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Summary

This report describes the results of dendrochronological analysis of samples taken from the surviving trusses of Pound Farm, near Kington, Herefordshire (NGR SO28925418), originally a four-bay hall house with five cruck trusses. The house is a Grade II* listed building currently in poor condition but about to undergo extensive repairs.

Seven samples taken from *in situ* cruck blades, collars, and a strut, and from one of the blades of a collapsed truss, were cross-matched, and a 125-year site mean calculated which dated against numerous reference chronologies to AD 1316-1441. No samples with bark edge were recovered, but the presence of heartwood/sapwood boundaries on six of the dated samples indicates a felling date range for the parent timbers of AD 1451-61, implying a mid-fifteenth century date for the building's construction.

Keywords

Dendrochronology
Standing Building

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TREE-RING ANALYSIS OF TIMBERS FROM POUND FARM, KINGTON, HEREFORDSHIRE

Introduction

This document is a technical archive report on the tree-ring analysis of oak timbers from Pound Farm, near Kington, Herefordshire (NGR SO28925418; Fig 1). The house is a Grade II* listed building, currently on the English Heritage Buildings at Risk register. It comprises the remains of a probable four-bay hall house, of which four of the original five cruck trusses with collars and arch-braces survive *in situ*. The house has been refaced with sandstone rubble and the original roof replaced. Dating on stylistic grounds is uncertain with both fourteenth- and fifteenth-century dates having been proposed (Pevsner 1977). Analysis of the surviving timbers was requested by John Yates of English Heritage to provide a precise date for the original construction of the building which, although presently unoccupied and in poor condition, is due to undergo major repair by the new owner.

It is beyond the dendrochronological brief to describe the building in detail or to undertake the production of detailed drawings. As part of a multifaceted and multidisciplinary study of the building, elements of this report may be combined with detailed descriptions, drawings, and other technical reports at some point in the future to form either a comprehensive publication or an archive deposition on the building. The conclusions may therefore have to be modified in the light of subsequent work.

Methodology

Methods employed at the Lampeter Dendrochronology Laboratory in general follow those described in English Heritage (1998). Details of the methods used for the dating of this building are described below.

A tour of the building was made in the company of the present owner in order to identify those oak timbers with the most suitable ring sequences for analysis. Those with more than 50 annual rings and some survival of the original sapwood and bark-edge were sought. The dendrochronological sampling programme attempted to obtain cores from as broad a range of timbers, in terms of structural element types, scantling sizes, and carpentry features, as was possible within the terms of the request whilst also meeting health and safety requirements. Most of the cruck trusses were partially obscured, either by inserted floors and ceilings (and subsequent plastering) or by tarpaulins draped over timbers exposed to the elements to offer protection.

For the purposes of recording, the cruck trusses were numbered 1-5 starting from the north (Fig 2). The northernmost truss (Truss 1) has collapsed, but the cruck blades were located, stacked outside under tarpaulins and corrugated iron covers, and sampled. Truss 2 was covered by tarpaulin, but it proved possible to sample the collar (Fig 3). The blades in Truss 3 (Fig 4) contained relatively few tree rings, but one of the cusped struts above the collar was sampled. Access to the upper parts of Truss 4, using the inserted first-floor ceiling, allowed sampling of one cruck blade, and the collar (Fig 5). Both cruck blades from the southernmost truss, Truss 5, were sampled (Fig 6). Sapwood rarely survived on the timbers and, where it did, proved too poorly preserved to survive coring.

The timbers were sampled using a 15mm diameter corer attached to an electric drill. The cores were taken as closely as possible along the radius of the timbers so that the maximum number of rings could be obtained for subsequent analysis. The core holes were left open. Sanding revealed the ring sequences in the cores.

A sample was also taken, using an increment corer, from an ancient, now dead, oak tree which stands in a field below the house. This tree may be a locally renowned oak after which two nearby properties known as Pember's Oak, may be named.

The complete sequences of growth rings in the samples that were selected for dating purposes were measured to an accuracy of 0.01mm using a micro-computer based travelling stage (Tyers 1999). Cross-correlation algorithms (Baillie and Pilcher 1973; Munro 1984) were employed to search for positions where the ring sequences were highly correlated. The ring sequences were plotted electronically and exported to a computer graphics software package (Coreldraw™ v.8) to enable visual comparisons to be made between sequences at the positions indicated and, where these were satisfactory, new mean sequences were constructed from the synchronised sequences. The *t*-values reported below are derived from the original CROS algorithm (Baillie and Pilcher 1973). A *t*-value of 3.5 or over is usually indicative of a good match, although this is with the proviso that high *t*-values at the same relative or absolute position must be obtained from a range of independent sequences, and that satisfactory visual matching supports these positions.

All the measured sequences from this assemblage were compared with each other and any found to cross-match were combined to form a site master curve. These, and any remaining unmatched ring sequences were tested against a range of reference chronologies, using the same matching criteria: high *t*-values, replicated values against a range of chronologies at the same position, and satisfactory visual matching. Where such positions are found these provide calendar dates for the ring-sequence.

The tree-ring dates produced by this process initially only date the rings present in the timber. The interpretation of these dates relies upon the nature of the final rings in the sequence. If the sample ends in the heartwood of the original tree, a *terminus post quem (tpq)* for the felling of the tree is indicated by the date of the last ring plus the addition of the minimum expected number of sapwood rings which are missing. This *tpq* may be many decades prior to the real felling date. Where some of the outer sapwood or the heartwood/sapwood boundary survives on the sample, a felling date range can be calculated using the maximum and minimum number of sapwood rings likely to have been present. The sapwood estimates applied throughout this report are a minimum of 10 and maximum of 46 annual rings, where these figures indicate the 95% confidence limits of the range. These figures are applicable to oaks from the British Isles (Tyers 1998a). Alternatively, if bark-edge survives, then a felling date can be directly utilised from the date of the last surviving ring. The dates obtained by the technique do not by themselves necessarily indicate the date of the structure from which they are derived. It is necessary to incorporate other specialist evidence

concerning the re-use of timbers and the repairs of structures before the dendrochronological dates given here can be reliably interpreted as reflecting the construction date of phases within the structure.

Results

The relatively short tree-ring sequences observable in many of the original timbers, and limited accessibility, restricted the number of suitable timbers available for sampling. A total of eight samples were attempted, although one (sample **5**) was abandoned during sampling when extraction of a partial core indicated that a sample with sufficient rings was unlikely to be recovered (Table 1; Figs 2-6).

The remaining seven samples were measured and the resultant ring sequences compared. Crossmatching was identified between all seven samples (Table 2). A mean sequence calculated for these matching samples was then compared with dated reference chronologies from throughout the British Isles and northern Europe. Table 3 shows the correlation of the mean sequence **PoundT7** with dated series at the dating position identified of AD 1316-1441. Table 4 lists the dated mean chronology and the relationships between the dated timbers are indicated graphically in Figure 7.

The nearby ancient oak tree has a form compatible with it having been pollarded, including a short and broad trunk (or bolling), and a canopy of relatively straight-stemmed branches. It has apparently been dead since being struck by lightning in the 1960s (Boylett *pers comm*) and the bolling is thoroughly hollow, with no bark or sapwood surviving on its outer surface. A core taken from the presumed heartwood/sapwood boundary towards the rotten heart produced a 134 year sequence. This does not match against modern oak chronologies. Measuring the sequence proved difficult, particularly where a succession of narrow ring events occurred (Figure 8), with poorly-defined ring boundaries. These features could reflect past pollarding events when the canopy was cut back leading to subsequent narrow rings with gradual recovery in ring-width as the canopy became re-established (cf Rackham 1993, fig 35). Given the hollow condition of the bolling, it is not possible to determine the tree's age by dendrochronological analysis.

Interpretation

Six of the seven dated samples have definite or probable heartwood/sapwood boundaries (Figure 7), indicating felling of the parent trees in the mid-fifteenth century. The felling dates for the individual timbers show that it is possible that the collar from truss 2 (sample 8) could have been felled slightly later than the other timbers. However there is no other evidence for this collar having been inserted after the primary construction. Consequently if the dated timbers are seen as all contemporary then, taking account of present sapwood estimates (Tyers 1998a), this indicates felling during the date range AD 1451-61. A construction date in the mid fifteenth-century is therefore suggested for the farmhouse from the dendrochronological dating evidence.

Acknowledgements

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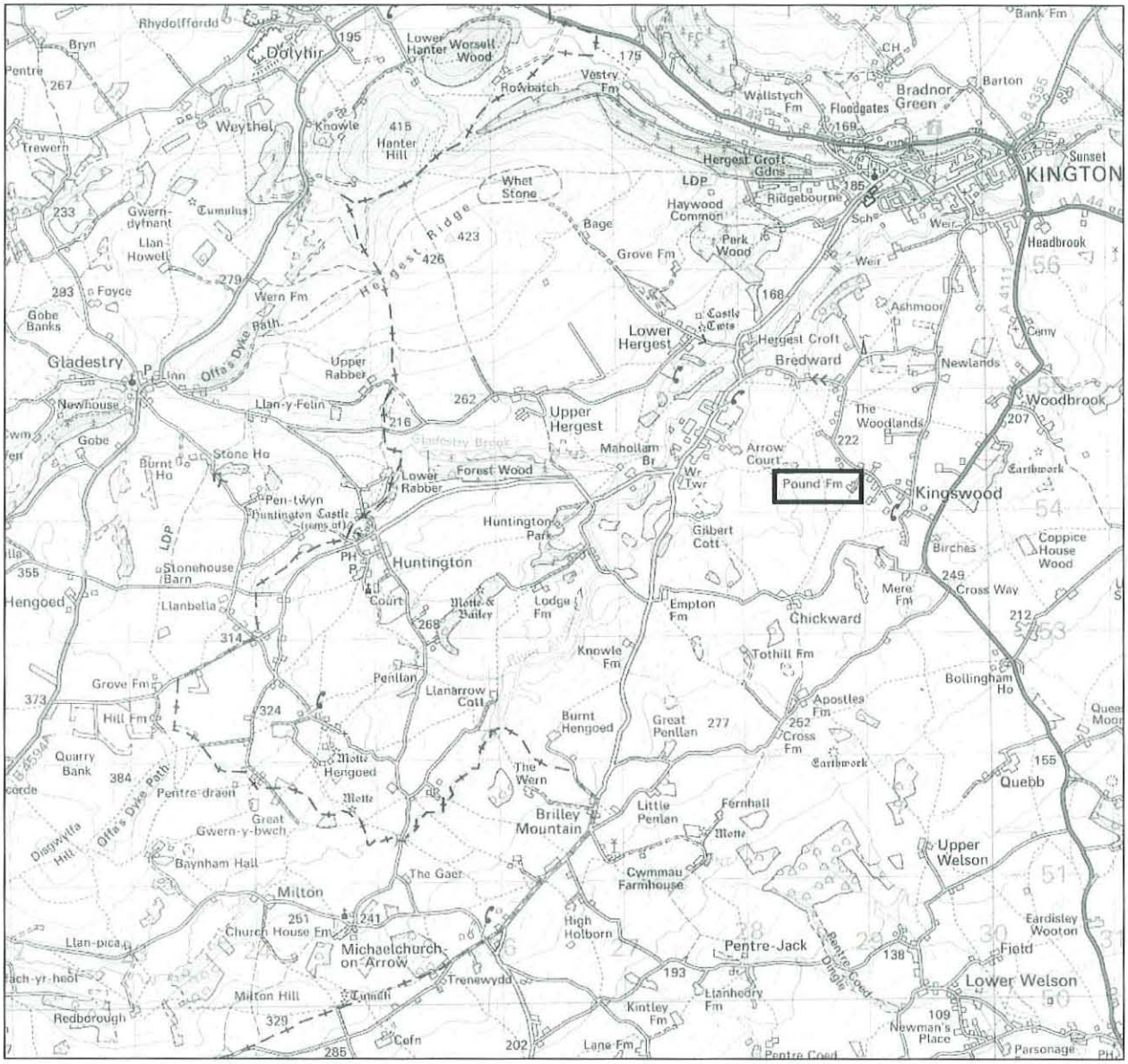

Figure 1 Location of Pound Farm, near Kington, Herefordshire. Based upon 1:50,000 Ordnance Survey map

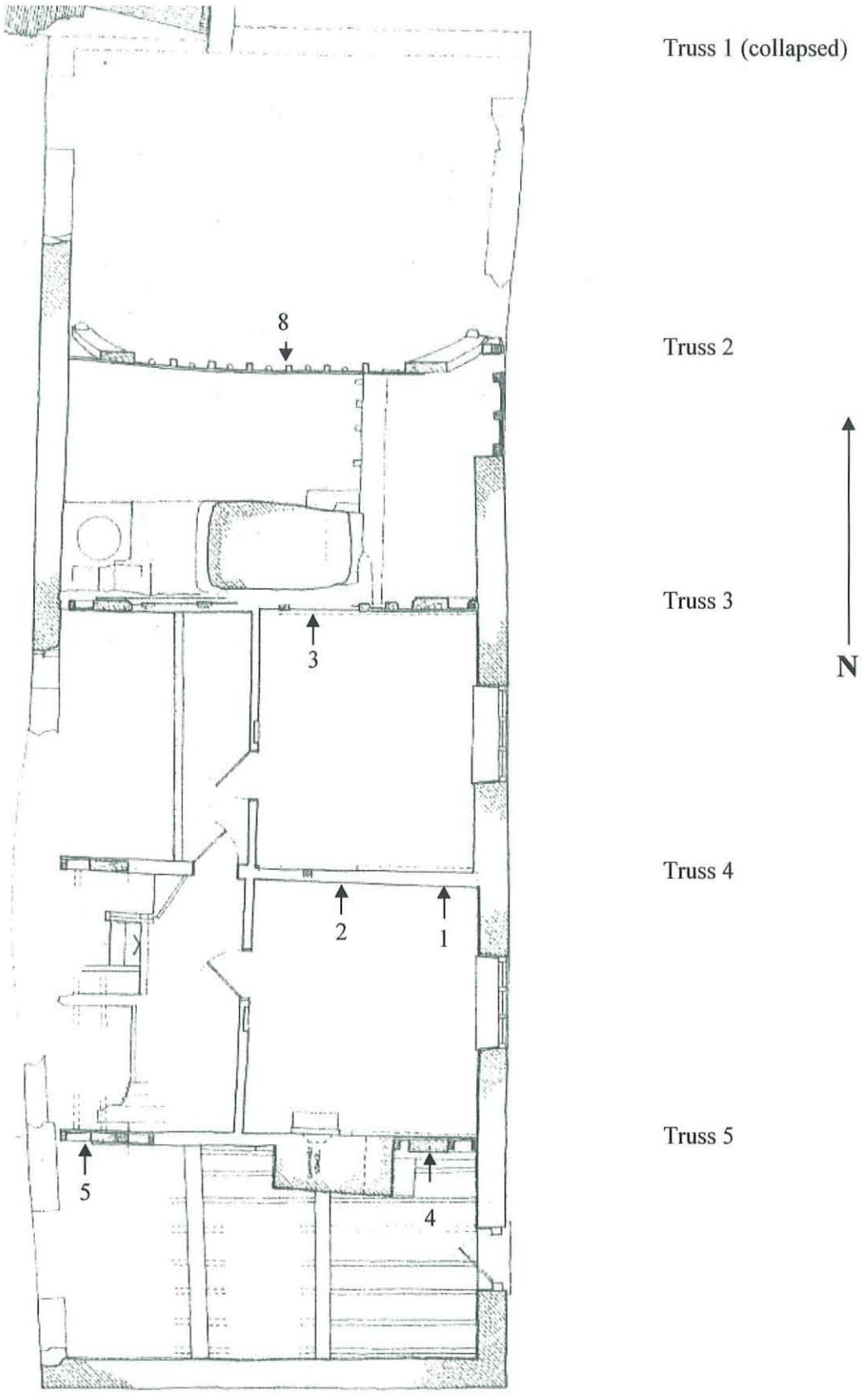

Figure 2 First floor plan of Pound Farm, indicating numbering of trusses and location of samples (after J Demaus, Chartered Architect)

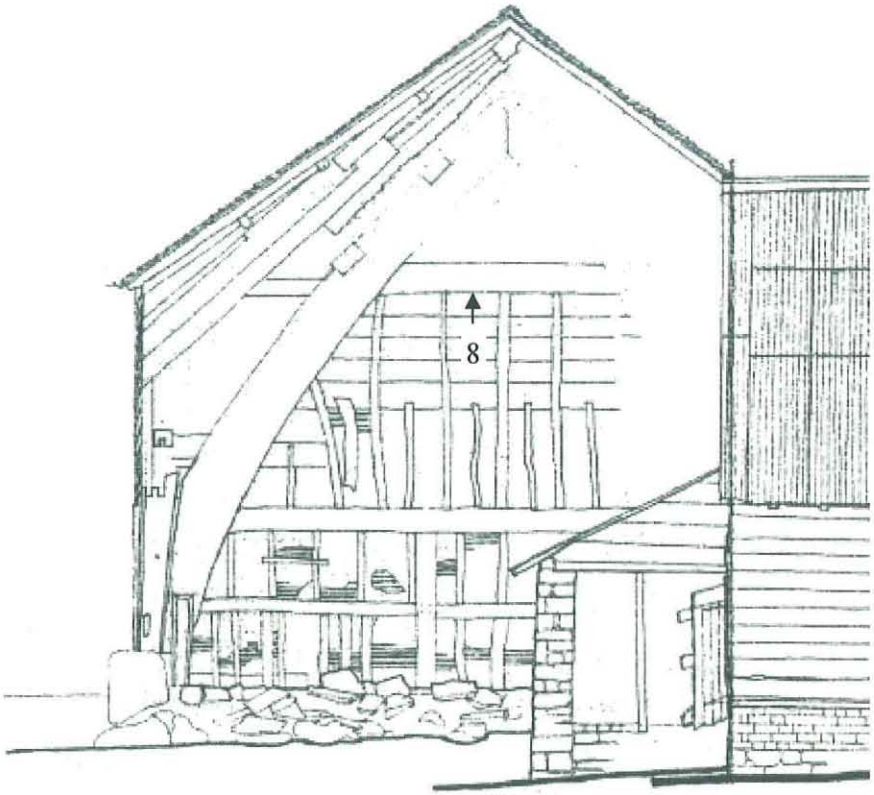

Figure 3 Elevation of Truss 2, Pound Farm, indicating location of sample 8. View towards the south (after J Demaus, Chartered Architect)

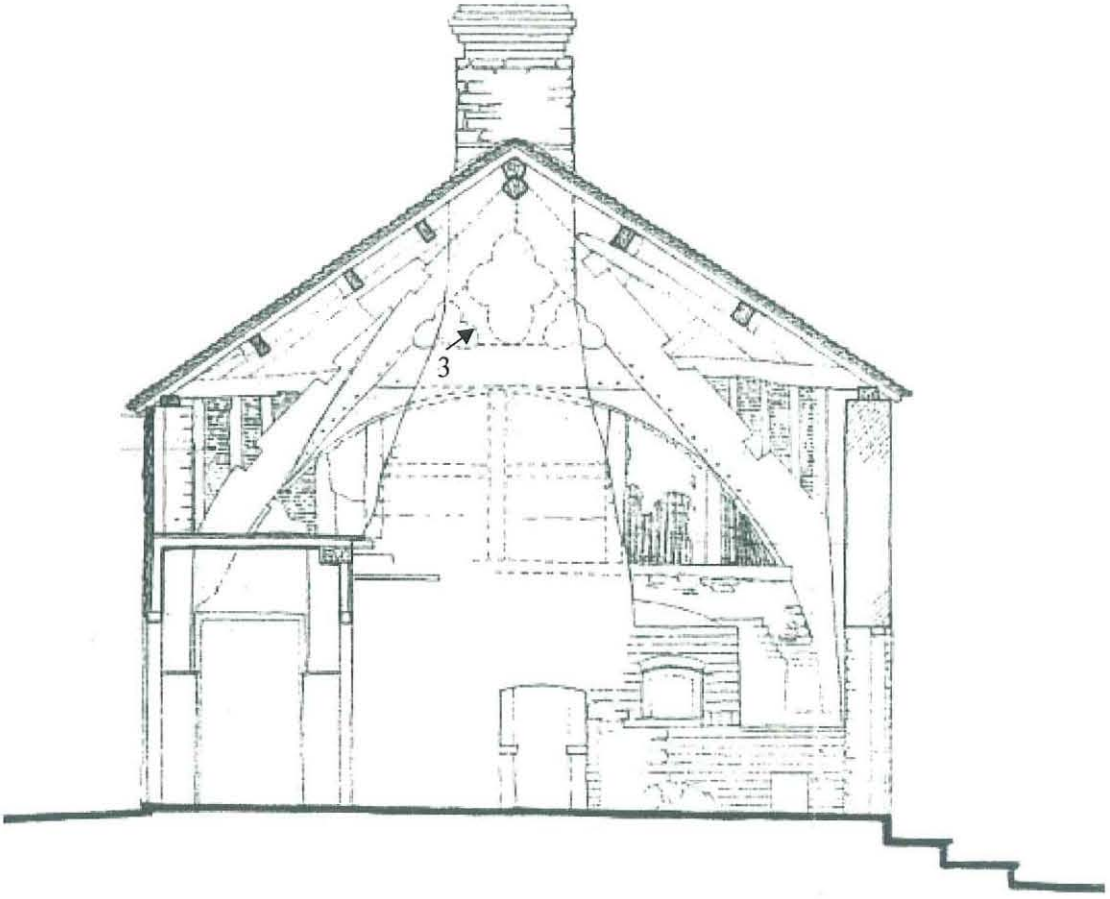

Figure 4 Elevation of Truss 3, Pound Farm, indicating location of sample 3. View towards the south (after J Demaus, Chartered Architect)

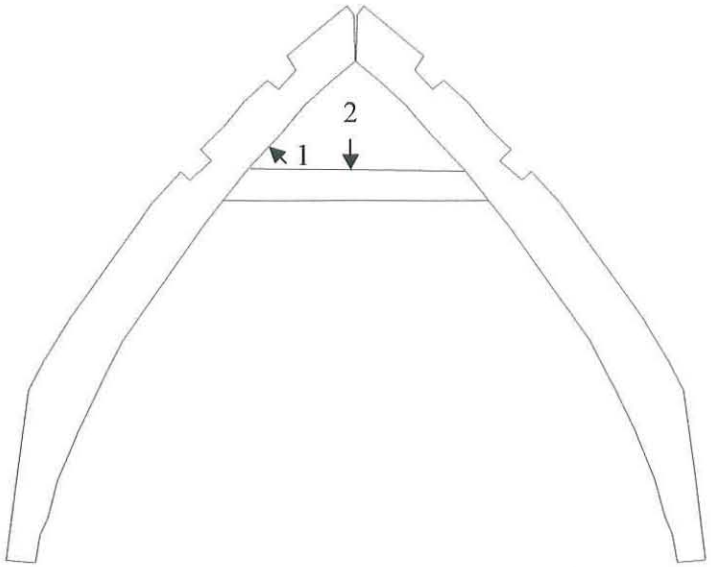

Figure 5 Diagrammatic elevation of Truss 4, Pound Farm, indicating location of samples 1 and 2. View towards the south

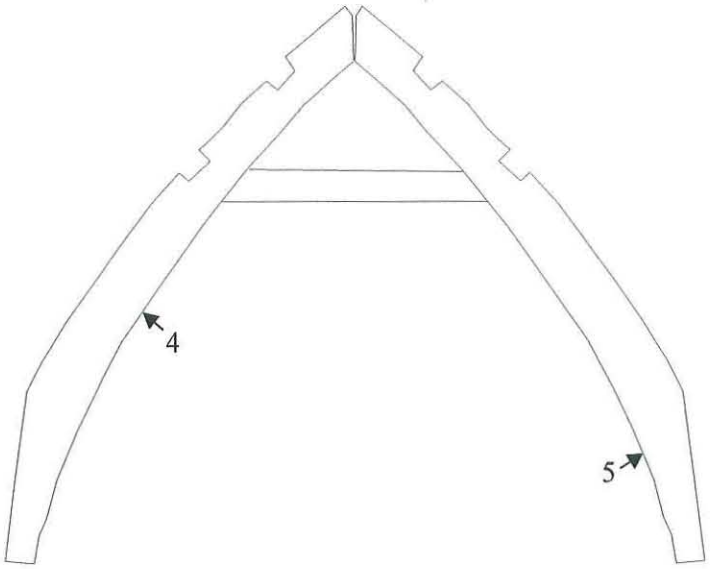

Figure 6 Diagrammatic elevation of Truss 5, Pound Farm, indicating location of samples 4 and 5. View towards the south

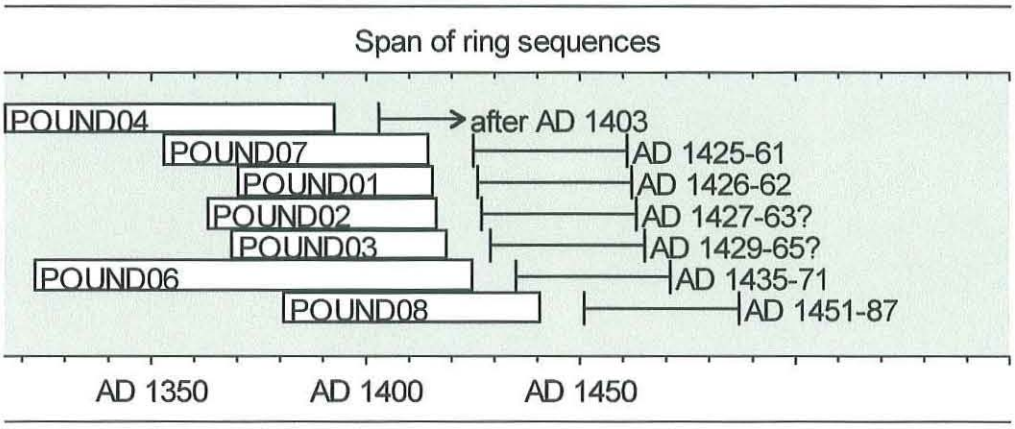

Figure 7 Bar diagram showing the chronological positions of the seven dated timbers. The estimated felling date ranges are also shown

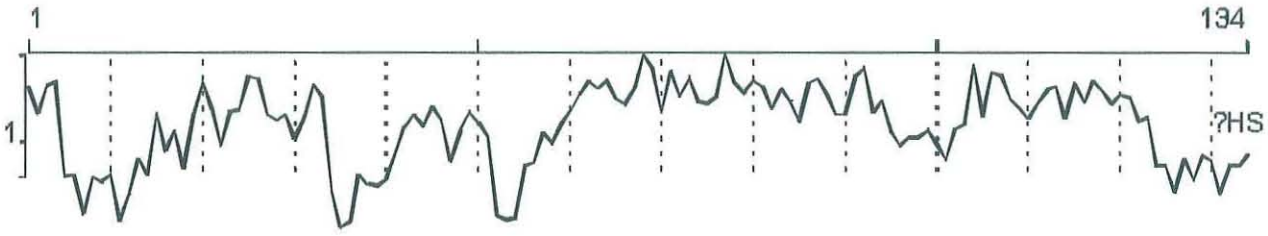

Figure 8 Ring width sequence for ancient oak in field adjacent to Pound Farm. Note narrow ring events

Table 1

List of samples

Core No	Origin of core	Cross-section size (mm)	Cross-section of tree	Total rings	Sapwood rings	ARW mm/year	Date of sequence	Felling period
01	Truss 4 east cruck blade	430 x 140	Half	47	+HS	2.93	AD 1370-AD 1416	AD 1426-62
02	Truss 4 collar	370 x 140	Half	55	+?HS	3.24	AD 1363-AD 1417	AD 1427-63?
03	Truss 3 strut	330 x 75	Half	51	+?HS	1.76	AD 1369-AD 1419	AD 1429-65?
04	Truss 5 east cruck blade	470 x 120	Half	78	-	1.93	AD 1316-AD 1393	after AD 1403
05	Truss 5 west cruck sample abandoned	520 x 140	Half	<50	-	-	-	-
06	Truss 1 cruck blade	350 x 120	Half	103	+HS	2.11	AD 1323-AD 1425	AD 1435-71
07	Truss 1 cruck blade	420 x 130	Half	63	+HS	1.65	AD 1353-AD 1415	AD 1425-61
08	Truss 2 collar	370 x 135	Half	61	+HS	3.51	AD 1381-AD 1441	AD 1451-87

Total rings = all measured rings

Sapwood rings: H/S heartwood/sapwood boundary, ?H/S possible heartwood/sapwood boundary

ARW = average ring width of the measured rings

Table 2 *t*-value matrix for samples **1 - 4** and **6 - 8** inclusive. \ = overlap < 15 years, - = t-values less than 3.00, * = empty triangle

Samples	pound02	pound03	pound04	pound06	pound07	pound08
pound01	-	4.37	-	3.45	5.21	-
pound02	*	4.14	-	4.40	3.74	4.25
pound03	*	*	3.39	6.74	7.86	3.45
pound04	*	*	*	4.25	-	\
pound06	*	*	*	*	4.97	4.75
pound07	*	*	*	*	*	-

Table 3 Dating the mean sequence **PoundT7**, AD 1316 - 1441 inclusive. *t*-values with independent reference chronologies

Area	Reference chronology	*t*-value
Herefordshire	14 Church Street, Hereford (Tyers 1996)	5.70
Herefordshire	Booth Hall and 16-18 High Town, Hereford (Boswijk and Tyers 1997)	6.84
Herefordshire	Gatley Park, Leominster (Tyers 1991)	5.29
Herefordshire	Hereford Cathedral Barn (Tyers 1996)	7.70
Herefordshire	Lower Brockhampton Gatehouse (Nayling 2001)	6.64
Herefordshire	Penrhos Court, near Kington (Tyers 1998b)	7.96
Herefordshire	White House, Vowchurch (Nayling 1999)	8.31

Table 4
Ring-width data from site master **PoundT7**, dated to AD 1316 - 1441 inclusive

Date	Ring widths (0.01mm)										No of samples									
AD 1316						484	564	382	382	386					1	1	1	1	1	
-	356	232	288	279	240	254	208	243	156	189	1	1	2	2	2	2	2	2	2	
-	200	268	284	230	227	207	246	248	230	202	2	2	2	2	2	2	2	2	2	
-	207	191	126	173	185	199	186	195	231	210	2	2	2	2	2	2	2	2	2	
AD 1351	208	158	196	195	224	207	233	233	179	151	2	2	3	3	3	3	3	3	3	
-	197	209	239	249	229	249	216	168	250	281	3	3	4	4	4	4	4	4	5	6
-	259	263	261	271	302	249	218	251	283	210	6	6	6	6	6	6	6	6	6	6
-	197	207	187	257	260	314	264	279	271	220	7	7	7	7	7	7	7	7	7	7
-	293	239	286	239	300	291	219	262	281	326	7	7	7	6	6	6	6	6	6	6
AD 1401	217	204	255	217	199	202	174	201	298	215	6	6	6	6	6	6	6	6	6	6
-	171	218	203	198	216	199	218	189	127	207	6	6	6	6	6	5	4	3	3	2
-	226	194	266	233	284	299	220	350	328	360	2	2	2	2	2	1	1	1	1	1
-	277	326	201	328	370	201	225	275	153	219	1	1	1	1	1	1	1	1	1	1
-	118										1									