

A revision of the Ancient Woodland Inventory for Sevenoaks district, Kent

**Report and Inventory Maps
August 2012**



**Project carried out by the
Weald and Downs Ancient Woodland Survey**

A revision of the Ancient Woodland Inventory for Sevenoaks district, Kent

Project carried out by Philip Sansum for the
Weald and Downs Ancient Woodland Survey
August 2010 to August 2012

Report by Philip Sansum, with contributions
from Sally Westaway, formerly of the
Weald and Downs Ancient Woodland Survey, and
Patrick McKernan, Natural England

A partnership project funded by:
Sevenoaks District Council, High Weald AONB, Kent Downs AONB,
Forestry Commission and Natural England





Natural England foreword

Natural England works for people, places and nature, to enhance biodiversity, landscapes and wildlife in rural, urban, coastal and marine areas; promoting access, recreation and public wellbeing, and contributing to the way natural resources are managed so that they can be enjoyed now and in the future.

Natural England considers that ancient woodlands are irreplaceable, and should therefore be protected and managed so as to maintain and enhance their special character. Knowing where ancient woods are is therefore a key nature conservation need.

The Ancient Woodland Inventory was originally compiled by the Nature Conservancy Council (a predecessor to Natural England) between 1981 and 1992, with the Inventory for Kent being produced first in 1984. The Inventory was further updated in 1990 and 1994 and was digitized by the Forestry Commission in 2000 for use on Geographic Information Systems.

A new inventory revision began in Wealden District in East Sussex in 2004, consolidating the earlier work on the Ancient Woodland Inventory, and including woodlands below two hectares in size for the first time. This revision grew to become the Weald and Downs Ancient Woodland Survey which has now undertaken revisions to the Ancient Woodland Inventory in a number of districts of Kent and across West and East Sussex. Similar projects were established in The Chilterns AONB and surrounding districts and Hampshire.

This report outlines the work of the project in Sevenoaks district, taking in additional historical map evidence and site surveys to verify the status of sites. Natural England will add the information captured by this project to the national inventory.

Natural England welcomes the work of this survey and the increased protection and understanding of ancient woodland that it brings.

Emma Goldberg

Forestry and Woodland Specialist
Natural England

Foreword from Protected landscapes

Foreword from Local Authority

Contents

	Page
1. Summary	4
2. Introduction	4
2.1 Background	4
2.1.1 The Weald and Downs Ancient Woodland Survey	5
2.1.2 Sevenoaks Ancient Woodland Inventory revision	5
2.1.3 Project aims	6
2.1.4 Project funding	6
2.2. Ancient woodland definitions	6
2.2.1 Recent woodland	6
2.2.2 Ancient woodland	7
2.2.3 Ancient wood pasture	8
3. Methodology and Sources	10
3.1 Software	10
3.2 Inventory revision	10
3.2.1 Desk-based mapping – capture of the dataset	11
3.2.2 Refining the dataset using historical maps	13
3.2.3 Other evidence sources	22
3.2.4 Refining the dataset through field survey	23
3.2.5 Deciding on ancient semi-natural or replanted ancient woodland status	25
3.2.6 Minimum size of a wood to be included in the inventory revision	26
3.2.7 Ancient woodland status	26
4. Results	27
4.1 The ancient woodland resource	27
4.1.1 Extent of ancient woodland	27
4.1.2 Plantations on Ancient Woodland Sites	30
4.2 Results from the woodland survey	30
5. Outputs	31
6. Limitations of the survey	31
7. Acknowledgements	33

8. References and Bibliography 34

Figures

- Figure 1. Example of the Ordnance Survey First Edition County Series 25 inch to 1 mile map for Kent (c.1871). 13
- Figure 2. Example of a Tithe Map (surveyed 1844). 15
- Figure 3. Example of an Ordnance Survey Drawing (1799). 18
- Figure 4. Example of an early 18th century estate map. 21
- Figure 5. An illustration of how the revision process changes the area of ancient woodland in the inventory. 28
- Figure 6. Histogram of the size class distribution for parcels of woodland in the original and the revised AWIs. 29

Tables

- Table 1. Summary of the woodland area and number of separate woodland parcels from the National Inventory of Woodland and Trees (Forestry Commission, 2000), the original AWI (digitised version, 2003), and the revised AWI (2012) 29
- Table 2. Ancient woodland types 30

Appendix 36

Ancient woodland vascular plant ‘indicator species’
in the South East

Maps

37

- Map 1: Location of Sevenoaks district in the South East region showing Landscape Character Areas
- Map 2: Comparison of the Ancient Woodland Inventories for Sevenoaks district
- Map 3: The revised Ancient Woodland Inventory for Sevenoaks district – overview and index sheet
- Map 4: The revised Ancient Woodland Inventory for Sevenoaks district - North sheet
- Map 5: The revised Ancient Woodland Inventory for Sevenoaks district - Central sheet
- Map 6: The revised Ancient Woodland Inventory for Sevenoaks district - Southeast sheet

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 2010 to 2012) to revise the Ancient Woodland Inventory for Sevenoaks district. The Weald and Downs Ancient Woodland Survey has worked with Sevenoaks District Council, the Forestry Commission and Natural England to provide a robust evidence base upon which to assign ancient woodland status. The aim of the survey, based at the High Weald AONB Unit, 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 Sevenoaks district's ancient woodland resource has been re-examined. The area of ancient woodland since the original inventory was produced has risen from 3,628 ha to 3,948 ha, a gain of 320 ha as a result of this revision. This is a net gain, representing 961 ha of newly identified area which has been offset by the removal from the pre-existing ancient woodland inventory of 642 ha of mis-mapped, misattributed or lost woodland. Overall this represents a small increase of 0.86% in the district's area designated as ancient woodland bringing the total coverage to 10.66%. The number of parcels of ancient woodland in the revised inventory, by contrast, is more than triple that in the original inventory.

The revised Ancient Woodland Inventory will assist Sevenoaks District Council's planners 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 Sevenoaks'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 Kent was first produced in 1990 by the NCC ². The Inventory was originally only available on printed maps, until being digitally

¹ Spencer & Kirby (1992)

² Hutton (1990)

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 England), the successor to the NCC. For the purposes of this report, a comparison has been made between the revised inventory and the Forestry Commission's 2003 digitised version of the inventory. For Sevenoaks the data in this version is the nearest to the original paper inventory available to this survey in electronic format, and is referred to hereafter in the text and maps as the 'original AWI' or 'original inventory'.

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 well wooded (districts such as Sevenoaks) areas, for example the North Downs, 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 routinely includes small ancient woodland sites 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 Kent and Sussex. Key partners in the survey include the Forestry Commission, Natural England, the High Weald Area of Outstanding Natural Beauty (AONB) Unit, the Kent Downs AONB, Kent & Medway Biological Records Centre 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. The project in Sevenoaks is part of a wider initiative in the South-East of England which has completed revisions of the old inventories for Wealden district (2006), Mid Sussex district (2007), Tunbridge Wells borough (2007), Ashford borough (2009), West Sussex and Brighton and Hove Unitary Authority (2010), Rother district (2010), Hastings borough (2010), Tonbridge & Malling borough (2010), Lewes district (2010), Eastbourne district (2011), the county of Surrey (2011) and The Chilterns AONB and surrounding districts (2012).

2.1.2 Sevenoaks Ancient Woodland Inventory revision

Sevenoaks district is relatively well wooded. Of the 67 local authorities in the South East region, it has the twentieth greatest area of woodland, and the fifteenth greatest area of ancient woodland, with about 60% of its woodland area identified as ancient. These ancient woodlands represent a significant resource, covering just less than 10% of the district (based on the original AWI) the tenth greatest ancient woodland land cover percentage for a local authority in the region³.

Sevenoaks encompasses appreciable parts of the High Weald AONB and the Kent Downs AONB where fields and woodlands form an intimate mosaic. Sevenoaks's core area, lying in the Low Weald and Wealden Greensand character areas (see Map 1) is also very important for woodland. Many of the woodlands in all these areas are field shaws, belts of trees, or woodlands less than two hectares in size.

³ Based on analysis of the Forestry Commission's National Inventory of Woodland and Trees (2000), and the English Nature (2000) and Forestry Commission (2003) digitised versions of the Ancient Woodland Inventory.

The extent of woodland in the district, and the absence of small woodlands in the original Ancient Woodland Inventory were important factors in deciding to undertake this revision of the inventory.

2.1.3 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.

2.1.4 Project funding

The revision of the Ancient Woodland Inventory for Sevenoaks was jointly funded by Sevenoaks District Council, the Forestry Commission, Natural England, the High Weald AONB Unit and the Kent Downs AONB.

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 1970s⁴. 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 open land, or where trees have been allowed to grow naturally through regeneration, usually as the result of a cessation in land use management⁵. 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.

⁴ e.g. Peterken (1977), Rackham (1980)

⁵ Bannister (2007)

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 authorities⁶. 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 Peterken⁷, 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’⁸. Other dates could be argued for: 1650 was used by Peterken and Harding⁹ to distinguish post-medieval woods in Rockingham Forest, as a detailed map for that area was produced at that time, while Rackham uses 1700¹⁰. 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.

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*) [but see 3.2.5, below].

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 non-native

⁶ Kirby & Goldberg (2006)

⁷ Peterken (1977)

⁸ Evelyn (1664)

⁹ Peterken & Harding (1974)

¹⁰ Rackham (2003)

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 deer¹¹. 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 omitted¹². 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 forests¹³. 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 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 use¹⁴. This spatial complexity and 'historical dynamism' within the woodland vegetation is also paralleled in Kent in some old woodland sites on the North Downs¹⁵ and in the formerly extensive 'chart' woods overlying the Wealden Greensand formations (although many of those which survive have now been replanted to give a more densely uniform canopy).

Within the revision of the Ancient Woodland Inventory for local authority areas in Kent, 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).

¹¹ Harding & Rose (1986)

¹² Spencer & Kirby (1992)

¹³ Westaway (2005)

¹⁴ Greenaway, Roper, & Ryland (2004)

¹⁵ Bannister (2007); Tuson (2007)

- Woodland shown on the Ordnance Survey First Edition County Series maps (produced for Kent 1858-73), 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.

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 revision¹⁶ and developed in subsequent revisions to the inventory for Mid Sussex, Tunbridge Wells and Ashford¹⁷ combining digital map sources, field surveys and archive research.

The revision represents a complete and systematic rebuilding of the Ancient Woodland Inventory dataset for Sevenoaks. 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 Sevenoaks. 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 sample set of sites (with the local authority given the opportunity to identify areas of high priority). 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 surveys¹⁸.

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 9.3*¹⁹. The resulting GIS database can be linked to external databases which hold more detailed site survey and archive 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
2. Research on historical maps and documents – refinement of the dataset
3. Field survey work – refinement of the dataset

¹⁶ Westaway (2005)

¹⁷ Westaway, Grose & McKernan (2007a); Westaway, Grose & McKernan (2007b); Sansum et al (2009)

¹⁸ Spencer & Kirby (1992)

¹⁹ ESRI (2008)

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 of Kent (coverage flown in 2003 and 2008).
- Ordnance Survey First Edition County Series 25 inch to 1 mile map: Kent 1858-1873 (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 digitisation 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 study area, 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 were included if they appeared to be natural or semi-natural features and were small in relation to the extent of the surrounding woodland polygon. Man-made surfaces, where *MasterMap* identifies these or where they are clearly identifiable on aerial photographs, were excluded unless of very small proportional extent (e.g. the footprint of a small shed in the middle of a large wood). 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 appear in *MasterMap* and recent air 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, or part of a wood, on the highly accurate Epoch 1 maps was generally considered sufficient evidence to eliminate it from the search for ancient woodland (i.e. if a wood only appeared on later maps or aerial photographs and not on earlier historic maps it was generally excluded, see 3.2.2, below). 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 (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 were made.



Figure 1. Example of the Ordnance Survey First Edition County Series 25 inch to 1 mile map for Kent (c.1871) showing detail from part of the parish of Edenbridge in the High Weald AONB. Numerous woods and shaws (small woods and strips of woodland) occupy declivities within the complex 'ridge and gill' topography formed by past erosion of upfolded sandstone, siltstone and clay strata.

3.2.2 Refining the dataset using historical maps

The capture stage described above yielded an indicative ancient woodland dataset comprising approximately 730 *MasterMap* derived polygons corresponding with the approximately 3,600 ha of previously designated ancient woodland in the local authority area (equivalent to 402 polygons on the original inventory which was digitised with lower precision) and a further 1,900 polygons of potentially additional ancient woodland (wooded areas apparently in existence since at least the 1870s) amounting to approximately 1550 ha. 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 Kent 1858-73)**²⁰

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

²⁰ Dates sourced from the British Library website:
<http://www.bl.uk/reshelp/findhelpprestype/maps/oscountyeditions/oscountyeditions.html>

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 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 Sevenoaks 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 elsewhere woodland was exempted from tithe according to local custom²¹. The maps provide an invaluable record of the land-use and economy of mid 19th century England²² 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.

The maps relating to the parishes of modern Sevenoaks district (see Figure 2 for an example) were drawn up between 1831 and 1856 (occasionally, for example for Fawkham, there was an existing parish survey, sufficiently well surveyed, which could be adopted as the official tithe map after the 1836 Act). They are large scale (usually between 12” and 25” to 1 mile) and show each compartment of land within the parish together with a, usually numeric, code which is indexed and listed in a bound apportionment volume (a schedule to the map) detailing the owner and/or occupier, the name of each parcel of land, a description of its ‘state of cultivation’ and the associated rent charge calculation. The maps vary in quality and accuracy from parish to parish. The original intention of the commission was to produce all the maps to a uniformly high standard but the cost implications of this meant that there was much local variability in the results achieved and not all of the maps were ultimately given the commissioners’ seal. Those which did become known as ‘first class’ maps and the rest as ‘second class’²³.

²¹ Kain (1974)

²² Prince (1959)

²³ Kain (1974)



Figure 2. Example of a Tithe Map (surveyed 1844). The detail in this figure shows the same area of the parish of Edenbridge as Figure 1. Land parcels are inscribed with numbers, which relate to a book of apportionments listing the owner, extent, state of cultivation and tithe charges due. The schedule for this particular parish has been transcribed by the Kent Archaeological Society and can be accessed online (www.kentarchaeology.org.uk). The names of more significant woodland areas are also written in pen and ink on the map. © Kent Archives Service.

The Kent Tithe Maps have recently been made available as digital images by the Centre for Kentish Studies, Maidstone (now replaced by the Kent History & Library Centre, Maidstone) following an HLF funded project to photograph them. The modern Sevenoaks district is roughly coterminous with 27 parish territories as they were in the 1830s. Images for most of these parishes were obtained by the Weald and Downs Ancient Woodland Survey and georeferenced for GIS use especially for this project (unfortunately a substantial part of Chiddingstone and the whole of West Kingsdown were not covered by the georectification project). Of the relevant parish apportionment volumes 19 had been transcribed by the Kent Archaeological Society and published on the World Wide Web at the time of the project. The authors are grateful to the transcribers of these documents for their generosity in making the resulting information freely and publicly available. For woodland areas falling in parishes where a transcription of the tithe apportionment was available this was cross-referenced with the polygon and the georeferenced tithe map and historical details of the land parcel transferred to the working GIS dataset (except where occasionally polygons fell in areas where the parts of the map in question were illegible, missing or damaged or the corresponding number in the apportionment transcription was missing). Approximately 47% of the polygons (1250 polygons) in the indicative dataset were checked in this way. This information could help to verify ancient woodland status where it had been previously assigned and act as a second filter to the potential revisions to the inventory identified on the Epoch 1 maps at the capture stage.

For woodland areas in parishes where the project had developed a georeferenced tithe map but no transcribed apportionment volume was available the corresponding map inscription numbers (if legible) were still transcribed to a version of the GIS dataset. This means that the option remains to extend the evidence base for any polygon within the dataset in the future should further information be required. For example, the status of specific woods could be researched directly from the original tithe apportionment documents held at the Kent History & Library Centre or from further transcriptions of these if they become available in the future. Working with the tithe apportionments in their original manuscript form (or microfilm reproductions of them) in the archives is labour intensive. Resource constraints in the present project meant that it was not feasible to check every woodland polygon against this source and closure of the Centre for Kentish Studies during a major research phase of the project in 2011 and 2012 also militated against such a task.

Even where tithe apportionment data were unavailable the tithe maps were often a valuable source of topographic information. In many cases the presence of woodland is depicted on these maps with detailed tree symbols (as with Ordnance Survey maps) and in others there is a textual inscription on the map to indicate a named wood. In some parishes in Sevenoaks district, for example Chevening and Sevenoaks, woodland areas appear to be plotted on the tithe map with no apportionment number inscribed to link woods to a schedule of tithe charges, presumably because woodland was not included in the titheable acreage for landowners in these areas. It is, however, important to note that the absence of woodland cannot reliably be inferred from a tithe map without reference to the relevant schedule. Even within a single parish there can be inconsistency in the way a map has been 'finished' by the draughtsman responsible so that some woodland areas are shown blank, as if fields, whilst others are shown with detailed tree symbols. In 797 polygons in the indicative dataset (a further 30% of the total) where apportionment data were unavailable or only partially available (for instance where a wood straddled the boundary of two parishes one of which did not have an available apportionment transcription) the mid-19th century land-use could be discerned by visual reference to the map alone and this was also recorded in a working version of the GIS dataset in order to extend the evidence base for deciding on ancient woodland status for woodland polygons.

The Tithe maps possess similar advantages and disadvantages, in terms of the project aims, 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 Kent'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 at the end of the 19th century)²⁴. 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 woodland²⁵.

A significant number Sevenoaks' 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 instance where part of a wood was shown to have been a field or plantation in the 1830s. The work on the tithe maps and apportionments described above identified 160ha (270 polygons) which were recorded as some other land-use than woodland at the time of the

²⁴ Roberts (1998)

²⁵ *ibid.*

tithe survey – generally pasture, arable or meadow but also downland, commons, hop gardens and other uses. Much of this land was distributed among the small (< 2 ha) polygons not mapped in the original inventory; whilst this is a small proportion of the area of woodland mapped in the whole dataset it represents a significant gain in evidence for the ancient woodland inventory. A further 36 polygons (72ha) within the indicative ancient woodland dataset were identified which were classed wholly or partly as ‘Plantation’ in the Tithe survey. Usually the apportionments do not refer to the species in the plantation but chestnut, ash, oak and alder are each mentioned once in the sites identified and 'fir' (probably Scots Pine), four times.

Following corroboration by other sources many of these sites could be eliminated from the ancient woodland dataset. The Tithe Maps are a very valuable tool for refining the inventory.

- **Ordnance Survey Drawings, 2 to 6 inches to 1 mile (produced for Kent 1795-1801), prepared for the First Edition Ordnance Survey maps**²⁶

The Ordnance Survey Drawings and drafts (see Figure 3 for an example) are the manuscript maps upon which the first fully triangulated large scale published maps of southeast England were based, with Kent being the first county to be completed and published in 1801. This endeavour was a military response by the British government to the Napoleonic threat of invasion from across the English Channel and 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. Work on the map of Kent officially begun in 1795 with the final map being published in 1801²⁷ though the earliest preliminary sketches consulted in this study date from the 1780s.

The most detailed drawings were made at a scale of six inches to the mile in areas of strategic importance with smaller scales down to two inches to the mile elsewhere. The significant advantage of these maps over the better known printed version of 1801²⁸ is that the latter was reduced and standardised to a scale of one inch to the mile for publication with an attendant loss of information and simplification in the depiction of features, for instance, the straightening of sinuous 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 Sevenoaks. The images were examined along with the tithe and Epoch 1 data using GIS software. Most of the relevant information is contained on eleven overlapping sheets of various sizes. Some parts of the study area are 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 in size but with the poorest sheets coarse and distorted with little information on small woods.

Nevertheless, features of military significance – which included many woods – were generally mapped in detail.

²⁶ Dates sourced from the British Library website: <http://www.bl.uk/onlinegallery/onlineex/ordsurvdraw/>

²⁷ British Library website: <http://www.bl.uk/onlinegallery/onlineex/ordsurvdraw/curatorintro23261.html>

²⁸ The 1st Edition Ordnance Survey 1 inch to 1 mile, or ‘Mudge Map’ which, as the oldest accurate and relatively large scale county map widely available at the time for such research, the original Ancient Woodland Inventory drew heavily on.



Figure 3. Example of an Ordnance Survey Drawing (1799, pen and ink on paper, produced at 3 inches to 1 mile). This employs a more generalised set of symbols to indicate trees than the later Ordnance Survey maps (compare Fig. 1) but the map still contains a great deal of informative topographic detail. A number of the small linear woods and shaws in field corners characteristic of the High Weald landscape in this part of Kent are carefully depicted and the courses of gill streams as they pass through the two main areas of woodland are accurately plotted.

Absence of a wood from these maps cannot be taken as proof of woodland not existing at this time however. 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 research to support AWI revisions in this and other parts of Kent 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 and parcels of brushwood are sometimes omitted. Similarly, where steep ground is occupied by woodland or scrub, the surveyors have sometimes 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'²⁹ 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 over were simply overlooked by the surveyors or that they mistook recent woodland harvesting for conversion to agriculture³⁰ (an error which sometimes occurs in modern map making). Large woods managed

²⁹ British Library website:

<http://www.bl.uk/onlinegallery/onlineex/ordsurvdraw/t/002osd00000016u00330000.html>

³⁰ Hodson and Campbell (1989)

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 but where woodland is recorded they 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 of other sources. Following the approach of the original inventory³¹, which utilised the smaller scale printed version of this source (below), a presumption in favour of retaining those woods shown on these maps (as provisionally ancient woodland sites) has been made.

An attempt was made to cross reference every polygon in the indicative ancient woodland dataset with the Ordnance Survey Drawings. Approximately 66% of polygons were shown in some form as woodland on this source and 28% were ostensibly not depicted with tree cover³². For about 5% of polygons the status of the corresponding land cover on the OSD was either unclear or impossible to interpret due to damage, wear or distortion of distances and angles in the manuscript map relative to modern maps. For a small number of polygons (<1% of the total) map coverage was lacking.

- **Ordnance Survey First Edition, 1 inch to 1 mile 1801 and later revisions**³³

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. 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. It is to be noted that the 1801 printed version depicts a number of woods which are not shown on earlier drawings (although the total number of woods shown on the drafts is greater). This is presumably because the drawings were originally accompanied by notes and annotations which were also taken into account when the final maps were produced. Occasionally such instructions to the engravers can be seen on the drawings. In one instance the textual annotation, 'wood', is appended to a parcel of land where no tree symbols have been inserted. This kind of detail can be faint and easily overlooked on photographs of two hundred year old manuscript maps (or destroyed altogether by the passage of time).

³¹ Hutton (1990)

³² The evidence of other sources would often corroborate this but for 18% of these sites this was not so - either a recent origin could not be demonstrated from other evidence or an older origin positively could be demonstrated from either earlier or contemporary map evidence or field evidence. These sites were therefore retained in the provisional Ancient Woodland Inventory.

³³ Mudge [1801] (1990); Hull (1988)

- **Hasted's maps of the Hundreds of Kent**

Hundreds are sub-divisions of counties introduced in the 10th century primarily for taxation purposes but also having administrative, judicial and military functions. By the time of Domesday Book Kent had more than sixty hundreds³⁴. The name probably arose from the nominal size of the unit, containing 100 *sulungs* (or hides as they were known elsewhere in England). In the late eighteenth and early nineteenth centuries the great topographer and antiquarian of Kent, Edward Hasted, had maps of the Kent Hundreds produced, for his twelve volume 'The History and Topographical Survey of the County of Kent'³⁵.

These are derived from the county map of Andrews, Dury and Herbert (below) and re-engraved by William Barlow. Hasted and his collaborators did try to correct errors in the maps³⁶ but they did not have the resources to perform any serious revision of topographical surveying. Differences between these maps and the original are not significant in the study area and this source suffers from the same disadvantages as that map (discussed in more detail below) as a tool for detailed research on historical woodland distribution. It has been used in the same way – as supplementary evidence cautiously interpreted rather than as a core historical source.

- **A topographical map of the county of Kent in twenty five sheets on a scale of 2 inch to a mile John Andrews, Andrew, Dury and William Herbert 1769³⁷**

This is a county map produced under the patronage of the Kent gentry prior to the state-run military efforts of the following decades³⁸. It has the advantage of being earlier in date than the above sources and so takes the evidence base available for the whole study area back into the 18th century. Whilst containing interesting information it is overshadowed by the vastly superior quality of the Ordnance Survey Drawings (above). Its focus is on the locations of settlements, the seats of gentlemen and the routes of communication between them. The overall effect is schematic and distances and angles are often distorted. It does depict woodland but the relatively large scale for a county map of this period (two inches to one mile) belies a lack of spatial precision in the surveying of topography with 'much of the detail sketched in rather than surveyed'³⁹. The map is of little practical assistance in defining and refining the boundaries of small ancient woods but it can provide a useful indication of the general presence or absence of woodland within the area of a site under review. This can be valuable where other evidence is sparse. The smallest woods which the map seems to portray are about two hectares in size, the upper limit for many of the revisions to the inventory being undertaken in this project. However, many larger woods are omitted. In areas where there was a high concentration of small woods in a pastoral landscape the map may either show a schematic 'generally wooded' area or not show any woods at all.

The candidate polygons were not systematically checked against this source, but it was sometimes used as a supplement to the evidence base particularly where other map sources were ambiguous as to the status of a site.

³⁴ Jessup (1974)

³⁵ Hasted [1797] (1972)

³⁶ Burgoyne Black (2001); Boyle 1981

³⁷ Andrews, Dury & Herbert (1769)

³⁸ Hull (1973)

³⁹ Hull (1988)

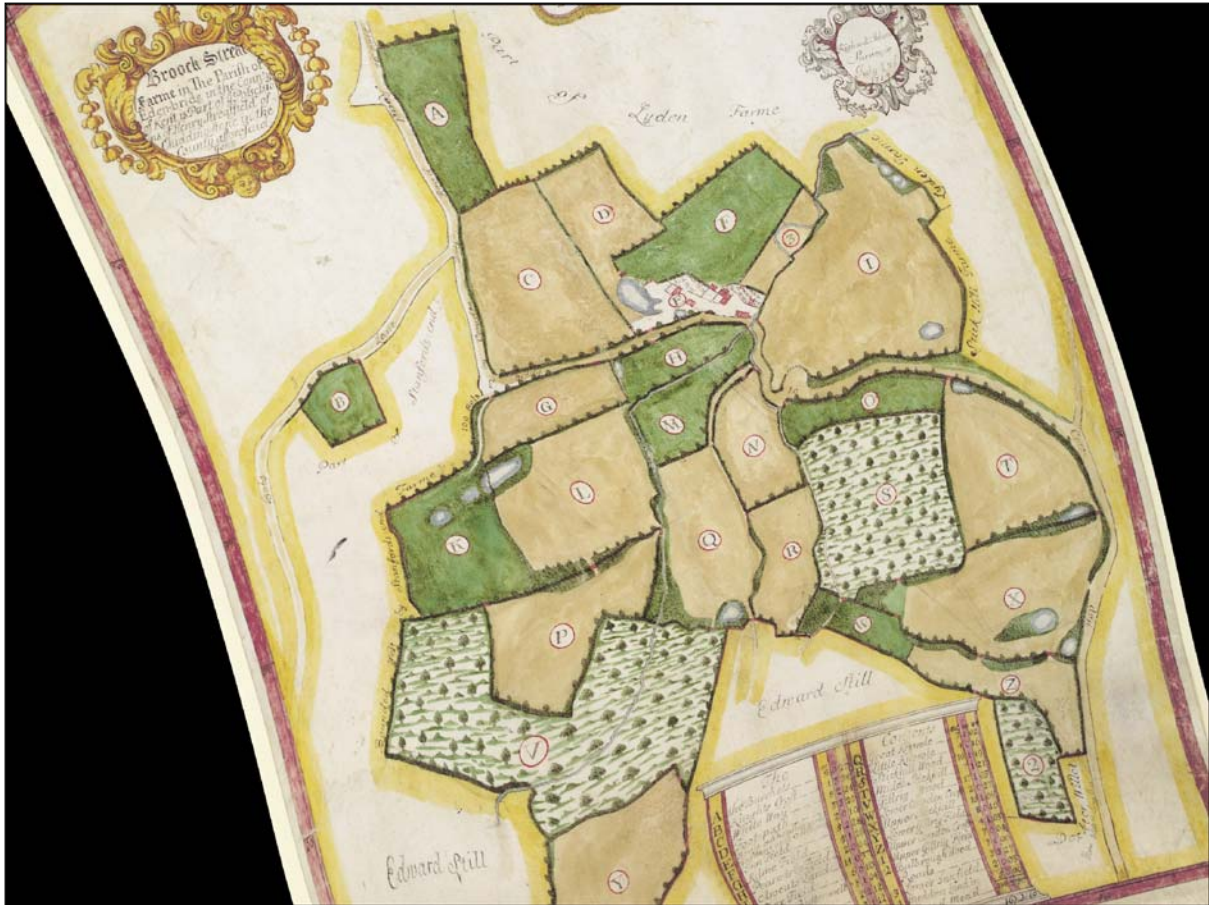


Figure 4. Example of an early 18th century estate map: detail from 'Brook Street Farm, part of the possessions of Henry Streatfeild of Chiddingstone, gent. surveyor Richard Adams, July 20th 1714'. The detail shown here is positioned so as to compare with the Figures 1-3 above. The arable field labelled 'P' is recognisable on the later maps but by the 1870s (Fig. 1) this is fully wooded. © Kent Archives Service. ref: U908 P22.

- **Estate maps**

There was an efflorescence in the production of detailed estate maps in Kent which began in the reign of Elizabeth I⁴⁰. 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 map-making 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. Mediaeval 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 standardised⁴¹.

Kent and the district of Sevenoaks are blessed with a wealth of high quality estate maps belonging to the period of interest (before c.1800 when accurate and standardised county wide maps begin to appear – see above). These are of great value in determining the status of individual woods and the project has aimed to exploit this rich evidence source to refine the inventory where possible (see Figure 4). Generally the material consulted was held at the Centre for Kentish

⁴⁰ Hull (1973)

⁴¹ *ibid.*

Studies at Maidstone (now replaced by the Kent History & Library Centre, Maidstone). Pertaining, as they do, to a dispersed array of landholdings, some as small as five or fewer acres, across the borough they do not give a complete coverage and their study is time consuming and not always fruitful. 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.

In view of the limited time resources of the current project, research on estate maps was prioritised so that maps which it was thought might inform decision making on the potentially additional polygons in the indicative ancient woodland dataset (woods not already designated ancient by the, already considerable, researches of the original Ancient Woodland Inventory) were sought out in preference. The approach to this large body of information was to systematically comb the catalogues of estate maps⁴² (and later supplements) produced by Kent Archives for references to the historical parishes within the area of study. This search concentrated on maps dating from the period 1590-1840, given the fairly good information already available on the mid to late 19th century landscape described above. Occasionally, where the site under review was complicated or the material difficult to interpret, printed copies were made from digital versions of the estate maps at the Centre for Kentish Studies. These were then scanned and geo-referenced for GIS use.

Decisions on the status about 25% (636) of the total number of polygons in the indicative ancient woodland dataset could be supported or were directly informed by reference to estate maps (about 120 separate estate maps were consulted). Reference to these estate maps is also of considerable indirect value in helping to develop an understanding of the historic landscape which informs the interpretation of status for analogous sites in the dataset in locations where no estate map gives coverage directly.

It should be noted that there are likely to be significant other historical documentary resources of relevance to the inventory of Sevenoaks's 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

⁴² Kent Archives Office (1973)

term. They can however, with caution, be used as a guide to help reconstruct the landscape⁴³. 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 hill⁴⁴. 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 planted woodland particularly where the site is associated with a large house and/or on cultivable land. However, a degree of caution must be exercised because names change over time and ‘The Plantation’ might well occupy the site of a pre-existing wood⁴⁵.

- **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 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. The topographical position of a site (and sometimes also the underlying geology) in conjunction with the cartographical sources detailed above can provide clues useful for helping to determine its likely antiquity as woodland habitat.

3.2.4 Refining the dataset through field survey

On completion of the capture stage (3.2.1) and in tandem with historical research (3.2.2) a priority set of woodlands was identified for ground survey. These sites were selected in consultation with Sevenoaks District Council and included woods situated in areas of potential growth and development or where other activities potentially impinged on woodland. Survey site selection was further informed by the emerging historical evidence for woodland status and sites were prioritised where this evidence was weak or ambiguous.

The field surveys were carried out in the spring and summer of 2011 and 2012 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 work⁴⁶ 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.

⁴³ Brandon (2003)

⁴⁴ *ibid.*, and Rackham (2003)

⁴⁵ Isaac & Reid (1997)

⁴⁶ Kirby (1988)

- 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:

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 fence⁴⁷.

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 composition⁴⁸. 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 sites⁴⁹. The South East list used in this revision is appended.

⁴⁷ Rackham (2003)

⁴⁸ Hornby & Rose (1986), Rose (1999) and Rackham (2006)

⁴⁹ Kirby & Goldberg (2006)

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

The Forestry Commission's National Inventory of Woodland and Trees (NIWT)⁵⁰ 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 for some sites using interpretation of aerial photography, the existing AWI PAWS/ASNW 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. The extensive areas of sweet chestnut (*Castanea sativa*) coppice in Kent make this crop, as a broadleaved non-native species occurring in large stands present a particular issue. The approach to sweet chestnut taken in the survey is described below.

Sweet chestnut

Sweet chestnut (*Castanea sativa*) is a non-native species, widely planted in woods in Kent, Sussex, and Surrey. As such, the significant presence of sweet chestnut in an ancient woodland should lead to its definition as PAWS. However, Hutton, considering this issue in the 1990 report on the provisional Ancient Woodland Inventory for Kent, provided the following comments:⁵¹

It is thought that sweet chestnut was introduced to Britain in Roman times (Rackham, 1980). Evidence that it persisted through the Dark Ages comes from the Anglo-Saxon's knowledge of the tree and from the nature and distribution of mediaeval records. By the 13th century many records specifically mention chestnut in woods which were well away from habitation. Records from the Forest of Dean and from Sittingbourne state that it was accompanied by oak and beech with which it can still be found in the same stand today, e.g. in Ellenden Wood near Canterbury. This association of chestnut with what were then the typical trees of very acid soils shows that it did not depend totally on where growers had put it.

On the basis of this historical 'naturalisation' of sweet chestnut in the woods of the county, and of the present character of known ancient woods in which sweet chestnut comprises a major component of the woodland community, some sweet chestnut coppices have been included in the semi-natural category of the inventory.

Many formerly mixed coppice stands have been interplanted with sweet chestnut, and the stumps of existing native trees and shrubs treated and killed. This type of management results in a dense monoculture of sweet chestnut coppice which, in many cases, has the effect of suppressing the semi-natural flora. Where the later planting of sweet chestnut in ancient woods is known to have resulted in a marked suppression of the semi-natural underwood and ground flora, such woods have been recorded as replanted.

Even in these apparently uniform plantations, however, many sweet chestnut coppices continue to provide very important habitats for nightingales, nightjars and tree pipits, as well as certain rare lepidoptera, such as the heath fritillary in the Blean Woods. In addition, many of the species of semi-natural woodland, although often drastically reduced, may still persist in these highly modified sweet chestnut plantations. Although replanted, these woods are often of considerable

⁵⁰ Smith (2000)

⁵¹ Hutton (1990)

wildlife value and retain features characteristic of their ancient origin. At a county and regional level, they represent a significant and extensive wildlife resource.

The information so far gathered in this inventory is insufficient to identify all sweet chestnut coppices where the semi-natural vegetation has been suppressed and the extent of ancient woodland in the county which should be recorded as replanted may, consequently, have been considerably underestimated.

Hutton's comments in the last paragraph above remain true for this survey. Sweet chestnut was only identified in the woods included in the field survey, and these only represented a small proportion of all the ancient woodlands in Sevenoaks district. Within the surveyed woods, a judgement was made on whether the presence of sweet chestnut meant that the wood should be considered as ancient replanted.

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 coppice⁵². However, the NIWT is likely to include sweet chestnut predominantly in the coppice or broadleaved categories, so this analysis will not help identify sweet chestnut plantations as ancient replanted areas.

For ancient woodlands less than two hectares, a judgement on ASNW or ancient replanted status was based on an interpretation of aerial photographs, information given in the attribute table of Ordnance Survey *MasterMap* and any other data available. As above, Ancient Semi-Natural Woodland was used as the default classification where it was not possible to determine the woodland type. This methodology also did not enable specific identification of sweet chestnut plantations. As a result of these factors, the area of ancient replanted woodland in this revision of the Ancient Woodland Inventory is likely to be an underestimate, as it is was in the original inventory report in 1990.

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.

⁵² Smith (2000)

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 Sevenoaks 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. In the interim a version of the digital data will be made available to Sevenoaks District Council for reference internally on its GIS. 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.

4.1 The ancient woodland resource

The total amount of all woodland (ancient and recent) within Sevenoaks district greater than two hectares, as recorded in the Forestry Commission's National Inventory of Woodland and Trees (2000), is 5,352 ha (Table 1). This amounts to 14.45% of the district's area, substantially more than the England average of 8.4%⁵³.

4.1.1 Extent of ancient woodland

The area of ancient woodland mapped has risen from 3,628 ha in the original inventory to 3,948 ha, a gain of 320 ha, as a result of this revision (see Table 1). This is a net gain, representing 962 ha of newly identified area which has been offset by the removal of 642 ha of land included in the original inventory. In the revised inventory 10.66% of the district's area is mapped as ancient woodland, a moderate increase of 0.86% on the original inventory. The number of parcels⁵⁴ of ancient woodland in the ancient woodland inventory (1007), by contrast, has trebled (Table 1).

The 642 ha loss from the original inventory was due to a combination of inaccuracies and imprecision in the initial mapping process, conversion of ancient woodland to other land-uses since the original inventory was compiled and misattribution of some woods or parts of woods in the original inventory.

These areas were removed following re-alignment of boundaries with OS *MasterMap* and Epoch 1 maps (c.1870), using recent aerial photographs as a reference, and re-examination of the historic map evidence. Figure 5 gives an illustration of the process using a single polygon from previous work in East Sussex (which employed the same methodology as the present project) as an example. Here, comparing the original inventory with the revised boundary, the revision of the inventory has resulted in a small loss of ancient woodland area. There are a number of components to the revision of a boundary of an existing ancient woodland polygon. These

⁵³ Smith (2000). The most recent data available at the time of writing for a comparison of the local authority and national level woodland coverage. The current National Forest Inventory is due to be completed in 2014; provisional statistics indicate that 9.9 % of the total land area in England is now woodland.

⁵⁴ A 'parcel' is here defined as a single contiguous area of woodland as mapped regardless of any internal boundaries (for example between broadleaved and coniferous stands within a wood). Note that this differs from the term 'polygon' used elsewhere in this report to refer to any mapped area of woodland used in the development of the AWI - a polygon may be either spatially isolated or form part of a contiguous area of woodland with one or more other polygons. For the purposes of calculating and reporting the figures in Table 1 and Figure 6, where woodland areas straddle the local authority boundary a false woodland boundary has been created so that the picture only reflects woodland within the local authority. This means that the true parcel size for some woods may be substantially larger; the number of parcels in very small size classes may be inflated and the number in the larger size classes deflated relative to the landscape on the ground. However, this approach allows a direct comparison at local authority level of the original and revised inventories and gives a fair picture of the differences between them.

involve both the removal and addition of small ‘slivers’ of land where the old paper-based plotting is at variance with OS *MasterMap* digital data as well as the correction of obvious digitisation errors (such as the inclusion of a field in the Figure 5 example). The large scale maps used in the current project also allow the better representation of intricacies in the ancient woodland boundary which could not be accurately plotted in the past. Because of the way the original inventory boundaries were traced from smaller scale maps and later manually digitised in order to ‘capture’ rather than precisely plot the woodland boundaries, previously designated woods typically undergo a slight shrinking of area during the digital revision process with hundreds. When it is extrapolated up to district-scale this effect can amount to a significant area of woodland.

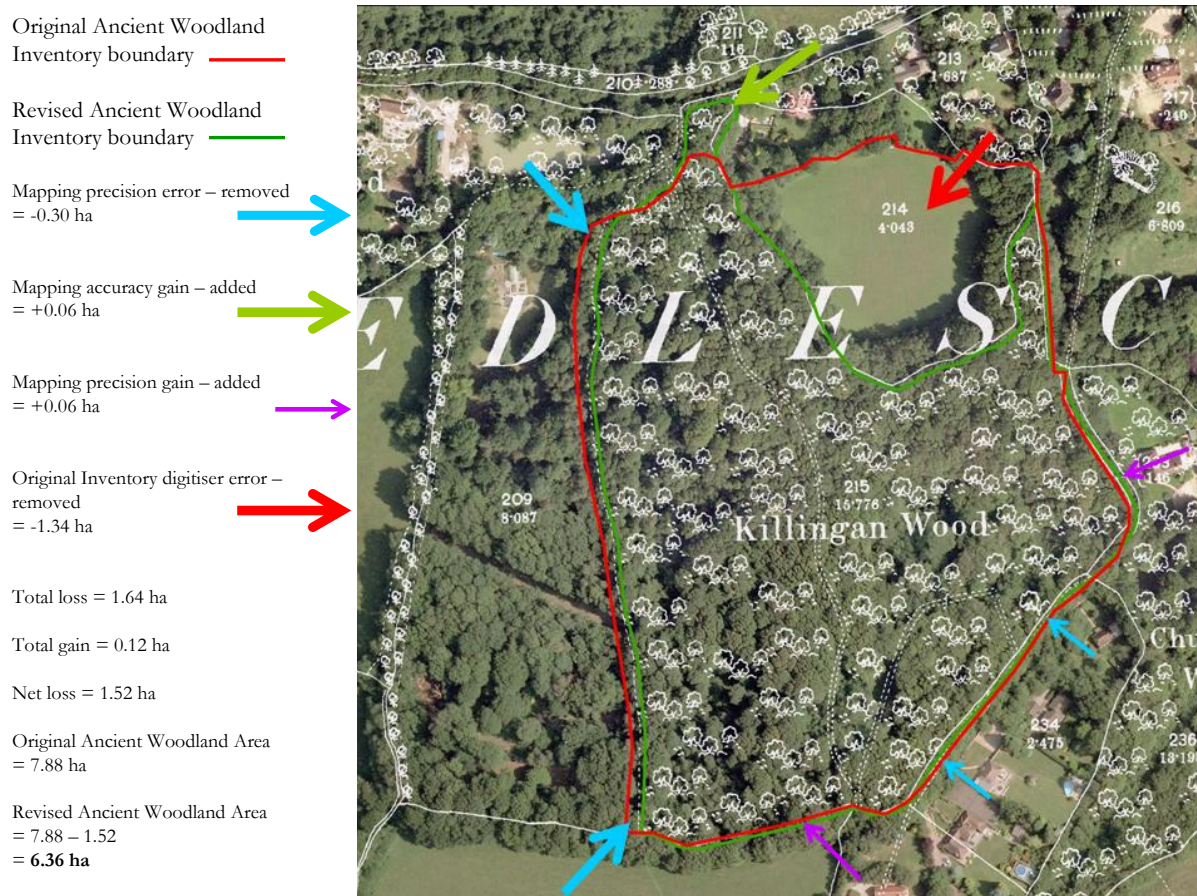


Figure 5. An illustration of how the revision process changes the area of ancient woodland in the inventory: This wood was included on the original inventory but the use of GIS, large scale maps and digital map data from the Ordnance Survey allowed its boundary to be drawn more precisely and accurately. The process also identifies and corrects errors made in the earlier manual digitisation of the original inventory. Here a recent aerial photograph is shown with the Ordnance Survey First Edition County Series 25 inch to 1 mile map (1869-75) superimposed. (The site, Killingan Wood in Sedlescombe, is an example from earlier work in East Sussex illustrating the methodology as used in the present project in Kent)

The revised ancient woodland area includes 676 more woodland parcels than the original inventory and 962 ha of woodland not included on the original inventory. The average size of woodland parcel in the revised inventory is 3.92 ha. As would be expected, the majority of the additions to the inventory fall into the sub 2 ha size classes (Figure 6). The number of woods in the 2–5 ha size class has also increased significantly. Some of these are genuinely ‘new’ sites but many have been formed by the breaking up of larger woods into smaller units with the more precise mapping of neighbouring but non-contiguous woodland parcels that use of *MasterMap* has brought to the inventory (see 3.2.1).

	Area	% of the district	Number of woodland parcels	Average area of woodland parcel
Sevenoaks district	37,033			
All woodlands (NIWT) >2 ha	5,352	14.45	437	12.25
Original AWI (woods >2ha)	3,628	9.80	331	10.96
Revised AWI (including woods <2ha)	3,948	10.66	1007	3.92
Overall ancient woodland gain – compared to Original AWI (2003)	320	0.86	676	

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 (digitised version, 2003), and the revised AWI (2012). All areas in ha.

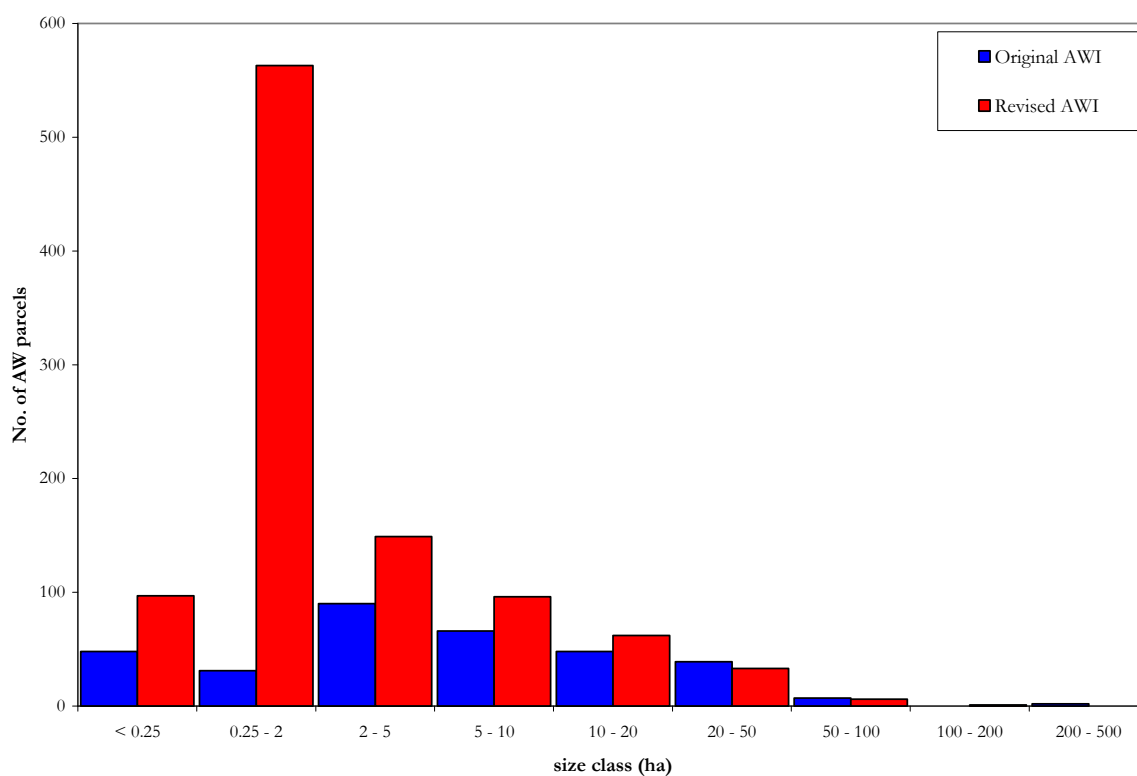


Figure 6. Histogram of the size class distribution for parcels of woodland in the original and the revised AWIs.

4.1.2 Plantations on Ancient Woodland Sites

In the revised inventory, 72% of the ancient woodland area is recorded as ancient semi-natural, with an area of 2,853 ha (Table 2). However, as discussed in section 3.2.5, the area of replanted ancient woodland, or PAWS, may be an underestimate, given the difficulties in identifying areas of sweet chestnut plantation from map and aerial photograph analysis.

Table 2: Ancient woodland types (areas in hectares).

Ancient woodland type	Area (hectares)	% of ancient woodland area
Revised AWI – ASNW	2,853	72
Revised AWI – PAWS	1,095	28
Total:	3,948	100

4.2 Results from the woodland survey

A proportion of Sevenoaks district's woodlands were surveyed for this project. This was primarily for the purpose of refining the inventory by confirming the ancient status of some sites and eliminating others which proved to be of recent secondary origin. The surveys also allowed the collection of a small dataset giving information on the current character and condition of woods in the district.

The sites surveyed comprised 188 polygons amounting to approximately 353 ha of woodland. Approximately 58% of this area (or 50% of the number of polygons) was accepted as provisional ancient woodland on the basis of the field survey data interpreted alongside the other historical information available. The average size of these woods was 2.2 ha. The remainder of the surveyed area was judged to be of recent secondary origin or else too degraded to be defined as ancient woodland and thus excluded from the inventory.

In addition to the formal survey, a further 103 polygons, amounting to 81 ha of woodland, were seen or visited during the course of the project. Whilst not possible to survey these for reasons of time and/or access some observation or rapid assessment was made which could aid in the decision making process. These were dispersed across the district with a mean size of 0.8 ha. 52 (64%) of these polygons (amounting to 35% of their combined area) were eliminated from the inventory after consideration of the improved information provided by a rapid visual inspection.

The survey methodology sought to establish a vascular plant species list for each site, along with a record of other features that helped decide on the status of a site. These included Site damage, Woodland management and habitat features, and Archaeological and boundary features. The data generated by this survey work are being incorporated into a wider digital dataset containing records from other parallel projects in Kent and Sussex based at the High Weald AONB Unit. The data will also be lodged with the appropriate county biological records centres and Natural England and other project partners will retain scanned copies of the original field surveys.

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 Sevenoaks 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 Independent Panel on Forestry (established in March 2011 by the Secretary of State for Environment, Food and Rural Affairs to advise government on the future direction of forestry and woodland policy in England) has recently published its final report⁵⁵. The Panel reaffirmed the irreplaceable nature of ancient woodland and the importance of protecting, managing and restoring ancient woodland sites. Its report recommends that the strong commitment to ancient woodland pledged in the 2005 'Keepers of Time' policy statement (DEFRA and the Forestry Commission 2005) is now reconfirmed by government and that planning policy and practice should *reflect the value of ancient woodlands... and other priority habitats in Local Plans, and refuse planning permission for developments that would have an adverse impact on them.*

In view of this, the identification of the additional ancient woodland areas detailed in this report and maps should afford this habitat in Sevenoaks district a higher degree of protection. The revised inventory will enable planning decisions relating to wooded areas in the district to be made in the light of an improved evidence base.

The revised inventory provides a more complete picture of the location of the district'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 Sevenoaks project built on the methods trialled in earlier surveys, including Wealden, Tunbridge Wells, Rother and Ashford⁵⁶. 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:

⁵⁵ Independent Panel on Forestry (2012)

⁵⁶ Westaway (2005); Westaway, Grose & McKernan (2007b); Sansum et al (2009)

- 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.
- 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.

The inclusion of small woods, less than 2ha in size, in this revision has meant that the number of potential sites under consideration relative to the original inventory has increased exponentially. The limitations of historic map evidence are sometimes amplified for small woods whose locations can be difficult to pinpoint with accuracy on old maps (for example, where there is distortion or inaccuracy in the original surveying - see 3.2.2). Whilst improved digital mapping technology allows these small sites to be captured with precision, the consequent increase in volume of sites has not been met by an attendant increase in the resources available for field survey work (which is relatively inefficient when working with a high volume of small sites as opposed to equivalent areas in larger woods). Small woods are more prone to 'edge effects' than large ones, having a higher ratio of perimeter to interior habitat. The experience of the survey work undertaken across the Weald and Downs Ancient Woodland Survey projects since 2004 has been that very small sites can sometimes harbour a surprising wealth of ancient woodland features. Yet in other situations even small sites which are clearly derived from formerly more extensive ancient woods can appear to retain little recognisable ancient woodland habitat. Numerous factors, including aspect, soil conditions and the type and intensiveness of neighbouring land-use (past and present), affect the ability of a small site to persist in supporting ancient woodland features. However, these can be difficult to assess from remote evidence sources.

Decisions on small sites with particularly high perimeter to interior ratios and with little supporting evidence were made on a case by case basis by judging the likelihood of the site having retained ancient woodland interest. The smallest size of woodland parcel generally assessed was 0.25 ha (see 3.2.6) and while the overall approach was one of inclusiveness (see 3. Methodology and Sources) many very small sites, those in the smallest size bracket (0.25 to 0.5 ha), could not justifiably be included in the inventory where evidence was lacking because they were judged to be highly unlikely to support viable ancient woodland habitat. Typically these exclusions were sites where the appearance was of a wooded area lacking a significant 'body' or

interior and where map evidence for long-term continuity of enclosed woodland was weak (considerable numbers of small linear woods, a feature of many Kent landscapes, were still included in the revised inventory on the basis of supporting map or field evidence). The provisional character of the inventory in respect of the sites it includes has been referred to above (3.2.7) but there also always remains the possibility that some of the excluded sites could retain small vestiges of AW habitat and users of the inventory should be aware of this. Furthermore, exclusion of an area of woodland from the ancient woodland inventory should not be taken to indicate that it is lacking in wildlife or landscape value.

7. Acknowledgements

The project would like to thank everyone who supported this survey and assisted in the research: The High Weald AONB Unit, particularly Sally Marsh, Simon Aguss, Kerry Baldwin, Samantha Nicholas; Les Jones of Sevenoaks District Council; Deanne Cunningham of Maidstone Borough Council; John Lambourne of Canterbury City Council; for ongoing technical support Matthew Grose formerly of the Weald & Downs Ancient Woodland Survey; Victoria Benstead-Hume and Robert Davies of the Surrey Ancient Woodland Survey and the Chilterns Ancient Woodland Survey; Kate Ryland of Dolphin Ecological Services; Dr Nicola Bannister, Landscape Archaeologist shared knowledge of Kentish woods from her own survey work; staff of the former Centre for Kentish Studies; all those landowners and managers who allowed access to their woods or provided assistance in access for survey work.

Photograph credits:

Front and back cover photographs by Patrick McKernan, Natural England.

Report authors and contributors:

Philip Sansum, Ancient Woodland Survey Officer, Weald and Downs Ancient Woodland Survey, based at the High Weald AONB Unit.

Patrick McKernan, Thames Basin Heaths Senior Adviser, Natural England.

Victoria Benstead-Hume, Ancient Woodland Survey Officer, Thames Valley Environmental Records Centre.

Sally Westaway, formerly the Ancient Woodland Survey Officer for the Weald Ancient Woodland Survey.

Matthew Grose, formerly the GIS, Access, and Habitats Mapping Officer, High Weald AONB Unit.

8. References and Bibliography

- Bannister, N. R. (2007) *The Cultural Heritage of Woodlands in the South East*. SE AONBs Woodlands Programme, High Weald AONB, Flimwell.
- Brandon, P. (2003) *The Kent and Sussex Weald*. Phillimore, Chichester.
- DEFRA and the Forestry Commission (2005) *Keepers of time: A statement of policy for England's ancient and native woodland*. DEFRA and the Forestry Commission, England.
- Ellis, J. (2004) *Seeing the wood for the trees: a forestry and woodlands framework for South East England*. Forestry and Woodlands Framework Steering Group, Alice Holt, Farnham.
- English Nature (2002) *Position statement: Environmentally sustainable forestry and woodland management*. English Nature, Peterborough.
- ESRI (2008). *ArcMap 9.3*. ESRI Corporation, Redlands, California.
- Evelyn, J. (1664) *Sylva, or a discourse on forest trees and the propagation of timber in his majesties dominions*. Modern edition published by Boydell & Brewer, Woodbridge, Suffolk.
- Greenaway, T., Roper, P. & Ryland, K. (2004) *Wooded heaths in the High Weald*. Sussex Biodiversity Record Centre Survey Unit, Woods Mill, West Sussex.
- Harding, P. T. & Rose, F. (1986) *Pasture-Woodlands in lowland Britain*. Institute for Terrestrial Ecology, Huntingdon.
- Hodson, Y. & Campbell, A. (1989) *Ordnance Surveyors' Drawings, 1789 - c.1840: the original manuscript maps of the first Ordnance Survey of England and Wales from the British Library Map Library; introduction, summary listing, and indexes*. Research Publications, Reading.
- Hornby, R. J. & Rose, F. (1986) *The use of vascular plants in evaluation of ancient woodlands for nature conservation in southern England*. Internal report. Nature Conservancy Council.
- Hull, F. (1973) *Kentish Maps and Map-makers 1590-1840*. Kent County Council, Maidstone.
- Hutton, D. (1990). *A Provisional Inventory of Kent's Ancient Woodlands: Revised 1990*. Nature Conservancy Council, Peterborough.
- Independent Panel on Forestry (2012). *Final Report*. DEFRA. Available: <http://www.defra.gov.uk/forestrypanel/files/Independent-Panel-on-Forestry-Final-Report1.pdf> [Accessed July 2012]
- Isaac, D. & Reid, C. M. (1997) *Inventory of ancient woodland (provisional) in Surrey*. English Nature, Peterborough.
- Jessup, F. W. (1974) *A History of Kent*. Phillimore, Chichester.
- JNCC (2007) *Recorder 6*. Joint Nature Conservancy Committee, Peterborough.
- Kirby, K. J. (1988). *A woodland survey handbook*. Report No 11. NCC, Peterborough.

- Kirby, K. & Goldberg, E. (2006) Ancient woodland: guidance material for local authorities. English Nature, Peterborough.
- Peterken, G. F., & Harding, P. T. (1974) Recent changes in the conservation value of woodlands in Rockingham Forest. *Forestry*, 47, 109-128.
- Peterken, G. F. (1977) Habitat conservation priorities in British and European woodlands. *Biological Conservation*, 11, 223-236.
- Rackham, O. (1980) *Ancient Woodland: Its history, vegetation and uses in England*. Edward Arnold, London.
- Rackham, O. (2003) *Ancient Woodland: Its history, vegetation and uses in England*. New Edition. Castlepoint Press.
- Rackham, O. (2006) *Woodlands*. New Naturalist Library. Collins, London.
- Rose, F. (1999) Indicators of Ancient Woodland – the use of vascular plants in evaluating ancient woodland for nature conservation. *British Wildlife*, 10(4), 241-251.
- Sansum, P., McKernan, P., Westaway, S., and Grose, M. (2009) A revision of the Ancient Woodland Inventory for Ashford Borough, Kent. Weald and Downs Ancient Woodland Survey, High Weald AONB Unit, Flimwell.
- Smith, S. (2000) The National Inventory of Woodland and Trees – England. Forestry Commission, Edinburgh.
- Spencer, J. & Kirby, K. (1992) An inventory of ancient woodland for England and Wales. *Biological Conservation*, 62, 77-93.
- Westaway, S. (2005) Weald Ancient Woodland Survey: A revision of the Ancient Woodland Inventory for Wealden District.
- Westaway, S., Grose, M., & McKernan, P. (2007a) A revision of the Ancient Woodland Inventory for Mid Sussex District, West Sussex. High Weald AONB Unit, Flimwell, East Sussex.
- Westaway, S., Grose, M., & McKernan, P. (2007b) A revision of the Ancient Woodland Inventory for Tunbridge Wells Borough, Kent. High Weald AONB Unit, Flimwell, East Sussex.

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

The 100 species which in NCC’s South East Region are associated with ancient woodland and are typical components of botanically rich ancient woodland communities ⁵⁷.

Trees and Shrubs

Field Maple *
Hornbeam *
Midland Hawthorn
Spurge-laurel
Alder Buckthorn
Holly
Crab Apple *
Aspen
Wild Cherry
Sessile Oak
Black Currant *
Red Currant
Field-rose
Butcher's-broom
Wild Service-tree
Small-leaved Lime *
Wych Elm
Bilberry
Guelder-rose

Forbs

Moschatel
Ramsons
Chaffweed
Wood Anemone
Columbine *
Nettle-leaved Bellflower
Large Bitter-cress
Opposite-leaved Golden-saxifrage
Pignut
Lily-of-the-valley *
Small Teasel
Broad-leaved Helleborine
Violet Helleborine
Wood Spurge
Woodruff
Green Hellebore
Bluebell
Tutsan
Slender St John's-wort
Stinking Iris
Yellow Archangel
Toothwort
Bitter-vetch
Narrow-leaved Everlasting-pea
Yellow Pimpernel
Common Cow-wheat
Three-nerved Sandwort
Wild Daffodil
Bird's-nest Orchid
Early-purple Orchid
Lady Orchid

Acer campestre
Carpinus betulus
Crataegus laevigata
Daphne laureola
Frangula alnus
Ilex aquifolium
Malus sylvestris
Populus tremula
Prunus avium
Quercus petraea
Ribes nigrum
Ribes rubrum
Rosa arvensis
Ruscus aculeatus
Sorbus torminalis
Tilia cordata
Ulmus glabra
Vaccinium myrtillus
Viburnum opulus

Adoxa moschatellina
Allium ursinum
Anagallis minima
Anemone nemorosa
Aquilegia vulgaris
Campanula trachelium
Cardamine amara
Chrysosplenium oppositifolium
Conopodium majus
Convallaria majalis
Dipsacus pilosus
Epipactis helleborine
Epipactis purpurata
Euphorbia amygdaloides
Galium odoratum
Helleborus viridis
Hyacinthoides non-scripta
Hypericum androsaemum
Hypericum pulchrum
Iris foetidissima
Lamium galeobdolon
Lathraea squamaria
Lathyrus linifolius
Lathyrus sylvestris
Lysimachia nemorum
Melampyrum pratense
Moehringia trinervia
Narcissus pseudonarcissus *
Neottia nidus-avis
Orchis mascula
Orchis purpurea

Wood-sorrel
Herb-paris
Greater Burnet-saxifrage
Greater Butterfly-orchid
Solomon's-seal *
Barren Strawberry
Primrose *
Allseed
Goldilocks Buttercup
Sanicle
Lesser Skullcap
Orpine
Saw-wort
Goldenrod
Betony
Black Bryony
Wood Speedwell
Bush Vetch
Wood Vetch
Marsh Violet
Early Dog-violet
Ivy-leaved Bellflower

Grasses, Sedges and Rushes

Hairy-brome
Wood small-reed
Smooth-stalked Sedge
Pale Sedge
Pendulous Sedge *
Remote Sedge
Thin-spiked Wood-sedge
Wood-sedge
Bearded Couch
Giant Fescue
Creeping Soft-grass
Southern Wood-rush
Hairy Wood-rush
Great Wood-rush
Wood Melick
Wood Millet
Wood Meadow-grass
Wood Club-rush

Ferns & allies

Hard-fern
Hay-scented Buckler-fern
Scaly Male-fern
Narrow Buckler-fern
Wood Horsetail
Lemon-scented Fern
Hart's-tongue
Polypody
Hard Shield-fern
Soft Shield-fern

Oxalis acetosella
Paris quadrifolia
Pimpinella major
Platanthera chlorantha
Polygonatum multiflorum
Potentilla sterilis
Primula vulgaris
Radiola linoides
Ranunculus auricomus
Sanicula europaea
Scutellaria minor
Sedum telephium
Serratula tinctoria
Solidago virgaurea
Stachys officinalis
Tamus communis
Veronica montana
Vicia sepium
Vicia sylvatica
Viola palustris
Viola reichenbachiana
Wahlenbergia hederacea

Bromopsis ramosa
Calamagrostis epigejos
Carex laevigata
Carex pallescens
Carex pendula
Carex remota
Carex strigosa
Carex sylvatica
Elymus caninus
Festuca gigantea
Holcus mollis
Luzula forsteri
Luzula pilosa
Luzula sylvatica
Melica uniflora
Milium effusum
Poa nemoralis
Scirpus sylvaticus

Blechnum spicant
Dryopteris aemula
Dryopteris affinis
Dryopteris carthusiana
Equisetum sylvaticum
Oreopteris limbosperma
Phyllitis scolopendrium
Polypodium vulgare
Polystichum aculeatum
Polystichum setiferum

⁵⁷ NCC's South East region comprised Kent, Surrey, Sussex, London and Hertfordshire. See Hornby & Rose (1986). * Species marked with an asterisk also occur sometimes in woods as planted specimens or as garden escapes - only where these species occur well within a wood and do not appear to have been planted do they provide valid support for ancient woodland vegetation.

Maps

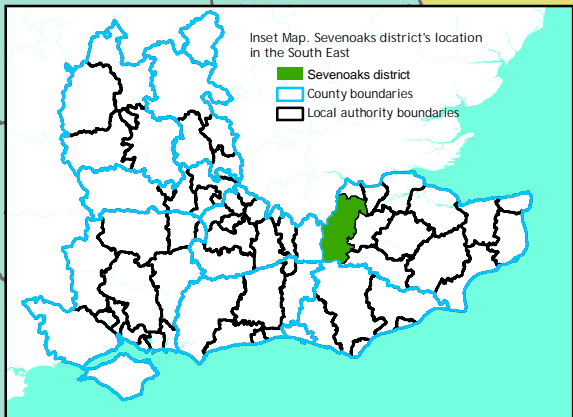
- Map 1: Location of Sevenoaks district in the South East region showing Landscape Character Areas
- Map 2: Comparison of the Ancient Woodland Inventories for Sevenoaks district
- Map 3: The revised Ancient Woodland Inventory for Sevenoaks district – overview and index sheet
- Map 4: The revised Ancient Woodland Inventory for Sevenoaks district - North sheet
- Map 5: The revised Ancient Woodland Inventory for Sevenoaks district - Central sheet
- Map 6: The revised Ancient Woodland Inventory for Sevenoaks district - South sheet

540000

550000

560000

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



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. Kent County Council - 100019238 (2012)

170000

170000

160000

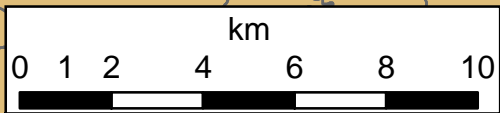
160000

150000

150000

140000

140000



Legend

- Sevenoaks district
- Parish boundaries
- Revised ancient woodland areas
- Landscape Character Areas**
- High Weald
- Low Weald
- Wealden Greensand
- North Downs
- North Kent Plain

540000

550000

560000

540000

550000

560000

Map 2. Comparison of the Ancient Woodland Inventories for Sevenoaks district

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. Kent County Council - 100019238 (2012)

170000

160000

150000

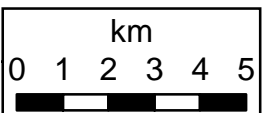
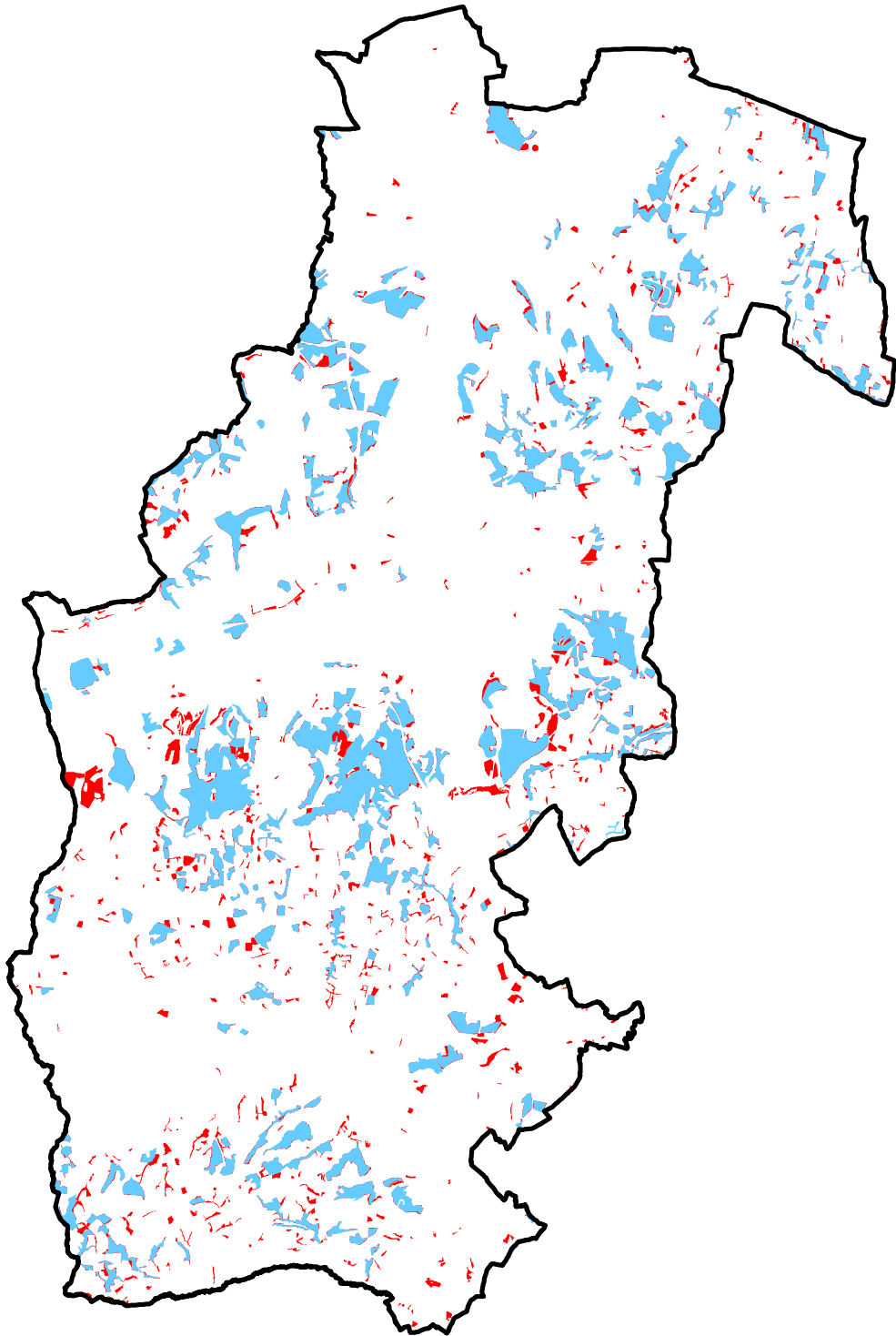
140000

170000


160000

150000

140000



Legend

-  Sevenoaks district
-  Original digital version of the Ancient Woodland Inventory (Forestry Commission, 2003)
-  Revised Ancient Woodland Inventory, 2012

540000

550000

560000

540000

550000

560000

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

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. Kent County Council - 100019238 (2012)

170000

170000

160000

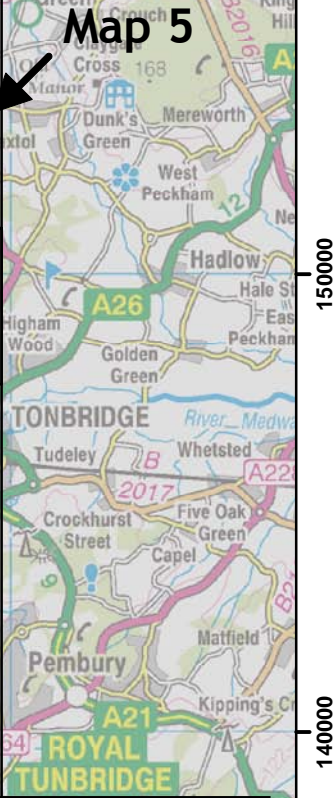
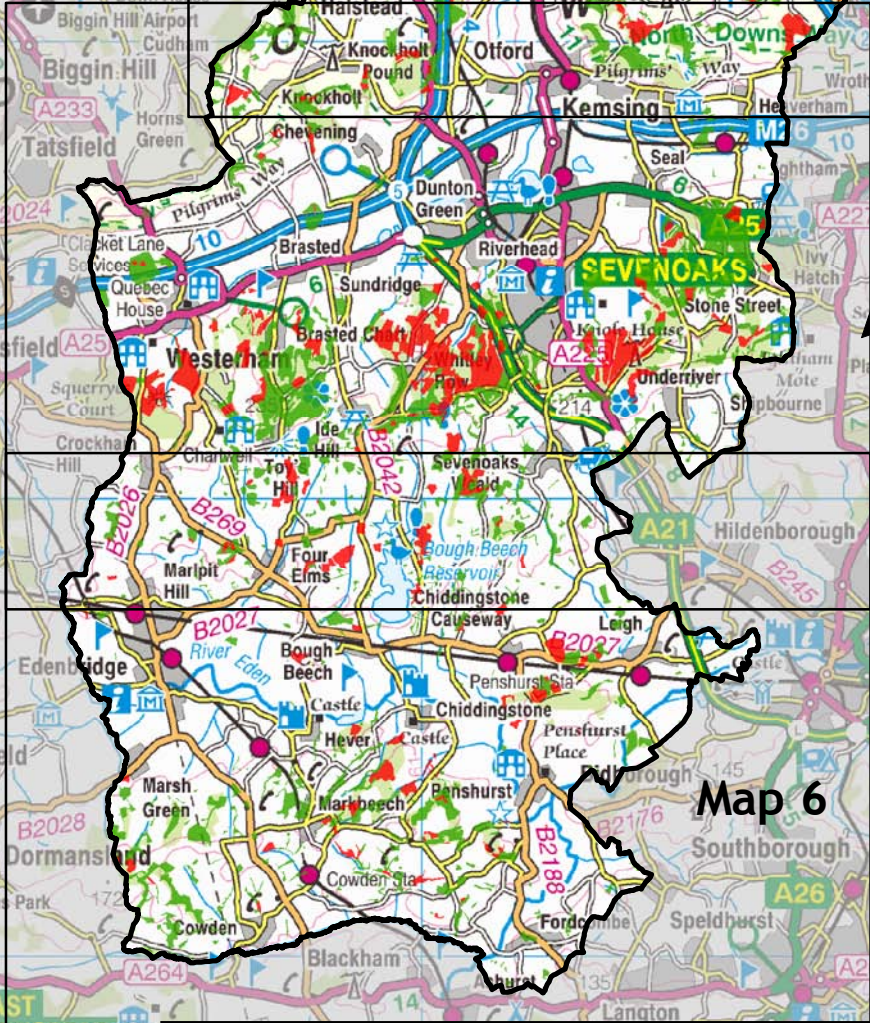
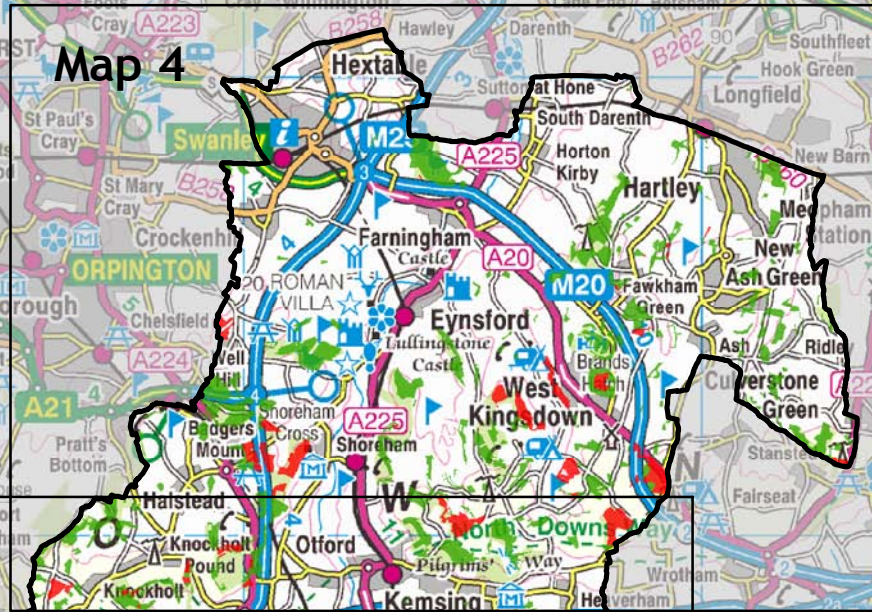
160000

150000




150000

140000

140000



Legend

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



km

0 1 2 3 4 5

540000

550000

560000

550000

560000

Map 4. The revised Ancient Woodland Inventory for Sevenoaks district - North sheet

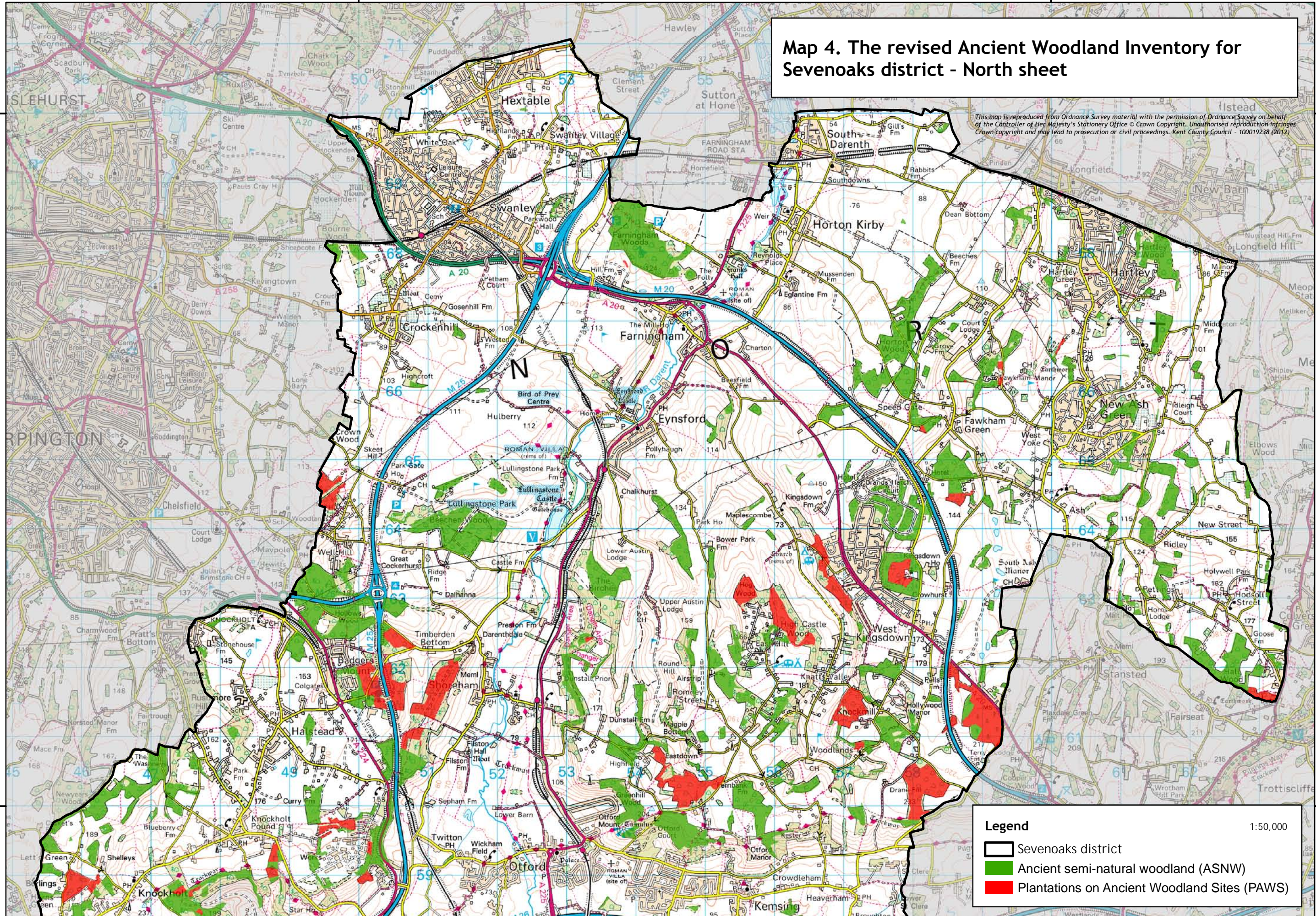
This map is reproduced from Ordnance Survey material with the permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office © Crown Copyright. Unauthorised reproduction infringes Crown copyright and may lead to prosecution or civil proceedings. Kent County Council - 100019238 (2012)

170000

170000

160000

160000



Legend 1:50,000

- Sevenoaks district
- Ancient semi-natural woodland (ASNW)
- Plantations on Ancient Woodland Sites (PAWS)

550000

560000

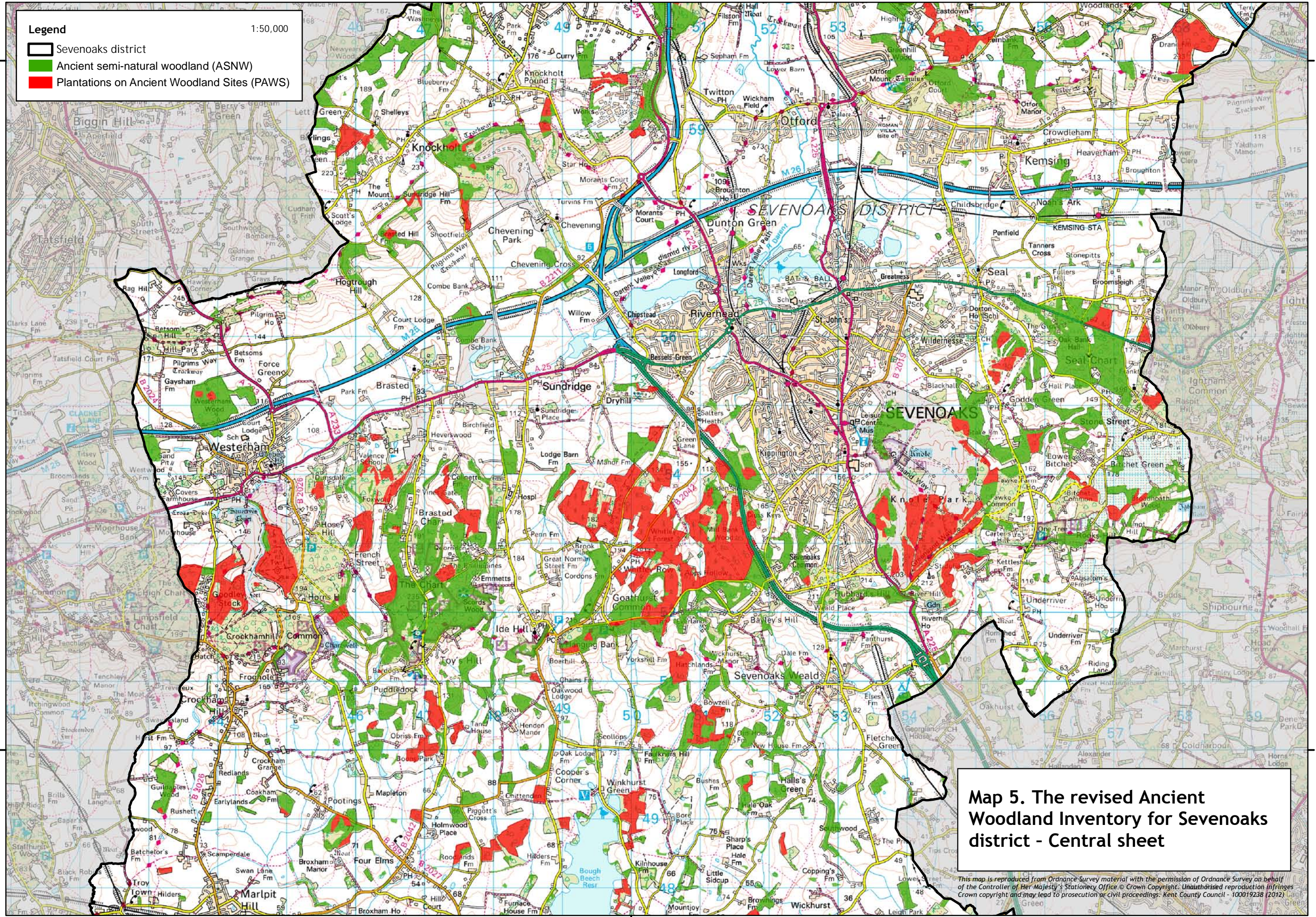
550000

160000

160000

Legend 1:50,000

- Sevenoaks district
- Ancient semi-natural woodland (ASNW)
- Plantations on Ancient Woodland Sites (PAWS)



150000

150000

550000

Map 5. The revised Ancient Woodland Inventory for Sevenoaks district - Central sheet

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. Kent County Council - 100019238 (2012)

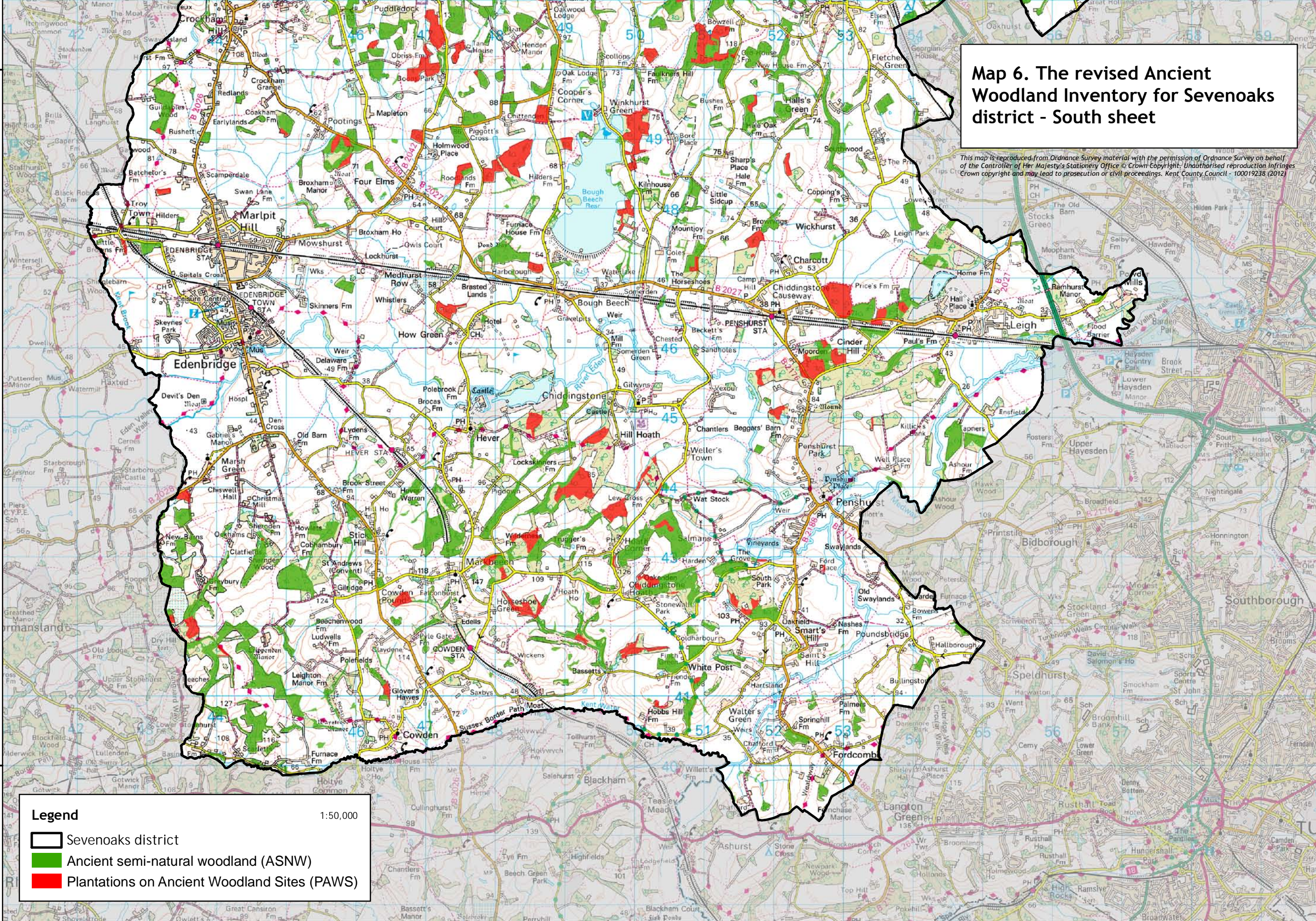
550000

150000

150000




Map 6. The revised Ancient Woodland Inventory for Sevenoaks district - South sheet

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. Kent County Council - 100019238 (2012)



Legend

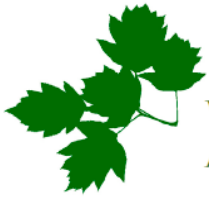
1:50,000

-  Sevenoaks district
-  Ancient semi-natural woodland (ASNW)
-  Plantations on Ancient Woodland Sites (PAWS)

550000

140000

140000



WEALD AND DOWNS
ANCIENT WOODLAND SURVEY

Project carried out by the
Weald and Downs Ancient Woodland Survey
August 2010 to August 2012

With additional field surveys by Kate Ryland,
Dolphin Ecological Services

Report published August 2012

Report by:
Philip Sansum, Weald and Downs Ancient Woodland Survey,
Patrick McKernan, Natural England,
Sally Westaway, formerly of the High Weald AONB Unit,
and Matthew Grose, High Weald AONB Unit

Contact: patrick.mckernan@naturalengland.org.uk

The Weald and Downs
Ancient Woodland Survey
High Weald AONB Unit
Woodland Enterprise Centre
Hastings Road
Flimwell
East Sussex
TN5 7PR
Tel: 01580 879500
www.highweald.org

Front cover: Truggers Gill and part of Chiddingstone

