A revision of the Ancient Woodland Inventory for Lewes district, East Sussex

Report and Inventory Maps
November 2010

Project carried out by the
Weald and Downs Ancient Woodland Survey

WEALD AND DOWNS
ANCIENT WOODLAND SURVEY

A revision of the Ancient Woodland Inventory for Lewes district, East Sussex

Project carried out by Victoria Hume, Matthew Grose and Philip Sansum for the Weald and Downs Ancient Woodland Survey

**A partnership project funded and supported by:
Lewes District Council, the Forestry Commission, Natural England, the South Downs National Park Authority, and Sussex Biodiversity Record Centre**

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1. Summary

Ancient woodland is a nationally important and threatened habitat, and its existence over hundreds of years has preserved irreplaceable ecological and historical features. The South East has approximately 40% of the ancient woodland in England, but this valuable resource is increasingly under threat from development pressures in this densely populated region. The Weald and Downs Ancient Woodland Survey was set up in recognition of the increasingly important role of ancient woodlands and the deficiencies of the existing Ancient Woodland Inventory.

This report summarises the methodologies and findings of a two year project (running from June 2009 to November 2010) to revise the Ancient Woodland Inventory for Lewes district. The Weald and Downs Ancient Woodland Survey has worked with Lewes District Council, the Forestry Commission, Natural England, and Sussex Biodiversity Record Centre Centre to provide a robust evidence base upon which to assign ancient woodland status. The aim of the survey, based at the Sussex Biodiversity Record Centre, has been to enhance and update the Ancient Woodland Inventory, and to include, for the first time, ancient woodlands less than two hectares in size.

The whole of the district's ancient woodland resource has been re-examined. The area of ancient woodland since the original inventory was produced has risen from 1,019 ha to 1,156 ha, a gain of 137 ha as a result of this revision. This is a net gain, representing 213 ha of newly identified area which has been offset by the removal of a 76 ha of mis-mapped, misattributed or lost woodland. Overall this represents an increase of about 0.5% in the district's area designated as ancient woodland bringing the total coverage to 3.93%. The number of parcels of ancient woodland in the revised inventory, by contrast, is almost twice that of the original inventory.

The revised Inventory will assist Lewes District Council in making decisions about development within the district, thus ensuring that the effects of any development proposals on ancient woodlands can be properly assessed and considered. The revised inventory will also enable a better assessment of the extent and quality of Lewes district's ancient woodland resource to be made, and will help identify threats to the resource, areas for improving habitat connectivity, and opportunities for the strategic management of key woodlands.

2. Introduction

2.1 Background

Ancient woodland sites over two hectares in size are recorded in the county Ancient Woodland Inventories which were compiled in the 1980s and 1990s by the Nature Conservancy Council (NCC) [1]. These inventories, now brought together as the national Ancient Woodland Inventory, have become an important tool for policy makers and planners whilst also assisting land managers to identify key areas for the restoration and planting of native woodlands and increasing awareness of the importance of ancient woodland.

The original Ancient Woodland Inventory (AWI) for East Sussex was first produced in 1989 by the NCC [2]. The Inventory was originally only available on printed maps, until being digitally mapped (digitized) between 1998 and 2000 by the Forestry Commission. This digital dataset was subsequently updated on a case-by-case basis by English Nature (now part of Natural

[1] Spencer & Kirby (1992)
[2] Whitbread et al (1989)

England), the successor to the NCC. For the purposes of this report, a comparison has been made between the revised inventory and the digitized inventory which became available in 2000. This version is the nearest to the original inventory available to this survey in electronic format, and is referred to hereafter in the text and maps as the 'original AWI'.

Whilst the compilation of the original inventory was an extremely valuable process at the time, and a landmark achievement for the conservation of British woodland, new information and advances in technology mean that its inaccuracies and omissions can now be addressed. With the pressure on land increasing year on year, these errors can cause significant problems for a planning authority. The original inventory also only recorded ancient woods greater than two hectares in size. In Lewes district, small woodlands are a central part of the fabric of the countryside and make a significant contribution to the overall woodland resource. Their omission from the inventory undermines their protection through the planning process. This survey includes these small woodlands for the first time.

2.1.1 The Weald and Downs Ancient Woodland Survey

The Weald and Downs Ancient Woodland Survey is the name given to the partnership of organisations revising the Ancient Woodland Inventory in the Weald and Downs of Sussex and Kent. Key partners in the survey include the Forestry Commission, Natural England, the High Weald Area of Outstanding Natural Beauty (AONB) Unit, Sussex Biodiversity Records Centre, the South Downs National Park Authority, and local authorities. The aim of the survey is to revise and update the Ancient Woodland Inventory in these areas, and to include, for the first time, ancient woodlands less than two hectares in size.

2.1.2 Project aims

The primary aim of the Weald and Downs Ancient Woodland Survey is to re-examine all available information and to present a revised Ancient Woodland Inventory for a local authority area. This enables local authority planning officers to identify areas of ancient woodland and hence provide these woodlands with the appropriate recognition in accordance with planning guidance and policy.

Additional aims of the survey are:

- To develop a better understanding of the key issues and threats affecting ancient woodland.
- To document the location of ancient woodland sites within the local authority areas which will help to identify areas of opportunity for environmental enhancement, increase the understanding of habitat connectivity, and highlight woodland areas for targeting woodland management programmes and grant funding.

2.1.3 Project funding

The revision of the Ancient Woodland Inventory for Lewes district was jointly funded by Lewes District Council, the Forestry Commission, Natural England, and the South Downs National Park Authority. Additional support for the project was provided by Sussex Biodiversity Record Centre.

2.2 Ancient woodland definitions

Woodlands in Britain are routinely grouped into the two categories of 'ancient woodland' and 'recent woodland' according to their history. This follows the pioneering research on the subject by George Peterken, Oliver Rackham and others in the 1970s [3]. The distinction is now well established as a useful one and the concept of 'ancient woodland' is embedded in national forestry and nature conservation policy.

2.2.1 Recent woodland

Secondary or recent woodland (less than 400 years old), is where a wood has either been planted on an area of land, or where trees have been allowed to grow naturally through regeneration, usually as the result of a cessation in land use management [4]. Recent woodland sites can show similarities to ancient woodland depending on their age, proximity to ancient sites and the diversity of microhabitats within the site. However, generally their biological diversity is not as great as that of ancient woodland. These woods are therefore excluded from the Inventory.

2.2.2 Ancient woodland

The definition of ancient woodland used for this survey is that given by English Nature (now part of Natural England), as included in an English Nature guidance document on ancient woodland for local authorities[5]. The relevant extract from this document is included below:

> 'Ancient woodland in England is defined as an area that has been wooded continuously since at least 1600 AD. Ancient woodland is divided into ancient semi-natural woodland and plantations on ancient woodland sites. Both types of stand are classed as ancient woods.'

The trees and shrubs in ancient woodlands may have been felled or cut for coppice at various times since 1600, but as long as the area has remained as woodland, i.e. the coppice stools have regrown or the stand has been replanted soon after felling, then it still counts as ancient woodland. Because it may have been cut over many times in the past, ancient woodland does not necessarily contain old trees.

The date used to define ancient woodland for England, 1600 AD, was chosen by Peterken [6], because it reflected the point at which good maps started to become more common and was prior to the impetus for new woodland planting from the publication of Evelyn's influential book 'Sylva' [7]. Other dates could be argued for: 1650 was used by Peterken and Harding [8] to distinguish post-medieval woods in Rockingham Forest, as a detailed map for that area was produced at that time, while Rackham uses 1700 [9]. In practice 1600 has been adopted for policy and practical purposes in England.

Ancient woodland is divided into ancient semi-natural woodland and plantations on ancient woodland sites. Both types of stand are classed as ancient woods.

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[3] e.g. Peterken (1977), Rackham (1980)
[4] Bannister (2007)
[5] Kirby & Goldberg (2006)
[6] Peterken (1977)
[7] Evelyn (1664)
[8] Peterken & Harding (1974)
[9] Rackham (2003)

Ancient semi-natural woodland (ASNW)
Ancient semi-natural stands are those that are composed predominantly of trees and shrubs native to the site that do not obviously originate from planting. They include stands that may have been managed by coppicing or pollarding in the past, as well as those where the tree and shrub layer has grown up by natural regeneration.

Ancient replanted woodland (or PAWS)
Ancient replanted woodland sites (also called Plantations on Ancient Woodland Sites, or PAWS) are areas of ancient woodland where the original native tree cover has been felled and replaced by planted stock most commonly of a species not native to the site, for example conifers such as Norway spruce (*Picea abies*) or Corsican pine (*Pinus nigra var. maritima*), but also broadleaves such as sycamore (*Acer pseudoplatanus*) or sweet chestnut (*Castanea sativa*).

The division between semi-natural stands and plantations is not always easy to define, because there are intermediates, for example small clearings within woods, old plantations of native species, semi-natural structured stands of introduced species, planted conifer stands that now contain a proportion of self-sown native broadleaves, or semi-natural tree layers with no native understories or improved ground floras. Therefore a judgement may be necessary as to the balance between the planted/introduced elements versus the native/naturally regenerating elements.

For the purposes of this survey, the following definitions have also been used to help define areas of ancient woodland:

- Areas with continuous woodland cover.
- Areas managed or periodically cleared for timber or underwood production.
- Areas regenerating following woodland management.
- Open grazed areas within the woodland site (at least 20% canopy woodland over 80% of the site).
- Temporary clearings that may have been created within the woodland complex but which have regenerated, or are regenerating, back to woodland.

2.2.3 Ancient wood pasture

Wood pasture describes woods derived from ancient pasture woodland managed for both trees and livestock or deer [10]. These woodlands are usually associated with ancient deer parks, Royal Forests or wooded common land. They frequently occur in a mosaic with other habitats and the boundaries are often poorly defined. Wood pasture was previously included on the original Inventories as ASNW where recognisable stands of trees evident on old maps remain unchanged. Parkland sites with wide-spaced trees were omitted[11]. However, the map sources used for the original Inventories were often inconsistent with only a partial coverage.

The revision of the Ancient Woodland Inventory in Wealden district, East Sussex highlighted the problems of classifying woodland sites in historically more open areas such as the Ashdown Forest and other former commons and hunting forests [12]. Some of these woodlands had been classified on the original inventory as ancient whilst others had been omitted. However, re-examination of the historic map and other evidence does not always appear to support these

[10] Harding & Rose (1986)
[11] Spencer & Kirby (1992)
[12] Westaway (2005)

decisions. Study of the historical extent of these sites can reveal a complex management history with a mixed pattern of woodland, grazing and shifting agricultural use [13].

Within the revision of the Ancient Woodland Inventory for Lewes district, some sites were classed as a subcategory of ancient woodland, wood pasture, whilst keeping the ASNW/ PAWS split.

The following criteria were used to define the subcategory:

- Wooded today (at least 20% tree cover over 80% of the site).
- Woodland shown on the Ordnance Survey First Edition County Series maps (produced for East Sussex 1869-75), with the cartography indicating at least 20% tree cover over 80% of the site.
- Former enclosed Forest or common land as identified on the Ordnance Survey Drawings (1795-1801).

(See section 3.2.2 for a fuller description of these map sources).

Pasture woodland was therefore defined as a semi-natural habitat that has retained a wooded nature throughout recent history as documented by the above map sources. The revised inventory includes these areas and they can be readily extracted from the dataset.

[13] Greenaway, Roper, & Ryland (2004)

3. Methodology and Sources

The guiding principles followed in this project are those used to compile the original inventory. The work utilised methods piloted in the Wealden inventory revision[14] and developed in subsequent revisions to the inventory for Mid Sussex and Tunbridge Wells[15] combining digital map sources, field surveys and archive research.

The revision represents a complete and systematic rebuilding of the Ancient Woodland Inventory dataset for Lewes district. It draws heavily on the established intelligence contained in the original inventory (and its subsequent amendments) but also reappraises this information in the light of a range of, often hitherto unavailable, evidence sources. The availability of high precision digital mapping tools and large-scale historical map sources in digital format mean that, for the first time, small ancient woods (less than two hectares in size) can be routinely included on the inventory for Lewes district. Whilst the methodology aims to be systematic and robust, because of the regional scope of this research, the methods are, by necessity, relatively simple and quick with more detailed historical and field surveys confined to a priority set of sites. The inventory is therefore inclusive, meaning that the default for borderline sites, or those for which data is lacking, is that they are retained on the inventory, thus ensuring they can be considered in future surveys [16].

3.1 Software

The mapping of woodland in this project and much of the map research underpinning the final dataset was done in a Geographic Information System (GIS). This allows the relatively rapid comparison and combination of a variety of spatial data sources. Importantly, it also allows the editing of the dataset to a standard of spatial precision which would have been impossible to achieve within the space of time available without such technology. The GIS software used was *ESRI ArcMap 8.3* [17]. The resulting GIS database can be linked to external databases which hold more detailed site survey and archive data.

Data accrued from on-the-ground woodland survey in the project is held in a Recorder 6 database from which a report for each site outlining the main survey findings can be generated [18]. Recorder 6 is specifically designed for biological recording. It allows species observations and habitat data to be captured in an electronic format that is compatible with the National Biodiversity Network. This enables the methods of data storage to be easily reproduced and also allows easy exchange of data.

3.2 Inventory revision

The approach to mapping ancient woodland used in this project is deductive. A relatively large set of woods is first captured from highly accurate and reliable but relatively recent map evidence. This 'indicative ancient woodland dataset' is then sequentially refined and filtered by interpretation of further sources of evidence, historical, ecological and archaeological. The procedure for revising the ancient woodland inventory has three interlinked elements:

1. Desk-based mapping – capture of the dataset

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[14] Westaway (2005)
[15] Westaway, Grose & McKernan (2007a); Westaway, Grose & McKernan (2007b)
[16] Spencer & Kirby (1992)
[17] ESRI (2002)
[18] JNCC (2007)

2. Research on historical maps and documents – refinement of the dataset

3. Field survey work – refinement of the dataset

3.2.1 Desk-based mapping - capture of the dataset

The initial stage identified, with a high degree of spatial accuracy, that subset of the present-day woodland resource which could clearly be demonstrated to be long-established woodland. Woods of late 19th century and 20th century origin were thereby eliminated from the search.

This capture of potentially ancient woodland sites employed two key mapping elements:

- The current Ordnance Survey *MasterMap* Topographic Layer displayed over recent high-resolution aerial photographs covering Lewes district.
- Ordnance Survey First Edition County Series 25 inch to 1 mile map: produced for East Sussex 1869-75 (also referred to in this report as 'Epoch 1', a term used by historians).

The first of these is the modern vector dataset from which other current OS map products are derived. It is the 'industry standard' baseline for the creation of maps and geographic datasets in the UK. The second is the earliest very large scale mapping to give a complete and systematic national coverage. It is sufficiently accurate that, following its recent digitization and georectification by a partnership between the Ordnance Survey and Landmark Solutions, it can be routinely used in a GIS environment alongside modern datasets (see Figure 1). Both maps were surveyed at comparable scales of 1:2500 or greater and are arguably the most detailed and precise maps ever produced as a national coverage. As such, the comparison and integration of these sources provides an ideal method for the accurate capture of historic woodland boundaries – including small woods – as a first stage in revising the Ancient Woodland Inventory.

Working systematically through a grid of 500m x 500m cells covering the district, all *MasterMap* polygons visibly woodland on the aerial photograph were compared with the Epoch 1 maps in order to identify those areas of woodland common to both. Each woodland *MasterMap* polygon (or part of) was coded according to its presence or absence on the Epoch 1 map (this approach is flexible, in that more layers of map evidence, if available for a given region, can be worked into the procedure). For the purposes of this mapping, woodland was defined as land with at least 20% canopy woodland over 80% of the site. Any continuous blocks of woodland were regarded as discrete sites with historical or ownership boundaries disregarded; ponds and other open areas within the wood less than one hectare in size were included. Man-made linear features passing through wooded areas such as surfaced roads have generally been edited out of the polygon whereas unsurfaced tracks and natural and semi-natural linear features such as watercourses less than 10m wide have been included as part of the woodland polygon.

Woods which were depicted on the Epoch 1 map but are no longer visible (lost woods) and woods which appear in *MasterMap* and recent photographs but which are not shown on the Epoch 1 map (woods apparently of recent origin) are systematically identified in this way. The absence of a wood on the highly accurate Epoch 1 maps was generally considered sufficient evidence to eliminate it from the search for ancient woodland where it only appeared on later maps or aerial photographs. An important tenet of the methodological approach adopted was that no other elimination of woods depicted on the Epoch 1 maps was carried out based on judgement or interpretation of the map at this capture stage. Many woods shown on these maps have a modern, planted or planned appearance but may prove upon further examination (see

3.2.2) to have deeper historical origins. Premature removal of sites from the dataset would prevent any such examination being carried out.

The resulting dataset comprises a map of a particular subset of the woodland resource – the surviving portion of the woods which appeared on the Victorian Epoch 1 maps – in which woodland boundaries are both historically accurate and conform wherever possible to OS *MasterMap*. Theoretically speaking, the woods included in this dataset contain all the ancient woods in the area of interest in addition to some woods with origins in the 17th, 18th & 19th centuries (see Ancient Woodland Definitions - 2.2).

This indicative ancient woodland dataset was then incorporated and compared with the digital version of the Natural England existing Ancient Woodland Inventory within GIS. This allowed:

- Currently designated ancient woodland sites to be attributed to the corresponding polygons in the new *MasterMap* derived dataset subject to further confirmation of status.
- Identification and enumeration of the sites identified by the process described above as potentially new (hitherto unrecorded) ancient woodland sites.
- Potential discrepancies between the two datasets to be marked for further investigation (for example where a piece of woodland recorded on the original inventory does not appear to be shown as woodland on either the Epoch 1 map or on current aerial photographs).

A general principle has been to retain areas of previously designated ancient woodland in the revised inventory where the evidence of Epoch 1 supports this (but with boundaries now mapped to *MasterMap* standard where appropriate) and place the thrust of the research effort on assigning the correct status to the additional potential sites identified by the process described above. If incontrovertible evidence subsequently emerged in further archival and field research (see below) against an original ancient woodland designation then appropriate boundary revisions to those areas have been made.

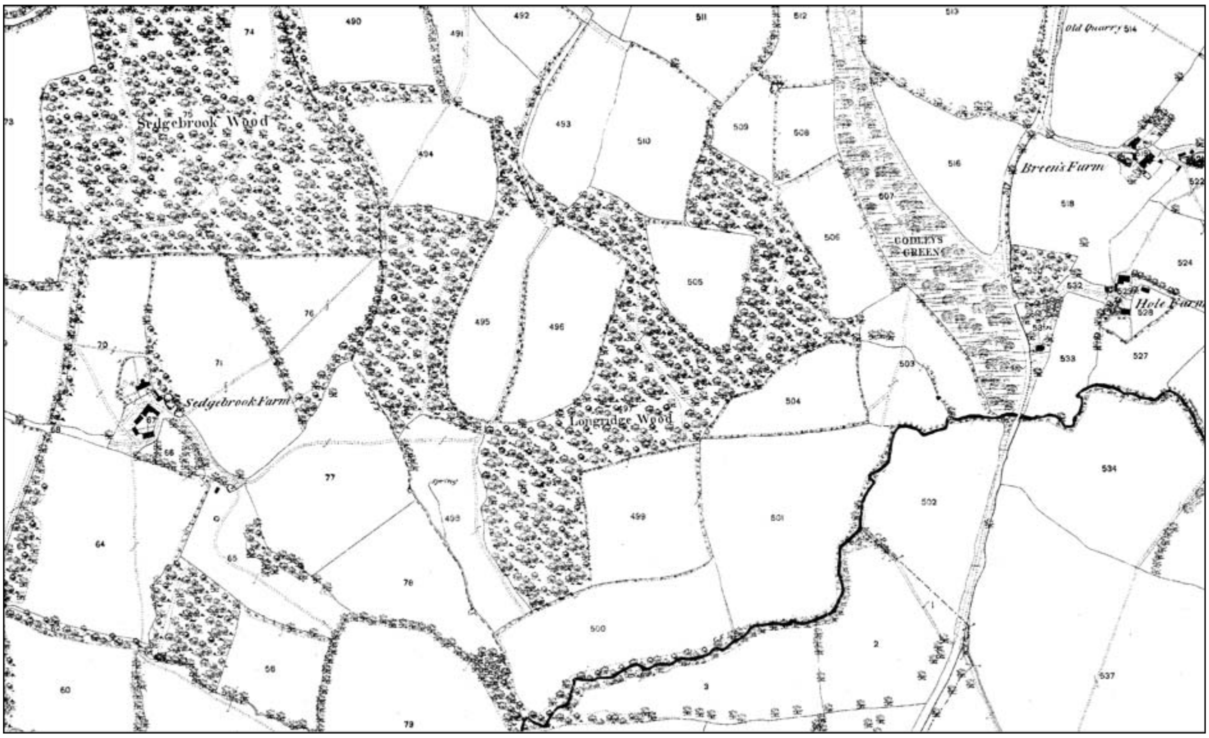

Figure 1. Example of the Ordnance Survey First Edition County Series 25 inch to 1 mile map for East Sussex (c.1869-75) showing woods and shaws at Godley's Green near Wivelsfield.

3.2.2 Refining the dataset using historical maps

The next stage in the methodology consisted of checking this indicative dataset against the evidence of a range of historical map sources held both in traditional archives and in digital form which could be analysed in a GIS as an extension of the desk-based mapping stage (above). Not all the evidence sources consulted can be detailed in this report but the key ones are described below in reverse chronological order.

- **The Ordnance Survey First Edition County Series 25 inch to 1 mile maps (produced for East Sussex 1869-75)** [19]

These are the digital geo-referenced Epoch 1 images used in the capture process described above (3.2.1). These maps are superbly detailed and contain a wealth of information about the woods under review beyond that of simple presence or absence (Figure 1). The engravers used an extensive palette of symbols to depict different types of woodland and scrub vegetation including, simple coppice, coppice-with-standards, high forest, plantations - mixed and coniferous, osiers, pasture woodland, parkland etc. It is also possible to discern from these maps which woods were enclosed and which were not, as well as to see features within woods such as buildings and enclosures. In fact, the attention to nuance in the vegetation and the varying character within and among woods shown in these maps far surpasses that of modern maps and reflects the still central importance of woods and woodland produce to the rural and wider economy at the time of their production. From the perspective of this research – attempting to identify woods which have been in existence since at least 1600 AD – the main disadvantage of Epoch 1 is the relatively recent date. Because of the high level of accuracy of this source, absence of a wood on these maps is considered highly significant. On the other hand, whilst more recent woods can

[19] Dates sourced from the British Library website: http://www.bl.uk/reshelp/findhelprestype/maps/oscountyeditions/oscountyeditions.html

sometimes be identified as regularly shaped enclosures or having map symbols that indicate a previous non-woodland use or recent planting the map does not, of itself, necessarily give grounds for elimination of such sites.

- **The tithe maps covering the parishes which now fall within Lewes district (produced from the 1830s to 1840s)**

Tithe Maps were produced under the direction of a parliamentary commission following the Tithe Commutation Act of 1836 when tithes in kind to the parish were replaced by payments in rental value. For this act to be workable a prerequisite was a consensus on ownership boundaries and the extents of properties. Furthermore, the actual state of cultivation of every parcel of land in each Tithe district needed to be recorded as this determined the charges due. For example, land classed as 'wood' was exempt from Tithe payment within the legal boundary of the Weald and sometimes also elsewhere. The maps provide an invaluable record of the land-use and economy of mid 19th century England at the local level in the way that the Domesday Book does for the 11th century but with the important advantage over that source of spatial precision.

These maps possess similar advantages and disadvantages, in terms of the survey, to the Epoch 1 maps – namely, accuracy (usually – see above) and a high information content on the one hand and on the other, the lack of antiquity ideally needed to demonstrate that a wood depicted is truly ancient. However, the production of these maps only a few decades before Epoch 1 does not detract altogether from their usefulness as an evidence source in this exercise. The tithe maps come at an opportune moment in the history of the region's woods, at the beginning of the Victorian period during which woodland produce would reach unprecedented heights in its economic value (prior to a decline of equal proportions in the later 19th century and early 20th century).

Consequently, the first half of Victoria's reign was a time of considerable change for wood resources both in the style and efficiency of management and the proportion of the land given over to managed woodland. Many woods, or parts of them, appear to have their origins in this period or in the decades immediately before. Examination of the Epoch 1 and MasterMap derived polygons in the light of tithe map evidence often resulted in further edits to the polygons being made, for example where part of a wood was shown to have been a field or plantation in the 1830s. The Tithe Maps therefore represent a very valuable tool for refining the inventory.

Figure 2. Example of an Ordnance Survey Drawing showing woodland near Ditchling Common (by Thomas Budgen, pen and ink on paper at 2" to 1 mile, produced 1798.)

- **Ordnance Survey Drawings, 2 to 6 inches to 1 mile (produced for East Sussex 1789-1806), prepared for the First Edition Ordnance Survey maps [20]**

The Ordnance Survey Drawings and drafts (see Figure 2 for an example) are the manuscript maps upon which the first fully triangulated large scale published maps of southeast England were based. The printed maps, referred to as the 'Old Series,' were published for Sussex in 1813. This endeavour was a military response by the English government to the Napoleonic threat of invasion from across the English Channel. It was undertaken by the Board of Ordnance (a body something akin to the modern Ministry of Defence) from which the Ordnance Survey takes its name.

The most detailed drawings were made at a scale of six inches to the mile in areas of military importance. Particular attention was paid to rivers, roads, woods that could provide cover or obstruction and the contours of hills. Elsewhere, the maps were drawn at smaller scales - sometimes as low as two inches to the mile. The data from these drawings was reduced and standardised in order to produce the published 'Old Series' maps. These maps were drawn at a scale of one inch to the mile. The printed maps therefore had an attendant loss of information and simplification in the depiction of features, for instance, the straightening of woodland boundaries, the truncation of tapering gills and other linear woodland shapes and the removal of smaller woods.

The original drawings are held by the British Library, and geo-referenced scans of these data were used to supply coverage of Lewes district. The images were examined along with the tithe and Epoch 1 data using GIS software. Most of the relevant information is contained on five overlapping sheets of varying size. Where maps overlap, woods may be served by two or more drawings whilst some small areas have no surviving coverage. Individual sheets were often produced by different surveyors and map styles and dates vary accordingly. The level of accuracy also varies greatly, with the finest sheets depicting, very precisely, woods as small as an acre (or

[20] Dates sourced from the British Library website: http://www.bl.uk/onlinegallery/onlineex/ordsurvdraw/

0.4ha) in size but with the poorest sheets coarse and distorted with little information on small woods.

Absence of a wood from these maps cannot be taken as proof of woodland not existing at this time. Some of the sheets represent early drafts of other sketches. Comparison between drawings sometimes reveals woods which are present on one version but not the other and comparison with estate maps (below) of similar age sometimes reveals the surveyors' apparent omission of sizeable woods. The experience of the research in Lewes and in neighbouring districts of the Weald seems to suggest that while enclosed woods containing significant timber would generally be accurately depicted, simple coppices (without standards) such as low-lying alder beds, parcels of brushwood and the narrower of the gill type woods are often omitted. Similarly, where steep ground is occupied by woodland or scrub, the surveyors have often placed priority on conveying the physical relief the land, above depiction of the vegetation cover. In other places the surveyors' 'preoccupation with the lie of the land'[21] and use of dense hachuring to indicate steep topography obscures other coincident features.

The suggestion has also been made that woods which had recently been cut were simply overlooked by the surveyors or that they mistook recent woodland harvesting for conversion to agriculture [22] (an error which sometimes occurs in modern map making). Large woods managed in the traditional way by coppicing would tend to be divided into a series of compartments harvested on a cyclic rotation. Such woods would perpetually contain some conspicuous growth and be visible as woodland. Small woods however, were sometimes harvested in their entirety, with a dispersed group of copses across a farm or larger estate each acting as a felling compartment within the coppice rotation. At the time of the first Ordnance Survey most, if not all, woods would have been actively managed. At any one time then, a relatively large proportion of small woods may have been at a low and inconspicuous state of growth.

We should not expect to see every small wood depicted on these maps. However, where woodland is recorded these maps are considered to be reliable and give a strong indication of possible ancient woodland status when this is supported by the context of the site and the evidence from other sources. Following the approach of the original AWI, [23] which utilised the smaller scale printed version of this source (see below), a presumption in favour of retaining those woods shown on these maps (as provisionally ancient woodland sites) has been made.

- **Ordnance Survey First Edition, 1 inch to 1 mile, 1813 [24]**

In spite of the disadvantages of using this map to identify ancient woodland rather than the larger scale drafts produced in its development (discussed above) this source is not to be ignored completely. A copy of Sheet 5 of the Ordnance Survey First Series Map was obtained and georeferenced for the purpose of the project and consulted alongside the other map sources when required. Although it represents a 'loss of information' relative to the drawings it also represents the definitive distillation of an immense body of work and the Ordnance Survey's final decision on what should and should not be mapped at the time. Occasionally the 1813 printed version depicts woods which are not shown on earlier drawings (although the number of woods shown on the drafts is far greater).

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[21] British Library website:
http://www.bl.uk/onlinegallery/onlineex/ordsurvdraw/t/002osd000000016u00330000.html
[22] Hodson and Campbell (1989)
[23] Whitbread et al (1989)
[24] See http://visionofbritain.org.uk/maps/

- **Yeakell & Gardner map of Sussex, 2 inches to 1 mile, 1778 – 1783**

Yeakell and Gardner originally intended to survey the whole of Sussex in eight sheets. However, a lack of subscriptions and the deaths of several sponsors meant only four sheets were published. These sheets correspond to the southern part of the county (they extend to 50°56'30" north) and therefore cover only the southern part of Lewes district.
This map was the first, large scale, detailed plan of Sussex that used triangulation. This meant that actual field boundaries, rather than diagrammatic illustrations could be drawn. The surveyors also claimed to illustrate 'every inclosure, however small … every road, public and private… the rivers, with their bends, fords and bridges'.

The 'Great' or 'Large' survey maps, as they were referred to, are comparable in style and method to the later Ordnance Survey Drawings and the problem of the depiction of topographic relief obscuring some of the finer details, discussed above, is especially apparent when using this map to research woods lying in the steeper valleys of the district. Nevertheless, they are of great value in allowing the evidence base for a large number of sites to be extended into the 18th century period when large scale map evidence for woodland continuity becomes scarcer. They provided a very useful point of comparison with the OSDs, especially where the information given by the latter was unclear, for example where land-use was difficult to interpret or where distortion in the original triangulations and lack of detailed information on field boundaries made sites difficult to trace with confidence.

Figure 3. Detail from Yeakell and Gardner's map of Sussex for the area near Isfield (Sussex map produced 1778-1783, 2inch to 1 mile.)

- **Estate maps**

In the later Tudor period the production of detailed estate maps in England became increasingly common [25]. This was precipitated partly by an increasing interest in lay lands in the aftermath of the dissolution of the monasteries. Another significant factor in the development of mapmaking at this time was technological innovation. The use of the theodolite for triangulation from 1570 onwards (rather than the less satisfactory trigonometry produced by the 'plane table') resulted in increasingly accurate maps. Medieval cartographers had often relied on tradition, reputed area and local wisdom for their information. The introduction of a standard length chain in the early 17th century meant that units of measurement increasingly became standardised [26].

East Sussex has a rich archive of estate maps belonging to the period of interest. These are of great value in determining the status of individual woods and the project has aimed to exploit this evidence source to refine the inventory where possible. The majority of the material consulted is held by the East Sussex Record Office (ESRO) at Lewes. Whether a map is relevant to the woodland sites targeted for research is often not evident until it has been examined, sometimes at length. The maps naturally vary significantly in their quality and accuracy. Each map must be interpreted on its own merit and with an awareness of its possible original purpose.

It should be noted that there are likely to still be other historical documentary resources of relevance to the inventory of Lewes' ancient woodland resource. Estate papers describing woodland management, deeds, charters, leases etc have not been investigated due to the practical time constraints on production of the dataset. For the same reasons information in the privately held archives of landowners has not been used in the current project.

3.2.3 Other evidence sources

This revision of the Ancient Woodland Inventory was primarily a mapping exercise supported by research on historical maps and field survey (below) and evidence from these sources was given the greatest weight. However, there are important additional factors which are brought into interpretations of woodland status during the decision making process. These include:

- **Place names**

The attraction of historic place names is the link they speak of to features in a past landscape for which we have no description. Unfortunately place-name scholars often disagree as to the true meaning of a name, with some assigning quite different topographic associations to the same term. They can however, with caution, be used as a guide to help reconstruct the landscape [27]. For example 'leah' or 'ley' refers to a woodland glade or clearing, 'den' to a woodland swine pasture and 'hyrst' or 'hurst' to a wood or a grove especially one on a hill [28]. The disadvantage is that many topographic place names probably relate to features which were atypical, and therefore distinctive, rather than describing the general situation. Hence, when the term hurst, originally applied to a small and distinctive hilltop grove, is later transferred to the general area of the hill, it does not necessarily support ancient woodland status for sites in the vicinity.

Wood names can also help to identify non-ancient woods as non-ancient wood names are often readily obvious. 'The plantation' or 'The Grove' for example, may indicate more recently

[25] Harvey (1993)
[26] Hull (1973)
[27] Brandon (2003)
[28] ibid., and Rackham (2003)

planted woodland particularly where the site is associated with a large house and/or on cultivable land. However, a large degree of caution should be exercised because names change over time and 'The Plantation' might well occupy the site of a pre-existing wood [29].

- **Woodland shape and situation in the landscape**

Larger ancient woodland sites often survive on parish boundaries or follow steep inaccessible topography such as the slopes down to a gill or the land surrounding old iron extraction pits. The boundaries of intact older woodlands are rarely straight and often follow natural features such as streams. Surviving fragments of historically larger woods, however, often do have straight margins where their modern boundaries have been chased back to the limits of viable cultivation by successive agricultural improvements.

3.2.4 Refining the dataset through field survey

The field surveys were carried out in the spring and summer of 2009 in order to facilitate the recording of ancient woodland indicator plants. The survey aim was to make a quick assessment of each site recording the key information needed to aid in the identification of ancient woodland. The methodology was broadly in keeping with the 'walk-about' survey recommended by the Nature Conservancy Council for rapid assessment at the time of the original inventory work [30] whereby the boundaries of the site are walked and confirmed and the interior of the wood is traversed with the objective to ensure that all the major sources of variation likely to be on the site are seen (i.e. woods are not surveyed by quickly looking at just part of them unless there is good reason to believe that the part selected is representative of the whole). Emphasis was placed on recording the following:

- A list vascular plant species.
- Living evidence relating to the past management of a wood, for example, coppice structure, aged coppice stools, veteran trees or pollards.
- Archaeological evidence relating to the past management of the site such as saw pits, charcoal hearths, drainage systems, old banks, mineral diggings, etc.
- Physical features indicating a previous agricultural land use, such as ridge and furrow plough markings and lynchets.
- Historical boundary features, such as wood banks, stubbed trees or outgrown laid hedges, delineating the wood.
- Current uses or factors causing disturbance or damage to the wood.
- Structural and habitat diversity, presence of dead wood and the presence of streams and ponds following natural courses and depressions.

These features can all provide evidence of past land use and so help determine ancient woodland status. For example:

[29] Isaac & Reid (1997)
[30] Kirby (1988)

Wood banks

Distinct wood banks are characteristic indicator features of lowland ancient woodlands. A wood bank consists of an earth bank, often though not always with an associated ditch, constructed at the boundary of woodland or of compartments within it. These banks, which were constructed to keep out both grazing animals and human intruders, would in most cases have been topped by a hedge or fence [31].

Ancient woodland indicator species

The presence of these vascular plant indicator species can aid in the identification of ancient woodland, and ancient woodland sites tend to be richer in terms of their species composition [32]. However, care is required as other factors affect the presence and abundance of these species. These factors include the area of the wood, the time of year of the survey, the diversity of habitats within the wood, soil type, and the position of the woodland relative to other wooded areas. Current uses, including disturbance, damage or invasive species may also influence species diversity and the time spent surveying will affect the number and abundance of species recorded as well as the likelihood of other features being recorded.

Lists of vascular plant species strongly associated with ancient woodland sites known as 'indicators' have been compiled for different geographical areas of the British Isles. These lists are based on the occurrence of species in known ancient woodland sites [33]. The South East list used in this revision is appended.

3.2.5 Deciding on ancient semi-natural or replanted ancient woodland status

The Forestry Commission's National Inventory of Woodland and Trees (NIWT) [34] was used as the core dataset to redefine the boundaries of PAWS and ASNW. This dataset is based on interpretation of aerial photography; it classifies woodland into broad categories including broadleaved, coniferous and coppice woodlands. Boundaries were then further refined using aerial photography, the existing AWI boundaries, Ordnance Survey *MasterMap* boundaries and the results from survey work.

The reliance on aerial photography for identifying PAWS means that there are inevitably some inaccuracies in the classification, for example, in distinguishing between mature broadleaved plantations and stands of semi-natural woodland. Ancient Semi-Natural Woodland was used as the default classification where it was not possible to determine the woodland type.

For the remainder of the ancient woodlands greater than two hectares, the definition of ancient replanted, or PAWS, was based on an analysis of the Forestry Commission's National Inventory of Woodland and Trees (NIWT), which defines all woodlands greater than two hectares into categories such as broadleaved, coniferous, mixed, and coppice [35]. For ancient woodlands less than two hectares, a judgement on ASNW or ancient replanted status was based on an interpretation of aerial photographs.

[31] Rackham (2003)
[32] Hornby & Rose (1986), Rose (1999) and Rackham (2006)
[33] Kirby & Goldberg (2006)
[34] Smith (2000)
[35] ibid. (2000)

3.2.6 Minimum size of a wood to be included in the inventory revision

0.25 ha was generally the lowest size of woodland polygon considered for inclusion in the revised inventory, making it directly comparable with the Forestry Commission's NIWT. However, each wood is considered separately and factors such as the location and historical extent of the woodland mean that some woods under 0.25 ha may be included. This allows these woods to be considered when looking at the whole habitat matrix. Querying the GIS attribute table will allow a size restriction to be imposed if required.

3.2.7 Ancient woodland status

It is recognised that a desk based exercise will always be flawed and ideally ground survey work would be undertaken in every wood. Due to time and financial constraints this is clearly impractical. Therefore the decisions are based on available data. Thus, whilst every effort has been made to make this revision as accurate as possible, the inventory is still regarded as provisional.

4. Results

The results of the Ancient Woodland Inventory revision are primarily stored in digital format. The final dataset showing the ancient woodland resource for Lewes district will be incorporated by Natural England into the national Ancient Woodland Inventory. It will also be freely available to download from www.magic.gov.uk in due course. The revised map boundaries are also shown at the end of this report. Copies of the field survey data pertaining to individual sites will be held by Natural England and Sussex Biodiversity Record Centre.

4.1 The ancient woodland resource

The total amount of all woodland (ancient and recent) within Lewes district greater than two hectares, as recorded in the Forestry Commission's National Inventory of Woodland and Trees (2000), is 2,109 ha (Table 1). This amounts to just over 7% of the borough's area, similar to the England average of 7.5%.

4.1.1 Extent of ancient woodland

The area of ancient woodland since the original inventory was produced has risen from 1,019 ha to 1,156 ha, a gain of 137 ha as a result of this revision (see Table 1). This is a net gain, representing 213 ha of newly identified area which has been offset by the removal of a 76 ha of woodland. Overall this represents an increase of about 0.5% in the district's area designated as ancient woodland bringing the total coverage to 3.93%. The number of parcels of ancient woodland in the revised inventory, by contrast, is almost twice that of the original inventory.

The 76 ha loss from the original inventory was due to a combination of inaccuracies in the initial mapping process, misattribution of some woods or parts of woods in the original inventory and conversion of ancient woodland to other land-uses since the original inventory was compiled. These areas were removed following re-alignment of boundaries with OS *MasterMap* and Epoch 1 maps and re-examination of the historic map evidence.

Table 1: Summary of the woodland area and number of separate woodland parcels from the National Inventory of Woodland and Trees (NIWT, Forestry Commission, 2000), the original AWI (digitized version, 2000), and the revised AWI (2010). All areas in hectares.

	Area	% of the district	Number of woodland parcels	Average area of woodland parcel
Lewes district	29,440			
All woodlands (NIWT) >2 ha	2,109	7.16	266	7.93
Original AWI (woods >2ha)	1,019	3.46	112	9.09
Revised AWI (including woods <2ha)	1,156	3.93	212	5.45
Overall ancient woodland gain – compared to Original AWI (2000)	137	0.47	100	

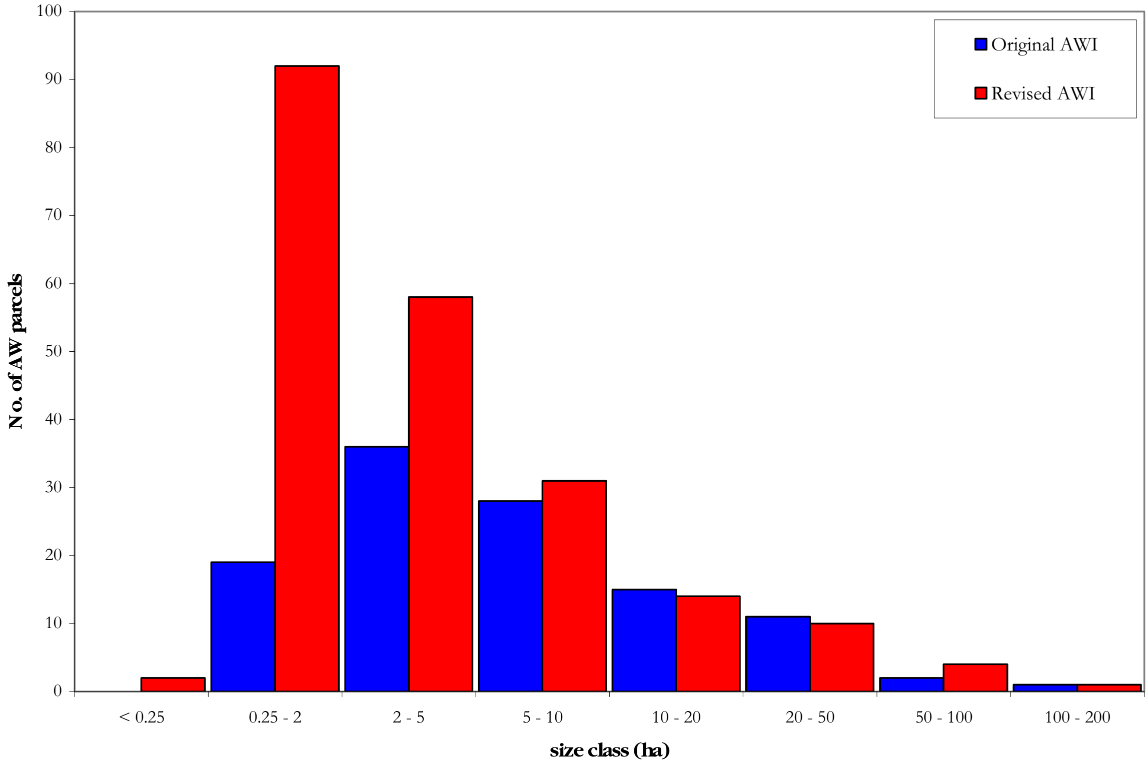

Figure 4. Histogram of the size class distribution for the original and the revised AWIs.

4.1.2 Plantations on Ancient Woodland Sites

In the revised inventory, 91% of the ancient woodland area is recorded as ancient semi-natural, with an area of 1,054 ha (Table 2). This is a very high percentage, reflecting a general lack of commercial plantation forestry in the district.

Table 2: Ancient woodland types. Area in hectares.

Ancient woodland type	Area	% of ancient woodland area
Revised AWI – ASNW	1,054	91
Revised AWI – PAWS	102	9
Total:	1,156	

The predominantly semi-natural condition of the ancient woodland resource has many positive implications for nature conservation in the district. The accurate mapping of this resource provides important opportunities for understanding and improving connectivity of semi-natural habitats and biodiversity at the landscape scale.

The importance of semi-natural ancient woodland is widely acknowledged [36]. This resource is increasingly threatened by development pressures and lack of appropriate management. It is

[36] English Nature (2002), Defra and the Forestry Commission (2005), Ellis (2004)

hoped that the work outlined here will make a useful contribution towards the long-term protection and appropriate management of this irreplaceable resource.

5. Outputs

Maps 4 to 6 at the end of this report show the revised Ancient Woodland Inventory on an OS 1:50,000 base map. Due to the map scale and the volume of small woods added to the inventory this map should be used as indicative only. The paper maps also only represent a snapshot in time and will not show any subsequent revisions. Digital boundaries will be available to download online (www.magic.gov.uk) or alternatively printed copies can be obtained on request from Lewes District Council or from Natural England.

By its nature, the revised inventory is still provisional, but represents an important advance in establishing ancient woodland status using a wide range of evidence and making full use of advances in modern technology. There may however be facts that come to light in the future that could alter or reinforce the decisions taken in this survey. The database is set up in such a way as to incorporate any future modifications or additional information.

The revised inventory is an important information base on which to inform planning policy, and will enable planning decisions relating to wooded areas in Lewes district to be made in the light of an improved evidence base.

Planning Policy Statement 9 [37] strengthens the protection granted to areas of ancient woodland. The guidance requires local authorities to identify all areas of ancient woodland within their administrative area. The identification of 100 new ancient woodland parcels in Lewes district not only affords these woodlands a higher degree of protection, but also emphasises the need for a review of the inventory in other well wooded areas.

The revised inventory provides a more complete picture of the location of the borough's ancient woods within a habitat network and will help to identify areas of opportunity for environmental enhancement, and inform more strategic distribution of funding for woodland management programmes, such as the English Woodland Grant Scheme (EWGS). The survey data and revised inventory will also be useful to inform Biodiversity Action Plans.

6. Limitations of the survey

The Lewes project built on the methods trialled in earlier surveys, including Wealden, Mid Sussex, and Ashford. [38]. The solutions to problems encountered in these previous revisions have been fed into the procedure for mapping and identifying ancient woodland used in this inventory revision.

There will, however, always be limitations with the types of evidence used in assessing ancient woodland status and these need to be considered by all users of the dataset:

- The limitations and inaccuracies associated with early map sources were discussed in the relevant section of this document. No decision based on historical map evidence relating to woodland can be completely infallible and a project such as this must inevitably make many such decisions. This is especially true where woods of diverse historical character, which have been little studied in this way before, are concerned.

[37] Office of the Deputy Prime Minister (2005)
[38] Sansum et al (2009)

- Botanical evidence varies in its value as a guide to the antiquity of a wood. The use of such data is more problematic in heavily disturbed woods and PAWS sites where vascular plant floras are often poor. Similarly, ancient semi-natural woods managed traditionally as coppice over centuries can become less conspicuously diverse when the coppice structure becomes derelict and the ground flora enters a prolonged shade phase with suppression of some of the diagnostic elements of an ancient semi-natural ground flora. Sudden changes in management or disturbances can bring strong secondary elements to ancient woodland vegetation locally which can mask the presence of diagnostic specialist species. In large woods such an effect is more easily identified and understood but in small woods with high ratios of edge to area the effect of disturbance, where the whole site may be affected, can be to confuse the decision making process significantly.

- Woodland archaeological features, of considerable diagnostic value in interpreting the history of a site, are most conspicuous in the winter and early spring, but ground flora recording dictates that the bulk of field surveying is done in spring or early summer. Rarely are sufficient resources available to visit a site twice in order to form a more complete picture.

7. Acknowledgements

The project would like to thank everyone who contributed to this survey: Matthew Grose, Henri Brocklebank and Charles Roper at the Sussex Biodiversity Record Centre, Nick Heasman of the South Downs National Park Authority, and Kate Ryland of Dolphin Ecological Surveys who helped undertake the 2009 field work.

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Appendix 1: Ancient woodland vascular plant 'indicator species' in the South East

The 100 species which in NCC's South East Region are most strongly associated with ancient woodland and are typical components of botanically rich ancient woodland communities [39].

Grasses, Sedges, Rushes and Ferns		Black bryony		Stinking iris	
Bearded couch		Bluebell		Three-nerved sandwort	
Common polypody		Broad-leaved helleborine		Toothwort	
Creeping soft-grass		Bush vetch		Tutsan	
Giant fescue		Chaffweed		Violet helleborine	
Great wood-rush		Columbine*		Wild daffodil*	
Hairy brome		Common Solomon's-seal		Wood vetch	
Hairy wood-rush		Common cow-wheat		Wood spurge	
Hard shield fern		Early dog-violet		Wood speedwell	
Hard fern		Early-purple orchid		Wood anemone	
Hart's-tongue fern*		Goldenrod		Wood-sorrel	
Hay-scented buckler fern		Goldilocks buttercup		Woodruff	
Lemon-scented fern		Greater butterfly orchid		Yellow archangel	
Narrow buckler fern		Greater burnet-saxifrage		Yellow pimpernel	
Pale sedge		Green hellebore		**Trees and Shrubs**	
Pendulous sedge*		Herb-paris		Alder buckthorn	
Remote sedge		Ivy-leaved bellflower		Aspen	
Scaly male fern		Lady orchid		Bilberry	
Smooth-stalked sedge		Large bitter-cress		Black currant*	
Soft shield fern		Lesser skullcap		Butcher's-broom	
Southern wood-rush		Lily-of-the-valley*		Crab apple*	
Thin-spiked wood sedge		Marsh violet		Field maple*	
Wood melick		Moschatel		Field rose	
Wood meadow-grass		Narrow-leaved everlasting-pea		Guelder-rose	
Wood small-reed		Nettle-leaved bellflower		Holly	
Wood sedge		Opposite-leaved golden saxifrage		Hornbeam*	
Wood millet		Orpine		Midland hawthorn	
Wood club-rush		Pignut		Red currant*	
Wood horsetail		Primrose*		Sessile oak*	
Wild flowers		Ramsons		Small-leaved lime*	
Allseed		Sanicle		Wild cherry	
Barren strawberry		Saw-wort		Wild service tree	
Betony		Slender St John's-wort		Wych elm	
Bird's-nest orchid		Small teasel			
Bitter vetch		Spurge-laurel			

* *Only where these species occur well within a wood and do not appear to have been planted.*

[39] NCC's South East region comprised Kent, Surrey, Sussex, London and Hertfordshire. See Hornby & Rose (1986).

Maps

Map 1: Location of Lewes district in the South East region showing Landscape Character Areas

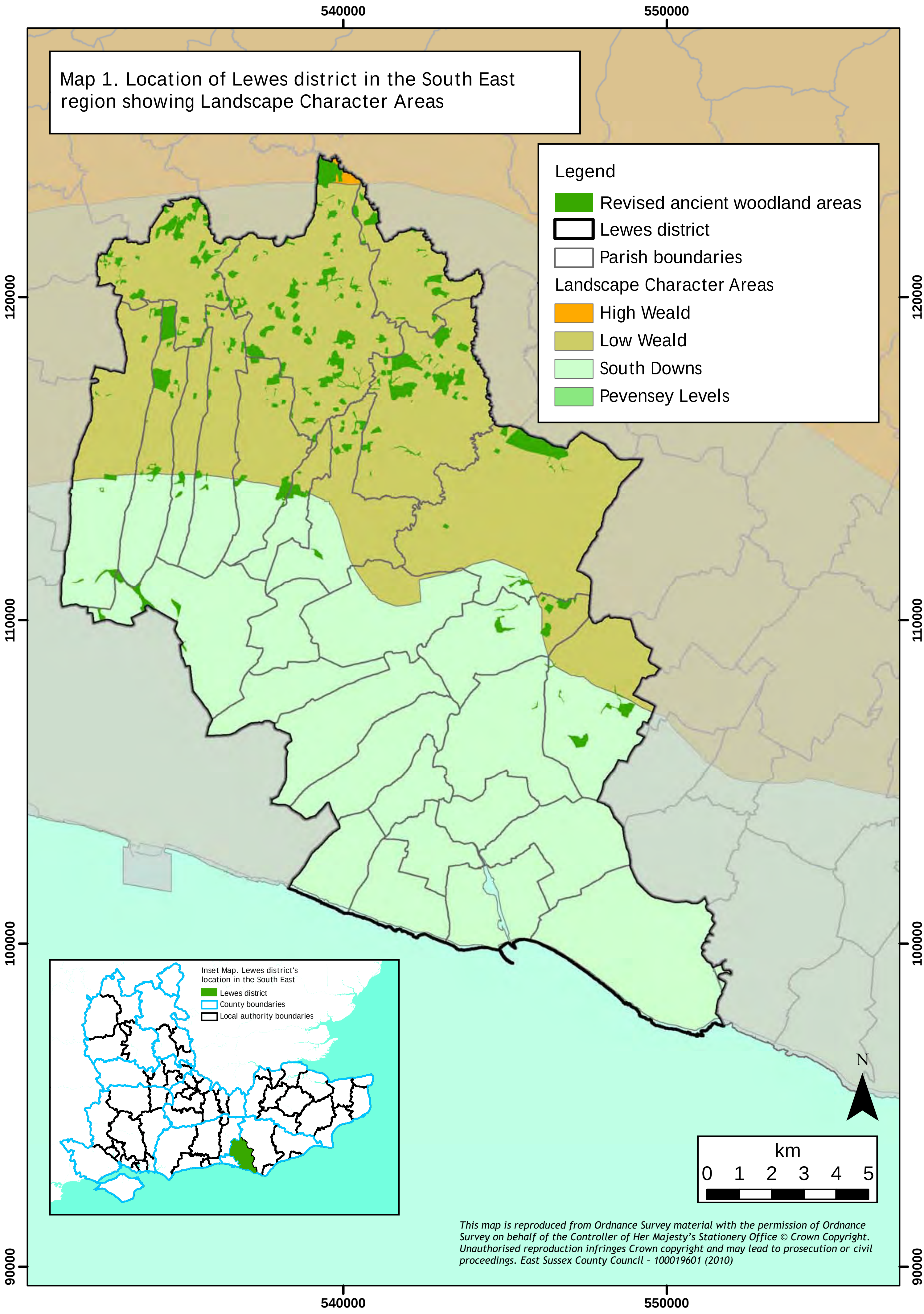
Map 2: Comparison of the Ancient Woodland Inventories for Lewes district

Map 3: The revised Ancient Woodland Inventory for Lewes district – overview and index sheet

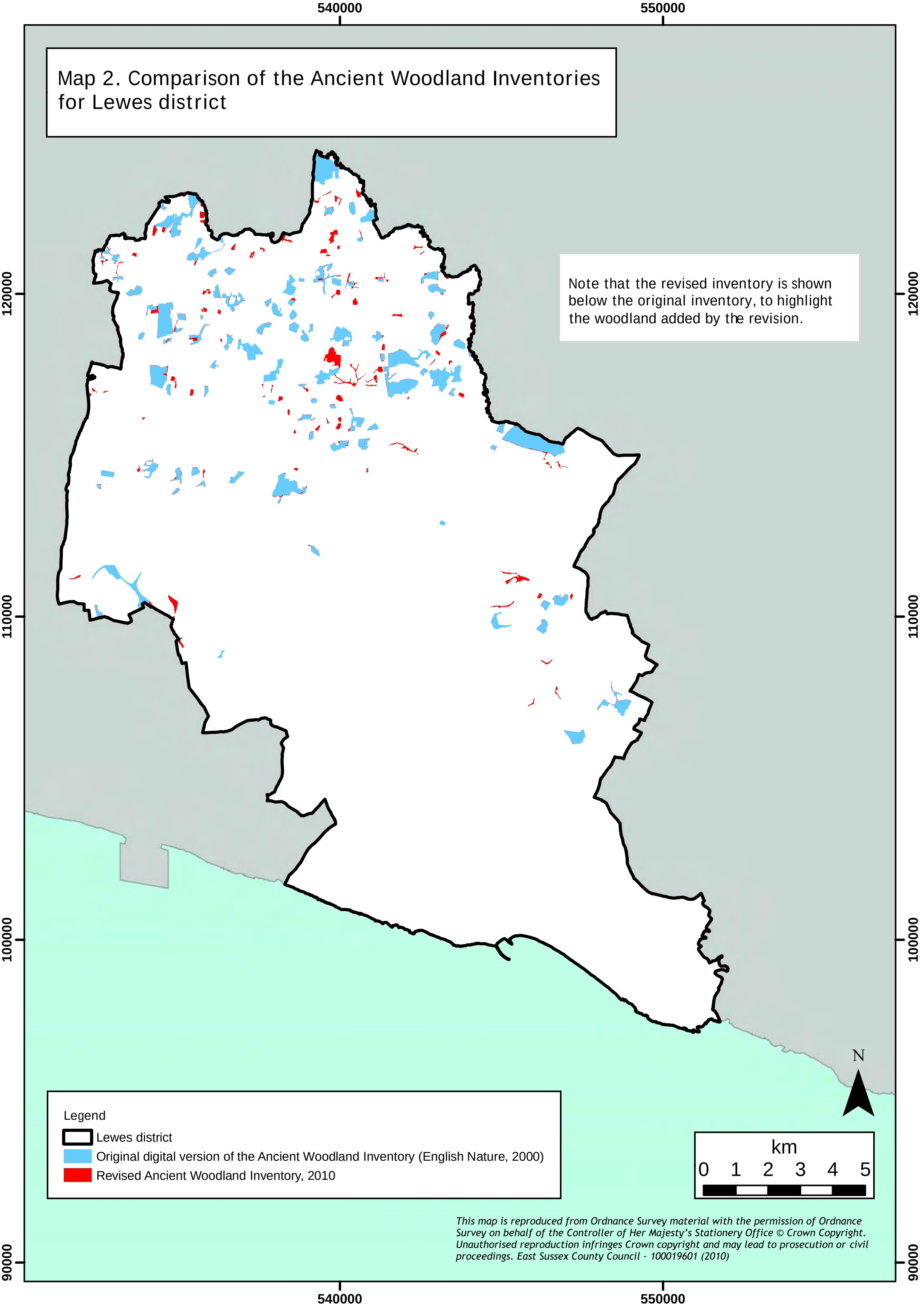
Map 4: The revised Ancient Woodland Inventory for Lewes district - North sheet

Map 5: The revised Ancient Woodland Inventory for Lewes district - South sheet

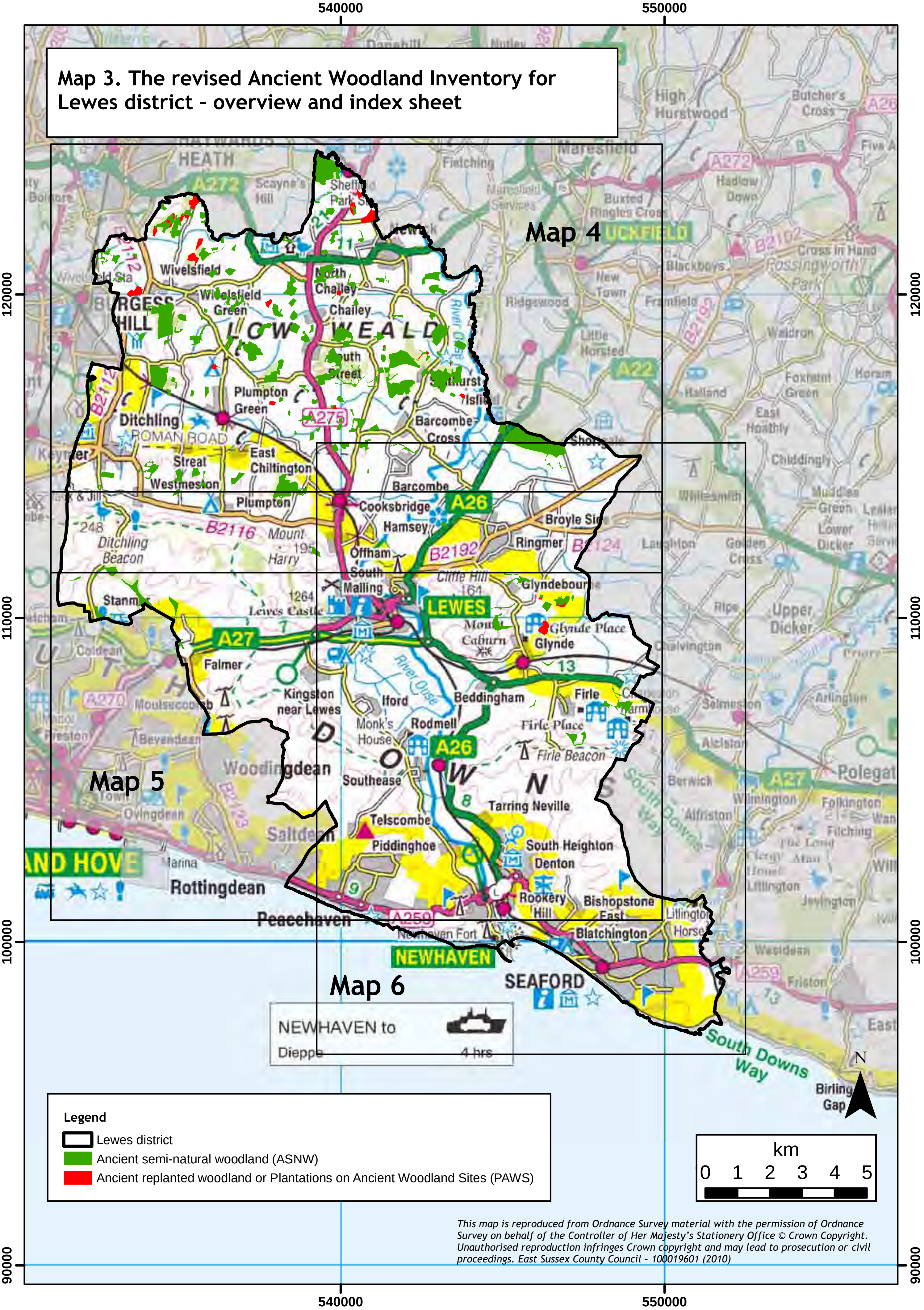
Map 6: The revised Ancient Woodland Inventory for Lewes district - Southeast sheet



Map 1. Location of Lewes district in the South East region showing Landscape Character Areas

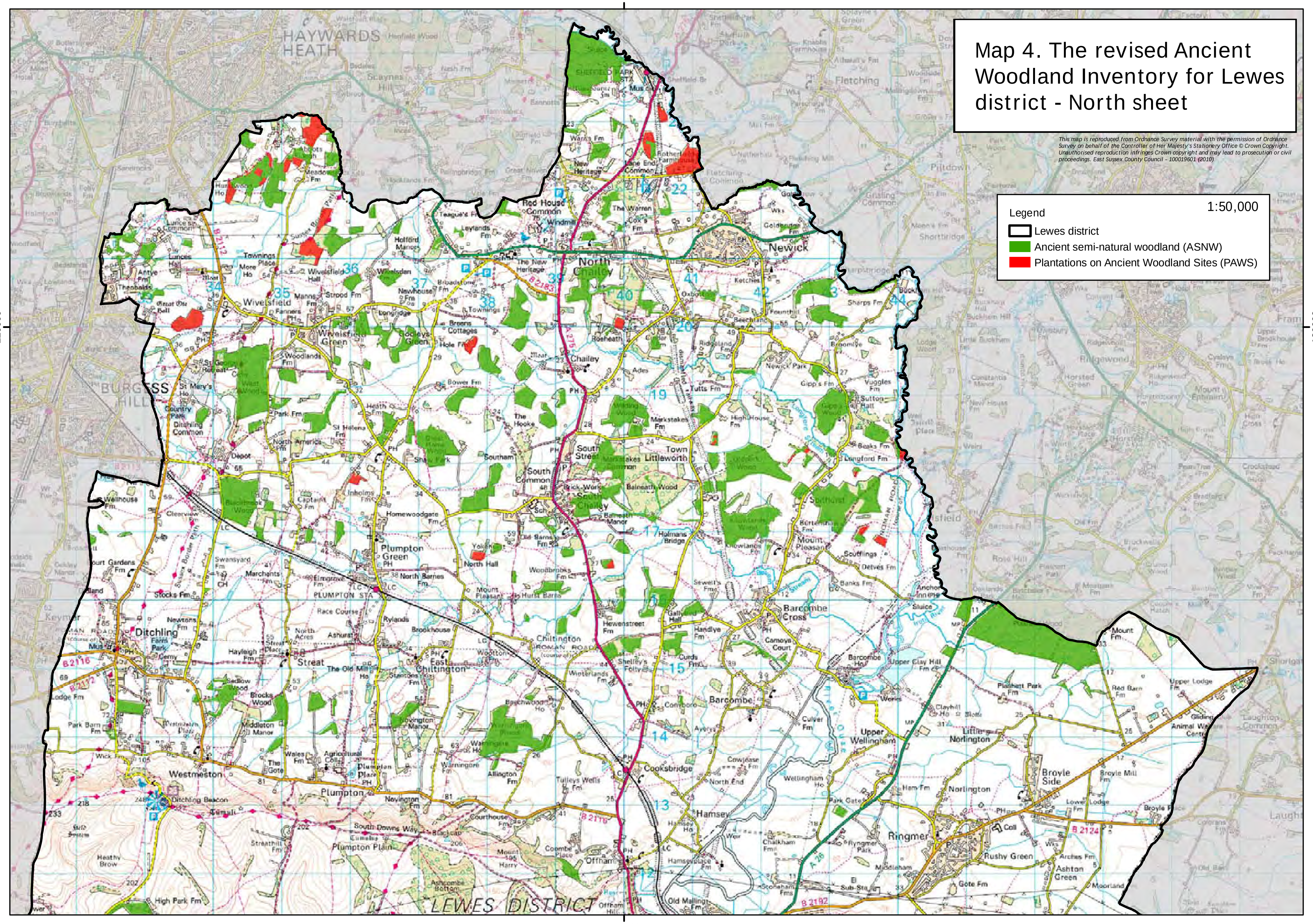

Map 2. Comparison of the Ancient Woodland Inventories for Lewes district
540000
550000
120000
110000
100000
90000
Note that the revised inventory is shown below the original inventory, to highlight the woodland added by the revision.
N
Legend
Lewes district
Original digital version of the Ancient Woodland Inventory (English Nature, 2000)
Revised Ancient Woodland Inventory, 2010
km
0 1 2 3 4 5
This map is reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. East Sussex County Council - 100019601 (2010)

Map 3. The revised Ancient Woodland Inventory for Lewes district - overview and index sheet



Legend

- Lewes district
- Ancient semi-natural woodland (ASNW)
- Ancient replanted woodland or Plantations on Ancient Woodland Sites (PAWS)


Map 4. The revised Ancient Woodland Inventory for Lewes district - North sheet
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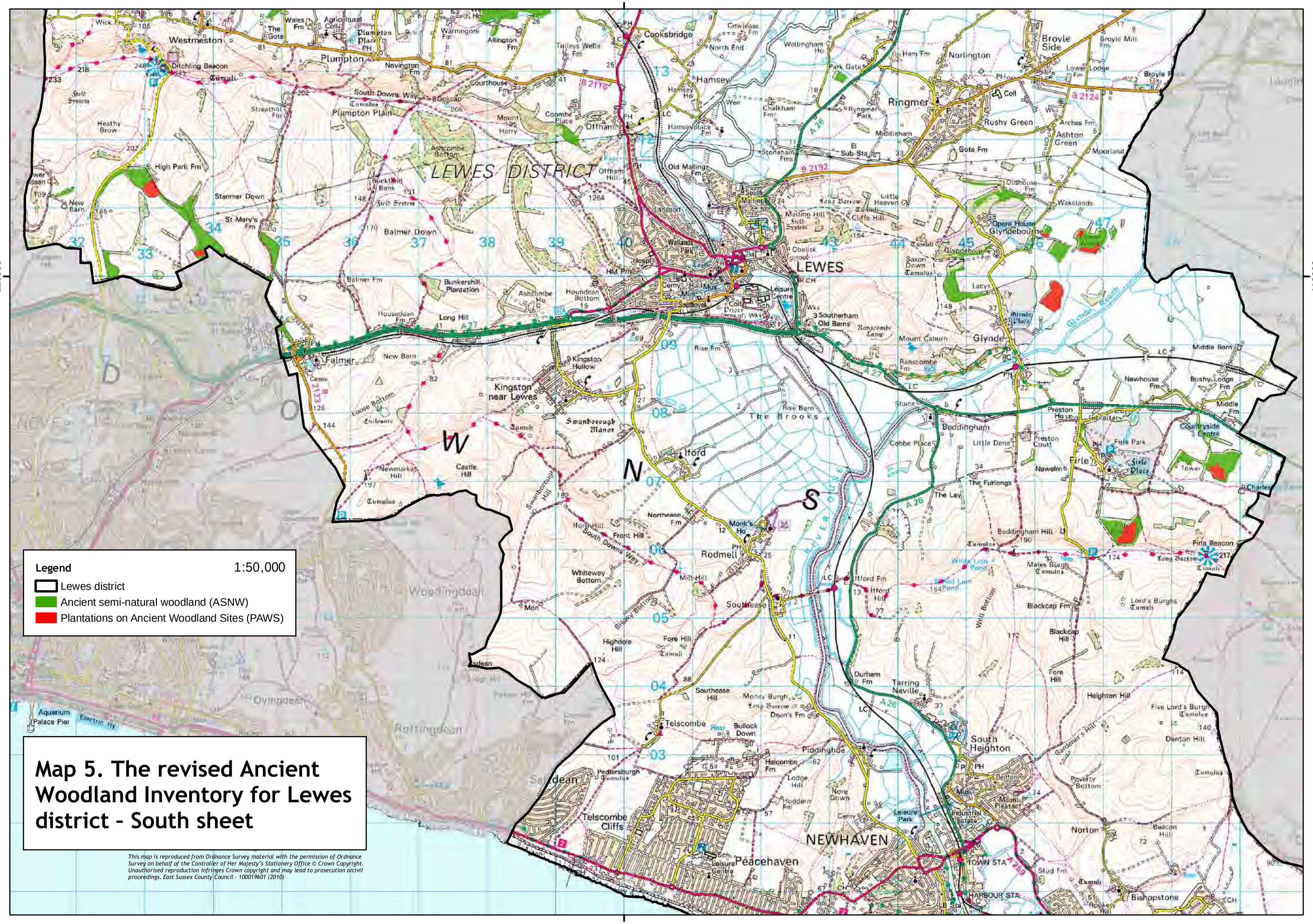
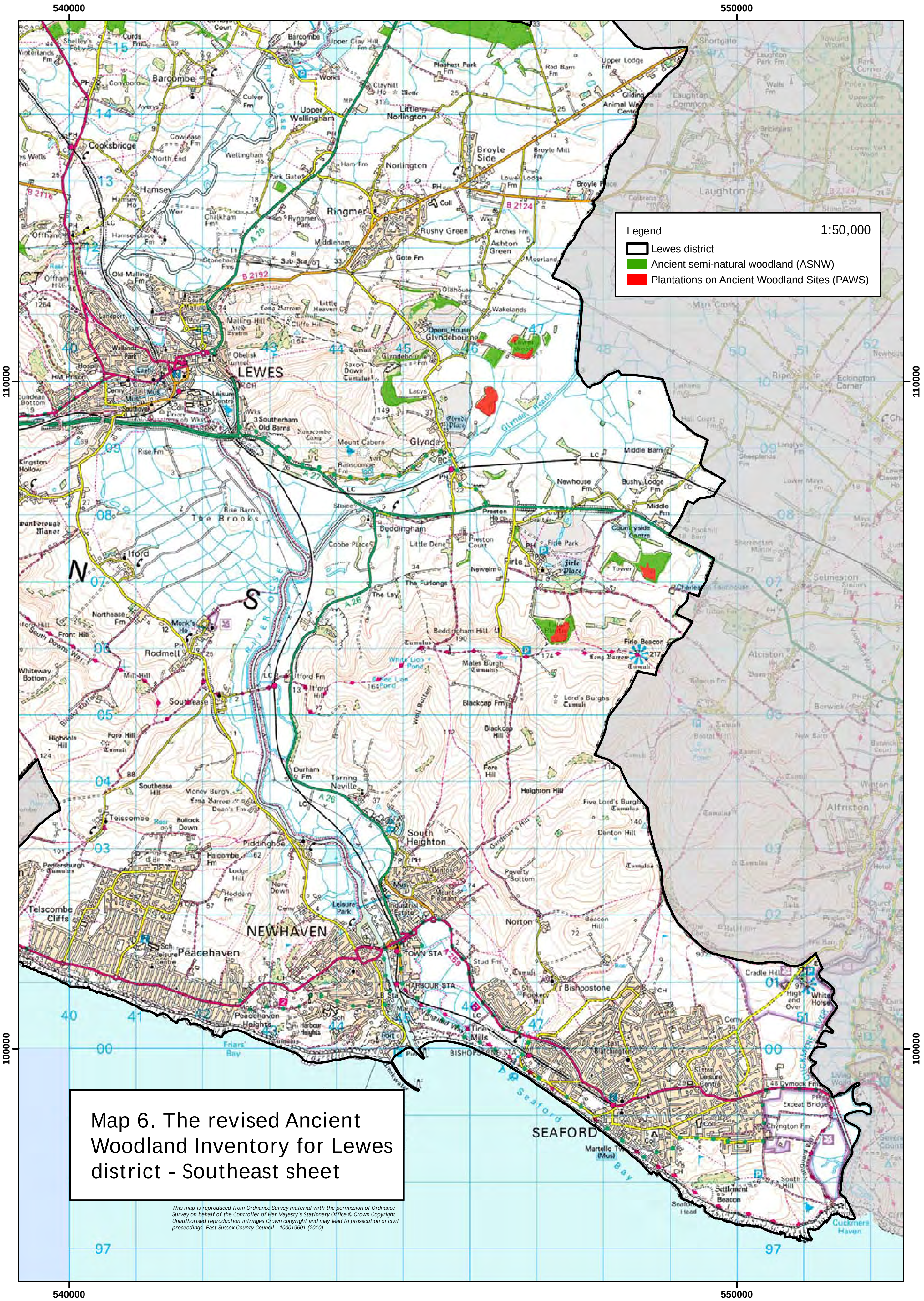
Legend
1:50,000
Lewes district
Ancient semi-natural woodland (ASNW)
Plantations on Ancient Woodland Sites (PAWS)
540000
120000
HAYWARDS HEATH
Newick
North Chailey
Wivelsfield
Ditchling
Plumpton
Barcombe Cross
Ringmer
Hamsey
Westmeston
LEWES DISTRICT



Map 5. The revised Ancient Woodland Inventory for Lewes district – South sheet



Map 6. The revised Ancient Woodland Inventory for Lewes district - Southeast sheet

WEALD AND DOWNS
ANCIENT WOODLAND SURVEY

Project carried out by Victoria Hume, Matthew Grose and Philip Sansum for the Weald and Downs Ancient Woodland Survey, with additional site surveys carried out by Kate Ryland of Dolphin Ecological Surveys
June 2009 to November 2010

Report produced November 2010

Report by Philip Sansum and Victoria Hume, Weald and Downs Ancient Woodland Survey, and Patrick McKernan, Natural England

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The Weald and Downs Ancient Woodland Survey for Lewes district hosted by:

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Front cover photograph: Ancient woodland near Lewes, East Sussex (photograph © Patrick McKernan, Natural England)