing to habitat management for waders, wetland and farmland birds, enhancing plant and invertebrate diversity and protecting buried archaeological deposits. Identify and support initiatives that explore and further information about and understanding of the impacts of drought and the relationship to other ecosystem services.	**...continued from previous.** **Sense of place / inspiration** **Sense of history** **Biodiversity**
Genetic diversity	Farm orchards	Many villages and farmsteads retain small traditional orchards preserving a number of locally important apple varieties, particularly local cider varieties.	Local	Although often severely decayed and containing only senescent trees, numerous farm orchards are found throughout the area. Cider varieties are of particular note and have a longstanding association with the area; traditionally agricultural workers in the area received part of their wages in cider. It is important to maintain the genetic diversity of orchard fruit varieties in order to safeguard future food and drink provision, and afford increased resilience to climate change and disease.	Raise awareness of local varieties and link owners of orchards with local fruit and cider producers and suppliers. Encourage regeneration of existing orchards and new planting with local varieties.	**Genetic diversity** **Sense of place / inspiration** **Sense of history** **Biodiversity**

[9] *The Parrett Catchment Abstraction Management Strategy*, Environment Agency (March 2006) (accessed June 2013; URL: http://publications.environment-agency.gov.uk/pdf/GESW0306BKMY-E-E.pdf)

[10] *The Tone Catchment Abstraction Management Strategy*, Environment Agency

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal service offered by opportunities
Biomass energy	Soils in combination with high water levels Woodland	Versatile fertile soils, a moderate climate and high water levels promote vigorous vegetative growth make the area suitable for biomass production in the form of either miscanthus or short rotation coppice. Competing demands for grass for livestock production, nature conservation and archaeological deposits has limited up-take of initiatives. Existing woodlands in traditional management yields small volumes of wood fuel for local supply.	Local	Yield maps indicate that the majority of the area has the potential for a medium yield of short rotation coppice and a high yield of miscanthus. Opportunities vary throughout the area and will be significantly limited by archaeological and biodiversity interests as well as water level management, food provision and existing land use. Reed cut from the many nature reserves and potentially rushes from wet grassland may provide a source of material for biofuels. Pollard arisings provide a local source of wood fuel.	Work with the farming community to identify suitable locations for the increase in net yield of miscanthus and short rotation coppice, avoiding locations that would be contrary to local landscape character, likely to impact on archaeological deposits or be in conflict with nature conservation opportunities. Explore initiatives that make use of arisings from the management of nature reserves, particularly rushes and reeds, as sources of biomass and biofuels.	**Biomass energy** **Climate regulation** **Water availability** **Regulating water flow**
Climate regulation	Peat soils Estuaries	There is high carbon storage in this NCA. The central and western area has soils with a carbon content of up to 10 per cent while in the north-east soil carbon content is up to 20 per cent and areas in the south-east have a soil carbon content of between 20 and 50 per cent. Areas of grazing marsh, mud flats and estuarine silts and muds fringing Bridgwater Bay and notably around the Parrett estuary.	National	There are peaty soils high in stored CO_2, including fen peat soils and raised bog soils, formed by the once extensive lowland raised bogs of the Moors and the Brue Valley. Much of this area has been previously exploited by commercial peat extraction and some peat extraction still continues under extant permissions. Soils with a naturally high groundwater and a peaty surface cover 23 per cent of the NCA and there are high levels of organic material in the soils of the Levels including the loamy and clayey soils of coastal flats with naturally high groundwater covering a further 37 per cent of the area. **Continued over...**	Restore and reconnect peatland and wetland habitats, restoring hydrological integrity where necessary and thereby protecting peat from desiccation and oxidisation, and ensure that cultivation of peat soils is minimised where possible. Realise opportunities to further protect and expand areas of flood plain and coastal grazing marsh, reedbeds, salt marsh and mudflats. **Continued over...**	**Climate regulation** **Food provision** **Water availability** **Regulating soil quality** **Regulating soil erosion** **Continued over...**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal service offered by opportunities
Climate regulation continued				**...continued from previous.** In addition, the loamy and clayey flood plain soils with naturally high groundwater, 17 per cent of the area, may be peaty at depth or include small areas of peaty soils. These high levels of soil carbon content are likely to be further elevated in areas under the wetland habitats that cover 69 per cent, (more than 45,000 ha) of the NCA including extensive areas of coastal and flood plain grazing marsh, fen, areas of long-established permanent pasture and estuarine muds and silts where carbon sequestration is an ongoing process. All these high carbon soils, that together cover over 75 per cent of the NCA, are very important to conserve because of the role they play in carbon sequestration and storage. Where cultivated, peat soils suffer from shrinkage and oxidation, with loss of CO_2 to the atmosphere; however, where undrained or saturated long-term there may be production of methane, a potent greenhouse gas. Across the remainder of the NCA, the predominantly mineral soils are low in soil carbon, although there is potential to increase soil carbon sequestration and storage through the addition of organic matter.	**...continued from previous.** Work with landowners, farmers and the Internal Drainage Boards to ensure that groundwater levels are maintained at a level that prevents the desiccation and subsequent oxidisation of peat soils. Ensure discrete hydrological units can function effectively. Work with farmers and land managers to ensure best practice in soil management, and particularly peat soils, to improve structure, quality and carbon content. This may be achieved through actions such as minimising or ceasing cultivation, using low pressure machinery, and managing stock levels and movement. Ensure that realignment initiatives are managed to their full potential to develop into habitats that sequester and store carbon, benefit biodiversity interest and enhance the landscape of the coast and estuaries. Support estuarine management measures that result in the maintenance and accretion of tidal salt marsh with its high carbon sequestration rates and low methane emissions.	**...continued from previous.** **Regulating water quality** **Regulating water flow** **Sense of place / inspiration** **Sense of history** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal service offered by opportunities
Regulating water quality	Extensive areas of semi-natural habitat including reedbeds, open waterbodies, fen and marsh Rivers, ditches and rhynes	The area falls within two Defra Catchment Sensitive Farming Priority Catchments; the River Brue and its tributaries including the River Axe from its source near Wells; and the North Somerset Moors Catchment comprising the Land Yeo, Blind Yeo and Congresbury Yeo. Both Priority Catchments suffer from soil erosion and associated nutrient leaching with sedimentation of watercourses. Both catchments suffer from phosphate pollution of watercourses while the Congresbury Yeo and Land Yeo, also suffer from nitrogen leaching. Significant presence of floating aquatic vegetation and algae indicate nutrient enrichment in all rivers.[11] Watercourses within the area are generally regarded as having 'moderate' ecological condition along their lengths, with westerly stretches of the River Brue declining in condition to 'poor'. The Bridgwater and Taunton Canal has been assessed as having 'good' ecological potential. Estuarine waters of both the Rivers Parrett and Severn (lower) have moderate ecological condition and good chemical condition. Groundwater condition, where assessed, is generally considered 'good'.[12]	National	Significant problems of phosphate and nitrate pollution and sedimentation have been identified in most watercourses across the area, mainly associated with agriculture and exacerbated by the connectivity of the internal drainage system. This can be exacerbated in drought conditions when low water levels increase concentrations and biological oxygen demand. Further negative impacts and effects arise from illegal septic tank discharges, poorly maintained package treatment plants, trade discharges and poorly managed sewage treatment works. Similarly, prolonged summer flooding, combining high temperatures and large quantities of decaying vegetation, can result in floodwater with high nutrient and low oxygen levels that cannot be returned to main watercourse without high risk to fish populations and overall water quality. Other threats to water quality include; sedimentation as a result of erosion and damage to the soils both in and outside of the area; diffuse water pollution from agriculture, particularly run-off of manure, fertiliser, poor stock management infrastructure and chemicals; soil erosion due to overgrazing and excessive stock access to watercourses resulting in severe bankside erosion. **Continued over...**	Work with farmers and landowners to establish and maintain best practice in water quality management including; grazing regimes and stocking rates; applications of organic matter and fertilizer; maintenance of farm infrastructure; and cultivation and cropping activity. Work with farmers and landowners to identify crops and cropping regimes which require lower applications of fertiliser and pesticide, to help protect watercourses from chemical run-off. Promote the use of buffer strips to watercourses, and the creation of riparian semi-natural habitat, supported through agri-environment schemes. Promote improvements in farm infrastructure and waste management. **Continued over...**	**Regulating water quality** **Regulating soil quality** **Biodiversity** **Sense of place / inspiration**

[11] Defra catchment priorities identified under the England Catchment Sensitive Farming Delivery Initiative

[12] *South West River Basin District Management Plan, Annex A: Current state of waters*, Environment Agency (2009)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal service offered by opportunities
Regulating water quality continued				**...continued from previous.** The Upper Tone and Upper Parrett feed SSSI such as Curry Moor and Hay Moor as well as Southlake and King Sedgemoor carrying sediment and nutrients into these nationally important habitats.[13] Water and water quality is intrinsically linked to the quality, type, range and importance of habitats and species found across the area. Watercourses of all sizes, throughout the area are noted for their important fish populations, and aquatic flora and fauna. Eels are of particular importance within the area and also have strong cultural associations.	**...continued from previous.** Work with the local community and local businesses to identify and improve problematic sewage and trade discharges. Work with the relevant water companies to assess potential nutrient impact from sewage treatment works. Similarly, work with the peat industry to assess and address the impacts and effects arising from peat workings and their de-watering activities Encourage positive management of vegetation along ditches and rhynes that maintains water flow, but helps trap sediments and nutrients and manage and continue to introduce reedbeds and other wetland habitats, that help to filter water.	

[13] Defra catchment priorities identified under the England Catchment Sensitive Farming Delivery Initiative

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal service offered by opportunities
Regulating water flow	Flood banks, levees, water control infrastructure, including sluices and pumps Rivers, drains, ditches and rhynes Flood plain and coastal grazing marsh over permeable soils Moors	There is considerable and extensive flood risk across most of the Somerset Levels and Moors. Much of the history of the area is intrinsically linked to flooding and the management of water levels. The area, once part of the Severn estuary, is now the largest area of lowland wet grassland and flood plain remaining in England. The area forms the flood plain of eight major rivers or drains. The river catchment systems of the surrounding NCAs influence water flows within the area; the catchment outside of the NCA is four times the size of the NCA. Rivers drain from the Mendips, Quantocks and Blackdown Hills through low lying levels, coastal plains and moors to the Severn estuary. Gradients to drain water within the NCA are very limited and the ground level is lower than the high spring tides in the Severn estuary (see also 'regulating coastal erosion'). Management of flooding is often dependent on pumped drainage. Floodwater storage across the area during periods of high or prolonged rainfall is a natural process and an essential part of; the flood defence system to prevent the flooding of urban areas, and; the maintenance of raised water levels necessary to support nature conservation interests. Uncontrolled flooding causes damage to property and agricultural interests.	National	The river network and drainage systems across the Levels and Moors have been artificially modified over several centuries to improve drainage and increase the flow of water to the sea. Many rivers, drains and embanked channels are unable to contain fluvial floodwaters leading to extensive flooding across most of the NCA, often exacerbated by frequent high tidal conditions. In the south-east of the NCA, steep uplands, the Blackdown Hills, combined with impermeable geology and soil conditions result in rapid run-off following rainfall leading to flooding of the clay lowlands. In the north-east the response to rainfall events is slower as the surrounding permeable limestone hills, the Mendips and Poldens absorb the water which subsequently appears as increased spring line flows. Future growth of Taunton, Bridgwater and Weston-super-Mare could place further pressure on the flood plain to accommodate further flood alleviation measures. **Continued over...**	Work with landowners, farmers, the Internal Drainage Boards, statutory agencies and conservation bodies to ensure the complex network of flood management and hydrological infrastructure and drainage, from field gutters through rhynes, ditches and drains to major rivers, sluices spillways and pumps, function effectively 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. Work with key partners and landowners to identify the most suitable sites for flood storage in different seasonal scenarios. Optimise design and implementation of future flood storage areas to create new wetland habitats, such as flood plain grazing marsh, and creating links where appropriate and where no risk of increasing the range of non-native invasive species is likely, within existing semi-natural habitats. **Continued over...**	**Regulating water flow** **Regulating water quality** **Regulating soil quality** **Biodiversity** **Sense of place / inspiration** **Sense of history** **Geodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal service offered by opportunities
Regulating water flow continued				**...continued from previous.** Future Environment Agency policies includea working with others to store water or manage run-off in locations that provide overall flood risk reduction or environmental benefits and providing advice on adaptive farming techniques in flood plains. By redistributing water within the area, some areas with limited assets at risk will see more flooding while other areas will see a reduction in frequency and length of flooding.[14] [15] Summer flooding results in particular and specific problems of water quality as rotting, lush vegetation significantly reduces the oxygen content in water threatening fish species in main watercourses if floodwater is returned in too large quantities. Breeding waders, some farmland birds and invertebrates, and soil fauna and structure can suffer significant losses or be impacted as a result of prolonged summer flooding, further impacting on overall soil quality and ecological integrity.	**...continued from previous.** Manage all waterbodies, watercourses and flood risk areas to increase structural and habitat diversity across the landscape, which will help to retain floodwater more effectively in different seasonal scenarios and, where possible provide refuges for species vulnerable to inundation events. Encourage agricultural practices that build up organic matter, particularly in clay soils, to reduce the risk of soil compaction and improve water infiltration.	

[14] *Parrett Catchment Flood Management Plan*, Environment Agency (December 2009) (accessed June 2013; URL: http://publications.environment-agency.gov.uk/pdf/GESW1109BOUT-e-e.pdf)

[15] *North and Mid Somerset Flood Management Plan*, Environment Agency (December 2009) (accessed June 2013; URL: http://publications.environment-agency.gov.uk/pdf/GESW1109BOUM-e-e.pdf)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal service offered by opportunities
Regulating soil quality	Soil types Geomor-phological processes Geodiversity Semi-natural habitats High groundwater levels	There are 10 main soilscape types within the NCA the most significant being; loamy and clayey soils of the coastal flats with naturally high groundwater (37 per cent); loamy and clayey flood plain soils with naturally high groundwater (17 per cent); fen peat soils (11 per cent); slightly acid loamy and clayey soils with impeded drainage (10 per cent); loamy and sandy soils with naturally high groundwater and a peaty surface (8 per cent). Deep peat within this area also contains important palaeogeographical records and internationally important archaeology.	National	The loamy and clayey soils of coastal flats with naturally high groundwater (37 per cent) have high arable potential, but this is dependent on the continued ability to pump drain and protect the soils from sea flooding and saline intrusion. Locally some soils are saline and at risk of structural damage where drained. These soils are increasingly under threat of loss from sea level rise, although they also serve to protect other inland soils from inundation. Where there is a high silt and fine sand content compaction and, or capping may be an issue which may be reduced by increasing soil organic matter content. The loamy and clayey flood plain soils with naturally high groundwater (17 per cent) have flood storage potential, but wetness and flood risk means they tend to have a low bearing strength and are therefore at increased risk of compaction from mechanised operations, stock grazing and recreational use in wetter conditions. These soils may benefit, especially where under arable cropping, from increased levels of organic matter through management interventions. Where there are pockets of peat soils these are at risk of drying out and oxidation. Diffuse pollution from these soils, for example from applied manures and very fine sediments, is possible following local flooding. **Continued over...**	Work with farmers and landowners to establish and maintain best practice in soils management including; grazing regimes and stocking rates; applications of organic matter and fertilizer; and cultivation and cropping activity. Work with landowners, the Internal Drainage Board and others to maintain high water levels in areas with soils with high peat content to avoid desiccation and oxidisation. Encourage restoration of and an expansion in the area of permanent pasture. Seek and realise opportunities to improve farm infrastructure, particularly the location of feeders and drinkers, and the use of droves and farm tracks, to minimise localised compaction and, or poaching. Improve levels of organic matter in soils subject to prolonged flooding to improve resilience and recovery. Also, work flexibly and responsively with landowners and farmers to manage the recovery of soils following long periods of flooding.	**Regulating soil quality** **Regulating soil erosion** **Regulating water quality** **Regulating coastal erosion** **Food provision** **Water availability** **Sense of history** **Biodiversity** **Geodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal service offered by opportunities
Regulating soil quality continued				**...continued from previous.** The fen peat soils (11 per cent) are at high risk of peat loss through wastage, with peaty layers becoming thinner over underlying mineral layers, reducing long-term agricultural value. In some locations mineral material is within plough depth. Where over marine alluvium, drained soils may be extremely acid impacting on land use and management. Where drained, sporadic iron rich layers 'drummy layers' are difficult to wet. Slightly acid loamy and clayey soils with impeded drainage (10 per cent) are easily poached by livestock and compacted by machinery when the soil is wet. Weak topsoil structures can easily be damaged. Careful timing of activities is required to reduce the likelihood of soil compaction. Soil quality and particularly the quality and quantity of soil fauna is intrinsically linked to the internationally important variety and numbers of waders and wetland birds overwintering and breeding across the area.		

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal service offered by opportunities
Regulating soil erosion	Soil types High groundwater levels Good soil management Semi-natural habitats	Reflecting the vulnerability of the soils, much of the area falls within two of Defra's Catchment Sensitive Farming initiatives; the Somerset Levels and Moors Priority Catchment and the North Somerset Moors Priority Catchment.[16] Over 40 per cent of the soils covering this area are at some risk of erosion.	Regional	In both priority catchments the primary concern is the down-washing of sediments from higher in the catchments of the rivers that feed the Somerset Levels and Moors, from outside of the area, leading to the sedimentation of important habitats within the area, such as at Southlake, King's Sedgemoor and West Sedgemoor SSSI fed by the Parrett. Nevertheless, the vulnerability of the soils of the Levels and Moors is also a concern. The clayey soils with impeded drainage and base-rich soils, covering 19 per cent of the area, are easily compacted by machinery and livestock, especially during wet conditions, leading to capping and slaking. The soils with peaty topsoil, covering 23 per cent of the area, are at risk of water erosion where cultivated and exposed to floodwater and wind erosion if remaining exposed and allowed to dry out. In addition, where drained and cultivated there is a loss of peat through shrinkage and oxidation. The slowly permeable soils and soils with naturally high groundwater in flood plains and coastal flats, together covering 55 per cent of the area, are not generally prone to soil erosion.	Working with farmers and land managers to apply the principles of good soil management as advocated by initiatives such as Catchment Sensitive Farming. Work with farmers, land managers, the Internal Drainage Boards and others to ensure ground water levels are maintained in areas with soils with high peat content in order to prevent drying out and subsequent oxidisation. Such measures may include; the use of shallow cultivation techniques; maintenance of gutters, ditches and rhynes, and associated control structures; reinstatement of permanent pasture and introduction of grassland margins to arable fields. Encourage the use of green manure crops, such as nitrogen-fixing legumes, within arable systems to replace nutrients and bind soil, winter stubble options in agri-environment agreements, and limiting livestock access to watercourses in locations particularly prone to erosion.	**Regulating soil erosion** **Regulating soil quality** **Regulating water quality** **Biodiversity** **Sense of history**

[16]Defra priority catchments identified under the England Catchment Sensitive Farming Delivery Initiative (http://archive.defra.gov.uk/foodfarm/landmanage/water/csf/documents/state-aid-ecsfdi2008.pdf)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal service offered by opportunities
Pollination	Floristically-rich ditches and rhynes Remnant traditional orchards	An extensive network of ditches, rhynes and drains form the boundaries between fields and often support rich floristic diversity attractive to pollinating invertebrates. Many villages and farmsteads across the area retain remnant or restored traditional orchards providing islands of nectar source attractive to pollinating insects.	Local	Sustainable and sympathetic management of watercourses to maintain networks and corridors of floristic diversity will provide both sources of nectar and refuges and movement corridors for pollinating invertebrates. Farm orchards have played an important part in the culture and historical development of the area; however, many continue to deteriorate and decline in condition and extent. Some initiatives have been established to encourage the reinstatement and conservation of traditional orchards; the South Somerset Orchards Project. Sympathetic management of roadside verges can generate an important connected network of nectar source and movement corridors, complimentary to the network of watercourses and also reinforce the local identity and character of the area.	Support the introduction of nectar and forage mixes in arable land and also the development of species-rich grasslands and leys. Maintain and enhance the floristic diversity associated with watercourse where possible, to increase the range of flowering plants, and increase the area and range of habitat mosaics making connections between existing sites that are attractive to pollinators. Encourage sympathetic management of sites beneficial to pollinators, including appropriate management of roadside verges and banksides. Encourage the protection and diversification of farm orchards through re-introduction of management, which will provide further nectar sources and improve insect diversity.	**Pollination** **Food provision** **Biodiversity** **Sense of place / inspiration**
Pest regulation	Extensive network of watercourses and waterbodies Semi-natural habitats within the farmed environment	The extensive network of semi-natural habitats, particularly the many drains, ditches, rhynes, open waterbodies and grazing marsh, is interspersed across the farmed landscape.	Local	The semi-natural habitats within this area support large numbers of predatory invertebrates, wetland and farmland birds. The integration of particularly the network of waterbodies within the agricultural landscape potentially contributes to the regulation of food crop pest species by bring predators into closer proximity.	Work with farmers and land managers to enhance the network of semi-natural habitats throughout the agricultural landscape so they provide habitat and movement corridors for predator species to bring them within close proximity of main food producing areas.	**Pest regulation** **Food provision** **Biodiversity** **Sense of place / inspiration**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal service offered by opportunities
Regulating coastal erosion	Sand dunes, salt marsh, mudflats and estuaries 'Hard' sea defences and engineered banks Geomorphological processes	Backed by low-lying land, often at, or in spring, below sea level, coastal defence and management of coastal erosion are imperative. The policies and identified actions of the shoreline management plans[17] along many sections of the coast are to provide sustainable protection against flood risk to the Somerset Levels and Moors, working with natural processes as far as possible and allowing the area to evolve naturally in the long term. The resultant management approach is a complex picture of managed realignment, 'hold the line' and no active intervention. The Severn Estuary Partnership has identified policy recommendations and proposals for the management of the estuary, including the coastal stretches in this area.[18] Most of the coastal part of the area is designated for its importance to nature conservation; Severn Estuary Ramsar site, Special Protection Area and Special Area of Conservation and Bridgwater Bay National Nature Reserve. Sections of the coast, particularly between Burnham-on-Sea and Brean Down and at Weston-super-Mare, are widely used for leisure and amenity.	National	The coastline of the area is complex and subject to many pressures and issues. Wave energy and tidal range place significant pressures on the coastline in this area. Tidal range in the Bristol Channel is classified as macromareal (greater than 4 m range) and is the second highest in the world; occasionally exceeding 9 m height. Wave action can also be extreme, driven by westerly winds and funnelled into the Bristol Channel from the Atlantic. Coastal erosion is regulated through a complex series of natural and engineered processes and structures. Natural formations, particularly dunes, salt marsh and mudflats, fed by sediment from the rivers Parrett, Wye, Avon and Severn, help to absorb wave and tidal energy. Seabanks and 'rock armour' are used to defend the most vulnerable and low-lying stretches of the coast. In May 2012 the Environment Agency began construction work to create one of the UK's largest new reserves for wildlife. Over 400 ha of the Steart peninsula will be turned into wildlife-rich habitats including salt marsh and freshwater wetland. The scheme will also provide better protection against flooding for Steart village and Steart Drove. **Continued over...**	Work in partnership to study and better understand the sediment dynamics and geomorphology of the Bristol Channel and Parrett estuary in order to continue to plan for the most effective and beneficial development of natural coastal defences where managed realignment and no active intervention is proposed. Identify and communicate effectively flood risk scenarios resulting from different coastal change models to inform risk and asset management strategies and planning. Realise benefits for habitat expansion and species resulting from coastal management and realignment initiatives in line with management objectives for the SAC, SPA and Ramsar designations. Develop beach management strategies that adequately address flood risk while recognising the leisure and amenity uses of the coastal strip.	**Regulating coastal erosion** **Biodiversity** **Geodiversity** **Sense of place / inspiration** **Regulating water flow** **Regulating soil erosion** **Recreation**

[17] *North Devon and Somerset Shoreline Management Plan*, Environment Agency (2010) and Severn Estuary Shoreline Management Plan, Environment Agency (2000)

[18] *Strategy for the Severn Estuary*, Severn Estuary Partnership (2001)

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal service offered by opportunities
Regulating coastal erosion continued				**...continued from previous.** Sand dunes are characteristically prone to drought and can become unstable with disturbance, particularly along paths and tracks, increasing the potential for 'blow-outs' during strong winds; part of the natural succession and process of sand dunes. The overall extent and rate of erosion is often dependent on the extent of vegetation cover. Much of the coast is a popular tourist destination, the beaches widely used for leisure and recreation and inland areas occupied by caravan and holiday facilities. This increases the pressure on maintaining coastal defences and beaches.		

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal service offered by opportunities
Sense of place / inspiration	Level landform with occasionally long, uninterrupted views Water Wide expanse of coast and Bridgwater Bay Abundance of wildlife Wet pastoral grassland and flood plain Pollard willows and withy beds Rich physical and cultural heritage Simple, austere and functional vernacular architecture	The level, sparsely populated land form can result in long, uncluttered views. The contrasts between the peat moors, clay levels, 'burtles' (inland clay 'islands'), surrounding hills, and coastline of storm gravel beaches, sand dunes and mudflats are often subtle, but contribute to a complexity and intricacy that helps to define the place. Water and the management of water is ever present in; the complex, chequer-board pattern of drainage through ditches, rhynes, drains and rivers; open waterbodies in former peat workings; Bridgwater Bay; and extensive, often long-standing areas of floodwater. Wildlife is abundant and is recognised and protected in internationally and nationally designated sites; more than an eighth of the area is subject to some form of nature conservation designation. Large flocks of waders, wetland birds and starlings are associated with the area as are many invertebrates, particularly dragonflies, and fish, notably eel. The largest remaining area of flood plain and coastal grazing marsh in Britain, resulting in a productive, pastoral farmed landscape. A wealth of visible and below ground heritage assets and a clear expression of human occupation, management and manipulation of the landscape over millennia. Simple, austere buildings in brick and Blue Lias limestone with slate, plain clay or pantile roofs as solitary farmsteads or simple, often linear villages. Part of the area, the Avalon Marshes, is closely associated with the legends of King Arthur.	National	Pressure for change is most notable along the corridor of the M5 motorway and in places along the coast; for infrastructure and distribution, and tourism facilities respectively. Housing development around Bridgwater, Weston-super-Mare and other larger settlements is also affecting a degree of change in the character of the area. The most distinctive characteristics of the landscape remain as a continuing challenge between water and land. Periods of prolonged flooding can test the agricultural viability of the landscape and bring about changes to the species and habitat composition of the area. Likewise, drought may also bring about noticeable change to the character and culture of the area. What persists is a fine balance between the lush, productive pastoral farmed landscape and the complex wildlife within it and the forces of nature and in particular the presence and absence of water. The landscape of the Levels and Moors has and continues to provide inspiration for many people, particularly as a place steeped in history, with a wealth of wildlife and peaceful undisturbed places. Basketry and willow weaving remains both a commercial and artistic pursuit intrinsically connected with this area.	Identifying, protecting and reinforcing the distinctive elements and features of the landscape are essential to maintaining the inspirational and immediately recognisable character of the area. Of particular importance are the maintenance of the 'wild' coastline, the mudflats, marshes and estuaries, and the open, uncluttered, and generally undeveloped character where it remains, the wealth of associated wildlife and the relationship between a productive landscape and the management of water. All opportunities to ensure that development respects local settlement patterns and building materials should be taken, and to avoid the loss of historic evidence through insensitive development or management.	**Sense of place / inspiration** **Sense of history** **Tranquillity** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal service offered by opportunities
Sense of history	Internationally important buried, 'found' and above ground archaeological and heritage assets Geological and palaeoenviron-mental records Wealth of sites and features illustrating human occupation and management of a wetland and coastal landscape Strong surviving pastoral land use and character	The NCA has a strong sense of history and a record of human occupation that is recognised, although not designated, as being of international importance. The underlying geodiversity also contains a nationally important record of ancient landscapes and climates. The deep peat deposits of the Brue Valley are particularly rich in buried archaeology; some of the oldest records of human occupation of the English landscape have been recovered from this area. Probably best-known is the 'Sweet Track'; a more than 6,000 year old example of a timber trackway used to traverse the wetlands of the Brue Valley. Many artefacts from prehistory, the Bronze and Iron Ages, Roman activity, notably saltings, and a wealth of medieval evidence have been recovered from the area. The history of the area is closely associated with water; the drainage of the landscape, flooding and occasional catastrophic inundation. The historical settlement pattern across the area is also closely related to the availability of land safe from flooding and access to productive pastoral ground. Many farmsteads and villages are positioned on small raised areas of land little more than a metre higher than the surrounding area. The abbeys of Glastonbury and Wells were influential in shaping this landscape and played an important role in the early history of Christianity. 19th and 20th century heritage is equally apparent in this landscape, for example the engineering infrastructure for water level management and the military installations and defences along the rivers and drains and particularly along the River Parrett.	International	Buried and upstanding heritage assets across the area are at risk from both human and natural forces. Prolonged periods of drought will cause desiccation of soils, particularly peat soils (wastage), resulting in the oxidisation of organic material and subsequent loss. Excessive pumped drainage lowering the ground water table may cause similar impacts and effects. Deep cultivation, particularly exacerbated in areas with reducing soil levels, will damage buried remains. Similarly, ongoing peat extraction within the area may result in the loss, or recovery of heritage assets. The extent of buried remains across the area can be estimated from that already discovered and as such the risk of further loss or recovery resulting from change in the landscape can also be estimated. Maintaining the long-standing pastoral character of the area that contributes to the sense of history is dependent on sustainable livestock and farming regimes that are able to respond to changing frequencies of flooding and drought. The ongoing maintenance of both the physical remains and sense of history across this area are, in many respects, dependent on the ongoing management of water. A number of heritage assets along the coast may be at risk from natural coastal processes or the need to build or realign coastal defences. Inappropriately located development may also damage or result in the loss of both physical assets and the strong sense of history to be found.	Minimise disturbance and damage to archaeological sites resulting from cultivation, particularly in peat areas, most notably within the Brue Valley. Ensure the preservation of palaeoenvironmental deposits and buried archaeological remains in wetland areas, for example by maintaining or raising where necessary water levels. Work with landowners, farmers, local communities and local decision makers to safeguard heritage assets and the pervading sense of history, and identify and realise opportunities for the enhancement of the setting, interpretation and legibility of heritage assets. Where opportunities for new development are identified and considered use local vernacular architectural styles and settlement patterns to inform design solution that reinforce the existing sense of history. The restoration and conversion of vernacular buildings should be sympathetic, use local materials and preserve local distinctiveness.	**Sense of history** **Sense of place / inspiration** **Regulating water flow** **Food provision** **Tranquillity** **Geodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal service offered by opportunities
Tranquillity	Low-lying and level topography Extensive areas of sparsely populated grazing marsh Open waterbodies and watercourses	According to CPRE Intrusion Mapping only 39 per cent of the area remains 'undisturbed'. There are, however, substantial areas where intrusion and disturbance have not occurred and large parts of the area remain sparsely settled and populated and uncluttered by modern infrastructure. The close association with waterbodies and watercourses further accentuates the sense of tranquillity. The majority of intrusion into perceived tranquillity occurs along the M5 motorway corridor, around Bridgwater, Burnham-on-Sea and Weston-super-Mare and in places associated with tourism along the coast	Local	Tranquillity remains an important aspect of the Levels and Moors landscape. Although increased development has occurred along the M5 motorway corridor, around Bridgwater, Burnham-on-Sea and Weston-super-Mare, and along the coast much of inland area, east of the M5, remains sparsely populated, isolated from roads and settlement and often appears 'wild' and remote, particularly along the upper reaches of the rivers Axe, Brue and Parrett. The lack of intrusion into many parts of the Levels and Moors is also a contributory factor to the wealth of wildlife to be found, particularly the large assemblages of waders, wetland and farmland birds. The coastline of Bridgwater Bay, notably between Steart and Stolford and at Brean Down remains largely tranquil, closely associated with the seascape of the Bristol Channel.	Seek to conserve remaining areas of tranquillity, the open uncluttered views and skylines and the strong pastoral character particularly along the Axe, Brue and Parrett valleys and around the fringes of Bridgwater Bay. Seek to conserve areas of tranquillity associated with the coast, Bridgwater Bay and the Bristol Channel reflecting the strength of maritime character	**Tranquillity** **Sense of place / inspiration** **Sense of history** **Biodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal service offered by opportunities
Recreation	Close to 1,500 ha of accessible National Nature Reserve Accessible nature conservation sites Coast and beaches Small areas of open access land Droves, tracks, bankside paths and quiet lanes	The area provides substantial areas of exceptionally high quality access to wildlife. The many nature reserves attract large numbers of visitors at all times of year and often include easy and level access catering for all. They provide access to nature for a wide range of interests; from the casual visitor to the amateur scientist. Coastal recreation includes traditional seaside resort activities, birdwatching and fishing, horse riding and some more active sports such as kite buggying. Wildfowling is also pursued across the area, but most typically at and around the coast. The area offers a network of rights of way totalling 892 km at a density of 1.4 km per km^2. Many rights of way and permissive paths follow traditional droves – livestock tracks running into the heart of the levels and moors. Tracks and quiet lanes are popular with cyclists and walkers and provide level and often easy access for all abilities.	National	Recreation is of particular importance in this NCA, both in terms of the opportunities on offer and managing the impacts of recreational pressures, which can impact on the tranquillity, biodiversity and geodiversity of the NCA if not managed appropriately. For example, water-based recreational activities may increase the risk of spread of non-native invasive species through the network of watercourses; appropriate bio-security measures should be promoted and applied as necessary. The relative ease of access to wildlife and popularity of the area can result in localised pressures at some sites. Large numbers of people visit the moors in the autumn to see the dramatic displays of evening roosting starlings occasionally causing congestion on local roads. Coastal tourism and recreational activities are often found in close proximity to internationally important habitats and assemblages of wildlife resulting in some potential disturbance. Access and recreational activities, particularly close to where people live, brings mental and physical health benefits. A network of trails linking quality natural spaces and other visitor destinations can also provide significant benefits in terms of income from local visitors and tourists. There is a challenge to achieve a balance between promoting access opportunities, recognising the wider health and economic benefits essential to the area while reducing the impacts of inappropriate recreation on key biodiversity and heritage sites	Support sustainable recreational and educational access to enable understanding and appreciation of the Levels and Moors, in particular its wealth of biodiversity and clear evidence of historic environmental and cultural change. Identify and realise opportunities to create new circular routes or links to existing rights of way, particularly in the Brue Valley and along major rivers taking all reasonable steps to prevent the spread of non-native invasive species. Identify and realise opportunities to create new cycle routes and networks throughout the area, promoting a low-impact form of access to sensitive nature conservation sites, encouraging 'green tourism' initiatives and increasing health and well-being opportunities locally. Further opportunities for enhancements to the public rights of way network should be realised. Improved access should incorporate enhanced interpretation, particularly of natural and heritage assets and features. Extend awareness of access and recreational opportunities available across the area, and particularly beyond the coast and main nature reserves where possible.	**Recreation** **Sense of place / inspiration** **Sense of history** **Tranquillity** **Biodiversity** **Geodiversity**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal service offered by opportunities
Biodiversity	Wetland habitats including large areas of flood plain and coastal grazing marsh, open water and watercourses Coastal and estuarine habitats; salt marsh and sand dunes Large areas designated for their nature conservation interests including SAC, SPA, Ramsar, SSSI and local sites Rare, scarce and common species	The area contains 8,385 ha of Sites of Special Scientific Interest (SSSI) over 36 sites, 6,777 ha of Special Protection Area (SPA) and Ramsar, and 651 ha Special Area for Conservation (SAC). Six National Nature Reserves (NNRs) cover 1,437 ha of the area. Thirteen per cent of the area is designated as SSSI over 36 sites. In 2011, 92 per cent of SSSI land was in favourable or unfavourable, recovering condition. Over 43,000 ha, two-thirds of the area, is classified as flood plain and coastal grazing marsh priority habitat and there are 1,790 ha of fen. The large areas of widely undisturbed wetland habitat support large numbers of over-wintering and breeding waders, wetland and farmland birds. This is complimented by the close proximity to the fertile waters and mud flats of Bridgwater Bay and the Bristol Channel. Common species of bird, invertebrate and mammals can be found in large numbers, for example starling and dragonflies, alongside rare and scare species; bittern, great white egret, silver diving beetle and greater water parsnip.	International	Across much of the area many habitats, particularly flood plain and coastal grazing marsh and coastal and estuarine habitats, occur in coherent and heterogeneous mosaics. Generally, designated sites and habitats are in favourable or favourable, recovering condition. Semi-natural habitats are dispersed widely throughout the area and are often closely related or integrated into the farmed environment The main influence on existing designated and non-designated terrestrial habitats and species is flooding. Other effects of climate change, development pressures and changes in agricultural practices will place further pressures on species and habitats. However, increased flooding and prolonged periods of high water levels may favour certain species and result in a requirement to adopt extensive grazing practices. A changing climate may also increase the risk of colonisation by non-native invasive species, particularly along watercourse and in waterbodies. **Continued over...**	Continue to work in partnership with landowners, farmers, the Internal Drainage Boards and others involved with water and land management, and the range of agencies and conservation organisations operating in the area to maximise the combined potential for food provision, water regulation and biodiversity. Maintain and increase where appropriate the extent of wet grassland and encourage the use of extensive grazing regimes that realise the potential to increase floristic diversity and improve soil quality. Improve the quality and increase the area of all priority habitats, notably flood plain and coastal grazing marsh, reedbeds, mires and fen, open waterbodies, arable habitats and connecting watercourses, looking to better connect, buffer, improve and create habitat patches, resulting in more coherent and resilient ecological networks to improve habitat resilience and enable necessarily responsive species movement. **Continued over...**	**Biodiversity** **Regulating coastal erosion** **Regulating water quality** **Regulating water flow** **Regulating soil quality** **Food provision** **Sense of place / inspiration**

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal service offered by opportunities
Biodiversity continued				**...continued from previous.** Conversion of pastoral land to arable production or maize production for livestock feeds may also place pressure on some habitats and result in localised fragmentation of habitat networks. However, a number of species, notably a number of wetland and wading birds can benefit from areas under cultivation if best practice and timing of cropping is adopted. A number of peat workings remain in operation and will present further opportunities for restoration and creation of habitats when expended. Change along the coast, for example the realignment project at the Steart peninsula, can bring significant benefits for biodiversity; however, 'coastal squeeze' on intertidal habitats may be exacerbated in some areas as a result of a need to 'hold the line' of coastal defences.	**...continued from previous.** Continue to use evidence to build a landscape scale approach to habitat management and restoration and to prioritise action on the ground, benefitting the strong sense of a special place and strengthening landscape character. In particular use all tools available, such as habitat mapping, to target appropriate action. Protect and enhance designated sites aiming to achieve favourable condition on all sites and linking them, where appropriate and where there is no risk of increasing the range of non-native invasive species, to the wider habitat network to further enhance their influence, functionality and resilience to climate change and other threats. Identify and realise opportunities to protect, restore and manage wetland and coastal habitats and manage them appropriately to increase their adaptability to climate change and rising sea levels.	

Service	Assets/ attributes: main contributors to service	State	Main beneficiary	Analysis	Opportunities	Principal service offered by opportunities
Geodiversity	Post-glacial accumulation of Quaternary alluvium, including Burtle Beds, peats and marine clays Soils and soil formation Coastal, estuarine and river geomor-phological processes Local stone and locally derived brick in vernacular buildings	There are 5 SSSI within the Levels and Moors that are designated wholly or in part, for their geological interest. Quaternary deposits over the level basin of Mercia Mudstones are particularly important for the record of; fluctuating climate and sea levels; fluvial and marine geomorphological processes; fossiliferous deposits preserving evidence of past landscapes and climates, for example plant fossils documenting the vegetation succession through moss, sedge, carr and wood fen; and peat and soil deposition and development. There is a dynamic system of accretion and erosion along the coastline – much influenced by the extremely high tidal range and sediment carried down the Severn estuary – creating intertidal and subtidal mudflats, sand flats and salt marsh around the fringe of Bridgwater Bay and within the River Parrett estuary.	National	The development and deposition of peat is an ongoing and measureable process in a few remaining areas of fen; however, maintenance of low water levels will impair this process. Past and ongoing extraction of peat from the area allows for some, limited exploration of palaeo-environmental records. Of particular importance to this area is the study, understanding and functioning of coastal and estuarine geomorphological processes. The use of locally sourced stone in vernacular architecture is an expression of the deeper, solid geology in and adjacent to the area, notably the use of blue Lias Limestone and locally derived bricks.	Identify and realise opportunities for enhanced access to and understanding of geodiversity and particularly soils within the area. Maintain natural geomorphological processes, particularly in fen areas, along rivers and at the coast that contribute to the regulation of flooding. Support the use of local stone as a building material to help maintain local distinctiveness. Improve the long term condition of geological sites by ensuring that underlying factors influencing site favourability are managed appropriately, for example management to keep exposures clear. For coastal sites this should be considered within the context of dynamic coastal processes.	**Geodiversity** **Regulating soil quality** **Regulating coastal erosion** **Sense of place / inspiration** **Sense of history**

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NATURAL ENGLAND

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