Ancient Monuments Laboratory
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Summary

'The cottage' at 74 Liverpool Road, Birkdale includes a small two-bay cruck-framed house that is of a rare type reminiscent of an open hall. The property has recently undergone remedial repair work following a period of dereliction and vandalism. A tree-ring dating programme was commissioned by English Heritage to help inform repair decisions. The results indicate that timbers felled in the mid-seventeenth century are present in the building. Due to the likely presence of re-used timbers in the property the correct interpretation of the results is difficult to identify.

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Introduction

This document is a technical archive report on the tree-ring analysis of oak timbers from 'The Cottage' located at 74 Liverpool Road, Birkdale, Merseyside (NGR SD 3320 1543). 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.

'The Cottage' is a three-bay small house aligned north-south. The property lies on the corner of Liverpool Road and Crosby Road some 300m south of the centre of Birkdale, and is less than 2km from the sea (Figs 1 and 2). In the nineteenth century it was an isolated farmstead but by the early-twentieth century it became engulfed by the rapidly growing seaside resort of Southport. The southernmost bay is presumed to be a later box-framed addition to the two-bay cruck-framed northern part of the building (Fig 3). The northernmost bay has a bedroom above a kitchen and modern bathroom, whilst the central bay is open to the thatched roof. There is a single cruck truss separating the central and northern bays. At the time of the initiation of this project this grade II* building was undergoing English Heritage funded grant-aided repairs. A tree-ring sampling programme of the timbers in the cottage was requested by Jane Harding, the then local English Heritage Inspector, to inform repair decisions.

The request documentation (Harding pers comm.) and two separate building reports (Fletcher 1997, Smith 1997) discuss the development of the township of Birkdale and the structure of the building. Cartographic and documentary evidence suggests the building was an isolated property in the early nineteenth century, and that the beach was closer at that time. The hearth tax returns of AD 1673 suggest only 27 houses were present in seventeenth-century Birkdale. The central bay of the surviving structure, the housebody, open to the roof is evidently a rare survival of a once widespread vernacular type. The problem for tree-ring dating in the property is the widespread physical evidence for re-use of the timbers as well as the extensive documentary evidence for re-use of timbers within the area. Fletcher (1997, section 6.2) suggests many came from a building of similar dimensions to the current two northern bays, which he quite reasonably assumes was on or near the current site. However, he also quotes Farrer and Brownbill (1907) as indicating that the Lords of the manor of Birkdale salvaged material from the adjacent shoreline and thinks that 'portions of ship wreckage most likely found their way into the fabric of local dwellings'. Certainly alternative sources of building timber are difficult to identify on this windswept coastal strip, and the recycling of earlier buildings into later dwellings seems inevitable. Use of ships timbers is less common but Birkdale is as likely a candidate as I have seen for such re-use.

Methodology

The general methodology and working practises used at the Sheffield Dendrochronology Laboratory are described in English Heritage (1998). The methodology used for this building was as follows.

An initial visit was made during which a survey was undertaken to identify the location of any suitable timbers visible in the structure. This survey aimed at identifying those oak timbers with the most suitable ring sequences for analysis. Those timbers with more than 50 annual rings and some survival of the original sapwood and bark-edge were sought. The timbers in this building were generally of small scantling size and relatively low numbers of rings. The short-list of appropriate material was then compared with the areas and phases of the property selected for analysis in the sampling request documentation. The sampling request covered the primary construction timbers from the northern two-bay house, and included the extensive potentially re-used material present in the structure. A decision as to whether to proceed with the analysis of the only phase that contained suitable timber was requested from English Heritage, and only after this was forthcoming was sampling initiated in the property. Subsequently a second visit was made during which the sampling was undertaken.

The most promising 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. The ring sequences in the cores were revealed by sanding.

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 1999a). The ring sequences were plotted onto semi-log graph paper to enable visual comparisons to be made between sequences. In addition cross-correlation algorithms (Baillie and Pilcher 1973) were employed to search for positions where the ring sequences were highly correlated. These positions were checked visually using the graphs 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 these positions are supported by satisfactory visual matching.

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 (Tyers 1998). These figures are applicable to oaks from England and Wales. 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.

A further important element of the tree-ring analysis of buildings and archaeological assemblages is the identification of 'same tree' groups within the sampled material. Inspection of timbers, both in buildings and archaeological sites, often suggests that the patterns of knots or branching in timbers are so similar that they appear to be derived from a single tree. Tree-ring analysis is often used to support these suggestions. The identification of 'same tree' groups is based on a combination of high levels of matching between samples, extremely similar longer term growth trends, and individual anatomical anomalies within the timbers. High *t*-values are not by themselves necessarily indicative of two series being derived from a single tree. Conversely low *t*-values do not necessarily exclude the possibility. It is the balance of a range of information that provides the evidence.

Results

The initial assessment had identified that there were very few suitable samples within the building. The southern bay contained no suitable material since it is of small scantling and fast grown, some material in the southern bay is softwood. The timbers in the chimneys were equally disappointing, being also of small scantling and fast growth rates. As a result only 5 timbers were identified that were suitable for sampling but the decision was taken to proceed following consultation with English Heritage. The samples were numbered **1-5** inclusive (Table 1).

Two of the samples (numbers **2** and **5**) when examined in the laboratory were rejected because they had too few rings for reliable analysis. The remaining three samples were measured and the resultant series were then compared with each other. These three sequences were found to match together to form an internally consistent group (Table 2; Fig 4). A 137-year site mean chronology was calculated, named BIRKDALE. The site mean was then compared with dated reference chronologies from throughout the British Isles and northern Europe. A single well correlated position was identified for the BIRKDALE sequence. Table 3 shows example correlations of the BIRKDALE mean sequence at the dating position

identified, AD 1482 - 1618 inclusive, against independent reference chronologies. Table 4 lists the BIRKDALE site mean chronology.

Discussion

The 137-year chronology BIRKDALE is dated AD 1482 to 1618 inclusive. It was created from three timbers. One of these dated samples included some sapwood, and this has a last ring for AD 1618. Another sample is complete to the heartwood/sapwood boundary (Table 1) and also ends at AD 1618. Inspection of the bar diagram (Fig 4) suggests they are most likely derived from a single felling period, although this cannot be proven without sapwood and surviving bark-edge on each timber. However making due allowance for missing sapwood and assuming they are the product of a single building or other object suggests the felling date for these timbers was between AD 1628 and AD 1656. The dated timbers include a ridge piece, a purlin and a timber from the kitchen ceiling. The latter of these is a round timber, crudely squared up and is one of the apparently re-used timbers in this present structure. The building reports indicate there is a strong possibility that the other two are also re-used but this is not entirely clear.

Conclusion

The dendrochronological analysis of timbers from Birkdale identifies the northern two-bay cruck-framed structure as incorporating timbers felled in the second quarter of the seventeenth century. These timbers cross-match reasonably well, especially considering their lengths, so it seems unlikely that the dated material is derived from more than one structure. The relevance of the result is dependant of whether the timbers are re-used. There seems to me to be three possible interpretations all of which seem equally likely from the dendrochronological evidence.

1) *Re-used timbers from an earlier building on the same site.* If we assume that all the timbers are re-used, and derived from an original building on the site then this suggests both that a mid seventeenth-century property was present on the site, and probably indicates that the present structure dates from some time after the mid-seventeenth century. Although I am not personally aware of the extent of the hearth tax records if this is true then the original building is presumably part of the hearth tax returns for the township since it should have been extant at that time.

2) *Re-used timbers from elsewhere.* If the timbers are re-used from another building, or even a vessel, then they presumably still indicate that the present structure dates from some time after the mid-seventeenth century.

3) *The extant building is mid-seventeenth century.* If the timbers are not re-used then presumably the current property is the, admittedly much modified, surviving fragment of a building dated by

tree-ring evidence to the second quarter of the seventeenth century. If this is true then it seems evident that the current vernacular architectural assumptions about such small houses are in error. The easiest way to test this would perhaps be to tree-ring date some of the similar houses referred to by Fletcher (1997) such as Shaw's House, or Sutton's House both in Birkdale. If analysis of these was to be undertaken it should be a prerequisite that any suitable timbers in either property were definitely understood to be primary.

Acknowledgements

The sampling and analysis programme was funded by English Heritage. Mr Terry and Mrs Beryl Morris kindly allowed me access to their home, coped with the dust and dirt generated by the sampling, and provided tea and sandwiches. Cathy Groves provided useful discussion.

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Table 1

List of core samples from 74 Liverpool Road, Birkdale

Core No	Origin of core	Total rings	Sapwood rings	ARW (mm/year)	Date of sequence	Felling period
1	Ridge piece	75	8	0.79	AD 1544-1618	AD 1620-56
2	North-east purlin	-	-	-	not measured	-
3	North-west purlin	103	-	0.93	AD 1482-1584	after AD 1594
4	Kitchen ceiling beam	69	h/s	1.52	AD 1550-1618	AD 1628-64
5	East cruck blade	-	-	-	not measured	-

KEY

Total rings = all measured rings
Sapwood rings: h/s = heartwood/sapwood boundary
ARW = average ring width of the measured rings

Table 2

t-value matrix for the timbers forming the chronology BIRKDALE

	3	**4**
1	3.78	4.42
3		4.13

Table 3

Dating the mean sequence BIRKDALE, AD 1482-1618 inclusive. *t*-values with independent reference chronologies

Area	**Reference chronology**	***t*-values**
Cheshire	Whixall Moss Manor House (Lagaerd pers comm)	5.88
Devon	Exeter Quay (Mills 1988)	5.27
Gtr Manchester	Market Place Stockport (Tyers 1999b)	5.78
Gtr Manchester	Peel Hall; nr Manchester (Leggett 1980)	5.22
Herefordshire	Lower House Farm Tupsley (Tyers 1997)	4.53
Northern Ireland	Belfast regional master (Baillie 1977a)	4.82
Nottinghamshire *et al*	East Midlands regional master (Laxton and Litton 1988)	5.17
Scotland	South Central Scotland regional master (Baillie 1977b)	4.94
Shropshire	Brookgate Farm (Miles *et al* 1993)	5.54
Staffordshire	Black Ladies nr Brewood (Tyers 1999c)	5.11
Wales	Llanigon; Lower Wenallt (Morgan 1980)	4.42
West Yorkshire	Finthorpe Barn (Boswijk 1997)	4.94
Worcestershire	Droitwich Upwich (Groves and Hillam 1997)	5.04

Table 4

Ring-width data from site master BIRKDALE dated AD 1482-1618 inclusive

Date	Ring widths (0.01mm)										No of samples									
AD 1482		293	292	296	259	207	238	141	137	139		1	1	1	1	1	1	1	1	1
	122	102	73	98	117	141	92	89	100	83	1	1	1	1	1	1	1	1	1	1
AD 1501	91	81	63	80	85	47	30	27	37	63	1	1	1	1	1	1	1	1	1	1
	94	123	146	124	110	108	114	84	78	73	1	1	1	1	1	1	1	1	1	1
	75	97	76	77	66	73	70	96	76	59	1	1	1	1	1	1	1	1	1	1
	106	79	78	85	116	120	128	111	88	95	1	1	1	1	1	1	1	1	1	1
	105	48	42	32	36	52	92	77	76	151	1	1	1	2	2	2	2	2	2	3
AD 1551	217	193	184	193	164	154	125	128	177	89	3	3	3	3	3	3	3	3	3	3
	122	130	123	162	137	66	72	88	100	112	3	3	3	3	3	3	3	3	3	3
	90	67	62	54	70	49	70	65	81	101	3	3	3	3	3	3	3	3	3	3
	95	80	98	109	127	160	109	112	124	91	3	3	3	3	2	2	2	2	2	2
	64	60	100	95	122	96	81	70	57	76	2	2	2	2	2	2	2	2	2	2
AD 1601	80	85	118	116	92	133	135	119	54	73	2	2	2	2	2	2	2	2	2	2
	74	84	111	115	142	76	88	101			2	2	2	2	2	2	2	2		

Figure 1 Location of Birkdale within England and Wales,

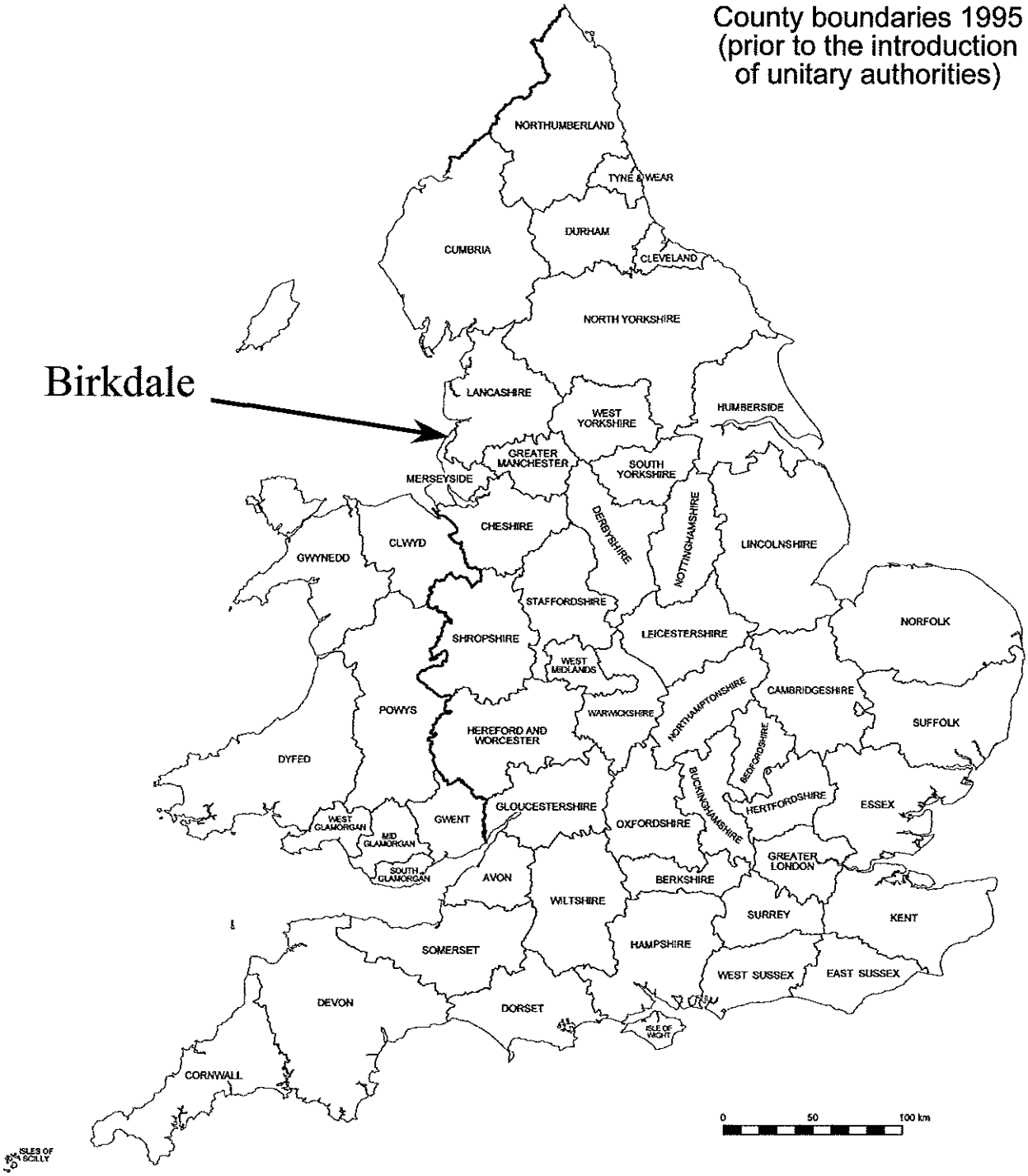

Figure 2 Location of 74 Liverpool Road, Birkdale

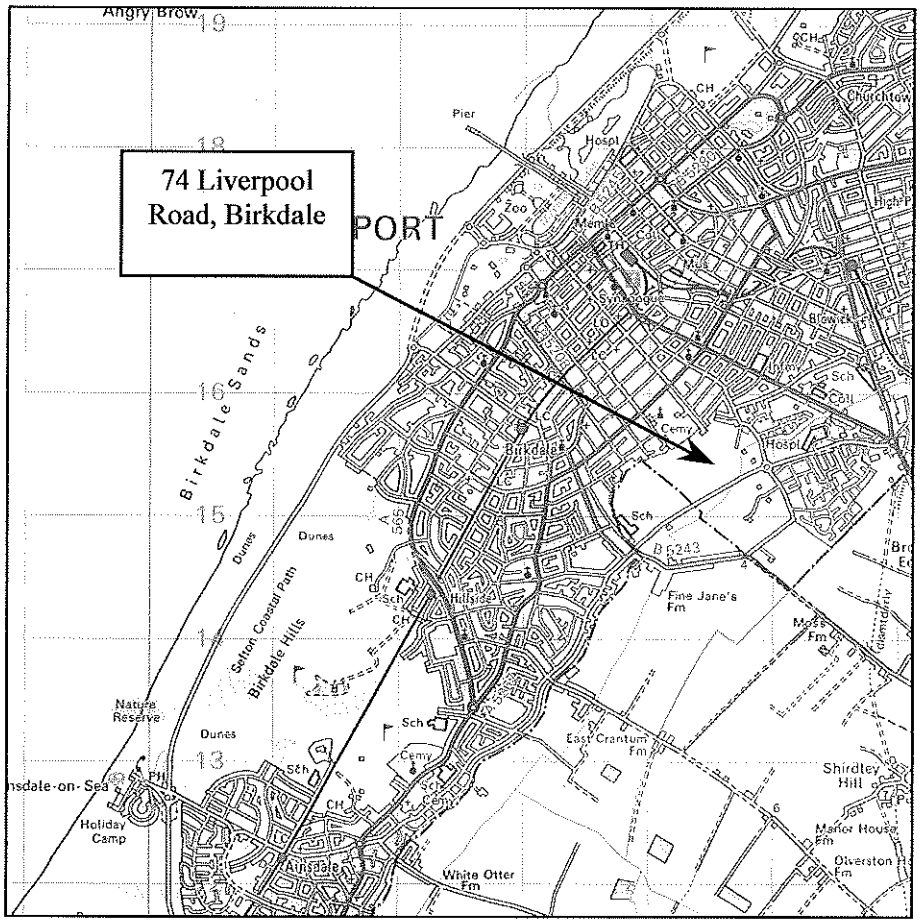

Figure 3 Isometric view of 74 Liverpool Road, Birkdale showing the sampled timbers and the approximate location of the sampled timbers. Viewed from the south-east (after Ashenheim unpubl)

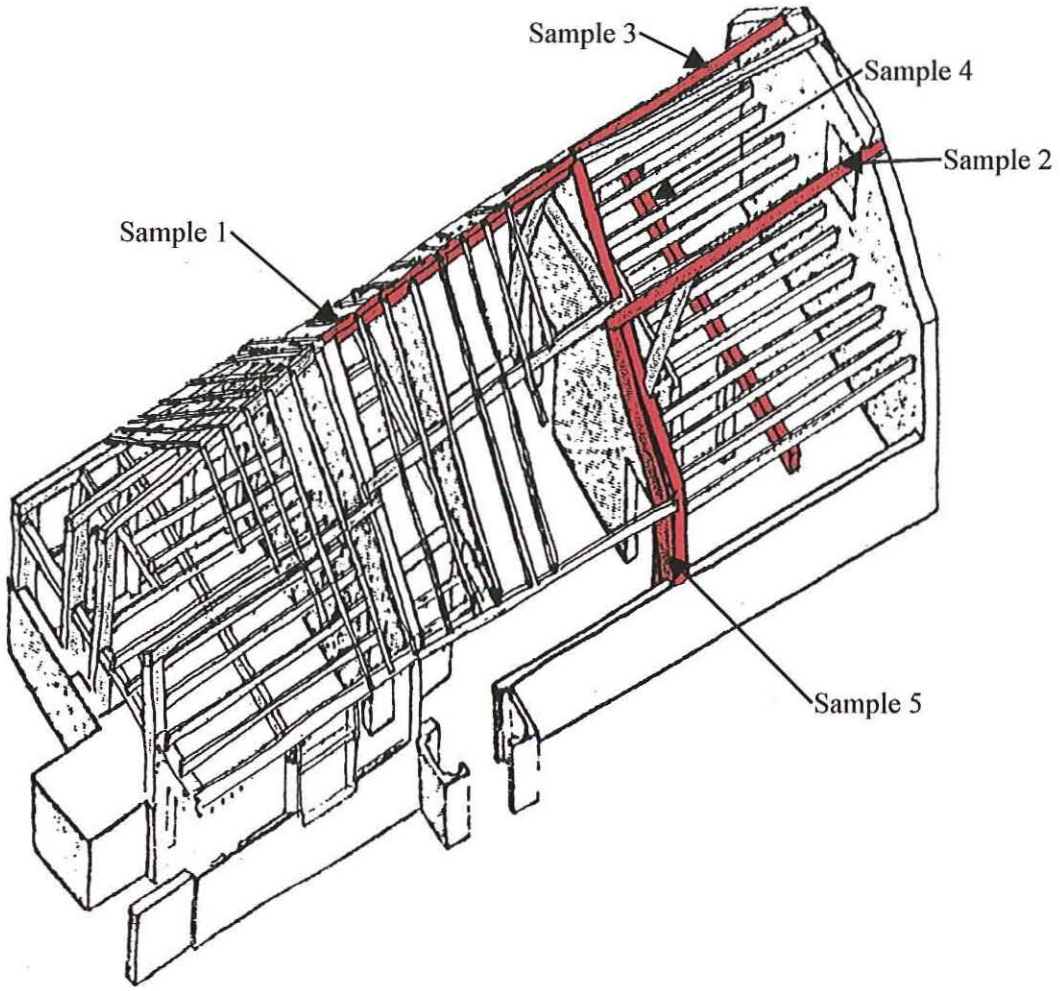

Figure 4 Bar diagram showing the chronological positions of the three dated timbers from 74 Liverpool Road, Birkdale. The felling period for each sequence is also shown