

PIRTON GRANGE, SHILLINGTON ROAD,
PIRTON, HERTFORDSHIRE
TREE-RING ANALYSIS OF TIMBERS
FROM THE GATEHOUSE

SCIENTIFIC DATING REPORT

Martin Bridge



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NGR: TL 1229 3294

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ISSN 1749-8775

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SUMMARY

A total of six samples were taken from various oak elements judged likely to be of greatest age in the gatehouse, in which newer timbers were also evident. Some timbers were found to be of elm, including the north-east corner post, all the attic joists, and several studs. The two oak corner posts in the south wall almost certainly came from the same tree, but neither this combined ring-width series, nor any of the others, gave acceptable consistent matches in comparisons with dated reference material. All the timbers remain undated therefore.

CONTRIBUTOR

Dr M C Bridge

ACKNOWLEDGEMENTS

The sampling and analysis of these timbers was funded by English Heritage (EH), and requested by Malcolm Starr (English Heritage). The work was commissioned by Dr Peter Marshall (EH Scientific Dating Team). I am grateful to the architect, Laurane Bubbins, for arranging access, and accompanying me on site. The owners, Mr and Mrs Moffatt made a large party of specialists very welcome and were most hospitable. Cathy Tyers (Sheffield University) and Derek Hamilton are thanked for their comments on an earlier draft of this report.

ARCHIVE LOCATION

Hertfordshire HER, Historic Environment Unit, Environment Department, Hertfordshire County Council, County Hall, Hertford, Hertfordshire. SG13 8DN

DATE OF INVESTIGATION

2011

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INTRODUCTION

This small, almost square two-storied gatehouse faces east, forming the entrance to this moated site which itself lies approximately 7km north west of central Hitchin (Figs 1 and 2). This timber-framed building stands on a brick bridge over the moat. The timbers are whitewashed on their internal surfaces. The rear elevation (west) facing the house has a chevron infill pattern between the studs. The top of the building is leaning some 400mm to the south, and this Grade II* listed building is on the Heritage at Risk Register. Dendrochronological dating was requested by the EH Historic Buildings Architect Malcolm Starr, to inform grant-aided repairs being undertaken to safeguard the long-term survival of this structure.

METHODOLOGY

The timbers were assessed and sampling was carried out in January 2011. In the initial assessment, accessible oak timbers with more than 50 rings and where possible traces of sapwood were sought, although slightly shorter sequences are sometimes sampled if little other material is available. Those building timbers judged to be potentially useful were cored 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 polished on a belt sander using 80 to 400 grit abrasive paper to allow the ring boundaries to be clearly distinguished. The samples had their tree-ring sequences measured to an accuracy of 0.01mm, using a specially constructed system utilising a binocular microscope with the sample mounted on a travelling stage with a linear transducer linked to a PC, which recorded the ring widths into a dataset. The software used in measuring and subsequent analysis was written by Ian Tyers (2004). Cross-matching was attempted by a combination of visual matching and a process of qualified statistical comparison by computer. The ring-width series were compared for statistical cross-matching, using a variant of the Belfast CROS program (Baillie and Pilcher 1973). Ring sequences were plotted to allow visual comparisons to be made between sequences. This method provides a measure of quality control in identifying any potential errors in the measurements when the samples cross-match.

In comparing one sample or site master against other samples or chronologies, *t*-values over 3.5 are considered significant, although in reality it is common to find demonstrably spurious *t*-values of 4 and 5 because more than one matching position is indicated. For this reason, dendrochronologists prefer to see some *t*-value ranges of 5, 6, and higher, and for these to be well replicated from different, independent chronologies with both local and regional chronologies well represented, except where imported timbers are identified. Where two individual samples match together with a *t*-value of 10 or above, and visually exhibit exceptionally similar ring patterns, they may have originated from the same parent tree. Possible same-tree derivation can also be identified through the external characteristics of the timber itself, such as knots and shake patterns. Lower *t*-values however do not preclude same tree derivation.



Figure 1. Map to show the location of Pirton Grange (based on the Ordnance Survey map with permission of the Controller of Her Majesty's Stationery Office, ©Crown Copyright)



Figure 2. Map showing the location of Pirton Grange within its immediate environs (based on the Ordnance Survey map with permission of the Controller of Her Majesty's Stationery Office, ©Crown Copyright)

Ascribing felling dates and date ranges

Once a tree-ring sequence has been firmly dated in time, a felling date, or date range, is ascribed where possible. With samples which have sapwood complete to the underside of, or including bark, this process is relatively straightforward. Depending on the completeness of the final ring, ie if it has only the spring vessels or early wood formed, or the latewood or summer growth, a precise felling date and season can be given. If the sapwood is partially missing, or if only a heartwood/sapwood transition boundary survives, then an estimated felling date range can be given for each sample. The number of sapwood rings can be estimated by using an empirically derived sapwood estimate with a given confidence limit. If no sapwood or heartwood/sapwood boundary survives then the minimum number of sapwood rings from the appropriate sapwood estimate is added to the last measured ring to give a *terminus post quem* (*tpq*) or felled-after date.

A review of the geographical distribution of dated sapwood data from historic timbers has shown that a sapwood estimate relevant to the region of origin should be used in interpretation, which in this area is 9–41 rings (Miles 1997). It must be emphasised that dendrochronology can only date when a tree has been felled, not when the timber was used to construct the structure or object under study.

RESULTS AND DISCUSSION

Basic information about the samples taken is presented in Table 1 and illustrated in Fig 3. A number of the whitewashed timbers were found on careful inspection to be of elm (*Ulmus* spp.). These included the corner posts in the north wall, the fourth large stud from the north end in the west wall, as well as the second stud from the south end, all the attic joists, and the mid-rail in the north wall. A sample with complete sapwood was taken from the north-east corner post. This was found to be of elm, and was retained by Helen Chappel (EH) in case it could be used later for a radiocarbon study. After six samples had been taken from what looked like the oak timbers with the most rings likely to be associated with the initial construction, several of which had shorter sequences than are usually considered useful for dendrochronology, no more sampling was undertaken. A large number of extant timbers were seen to be later inserts; for example the small studs in the south wall. Larger mortices were visible in the south tie showing that larger studs had been present. The present studs were not pegged in. Some studs in both the east and west walls were of different sizes and appeared to be later replacements. The external chevron pattern on the west wall was formed by very thin applied timbers and did not appear to be part of the original structure.

Cross-matching was found between two series, pir04 and pir05 matching with $t=12.5$ with 52 years overlap, indicating that these two large corner posts were probably produced from a single trunk cut in half. The two series were combined into a single tree series pir45m, retaining the maximum number of sapwood rings, but neither this nor any

of the other three unmatched short sequences were dated. The ring width series are presented in the Appendix.

Table 1. Details of the undated samples taken for dendrochronology

Sample	Description	Rings	Sapwood	Mean ring-width (mm)
pir01	Tie in north wall	43	16C	3.28
pir02	West wall, 4th stud from north end	<40	h/s	NM
pir03	Tie in south wall	46	-	1.63
pir04	South east corner post	71	6	2.22
pir05	South west corner post	55	9	2.28
<i>pir45m</i>	<i>Mean of series 04 and 05</i>	74	9	2.40
pir06	East wall, 1 st stud from north end	48	18½C	2.17

h/s = heartwood-sapwood boundary; NM = not measured; C = complete sapwood, winter felled; ½C complete sapwood, felled the following summer

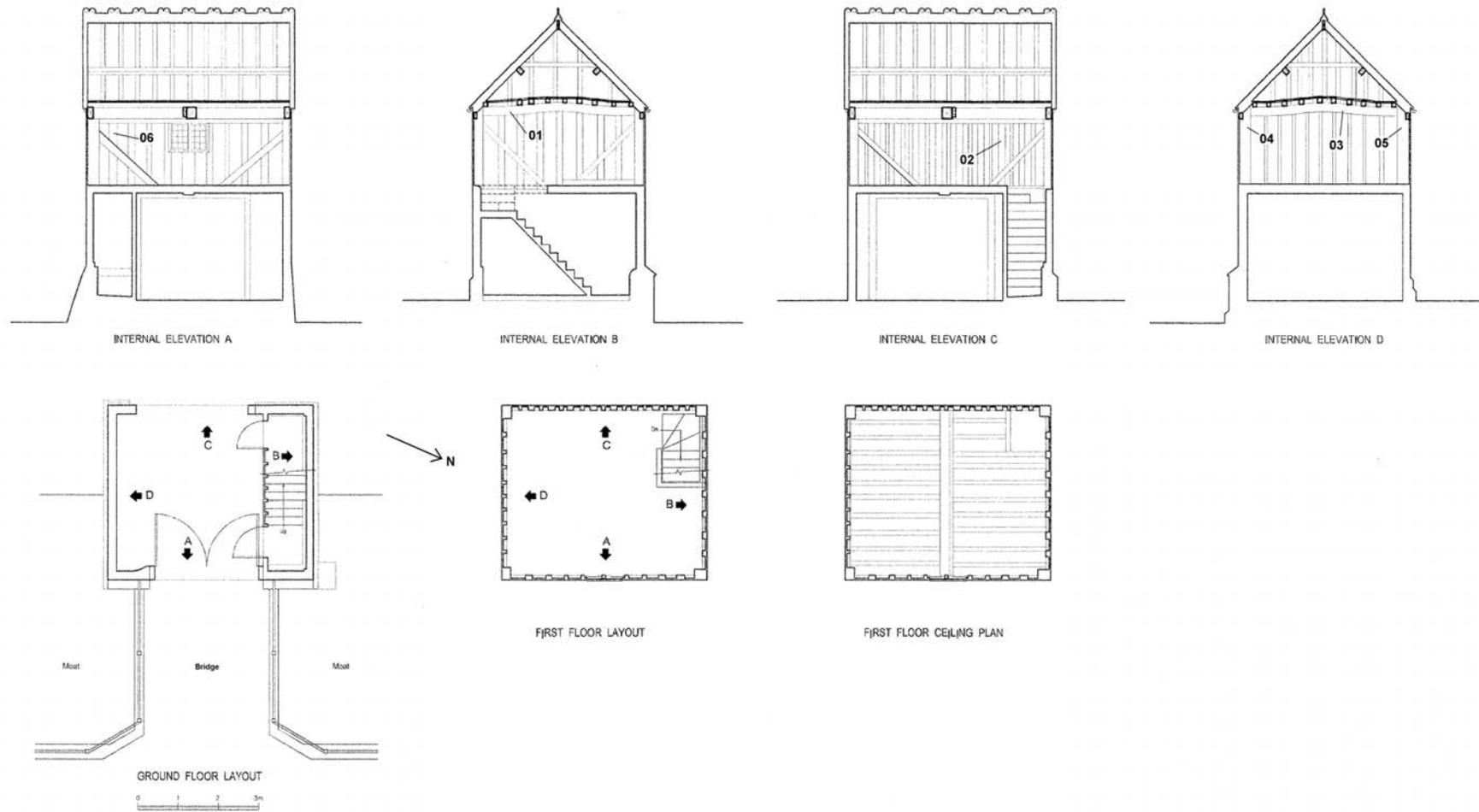


Figure 3. Drawings of the gatehouse, showing the approximate locations of samples taken for dendrochronology, adapted from original drawings by The Victor Farrar Partnership

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APPENDIX

Ring width values (0.01mm) for the sequences measured

pir01

282 324 351 410 328 454 437 353 366 315
277 271 351 387 381 508 467 383 389 403
381 370 340 450 449 532 357 353 323 337
315 281 265 242 218 180 134 116 170 285
186 206 193

pir03

176 77 103 142 129 98 60 57 106 144
74 61 39 101 149 141 184 228 198 326
217 47 56 79 109 146 132 199 237 306
216 150 215 334 212 316 261 219 182 175
181 73 111 211 259 265

pir04

519 249 326 343 449 510 494 383 453 316
233 360 585 112 171 288 390 305 76 50
81 113 156 203 196 258 213 278 312 74
58 116 90 116 230 149 162 170 170 174
100 146 233 75 49 101 110 53 84 108
81 92 139 153 85 124 121 257 249 185
225 348 316 225 401 322 275 318 230 331
328

pir05

69 71 122 162 294 311 459 378 567 350
75 75 163 178 280 408 393 248 223 245
199 118 144 334 73 44 119 142 30 62
175 109 129 209 165 151 218 224 319 340
201 287 368 280 234 313 345 300 374 252

323 268 240 174 223

pir06

258 298 246 160 131 171 183 225 128 119

243 262 179 215 205 295 316 286 230 286

312 274 235 294 253 284 218 217 277 246

235 176 177 144 160 197 281 284 225 265

185 151 186 167 98 116 122 182



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