THAMES VALLEY

ARCHAEOLOGICAL

SERVICES

Bramshill High Bridge, Bramshill Police College, Bramshill, Hook, Hampshire

Archaeological Watching Brief

by Tim Dawson

Site Code: BHB12/89

(SU 75386 59347)

Bramshill High Bridge, Bramshill Police College, Bramshill, Hook, Hampshire

An Archaeological Watching Brief

For National Policing Improvement Agency

by TimDawson

ThamesValleyArchaeologicalServices

Ltd

SiteCodeBHB12/89

October 2012

Summary

Site name: Bramshill High Bridge, Bramshill Police College, Bramshill, Hook, Hampshire

Grid reference: SU 75386 59347

Site activity: Watching Brief

Date and duration of project: 11th June - 10th September 2012

Project manager: Steve Ford

Site supervisor: Tim Dawson

Site code: BHB 12/89

Summary of results: A series of structural timbers were recorded and recovered from the interior of the present bridge structure at its eastern end and immediately to the north outside the bridge. These may indicate that a wooden causeway and bridge once stood on the site and was later replaced by the current brick-built structure. Dendrochronology dates for two of the timbers suggest a construction date of the early 17th century, contemporary with Bramshill House.

Monuments identified: Structural timbers

Location and reference of archive: The archive is presently held at Thames Valley Archaeological Services, Reading and will be deposited at Hampshire Museum Service in due course.

Report edited/checked by:	Steve Ford✓ 19.10.12
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Bramshill High Bridge, Bramshill Police College, Bramshill, Hook, Hampshire
An Archaeological Watching Brief

by Tim Dawson

Report 12/89

Introduction

This report documents the results of an archaeological watching brief carried out at Bramshill High Bridge, Bramshill Police College, Bramshill, Hook, Hampshire RG27 0JW (SU 75386 59347) (Fig. 1). The work was commissioned by Mr Robert Stone, of Balfour Beatty Regional Civil Engineering Southern Region, Endeavour House, Crow Arch Lane, Ringwood, Hampshire BH24 1PN on behalf of National Policing Improvement Agency, Bramshill, Hook, Hampshire RG27 0JW.

Planning consent (12/00381/LBC) has been gained from Hart District Council for conservation and repair works to the High Bridge at Bramshill Police College. This is subject to a condition (C20.197) which requires the implementation of an archaeological watching brief to be carried out as part of the proposed works.

This is in accordance with the Department for Communities and Local Government's *National Planning Policy Framework* (NPPF 2012) and the District's policies on archaeology. The field investigation was carried out to a specification approved by Dr Hannah Fluck, Senior Archaeologist at Hampshire County Council. The fieldwork was undertaken by Aiji Castle, Christopher Crabb, Steven Crabb, Tim Dawson and Jo Pine on 11th, 19th, 28th June, 20th, 23rd and 26th July, 2nd August and 10th September 2012 and the site code is BHB 12/89.

The archive is presently held at Thames Valley Archaeological Services, Reading and will be deposited at Hampshire Museum Service in due course.

Location, topography and geology

The site is located in the south-western corner of Bramshill Park, within the grounds of the National Policing Improvement Agency at Bramshill Police College (Fig. 1). The High Bridge forms a crossing point of the River Hart for the historic main driveway from the park gate to the south-west, to Bramshill House to the north-east (Fig. 2). Bramshill Park is situated *c*.1km to the southeast of the village of Bramshill and *c*.6.5km northeast of Hook. The River Hart flows northwards under the bridge with the land rising to a flat area of meadows to the west and steeply uphill through the park to the House east. The river runs through an area of boggy ground which the bridge crosses, acting as a causeway, with a double arch spanning the river itself (Pl. 1). The underlying geology is described as alluvium over London Clay formations for the area of the bridge with the

land immediately to the east and west consisting of undifferentiated gravel deposits overlying the London Clay (BGS 1981). Where the geology was exposed during the ground works it consisted of alluvium with patches of gravel. The site is at a height of *c*.53m above Ordnance Datum.

Archaeological background

The archaeological potential of the site stems from its location close to the centre of the estate of Bramshill. Bramshill has late Saxon origins and is mentioned in Domesday Book of 1086 (Williams and Martin 2002). The site was allowed by the king to be made into a deer park in the 14th century by Thomas Foxley, who also built a house. The present house, however, was built by Lord Zouche in the early 17th century and was restored and extended later that century with further development of the park in which it is situated in the 18th and 19th centuries. Bramshill Park is registered (511) grade II*. The High Bridge over the River Hart is a substantial brick-built structure made in the Jacobean style and is a grade I listed building (1091941). The bridge is early 19th century in date although it is likely to have replaced an earlier wooden structure.

Objectives and methodology

The purpose of the watching brief was to excavate and record any archaeological deposits affected by the works. These included stripping overburden to the sides of the bridge to provide a solid platform for the scaffolding required for the repair work, the removal of the bridge deck and the fill beneath and the excavation of drains on adjacent to the bridge structure.

All groundworks were undertaken using a mini-digger with toothless grading bucket where possible. Areas dug through the Tarmac bridge deck and the rubble fill beneath were excavated either using a toothed bucket or by hand. Where it was safe to do so possible archaeological deposits were hand-cleaned and excavated and spoil heaps monitored, when this was not possible excavations were only observed.

Results

Overburden strip

Two areas were stripped of overburden to reveal patches of the underlying geology immediately to the north and south of the western end of the bridge (Fig. 3, Pl. 1 foreground). The northern strip extended 6m out from the wall of the bridge and from the foot of the river bank to the west across the area of flat ground to the edge of the water to the east. Approximately 0.1m of overburden (topsoil) was removed, to expose patches of gravel and

alluvium natural geology within pockets of topsoil. A 4m-wide strip was cleared to the south of the bridge across a similar width although this only scraped off the vegetation and *c*.0.02m of topsoil and so exposed no further stratigraphy. No archaeological features were observed during this phase.

Pipe trench

One pipe trench was observed being dug in a north-westerly direction from the northern face of the bridge on the east bank (Fig. 3). The trench was 5.00m long and 0.50m wide and exposed a stratigraphic sequence consisting of 0.28m of modern made ground (deposit 52), 0.29m of dark black-blue peat (53) and 0.23m of mid orange-blue clayey sand (54) (Fig. 4, Pl. 2). These layers sealed cut 2, which was aligned parallel with the bridge structure, a vertical-sided feature which was seen to a depth of 0.40m, the lower limit of the pipe trench. Cut 2 was filled with a soft mid grey-brown sandy silt (56) and contained four sections of timber which had been preserved in the waterlogged conditions. Two timbers (57 and 58) were preserved *in situ* with the others (59 and 60) being removed during excavation and retained as finds (Pl. 7). All four sections had been cut into planks with those *in situ* possibly forming the vertical side and horizontal top of a wooden channel.

Bridge test pit

A test pit was dug through the bridge deck immediately to the east of the central pier to determine the presence and nature of any services beneath (Fig. 3). The pit extended across the width of the bridge between the balustrades (3.10m) and was 0.50m wide and a maximum of 0.66m deep. The stratigraphy exposed consisted of 0.13m of Tarmac, 0.15m of red-yellow sandy gravel, 0.35m of concrete and brick rubble and, finally, the bricks which form the inside of the eastern arch (Fig. 4). The bricks (frogged) within the rubble layer are of dimensions (9 x 4 1/3 x 2 2/3 inches) which suggest they are of late 18th/early 19th century date (Harley 1974). None were retained as finds. The test pit did not extend far into the bridge structure and no features of archaeological interest were noted.

Bridge excavation

Both ends of the interior of the bridge were excavated down to a depth of *c*.1.00m before being taken down to their full depths - 2.00m in the west and 2.54m in the east (Fig. 3). The stratigraphy of the bridge fill at the western end consisted of 0.35m of concrete and service pipes, 0.20m yellow sand and gravel, 0.10m of mid brown-grey sand and gravel and 0.35m of red-yellow sand and gravel. At the eastern end of the bridge it consisted of 0.45m of concrete, 0.15m of grey sand and gravel and 0.15m of loose coarse gravel in a sand matrix all overlying 0.20m of mid grey-brown sandy clay. These layers covered a deposit of gravel and sandy clay at both ends of the bridge with a possible construction cut (1) seen parallel with the bridge walls. The excavation of

the eastern end of the bridge continued *c*.1.50m through this layer to a peat deposit (51) 2.54m below the surface of the bridge. Within the base of the gravel deposit and extending down into the peat were three sizable worked timbers driven vertically into the ground (Fig. 3 inset). These were later removed when the upper levels of the peat were reduced to enable drainage pipes to be bored through the bridge structure and placed on the riverbank along with a further two timbers that were not seen *in situ*. Two additional timbers (50, 52) exposed in the peat deposit were recorded then left to be preserved *in situ* (Pl. 4). Of the timbers in this area of excavation one was a plank (Timber D) which, with a second plank (52), possibly formed a channel similar to that seen in the pipe trench excavation. Of the others removed, the timbers included a notched pile (Timber A, Pl. 5) and a robust squared stake (Timber F, Pl. 6).

Finds

Wood by Tim Dawson

A total of eight sections of preserved timber (50, 52, Timbers A to F) were recorded from inside the base of the bridge structure with a further four (57-60) recorded in the drainage trench excavated immediately to the north.

Timber 50, a large trunk-like timber, was exposed to a length of 2.64m lying horizontally in the peat layer below the bridge (Pl. 4). There appeared to be no signs of conversion or tool marks although it had a distinct V-shaped groove in its northern end, although, due to very little of the depth of the timber being uncovered, it is uncertain whether this is man-made or natural. Timber 52, the second timber that was left *in situ*, consisted of a well-preserved 3.30m long, 0.03m wide plank set into the peat on its edge, perpendicular to the orientation of the bridge.

Of the six timbers that were removed from the bridge interior by machine all except Timber E were worked in some form or other.

Timber A, 2.54m long and 0.23m in diameter (Pl. 5), has been worked with the cutting of a series of shallow diamond-shaped notches along one side and a 0.60m-wide slot taken out of the top. The diamond-shaped notches appear too small to have served a structural purpose and are more likely to have been part of a decorative device.

Timber B, a 1.63m-long, 0.22m diameter sharpened post, showed signs of modification in the tool marks visible in its squared-off edges and the sharpening of one end into a stake.

Timber C, 1.32m long, 0.28m wide and 0.10m deep, appeared almost hexagonal in cross-section with a large amount of shaping having been carried out. A notch had been cut in one side of the timber near the end and rough edges had been trimmed to smooth the wood's appearance.

Timber D was a plank 1.09m long, 0.26m wide and, like Timber 52, 0.03m deep. One end appeared to have been snapped off while a perpendicular cut approximately half way along the surviving section caused the opposite end to narrow to a width of 0.16m.

Timber E proved to be a curved section of unworked tree stump likely to have just been preserved in the peat in the area of the bridge rather than representing an aspect of the bridge's construction.

The most substantial timber recovered from the interior of the bridge was Timber F, a 1.79m × 0.26m × 0.26m stake with square cross-section and the end 0.30m sharpened to a squared-off point (Pl. 6). Analysis of samples of these timbers for dendrochronological dating (see below) showed that Timbers A, B, D and F were oak (*Quercus* spp) and Timber C was most likely beech (*Fagus* spp). Unworked Timber E was not studied.

With the exception of Timber 57, three of the four timbers recorded in the drainage trench to the north of the bridge were plank-like in form. Timber 57, only seen in section, was 0.20m wide and 0.14m thick and is possibly a smaller structural timber. Timbers 58, also only seen in section, (0.20m wide, 0.08m thick), 59 (0.55m long, 0.12m wide and 0.60m thick) and 60 (0.55m long, 0.22m wide and 0.07m thick, Pl. 7) appeared aligned parallel to the bridge across the drainage trench with Timbers 59 and 60 both having a lap or tenon joint worked into one end.

Dendrochronological dating by Andy Moir

Five samples were dendrochronologically analysed. The five sections were labelled BHB-A, BHB-B, BHB-C, BHB-D and BHB-E. The samples were all visually confirmed as Oak (*Quercus* spp) with the exception of sample BHB-C, which is probably Beech (*Fagus* spp). As section BHB-C was poorly preserved and the ring boundaries generally indistinct, no further analysis was undertaken on this sample. Section BHB-B was in two parts and these sections were labelled BHB-B1 and BHB-B2.

Two of the oak timbers are dated. In the absence of bark, one sample produces a felling-date range of AD 1608–1640; a felled-after date of AD 1566 is identified for the second sample dated. Both the samples dated may be from a single phase of construction, but additional archaeological evidence and/or the dating of additional timbers would be required to confirm this interpretation.

The full report is presented as Appendix 1.

Conclusion

The discovery of several sections of structural timber preserved in waterlogged deposits beneath the present High Bridge and immediately to the north suggest that the current brick structure was built to replace an older one of wood. The dates obtained through dendrochronology indicate that at least two of the timbers were felled around the first half of the 17th century, a date contemporary to the construction of Bramshill House, which was built between 1605 and 1612 (English Heritage).

Very few of the timbers, the larger structural examples in particular, were recorded *in situ* so it is not possible to draw any conclusions regarding the orientation or design of the wooden bridge or causeway except that it consisted of both planks and posts and appears to have been sculpturally decorated.

References

BGS, 1981, *British Geological Survey*, 1:50,000, Sheet 284, Solid and Drift Edition, Keyworth

Harley, L S, 1974, 'A typology of brick: with numerical coding of brick characteristics', in *J Brit Archaeol Assn ser 3*, **37**, 63-87

NPPF 2012, *National Planning Policy Framework*, Dept Communities and Local Govt, London

Williams, A and Martin, G H, 2002, *Domesday Book: A Complete Translation*, London

Appendix 1. Dendrochronological Report

DENDROCHRONOLOGICAL ANALYSIS OF OAK TIMBERS EXCAVATED AT HIGH BRIDGE, BRAMSHILL POLICE COLLEGE, NEAR HOOK, HAMPSHIRE, ENGLAND.

Tree-Ring Services Report: BHBA/14/12

Dr Andy Moir

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DENDROCHRONOLOGICAL ANALYSIS OF OAK TIMBERS EXCAVATED AT HIGH BRIDGE, BRAMSHILL POLICE COLLEGE, NEAR HOOK, HAMPSHIRE, ENGLAND

Dr Andy Moir

Tree-Ring Services Report: BHBA/14/12

SUMMARY

Five samples excavated at High Bridge, near Hook in Hampshire were dendrochronologically analysed. Four of the samples are oak and the rings were measured. One sample is probably beech and was rejected from further analysis.

Two of the oak timbers are dated. In the absence of bark, one sample produces a felling-date range of AD 1608 to AD 1640; a felled after date of AD 1566 is identified for the second sample dated. Both the samples dated may be from a single phase of construction, but additional archaeological evidence and/or the dating of additional timbers would be required to confirm this interpretation.

KEYWORDS

Dendrochronology, 17th Century, near Hook, Hampshire.

Figures

Tables

Photos

INTRODUCTION

Five sections of timbers excavated at High Bridge NGR: SU 7539 5934 (**Figures 1 & 2**) were received for dendrochronological analysis.

Figure 1: Area location map

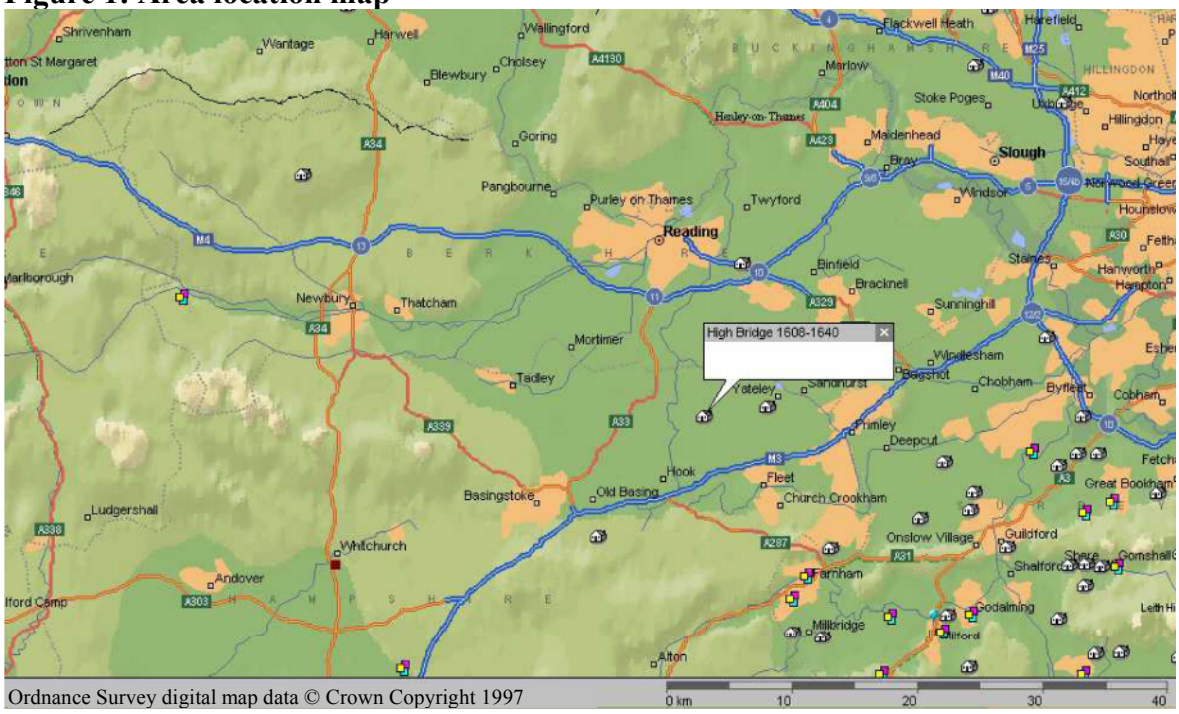
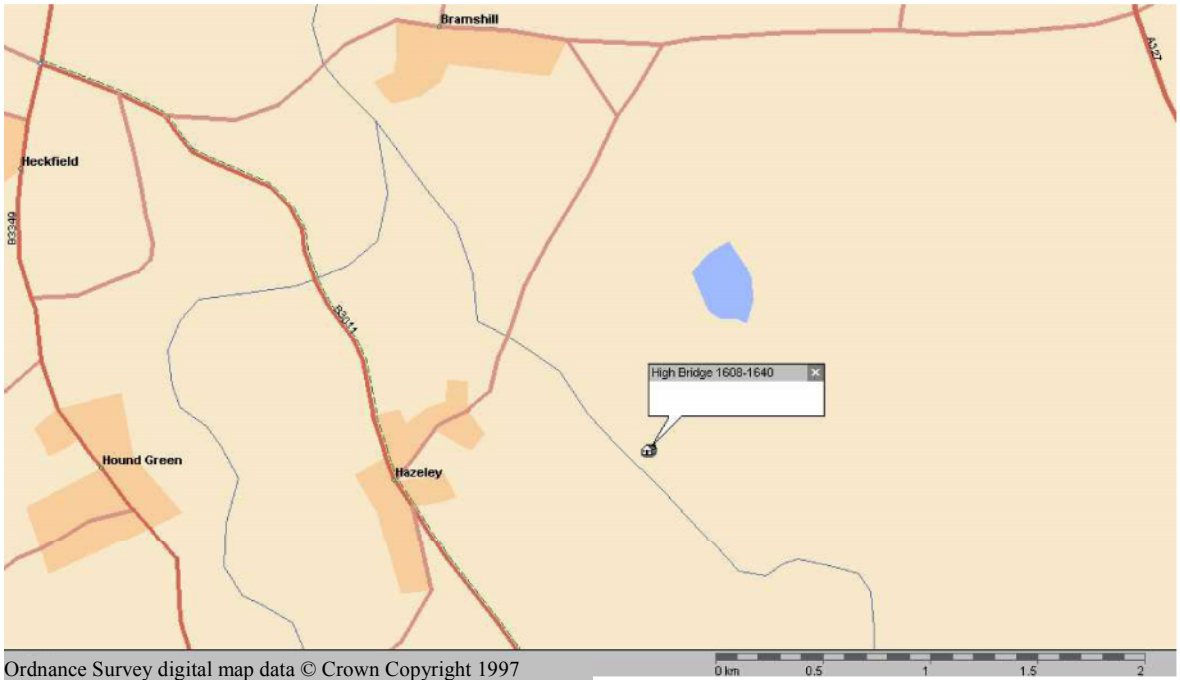


Figure 2: Site location map



METHODOLOGY

Methods employed by Tree-Ring Services in general are those described in English Heritage guidelines (Hillam 1998). Part 2 of the Guidelines is designed for large projects in conjunction with other specialist disciplines and is not applicable to the type of privately commissioned dendrochronological analysis generally conducted by Tree-Ring Services and is therefore not used. Details of the methods employed for the analysis of this building are described below.

Sampling and Preparation

The sections were air dried and tree-ring series were revealed through sanding with progressively finer grits to a 600 abrasive grit finish to produce results suitable for measuring. When required, for example where bands of narrow rings occurred, further preparation was performed manually.

Tree-ring series are measured under a ×20 stereo microscope to an accuracy of 0.01mm using a microcomputer-based travelling stage. All samples are measured from the centremost ring to the outermost. Samples considered unsuitable for dating purposes are then rejected. These include samples with disturbed ring series which cannot be measured due to knots or bands of extremely narrow rings, and those samples with less than 40 rings. Samples are measured twice and the two sets of measurements cross-matched and plotted visually as a check. Where series match satisfactorily they are averaged and the resulting series used in subsequent analysis.

Cross-correlation algorithms are then employed to search for the positions where tree-ring series correlate and therefore possibly match. All statistical correlations are reported as *t*-values derived from the original CROS73 algorithm (Baillie and Pilcher 1973). A value of 3.5 or over is usually indicative of a good match as it represents the value of *t* which should occur by chance only once in every 1000 mismatches (Baillie 1982), and the higher the *t*-value the closer to congruency in the cross-matching. However, due to the remaining small risk of high *t*-values being produced by chance, all indicated correlations are further checked to ensure that corroborative high results are obtained at the same relative position against a range of independent tree-ring series. Visual comparisons of series are also employed to support or reject possible cross-matches and serve as a means of identifying measuring errors.

Timber Groups

Tree-ring analysis is used to support suggestions of same-tree groups between samples based on a combination of information. Timbers derived from the same tree are generally expected to have *t*-values over 10, although lower *t*-values may be produced when different radii measured from the same tree are compared. Tree-ring series producing *t*-values of 10 or above are examined to identify same-tree groups. Good comparisons of visual matching, growth rates, short and longer term growth patterns, are combined with pith information, sapwood boundaries, bark and anatomical anomalies, to help decide whether timbers are likely to come from the same tree. Where timbers are assessed to derive from the same tree, to avoid bias the series are averaged to produce a single tree-ring series before inclusion in the final site chronology, but inevitably some same-tree samples go undetected by dendrochronology.

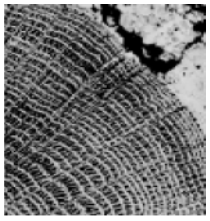
Chronology Building and Cross-dating

The process of cross-matching compares all tree-ring series against one another and those found to cross-match satisfactorily together are combined to create an average series. The site mean(s) and individual ring series which remain unmatched with the site mean are then tested against a range of established reference series (reference chronologies). Significant *t*-values replicated against a range of series at the same position with satisfactory visual matching are similarly used to establish cross-matches with reference chronologies. Where cross-matching is established against dated reference chronologies, calendar dates can be assigned to the site series. The dates of the first and last ring of dated series are produced as date spans and these dates should not be confused with felling dates. Timbers derived from the same tree are generally expected to have t-values over 10, although lower t-values may be produced when different radii measured from the same tree are compared. Where timbers derive from the same tree, to avoid bias the series are averaged to produce a single tree-ring series before inclusion in the final site chronology

Felling Dates

Series dated by the cross-dating process provide calendar year dates for the final tree-ring present in the measured timber sample. The interpretation of these dates then relies upon the nature of the final rings in the series. Where bark survives intact on a sample a felling date is given as the date of the last ring measured on the tree-ring series. Based on the completeness of the final ring it is sometimes even possible to distinguish between spring, summer or winter fellings, corresponding to approximately March to May, June to September and October to February respectively. Where timbers were felled in either spring or summer and the final ring is incomplete and therefore not measured, allowance has to be made for the one-year discrepancy between the end of a measured series and the actual year of felling.

Sapwood Estimates



Where bark is missing from oak samples, as long as either sapwood or the heartwood/sapwood boundary have been identified, an estimated felling date range can be calculated using the maximum and minimum number of sapwood rings that were likely to have been present. Sapwood estimates have varied over time with different data sets, geographical location and researchers. A general trend identified is that the number of sapwood rings in oak decreases from north to south and from west to east across Europe.

This report applies a minimum of 9 and maximum of 41 annual rings sapwood estimate, which means that 19 out of every 20 trees examined is expected have between 9 and 41 sapwood rings. This sapwood estimate is currently applied to most of the south east region and has been arrived at by Oxford Dendrochronology Laboratory (Haddon-Reece *et al.* 1990, Miles 1997). Felling date ranges have been calculated by adding the sapwood estimate of minimum and maximum missing rings to the date of the heartwood/sapwood boundary. Felling date ranges have been refined by the presence of surviving sapwood where appropriate, see **Table 3**. Where samples ending in heartwood were dated, "felled after dates" have been calculated by adding the minimum expected number of missing sapwood rings to the samples' final ring dates. These dates represent the earliest probable felling dates. However, the actual felling date of a tree may be decades later due to an unknown number of missing heartwood rings.

Date of Construction

It is vitally important to understand that dendrochronological analysis provides dates for when trees were felled and not necessarily when their timbers were used. Green or freshly felled wood is, however, far easier to work and it is standard practice to assume that medieval timbers were felled as required and used green (Rackham 1990, Miles 1997). However, the use of previously felled timbers in vernacular construction was not uncommon, with short-term stockpiling of usually not more than 1 to 2 years (Miles 1997), and the use of leftovers or re-used timbers may certainly give rise to differences between felling dates and the date of construction where samples are analysed in isolation. A number of samples having a close range of felling dates are required from different elements of a building either to strongly indicate a single date of construction or to identify separate phases of construction.

Tree-Ring Services - Methods and Criteria

Tree-ring analysis and graphics are achieved via a dendrochronological programme suite developed by Ian Tyers of Sheffield University (Tyers 1999). Location maps are produced using *Microsoft AutoRoute Express GB 98 Auto Street Navigator*, which uses Ordnance Survey digital map data © Crown Copyright 1997. Alcock's (1996) timber-framed building nomenclature has been adopted throughout to facilitate regional comparisons.

It is generally beyond the scope of an analysis to describe a building in detail or to undertake the production of detailed drawings. Without the benefit of other specialist disciplines there is always the danger that re-used timbers may be inadvertently selected, and the conclusions presented in a report may be modified in the light of subsequent work.

RESULTS

The five sections were labelled BHB-A, BHB-B, BHB-C, BHB-D and BHB-E (**Photos 1 to 5**). The samples were all visually confirmed as Oak (*Quercus* spp) with the exception of sample BHB-C, which is probably Beech (*Fagus* spp). As section BHB-C was poorly preserved and the ring boundaries generally indistinct, no further analysis was undertaken on this sample. Section BHB-B was in two parts and these sections were labelled BHB-B1 and BHB-B2.

Photo 1: Section BHB-A

Photo 2: Section BHB-B

Photo 3: Section BHB-C

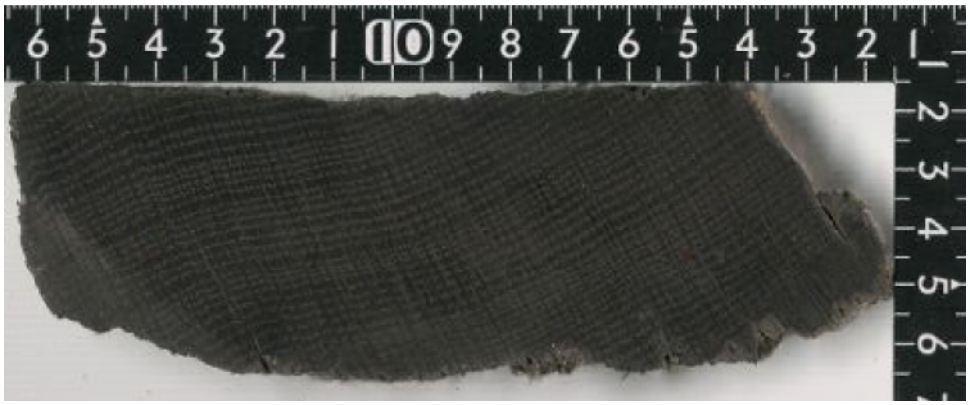


Photo 4: Section BHB-D

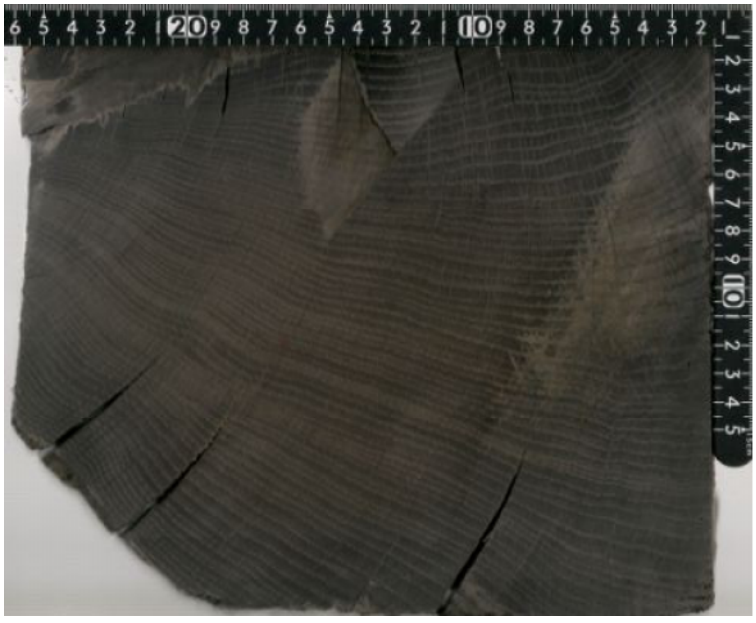


Photo 5: Section BHB-E

The measured series BHB-A, BHB-B1, BHB-B2, BHB-D and BHB-E were not found to match together and therefore all the series were individually compared against our database of reference chronologies.

Two of the samples are dated. The 50-year series from sample BHB-D produces consistently high *t*-values against reference chronologies with the first ring of the series at AD 1508 and the final ring of the series at AD 1557 (**Table 1**).

Table 1: Dating evidence for site chronology BHB-D against reference chronologies

BHB-D dated AD 1508 TO AD 1557					
File	**Start Date**	**End Date**	***t*-value**	**Overlap (yr.)**	**Reference chronology**
FRM_S2	AD1358	AD1584	6.01	50	Thames Foreshore - Old Place Lane - Richmond - Surrey (Hillam 1997)
WOKIN-OC	AD1441	AD1551	5.95	44	Old Cottage - Old Woking - Surrey (Moir 2009b)
NUTFD-6	AD1379	AD1608	5.83	50	Nutfield Area - Surrey {Moir 2009
NUFFIEL	AD1404	AD1627	5.74	50	Upper Hse Fm - Nuffield - Oxfordshire (Haddon-Reece *et al.* 1989)
SINAI	AD1227	AD1750	5.69	50	Sinai Park - Staffordshire (Tyers 1997)
HILLHAL1	AD1425	AD1564	5.53	50	Hill Hall - Waltham Abbey - Essex (Bridge 1999)
CRATFLD2	AD1503	AD1639	5.52	50	St Marys Church - Cratfield - Suffolk (Bridge 2008)
WNDS61	AD1494	AD1613	5.51	50	Round Tower - Windsor Castle - Berks (Miles and Haddon-Reece 2003)
OAKHM-F2	AD1408	AD1591	5.50	50	Flore's House - High St - Oakham - Rutland (Arnold *et al.* 2008)
WHTOWER7	AD1463	AD1616	5.45	50	H M Tower of London - London (Miles 2007)
NUTFD-CC#	AD1439	AD1558	5.43	50	Charman Cottage - Nutfield Marsh - Surrey (Moir 2009a)
LITTLEY2	AD1347	AD1648	5.34	50	Fordhams House - Littley Green - Essex (Moir 2000)

KEY: **Bold** = indicates a composite reference chronology consisting of multiple site chronologies. # = component of the NUTFD-6 chronology.

The 77-ring series from sample BHB-E produces consistently high *t*-values against reference chronologies, with the first ring of the series at AD 1523 and the final ring of the series at AD 1599 (**Table 2**).

Table 2: Dating evidence for site chronology BHB-E against reference chronologies

BHB-E dated AD 1523 TO AD 1599					
File	**Start Date**	**End Date**	***t*-value**	**Overlap (yr.)**	**Reference chronology**
LANGLEY	AD1491	AD1600	5.87	77	Langley Gatehouse - Shropshire (Hillam and Groves 1993)
WHTOWER7	AD1463	AD1616	5.77	77	H M Tower of London - London (Miles 2007)
CHARL-32	AD1233	AD1727	5.73	77	Charlwood Parish - Surrey (Moir 2004)
REIGATE	AD1401	AD1590	5.65	68	43 High Street - Reigate - Surrey (Tyers 1990)
CHARL-PF	AD1484	AD1595	5.47	73	Charlwood Place Farm - Charlwood - Surrey (Moir 2004)
THURS-R2	AD1519	AD1626	5.33	77	Kitchen wing - Ridgeway Farm - Thursley - Surrey (Moir 2006a)
BROOKGT	AD1362	AD1611	5.23	77	Brookgate Farm - Salop - Shropshire (Miles and Haddon-Reece 1993)
WOODB-CX	AD1529	AD1650	5.06	77	St Swithuns Church - Woodbridge - Nottinghamshire (Arnold and Howard 2008)
OCKHM-B3	AD1386	AD1601	4.90	77	Bridgefoot Barn east - Ockham - Surrey (Moir 2007)
GODAL-20	AD1282	AD1626	4.85	77	Godalming Area- Surrey (Moir 2006a)
CHDLY-P1	AD1324	AD1575	4.68	53	Chiddingly Place - Chiddingly - E Sussex (Arnold and Litton 2003)
LIMPS-T1	AD1482	AD1599	4.53	77	Tenchleys Manor - Limpsfield - Surrey [LIMPS-T1] (Moir 2006b) LITM/22/06

KEY: **Bold** = indicates a composite reference chronology consisting of multiple site chronologies.

INTERPRETATION

Felling Dates

A summary of the results and the felling dates now discussed are presented in **Table 3**, and the bar diagram (see **Figure 3**) helps to demonstrate the findings visually.

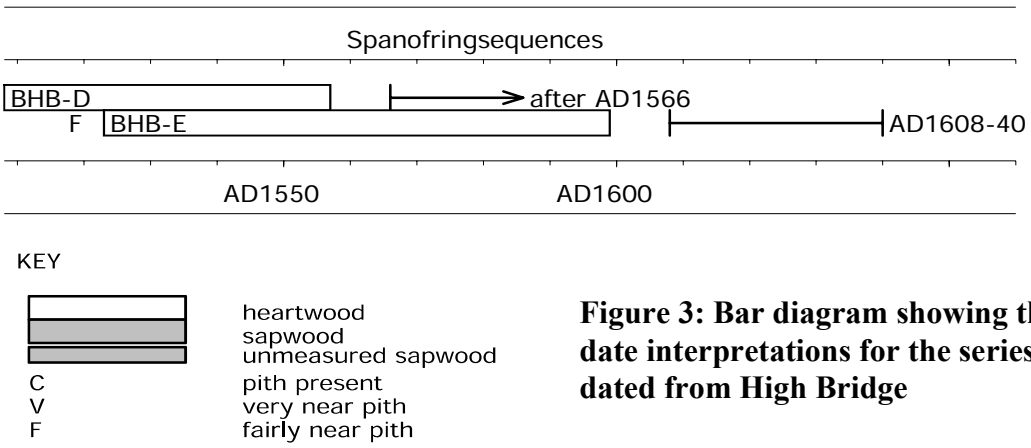


Figure 3: Bar diagram showing the date interpretations for the series dated from High Bridge

Table 3: Summary of dendrochronological analysis

Sample	Timber Conversion	Timber Dimensions (mm)	Species	Rings	Sapwood	Average Growth Rate (mm/yr)	Sequence Date Range	Felling Date	Rings to Pith		Age Estimate
BHB-A	B2	175 x 105	Oak	50	+?HS	2.23				5	73
BHB-B1				32		3.03				0	
BHB-B2	C2	180 x 110	Oak	26		2.09					76
BHB-C	E2	150 x 95	Beech	*c*. 80					>	15	95
BHB-D	E2	145 x 50	Oak	50		1.68	AD1508-AD1557	after AD1566	>	15	83
BHB-E	C2	240 x 220	Oak	77	+HS	2.85	AD1523-AD1599	AD1608-AD1640		10	105

KEY	
+	= additional information not measured on the core
HS	= heartwood/sapwood boundary
HS?	= probable bark
A2	= boxed heartwood & trimmed
B2	= halved & trimmed
C2	= quartered & trimmed
E2	= tangential & trimmed

In the absence of bark on sample BHB-E, felling-date ranges have been calculated. Applying a sapwood estimate to the heartwood/sapwood boundary of sample BHB-E produces a felling-date range of AD 1608 to AD 1640. No heartwood/sapwood boundary was evident on sample BHB-D and therefore only a felled after date of AD 1566 can be calculated. Despite the lack of cross-matching together, both the dated samples may be from a single phase of construction.

Timber analysis

There are insufficient available references chronologies in the area to indicate whether the dated timbers came from a local source, although this is most likely the case.

CONCLUSIONS

Five samples excavated at High Bridge, near Hook in Hampshire were dendrochronologically analysed. Four of the samples are oak and the rings were measured. One sample is probably beech and was rejected from further analysis.

Two of the oak timbers are dated. In the absence of bark, one sample produces a felling-date range of AD 1608 to AD 1640; a felled-after date of AD 1566 is identified for the second sample dated. Both the samples dated may be from a single phase of construction, but additional archaeological evidence and/or the dating of additional timbers would be required to confirm this interpretation.

ACKNOWLEDGEMENTS

This report was commissioned by Thames Valley Archaeological Services Ltd (TVAS).

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APPENDIX I: Raw ring-width data

BHB-A

351	350	369	473	546	432	490	264	188	182
285	261	211	150	177	148	231	193	140	81
206	181	217	239	205	217	112	139	168	220
223	229	276	108	218	161	173	189	257	142
164	241	178	173	144	135	207	143	187	166

BHB-B1

168	150	212	139	225	297	307	272	280	348
324	308	349	522	400	509	301	480	426	353
377	426	280	351	225	262	197	248	189	345
223	209								

BHB-B2

150	201	199	205	243	200	247	225	249	238
191	225	187	235	241	207	229	203	186	257
253	123	160	244	205	138				

BHB-D

165	164	174	217	238	149	218	206	230	175
240	196	130	133	140	159	228	143	137	136
191	181	193	243	147	125	164	212	213	210
198	222	173	138	78	130	100	136	138	111
179	195	199	167	161	162	146	141	99	73

BHB-E

211	211	300	441	365	414	410	385	472	402
300	332	407	343	452	366	348	368	298	194
257	206	312	222	308	327	441	374	309	262
243	327	327	289	229	219	252	216	246	212
284	227	154	156	307	345	362	336	225	170
136	132	195	182	260	183	292	335	282	218
450	429	406	405	382	260	249	233	243	189
194	268	255	151	159	160	111			

BHB 12/89

Bramshill High Bridge, Bramshill Police College, Bramshill, Hook, Hampshire, 2012
Archaeological watching brief

Figure 1. Location of site in relation to the College, Bramshill and within Hampshire.

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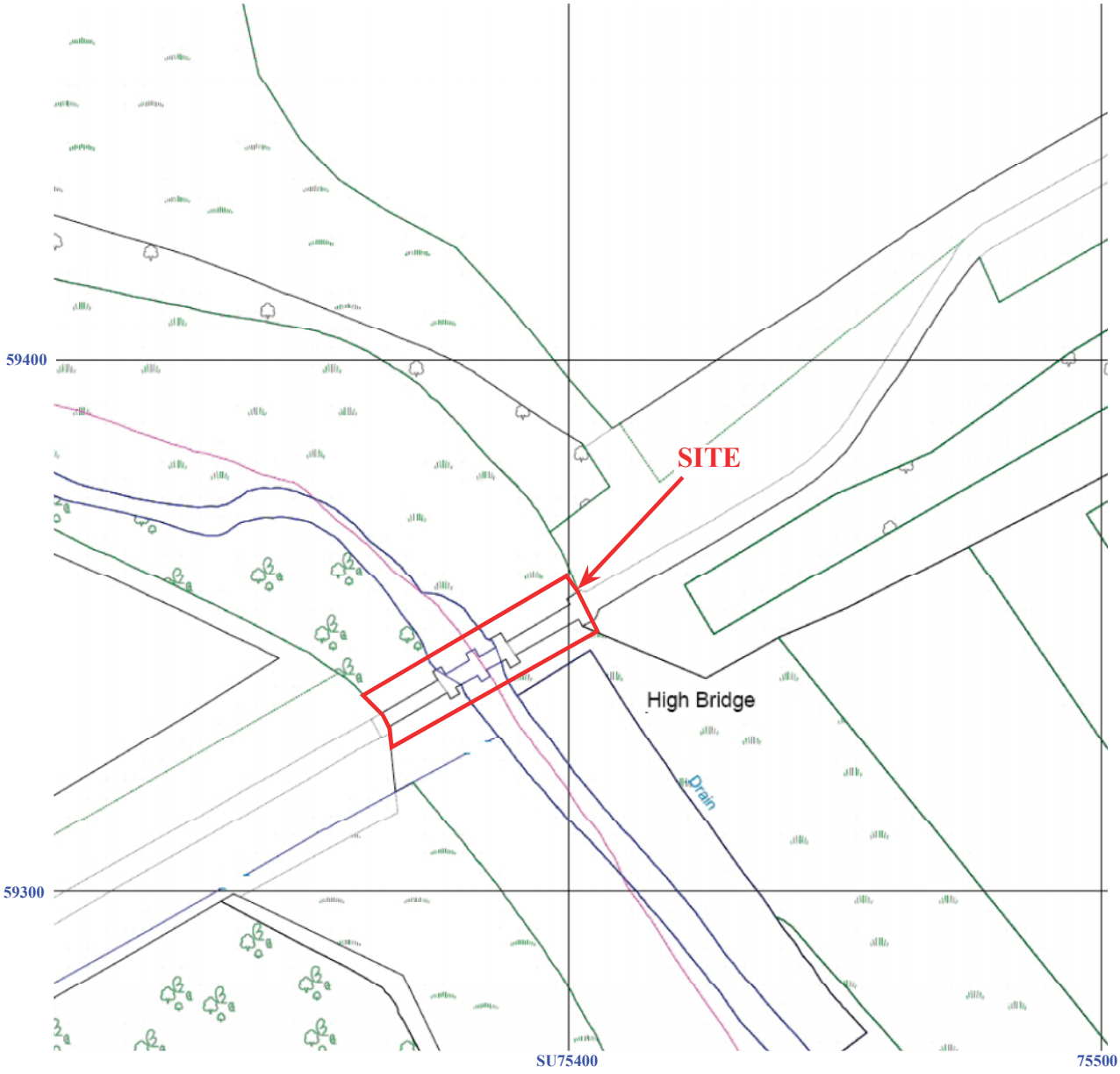

BHB 12/89

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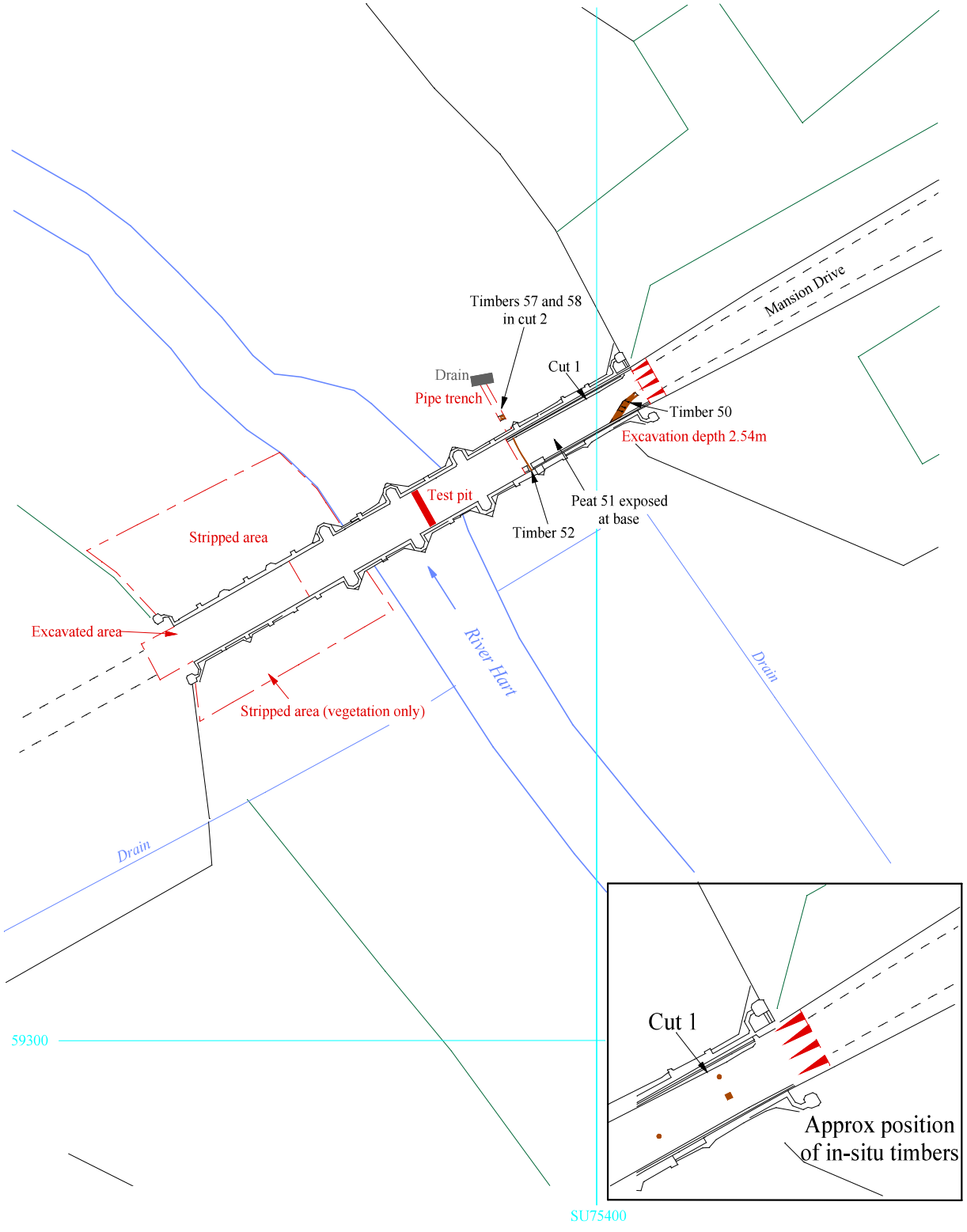
Bramshill High Bridge, Bramshill Police College, Bramshill, Hook, Hampshire, 2012
Archaeological watching brief

Figure 2. Detailed location of site.

THAMES VALLEY ARCHAEOLOGICAL SERVICES



BHB 12/89

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Figure 3. Location of area observed on High Bridge.

0 25m

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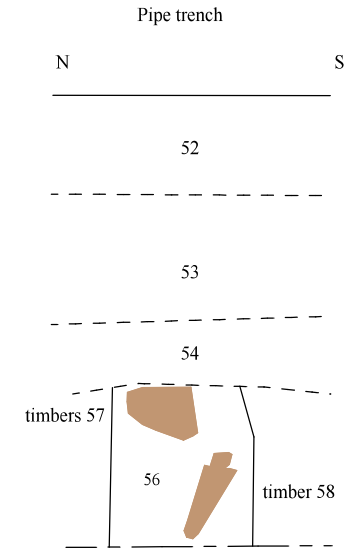

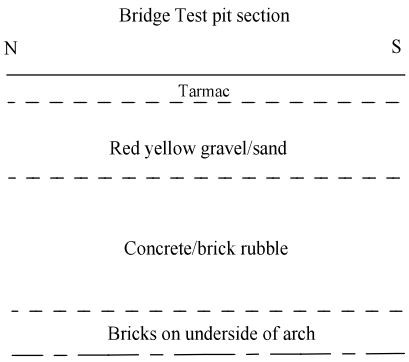

BHB 12/89

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Figure 4. Representative sections.

0 1m

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Plate 1. High Bridge, looking looking east.

Plate 2. Section showing stratigraphy exposed by pipe trench, looking east. Note *in situ* timbers. Scales 0.5m and 0.3m.

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Plates 1 and 2.

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Plate 3. Deepest part of the interior brdige excavation, looking south west, Scales: 2m and 1m.

Plate 4. Timber 50 in situ, looking southeast, Scales: 2m, 1m and 0.5m.

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Plates 3 and 4.

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Plate 5. Detail of Timber A once removed, Scales: 1m, 0.3m and 0.1m.

Plate 6. Timber F, Scales: 2m, 0.3m and 0.1m.

Plate 7. Timber 60, plank removed from drainage trench, Scales: 0.5m and 0.1m.

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Plates 5, 6 and 7.

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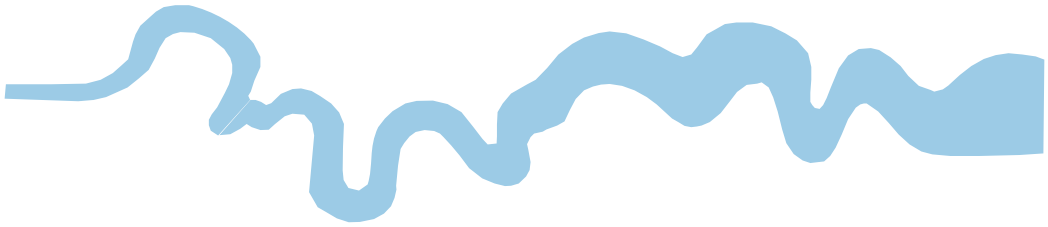
TIME CHART

	Calendar Years
Modern	AD 1901
Victorian	AD 1837
Post Medieval	AD 1500
Medieval	AD 1066
Saxon	AD 410
Roman	AD 43
Iron Age	BC/AD 750 BC
Bronze Age: Late	1300 BC
Bronze Age: Middle	1700 BC
Bronze Age: Early	2100 BC
Neolithic: Late	3300 BC
Neolithic: Early	4300 BC
Mesolithic: Late	6000 BC
Mesolithic: Early	10000 BC
Palaeolithic: Upper	30000 BC
Palaeolithic: Middle	70000 BC
Palaeolithic: Lower	2,000,000 BC



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