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TREE-RING ANALYSIS OF TIMBERS FROM ABBEY FARM BARN, SNAPE SUFFOLK

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Summary

This grade II* listed aisled barn retains many timbers presumed to be from the primary phase of construction, along with a number of re-used timbers and more recent additions. Dendrochronological investigation was requested to assist in dating its origins and identifying non-primary timbers. None of the sampled timbers dated, the timbers having few rings, and there being little material with which to compare their ring sequences from this geographical area.

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Introduction

This aisled barn is situated 60m north west of Abbey Farm (NGR TM 390580) near the village of Snape (Fig 1). Its general form, illustrated in Figures 2 - 4, with passing braces and arcade posts curved outwards at the lower end, suggests a date of around AD 1300. Its relationship to other buildings on the site is illustrated in Figure 5. There is some disagreement as to whether the extant seven-bay structure is all original, the westernmost two bays appearing to many to have been reconstructed at a later date. Other later alterations and a largely twentieth-century roof are also evident. Dendrochronological dating was requested by the local English Heritage architect (Trudi Hughes) in order to try to ascertain the importance and chronology of this building and assess the impact of proposed changes to it. It was also of interest in trying to provide greater replication of dated oak material from Suffolk, which is at present poorly represented in the dendrochronological dataset.

This report only details the dendrochronological study of the building, which forms part of a wider study into its history and development.

Methodology

The site was visited on two occasions in February and March 1999, when the timbers were assessed for their potential use in dendrochronological study. On the first occasion mains electricity was unavailable and much of the time was spent in assessing the potential for sampling. Samples were taken from twelve timbers, the locations of which are described in Table 1 and illustrated in Figures 2 and 4.

Core samples were obtained using a 15mm auger attached to an electric drill. The cores were glued to wooden laths, labelled, and stored for subsequent analysis. The cores were prepared for measuring by sanding using an electric belt-sander with progressively finer grit papers down to 400 grit. Any further preparation necessary, eg where bands of narrow rings occurred, was done manually. Only samples with more than 45-50 rings were measured and used in subsequent analyses as sequences with fewer than this number of rings rarely give reliable crossmatching. Suitable samples had their tree-ring sequences measured to an accuracy of 0.01 mm using a specially constructed system utilizing a binocular microscope with the sample mounted on a travelling stage with a linear transducer linked to an Atari desktop computer. The software used in measuring and subsequent analysis was written by Ian Tyers (pers comm 1992).

Ring sequences were plotted on translucent semi-log graph paper to allow visual comparisons to be made between sequences on a light table. This activity also acts as a measure of quality control in identifying any errors in the measurements when the samples crossmatch. Statistical comparisons were made using Student's *t*-test (Baillie and Pilcher 1973; Munro 1984). The *t*-values quoted below were derived from the original CROS program (Baillie and Pilcher 1973). Those *t*-values in excess of 3.5 are taken to be indicative of acceptable matching positions provided that they are supported by satisfactory visual matches, and give consistent matching positions.

When crossmatching between samples is found, their ring-width sequences are meaned to form an internal site mean sequence which is then compared with a number of reference chronologies

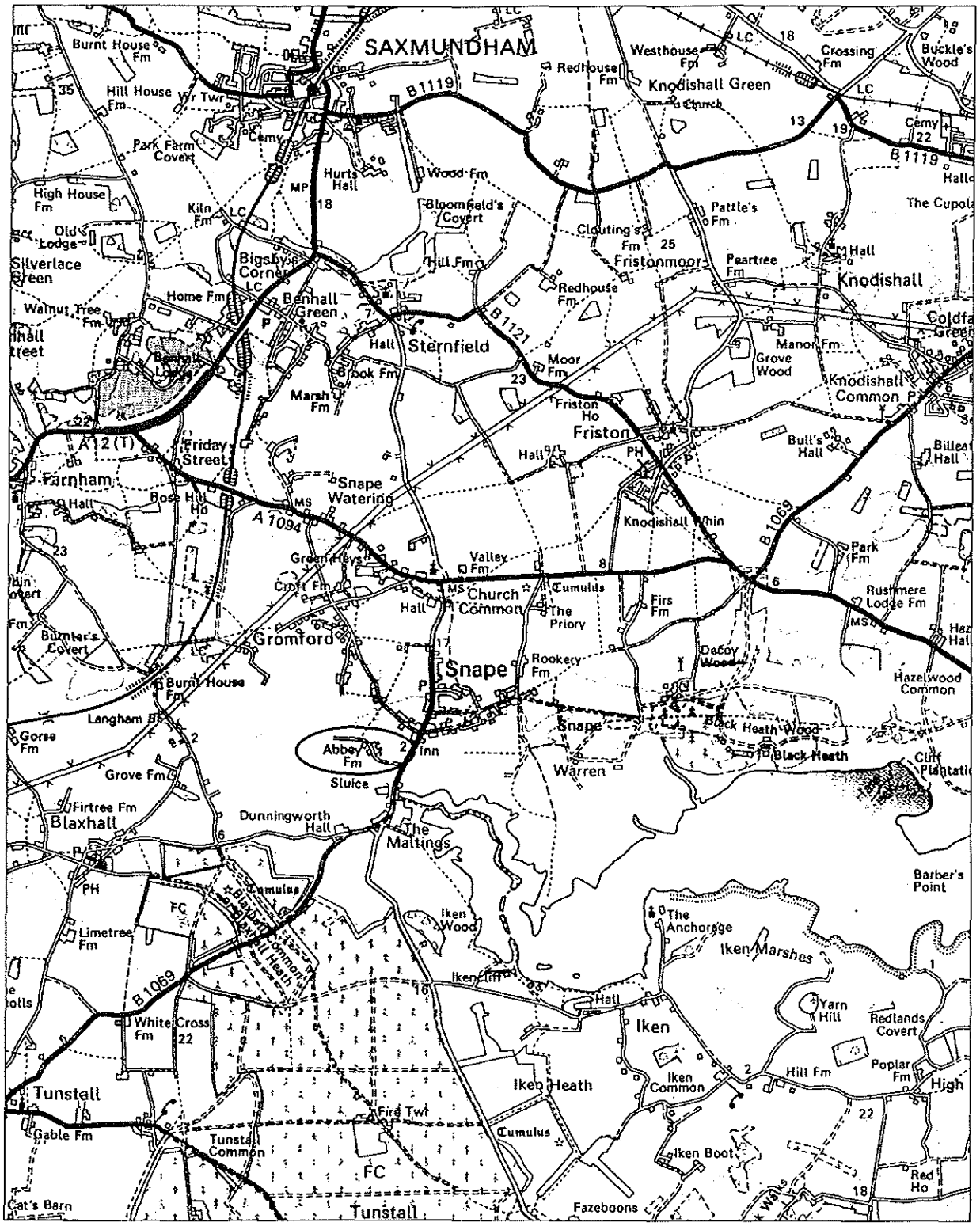


Figure 1: Map to show the general location of Abbey Farm, Snape

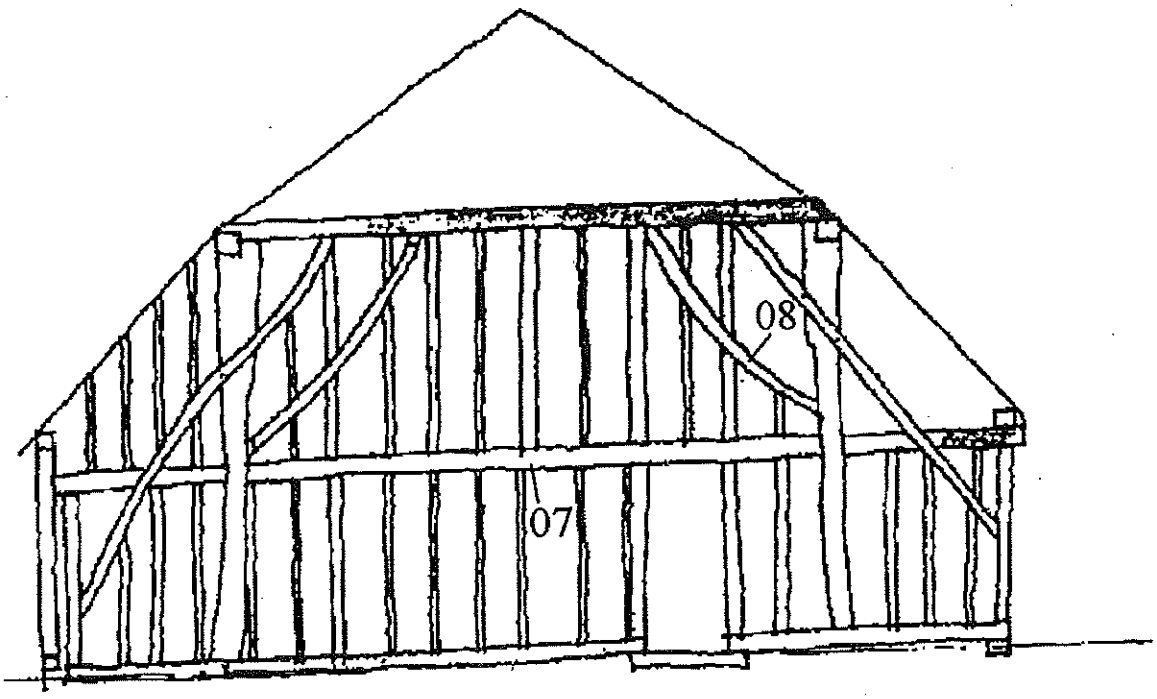


Figure 2: Internal view of the east gable, showing the locations of samples taken for dendrochronology

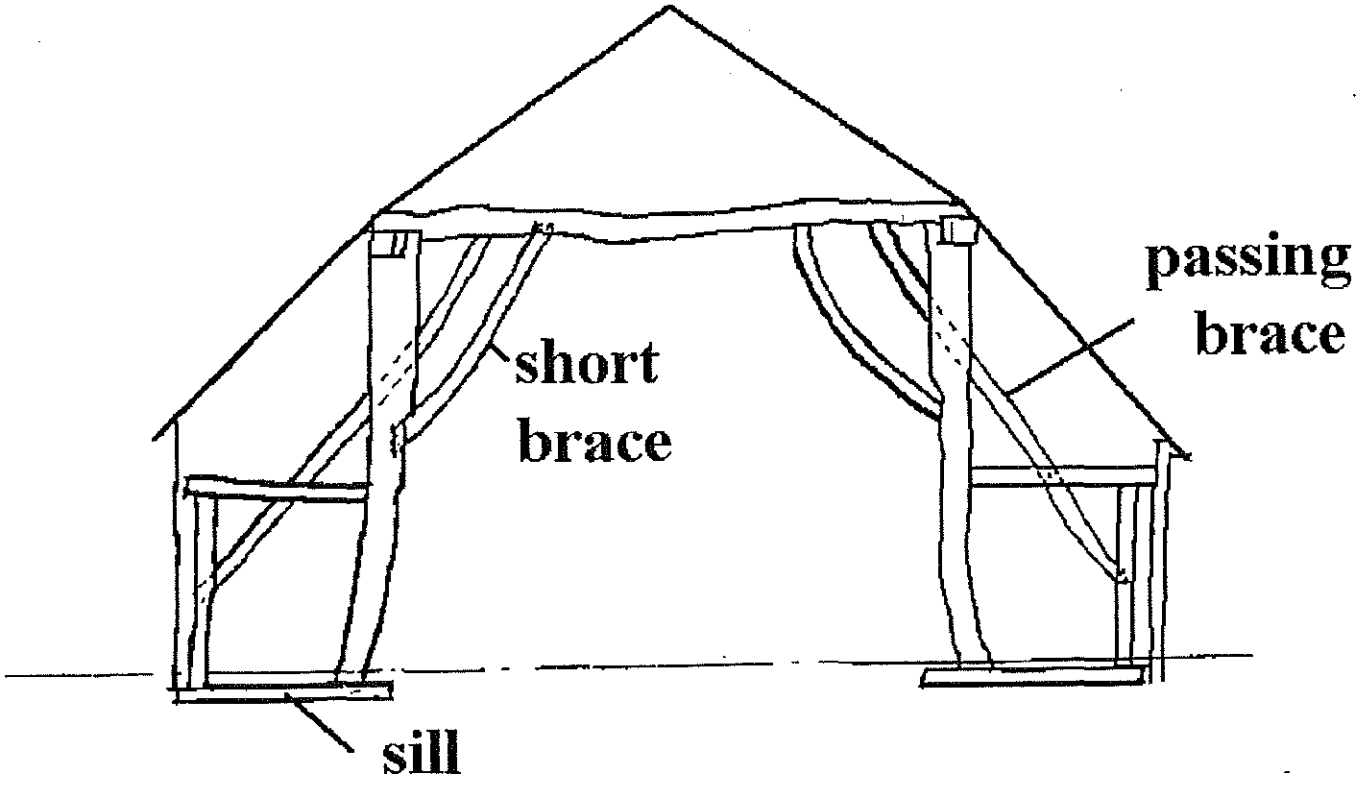
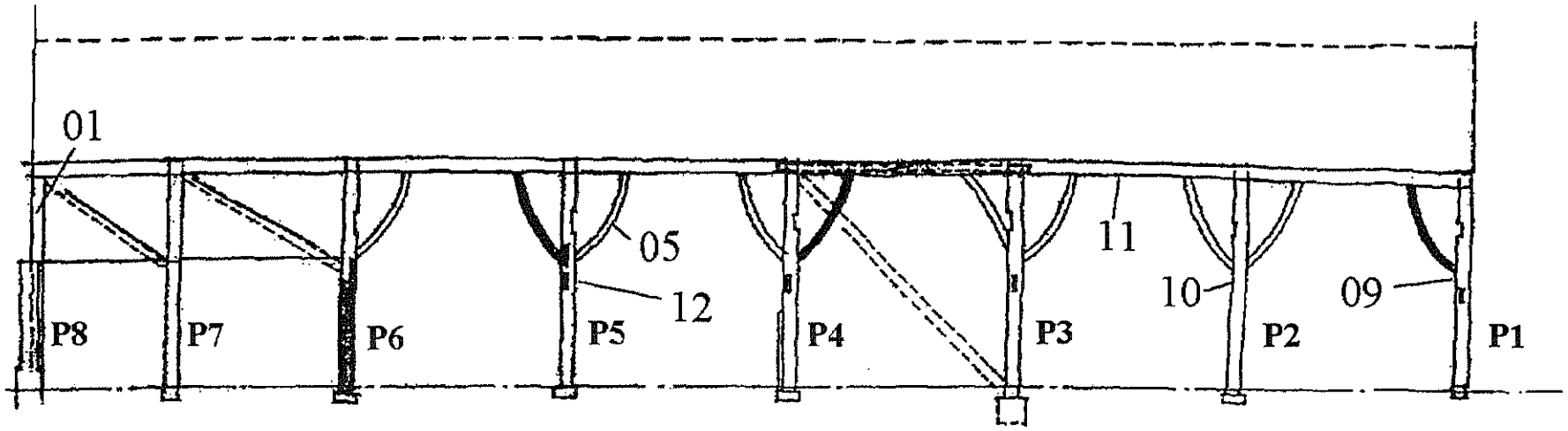


Figure 3: Sketch of truss 6, showing the general form of the trusses



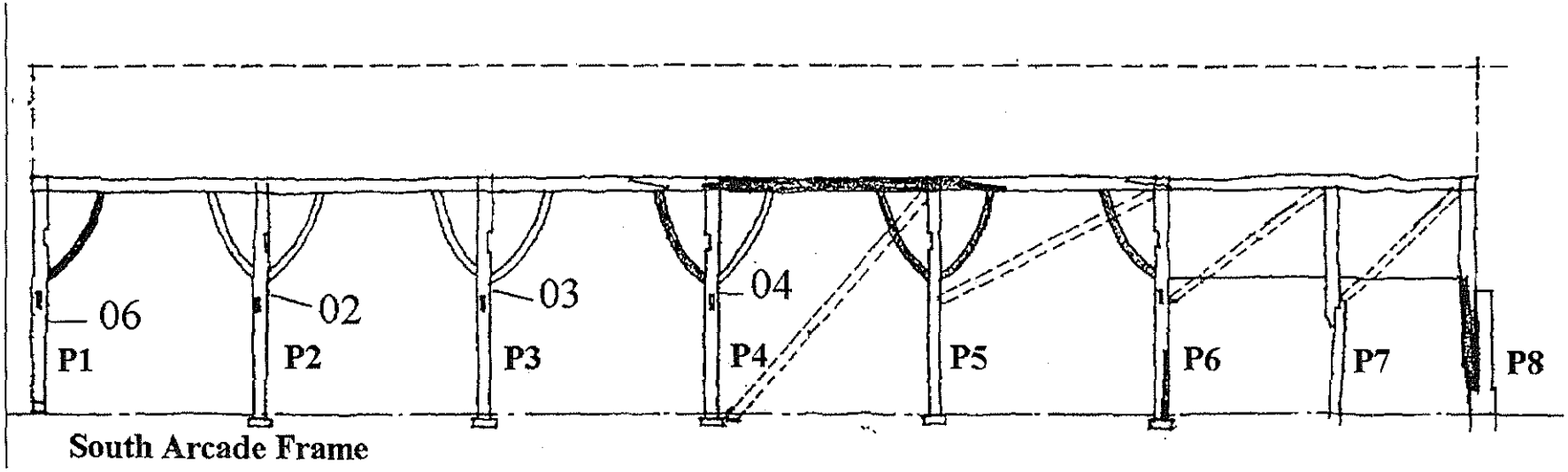


Figure 4: Drawings of the arcade frames showing the locations of samples taken for dendrochronology

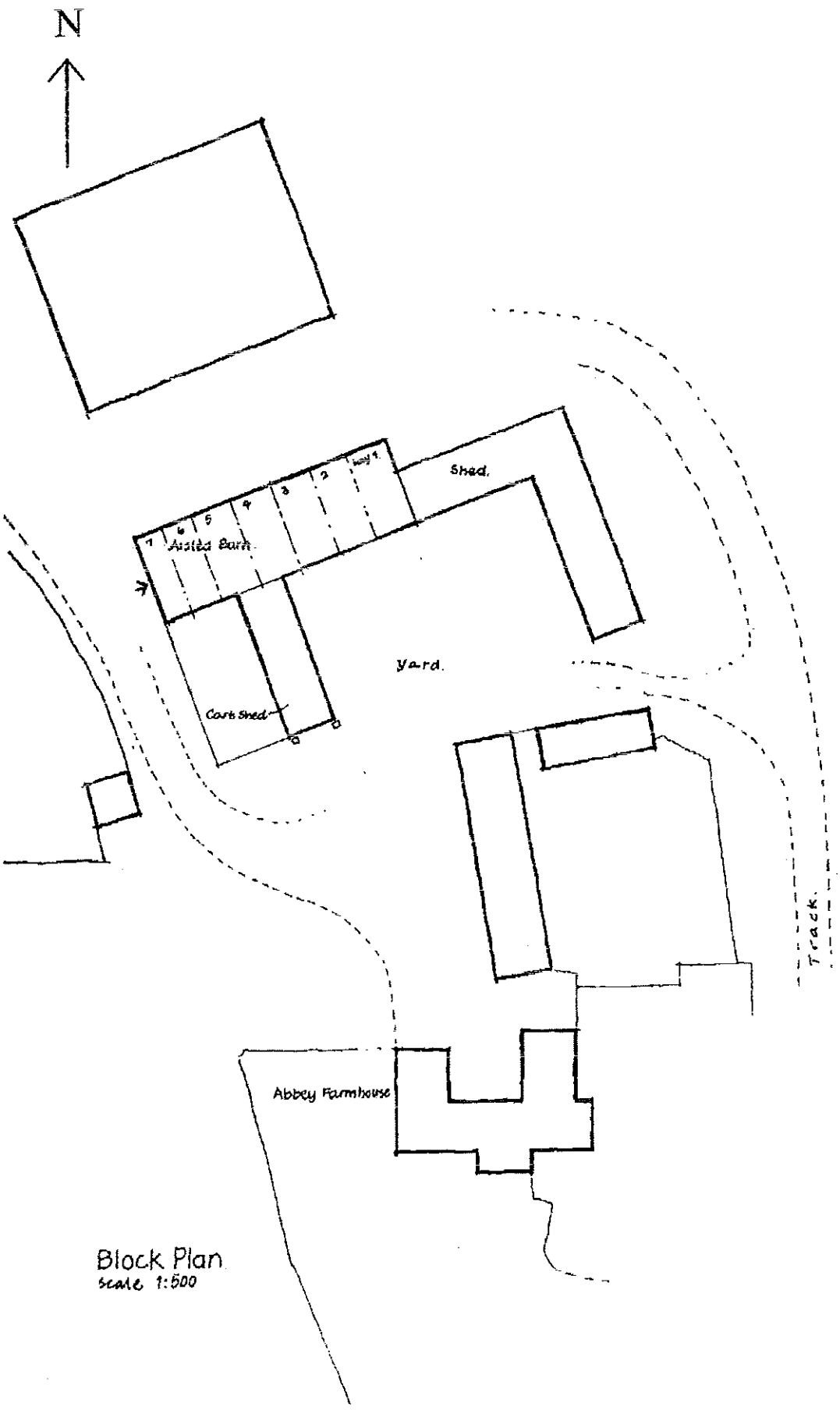


Figure 5: Site plan of Abbey Farm, Snape, showing the relationship of the aisled barn to other buildings on the site

(multi-site chronologies from a region) and dated individual site masters in an attempt to date it. Individual long series which are not included in the site mean(s) are also compared with the database to see if they can be dated.

The dates thus obtained represent the time of formation of the rings available on each sample. Interpretation of these dates then has to be undertaken to relate these findings to the construction date of the phase under investigation. An important aspect of this interpretation is the estimate of the number of sapwood rings missing. In this instance, the sapwood estimates are based on those proposed for this area by Miles (1997), in which 95% of samples are likely to have from 9 to 41 sapwood rings. Where bark is present on the sample the exact date of felling of the tree used may be determined.

The dates derived for the felling of the trees used in construction do not necessarily relate directly to the date of construction of the building. However, evidence suggests that, except in the re-use of timbers, construction in most historical periods took place within a very few years after felling (Salzman 1952; Hollstein 1965).

Results

All the timbers were of oak (*Quercus* spp.). Details of individual samples are given in Table 1. The nature of the timbers was such that many of the cores had breaks in and there was thus some uncertainty about the sequences measured. The plots of the series showed some similarities, but even after careful reassessment at break points in the core where rings may have been missing, no series were satisfactorily crossmatched. The ring width data for the measured series is given in Table 2.

Only one sample (SNP01) was taken from the two westernmost bays which it was thought may have been reconstructed and/or made from re-used timbers. This timber retained its bark and had been fashioned in such a way that it did not look original to the building. None of the other timbers in these two bays were judged to be suitable for further dendrochronological study.

Although the original brief was to attempt to identify primary and non-primary timbers, too few timbers were found to have sufficient rings to make a more extensive study possible.

Each measured series was compared individually with a range of site and regional chronologies, but no replicated significant matches were found.

Table 1: Oak (*Quercus* spp.) timbers sampled from Abbey Farm Barn, Snape, Suffolk

h/s = heartwood-sapwood boundary

Sample No	Origin of core	Total No of years	Average growth rate (mm yr^{-1})	Sapwood details
SNP01	Arcade post 8, north	64	2.58	20 + bark
SNP02	Arcade post 2, south	65	1.95	5
SNP03	Arcade post 3, south	52	2.29	-
SNP04	Arcade post 4, south	47	not measured	-
SNP05	East brace to post 5, north	35	not measured	h/s
SNP06	Arcade post 8, south	77	1.92	-
SNP07	Mid-rail, east wall	75	1.13	5

SNP08	South curved brace, east wall	38	not measured	-
SNP09	Arcade post 1, north	70	2.26	-
SNP10	Arcade post 2, north	80	2.33	h/s
SNP11	Arcade plate, bay 2, north	30	not measured	-
SNP12	Arcade post 5, north	54	2.17	-

Interpretation and Discussion

Although a number of ring sequences had sufficient rings to make crossmatching a possibility, the lack of replicated internal crossmatching between the timbers meant that no site chronology could be formed. If indeed the building does contain more than one phase of construction, then the few samples taken here as being suitable for dendrochronological purposes, may come from more than one phase, making the likelihood of internal crossmatching less likely. Individual timbers were compared with the reference dataset, but again, no timbers gave replicated significant matches. All the samples therefore remain undated.

There are several reasons why the timbers have not successfully dated. Firstly, the cores themselves often split during coring, and although the breaks appeared to be such that a continuous ring sequence could still be measured, it is possible that rings were lost between the sections of those cores affected. Secondly, whilst several sequences exceeded fifty rings, none was longer than eighty rings. Given that very little dated material is available for Suffolk as yet, these relatively short sequences are less likely to date than they may in other regions. It is possible that in years to come, as the available data set for Suffolk increases, some of these samples may be dated.

Acknowledgements

I am very grateful to Richard Bond, English Heritage, for arranging access to the site and his useful discussions and encouragement during the fieldwork. Graham Hussey provided the drawings which were adapted for use in this report and assisted me in finding a hire company to get a generator when mains electricity was unavailable. I should also like to thank the owners, Mr and Mrs Raynor for their hospitality during my visits.

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Table 2: Ring-width data for the measured undated oak sequences from Abbey Farm barn, Snape, Suffolk

Year	ring widths (0.01mm)
SNP01	
1	672 348 466 455 396 483 451 336 391 392
	313 281 284 328 271 303 379 339 302 261
	296 536 368 270 204 190 240 221 275 231
	186 181 176 200 297 247 300 270 266 210
	258 413 264 266 260 189 183 154 111 88
51	70 152 108 116 134 91 109 151 129 126
	106 139 138 132
SNP02	
1	221 162 206 210 97 184 242 195 167 139
	187 254 301 269 165 270 307 273 159 133
	154 168 141 163 171 189 123 177 204 267
	198 143 146 148 164 208 131 149 205 177
	198 122 174 211 296 225 345 238 279 157
51	219 147 208 148 164 173 121 107 129 199
	364 182 210 291 214
SNP03	
1	360 421 480 313 288 291 374 388 241 231
	221 260 239 289 208 231 148 151 137 278
	391 339 270 279 255 211 238 169 171 151
	203 261 144 133 180 198 195 173 266 289
	176 169 195 192 188 193 125 108 93 99
51	119 168
SNP06	
1	386 422 334 424 351 366 395 289 352 490
	330 282 260 302 224 260 250 200 234 216
	223 168 145 159 162 122 154 152 172 115
	93 105 215 260 213 207 144 141 124 110
	108 124 119 165 156 178 145 177 164 188
51	197 171 118 130 138 110 118 113 133 94
	81 107 126 153 145 128 152 113 166 121
	114 99 135 181 169 204 211
SNP07	
1	326 454 404 288 316 206 190 216 133 134
	206 192 137 132 150 140 168 147 108 121
	110 149 141 123 109 94 77 133 111 104
	106 77 99 92 101 114 71 81 55 60
	57 58 60 51 54 69 59 47 59 65
51	58 57 54 56 60 75 51 59 49 48
	48 37 52 36 38 63 65 49 64 69
	104 104 126 151 136

Year	ring widths (0.01mm)
SNP09	
1	341 318 462 349 303 386 313 308 402 443
	296 365 363 408 292 355 260 234 196 249
	267 230 163 114 159 199 261 227 189 185
	146 168 192 164 164 177 193 270 202 163
	121 192 157 205 205 208 152 187 223 195
51	165 184 225 146 151 167 175 230 216 236
	203 162 199 145 145 152 145 137 151 190
SNP10	
1	513 256 239 296 355 322 269 309 307 305
	167 203 242 325 357 215 250 283 220 248
	206 233 209 187 167 193 172 216 261 255
	222 234 291 282 238 264 158 176 207 218
	160 180 187 153 153 133 162 250 232 251
	210 217 194 224 214 247 216 164 150 132
	146 127 169 206 203 169 195 168 275 196
	135 239 226 295 377 326 322 364 301 340
SNP12	
1	405 421 303 354 394 228 367 390 356 276
	258 266 402 476 385 320 311 254 362 295
	355 272 243 211 217 207 238 190 170 235
	202 248 212 155 146 120 97 112 129 99
	83 80 105 71 63 54 53 61 89 85
51	103 66 73 75