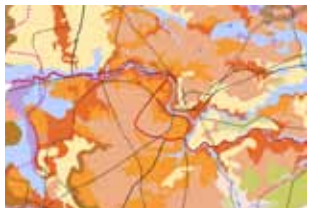
NORFOLK & SUFFOLK BRECKS

Landscape Character Assessment

Page 51 Conifer plantations sliced with rides. An abrupt, changing landscape of dense blocks and sky.

Page 34 The Brecks Arable Heathland Mosaic is at the core of the Brecks distinctive landscape.

Page 108 Secret river valleys thread through the mosaic of heaths, plantations and farmland.



Page 07 Contrasting acidic and calcareous soils are juxtaposed on the underlying chalk

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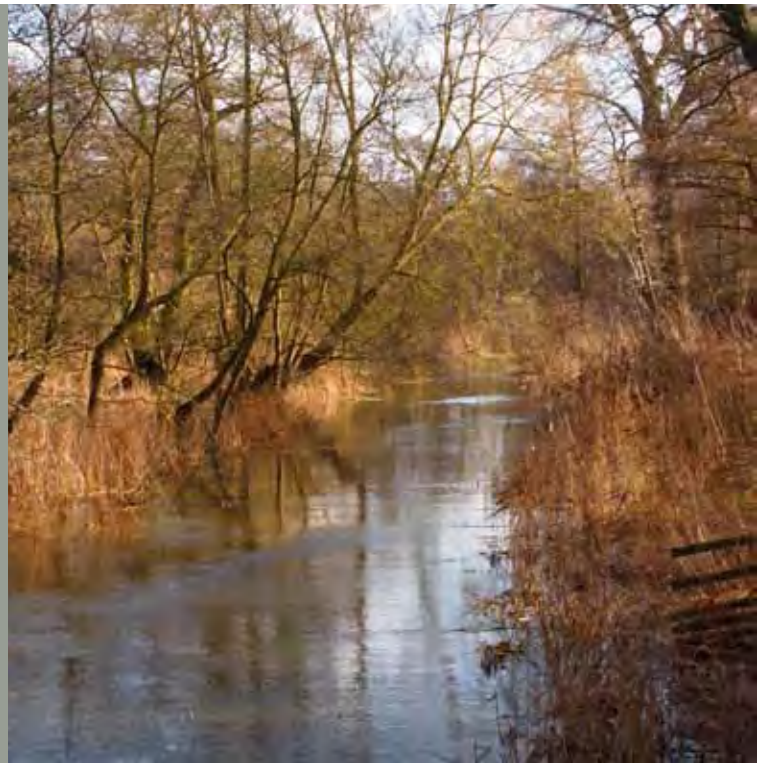
Introduction

Context
Sets the scene
Purpose and timing of the study

How the study should be used
Status and strategic fit with other documents
Structure of the report



Introduction

Context

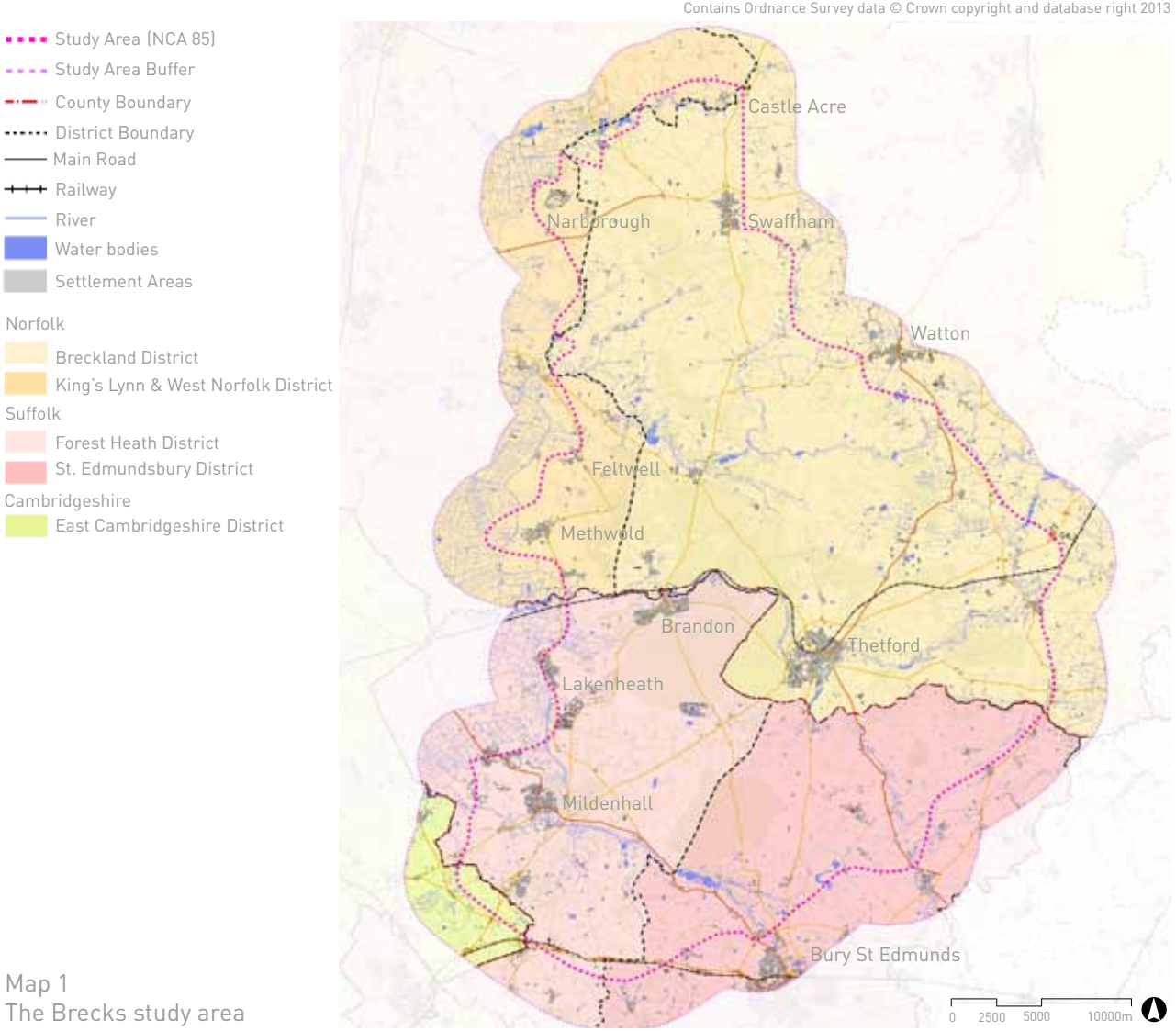
This landscape character assessment focuses on the Brecks, a unique landscape of heaths, conifer plantations and farmland on part of the chalk plateau in south-west Norfolk and north-west Suffolk. It was commissioned in 2013 by the Brecks Partnership as part of the suite of documents required for a Heritage Lottery Fund bid entitled 'Breaking New Ground'. However, it is intended to be a stand- alone report which describes the distinctive character of the Brecks and supports the positive management of the area.

The study area is the whole of the Brecks National Character Area (NCA 85)[1], one of 159 such NCAs across England. The NCAs are areas that share similar landscape characteristics and which follow natural lines in the landscape rather than administrative boundaries, making them a useful framework for land management decisions.

Objectives

Landscape character assessment (LCA) has been developed as a means of identifying

[1] Natural England, National Character Area profile:85 - The Brecks, 2013



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Map 1
The Brecks study area

what it is that makes a landscape special and distinctive - its 'sense of place'. By articulating and describing the distinctive characteristics of different types of landscape, LCA can be used to inform decisions about landscape planning and management that can guide future change. The aim is to conserve and enhance the distinctive landscape character that makes places like the Brecks special, counteracting forces for change that may otherwise erode local distinctiveness.

The twin objectives of the Brecks LCA are to:

- provide a technical assessment of the area by developing landscape typologies and descriptions, with guidelines for their future management, together with appropriate digital mapping.

- develop a public-facing narrative that tells the story of the landscape, defining landscape areas that make sense locally and with which people can associate. The intention is that this narrative will help improve people's understanding of the Brecks, their connection to it, and thereby building their 'sense of place'.

The assessment and guidance will be used, outwith the Breaking New Ground project to influence and inform land management decisions.

Status

The study area covers parts of Norfolk, Suffolk and a (very small) part of Cambridgeshire. It falls within five different local planning authorities (LPA):

- Kings Lynn & West Norfolk (Norfolk);
- Breckland (Norfolk);
- Forest Heath (Suffolk);
- St Edmundsbury (Suffolk); and
- East Cambridgeshire (Cambridgeshire).

Each of these LPAs has its own policies covering environment and planning issues and this LCA sets out to supplement and complement these existing formal decision-making frameworks. It draws on the existing LCAs within the area (see page 31), re-interpreting the material to provide a tailored, 'Brecks-centric' LCA which fits within the hierarchy of available landscape characterisation work. The adopted LCAs will remain the principal reference for development control policy, but this Brecks LCA will provide supplementary detailed information on local landscape character and guidance for managing change to conserve and enhance that character.

Structure of the report

Following this introduction, the report is subdivided into the following four sections:

1. **Evolution of the landscape** - an overview of the physical character of the Brecks, the history of human settlement and the development of the region's distinctive land cover and biodiversity.

2. **Landscape character** – summary of existing landscape character assessments and description of the specific landscape typology that has been developed for the Brecks. These sections identify landscape elements and features that are particularly sensitive to change and provide guidance for directing landscape change so that it conserves and enhances distinctive landscape character.

3. **Local landscapes** – five case studies which demonstrate how the Brecks LCA can be used to interpret landscape character and landscape history at a local scale. The case studies tell the story of these local landscapes, illustrating how the landscape has evolved from post glacial times to the present day. They highlight the remnant historic features that help to create a strong local identity, contributing layers of meaning and a sense of time-depth in the landscape.

4. **The Brecks in literature** -The Chairman of the Brecks Society explores how the landscapes of the Brecks have motivated and inspired writers through the centuries.

Evolution of the landscape

Physical influences
Overview of topography, geology and soils

Human influences
Evolving history of the land, from prehistoric to present-day

Biodiversity
Land cover and the development of valuable biodiversity habitats

Brecks geology, landform and soils

The distinctive character of the Brecks stems from the underlying chalk bedrock, the effects of glaciations, which left only a thin mantle of soil covering the chalk, and the freeze-thaw conditions that occurred in the final stages of the last Ice Age.

Bedrock

The Brecks lie on the broad band of chalk that extends diagonally across England from the Chilterns to north-west Norfolk. Generally the chalk is upstanding as a gentle ridge, but the Brecks lie on a slight depression between Newmarket and Swaffham where the chalk forms a low plateau, 15-30m above sea level.

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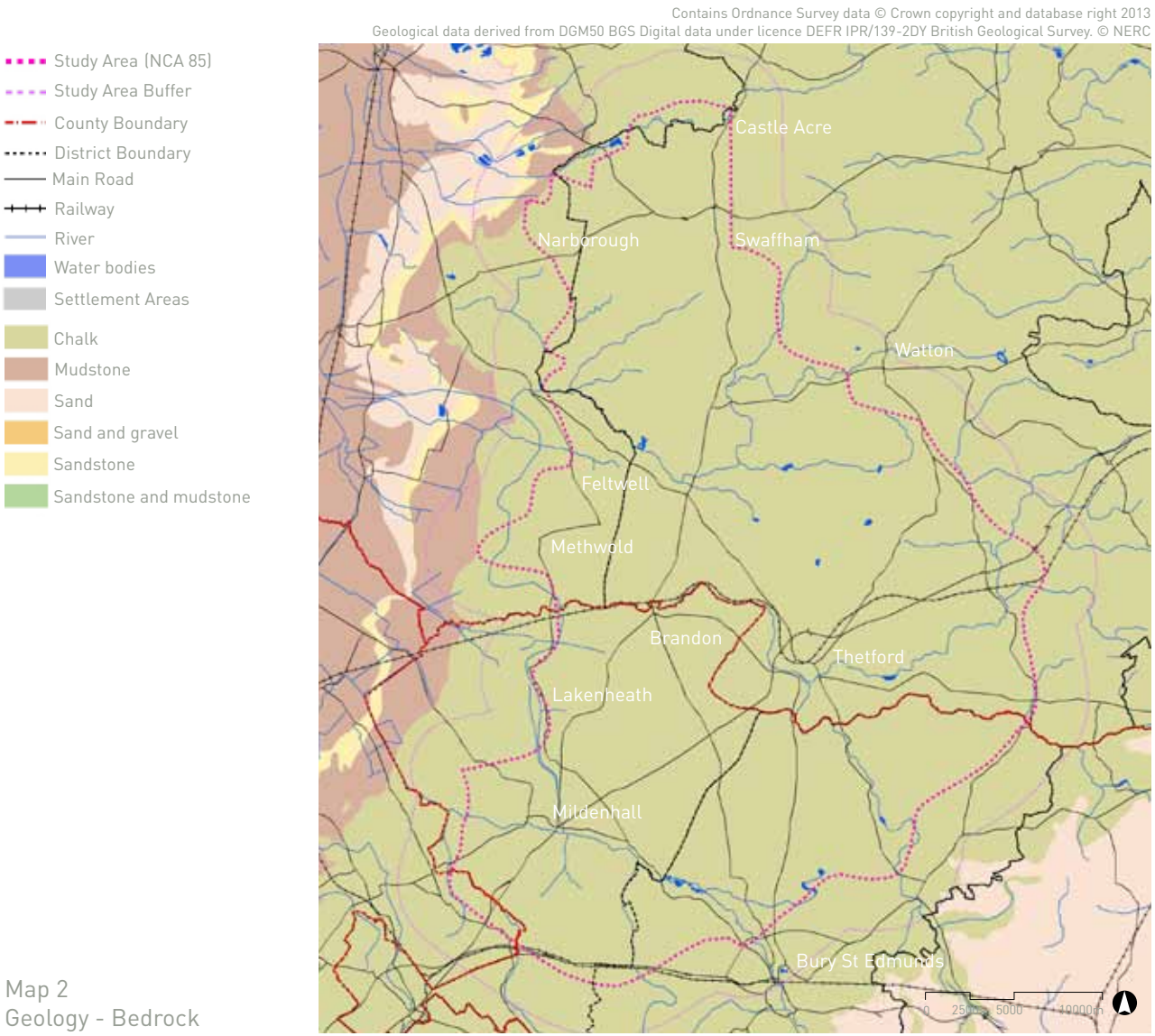

Map 2
Geology - Bedrock

Chalk was formed around 90 million years ago from the minute calcite plates shed from marine organisms that accumulated in deep layers on the bed of a great sea. The resulting calcite ooze gradually consolidated to form rock which was subsequently uplifted to form ridges. In East Anglia, the chalk strata are inclined eastwards towards the North Sea, with the harder, grey Lower Chalk forming the lower part of the chalk escarpment which faces westwards over the Fen Basin. The overlying Upper Chalk is paler and typically contains nodules of flint, formed from the silica of sponges and microscopic marine creatures.

Shaping the land

The topography of the Brecks was shaped by the Ice Age glaciers, particularly the Anglian Glaciation in which lobes of ice extended right across Suffolk to the northern edge of the London Basin. The glaciers gouged out the relatively soft, older Mesozoic rocks to the west of the chalk to form the fen basin and transported huge quantities of these clays to the east and south, where they were dumped to form the chalky boulder clays (Lowestoft Till) of central Norfolk and Suffolk.

The ice sheets left a relatively low, gently undulating chalk plateau, which rises to the north. The deposits of chalky boulder clay and

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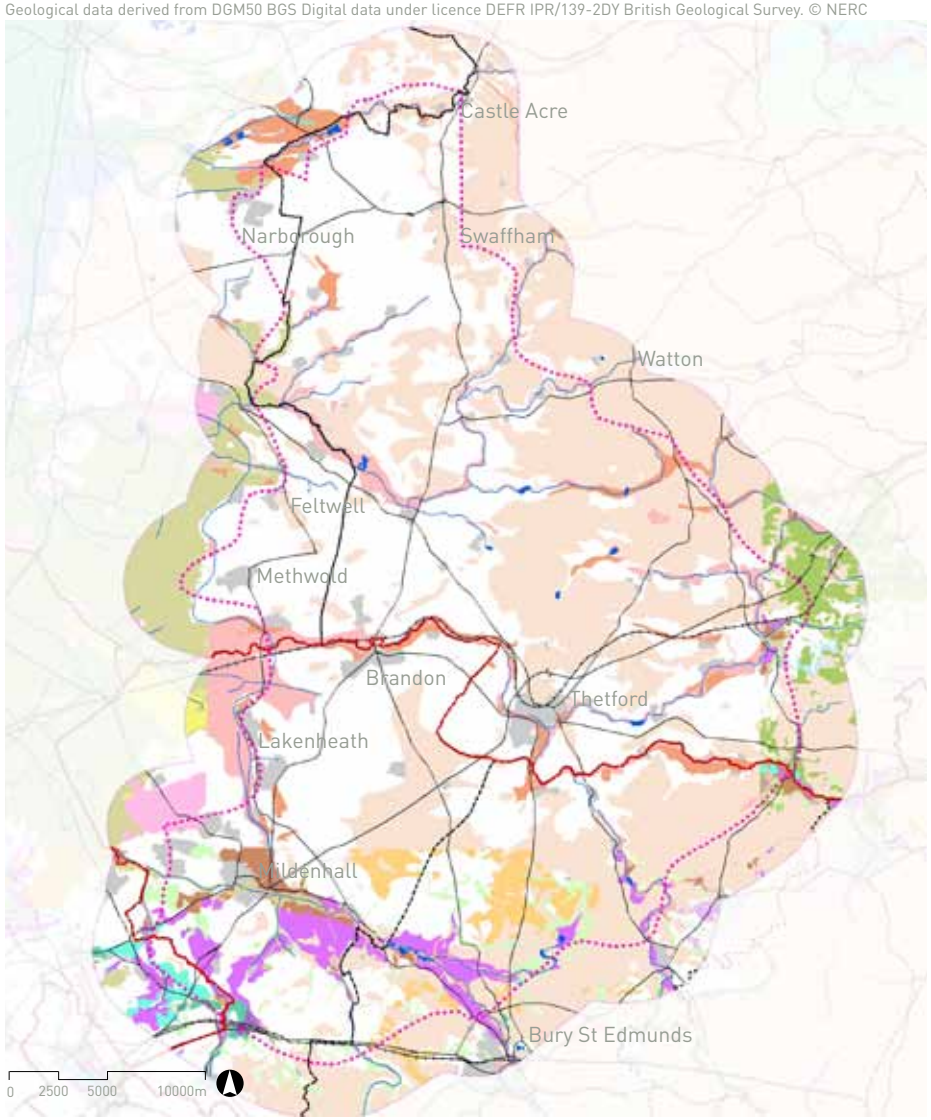

Map 3
Geology - Superficial

outwash gravels left by the retreating Anglian glaciers vary in thickness and composition. On the Brecks the deposits are relatively thin and sandy; to the east they are very much deeper and more clayey. The thick boulder clays of central Suffolk have formed higher land and the main rivers of the Brecks – the Nar, Wissey, Thet/Little Ouse and the Lark flow westwards from these more elevated claylands, cutting through the low dry chalk plateau of the Brecks, before flowing into the fen basin.

Periglacial influences

After the Anglian, there was a further sequence of warmer interglacial and freezing glacial periods but the glaciers formed during the two subsequent glaciations did not reach further south than the Norfolk Coast. The Brecks were untouched by these later ice sheets, but the repeated freezing and thawing that occurred in the periglacial conditions suffered by areas to the south of the glaciers were particularly influential on the thin chalk soils of the Brecks. Here the surface layers of chalk and glacial till deposits were shattered by alternate freezing and warm conditions. Mildly acidic rainwater gradually dissolved and leached the chalk from the surface layers leaving an insoluble surface residue of sand to accumulate. In places deep layers of sand may have been formed by wind blown drifts.

The surface layer sands of the Brecks, which caused such havoc during the 19th century 'sand blows', formed during these periglacial conditions. The subsurface layers of chalk, gravel, sand, loam and chalky boulder clay are typically covered by a surface layer of sand – in many areas the sand layer is only 1-2cm thick, but in the Elveden area it may be as much as 5m deep!

Surface deposits of sand, with a dense scattering of flint, in the Thetford Warren area

Local erosion (in part by wind) created ridges of chalk alongside troughs filled with sand and the contrasting soil types often produce striking variations in vegetation, with bands of acid-loving heather separated by chalk grassland. Areas where these contrasts occur are known as the 'patterned ground' and the variations are even visible on arable land as crops grow more vigorously on the chalky, moisture-retaining soils.

The freeze-thaw pattern of the periglacial climate also led to the development of ground ice depressions, commonly known as 'pingos'. These circular hollows, filled with water or fen vegetation typically occur in clusters, as at Thompson, Foulden and East Harling Commons.

Fluctuating meres, such as those at Fowlmere and Ringmere, may also have formed during the post glacial period. They are karstic formations which are often fed by springs so that water levels fluctuate according to the degree of groundwater saturation in the chalk.

Relict pingo at Thompson's Common. When the ice mound melted, the ground it had occupied collapsed, leaving a round hollow surrounded by earth ramparts.

Distribution of pingos across the Brecks

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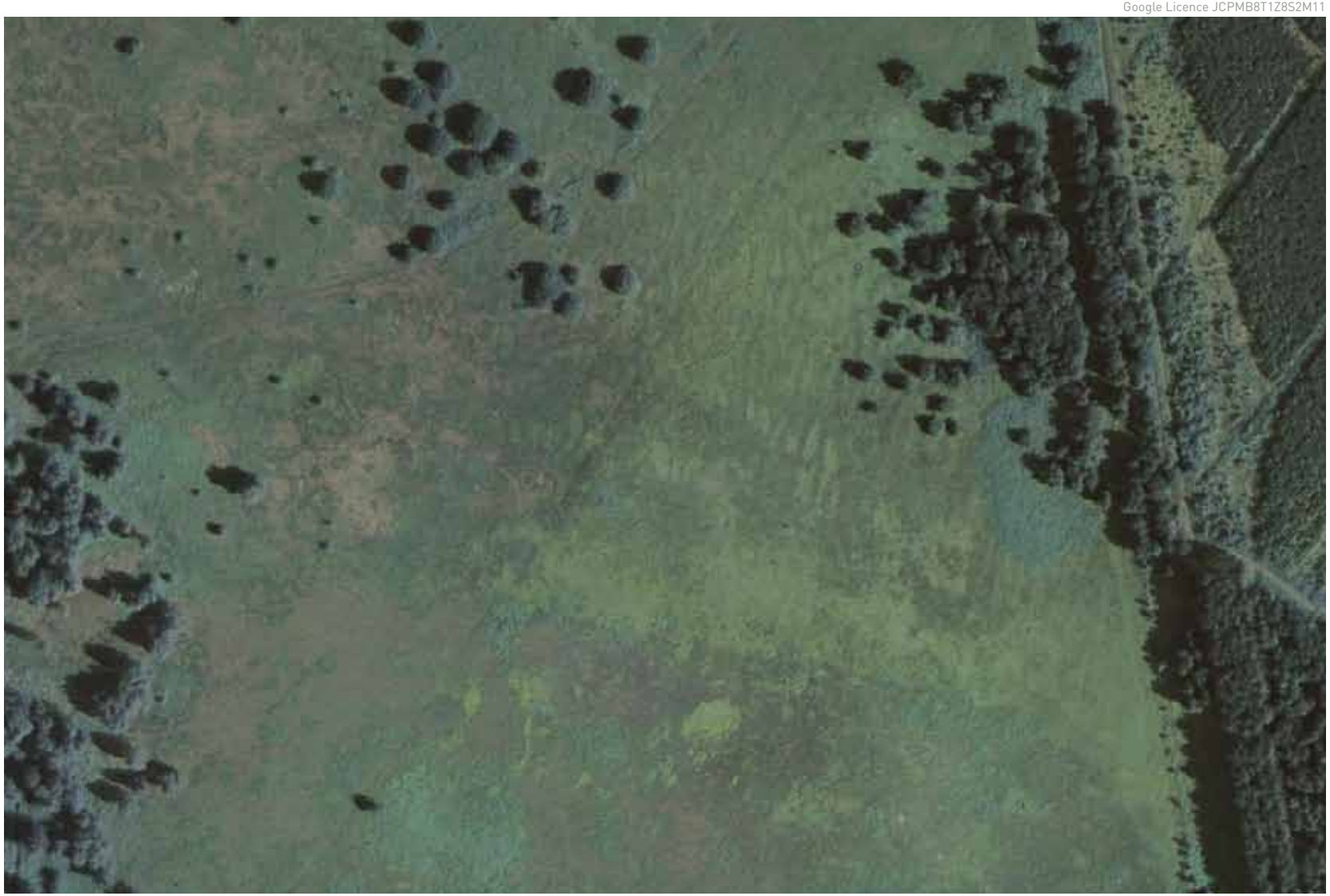

'Patterned ground' at Brettenham Heath. Stripes and polygons of different vegetation types reflect underlying contrasts in soil as acid and calcareous soils are juxtaposed.

Topography

The Brecks plateau is drained by four river systems – the Nar, Wissey, Thet/Little Ouse (with the Black Bourn) and the Lark, which flow westwards into the Fen Basin from the higher land to the east. Parts of the valley of the River Nar are steep sided but, with this exception, the other rivers flow across the Brecks within very shallow valleys, often with almost no perceptible valley slopes at all.

The central chalk plateau is relatively flat or gently rolling, but to the north of Thetford the plateau has a more distinct slope to the west, allowing long views towards the fens. Within the fen basin the land is completely flat and low lying, so even small 'islands' of chalk to the west of the main chalk plateau are noticeable. To the east, south and north of the Brecks, where thick layers of chalky boulder clay predominate, the topography becomes more dynamic and rolling, with views in all directions.

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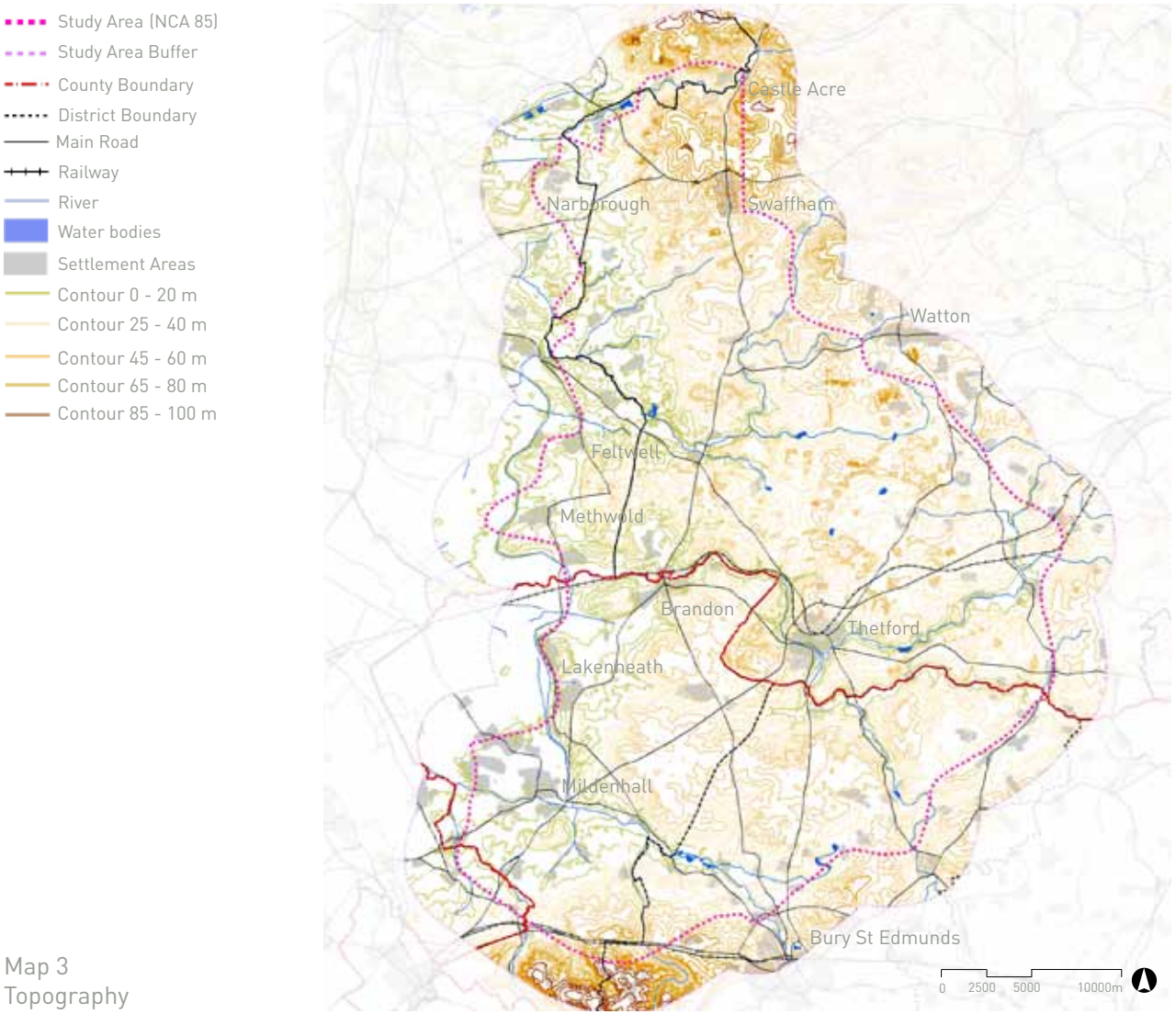

Map 3
Topography

Soils

The soil map shows that the chalklands of the central Brecks are overlain by sands and loamy sands, which range from shallow, highly calcareous soils to leached acid soils with low fertility. Flints are common, particularly where the Upper Chalk strata lie close to the surface.

To the west of the chalk, repeated freshwater flooding within the fen basin led to the formation of marshes and the accumulation of deep layers of peat. Within the river valleys bands of alluvium and river terrace gravels mark the course of rivers past and present and to the east of the chalk there is a gradual transition to the thick boulder clays of central Norfolk and Suffolk.

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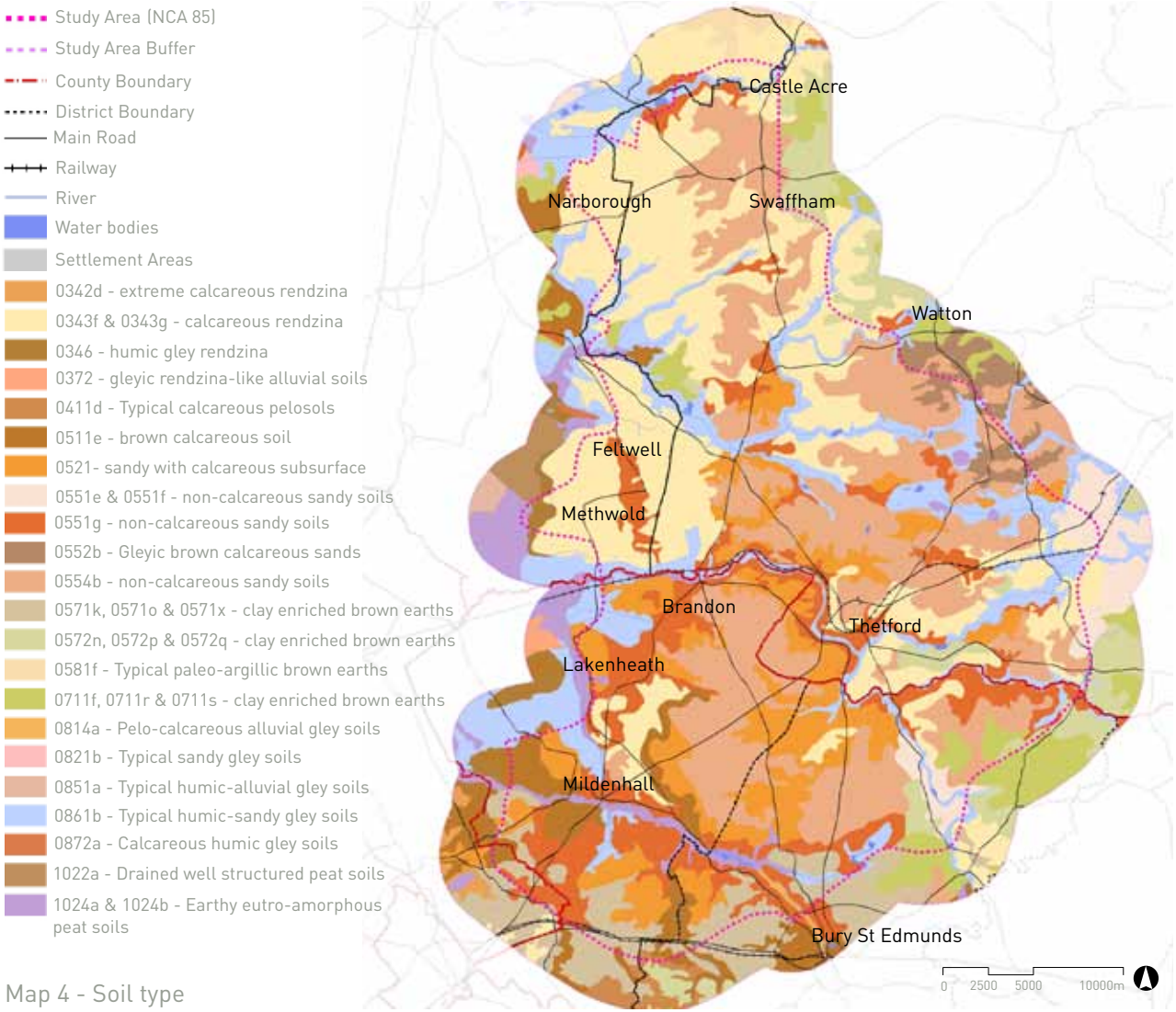
Soil series and horizon data obtained under licence from NATMAP, National Soil Resources Institute, Cranfield University.



Map 4 - Soil type

Human influences

Early settlers

Paleolithic (c.800,000 years ago) - Mesolithic

In Spring 2002, when the remains of at least eleven woolly mammoths were found at Lynford Quarry, it became apparent that this was a site of international significance for the study of our early human ancestors. The remains date back to around 60,000 years ago (the Middle Palaeolithic period). This site also contained numerous stone tools and is believed to show evidence of hunting by Homo neanderthalensis.

Following the last glaciations, warmer climatic conditions allowed the development of pine-birch and then a mixed oak forest, roamed by herds of deer and boar. Britain was connected to north-west Europe at this time and bands of hunter-gatherers migrated across the land bridge. As the ice melted, sea levels rose and water flowed through the English Channel. By 6500 BC, Britain was isolated.

Small bands of hunter gatherers lived in temporary settlements which have left very little archaeological evidence, but the sites used by these communities can still be traced from finds of Mesolithic flint tools, knapped flint and, from the later Mesolithic, flint axes. The distinctive flintwork from this period includes many small pieces of flint with sharp edges known as microliths, which were inset into the heads of wooden spears and arrows for use used in hunting.

The Brecks is exceptionally rich in flint evidence from this period which suggests that Mesolithic communities settled along the river valleys, beside the meres and on the edge of the fen basin, for instance at Lakenheath and Wangford. Scatters of flints and microliths on higher, drier land may relate to the sites of temporary hunting camps.

Neolithic (c.4000 – 2100BC)

As sea levels rose, the fen basin became increasingly flooded and peat began to develop in the deeper valleys. The lighter soils of the Brecks were favoured by the early farming communities of the Neolithic period, but the distribution of flint artefacts suggests that settlement remained concentrated along river valleys and the fen edge. Evidence from sites such as Hurst Fen, Mildenhall, Fornham All Saints and from the pollen record at Hockham Mere suggests that communities lived in small farmsteads, clearing the surrounding woodland, cultivating wheat and barley and keeping pigs, goats, sheep and cattle. A sudden decline in the proportion of elm in the mixed oak-alder-elm woodland and a marked rise in grass, heather and herb pollens suggests that the landscape became more open at this time and that areas of heathland had developed.

Inside an excavated mine shaft at the Neolithic flint mines of Grimes Graves

The semi-sedentary lifestyle of these early farming communities placed pressure on resources and the environment, which led to the development of enclosures and ritual monuments. For instance the site at Fornham All Saints has two linked causewayed enclosures overlain by a 1.8km-long linear cursus which has a cluster of hengi-form ring ditches at its end.

The flint mines at Grimes Graves were established towards the end of the Neolithic. Shafts were dug 13m down into the chalk, with radiating galleries to exploit a seam of fine, dark tabular flint known as 'floorstone'. The flint was extracted using antler picks. These extensive mines would have required a separate industrial community, supported by the agricultural economy. Trackways like the Icknield Way, an ancient trackway which broadly followed the crest of the chalk ridge from southern England to Norfolk, are likely to have been used as trading routes from Neolithic times, supporting the industry at Grimes Graves. A Cornish stone axe found at Grimes Graves indicates that the trade was a two-way one.

Bronze Age (c.2100 – 700BC)

Woodland clearance continued as more land was cultivated and grazed by stock and evidence from the excavation of Bronze Age barrows at Risby and Little Cressingham suggests that these landscapes were relatively open. Pottery evidence, together with the excavation of a Bronze Age settlement at West Row on the edge of the fens, demonstrate that fen edge sites continued to be favoured for settlement.
Items of metal, copper and bronze, such as those found at Hockwold on the fen edge, indicate trade links with continental Europe and the development of new more decorated styles of pottery may suggest the emergence of a more hierarchical society.

This path alongside Thetford Heath is supposed to be the Icknield Way, but there is no firm evidence to indicate the actual alignment of this ancient route.

Round Bronze Age barrows were highly visible burial graves which sometimes contained high quality metalwork. Many round barrow sites in the Brecks are on higher slopes, away from the main settlements, indicating that they may have been landmarks, sited to be seen against the local skyline in the open landscape.

Iron Age (c.700 BC – AD43)

The spread of iron technology led to the development of a more diverse economy. These communities could use the iron they made to develop more sophisticated, stronger tools, which allowed them to farm a wider range of soil types, and to make more effective weapons. Finds of decorated jewellery, weapons and chariot -rein rings suggests a strongly hierarchical society and, towards the end of the Iron Age, the first coins were minted.

The names of regional tribes were first recorded by Julius Caesar after his invasions of 55 and 54 BC. The Iceni tribe were dominant in the Brecks and the surrounding region at this time and retained administrative and some political autonomy after the Roman invasion. However, the balance of power shifted after the death of the Iceni ruler (Prasutagus) when the Romans asserted their authority. In retaliation, Prasutagus' widow, Boudica, led a famous revolt against the Romans – she was eventually defeated, but not before her army had overrun several newly established Roman towns.

The classic Iron Age hillforts on elevated summits did not exist in the relatively flat landscapes of the Brecks, but the distribution of Iron Age coins and other metalwork suggests that the Brecks was an important centre for the Iceni tribe. There were major defended enclosures at Barnham, underlying Thetford Castle and at Gallows Hill in Thetford. The Thetford Castle site is close to a crossing of the rivers Thet and Little Ouse and may have had a control function over movements and trade. Excavations at nearby Gallows Hill suggest that this site was a tribal ceremonial centre (rather than a farming site) perhaps indicating that such defended sites were not only used for military purposes (Barnham may have had a similar, but earlier function). Its abrupt demolition coincides with the date of Boudica's rebellion and the Roman's destruction of any centres of Icenian power and prestige.

Most Iron Age settlement was in the form of farmsteads, sited along river valleys. Excavations of an important site at West Harling suggest a group of farmsteads, but elsewhere there is evidence for single, self-sufficient farmsteads (as at West Stow).

Romans (AD 43 – AD 410)

Having overthrown the Iceni, the Romans established regional centre for the former tribal centre at Caistor St Edmund in Norfolk. The Romans established a network of roads which may include the Peddar's Way. Within the Brecks, local market centres at Icklingham, Threxton, Hockwold and Brettenham developed at road and river crossing points. Excavations at Icklingham have revealed *a linear spread of features including a building with underfloor heating, two cemeteries (one at each end of the town), pottery kilns, a possible pagan temple and a 4th century church.*[2]

Other smaller settlements developed, often with specialist economies such as peat cutting, agriculture or salt making. Examples were the fen edge villages of Methwold and Feltwell.

At Feltwell, Mildenhall and Eriswell, archaeological excavations suggest high status villa sites, with adjacent bathhouses and at Hockwold cum Wilton, cropmarks, earthworks and artefacts suggest a substantial settlement, with buildings for religious, domestic and agricultural purposes.

[2] Breckland Archaeological Survey 1994-6, Kate Sussams

The Fossditch is still visible in places today. These photographs show the embankment running alongside the road across Cranwich Heath

Middle Ages

Anglo Saxon (AD c.410 – 1066)

Migration from north-west Europe led to the emergence of an Anglo Saxon culture, with new rituals, styles of pottery, metal work and burial practices. Evidence for the character of Early Saxon settlement is provided by excavations at West Stow, an Early Saxon settlement on the slopes of the Lark Valley. They indicate a farming community with seven groups of buildings, each centred on a timber 'hall' and each likely to represent a family unit. The settlement is likely to have been self sufficient, growing wheat, barley, rye and peas and keeping sheep, cattle, pigs, horses and goats. Most Anglo Saxon settlements were close to rivers and the local economy would have been supplemented by fishing, wildfowling and some hunting of deer.

Much of the archaeological evidence from this period is from the excavation of Early Saxon, pre-Christian cemeteries, which indicate that a rich mixture of cremation and inhumation was practised and that grave-goods were often buried with the dead. The cremated remains were contained within pottery urns and the larger cremation cemeteries, such as that at Lackford, served several communities.

A number of defensive boundary ditches are likely to date from the Early Saxon period, including the Devils Dyke to the south-west of the Brecks, the Fossditch and the smaller Black Ditches, which are aligned across the Icknield Way near the River Lark at Cavenham Heath. The exact purpose of these defences is not known as they face different directions, but they suggest that communities were living under the threat of attack and were keen to define the edges of their territories.

A significant change in settlement pattern occurred in the 7th century, possibly as a result of the introduction of Christianity, which saw communities move from more dispersed settlements to more nucleated settlements, often with a church. The new settlements are associated with finds of a more sophisticated wheel-made pottery known as Ipswich Ware. A wealthy settlement which dates from this Middle Saxon period has been excavated at Brandon on the edge of the Little Ouse. Over twenty timber buildings have been excavated, including large halls, a church and two burial grounds. The finds suggest an aristocratic, literate community as they include metal styli for writing and a gold plaque depicting John the Baptist which is likely to have been part of the cover of a book. Evidence suggests that this

was not a farming community and that it was served by produce from a separate village. The settlement was abandoned by AD 900, perhaps because of rising water levels or perhaps as a result of Viking invasion.

During this period, a rising population and increasing mobility led to the development of a more hierarchical settlement pattern. Viking raids became frequent and Edmund, the East Anglian king was killed in one of the conflicts. The Anglo Saxon Chronicle records how in 879 King Guthrum, the Viking leader went from Cirencester into East Anglia and settled there and shared out the land. The Vikings adopted Christianity and the evidence from metal finds suggests the widespread influence of Scandanavian style and culture.

Thetford had long been an important local trading centre, but in the late Anglo Saxon period it grew and prospered, despite at least two devastating Viking raids. It was a centre for pottery, clothmaking and leather working and had its own mint. In 1066 Thetford had 943 privileged burgesses and 13 churches and, by the early eleventh century, the town had become one of the largest and most important towns in England. The East Anglian bishopric was relocated to Thetford from North Elmham in 1075 although, according to the 1086 Domesday Book, Thetford suffered a rapid decline as 224 house sites were recorded as empty in this year. The most likely explanation is that the town suffered as a result of an unsuccessful revolt staged by Ralph Guader, Earl of Norfolk in 1075. Thetford's prosperity also seems to have suffered from relocation of the Bishopric to Norwich in 1094.

Medieval (1066 – 1550)

Farming communities in the medieval Brecks used an 'infield-outfield' system of cropping that was typical of that part of East Anglia, but quite different from the classic three field system used throughout the Midlands. Over most of East Anglia, arable land was rarely enclosed or segregated into a set field pattern. Instead there was a complex system of field units that varied from village to village. Soil fertility was the determining factor, with the better soils cropped more intensively. The drier land in the central Brecks had less arable land and more extensive areas of grazing and warrens than parishes on the eastern edge.

The presence of medieval watermills along the Brecks valleys suggests that grain was produced locally but maintaining soil fertility depended on careful management of sheep flocks. Sheep were grazed on the heaths during the day and then 'folded' on fallow arable land to manure it overnight. This system required communal work and medieval foldcourses were often defined by

Thetford Warren Lodge was probably built around 1400 by the Prior of Thetford. It is a defensive building which housed guards who protected the rabbits of Thetford Warren from poachers.

markers and dykes. Rabbit farming was also an important part of the medieval economy and rabbits ran with the sheep on the heaths. Rabbits were particularly suited to the relatively dry climate and sandy soils of the Brecks and large numbers were sold at local markets. The larger rabbit warrens were protected from poachers by guards who were based at warren lodges. There was little woodland at this time, but local peasants had the right to cut fern and bracken for fuel on the heaths, though often this practice was regulated and only permitted at specified times of the year.

Overall, the settlements described at Domesday persisted and population densities in the Brecks were lower than in other parts of East Anglia, with an average of *only 15 tenants per 100 acres, as opposed to over 30 in many parts of Norfolk and Suffolk* [3]. The simple style and small stature of medieval churches in the Brecks suggests that the area was relatively poor, although larger churches within the fen edge villages may indicate more prosperity in this part of the Brecks. Population decline and economic recession in the 15th century led to the use of longer fallow periods on arable land, resulting in the rapid incursion of bracken and gorse and reversion to heathland.

The dramatic medieval motte and bailey castle at Thetford, which replaced an earlier Norman castle on a different site.

[3] A Marginal Economy? East Anglian Breckland in the later Middle Ages, Mark Bailey, 1989

Court records suggest that there was an active land market, particularly as rising population put pressure on soils that were of limited fertility. However the process of land division was halted by the advent of the Black Death and land holdings became increasingly concentrated in fewer hands. For instance, at Sturston the local landlord was accused of having seized arable land, pulled down several houses and converted the commons for his own use[4].

Thetford became a monastic centre, with a Cluniac priory, an Augustinian friary and a Dominican friary, together with a college of priests and six hospitals. However much land within the Brecks was controlled by absent landlords, principally the abbeys at Bury St Edmunds and Ely. The mid 16th century dissolution of the monasteries resulted in another major shift in land holdings as these extensive monastic estates were sold off to lay owners.

The 'shrunken' medieval village of Roudham. Earthworks in the fields to the north of the 14th C (ruined) church and existing village show the extent of the medieval village - many houses were abandoned following the Black Death in 1349.

[4] Sussams op cit (original source is Allison, The Lost Villages of Norfolk, Norfolk Archaeology 31, 1955]

Post medieval (1550 - present day)

The pattern of land holdings that defined the medieval landscape has been largely overridden by later large scale landscape change, from the 18th century by the large landed estates and in the 20th century by military influences and the development of post war conifer plantations.

Landed estates

The Brecks had a number of landed estates from the 15th and 16th centuries, but the subsequent increase in the popularity of hunting led to a proliferation of estates in the area. By the early 17th century the open heaths near Thetford were used for hunting, including by King James I, who bought King's House in Thetford for his use during hunting excursions. The major increase in landed estates came in the 18th century, when landscape parks and hunting became fashionable. The relatively low land prices, abundance of game and low population density of the Brecks attracted many new landowners at this time including Sylvanus Bevan at Riddlesworth and Stephen Payne Galway at West Tofts.

Shooting was an important pastime on the estates and Elveden was particularly well known. Trees were planted in vast numbers – as cover for game, but also to provide visible boundaries to the estates in a relatively open landscape. The construction of these parks obliterated the earlier medieval farming patterns and also sometimes led to the demolition of nearby villages eg at Little Livermere and Lynford.

The larger landholdings had advantages over the small-scale medieval field systems in that there was scope for economies of scale and for making use of the latest innovations, particularly new crops such as turnips and extensive marling techniques. The farmers were also able to rationalise sheep farming, providing more manure for soil improvement. Overall there was an increase in 'brecking' – temporary cultivation of heathland at this time.

The use of rabbit warrens increased throughout the 18th and 19th centuries and warrens were often enclosed by earth banks to define warren ownership and prevent damage to neighbouring crops.

Sand blows and pine lines

Large areas remained poor grazing land and Thomas Wright's 1668 evocative description of the 'wandring' sands at Santon Downham[5] demonstrate the problems of an impoverished sandy soil in areas with limited vegetation cover. Diarist John Evelyn (1677) described *'the*

[5] Published in Philosophical Transactions 3, 1668 722-725

Riddlesworth Hall - a 19th century mansion set within a designed parkland landscape.

Travelling Sands about ten miles wide of Euston, that have so damaged the country, rolling from place to place, and like the sands in the Deserts of Libya.[6] Later travellers, including Francois de la Rochefoucauld, who visited the area in 1784, also highlighted the aridity of the Brecks. He described *'A large quantity of shifting sand in which the district abounds...covered with heather in every direction as far as the eye can see....everywhere sand, everywhere little clumps of reeds and bracken. A large portion of this arid country is full of rabbits, of which the numbers astonished me* [7]

The Parliamentary Enclosure Acts of the late 18th century and early 19th century encouraged landlords to enclose the open fields and heaths, although in practice many enclosed their land of their own accord. Large rectangular fields were divided by straight roads and enclosed by Scot's pine shelterbelts and plantations. The pine lines that are now such iconic landmarks in the Brecks originated as pine hedges, planted in the early 19th century[8]. The method used was described by David Elisha Davy in 1829:

Within 2 miles of Brandon, I observed a mode, to me at least new, of raising a good fence in a very bad soil; a bank is thrown up, about 4 or 5 feet high, and of considerable thickness at the bottom; upon the top of this is planted a row of Scotch firs, as thick as they can stand; these seem to make rapid progress in this soil and branching out towards the sides, immediately from the ground, and have the addition al very strong recommendation of affording the best shelter from storms to the sheep and cattle what are fed, or rather starved upon the land.'

The fact that the pine rows were planted on both calcareous and acidic soils suggests that the practice may have been a fashion at the time[9], much like the trend for floated water meadows on the great estates, which allowed landowners to show off their improving techniques. Most pine rows were managed as hedgerows, although some may not ever have been cut, and most were subsequently left to grow out to form the lines of Scot's pine that are so characteristic of the Brecks landscape today.

[6] In - A Marginal Economy? East Anglian Breckland in the later Middle Ages, Mark Bailey, 1989

[7] In Bailey. Op. Cit.

[8] The Breckland Pine Rows: History, Ecology and Landscape Character, Tom Williamson, 2010

[9] Williamson op.cit.

Conifer forests

Despite the extensive planting on landed estates, the Brecks remained a relatively open landscape until after World War I, when a national shortage of timber led to the 1919 Forestry Bill. By this time persistent agricultural depression had reduced the price of land and much of the 'improved' land had been abandoned. Extensive blocks of land were compulsorily acquired by the Forestry Commission at a relatively low price, including Brecks estates such as Elveden and Downham Hall. Early planting was predominantly Scot's pine, but Corsican pine was later more widely planted. Early plans for substantial broadleaf plantings were not fully realised as it was found that species such as beech, oak, American red oak and birch did not grow easily on the infertile soils and in the relatively harsh climatic conditions of the Brecks[10].

Military sites

The Brecks became important for military use in World War II, when the flat topography and relative isolation of the area led to the development of 'expansion period' airfields at Mildenhall, Feltwell, Honington and Watton. These early airfields were subsequently expanded, along with additional dummy sites which were intended to provide a screen for the 'real' bases. The large scale of the Brecks and the low density of population also made the area suitable for bombing practice.

The military remains a major influence in the Brecks, with a vast area of heathland used for military training. Local village communities in the area that was to become the Stanford Training Area were initially told they were being evacuated on a temporary basis, but the use of live ammunition has meant that it is not safe for people to live there and the area has since been subject to compulsory purchase.

Red flag at one of the entrances to the STANTA (Stanford Training Area)

[10] Thetford Forest Park: The Ecology of a Pine Forest, 1996, ed. Philip Ratcliffe and Jenny Claridge, Forestry Commission Technical Paper 13

Biodiversity

Interconnections between physical character and land use history

The unique biodiversity of the Brecks stems from the region's free-draining, nutrient-poor sandy soils and its micro-climate, which is relatively dry with extremes of temperature. The combination of drought, low rainfall, hot summers and cold winters has influenced the development of steppe-type vegetation and to an agricultural system that used the infertile soils for grazing and rabbit warrening and the alluvial river valley soils for more intensive cropping and fen products.

The grazed dry vegetation of the plateau developed as grass or heather-dominated heathland. For years, the medieval open-field system maintained and developed the low heathland flora: livestock grazing kept the nutrient levels of the heathland low, while overnight folding of sheep flocks on arable land increased the fertility of these areas, transferring nutrients from heath to arable land. The traditional fold course rotation produced large areas of fallow arable every year, encouraging flora that required open, regularly disturbed ground. During the 18th and 19th centuries, local agricultural rotations included the 'brecks', areas of heathland that were converted to arable and cultivated for a few years before being left to revert to heath again. This practice also broke up the ground, encouraging the development of the Brecks' distinctive biodiversity.

Heathland was enclosed, marled and converted to arable throughout the 18th and 19th centuries, but the process was reversed in times of economic recession, when arable land was abandoned, creating sandy fallow Brecks which were grazed, mainly by rabbits. From the 1920s, large areas of heathland were forested and, with the use of fertilisers and irrigation, arable cultivation became increasingly intensive.

The diverse mosaic of fens, reedbeds, marshes and wet meadows within the river valleys has also been depleted as a result of drainage, reclamation, flood control and groundwater abstraction.

The scale and diversity of semi-natural habitats has been reduced, but the remnant areas of species-rich grassland, woodland, heathland, fen, marsh and reedbed form a valuable network, which sustains an exceptionally diverse flora and fauna.

Map 5 illustrates the present-day landcover[11] in the Brecks. It shows the extent of land under conifer plantation, arable crops and improved grassland versus the relatively small remnant areas of broadleaved woodland, low productivity grassland and fen marsh.

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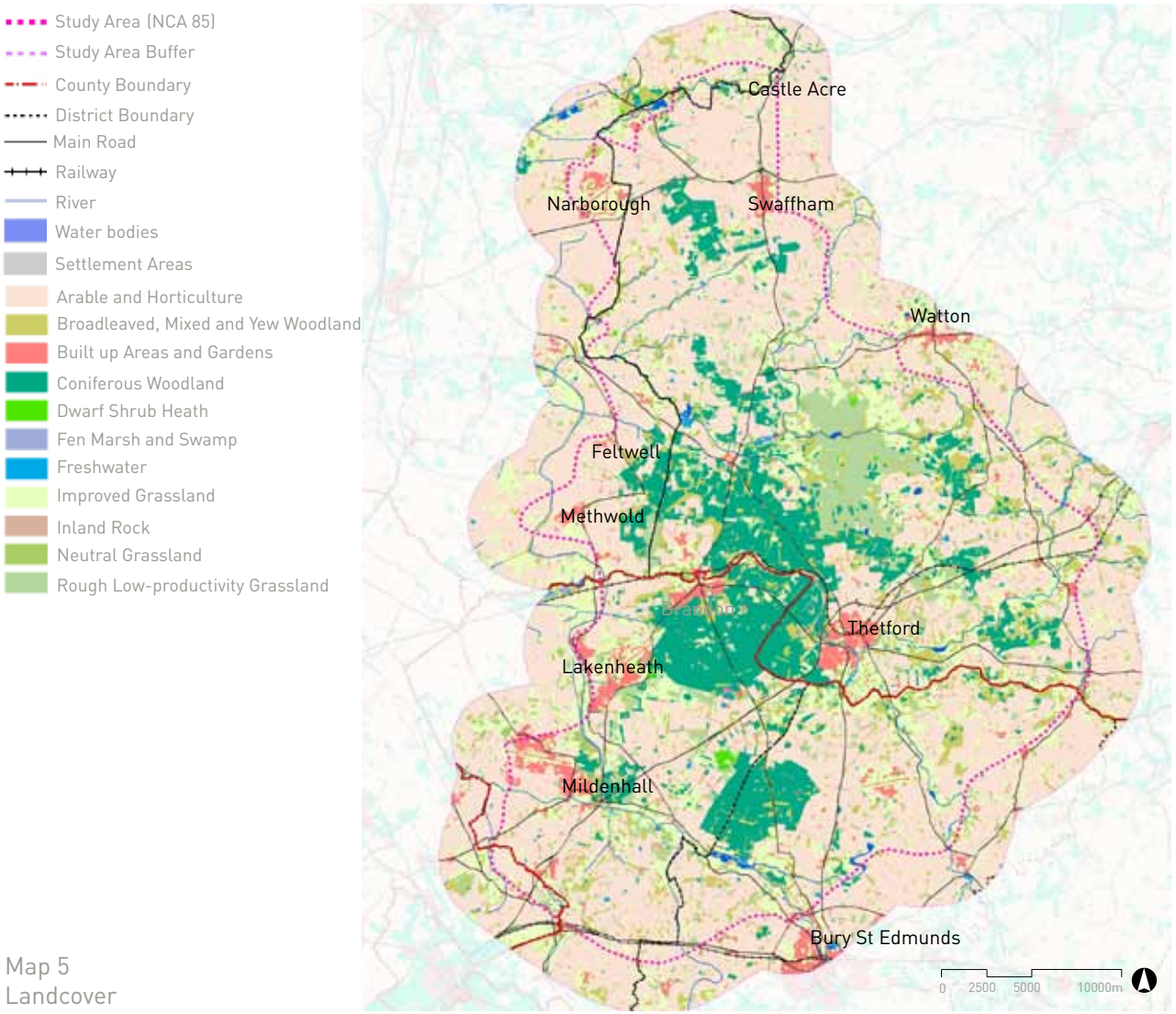


Map 5
Landcover

[11] Morton, D., Rowland, C., Wood, C., Meek, L., Marston, C., Smith, G., Simpson, I.C. 2011. Final report for LCM2007 – the new UK land cover map. CS Technical Report No 11/07 NERC/ Centre for Ecology & Hydrology 112pp. (CEH project number: C03259)

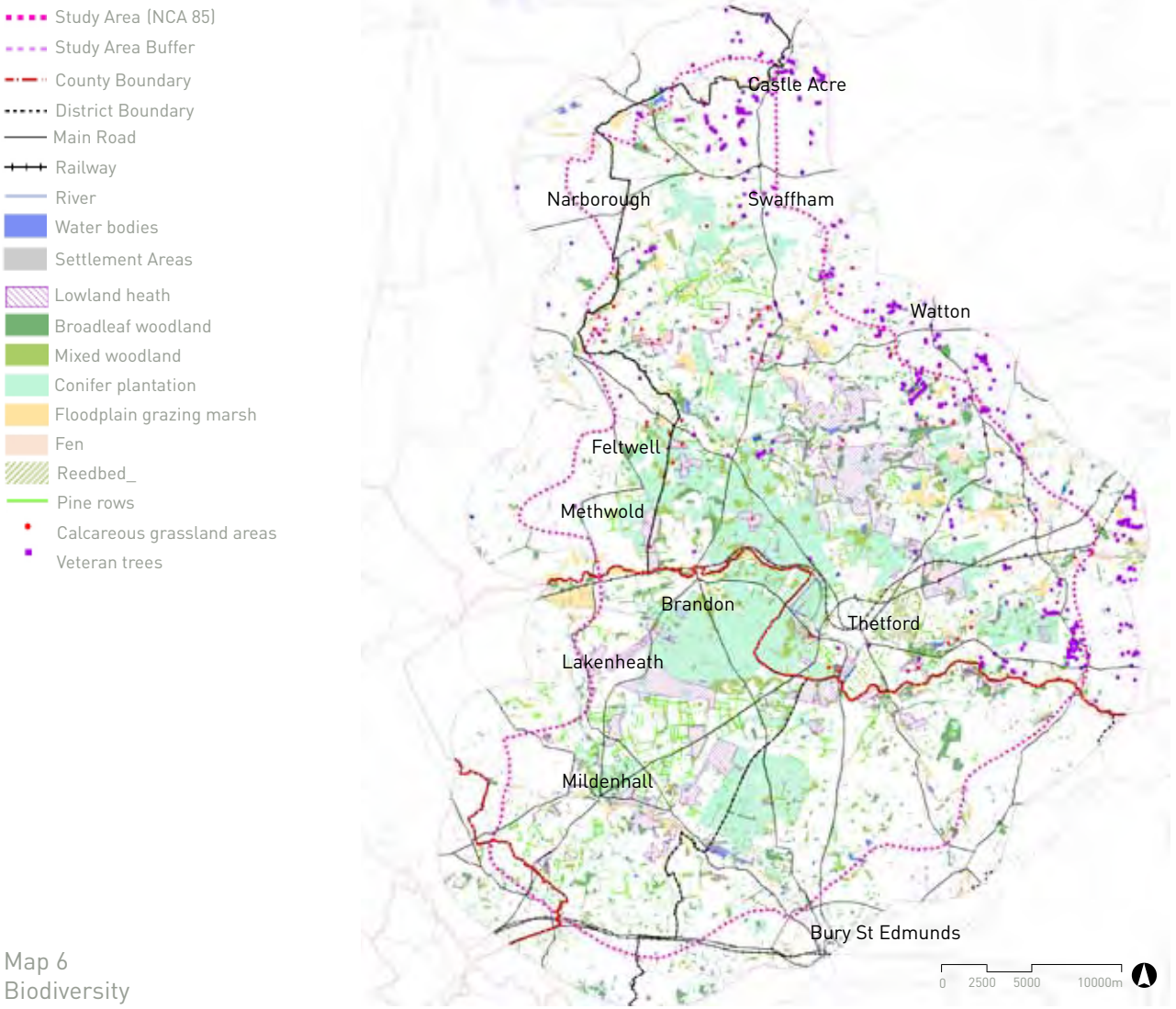
Biodiversity

The Brecks Biodiversity Audit[12] found that 28% of the priority S41 species in the UK occur in the Brecks and 72 species have their UK distribution restricted to the Brecks region. Map 6 shows the distribution of priority UK species in the Brecks, alongside a range of other habitat types. The key habitats which support the ecological network within the Brecks are:

- Lowland heath, acid grassland and calcareous grassland
- Valley marsh, fens and reedbeds
- Ponds – particularly the fluctuating mere and pingos
- Mixed and broadleaf woodland
- Pine rows and veteran trees; and
- Arable field and track margins (not shown on Map 6).

The remaining priority habitat is fragmented and species isolated in small sites are vulnerable to climate change.

[12] Dolman, P.M., Panter, C.J., Mossman, H.L. (2010) Securing Biodiversity in Breckland: Guidance for Conservation and Research. First Report of the Breckland Biodiversity Audit. University of East Anglia, Norwich.



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Map 6
Biodiversity

Ecological designations

40% of the Brecks study area is covered by statutory conservation designations. These are shown on Map 7 and include sites of international, national and regional importance.

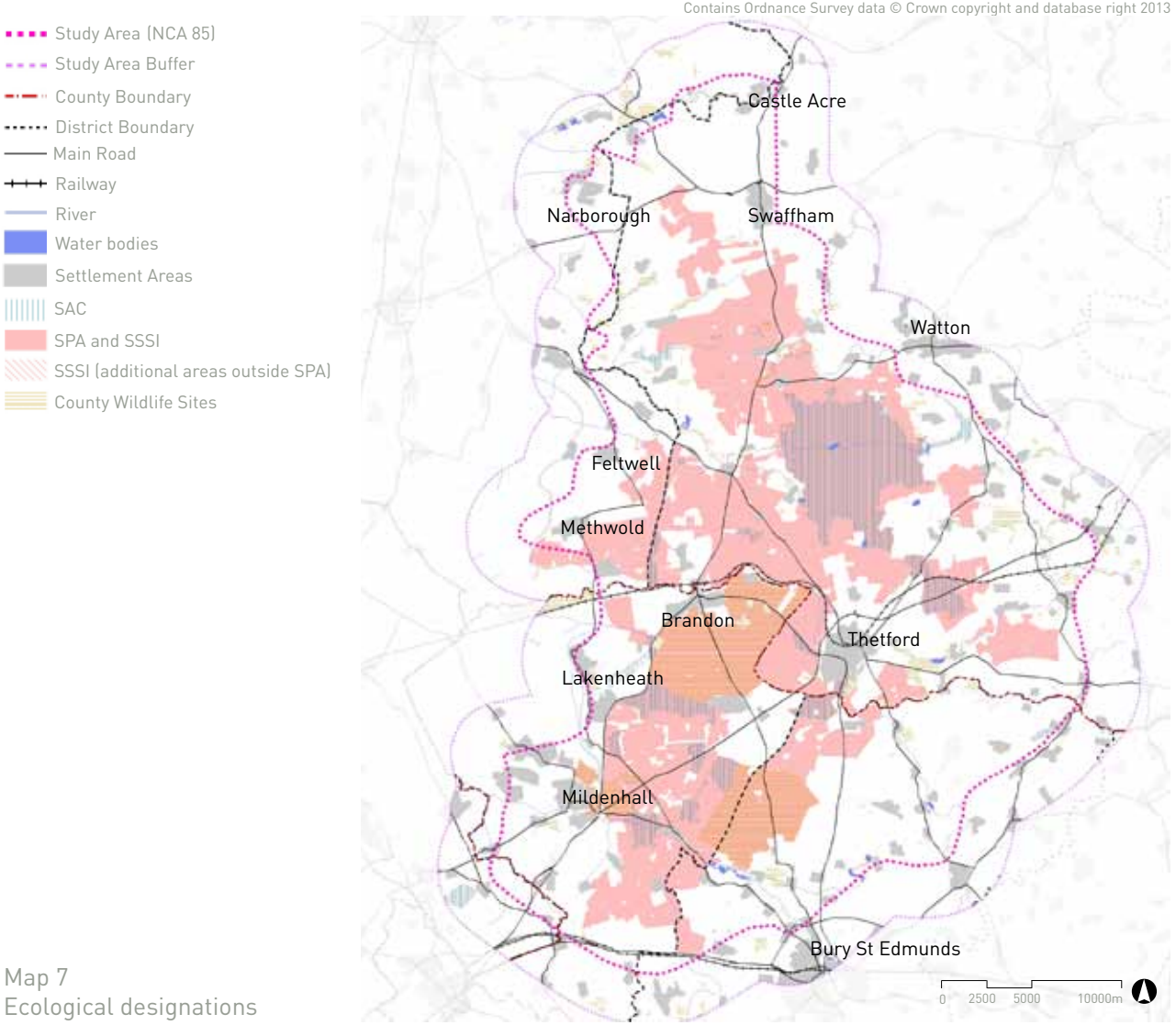
The international importance of the Brecks has been recognised by the designation of:

- Breckland Special Area of Conservation (SAC) totalling 7,548ha – for inland dunes with important open dry grassland habitats, dry heathland, semi-natural dry grassland and scrubland on calcareous substrate and habitats associated with the fluctuating meres;

- Norfolk Valley Fens SAC, which includes Foulden Common, Great Cressingham Fen and Thompson Common – for their calcium-rich spring fed vegetation and transitions to reed-swamp and other fen and wet grassland types

- Little Ouse Valley Fens SAC, which includes Market Weston and Hopton Fens for their calcareous fen and purple moor grass vegetation on calcareous, peaty or clayey soils.

- Breckland Special Protection Area (SPA) for the conservation of breeding populations of woodlark, nightjar and stone curlew.



Map 7
Ecological designations

There are 55 Sites of Special Scientific Interest (SSSIs) in the Brecks study area. These sites are of national importance and many are also within the Breckland SPA. The largest SSSIs in the Brecks are:

- The Breckland Farmland SSSI – for breeding populations of stone curlew, but the arable land is also important for the flora and invertebrates associated with arable field margins

- Breckland Forest – for woodlark and nightjar, as well as rare plants and invertebrates

- STANTA – for its mosaic of ancient heaths and grass heaths, as well as areas of plantation and wetland.

There are four National Nature Reserves in the Brecks – Cavenham Heath, Brettenham Heath, Weeting Heath and Thetford Heath and 583 County Wildlife Sites. There are also 48 Roadside Nature Reserves in the Brecks, which are designated for a range of important Brecks flora and fauna.

Devil's Punchbowl - a fluctuating mere (or doline) which supports rare flora and fauna that are adapted to survive in the changing environmental conditions