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98A Watling Street East, Towester, Northamptonshire

Tree-ring Dating of Oak Timbers

Martin Bridge and Cathy Tyers

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Summary

Twelve samples were taken from various elements in the two roofs and the basement. Two samples had too few rings for further analysis to be carried out, but eight of the remaining samples were dated. These show the two roofs and basement to be broadly coeval, using timbers most likely felled in the AD 1680s and early AD 1690s, with one timber having a precise felling date of winter AD 1689/90.

Contributors

Martin Bridge and Cathy Tyers.

Acknowledgements

We are grateful to Brian Giggins, Chair of the Historic Towcester Survey, for coordinating this work and supplying drawings and background information, and to Rebecca Lane the local projects coordinator for Historic England (South West Region, Architectural Investigation). The owner kindly allowed the sampling to take place. Thanks also to Shahina Farid (Historic England Scientific Dating Team) who commissioned the work.

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Historic environment record

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Date of research

2022

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Introduction

The Early Fabric in Historic Towns: Voluntary Group Projects, funded by Historic England, have been developed in the recognition and acknowledgement of the excellent work being undertaken by local vernacular groups in the study of local architectural trends and fabrics. The intention of these projects is to encourage this type of study through the provision of support and facilitate training of more people in building analysis and recording. The local projects are coordinated by Rebecca Lane (Historic England South West Region: Architectural Investigation).

Early Fabric in Towcester Project

Whilst there have been many local investigations of historic buildings in the town over a number of years, no systematic research had been undertaken before this project coordinated by Brian Giggins.

The project examines vernacular historic buildings in Towcester, aiming to improve understanding of the morphology and development of the historic town plan and to understand this within the framework of economic and social change. It aims to identify early plan forms and to understand the dates of the introduction of vernacular architectural details (e.g. in materials, carpentry, fenestration, and decorative features), thus mapping the survival of early (pre-1750) fabric and revealing the architectural evolution of the town's buildings.

Initially, properties were identified that were thought to be key to understanding the town's architectural development for a programme of comprehensive investigation. These properties were assessed for their suitability for dendrochronology and those that contained oak timber suitable for analysis were sampled and analysed.

98a Watling Street East

This property (List Entry Number 1190016 https://historicengland.org.uk/listing/the-list/list-entry/1190016) sits in an important position on the east side of the main street through the town (Fig 1) by the market and was built as a pair of two-storey shops, with attics and basements. The door to the shop on the left (north) is flanked by Doric pillars. The first floor has Ionic pilasters to the centre and ends. The style suggests a late-seventeenth-century origin.

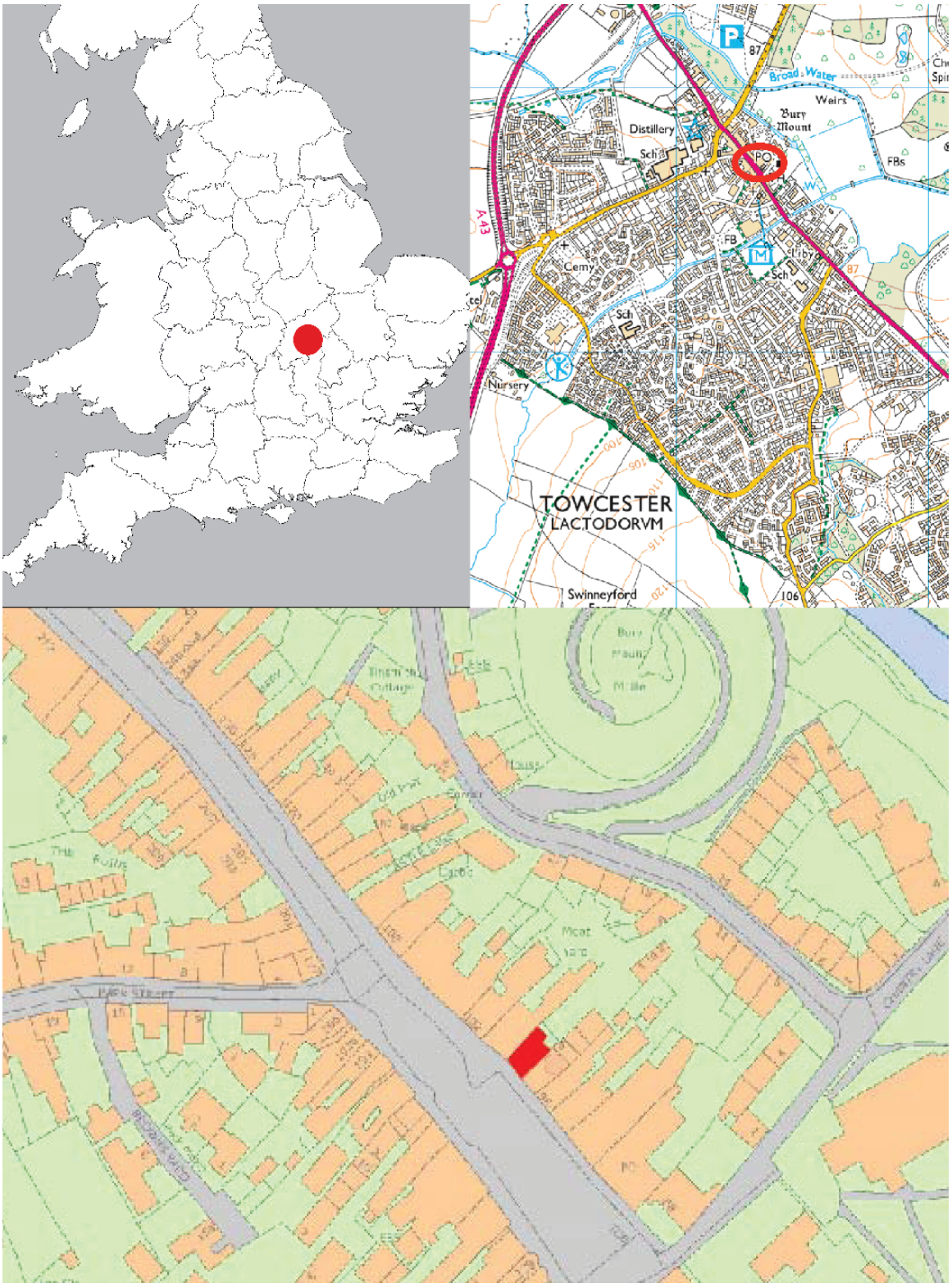

Figure 1: Maps to show the location of 98A Watling Street East, Towcester in Northamptonshire. Top left shown on map of England. Top right at scale:1:25,000; bottom scale: 1:1,300. © Crown Copyright and database right 2023. All rights reserved. Ordnance Survey Licence number 100024900.

Methodology

An initial assessment of the timbers for dendrochronological potential sought accessible oak (*Quercus* sp.) timbers with more than 50 rings and where possible traces of sapwood, although slightly shorter sequences are sometimes sampled if little other material is available. Those timbers judged to be potentially useful were cored in November 2022 using a 16mm auger attached to an electric drill. The cores were 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 process of qualified statistical comparison by computer, supported by visual checks. 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 on the computer monitor 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 in the range 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. Same-tree matches 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.

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 (i.e. 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 12–45 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

Twelve timbers were sampled (Table 1), nine from the roofs, and three in the basement. The sampled timbers are illustrated on Figures 2–4, with the exception of sampled towd08. The front range roof included a principal rafter that had clearly been turned through 90° (towd02). Two of the samples obtained had too few rings for secure dating purposes, and were not further investigated. The raw ring-width data for the other samples is given in the Appendix.

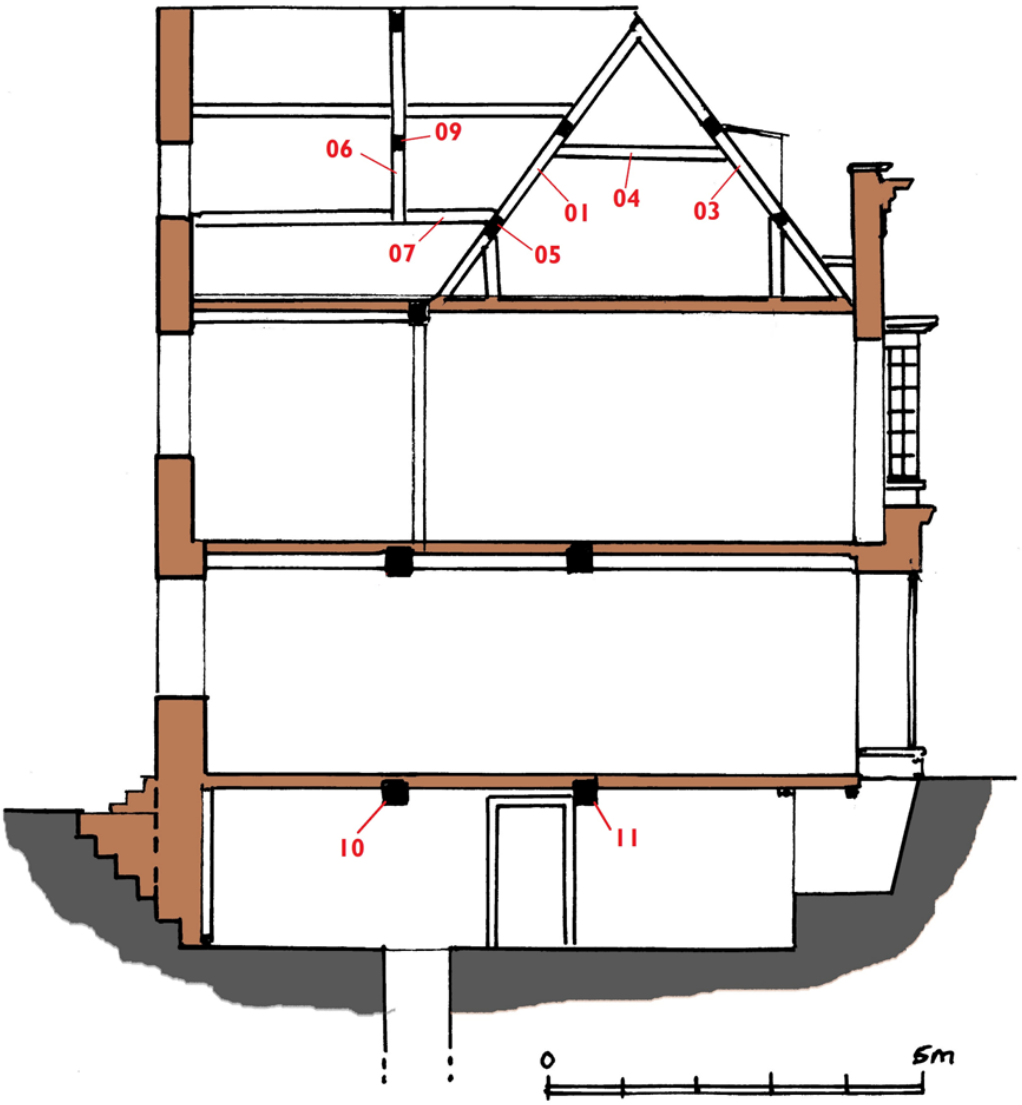

Figure 2: Cross-section, looking south, showing most of the timbers sampled for dendrochronology, based on a drawing by Brian Giggins

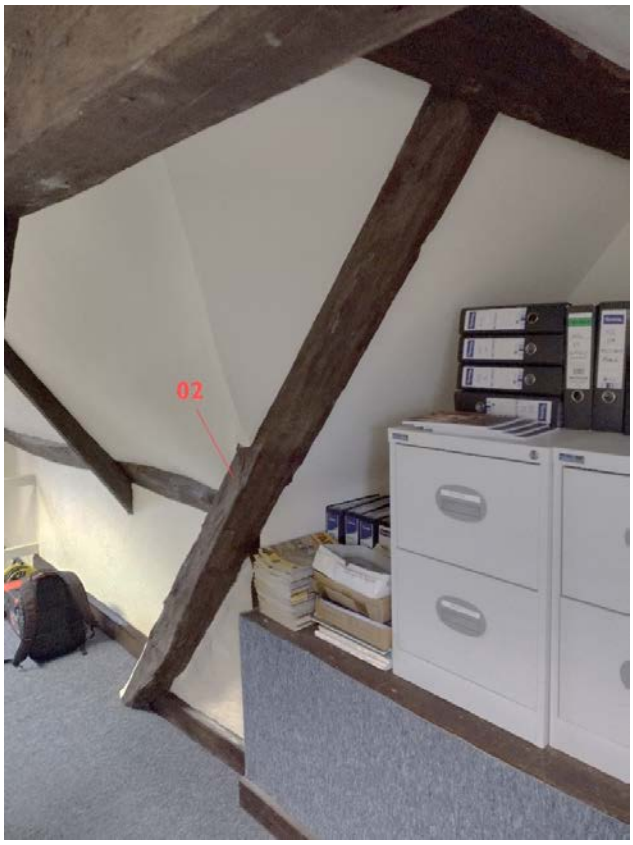

Figure 3: View of the turned principal rafter (towd02) looking south-east [photo Martin Bridge]

Figure 4: View of the east beam and fireplace lintel in the basement, looking north-east. [photo Martin Bridge]

Table 1: Details of the tree-ring samples taken from 98a Watling Street East, Towcester, Northamptonshire

Sample No	Location	Number of rings	Date of sequence (AD)	Sapwood	Mean ring width (mm)	Mean sensitivity	Felling date range (AD)
Roof							
towd01	Front range, principal rafter on east slope	55	1610–64	h/s +25mmC NM	1.66	0.24	*c.*1672–82
towd02	Front range, turned principal rafter next to wall	61	1629–89	27C	1.45	0.18	winter 1689/90
towd03	Front range, principal rafter on west slope	61	1609–69	5 +13mmC NM	1.76	0.24	*c.*1674–84
towd04	Front range, collar	<25	-	?h/s	NM	-	-
towd05	Front range, lower east purlin	52	1616–67	1	1.95	0.26	1678–1711
towd06	Rear range, south principal rafter	69	1616–84	23	1.77	0.24	1684–1706
towd07	Rear range, south lower purlin, west of truss	64	-	18 +*c.*5C NM	1.47	0.23	-
towd08	Rear range, north principal rafter	53	1618–70	9	1.96	0.29	1673–1706
towd09	Rear range, collar	54	-	h/s	1.82	0.23	-
Cellar							
towd10	East beam	53	1613–71	13 +*c.*10NM	1.54	0.21	1681–1703
towd11	West beam	79	1611–89	21 +5mmC NM	1.54	0.26	1689–*c.*98
towd12	Fireplace lintel	21	-	6	NM	-	-

Key: h/s = heartwood/sapwood boundary; NM = not measured; C = complete sapwood, felled the following winter

Comparison of all measured ring-width series revealed that those from seven samples cross-matched (Table 2). Sample towd02 was tenuously matched with this group of samples (Table 2). Sample towd02 dated well independently (Table 3a) at a date equivalent to the tenuous match identified with the group of seven samples. It was subsequently combined with the other seven matched samples into an overall site master, TOWDt8, the dating evidence for which is shown in Table 3b.

The relative positions of the dated individual timber ring-series are illustrated in Figure 5.

Although a number of the sampled timbers had complete sapwood present, the sapwood was very friable and, with one exception, it did not survive coring intact (Table 1). Thus only one of the dated timbers, towd02, provides a precise felling date, the tree from which it was derived being felled in winter AD 1689/90.

The remaining dated roof timbers from both the front and rear ranges and the two cellar timbers appear to form a coherent group, most likely felled at a broadly similar time. The mean heartwood/sapwood boundary date for this group of seven cross-matched timbers is AD 1663, which would give a likely felling date range for the group of AD 1675–1708, although this would have to be amended to take account of rings present on several samples that date later than AD 1675.

Thus, all eight dated timbers appear to be derived from trees felled at a similar, though not necessarily the same time. This interpretation is supported by the fact that three of the sampled timbers (towd01, towd03 and towd11) retained complete sapwood, which was lost on coring. The amount of lost sapwood could be determined approximately in millimetres, and this has enabled the likely felling date range for these timbers to be further refined (Table 1, Fig 5). These refined estimated felling date ranges have been calculated by taking the mean ring width of the outer 10 years, dividing the approximate lost sapwood length by the mean ring width, and then applying plus or minus five years to this date. This suggests that the dated timbers were mostly felled in the AD 1680s and early AD 1690s.

The dated timbers appear likely to be of relatively local origin, the strongest matches being with site chronologies from Kirby Hall and Apethorpe, both in Northamptonshire (Table 3b).

Table 2: Cross-matching between the dated samples from 98a Watling Street East, Towcester (values of t greater than 3.5 are significant)

	t-values						
Sample No	towd02	towd03	towd05	towd06	towd08	towd10	towd11
towd01	2.7	10.8	5.6	3.5	2.9	3.8	4.5
towd02		2.7	2.8	2.7	2.7	3.0	2.9
towd03			7.8	5.2	4.7	4.8	6.8
towd05				5.2	5.0	3.1	7.0
towd06					8.9	4.1	4.4
towd08						5.3	5.0
towd10							4.0

Cells highlighted in grey show the level of similarity of the independently dated sample towd02

Table 3a: Cross-matching for sample towd02 (AD 1629–89)

Source region	Chronology	Publication reference	Filename	Span of chronology (AD)	Overlap (years)	*t*-value
Cambridgeshire	Ely Cathedral	Arnold et al. 2005	ELYCSQ05	1592–1794	61	7.2
Bedfordshire	De Grey Mausoleum, Flitton	Howard et al. 2003	FLTASQ01	1510–1726	61	6.2
Bedfordshire	Woburn Abbey, phase two	Miles pers. comm.	WOBURN2	1574–1752	61	6.0
London	Chambers Wharf, Bermondsey	Tyers 2019	CHM2T9	1421–1703	61	6.0
Rutland	Oakham Castle	Arnold and Howard 2013	OKMCSQ03	1598–1737	61	5.7
Bedfordshire	Clophill House, Clophill	Miles et al. 2006	CLOPHILL	1646–1748	44	5.7
Northamptonshire	Highcroft House, Towcester	Bridge and Tyers 2023	TOWCHt3	1565–1713	61	5.6
Hampshire	Beechcroft, Tunworth	Miles and Worthington 2000	bct78	1618–86	58	5.6
Oxfordshire	Magdalen College, Oxford	Miles and Bridge 2015	MAGDALN9	1612–1716	61	5.6
Northamptonshire	Kirby Hall, Deene	Arnold et al. forthcoming	KRBHSQ01	1378–1795	61	5.6
Oxfordshire	Old Clarendon Building, Oxford	Worthington and Miles 2006	CLRNDNOX	1539–1711	61	5.5
Leicestershire	Kibworth Harcourt mill	Bridge et al. 2022	KBWRTHt17	1582–1786	61	5.5

Table 3b: Cross-matching for the site sequence TOWDt8 (AD 1609–89)

Source region	Chronology	Publication reference	Filename	Span of chronology (AD)	Overlap (years)	*t*-value
Northamptonshire	Apethorpe Hall, Apethorpe	Arnold et al. 2008	APTASQ02	1574–1749	81	11.3
Northamptonshire	Kirby Hall, Deene	Arnold et al. forthcoming	KRBHSQ01	1378–1795	81	11.0
Bedfordshire	Chicksands Priory	Howard et al. 1998	CHKSPQ01	1200–1541	79	9.3
Oxfordshire	Old Clarendon Building, Oxford	Worthington and Miles 2006	CLRNDNOX	1539–1711	81	9.2
Lincolnshire	Sneath's Mill, Lutton Gowts	Arnold et al. 2016	SNTMSQ01	1593–1728	81	8.8
Bristol	Red Lodge	Tyers 2008	RDLODGE2	1617–1703	73	8.8
Berkshire	Maidenhead Bridge	Miles et al. 2003	MDNHEAD2	1605–1750	81	8.6
Oxfordshire	Christ Church Library	Miles et al. 2020	CCL	1565–1737	81	8.4
Buckinghamshire	Claydon House Middle Claydon	Tyers 1995	CLAYDON	1613–1756	77	8.3
Bedfordshire	Woburn Abbey, phase two	Miles pers. comm.	WOBURN2	1574–1752	81	8.2
Bedfordshire	De Grey Mausoleum, Flitton	Howard et al. 2003	FLTASQ01	1510–1726	81	8.2
London	Breakspear House, Harefield	Arnold and Howard 2010	HFDBSQ01	1574–1694	81	7.6
Shropshire	Buildwas Abbey	Miles 2002	BUILDWS3	1563–1687	79	7.6

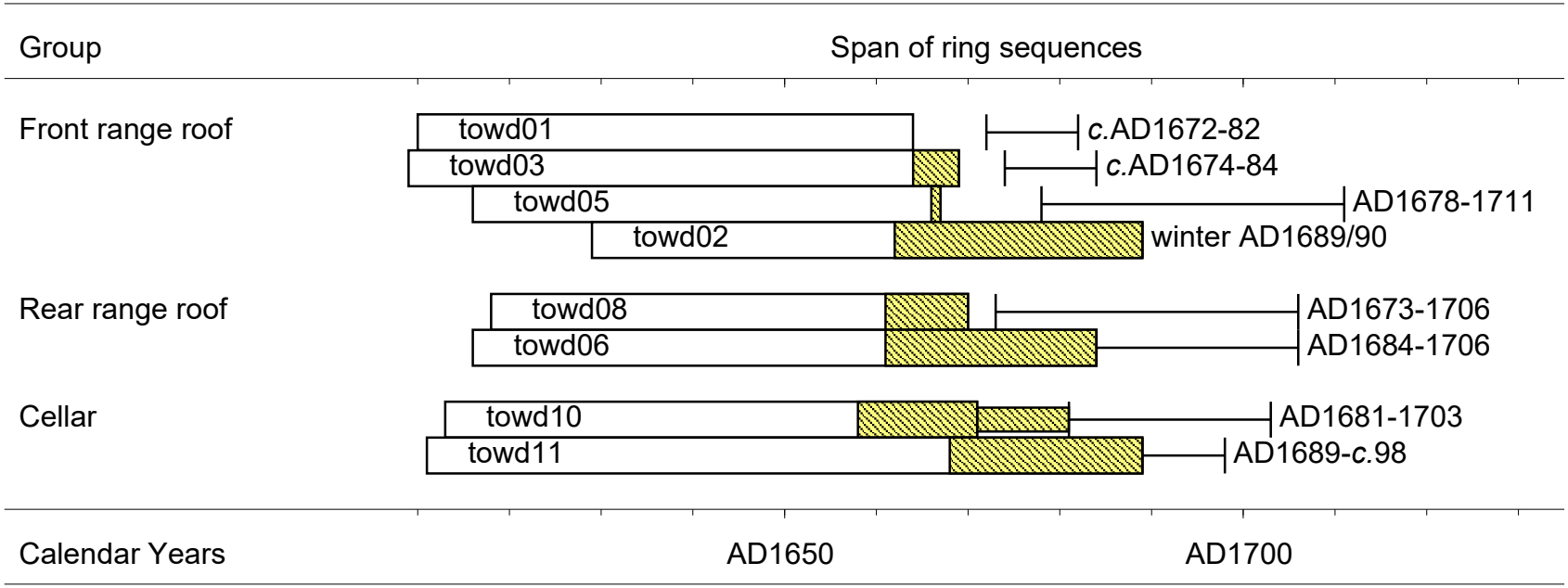

Figure 5: Bar diagram showing the relative positions of overlap of the dated ring sequences and their individual felling date ranges. White bars represent measured heartwood rings, yellow hatched sections represent measured sapwood rings; narrow sections of bar represent additional unmeasured rings

References

Arnold, A. J., and Howard, R. E. 2010 ‘Breakspear House, Breakspear Road North, Harefield, Hillingdon, Greater London: Tree-ring Analysis of Timbers’, Historic England Research Report Series, 71/2010: https://historicengland.org.uk/research/results/reports/71-2010 (acc.1 Nov 2023)

Arnold, A. J., and Howard, R. E. 2013 ‘Oakham Castle, Castle Lane, Oakham, Rutland: Tree-ring Dating of Timbers’, Historic England Research Report Series, 23/2013: https://historicengland.org.uk/research/results/reports/23-2013 (acc.1 Nov 2023)

Arnold, A. J., Howard, R. E., and Litton, C. D. 2005 ‘Tree-ring Analysis of Timbers from the High Roofs of the Cathedral of the Holy and Undivided Trinity, Ely, Cambridgeshire’, Historic England Research Report Series, 19/2005: https://historicengland.org.uk/research/results/reports/19-2005 (acc.1 Nov 2023)

Arnold, A. J., Howard, R. E., and Tyers, C. 2008 ‘Tree-ring Analysis of Timbers, Apethorpe Hall, Apethorpe, Northamptonshire’, Historic England Research Report Series, 87/2008: https://historicengland.org.uk/research/results/reports/87-2008 (acc.1 Nov 2023)

Arnold, A. J., Howard, R. E., and Tyers, C. 2016 ‘Sneath's Mill, near Lutton Gowts, Lincolnshire: Tree-ring Analysis of Oak Timbers’, Historic England Research Report Series, 50/2016: https://historicengland.org.uk/research/results/reports/50-2016 (acc.1 Nov 2023)

Arnold, A. J., Howard, R., and Tyers, C. forthcoming ‘Kirby Hall, Deene, Corby, Northamptonshire: Tree-ring Analysis of Oak and Conifer Timbers’, Historic England Research Report Series

Baillie, M. G. L., and Pilcher, J. R. 1973 ‘A simple cross-dating program for tree-ring research’, *Tree Ring Bulletin*, 33, 7–14

Bridge, M. C., Tyers, C., Bayliss, A., Bollhalder, S., and Wacker, L. 2022 ‘Kibworth Harcourt Mill, Langton Road, Kibworth Harcourt, Harborough, Leicestershire: Ring-width Dendrochronology and Radiocarbon Wiggle-matching of Additional Oak Timbers, Historic England Research Report Series, 42/2022: https://historicengland.org.uk/research/results/reports/42-2022 (acc.1 Nov 2023)

Bridge, M. C., and Tyers, C. 2023 ‘Highcroft House, 157 Watling Street West, Towcester, Northamptonshire: Tree-ring Dating of Oak Timbers’, Historic England Research Report Series, 1/2023:

Howard, R. E., Laxton, R. R., and Litton, C. D. 1998 'Tree-ring Analysis of Timbers from Chicksands Priory, Chicksands, Bedfordshire', Historic England Research Report Series, 30/1998: https://historicengland.org.uk/research/results/reports/30-1998 (acc.1 Nov 2023)

Howard, R. E., Litton, C. D., and Arnold, A. J. 2023 'Tree-ring Analysis of Timbers from the De Grey Mausoleum, St John the Baptist Church, Flitton, Bedfordshire', Historic England Research Report Series, 48/2003: https://historicengland.org.uk/research/results/reports/48-2003 (acc.1 Nov 2023)

Miles, D. W. H. 1997 The interpretation, presentation, and use of tree-ring dates, *Vernacular Architect*, 28, 40–56

Miles, D. W. H. 2002 'Tree-ring Dating at Abbey House, Buildwas Abbey, Shropshire', Historic England Research Report Series, 27/2002: https://historicengland.org.uk/research/results/reports/27-2002 (acc.1 Nov 2023)

Miles, D. H., and Worthington, M. J. 2000 List 108 - Dendrochronology Dates from Oxford Dendrochronology Laboratory, *Vernacular Architect*, 31, 102–5

Miles, D. H., Worthington, M. J., and Bridge, M. C. 2003 List 140 - Dendrochronology Dates from Oxford Dendrochronology Laboratory, *Vernacular Architect*, 34, 109–13

Miles, D. H., Worthington, M. J., and Bridge, M. C. 2006 List 177 - Dendrochronology Dates from Oxford Dendrochronology Laboratory, *Vernacular Architect*, 37, 118–23

Miles, D. H., and Bridge, M. C. 2015 List 274 - Dendrochronology Dates from Oxford Dendrochronology Laboratory, *Vernacular Architect*, 46, 108–12

Miles, D. H., Bridge, M. C., and Cook, R. 2020 List 318 - Dendrochronology Dates from Oxford Dendrochronology Laboratory, *Vernacular Architect*, 51, 144–6

Tyers, I. 1995 'Tree-ring analysis of Claydon House, Middle Claydon, Buckinghamshire', Historic England Research Report Series,13/1995: https://historicengland.org.uk/research/results/reports/13-1995 (acc.1 Nov 2023)

Tyers, I. 2004 *Dendro for Windows Program Guide*, 3rd edn, *ARCUS Report*, 500b

Tyers, I. 2008 'Tree-ring analysis of timbers from a building: Red Lodge, Park Row, Bristol', *Dendro Co Rep*, 51

Tyers, I. 2019 'Tree-ring spot-dates of archaeological samples: Chambers Wharf, Chambers Street, Bermondsey, London Borough of Southwark' *Dendro Co Rep*, 1183

Worthington, M., and Miles, D. 2006 'Tree-ring Analysis of Timbers from the Old Clarendon Building, Oxford, Oxfordshire', Historic England Research Report Series, 67/2006 https://historicengland.org.uk/research/results/reports/67-2006 (acc.1 Nov 2023)

Appendix

Ring width values (0.01mm) for the sequences measured

towd01

406	298	185	277	175	169	304	258	253	150
149	229	192	137	104	138	178	157	129	135
121	93	109	112	83	67	62	63	88	77
105	133	74	70	88	142	170	147	265	231
192	185	147	180	187	375	229	187	213	151
172	130	115	193	170					

towd02

263	165	193	253	300	240	251	198	162	155
175	210	203	189	188	195	163	187	157	207
164	162	189	128	104	138	190	161	148	135
113	126	134	150	157	121	101	97	101	182
150	111	139	126	117	72	72	65	107	110
99	107	72	112	100	92	79	80	60	87
112									

towd03

328	347	251	194	285	227	151	306	315	347
233	223	270	285	205	140	181	213	254	228
200	163	118	163	120	80	57	42	66	102
114	136	162	94	97	89	177	197	130	204
183	184	188	153	144	161	274	193	164	204
108	134	113	93	163	145	146	110	114	123
127									

towd05

285	269	514	261	309	290	219	197	125	246
350	373	281	232	145	164	191	150	104	86
55	89	147	123	123	132	118	155	190	240
251	165	197	141	143	162	124	149	187	341
211	148	193	138	210	183	194	218	182	185
115	135								

towd06

303	354	401	269	134	122	134	147	108	148
262	269	213	259	181	133	193	133	90	92
127	158	236	184	184	174	199	247	212	240
279	187	308	231	291	223	231	152	143	241
185	137	147	124	130	122	88	115	95	105
77	100	151	124	222	276	167	202	150	123

125 192 204 150 102 113 133 86 91

towd07

131 152 112 102 112 143 137 137 180 145
233 197 155 144 168 195 197 238 161 171
208 76 140 124 131 188 123 208 162 130
127 111 132 166 162 138 120 173 161 224
158 138 107 145 114 152 156 162 117 174
133 182 149 118 102 132 123 115 169 99
87 151 113 129

towd08

305 311 199 122 146 175 164 230 342 309
287 264 143 146 256 167 84 65 117 178
242 191 217 211 176 195 208 200 292 167
292 182 279 313 392 197 196 387 218 162
156 107 179 109 88 103 101 100 72 104
164 144 239

towd09

306 218 211 190 233 199 164 155 238 245
172 235 231 199 262 194 182 201 294 249
168 225 170 174 296 209 256 172 141 225
263 196 106 199 205 123 111 101 91 95
145 146 112 92 157 143 133 185 163 191
117 93 124 112

towd10

353 220 232 367 291 334 257 261 239 236
235 140 91 48 49 49 71 64 55 87
85 55 44 56 73 139 115 143 161 139
166 150 143 200 161 222 204 191 212 201
171 165 312 201 151 157 125 126 89 74
73 81 77 69 107 128 150 160 114

towd11

152 140 215 162 105 220 239 255 138 148
109 82 107 72 142 139 169 151 148 120
131 142 109 78 80 90 110 291 250 217
205 173 201 227 248 277 208 261 181 250
154 201 154 194 277 146 167 191 129 143
113 88 126 149 120 98 141 159 102 108
130 135 165 118 117 68 130 151 129 197
125 165 236 121 90 124 97 108 77

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