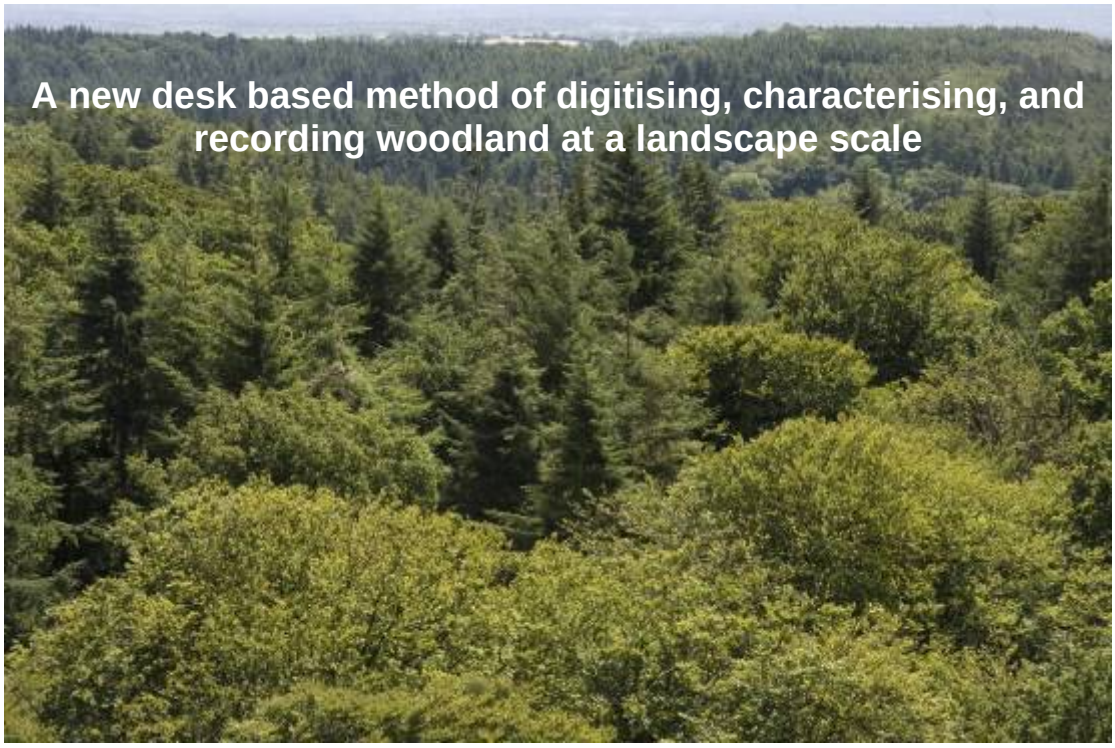
Cranborne Chase and
West Wiltshire Downs
Area of Outstanding Natural Beauty



A new desk based method of digitising, characterising, and recording woodland at a landscape scale

Version 1.0

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1. Summary

This document outlines the main characteristics of the Cranborne Chase and West Wiltshire Downs AONB digital Woodland Dataset. The primary product from which was a new Geographical Information System (GIS) dataset. This dataset was created by using existing information on the AONB in a new way.

This document is aimed at any organisation, especially protected landscapes, who may wish to undertake a similar desk-based woodland project. It therefore focuses on the methodology used to create the dataset, and analyses the new dataset against other available woodland datasets. It finally discusses some of the uses to which the dataset can be put.

An example of how this new dataset has already been put to practical use can be found in the AONB Woodland Advice Booklet, (available from the AONB Office). This was aimed at land managers and was based around the AONB Landscape Character Types identified in the AONB Integrated Landscape Character Assessment (Land Use Consultants: 2003).

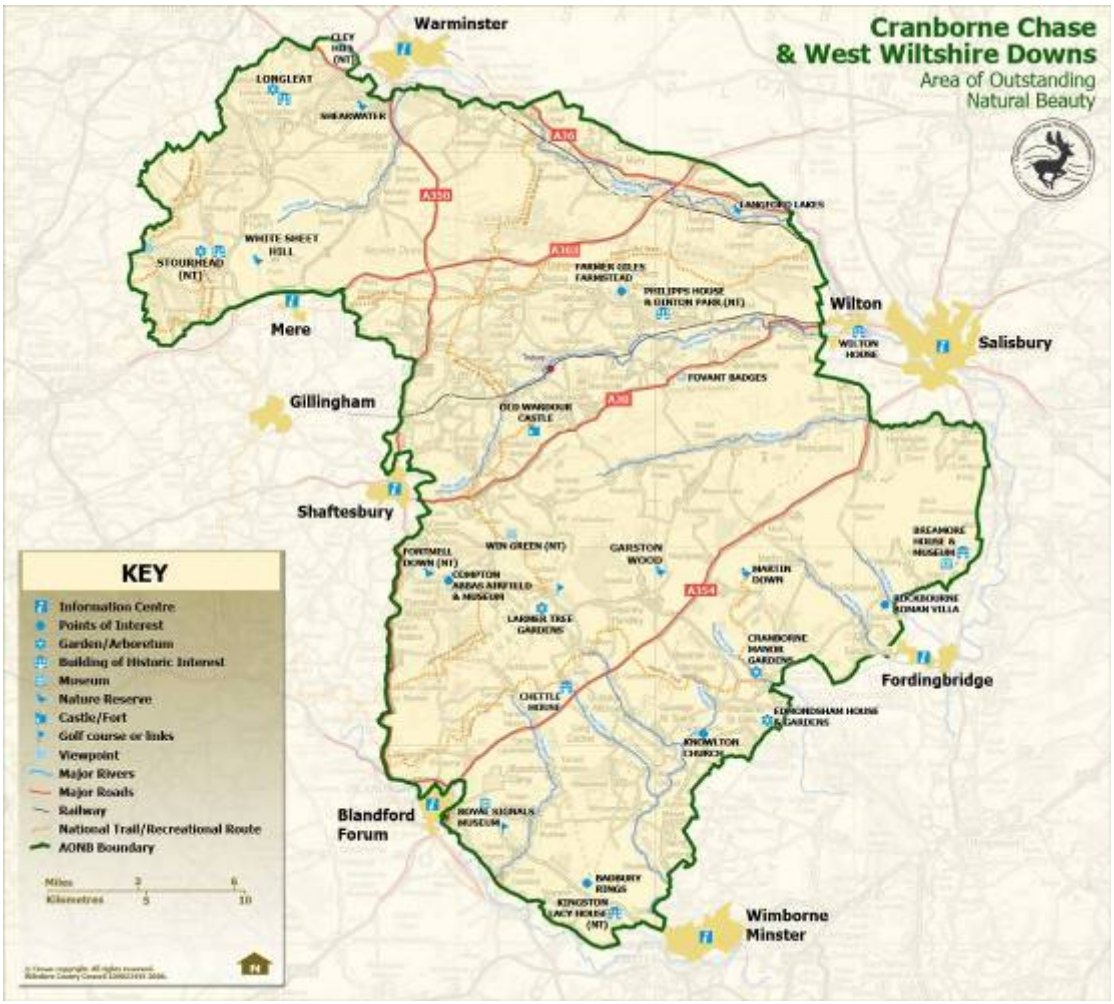
2. Introducing the Cranborne Chase and West Wiltshire Downs AONB

The Cranborne Chase and West Wiltshire Downs Area of Outstanding Natural Beauty is a protected landscape which has been established under the 1949 National Parks and Access to the Countryside Act to conserve and enhance the outstanding natural beauty of this area which straddles four counties and seven district councils. It is clear from the Act, subsequent government sponsored reports, and the Countryside and Rights of Way Act 2000 that natural beauty includes wildlife, scientific, and cultural heritage. It is also recognised that in relation to their landscape characteristics and quality, National Parks and Areas of Outstanding Natural Beauty are equally important aspects of the nation's heritage and environmental capital. The primary purpose of the AONB is to conserve and enhance natural beauty.

The AONB covers the administration areas of eleven Local Authorities: four county councils – Wiltshire, Dorset, Hampshire, Somerset; and seven district councils – Salisbury, West Wiltshire, East Dorset, North Dorset, New Forest, Mendip and South Somerset. West Wiltshire District Council, Salisbury District Council and Wiltshire County Council are due to merge into one new authority called Wiltshire Council in May 2009.

The AONB is located in a deeply rural area of south west England (Figure 1) with scattered villages and narrow roads. It covers 981 square kilometers (379 square miles). There are no large settlements in the AONB but nearby country towns such as Salisbury, Shaftesbury and Warminster are growth areas The AONB comprises all or part of 104 parishes and has a resident population of approximately 30,000.

Figure 1: Location of the AONB which covers 981 square kilometres (379 square miles).



The AONB is a partnership consisting of eleven local authorities and ten other major organisations[1]. The Countryside and Rights of Way Act 2000 placed a statutory duty on Local Authorities to prepare and publish an AONB management plan and to review it at five yearly intervals. This partnership's AONB Team is tasked to facilitate the achievement of management plan objectives. The new AONB Management Plan 2009-2014 (to be adopted April 2009) highlights the great ecological importance of the AONB. It's internationally and nationally protected sites range from ancient downland, chalk rivers and meadows to scattered deciduous woodland, which include remnants of the ancient Cranborne Chase royal hunting area and the former Royal Forests of Selwood and Gillingham. Woodland is a key attribute of the AONB which contributed to its designation.

It is of fundamental importance, therefore, that the AONB has a comprehensive and complete picture of the nature and character of the woodland within its borders.

[1] The other organisations who make up membership of the partnership are Natural England, Campaign Protection Rural England, South West Tourism, Forestry Commission, Environment Agency, National Farmers Union, Country Land & Business Association, Association of Town and Parish Councils (Dorset) and the Association of Town and Parish Councils (Wiltshire).

3. Previous Woodland studies in the AONB

Before the creation of the new Woodland dataset, if the AONB wished to map the character of its woodlands at a landscape scale, it relied primarily on two GIS datasets: -

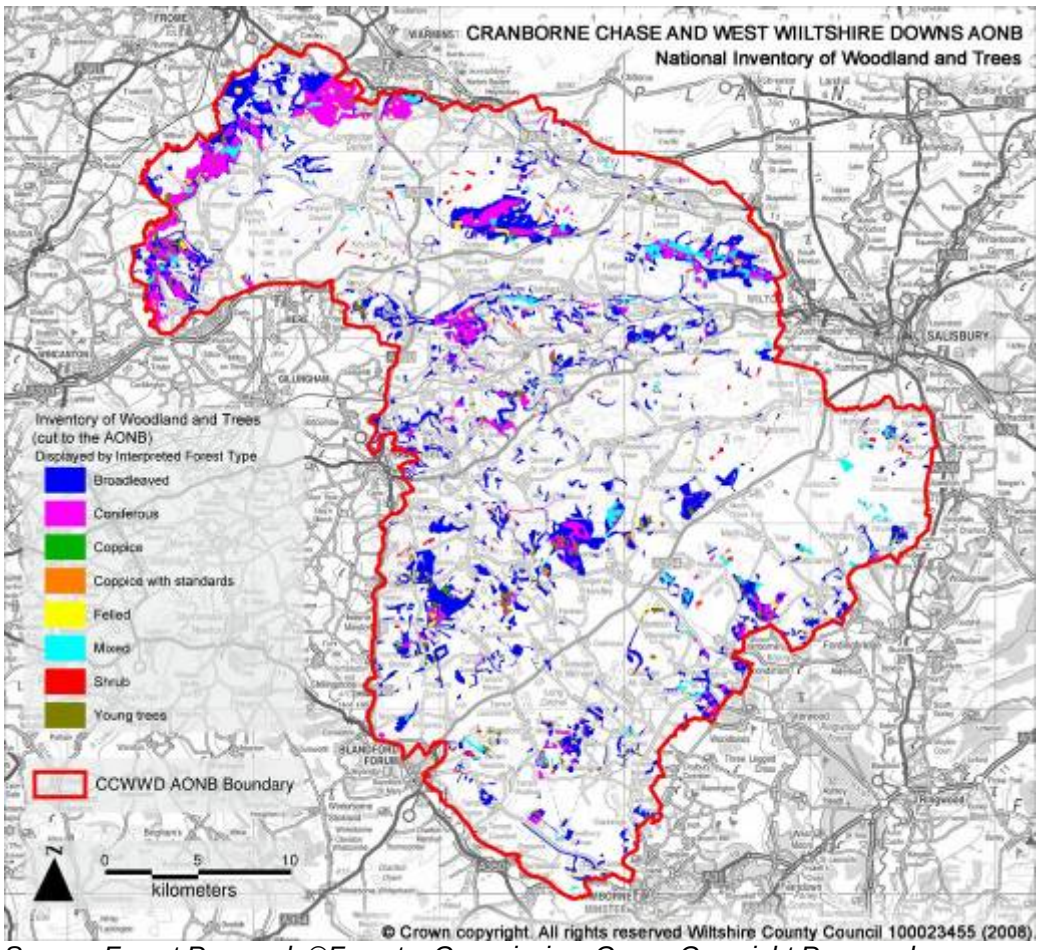
- National Inventory of Woodland and Trees available from woodland.surveys@forestry.gsi.gov.uk
- Ancient Woodland Inventory available from http://www.english-nature.org.uk/pubs/gis/gis_register.asp

Other datasets which could be used, in relation with these, included Forestry Commission datasets of Woodland Grant Schemes and Forest Enterprise Woodland.

3.1 National Inventory of Woodland and Trees

The Forestry Commission has been carrying out national woodland surveys since 1924. The latest National Inventory of Woodlands and Trees was completed in July 2000. The Inventory consists of two separate surveys. Firstly the Main Woodland Survey covering woodlands of 2 hectares and over. Secondly the Survey of Small Woodland and Trees covering small woods, groups of trees, linear features and individual trees (Forestry Commission: 2003).

Figure 2: National Inventory of Woodland and Trees cut to the boundary of the AONB



Source: Forest Research ©Forestry Commission. Crown Copyright Reserved

The GIS digital dataset which was provided by the Forestry Commission to the AONB for this survey is comprised of Interpreted Forest Type Woodland Polygons greater than 2 hectares (5 acres) in extent. Woodland is defined as consisting of areas of trees cover with a crown density of, or likely to achieve, at least 20%, a minimum width of 50 metres and a minimum area of 2 hectares. The dataset is made more complex by the fact that the Forestry Commission has split larger woodland into smaller woodland blocks. These internal polygons were identified with a minimum area of 1 ha (2.5 acres). The identification of woodland in this dataset was based on the following: -

- Interpretation of 1:25000 aerial photography (flown 1991-2000) and plotted against 1:25000 Ordnance Survey mapping for the Forestry Commission
- Woodland Grant Scheme data (1992-1999 digitised from paper maps, 1995-2001 WGS Digital data)
- Forestry Commission New Planting (1992-1999 digitised from paper maps, 1995-2001 digital data)
- Additional Aerial Photography Interpretation update for part North England (flown 1999-2000) – not relevant for this AONB
- Miscellaneous adjustments to original aerial photography interpretation as detected by survey foresters.

For each woodland polygon that was digitised within the Geographic Information System (GIS) the following information was recorded:

- Featcode – Interpreted Forest Type code (e.g. 76) and a text based description of called the Interpreted Forest types (e.g. Broadleaved, Coniferous). For example Coniferous Trees were defined as follows

  Coniferous woodland often occurs as large plantations with trees in regular rows and the stand edge may be regular and sharply defined. Some broadleaved trees may also be present but greater than 80% of the area will consist of conifers.
- Ref_date – Reference Date
- Tile_name – 100k tile reference
- Hectares – area of polygon in hectares
- Up_type – Update source for polygons updated after 1995

The Forestry Commission dataset therefore provides a picture of the distribution of woodland that is over 2 hectares across the country and characterises it by type (e.g. whether it is primarily broadleaved, coniferous, mixed coppice etc.). As shown in Figure 2 (pg. 5). This dataset is then analysed in a series of reports nationally and individually by county. The scale of the mapping used means that inaccuracies with the position of woodland and their boundaries becomes increasingly marked as you look at the individual position and context of woodlands.

3.2 Inventory of Ancient Woodland

In this dataset, maintained by Natural England (formerly English Nature), Ancient Woodland is defined as land that has had continuous woodland cover since at least 1600AD and may be:

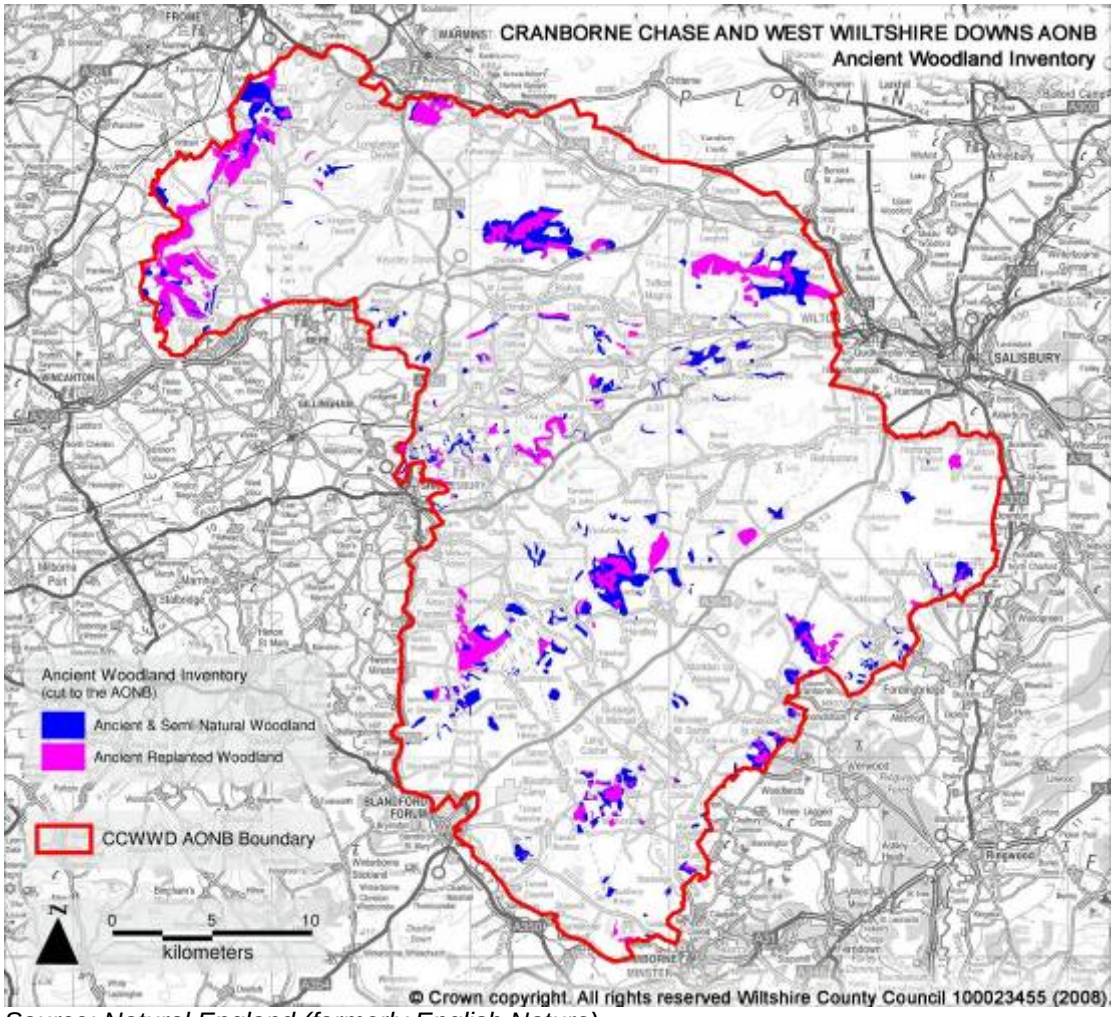
- Ancient Semi-natural Woodland
- Ancient Replanted Woodland (now known as Plantation on Ancient Woodland Sites or PAWS)

Ancient Woodland is identified using the presence or absence of woods from lod maps using interpretation of map symbology, information abiout the wood name, shape, internal boundaries etc. ground survey (including indicator species) and aerial photography. This includes woodland that still exists and does not include sites that are no longer woodland.

The woodland is captured as a series of polygons, see Figure 3, and information stored in the related internal database record. This information includes grid reference, area in hectares, and whether the woodland, or woodland block, is semi-natural or replanted. Only Ancient Woodland Sites that were over 2 hectares on the 1920's base map are included in the dataset.

Although the boundaries have been digitised at a large scale; the maps that they are based on include the OS 1" First Edition Maps, the OS 1:25'000 and the OS 1:50,000 maps. This means that the boundaries cannot be taken as precise and are only precisely comparable with other boundaries at the 1" map scale (1:63360). Inaccuracies become increasingly obvious as you look at an increasingly large base map scale.

Figure 3: Ancient Woodland Inventory (cut to the AONB)



Source: Natural England (formerly English Nature)

3.3 Issues identified with these datasets from the perspective of the AONB

Both the Inventory of Woodland and Trees and the Inventory of Ancient Woodland provide excellent information on the nature and character of woodland in England at a national scale, allowing easy cross comparison between areas. However, when they are used at a regional or sub-regional scale they become more problematic. Issues that the AONB has encountered when attempting to apply and use this data at an AONB scale includes: -

- Inaccuracies in the boundaries of the woodland become increasingly problematic, especially when attempting to look at the context of individual blocks of woodland to their surroundings. *See Figure 4*.

Figure 4: Differences in boundaries of Woodland digitised in the National Inventory of Woodland and Trees, Ancient Woodland Inventory and the Ordnance Survey MasterMap layer of current woodland.

- The two hectare limitation means that smaller areas of fragmented woodland are not recorded, these smaller woodlands are especially important in areas of the AONB which were assarted (subject to clearance) from an early age, and where the sum of the parts is greater than the whole. A good example of this can be found at Chetterwood in the southern half of the AONB. This covers and area of at least 8 kilometres squared and is composed of over 25 separate woodland blocks and copses which form the remnants of veteran medieval woodland.

- The smaller scale (less detailed) maps used to digitise the boundaries means that the inaccuracies in the locations of the woodland blocks becomes increasingly marked as you look at woodland against an increasingly large map scale *see Figure 4 (pg.8).*

- The interrelationship between different elements of a woodland character (e.g. origin and type) cannot be easily explored due to the differences in the boundaries and positions of the woodland digitised in the Inventory of Ancient Woodland and the National Inventory of Woodland and Trees. In addition not all the woodland in the National Inventory as information available on its origin as the focus has only been on Ancient Woodland and not more recent historical planting.

- The identification of ancient woodland as being pre 1600AD is arbitrary in the sense as it cannot be related to the individual map sources used to attribute its date.

4. Other important map based data

The AONB's primary purpose of conserving and enhancing natural beauty means that it needs to operate at a landscape scale. To this end, the AONB uses two interrelated datasets which map the character of the AONB at a landscape scale. These are the AONB Landscape Character Assessment and the AONB Historic Landscape Character Assessment. In order to be of maximum use to the AONB it is crucial that any new dataset focussing on a particular element of the AONB landscape, such as woodland, can be used alongside these Character Assessments. The AONB is interested in having a fuller understanding of the character of woodland within the boundaries and groupings of these characterisations. The main features of the Character Assessments are outlined below.

4.1 Landscape Character Assessment

The physical geology and topography, combined with the green cover, are major contributors to the structure and the aesthetic aspects of landscapes. These have combined with cultural, historic, social and economic influences over centuries to create the unique and distinctive character of the AONB.

Landscape Character Assessment (LCA) seeks to identify local landscape features, the broad character of a locality, indigenous materials and the other elements that contribute to the particular sense of place. LCA therefore presents an integrated view of the landscape and includes all the features which contribute to the special and distinctive character of the AONB. It plays a crucial part in enabling the AONB Partnership to conserve and enhance the AONB.

This AONB is characterised by a diversity of landscapes and these variations and differences are represented by eight broad Landscape Types each of these landscape types can be further sub-divided into component geographically specific Landscape Character Areas. These can be seen in *Figure 5* (pg. 10).

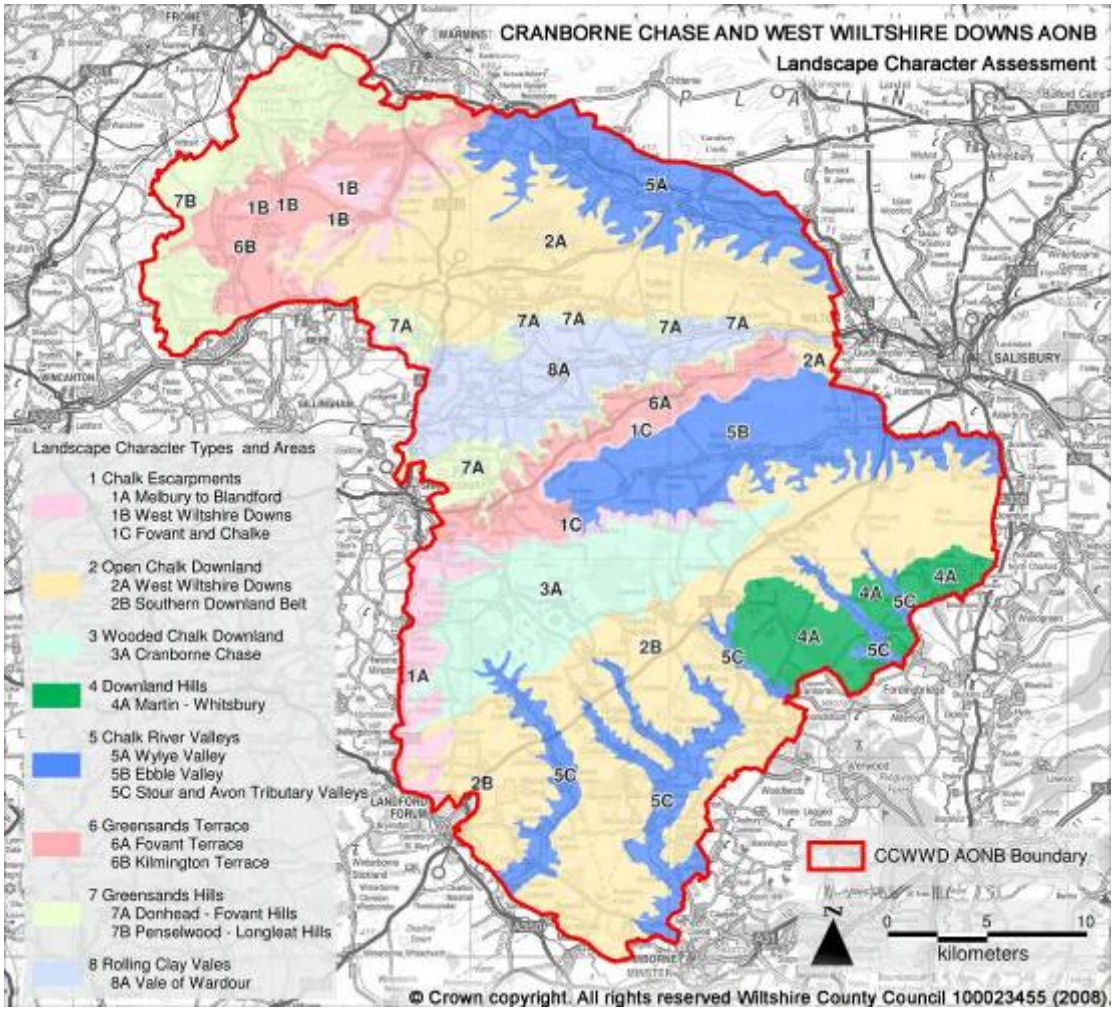
An independent Landscape Character Assessment was undertaken in 2003 by Land Use Consultants. The Landscape Character Assessment can be downloaded from the AONB Website at http://www.ccwwdaonb.org.uk/landscape/lca.asp .

In this context the contribution of woodlands to the character of the AONB is outlined in the textual descriptions accompanying each of the Landscape Character Types and Areas

> E.g. a key characteristic of the 5a Wylye Chalk River Valley is the hanging woodland on the steepest valley slopes

The new Woodland Survey will refine and add to this understanding.

Figure 5: Cranborne Chase and West Wiltshire Downs AONB Landscape Character Assessment



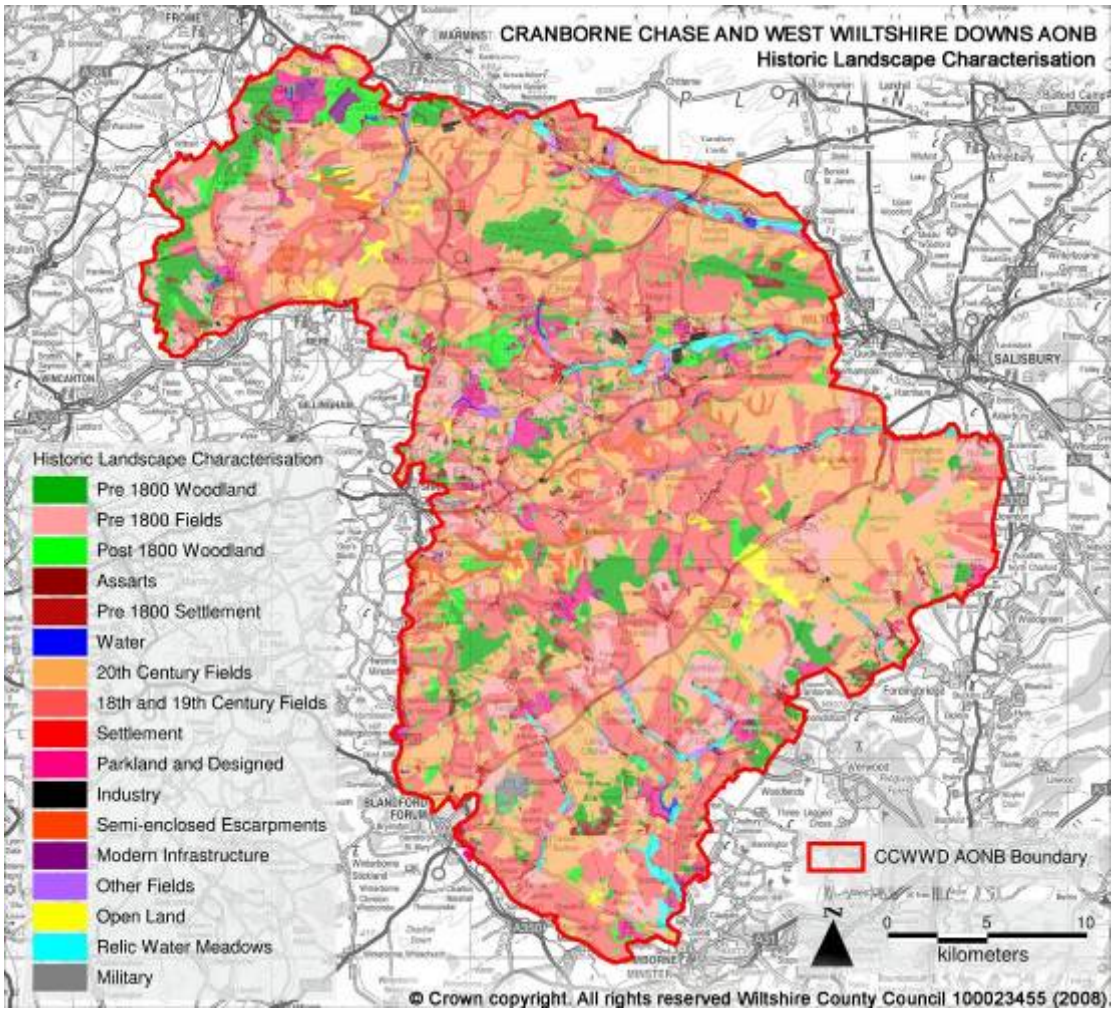
4.2 Historic Landscape Character Assessment

Historic Landscape Characterisation (HLC) is an archaeological method used to define and map the historic and archaeological dimension of the present day landscape. It forms part of a national programme overseen by English Heritage. HLC is concerned with the totality of the landscape, providing a broad overview of the complexity of the historic environment in a given area. It is concerned with mapping the common place and locally distinctive and identifying time depth in the landscape.

The HLC dataset is created using a desk-based programme of Geographical Information Systems (GIS) mapping and analysis which draws on a wide variety of data sources. These include modern maps, historic maps, aerial photographs, place name studies, Sites and Monument Record data and local archaeological and

historical knowledge and research. These sources are used to identify and group archaeological, historic and other environmental attributes attached to land parcels. This allows the creation of multiple and hierarchical historic landscape types each with their own distinct and recognisable character. The distribution of these types can be mapped in GIS and are supported by written descriptions. HLC is a relative generalised characterisation at the same level as the AONB Landscape Character Assessment. The shortcomings identified with the boundaries of the woodland datasets discussed above do not apply to HLC as it is concerned with Historic Landscape Character in the present day and uses Ordnance Survey MasterMap to digitise the boundaries of the polygons. It does not, however, record land parcels which are less than 1 hectare in size.

Figure 6: - Cranborne Chase and West Wiltshire Downs AONB Historic Landscape Character Assessment



The Historic Landscape Types identified include those related to woodland as can be seen in Figure Six. The dataset identifies the historic character of the woodland which exists in the AONB today. In addition, the HLC dataset records where woodland was previously that still influences today's landscape character. It also records information on generic woodland names relating to, for example, coppices and assarts. The HLC report includes written descriptions of individual historic landscape types including woodland and contains a section on the present day historic character of woodland across the AONB. As you will see from the map, Woodland was categorised as either pre AD1800 or post AD1800 based on the

sources available to the project rather than using a more arbitrary date of AD 1600 or 1700.

The fact that the HLC dataset recorded the source used to date each parcel of land and allocated it to a time period means that it can be used to form the basis of allocation of origin in the woodland dataset.

5. Rationale behind the Project

5.1 Why create a new digital woodland dataset for the AONB?

The initial impetus behind the project was twofold. Firstly, the desire to create a dataset characterising the woodland in the AONB which corrected or resolved many of the issues with the datasets available to the AONB, as outlined in section 3.3. Secondly, the need for a booklet of woodland advice aimed primarily at land managers, forestry officers, Natural England officers and local authority officers. This booklet is required to help in the process of enabling these individuals to have a fuller understanding of the character of the landscape in which they are working. This advice document therefore needed to outline a picture of the AONB woodland which could then be used to provide guidelines and advice for the management of that woodland. The issues with the available woodland datasets, outlined above, meant that the necessary first stage of this project was the creation of a new woodland dataset for the AONB.

It was realised that the dataset had the potential to answer many other questions, have a range of applications, as well as posing new questions for further enquiry. It would, for example, allow the AONB to: -

- Gain a much better understanding of the location and nature of veteran woodland in the AONB, its relationship to historic land use (through combination with the AONB Historic Landscape Characterisation),
- Identify landscape scale management priorities for Veteran Woodland based on a more complete picture of this woodland in the AONB.
- Identify areas of woodland, in a systematic manner, which contain undiscovered woodland archaeology, or which may particularly warrant future archaeological survey.
- Identify priority areas for the enhancement of woodland connectivity and connectivity with other kinds of semi-natural habitats, as a necessary first step for improving biodiversity, based on a fuller picture of the woodland in the AONB.
- Enhance the understanding of the contribution that woodland makes to the character of Landscape Character Types and Areas identified in the AONB Landscape Character Assessment.
- Transmit to a wider audience, including the general public, an enhanced understanding of the nature of woodlands in the AONB.

5.2 What is the primary product?

The primary product produced by the project is a new digital woodland dataset for the AONB. This dataset identifies all the woodland in the AONB regardless of size. It used existing data available to the AONB in a new way. The dataset applied a much broader definition of woodland than that used in the national inventory of woodland and trees. All the different kinds of woodland habitat that are found to be found on the AONB were recorded. This includes features such as wooded scrub on the sides of chalk escarpments, small copses in the corners of fields and small ornamental

plantations within the setting of larger designed landscapes, all of which tended to be excluded from the previous datasets available to the AONB.

For the purposes of the project woodland was defined as “land that is mostly covered with dense growths of trees and shrubs”.

Information was recorded for each woodland, from modern maps, aerial photographs, historic maps and HLC, on the date of origin of the woodland (5.3), type of wood present (5.4), and how connected the wood was other veteran woodland (5.5).

5.3 Recording information about the Origin of Woodland

As discussed above the Historic Landscape Characterisation has already studied the history of land use in the AONB in some detail. This included areas of woodland greater in size than 1 hectare (2.5 acres). This study means that the historical mapping sources available to the AONB have already been studied in some detail. For woodland too small to be recorded in the HLC, the primary mapping sources were consulted.

The historic map datasets which could be compared against the modern day MasterMap mapping base to identify the origin of woodland were: -

1. First County Series survey (6”: 1 mile maps) Epoch 1 1843-1893 available to the AONB in digital format. Reliable for woodland and boundaries.
2. Ordnance Survey 2” Surveyor’s Draft (1800-1820). Indicate the general location of woodland and the boundaries of larger woodlands are fairly well represented.
3. Historic County Maps. These date from the early 18th Century to the mid 19th Century and indicate the general location of woodland. The most important are as follows: -
    a. Andrew’s and Dury’s 1773 Map of Wiltshire
    b. Bowen 1748 Map of County of Dorset
    c. Smith 1801 Map of County of Dorset Divided into Hundreds and Liberties
    d. Taylor 1759 – Map of Hampshire
    e. Milne 1791 – Map of Hampshire
    f. Christopher Greenwood – Map of Hampshire 1826
4. Historic Maps of the Cranborne Chase including a map from 1618 by Thomas Aldwell and a 18th century revision of a 1618 map attributed to Richard Harding. These indicate the general location of woodland.

The identification of the date of each polygon uses historical map regression; there the existing of a particular block of woodland is tracked back in time through the available mapping sources.

There are some limitations imposed on the accuracy of the allocation of origin to woodland derived from the nature of the sources used. These are: –

- The approach will underestimate the age of older woodland as it only attributes the age of woodland to the earliest source in which it is depicted.
- Smaller woodland is not always featured on the oldest available map and so may be given a more recent date.
- There is a mismatch between the woodland boundaries featured on the very oldest mapping sources and there actual boundaries, which means that

relating a particular woodland in today's landscape with woodland depicted especially on the 18th century county maps can often be an approximation. There are, therefore, concerns about the precision/accuracy of earlier maps.

The Historic Landscape Characterisation polygons can each be allocated to one of nine time periods, ranging from 1950 to present to prehistoric. This reflects the range of land uses recorded across the whole dataset, including archaeological features. This has been simplified to reflect more closely the map based sources available to four categories: -

1. AD 1900 to present – Woodland only present on Modern Mapping
2. AD 1750 to AD 1900 – Woodland present on the First County Series survey
3. Pre AD 1750 – Woodland present on the historic county maps and the Ordnance Survey 2" Surveyor's Draft
4. Medieval – Only those woodlands which can be firmly dated as remnant medieval woodland through depiction on the oldest map based sources available to the AONB is identified as medieval. This means that much of the woodland identified as Category 3 – Pre AD 175- could also have a much earlier origin.

Veteran Woodland therefore is characterised to any Woodland dating to before AD 1750 (in either category 3 or 4) which is broadleaved.

5.4 Recording information on the Type of Woodland

The AONB is interested at the character of its woodland at a Landscape scale. It recorded each woodland in its entirety as one woodland block rather than having separate polygons comprising the component parts of each woodland. See section 6.3 for further discussion of this element of the dataset. This is a different approach to that adopted for the National Inventory of Woodland and Trees.

The AONB was interested in recording the broad character type of each woodland and therefore only three broad categories were identified: -

1. Broad-leafed – over 60% of the woodland is broad-leafed
2. Coniferous – over 60% of the woodland is coniferous
3. Mixed – For woodland which does not fall into categories 1 or 2. This mixed woodland could be were individual trees are interspersed coniferous and broad-leafed species or where the blocks of plantation which make up the woodland are not dominated by broad-leafed or coniferous

5.5 Recording information on the connectivity of woodland to semi-natural habitat

The AONB is interested in the level of connectivity between the woodland identified and veteran woodland. It aimed to allocate each woodland polygon to one of the following categories: -

1. Contiguous with veteran woodland
2. Less than 0.5km from veteran woodland
3. Between 0.5km and 1km from veteran woodland
4. Over 1km from veteran woodland

Semi-natural and veteran habitats can be defined as any habitat where human induced changes can be detected or that is human managed, but which still seems a natural habitat in terms of species diversity and species interrelation. This interaction

between human activities and natural ecosystems has led to the establishment of communities of flora and fauna of great interest and high biological diversity.

Connectivity between woodlands and veteran woodlands was assessed using data from the Forestry Commission research that defined Ancient Woodland clusters in the South West England Conservancy (Watts et.al.: 2005). This research defined focal species according to their habitat area requirements and dispersal abilities. This effectively measured the species vulnerability to habitat fragmentation. Habitat fragmentation, the combination of reduced habitat area and increased isolation, is considered to be a major threat to woodland conservation and an important factor in loss of biodiversity. The Forestry Commission research considered ancient woodlands to be close to each other when they were 1 km apart and distant when 10 km apart.

This document has attempted to assess the permeability of the landscape by looking at the connectivity of the areas surrounding the mapped woodlands. As Watts and Griffiths report: *"Semi-natural and extensive habitats are considered to be more conducive or permeable to species movement, whereas, intensive land uses are predicted to reduce connectivity and increase ecological isolation"* and "*based on these assumptions a woodland species with a dispersal distance of 1000m can effectively move 1000m through a scrub habitat due to its low modification and high vertical structure … while it can only move 50m through an arable landscape … due to the high level of modification and lack of vertical structure".* However, there is not a great deal of empirical evidence to support these widely accepted assertions, therefore the AONB study used 1 km between veteran woodland as the least acceptable measurement and contiguity as the preferred situation.

Figure 7: Semi-Natural Habitats in the AONB all of which have an important woodland component (A – Swallowcliffe Down, B – Great Ridge Wood, C – Wylye River, D - Meadow Fen, Teffont Evias)

6. Methodology

6.1 Summary

The AONB Woodland dataset was created using a desk-based programme of GIS mapping and analysis which drew primarily on aerial photography, Ordnance Survey mapping and the AONB Historic Landscape Characterisation dataset. The GIS package used was MapInfo Professional 9.5.

Each woodland was digitised in a GIS layer (Stage One) and information recorded on the following: -

- Period of origin of woodland (Stage Two)
- The broad type of woodland present (Broad-leafed, Coniferous, Mixed) (Stage Three)
- The level of connectivity to veteran woodland (Stage Four)

The creation of the new GIS based AONB woodland dataset took 40 working days during the latter half of 2008, not including the pilot study which took 4 working days. Stage 1 to 4 taking 10 days each.

6.2 Structure of the Dataset

The dataset consists of a single GIS layer comprising 3271 separate polygons. Each of the polygons is associated with a field in a data table internal to the GIS system. The table has six columns as follows: -

COLUMN NAME	TYPE	DESCRIPTION	EXAMPLE
ID	Numeric	Unique identifier of Polygon	*1055*
ORIGINATION	Text	Period of Origin of Woodland	*Post 1900 AD*
TYPE	Text	Type of Woodland	*Broad-leafed*
CONNECT	Text	Level of connectivity to semi-natural habitats	*Contiguous*
AREA_HECTARE	Numeric	Area in Hectares	*8*
LANDSCAPE_CHARACTER_TYPE	Text	Landscape Character Type within which the woodland is situated	*2 Open Chalk Downland*
LANDSCAPE_CHARACTER_AREA	Text	Landscape Character Area within which the Woodland is situated	*2B Southern Downland Belt*

6.3 Creating the dataset

Initial pilot study- An initial Project Feasibility Study was undertaken by the AONB GIS contractor Harry Bell, Jubliee Computing Services Limited. This identified the key datasets to be used, and enabled decisions to be made regarding the scope and nature of the work required to complete the full woodland dataset in a satisfactory manner. A pilot area of the East Dorset District Council section of the AONB was undertaken. This allowed the time and cost implications of the project to be estimated.

Stage One – Identifying and Digisting the woodland

The first stage in creating the dataset is to identify and digitise every block of woodland in the AONB. The aim being to create a new layer comprised of individual polygons. The base map used was Ordnance Survey MasterMap data (in particular

the MasterMap Topographic Area Layer). This layer was overlain over the AONBs georeferenced vertical aerial photography tiles (provided by GetMapping) (See Figure 8).

Figure 8: Example of OS Mastermap data (in white) overlying georeferenced aerial photography

Each block of woodland is selected on the OS Mastermap Layer and copied into the new Woodland dataset layer (see Figure 9). In some instances woodland present on the Aerial Photographs has not been captured on the Mastermap layer. This occurs especially where there are small woodland copses at the edge of fields, in this instances a new polygon is created in the new layer.

Figure 9: Example of woodland polygons (in purple) added to new woodland dataset layer

The new polygons are then adjusted where necessary. Sometimes individual polygons making up a larger woodland need to be combined, as in Figure 10.

Figure 10: Woodland polygons are combined where appropriate to create single woodland block

The process of capturing woodland polygons is then repeated until all areas of woodland in the AONB have been captured.

In order to ensure that all woodland in the AONB was captured in the new dataset, other GIS based datasets were used as reference maps. This included the Ancient Woodland Inventory, Inventory of Woodland and Trees and Historic Landscape Characterisation discussed above.

In addition a new layer was also created by querying the 'full' version of Ordnance Survey Mastermap. In this dataset OS MasterMap has provided useful information in the form of polygonised GIS data with theme descriptors (see Figure 11).

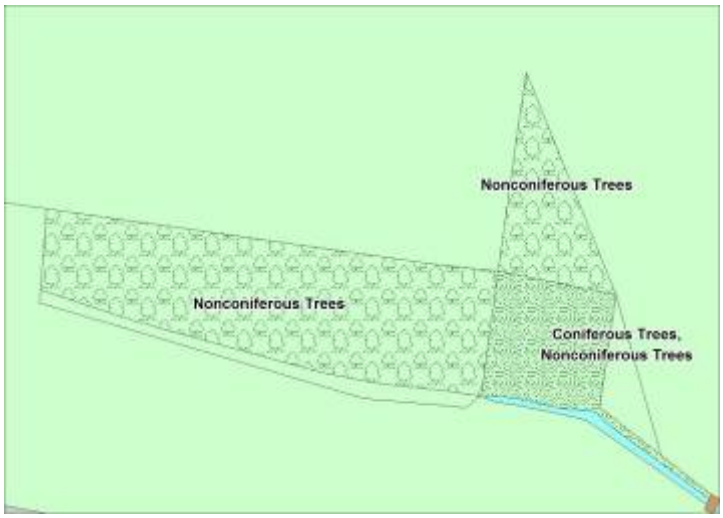


Figure 11: Example of information on woodland contained in the theme descriptors in the 'full' version of Ordnance survey MasterMap.

The theme descriptors relating to woodland can be copied from the basemapping via the use of Structured Query Language (SQL). See Figure 12.

Layer Used: Topo_Area
Desc_Group: Natural Environment

Desc_Terms:

Nonconiferous Trees
Nonconiferous Trees; Scrub
Coniferous Trees
Nonconiferous Trees; Coniferous Trees; Scrub
Scrub; Rough Grassland; Nonconiferous Trees (Scattered)

SQL Query:
Select * from Topo_Area where DESC_TERM like "%con%" into table named Woodland

Figure 12: *SQL Query used to extract and copy information on woodland held in full OS Mastermap layer*

This query yields all areas of woodland from the OS MasterMap base mapping, which can be imported into a new GIS map layer, and manipulated as required. This layer then be used as a cross check, along with the other datasets mentioned above, to ensure that all the woodland in the AONB is captured.

Stage Two Allocating Origin
The next stage is to identify the origin of each woodland. This was achieved by overlaying the AONB Historic Landscape Characterisation onto the woodland dataset. Each polygon in the HLC dataset identifies the Current Landscape Type

present, the period to which it dates, the mapping source used to date the type and the certainty of the recorder. The data recorded in this dataset was used to allocate a period of origin to each woodland polygon.

In the case of woodland which is less than one hectare in size, and therefore not recorded in the HLC dataset, reference was made back to the original sources used in the project (see Section 5.3 for more details). Using the HLC made the process of data allocation much quicker. In addition, the fact that the sources used in each allocation are recorded means that the allocation has been created based on justifiable decisions.

In order to speed up the process the origin of each woodland polygon was given a numeric code; this could be automatically replaced with text at the end of the process

Stage Three - Identifying the broad type of woodland
The type of woodland present in each polygon was identified by overlaying the new dataset over the aerial photography, and identifying the type of woodland present from the photographic image. This was cross-checked against the Inventory of Woodland and Trees and where there was a discrepancy in the allocation of type higher resolution versions of the aerial photographs held by the AONB were consulted. This was only done as a cross check due to the size of these images and the time taken to manipulate them.

As with Stage Two, a numeric code was used to speed up the process of allocation, 1= Broad-leafed, 2 = Coniferous and 3 = Mixed

Stage Four - Recording the connectivity of the woodland
The first step was to create a new GIS layer which contained all areas of veteran woodland known to the AONB. This layer was created by running a simple query which identified those woodland blocks which were broadleaved and mixed and which was identified as pre AD 1750 or Medieval was extracted from the main dataset. This was as follows:

> (Type = Broad leafed Or Type = Mixed) And (Origin = Pre AD750 Or Origin = Medieval)

The second step was to create new layers comprising buffer zones around each Veteran woodland in the composite layer. This was to identify any areas where woodland was further than 1km fro a veteran woodland which equals Poor or Low connectivity.

Buffer Zone 1

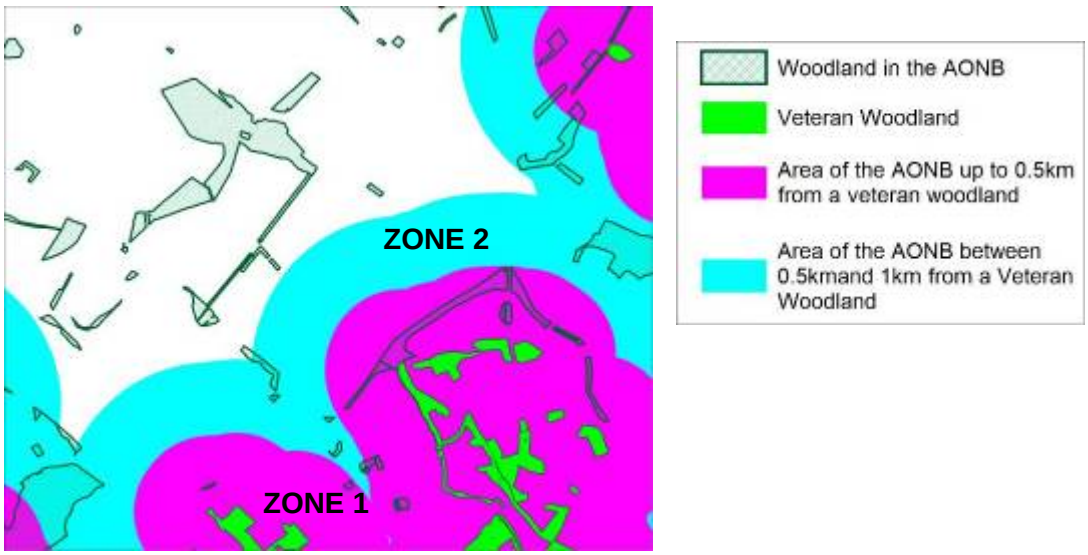
The first buffer zone to be created showed all areas of the AONB which were up to 0.5km from a veteran woodland.

Buffer Zone 2

The process of creating a second buffer zone initially created a showing all areas of the AONB which were up to 1 km from a veteran woodland. Removal of Zone 1 from this buffer left a zone of all areas of the AONB between 0.5km and 1 Km from a veteran woodland.

From these new maps is a relatively quick process to allocate a level of connectivity to each woodland polygon. See Figure 13 (Pg 20).

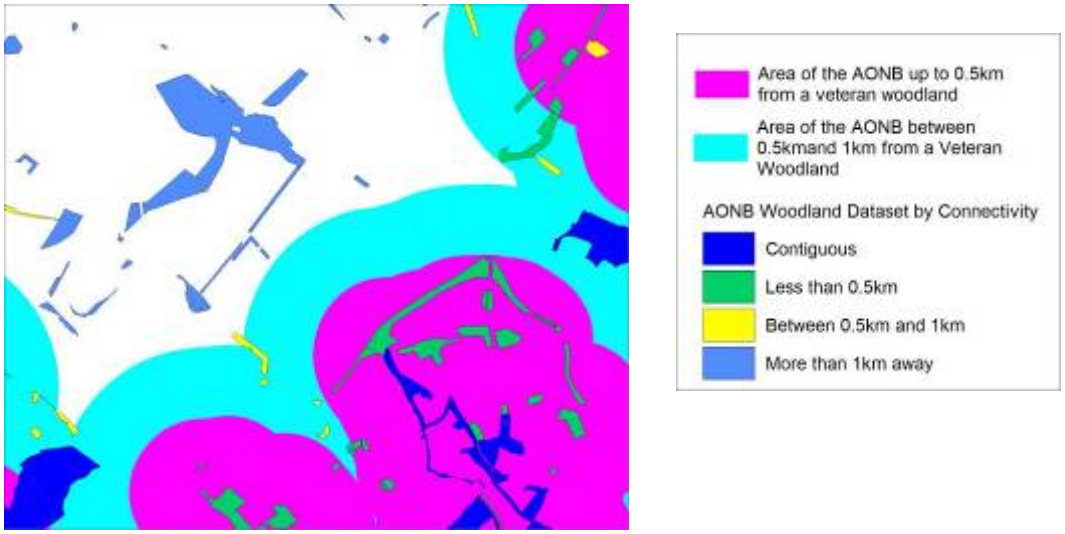
Figure 13: New layers created to allocate connectivity to Woodland Polygons.



The outlined shapes in Figure 14 represent the woodland polygons in the AONB Woodland Dataset; the level of connectivity would be allocated as follows: -

- All woodland polygons within or touching the green area would be **Contiguous** with veteran woodland (and therefore highly connected)
- All Woodland polygons wholly or partly within the pink area are **Less than 0.5km** from a veteran woodland
- All Woodland polygons wholly or partly within the blue area are **More than 0.5km and less than 1 km** from a veteran woodland
- All Woodland polygons within the blank area are **More than 1 km** from a veteran woodland (poorly connectivity).

Figure 14: Example of woodland dataset after level of connectivity with semi-natural habitat has been allocated to each Woodland polygon



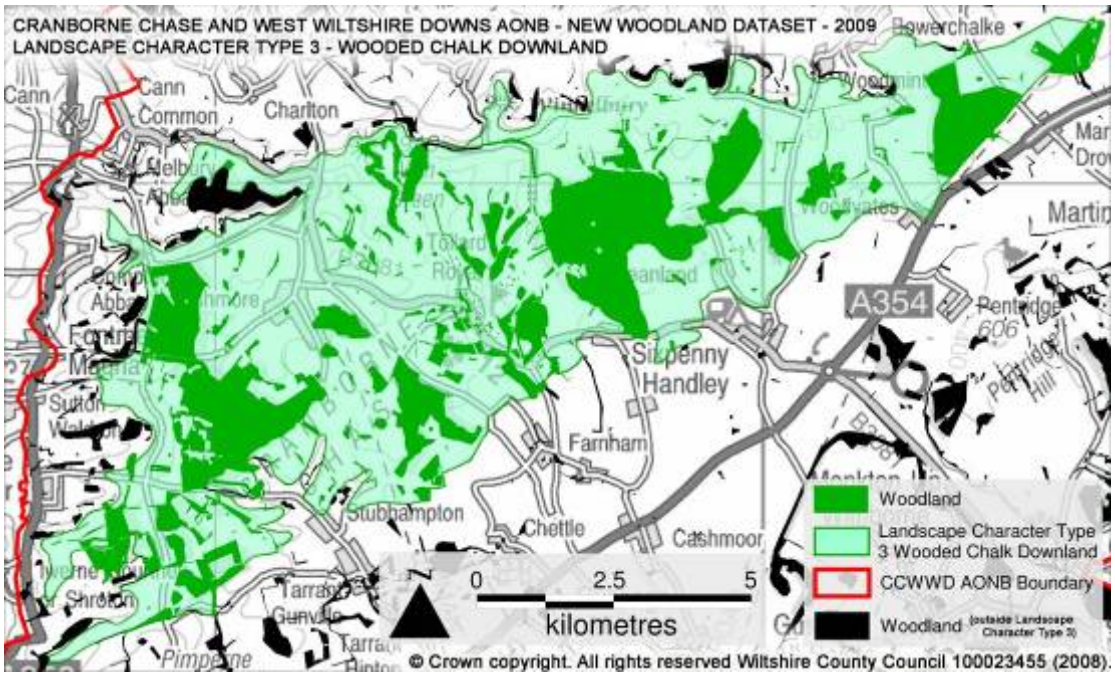
As with Stage 2 and 3 to speed up the process the connectivity of each woodland polygon was given a numeric code; this could be automatically replaced with text at the end of the process.

6.4 Relationship between LCA and WD

As discussed in Section 4 the new woodland dataset is designed to be used alongside existing AONB wide characterisations (LCA & HLC). The final step in the preparation of the Woodland dataset was to allocate each Woodland Polygon to the appropriate Landscape Character Type and Landscape Character Type. This could be done automatically in GIS using the existing LCA layer and the Update Column function. The woodland of the AONB can therefore be studied in relationship with an individual Character Type or Area see Figure 15.

Using this same method the AONB will be able to compare the relationship between the new Woodland Dataset and other spatial datasets it holds, for example, the Historic Landscape Characterisation or Geological Mapping.

Figure 15: The new AONB Woodland Polygons found within Landscape Character Type 3 – Wooded Chalk Downland



7. Results

As an initial step the new Woodland dataset has been briefly analysed statistically and spatially. The AONB Woodland dataset is comprised of 3721 polygons covering an area of 14657 hectares which equates to 15% of the total area of the AONB. The Woodland Cover of the AONB is therefore 15%

7.1 Statistical analysis

The total area of woodland recorded in the AONB Woodland dataset has been compared against the total area of woodland recoded in the AONB in the Forestry Commission Inventory of Woodland and Trees.

	Total Woodland Hectares in AONB
Inventory of woodland & Trees	13505
New AONB Woodland Study	14657
Woodland Gained	**1152**

Table 16: The new AONB Woodland Dataset compared against the NIWT

There has been a significant gain in the amount of woodland identified in the AONB as compared to the Forestry Commission Inventory of Woodland and Trees (2002). This equates to over an extra 1% of the area of the AONB being characterised as woodland.

This analysis can be further broken down by county both for the NIWT (Table 17) and the AONB Woodland Dataset (Table 18).

	Inventory of Woodland & Trees		
	Total Hectare in county*	Total Amount in AONB	% of total County woodland (NIWT)
Wiltshire	27325	8,481.47	31.0%
Dorset	28758	3,347.36	11.6%
Hampshire	66939	601.77	0.9%
Somerset	24291	1,074.32	4.4%

Table 17: Amount of woodland in each county recorded in the NIWT.

Table 18: Amount of woodland in each county recorded in the AONB Woodland Dataset.

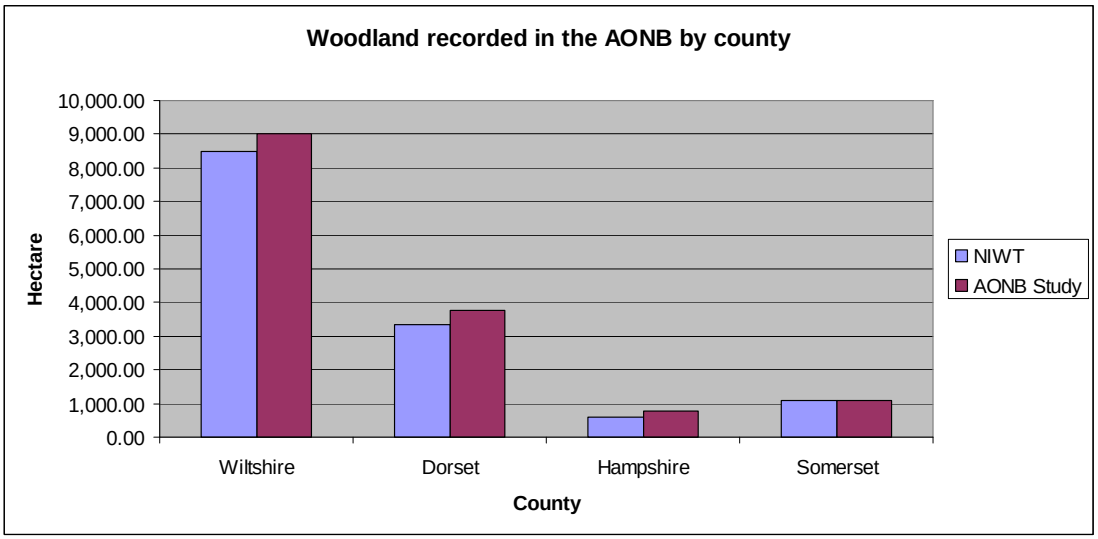
	New AONB Woodland Study		**Increase in Hectare from NIWT**	**% increase by county from NIWT**
	No. of Ha. by County	% of total County woodland (NIWT)		
Wiltshire	9,030.74	33.05%	**549.27**	**2.01%**
Dorset	3,755.48	13.06%	**408.12**	**1.42%**
Hampshire	767.04	1.15%	**165.27**	**0.25%**
Somerset	1,103.57	4.54%	**29.25**	**0.12%**

These tables illustrate that when compared against the total hectarage of woodland previously captured in the NIWT, the new AONB Woodland dataset has increased the area of woodland captured for each county, with some substantial gains for Wiltshire and Dorset. The relative propirtions for each This increase is due to several factors: the more accurate digitisation of boundaries, a refined methodology, smaller woods being captured, woodland missed by the NIWT being included, and new woodland plantation. This last factor is minimal in its impact.

The woodland recorded in the AONB woodland dataset has also been compared against the woodland recoded in the Ancient Woodland Inventory (Table 20).

This table shows that the AONB study has yielded a significant gain in woodland classified as Veteran Woodland when compared to the Ancient Woodland Inventory (Provisional) for England. The percentage of veteran woodland in the AONB has increased by over 2 %, in relation to the percentage of the AONB it covers. The increase may be attributed to several factors; a refined methodology with the boundaries of woodland being more accurately captured, a change in how veteran woodland is classified, the inclusion of woodland under 2 hectares, and the discovery of Veteran woodland not recorded in the older dataset.

Table 19: Graph of Woodland recorded in the AONB by county in the National Inventory of Woodland and Trees and the new AONB Woodland Study



	Veteran Woodland Hectares
Ancient Woodland Inventory	7019.45
New AONB Woodland Study*	8990.24
Woodland Gained	**1970.79**

Table 20: Comparison of the AONB Woodland Dataset against the Ancient Woodland Inventory

*Veteran Woodland in the AONB Woodland Study is all woodland with an origin prior to AD 1750.

The relationship between origin of woodland, type of woodland and connectivity can also be studied, see Table 21.

AONB Woodland Dataset		**Type**			
		B-Leaf	Conifer.	Mixed	**Total**
Origin	Post 1900	1973.28	280.44	197.48	**2451.2**
	1750-1900	1670.26	819.74	725.35	**3215.35**
	Pre 1750	2461.67	1532.36	799.05	**4793.08**
	Medieval	3003.73	129.15	1064.28	**4197.16**
	Total	**9108.94**	**2761.69**	**2786.16**	**14656.79**

Table 21: Relationship between Origin of Woodland and Type of Woodland.

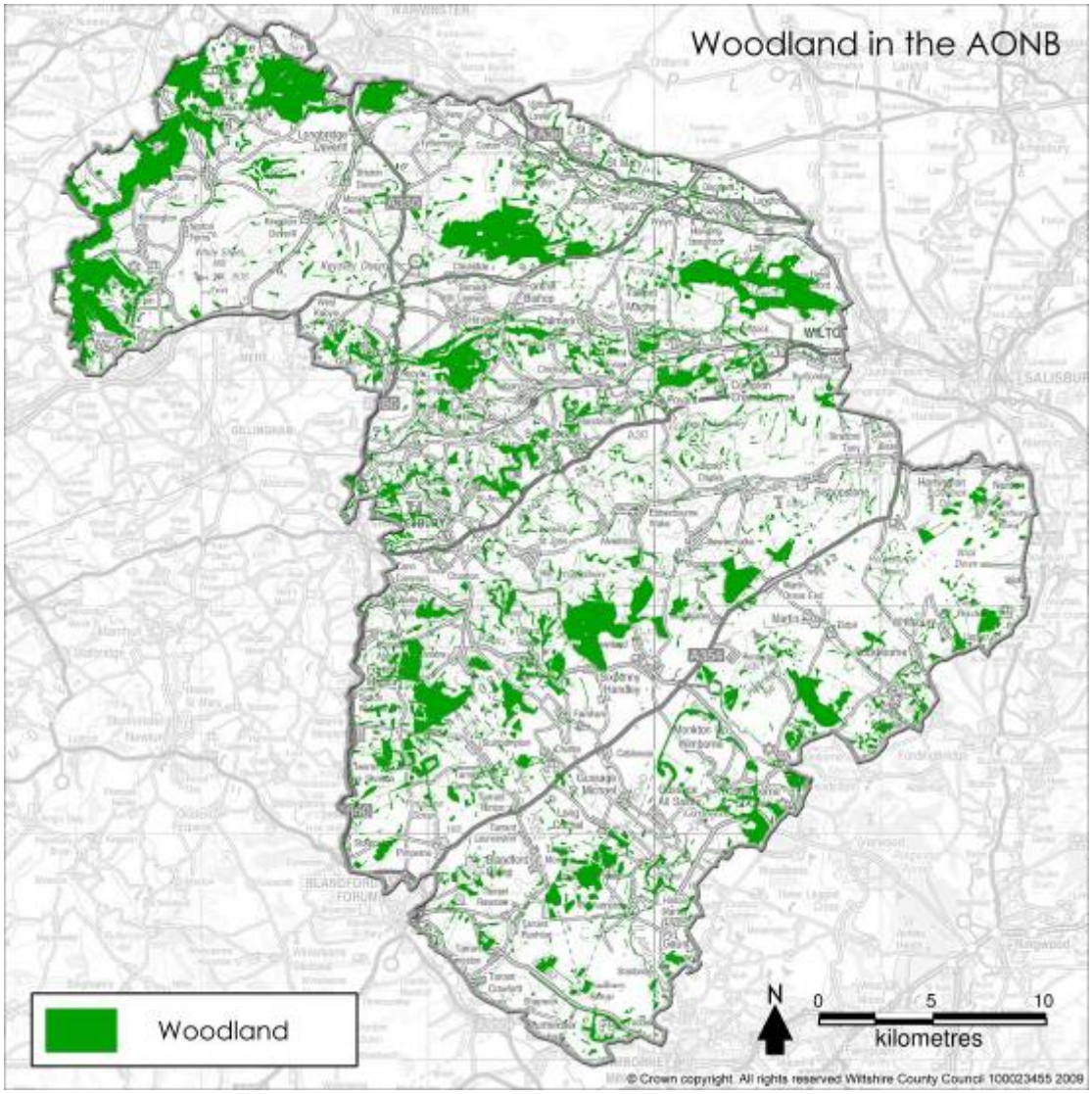
Table 21, for example, shows by simple calculation that 21% of the total woodland is both Medieval and Broadleafed.

Finally the relationship between the total woodland in each Landscape Character Type and Landscape Character Area was recorded. This was then further broken down to look at the relationship between origin, type and connectors in each Type and Area

7.2 Spatial Analysis

The woodland dataset has been used to create a series of AONB wide maps, which show the location of Woodland across the AONB, see Figures 22-25.

Figure 22: Cranborne Chase and West Wiltshire Downs AONB New Woodland Dataset



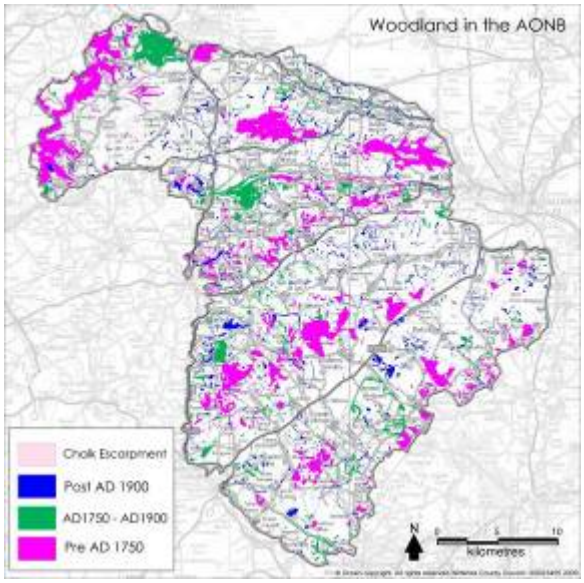


Figure 23: New Woodland Dataset displayed by origin of Woodland

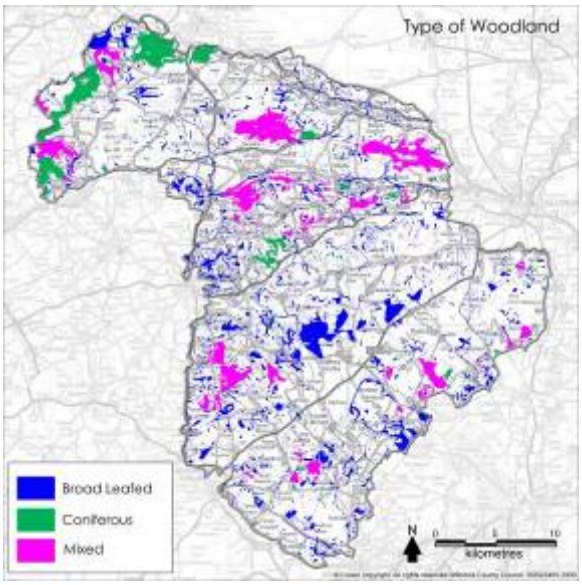


Figure 24: New Woodland Dataset displayed by type of Woodland

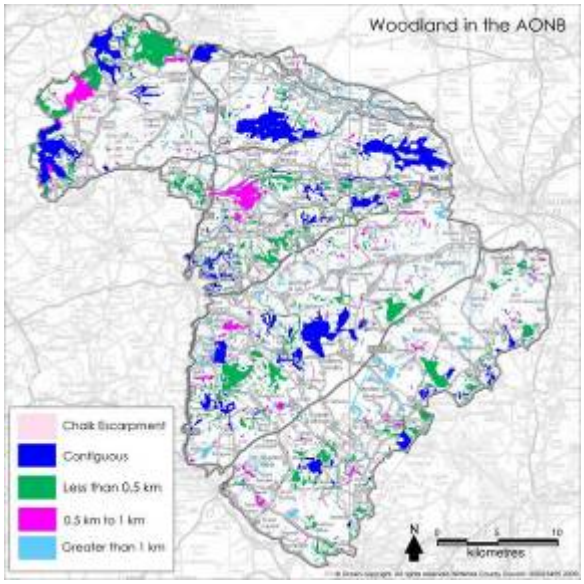


Figure 25: New Woodland Dataset displayed by connectivity with Semi-Natural Woodland

9. Conclusions

This document has introduced a new desk based method of digitising, characterising, and recording woodland at a landscape scale. This method uses existing datasets available to the Cranborne Chase and West Wiltshire Downs AONB, or indeed any protected landscape, but uses and combines them in a novel way.

This has resulted in a dataset which is more accurate and comprehensive at the AONB scale, and which allows the relationships between origin, type and connectivity of woodland to be mapped for the first time. It also records the assumptions behind the allocation of these categories in a robust and repeatable manner.

10. References

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