A21 Tonbridge-to-Pembury Dualling Scheme, Kent

Post-Excavation Final Report

Volume 6: Finds and Environmental Reports

December 2020

Client: Balfour Beatty

Issue No: 1
OA Reference No: 6014
NGR: TQ599447–TQ611417

oxfordarchaeology
southsouthsouth

Client Name:	Balfour Beatty
Document Title:	A21 Tonbridge-to-Pembury Dualling Scheme, Kent, Post-Excavation Final Report Volume 6: Finds and Environmental Reports
Document Type:	Post-Excavation Final Report
Grid Reference:	TQ599447–TQ611417
Site Code:	A21TPD 2014
Invoice Code:	A21TPDPX
Receiving Body:	Tonbridge Museum, Kent
Accession No.:	TBC
OA Document File Location:	Projects on Samba 2:a/A21TPDWB/Post-excavation/
OA Graphics File Location:	Servergo:Invoices a thru h/A-invoices/A21TPDWB/
Issue No:	v.1
Date:	10th December 2020
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A21 Tonbridge-to-Pembury Dualling Scheme, Kent

Post-Excavation Final Report Volume 6: Finds and Environmental Reports

Contents

List of figures

List of plates

List of tables

Summary

This sixth volume of the A21 Dualling Scheme post-excavation final report presents all the finds and environmental assessment and analysis reports from every site along the scheme. The contents include chapters on pottery, ceramic building material, metals, glass, clay pipes, worked flint, other stone, worked wood, industrial waste, leather, radiocarbon dating, charred plant remains, waterlogged plant remains, charcoal, animal bones, pollen and insect remains.

Acknowledgements

Oxford Archaeology would like to thank Balfour Beatty for commissioning this project, and in particular Julia Baker, Environmental Manager for the A21 Tonbridge to Pembury Dualling Scheme, for her support. Tony Hanna of WSP was Principal Archaeologist for the A21 Tonbridge to Pembury Dualling scheme, and OA is grateful to Wendy Rogers, who monitored the work on behalf of Kent County Council, for her advice and guidance.

The project was managed for Oxford Archaeology by Tim Allen and the fieldwork was directed by Mariusz Gorniak and Michael Donnelly. Survey and digitizing was carried out by David Jamieson.

Thanks are extended to the OA staff who cleaned and packaged the finds under the management of Leigh Allen, to those led by Sharon Cook who, processed the environmental remains under the management of Rebecca Nicholson, and to those led by Susan Rawlings who prepared the photos and archive under the management of Nicola Scott.

OA is grateful to all of the specialists who contributed to this volume of the report. In addition we would like to thank Kevin Stubbs, independent brick specialist, for his helpful comments in relation to the ceramic building materials report and the charred and waterlogged wood reports.

1 INTRODUCTION

1.1 Background

1.1.1 Oxford Archaeology (OA) was commissioned by Balfour Beatty PLC on behalf of Highways England to undertake the archaeological mitigation connected with the construction of the A21 Tonbridge-to-Pembury Dualling Scheme in Kent. This sixth volume of the Post-Excavation Final Report presents the post-excavation assessment and analysis finds and environmental reports of all the categories of material that were recovered from the excavations. Where no further work was recommended following assessment, the assessment report stands as the final record of that category of finds.

1.1.2 The contents include chapters on pottery, ceramic building material, metals, glass, clay pipes, worked flint and other stone, industrial waste, leather, radiocarbon dating, charred plant remains, waterlogged plant remains, charcoal, worked wood, animal bones, pollen and insect remains. Each report has been formatted and edited into the overall document but is largely presented as written by each author/specialist.

1.1.3 These reports should be read in conjunction with volumes 1, 2 and 5, which together cover the strip, map and sample and watching brief excavations, the excavations of the WC2 Brickworks, Castle Hill Wood, Burgess Rough and Burgess Hill Farm, and the various trial-trench evaluation sites. Volumes 3 and 4 contain the figures and plates relating to all these volumes.

1.1.4 All radiocarbon dates are presented at 95% (2σ) confidence, and rounded out to the nearest 10 years.

2 POTTERY

2.1 Prehistoric

By Lisa Brown

2.1.1 Small groups of prehistoric, probably Iron Age pottery occurred in contexts 406, 2065, and 2500.

2.1.2 Context 462, the fill of a tree-throw hole, produced a single 18g sherd of prehistoric pottery. This very abraded sherd is handmade in a soapy fabric tempered with abundant dark grey grog and black ferrous inclusions (perhaps weathered glauconite), along with rare buff grog or argillaceous material. The outer surface of the sherd is fired to reddish-orange on an otherwise dark grey vessel. The outer surface has not survived weathering, but the inner surface is roughly smoothed/squeezed, with signs of finger pressure to close up the clay. Although much native late Iron Age and early Romano-British pottery is grog-tempered, the fabric and treatment in this case suggest that the sherd is earlier prehistoric, possibly late Neolithic or early Bronze Age, although this dating is uncertain due to an absence of additional distinguishing traits.

2.1.3 Context 2500 is the top fill of pit 2099, part of a middle Bronze Age burnt mound complex. Three undecorated conjoining sherds of pottery, in total weighing 13g, were recovered from this fill. The fabric is lightly sanded with translucent rounded quartz sand and incorporates light grey and buff-coloured grog, giving it a slightly soapy texture. The outer surface of the otherwise light grey sherd is pale buff, highlighting a scattering of small dark red ferrous inclusions. The sherd is too abraded to determine the method of manufacture, but on the basis of appearance is more likely to be of late Iron Age/early Roman date than prehistoric. This indicates that the pottery, which is from the top fill of the pit, post-dates the burnt mound activity.

2.1.4 Context 2065, the secondary fill of pit 2063, yielded 13 conjoining sherds weighing 166g. The fragments make up a complete flat, 'kick base' and curved lower wall of a very crudely finished vessel. The base would have been c85mm in diameter. The fabric has a slightly soapy texture and is grog-tempered (brown and buff grog), flecked with soft particles of a white rock (perhaps Reigate stone—a calcareous sandstone), which also rarely occur as angular fragments up to 6mm across. There are occasional organic voids suggestive of grassy material. The vessel is very weathered on all surfaces, but it is nonetheless apparent that little attention was given to surface treatment. The character of the vessel would be consistent with an early Bronze Age date, but grog temper is also found in the middle/late Bronze Age and middle Iron Age in parts of Kent and a radiocarbon determination of 400–230 cal. BC at 95% confidence was obtained on short-lived hazel roundwood from the layer in which the pot was found, confirming a middle Iron Age date.

2.2 Late Iron Age and Roman

By Paul Booth

2.2.1 Only three sherds (10g) of pottery were recovered, both from the east end of IA4. These comprise two joining abraded body fragments (3g) in a fabric tempered with rounded clay/grog inclusions and organic voids (context 1425), and a relatively unworn rim sherd from

an undiagnostic jar in a fairly fine fabric containing rounded quartz sand, glauconite and ?grog inclusions (context 1471).

2.2.2 The sherds are broadly of late Iron Age-early Roman character. A date in the 1st century AD is perhaps most likely, but the material is not sufficiently diagnostic for this to be certain.

2.3 Medieval

By John Cotter

2.3.1 Medieval pottery was found in two contexts in IA4, 1418 and 1456, both parts of the same feature. Charcoal from context 1418 was also radiocarbon dated, giving a date range of 1050–1260 cal. AD at 95% confidence (SUERC-73972; 850 ±30 BP). Both contexts produced sherds of North-west Kent shelly ware (Kent Fabric EM35, *c* 1050–1225; Cotter 2012, 539–40).

2.3.2 Context 1418 contained four fairly fresh joining sherds (73g), (probably broken on excavation) from the rim and shoulder of a typical medieval cooking pot, handmade but possibly finished on a turntable (Fig. 133). It has a sub-squared/thickened flat-topped rim (diam. 260mm) suggesting a date of *c* 1150–1225. The fabric is soft, grey-brown in colour, with a dark grey core. The clay matrix contains moderate fine-medium quartz sand and moderate fairly coarse inclusions of crushed shell. The latter, however, have completely dissolved-out leaving a corky texture, and the internal surface is finely cracked and friable. On the outside there is clear evidence of sooting, especially on the shoulder, from use as a cooking vessel.

2.3.3 Context 1456 contained three small joining sherds (4g). From the very damaged everted rim/neck of a cooking pot. Fabric as in 1418 above (possibly same vessel?).

Catalogue of illustrated pottery

Fig. 133: EM35 cooking pot from context (1418) on Site IA4.

2.4 Post-medieval

By Paul Blinkhorn

Pottery Types

2.4.1 Where possible, the pottery was recorded using the conventions of the Museum of London type-series, with the following noted:

BBAS:	Black basalt ware, 1770–1900
CREA:	Creamware, 1740–1830
DERBS:	Derby stoneware, 1700–1900
HORT:	Horticultural earthenwares, 19th–20th century
PEAR:	Pearlware, blue shell-edged, 1770–1830
PEAR PNT:	Pearlware, painted polychrome decoration, 1770–1830
PMR:	Post-medieval redware, 1580–1900
PMR SLIP:	London-area slipped redware, 1800–1900
REFW:	Refined whiteware, 1800–1900

REFW CHROM: Refined white earthenware, painted decoration, 1830–1925+

TPW: Transfer-printed whiteware, 1830–1900

YELL: Yellow ware, 1840–1900

2.4.2 Other wares, not covered by the London types series, were also present. These were recorded using the conventions of the Canterbury Archaeological Trust type-series, as follows:

PM64: Calcareous-flecked smooth ware, 1550–1725

LPM1A: Late red earthenware, iron-streaked glaze, 1800–1900

LPM1B: Late red earthenware, 1775+

LPM10A: Modern English stoneware, Blacking Bottles, etc. 1800–1940

LPM10B: Modern English stoneware, Jam Jars, etc. 1800–1940

LPM10C: Modern English stoneware, Flagons, etc. 1800–1940

Chronology: Overview

2.4.3 In the main, the post-Roman pottery largely comprised 19th–early 20th-century types, most of which are utilitarian wares such as red earthenware and stonewares. The former can only be dated to their broad production span. The better quality tablewares, TPW and REFW, such as they were, are almost entirely from the poorer end of the market, and not a single sherd with a maker's mark or date-stamp was noted, meaning refined dating of the material was impossible. Some of stoneware preserve jars did have marks which could offer such information, but only in the broadest sense. For example a fragment of a Keiller Marmalade jar bearing the inscription "Grand Medal of Merit Vienna 1873" was noted amongst the Well Wood evaluation pottery. Such jars were made between 1873 and 1898 (Mathew 2000, 7). Also noted were two Hartley's stoneware jam-jars with their distinctive "Lighthouse" brand mark on the base, from Burgess Hill and Burgess Hill Farm. These were made and used for many decades from 1871 onwards. Stoneware jars such as these were often re-used, for storing treacle or as paint-pots for example (Licence 2015, 36), and thus could have had a long life before deposition. A "Moutard de Maille" stoneware mustard bottle with a Chesterfield maker's mark also occurred, but with a similarly broad chronology. Consequently, each of the context-specific dates should be regarded as a *terminus post quem*.

The Assemblages

Miscellaneous Dispersed Excavations and Evaluations

2.4.4 The pottery occurrence by number and weight of sherds per context by fabric type is shown in Table 1. All the material is well-known in the region. The following fabric types were noted:

PM64: Calcareous-flecked smooth ware, 1550–1725. 1 sherd, 3g.

BBAS: Black basalt ware, 1770–1900. 1 sherd, 12g.

CREA: Creamware, 1740–1830. 1 sherd, 1g.

HORT: Horticultural earthenwares, 19th–20th century. 10 sherds, 213g.

LPM1A: Late red earthenware, iron-streaked glaze, 1800–1900. 4 sherds, 203g.

LPM1B: Late red earthenware, 1775+. 18 sherds, 574g.

LPM10A: Modern English stoneware, blacking bottles etc. 1800–1940. 8 sherds, 58g.

LPM10B: Modern English stoneware, jam-jars, etc. 1800–1940. 13 sherds, 534g.

LPM10C: Modern English stoneware, flagons, etc. 1800–1940. 5 sherds, 230g.

PEAR: Pearlware, blue shell-edged, 1770–1830. 1 sherd, 14g.

PMR: Post-medieval redware, 1580–1900. 6 sherds, 175g.

REFW: Refined whiteware, 1800–1900. 39 sherds, 430g.

TPW: Transfer-printed whiteware, 1830–1900. 20 sherds, 168g.

YELL: Yellow ware, 1840–1900. 1 sherd, 10g.

2.4.5 The pottery from these sites is largely unremarkable, consisting in the main of fairly small groups of small sherds, other than at the Burgess Hill site. There, a few stoneware vessels were well-represented, including a near-complete but broken Hartley's "Lighthouse" brand stoneware jam-jar, along with another with no markings, and some fragments of a "rum jar" or flagon. Some pieces of fairly low-quality table-wares in the form of various REFW items were also present at the site, along with some large fragments of a few flower-pots.

2.4.6 A few sherds could be potentially earlier than the 19th–20th century; the fragment of a BBAS tea-pot from IA3, another of a Pearlware plate with a blue shell-edge from Middle Lodge and the tiny fragment of Creamware from Translocation (WC-WW) could all date to the second half of the 18th century. Similarly, the fragments of PMR from Burgess Hill and IA23 could be of such a date, as the fabrics and glazes seem less developed than those of the LPM1A and LPM1B vessels. A sherd of PM64 from WC3 could be 18th century. However, in each case, the overall date of the context-specific assemblages in which they occurred is within the date-range of their production, so they may simply represent late examples of their types.

Brickworks and Associated Sites

2.4.7 The pottery occurrence by number and weight of sherds per context by fabric type is shown in Table 2. All the material is well-known in the region. The following fabric types were noted:

PM64: Calcareous-flecked smooth ware, 1550–1725. 7 sherds, 66g.

CREA: Creamware, 1740–1830. 1 sherd, 8g.

HORT: Horticultural earthenwares, 19th–20th century. 64 sherds, 2644g

LPM1A: Late red earthenware, iron-streaked glaze, 1800–1900. 19 sherds, 1397g.

LPM1B: Late red earthenware, 1775+. 92 sherds, 1416g

LPM10B: Modern English stoneware, jam-jars, etc. 1800–1940. 9 sherds, 544g.

LPM10C: Modern English stoneware, flagons, etc. 1800–1940. 3 sherds, 329g.

REFW: Refined whiteware, 1800–1900. 9 sherds, 109g.

TPW: Transfer-printed whiteware, 1830–1900. 7 sherds, 138g.

YELL: Yellow ware, 1840–1900. 2 sherds, 19g.

2.4.8 The assemblage is very much dominated by utilitarian red earthenwares, both glazed and unglazed, with table-wares such as REFW and TPW very scarce. This is perhaps to be expected from an industrial site. Most of the red earthenware assemblage appears to be fragments of internally glazed bowls, as is typical of the tradition, but a large, near-complete unglazed flanged lid was also noted, from context (1798), a levelling deposit around Kiln 1. Bowls of this kind had a multiplicity of uses in the domestic sphere until the early decades of the 20th century, when cheap enamelled metal vessels began to replace them (Licence 2015, 35). They probably had similarly multi-functional lives at the brickworks, although it is worthy of note that glazed vessels mainly occurred at the WC-2 Sheds area of the site, whereas the unglazed pots occurred there, at the kilns, at WC2–BR, and Castle Hill Wood, suggesting that they had a more specialized range of uses than the unglazed pottery. Sherds from a single ?jug in PM64 (a Medway area product) probably date to the first half of the 18th century; these are from (2962), a make-up layer within the WC2 brickworks, underlying the brick piers of structure 2863 (Shed 1). As (2962) also produced late 18th-century pottery types the PM64 jug must either have been curated or be residual/redeposited.

2.4.9 Stonewares were reasonably well represented, although the only largely complete vessels were a jam-jar and a "Moutard de Maille" bottle. The latter is stamped with the maker's mark "Pearsons of Chesterfield". The company in question was established in 1805, before changing its name to "Pearson and Co (Chesterfield Ltd)" in 1925 (Lang 2006, 260). The mark on this vessel appears to pre-date the "spinning wheel" mark that the company introduced in 1880 (ibid.). As the context which produced the vessel (706) also yielded a sherd of TPW, a date of 1830–1880 seems appropriate.

2.4.10 A fragment of a "Keiller" stoneware marmalade jar occurred in context 2897, the demolition deposit over pugmill 2892. The sherd is quite small, and somewhat worn, and appears to be residual. It bears a fragment of the printed inscription "Grand Medal of Merit Vienna 1873", meaning that it was made between 1873 and 1898 (Mathew 2000, 7), although given the fact that it is clearly residual, this can offer no more than a *terminus post quem*. A near-complete stoneware jam-jar also occurred in the same deposit, in context 2895. It has a single letter "P" stamped in the base, but is otherwise unmarked. Its maker is unknown.

Burgess Hill Farm

2.4.11 The pottery occurrence by number and weight of sherds per context by fabric type is shown in Table 3. All the material is well-known in the region. The following fabric types were noted:

DERBS: Derby stoneware, 1700–1900. 1 sherd, 26g.

HORT: Horticultural earthenwares, 19th–20th century. 1 sherd, 20g.

LPM1A: Late red earthenware, iron-streaked glaze, 1800–1900. 13 sherds, 937g.

LPM1B: Late red earthenware, 1775+. 6 sherds, 143g.

LPM10B: Modern English stoneware, jam-jars, etc. 1800–1940. 19 sherds, 790g.

PEAR PNTD: Pearlware, painted polychrome decoration, 1770–1830. 1 sherd, 23g.

PMR: Post-medieval redware, 1580–1900. 1 sherd, 37g.

PMR SLIP: London-area slipped redware, 1800–1900. 3 sherds, 202g.

REFW: Refined whiteware, 1800–1900. 32 sherds, 415g.

REFW CHROM: Refined white earthenware, painted decoration, 1830–1925+. 2 sherds, 58g

TPW: Transfer-printed whiteware, 1830–1900. 12 sherds, 90g.

YELL: Yellow ware, 1840–1900. 4 sherds, 68g.

2.4.12 The assemblage from Burgess Hill Farm is perhaps what would be expected for such a site, and comprises a mixture of utilitarian earthenwares and stonewares, such as bowls in the case of the former and jam-jars and blacking bottles in the case of the latter, along with finer tablewares. None of the context-specific assemblages appear to date to before the 19th century, and there are few sherds which could date to before that time, as all the wares present had a manufacturing span which included that period. The only pottery with any sort of maker's mark was a partially complete Hartley's "Lighthouse" brand stoneware jam-jar from context (90179). As noted above, these cannot be accurately dated, other than to note that they were first made in 1871.

2.4.13 A single fragment of a "Pratt Ware" painted and moulded plate occurred in context (90082), perhaps the only piece of relatively high quality pottery from the site. It appears to date to the early 19th century, but occurred with fragments of TPW and is likely to be residual.

2.5 Pottery tables

Table 1: Post-medieval pottery occurrence by number and weight (g) of sherds per context by fabric type, miscellaneous sites

		EM35		PM64		PMR		CREA		BBAS		PEAR		LPM1B		REFW		TPW		LPM1A		LPM10A		LPM10B		LPM10C		HORT		YELL		
Site	**Context**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**Date**
Burgess Hill	105					5	162							2	35	18	166							2	166			4	96	1	10	M19thC
Burgess Hill	107													2	80									1	18							19thC
Burgess Hill	108															3	16							8	314			4	184			L19thC
Burgess Hill	112													13	284	14	231	14	138			2	25	1	13	4	162	2	38			E19thC
IA3	2001					1	13			1	12							1	4							1	68					E19thC
IA4	1418	4	73																													12thC
IA4	1452	3	4																													12thC
Middle Lodge	86004																	2	8													E19thC
Middle Lodge	86007											1	14							3	197											19thC
Middle Lodge	86013													1	175																	19thC
Translocation (WCPemW)	495																	1	14													E19thC
Translocation (WC-WW)	458							1	1									1	2													E19thC
WC2	201																							1	23							19thC
WC2	204																			1	6											19thC
WC3	1106			1	3																											18thC
Well Wood	23008															4	17					6	33									L19thC
Well Wood	27007																	1	2													E19thC
	Total	7	77	1	3	6	175	1	1	1	12	1	14	18	574	39	430	20	168	4	203	8	58	13	534	5	230	10	318	1	10	

Table 2: Post-medieval pottery occurrence by number and weight (g) of sherds per context by fabric type, brickworks and associated sites

		PM64		CREA		LPM1B		REFW		TPW		LPM1A		LPM10B		LPM10C		HORT		YELL		
Site	**Context**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**Date**
Castle Hill Wood	3300							1	3											1	13	M19thC
Castle Hill Wood	3337																	1	153			E19thC
Castle Hill Wood	3350																	3	66			E19thC
Castle Hill Wood	3351							3	14											1	6	M19thC
WC2–BR	706									1	6			1	328							E19thC
WC2–BR	709																	7	101			19thC
WC2–BR	714					1	28											21	396			MOD
WC2–BR	725																	10	255			MOD
WC2–BR	740									2	11											E19thC
WC2–BR	798									1	27											E19thC
WC2–BR	1915					1	17	1	7													19thC
WC2–BR Kilns	1798																	4	863			MOD
WC2–Sheds	2801					1	42	1	60			1	277									19thC
WC2–Sheds	2866					45	575			1	1	3	33					1	37			E19thC
WC2–Sheds	2869					8	240											1	187			19thC
WC2–Sheds	2889					7	168					2	53									19thC
WC2–Sheds	2895													6	200							L19thC
WC2–Sheds	2896							1	14													19thC
WC2–Sheds	2897							1	7	2	93	4	149	2	16	3	329	12	422			L19thC
WC2–Sheds	2956					4	18	1	4			1	15									19thC
WC2–Sheds	2957					10	160															L18thC
WC2–Sheds	2962	7	66	1	8	15	168															L18thC
WC2–Sheds	4185																	4	164			E19thC
WC2–Sheds	4192											8	870									19thC
	Total	7	66	1	8	92	1416	9	109	7	138	20	1403	9	544	3	329	64	2644	2	19	

Table 3: Post-medieval pottery occurrence by number and weight (g) of sherds per context by fabric type

		PMR		PEAR PNTD		LPM1B		PMR SLIP		DERBS		REFW		REFW CHROM		TPW		LPM1A		LPM10A		LPM10B		HORT		YELL		
Site	**Context**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**No**	**Wt**	**Date**
Burgess Hill Farm	90041																									1	30	M19thC
Burgess Hill Farm	90044											1	13															19thC
Burgess Hill Farm	90048																	1	24									19thC
Burgess Hill Farm	90078															1	2									1	4	M19thC
Burgess Hill Farm	90080											6	124															19thC
Burgess Hill Farm	90081																							1	20			E19thC
Burgess Hill Farm	90082			1	23	1	11									6	56			2	42							E19thC
Burgess Hill Farm	90174															1	7											E19thC
Burgess Hill Farm	90177					1	14																					L18thC
Burgess Hill Farm	90179	1	37									23	270	1	35			2	31			19	790					L19thC
Burgess Hill Farm	90184					2	59					1	4			2	8									1	11	M19thC
Burgess Hill Farm	90189							2	41							2	17											E19thC
Burgess Hill Farm	90191																	6	418									19thC
Burgess Hill Farm	90194																	2	161	1	31					1	23	L19thC
Burgess Hill Farm	90203																	2	303									19thC
Burgess Hill Farm	90211													1	23													19thC
Burgess Hill Farm	90218					1	16																					L18thC
Burgess Hill Farm	90220					1	43	1	161	1	26																	19thC
Burgess Rough Barn	2627											1	4															19thC
	Total	1	37	1	23	6	143	3	202	1	26	32	415	2	58	12	90	13	937	3	73	19	790	1	20	4	68	

3 CERAMIC BUILDING MATERIALS

By Cynthia Poole

3.1 Introduction

3.1.1 Large quantities of bricks were encountered in the excavations of the brickworks in structures and other deposits, which were systematically sampled to provide an assemblage for more detailed recording and analysis. A small number of complete or near-complete bricks were recovered from other sites within the project area, and these are also included in the analysis for this report (Table 4). A total of 327 objects (784kg) have been fully recorded on an Excel spreadsheet, which includes quantification, fabric type, dimensions, surface finish, manufacturing characteristics and features, presence of mortar, contextual information and any additional comments. Reference to top and base in the record and the reports refers to the objects as manufactured, not used. The assemblage comprises 273 bricks (670.894kg), 50 paviours (104.642kg), a paving block (3286g) and three whelms (5.193kg); more detailed breakdown by type appears in Table 5. Other ceramic building material (CBM) was catalogued separately and amounted to 534 objects weighing *c* 100kg. This material included a variety of roofing, floor tiles, various field drain and drain pipes, broken brick and other miscellaneous items. Whilst much of this material (58% by count, 65% by weight) came from the brickworks site, roughly a third was found on other sites investigated as part of the project.

3.1.2 A total of 42 objects have been selected to illustrate the range and characteristics of the ceramic building material, and for retention as part of the archive. These objects are referred to by number throughout the report (eg 3.1, 3.42). The seven plates for these objects can be found in Volume 4 (Plates 456–462).

3.2 Fabrics

3.2.1 The fabrics divide into two groups comprising the local clay fabric B and fireclays of fabrics A and C.

3.2.2 Fabric B is a fine sandy, finely micaceous clay, which contained varying quantities and grades of larger inclusions comprising primarily of dark red, maroon or black ferruginous grits, the larger clearly pieces of ironstone, up to *c* 25mm long, tabular fragments of fine grained pinkish sandstone up to *c* 30mm and mudstone nodules or unwedged clay up to 40mm. The coarser inclusions were not always visible in the finished surface of the bricks but were almost always visible in the core of broken bricks or where the surface had been heavily worn exposing the interior (Plate 456, 3.1). In other CBM the inclusions tend to be finer, depending on the size of the final product and often only the ferruginous grits are common. It fired to a range of red, pinkish red, maroon, purple or orange colours. This fabric derives from the mudstone of the Wadhurst Clay, which is known to have been exploited from the location of the clay pits found at the brickworks. The coarse inclusions must be natural and the fine sandstone grits possibly derived from the nearby deposits of Tunbridge Wells Sand Formation, that occur to the west of the site. These sandy deposits may have provided the moulding sand for the bricks. A small number of possibly earlier bricks had inclusions of black vesicular clinkerish material and bear some similarity to London Stocks (MoL fabric 3034/3035), but other inclusions are consistent with the local clay and it may be an effect of over-firing on certain of the coarse inclusions in the clay (Plate 456, 3.2). Remains of the last load of clay used in Pugmill 1 was found *in situ* (Plate 338): this is a uniform stiff yellow clay with no visible

inclusions, in contrast to most of the bricks' fabrics examined, though it would be compatible with some of the more specialised items with a fine fabric such as the roof finial (ctx 1766).

3.2.3 The fire clays were typical cream or whitish yellow clay. Small cream inclusions were visible in some examples of fabric A, which may have originated from different areas. Fabric *c* contained frequent black-maroon sub-rounded ferruginous inclusions 1–2mm across, creating a distinctive speckled effect, and can be linked to certain Stourbridge producers. A cream clay fabric containing a high density of angular white-cream grits up to 5mm in size, but mostly *c* 1–2mm, appears to derive the Durham–Newcastle coalfield, and was found in bricks from the kilns and a single firebrick from the Burgess Hill Farm site.

3.3 Castle Hill bricks

Manufacture

3.3.1 The bricks made in the local fabric B are all handmade using a wooden stock mould, probably with a metal lining at the upper edge of the mould, as on many bricks the arrises are angular and sharp, when not degraded by wear and usage. Fully metal-lined moulds did not appear until well into the 20th century (K. Stubbs pers. comm.). The upper surface (any reference to upper or lower surface is as made, not as used) is consistently fairly smooth with fine striations running longitudinally, where surplus clay has been removed either by hand or with a strike. The sides and lower surfaces are invariably sanded with a fine quartz moulding sand to prevent the clay sticking to the mould and generally are fairly regular and even, though there is some variation, some bases being noticeably rougher. The ends or headers were generally smoother than the stretcher faces, which all had evidence of creasing (often referred to as smiles) from the drag on the clay thrown into the mould, though often the creases were partly 'ironed out' during the stacking of the bricks to dry. Marks from handling are virtually absent - only six bricks have finger marks, indicating that once tipped out of the mould the bricks were handled between thin `loose boards' used to protect the wet bricks while loading onto the brick barrow and into the hacks. Bricks were rarely handled again until sufficiently dry and hard to resist finger pressure.

Brick types

3.3.2 The bricks fall into three basic categories: standard solid bricks (type 1 and 2), frogged bricks (type 3–8) and paviours or paving bricks (Plate 456, 3.3–6). The latter are characterized by being thinner (45–59mm) than standard bricks but in other respects have the same characteristics. Apart from the thickness of the paviours, there appears to be no significant difference in size between these forms (Plates 456–7), though they do all exhibit a range, and no distinctive groupings are apparent (Figs 134 and 135). The solid bricks (type 1) measured 60–75mm thick, 100–120mm wide and 216–250mm long (Plate 456, 3.3). Two notably thicker bricks of 82 and 91mm thickness were found on the Burgess Hill and Burgess Rough areas; such bricks are often attributed to the brick tax, but experimentation with large bricks started before the introduction of the brick tax in 1784 and continued afterwards its repeal in 1850 (Lucas 1997, 49–50). A small number of standard solid bricks are generally orange in colour, appeared to have a slightly rougher finish (Type 2) (Plate 456, 3.4) and may be of slightly earlier date than the type 1 bricks. The slight differences observed may reflect the type of mould used with a wooden mould used for type 2 and metal lined moulds for type 1. The size range of the type 2 bricks does not differ significantly from type 1, though out of the 13 bricks

only three had complete lengths. Their size range is 60–71mm thick, 102–115mm wide and 225–8mm long; one uncertain slightly larger example (67 x 117 x 238mm) is damaged and could be a frogged brick. The frogged bricks measured 62–71mm thick, 101–120mm wide and 223–245mm long. Paviours (Plate 456, 3.5–6) measured 45–58mm thick, 100–118mm wide and 219–250mm long and in terms of general characteristics and finish are very similar to the type 1 bricks. A small number (Ids 242, 270, 314 from contexts 4091, 4106, 4185 respectively) had a distinctive base with linear markings, which appear to be the impression of the wood grain from the mould (Plate 456, 3.6). A larger example from Burgess Rough (ctx 1202) has a width of 164mm.

3.3.3 The frogged bricks (types 3–4), which in other respects were identical to the standard solid bricks, were subdivided on the basis of frog type (designated FR1–FR9) (Plate 457, 3.7–10). The initial attempt to divide these into numerous types based on subtle differences in the frog size and shape was ultimately not very successful as most (FR1) were very poorly defined, with shallow concave profiles, which could not be sufficiently defined and separated to establish successfully different kicks in the moulds whilst in other cases only a very small number were sampled. Although details remain in the archive record and the subtypes are shown in table 6, for the purposes of more general analysis and discussion they have been divided into group A: a rectangular shallow type (brick type 3) and group B: a narrow U-shaped form (brick type 4). Details of sizes, form and structural context are summarised in table 6.

Type A frogs

3.3.4 The type A frogs (Plate 457, 3.7–9) predominated with a total of 93 examples. These were roughly rectangular, some with better-defined edges than others, forming shallow concave hollows with continuous curving base and sides and sloping ends that were not distinguished from the edges. In a few cases the ends formed a more triangular shape, but never distinct and separate from the sides. Some irregularities along the edges were suggestive of chiselling, though no clear tool marks were present. Seven had a more sharply defined edge on one or both long sides (FR2) (Plate 457, 3.9), but it was never sufficient to define this clearly as truly distinct from FR1. The majority range in size from 146–187mm long, 55–78mm and 5–15mm deep. The margins around the frog were wider at the ends than the sides, but none were really symmetrical with margins of equal width on opposite sides. A small number had distinctive irregularities that could be recognised in several bricks, FR1–A was tapered with an angled end and one side bowed inwards slightly, which was sufficiently distinctive to be identified on 13 bricks. This type measured 175–180mm long, 58–74mm wide and 8–12mm deep; the width variation reflects the irregularity of the edges not differences between individual frogs. A second distinctive sub-type FR1–C (Plate 458, 3.19) had a scalloped edge and occurred on five bricks (four from context 4142). Although an attempt was made to identify some other sub-types the characteristics were somewhat tenuous and the sample too small to have confidence that the differences were significant. One shorter than average frog (FR8) can be separated on the basis of size (105mm long by 55mm wide, 9mm deep) but otherwise has little to distinguish it other than rounded corners. Only two of these were sampled, one of which was mostly obscured by mortar. However, a group of five are clearly visible and recognisable in a photo of Kiln 2 (Plate 147).

3.3.5 Type B frogs Only three examples of type B occurred and the original subdivision into two sub-types is still valid based on size. One (FR7) was noticeably shorter in length measuring 133mm long by 42–47mm wide and 10–11mm deep with well-defined U-shaped profile with

sloped ends (Plate 457, 3.10). These were found in Shed 2. The other single example (FR5) from the making shed or workshop structure was similar in form but measured 165mm long by 43mm wide and 21mm deep. A further example of a type B frog (probably FR7) is visible in Plate 147 forming part of the north-west wall (1785) of Kiln 2.

Specials

3.3.6 Voussoir bricks (Plate 457, 3.11–13) in fabric B from the brickworks (imported examples are described below with the firebricks) included two solid and one frogged, of which only the frogged (Id. 18, kiln 1 ctx 1717) was complete. This (Plate 457, 3.11) measured 66–91mm thick, 120mm wide and 235mm long. The frog was rectangular and well defined with a flattish base and steeply sloping sides and measured 180mm long by 58mm wide and 10mm deep. One of the unfrogged voussoirs is of similar size measuring 65–85mm thick, 119mm wide and with an incomplete length of 110mm (Id26, kiln 2 ctx 797) (Plate 457, 3.12). The third (Id3, Shed 3 ctx 251) measured 66 to over 101mm thick, 77mm wide and over 165mm long (Plate 457, 3.13). All had presumably been made for use in the arches of the kiln flues, but all occur re-used in other elements of later structures.

3.3.7 Two complete rectangular hollow bricks (Plate 457, 3.14) were recovered together from the destruction layer over pugmill 2 (ctx 2896) and two fragments from a third from Kiln 1 (ctx 789). These were square-sectioned, measuring 90 by 100mm with walls 20–23mm thick and a length of 289mm. The ends were wire cut and they appear to have been made by the extrusion method suggesting manufacture in the latter half of the 19th century. It is uncertain whether these were for use in the kilns as some sort of specialised vent or were originally some form of field drain tile; although not unknown, square-sectioned drain tiles are rare.

3.3.8 A pair of whelms were recovered from Kiln 1 (ctx 1789) and a broken example from the Cottage (ctx 2880). These are bricks of standard size with a central semi-circular channel *c* 63mm wide running lengthways in the brick base (Plate 458, 3.15), but in other aspects of manufacture are the same as the standard solid and frogged bricks. There were designed for field drainage for use either singly or as pairs with one on top to form a circular drainage channel. One of the examples was unusual in forming a T-junction (Plate 458, 3.16), which may have been envisaged for an alternative specialised use, though field drain systems may be laid out in herringbone fashion with interlinked drains or a series in parallel all running into another at right angles. These examples are of uniform size measuring 63–64mm thick, 114–155mm wide and 230–235mm long. The channels measure 60–64mm wide and 35–37mm deep; in the T-shaped example the stem of the 'T' was 178mm long. There is little information recorded on the dating of drainage tiles and bricks, but these whelms are likely to be a later development than the horseshoe drains (see below); the whelms may have been developed during the latter half of the 19th century.

Hack marks

3.3.9 Following the moulding of the bricks, they would be stacked to dry on hacks in the drying sheds. Evidence of this is present on one stretcher face of most bricks in the form of skintling, pressure or hack marks. The term skintling derives from diagonal marks, which (in parts of Norfolk) apparently predate the 19th century (James 1995), but still occur on the bricks from building works in the 1830s at Lambeth Palace (Kennet 2004), and in places continue into the 20th century (K. Stubbs pers. comm.). Apart from a single diagonal example (ctx 1934), all the hack marks are longitudinal. It is possible this diagonal example actual

resulted from stacking in the kiln, as the same brick had a diagonal 'kiss' mark (below). The hack marks usually consist of two shallow linear depressions on either side of the stretcher face leaving a central slightly raised band, which varies in width from 8–23mm and can sometimes vary slightly from one end to the other if the bricks are slightly skewed (Plate 458, 3.17). The bricks were sometimes offset so the impression of the brick corner is visible. The actual brick depressions generally had a width of *c* 15–30mm though the most extreme pair had widths of 5 and 54mm. In some cases, only a single depression was visible, but it is clear from the faint and discontinuous character of many of the marks that hack marks did not form on all bricks. Occasionally, there are just one or two thin linear grooves, apparently where the arris marked the underlying brick as the overlying brick was placed on top. These thin lines also frequently delineate the shallow depressions.

3.3.10 A number of bricks have cross-wise depressions across the breadth of the stretcher face, which almost invariably occur in conjunction with 'kiss marks' indicating that some bricks were placed in the kiln whilst still soft enough to deform. Most of the marks from firing in the kiln occur on the stretcher face at right angles to its length and, apart from a small number of exceptions, on the opposite side to the hack marks.

Firing marks/kiss marks

3.3.11 These are the marks created during firing, where there is differential firing and colouring of the brick between the exposed areas and those areas covered by bricks stacked on top (Plate 458, 3.18–19). There are marks on 37 bricks and six paviours, which mostly indicate that the bricks were laid on edge. Usually the differentially fired bands have fairly diffuse boundaries but reflect the standard brick thickness in the unexposed sections: the more heavily fired band between bricks vary from 15 to 35mm wide. Where the marks of complete brick widths are visible, these have the typical brick thicknesses of 64, 66, 67, 68, 69 and 70mm. In a small number of cases the bricks were laid flat, outlining the breadth of the brick, and there is one complete impression 110mm wide. Sometimes the ends of the bricks are outlined, and this is particularly clear in one brick (Id. 286), where the exposed surface is heavily vitrified and glassy outlining the ends of four bricks (ctx 4142, Plate 458, 3.19).

3.3.12 The brick with a diagonal hack mark (Id.82) also had a diagonal kiss mark across one corner: diagonal layers were often used at intervals during stacking to provide greater stability.

3.3.13 It was frequently noted that the bricks had ends fired grey or lightly vitrified (at least 68 in number), as well as several bricks with heavily vitrified surfaces. Vitrification occurs naturally between sand in the clay and wood ash in wood-fired kilns, and sand was also used to separate the bricks and prevent them sticking during the early stages of firing. Vitrification may also have been encouraged by 'flashing through' the kiln (using smaller diameter brushwood to fully use up the oxygen) towards the end of the firing to create the characteristic dark grey to black brick ends (K. Stubbs, pers. comm.). Brushwood of suitable diameter was found at the end of the stoking area of the kilns (see section 13.6.25 below). A form of slag was found in the kiln flues, particularly towards the back, resulting from the vitrification of sand and wood ash during firing.

3.4 Other local kiln products

3.4.1 Other brickworks were present in the local area including several known in Tunbridge Wells. However, all were using the same geological deposits of Wadhurst Clay of the Wealden

deposits and it would not be easy to identify standard items of CBM. A single patterned paving block (context 90038) with a diamond impressed pattern divided into two was stamped in the frog on its base: "HIGH - BROOMS / BRICK Cº / TUN:WELLS." (Plate 458, 3.20). This indicates that it was made by the Highbrooms Brick and Tile Company, which was located in the High Brooms area of Tunbridge Wells, next to Southborough (now High Brooms) Station and was founded in 1885 with production continuing until 1968. The brick was recovered from a layer of brick paving at the Burgess Hill Farm site.

3.5 Non-local bricks

Fire bricks

3.5.1 A total of 14 firebricks were recovered in sampling, and were mostly associated with Kiln 2 (ctx 1781, 1785) (Plate 459, 3.22–28), apart from a single example from Kiln 1 (ctx 1744) (Plate 459, 3.21) and another found at the Burgess Hill Farm site (ctx 90038) (Plate 459, 3.29) associated with the stamped paving block from Tunbridge Wells (above). The firebricks were made in fabrics A, C and D and included seven standard bricks, five voussoirs, a half brick and a thin brick or tile. Sizes and characteristics are summarised in table 6, where the transcription of any stamp is also recorded. All except the thin brick had evidence of heavy firing or vitrification on their surfaces from use in the kilns. Over half were found in the north-west wall foundations (1785) of kiln 2 and a further four in the rubble infill of the north-east flue (1781). The single example from kiln 1 occurred in the vented brick floor of the kiln (1744) and that at Burgess Hill Farm had been reused in a paved brick surface (90038). They were obtained from several sources based on the evidence of the stamps (table 6), which occurred on all but the thin brick.

3.5.2 Three came from Stourbridge from three different producers: E J & J Pearson Ltd, (formerly Harris and Pearson), operating from 1860 (Id 25); the Thornleigh Fire Brick Works and Colliery at Blowers Green sold in 1892 to the newly formed Stourbridge Glazed Brick and Fire Clay Co. Ltd. (Id 35) and Hickman and Co, which operated on the Delph at Brierley Hill (Id 28) from the late 1800s. The brick stamp interpreted as "STAFFORD / STOURBRIDGE" (Id 41) has not been traced to a known company, but the stamp indicates the area of production, which is consistent with the fabric.

3.5.3 The other area that the firebricks come from is the north-east of England, from the Durham-Northumberland coalfield. The three bricks stamped "COWEN" were produced by M Cowen at the Lower Brickworks, Blaydon Burn, Newcastle-upon-Tyne, which was in operation from 1819 to mid-20th century. A brick stamped FRYER found at Burgess Hill Farm originated from the Bitchburn (or Beechburn) Colliery and associated Firebrick Works near Howden-le-Wear in south-west Durham, and which was owned by Joseph Fryer during the 1880s.

3.5.4 The two unidentified stamps "R•BCo" and “[?R/K/H]: B:C” probably both stand for ‘Brick Company’ and they may both be from the same company, if the correct reading of the second is an R at the beginning. RBC was used by Redheugh Brick Company on the banks of the River Team, a tributary of the Tyne, near Dunston on the outskirts of Gateshead. The company ceased trading around 1915, having been in existence for only some 35 years. Other brick stamps assigned to this company take a different form and it is uncertain whether those found at Castle Hill can be assigned to this company.

3.6 Other products

3.6.1 Other products manufactured at the Castle Hill brick works included drain tiles, peg tiles, ridge tiles, flooring and roof furniture.

Drain tiles

3.6.2 Field-drain tiles found on the site fall into three types: U-shaped 'horseshoe' drain tiles, large semi-circular tunnel tiles and cylindrical pipes. The first two were formed from flat rectangular slabs made in a mould and the third was machine-made.

3.6.3 The earliest type is the footed 'horseshoe' drain tile, which has an inverted U profile with expanded feet, which was often set on a flat sole plate to prevent it sinking into the ground (Plate 460, 3.30). It is possible that proper sole plates were produced in the form of the few wide paviours or floor tiles that have been found. Of the five horseshoe drains collected as a sample, two were complete: these measured 302mm long, 108mm high and 116–124mm wide (at the feet) (Id 183) and 317mm long, 101mm high and 105–115mm wide (Id282). The two half fragments were similar with heights of 98mm and 110mm and widths of 120–125mm. Wall thickness ranged from 13–18mm with the foot widening up to as much as 33mm. All had evidence of an oval perforation punched just above the foot at either end and the centre of both sides ranging in size from 12–16 by 16–27mm usually tapering to 9–12mm. Fingertip depressions observed on two probably result from steadying the tile while punching the holes rather than from lifting/carrying the tile. All were stamped with "DRAIN" on the apex, which indicates they were made between 1826 and 1833, when any tiles thus stamped would be exempt from the brick tax (Lucas 1997, 30, 42). Four of these came from the brickworks (Kiln 3, sheds area and two from the workshop) and one from Castle Hill. The latter was slightly different to the others in that the perforation was closer to the end and punched perpendicular to the surface measuring 12mm diameter. Too little survived to know whether it was stamped, but it had a rougher finish and may be slightly earlier in date than the others.

3.6.4 None of the other drain tiles or pipes were stamped, which suggests they were made after 1850, which is consistent with their form and finish. Three complete large semi-circular tunnel drains (Plate 460, 3.31–32) each weighing more than 5kg were retained from Burgess Hill Farm and area IA3, together with further fragments from Burgess Hill Farm. The example from Burgess Hill Farm (Id 339, Plate 460, 3.32) measured 304mm long, 275mm wide and 154mm high with walls 35mm thick. It appeared to have been made in a concave mould from the finish of its surfaces, in contrast to the pair from context 2034, which had been made from a flat slab laid over a bender or 'horse' to give them their curved shape (Plate 460, 3.31).

3.6.5 Cylindrical pipe tiles could be made by hand by taking a flat slab wrapping it around a cylindrical wooden drum and smoothing it whilst revolving the drum usually on a potter's wheel or similar arrangement. With this method it was possible to mould a socket also. A possible example of this may be the socketed fragments from Burgess Hill Farm (ctx 90176). This had a diameter of 150mm, a narrower flange 23mm long and walls 13mm thick, which appear to have been smoothed by turning on a wheel from the internal concentric grooves.

3.6.6 All the remaining ceramic pipes were made by the extrusion method with wire cut ends, which indicates a certain level of mechanisation was introduced at the brickworks. The introduction of extrusion machines became common from the mid-19th century following the

rapid development of such machinery during the 1840s encouraged by the forum provided by the Royal Agricultural Society of England for the exchange of information about such machines. The majority of the drains exposed on the site used circular pipes in a variety of sizes, though only two samples were retained from Kiln 1 (ctx 1798) (Plate 461, 3.34), one from the sheds area (ctx 4127) (Plate 461, 3.33), two from the Cottage (ctx 2963) and one from Burgess Hill Farm (90176). Only the two from kiln 1 were complete and measured 291mm and 302mm long, 103mm and 110mm in diameter with bores of 75 and 80mm respectively. One was slightly flattened on one side, but this resulted from the drying process, not a deliberately formed D-profile, which are not in evidence at this site. One of the pipes from the Cottage had a tapered exterior measuring 78–91mm diameter but with a constant bore of 43mm, allowing the narrower end to slot into the next pipe. The remaining examples had diameters of 60mm with a bore 38mm and 90mm with a bore of 64mm widening internally at the socketed end. A range of circular drain pipes *in situ* appear in plates 121, 130–31, 133–4, 138, 141, 144–5, 227–8, 236–7, 244, 251, 253, 308 and 310.

Flooring

3.6.7 A total of five items (12,744g) can be classified as flooring. These were all red-fired and made in Fabric B with varying coarseness of inclusions, though most were of the finer variety. At least two different sizes were produced as indicated by two complete examples retained. One from Kiln 2 (Id 34, ctx 1785) was rectangular and measured 290mm long, 145mm wide and 41mm thick (Plate 461, 3.35), whilst the second (Id 318), which came from the workshop (4185), was square and measured 225mm x 227mm and 49mm thick. This had rectangular channels moulded in the base as a form of keying (Plate 461, 3.36). A very similar broken example from the Cottage (2879) was probably of the same form, measuring 228mm wide and 45mm thick. Two other fragments measured 27 and 37mm thick. These were all hand made in sanded moulds in the same manner as the brick and paviours, with which they have more in common than quarry tiles. It is possible all were designed as varieties of paviours for outdoor paving or workshops rather than domestic flooring. It is possible the rectangular form was intended as a sole plate for the horseshoe drain tiles.

Roof tiles and furniture

3.6.8 A range of roof tiles and furniture was found, though peg tiles were the most common form, both in the retained sample and judging from the site photos in general. The most interesting deposit is the stack of over 90 peg tiles (3003) found set on edge lined up against the wall in the annex of kiln 1 (Plate 463). Four were sampled (Plate 461, 3.37–38), all of which were trapezoidal in shape, produced for use on a circular roof, most probably an oast house in this part of the country. These were very uniform in size, measuring 264–5mm long, 130 to 165mm wide and 15mm thick, and all had square/diamond peg holes 9–11mm wide centred 22–28mm from the top edge, 34–39mm from the side edges and 56–60mm apart. All had shallow wiped margins or indented borders (IB) 9–23mm wide down either side. All other peg tiles sampled from the site were of standard rectangular form (Plate 461, 3.39) measuring 10–16mm thick with the majority 11–13mm, 154–172mm wide and 252–268mm long.

3.6.9 All the handmade roof tiles were made in fabric B, though inevitably a finer version than that use for the bricks. The fine sandy clay, fired to a light red or orange colour, nearly always contained fine ironstone or ferruginous grits, generally less than 5mm size though occasionally larger, and occasional small fine sandstone grits and mudstone of the same size.

The decorative roof furniture was made in a finer fabric with no inclusions greater than sand size (less than 2mm), usually only containing fine ferruginous inclusions in the sandy clay. Details and sizes of the more complete tiles are tabulated in table 8. All the tiles had a fairly even upper surface, often with fine longitudinal striations from wiping the surface. The undersides were generally fairly even and regular but sanded from the mould, and edges could be rough or fairly smooth, and sanded. Peg holes were all square, diamond type or intermediate being slightly skewed and most measured 9–12mm square. Two tiles (Id 291, Id453) had a shallow circle around the peghole, which appears to be the impression left by the punch handle (Plate 461, 3.39). A quantity of broken peg tiles, all with similar characteristics and sizes, were recovered from the Brickworks, Burgess Hill and several other sites in the project. These tiles are all probably of 19th century date; though form, character and finish is no different to earlier roof tile, it is clear from the stratigraphic associations of most of this material that it was produced at these kilns during the 19th century.

3.6.10 A small quantity of early/mid-20th-century flat roof tile was identified made in red-orange fine sandy fabrics: those found at the brickworks appear to be a more refined version of fabric B, but may be products from one of the other producers in the region. These had smooth surfaces and on the underside were flat rectangular longitudinal channels *c* 17–19mm wide by 11–1.5mm deep and set the same apart. A cement roof tile (ctx 2896) of mid-late 20th-century date had similar longitudinal channels on the underside only in its case narrower (6.5mm wide) and rounded in profile. The examples associated with Pugmill 1 (ctx 4142) and the Sheds (ctx 2954) appear to be Castle Hill products from the fabrics though more refined than earlier products, but those from Burgess Hill (ctx 106, 108), whilst very similar in form, differ in fabric, which contained a high density of fine sand, occasional coarse quartz sand grains, chalk grit and calcareous flecking and were possibly produced outside the local area. The source of the cement tile is unknown, but certainly post-dates the operating period of the brickworks. Another early 20th century tile from Pugmill 1 (ctx2895) was a nibbed tile with a blind nail hole 5.5mm diameter. The nib measured 21x12.5mm in size and stood 11mm high.

3.6.11 Other roofing material was fragmentary. The ends of two hip tiles, one of which was the lower rounded end of a 'Kent bonnet' type with an angle of 60° were found reused in masonry structures (ctx 714, 789) at the brickworks and part of a valley tile was found at Burgess Hill Farm. Fragments of ridge tile were recovered from three contexts at the Brickworks (ctx 709, 714, 742) and from two (108, 90060) at Burgess Hill Farm. These were mostly curved fragments measuring 12–18mm thick and one had an estimated width of *c* 170mm. A single fragment of ridge crest (Id406) survived from context 714: it was a typical Victorian-Edwardian form of 'double round arch' design (Plate 462, 3.40) with a circular hole 30mm in diameter piercing the rounded arch. It is 26mm thick, over 110mm high and this section is *c* 120mm long, but the full ridge would have had two such sections and been in the region of 250mm long. A further item of roof furniture was a fleur-de-lys shaped roof finial (Plate 462, 3.41) found in the backfill dumped over Kiln 2. Local recollections (Botany 1969) show that the decorative roof furniture was made in moulds and that their range of ridge tiles was displayed on the roof of the office, which fronted onto the main road, as a means of advertising.

Malting Kiln Floor Tile

3.6.12 These specialised items of kiln floor were both found reused in kiln 1, two recovered in a block of mortar from wall 1730 and a better-preserved example in the dump of CBM 1798

against the kiln's north-east wall (Plate 462, 3.42). All the pieces were of the same design and are typical machine-pressed examples manufactured from the mid-19th century onwards. They measure 45–48mm thick (1¾"-1⅞") and one had a complete width of 284mm (11 ¼"); it is probable the incomplete side is of the same length and that the tiles were square. This accords well with the nominal size of 12" square by 2" thick noted by Crew (2003). They were made in a very fine sandy clay with fine-medium sand size black ferruginous grits that fired maroon red. This appears to be a very fine version of the local clay with all the coarse inclusions removed.

3.6.13 They had a smooth upper surface and slightly rougher base, which had been punched though in a honeycomb pattern of hexagonal/circular cells 23mm wide and 37mm deep leaving a thin skin 13mm thick at the top. The walls between the hexagonal perforations measure 10mm thick. The top of each cell was perforated by 7 small circular holes 2–3mm diameter arranged as a hexagon (or circle) with a single central hole. There are 11 or more rows of alternating 9 and 8 hexagonal cells. Following the coding of Crew (ibid) this would be classified as 7H/9 + 8A x 17 = 145—the final figure being the total number of cells (assuming it to be symmetrical and allowing for the missing rows). The arrangement of cells is the same as Crew's diamond pattern cells where the rows have alternating numbers of cells, but none of his examples have as many cells. This type of tile came into production in the mid-19th century, replacing earlier handmade examples with simpler and more irregular cell patterns, and continued in production into the mid-20th century. These tiles were probably used in oast houses for the floors over the kilns on which the hops were dried, but would have been equally suitable for malting kilns for sprouting barley prior to brewing.

Miscellaneous CBM

3.6.14 A small quantity of miscellaneous items, all broken and fragmentary, was recovered, mostly from Burgess Hill Farm. This included glazed and unglazed sewer pipes made in both stoneware and in a fine variety of the local fabric. They had varying diameters from 130mm (bore 100mm) up to 245mm (bore 200mm). Two were found in the brickworks and rest at Burgess Hill. Other items included white glazed sanitary ware, either a toilet or basin, a pale green glazed stoneware trough or sink and plain white glazed bathroom wall tiles. These are all mid-19th to 20th century in date.

3.7 Stratigraphic provenance of the bricks and ceramic building material

3.7.1 The material from the kilns, pugmills and sheds is described in more detail below together with material from Burgess Hill, but other structures only appear in table 9, where the type and number of items is tabulated for all structures.

Kiln 1

3.7.2 Nine bricks were sampled, including one voussoir fire brick from Stourbridge (ctx 1744). All other bricks are in the local fabric and comprise: two bricks one frogged standard type 3 and a frogged voussoir from the north-west kiln wall (ctx 1717); two standard solid bricks both broken from the kiln wall (1730), a frogged brick with type A frog and a paviour, both with heavily vitrified ends from the kiln stacking floor (ctx 1744); and two drainage bricks or whelms from the layer of collapse or backfill (1798). The latter are probably products, but may have been used in this or one of the other kiln structures, as one had mortar adhering to a broken surface. Summary details and dimensions of the individual bricks appear in Table 9.

Other CBM from this kiln included broken malting kiln floor tiles from one of the walls (1730) and a dump of CBM (1798) against the north-east wall, which also contained circular field drains: all these probably date to the latter half of the 19th century or later. Parts of two peg tiles were built into the kiln floor (1744) and a stack of over 90 specialised peg tiles of trapezoidal form for use on oast house roofs were found set on edge alongside outer wall 1729: these are clearly products of the kiln. Unusual items found in context 789 are two fragments of hollow bricks with rectangular cross-section and wire cut ends suggesting they were made by extrusion. It is possible these were in fact intended as a form of field drain, though square sectioned drains are very unusual. Alternatively, they may have been used in the kiln as some form of flue or vent to aid ventilation. Two complete examples were found in a deposit overlying pugmill 2. Their method of manufacture suggests they date from the mid-19th century or later.

Kiln 2

3.7.3 A total of 16 bricks were sampled. Six came from collapse or demolition rubble in the north-west flue (1781) comprising two standard solid firebricks, two voussoir firebricks and two frogged bricks with type A frogs in the local fabric B. Eight from the north-west wall foundations (1785) comprising four standard firebricks, two voussoir firebricks, a half size firebrick and a thin firebrick or tile. Products from the brickworks included two bricks from the brick floor (797), a paviour and solid voussoir brick, both broken. Details of the firebricks are summarised in table 7 and others in table 10. The firebricks are almost all stamped and come from several brickworks including three different ones in the Stafford—Stourbridge area, Cowen's brickworks at Blaydon Burn, Newcastle-on-Tyne and two (or possibly one) other producer(s) not yet certainly identified, but possibly the Redheugh Brick Company based near Newcastle on Tyne, which traded between *c* 1880 and 1915. Other items from this kiln include a rectangular floor tile and peg tile built into the foundations of the north wall (1785) and the fleur-de-lys roof finial from the dump of rubbish infilling the kiln following its disuse.

Kiln 3

3.7.4 Twenty-four bricks were sampled from 11 contexts (3094, 3200, 3202, 3235–7, 3239, 3243, 3244, 3247, 3249) within the kiln and most form a very uniform assemblage of solid bricks made in the local fabric fired pinkish red, cerise and plum in colour. Several had heavily fired vitrified ends. Their sizes covered the following range 62–71mm thick, 107–c 120mm wide and 222–250mm long. Details of individual bricks appear in table 11. One brick sampled from 3237—standard type 1 69x110x235mm. In addition, there was a single frogged brick with a type A frog and a paviour. Seven have hack marks, but only one has 'kiss' marks. In addition to the bricks one each of a horseshoe drain and roof tile was sampled from the drain 3099, which ran under the kiln. The drain tile was stamped 'DRAIN' indicating a production date of 1826–1833 for this item. The absence of firebricks in kiln 3 may be a reflection of its earlier date. Although refractory bricks were being produced in the first half of the 19th century, it may not have been economical for a brickworks of this size to consider bringing in specialised bricks from some distance, in view of transport costs and especially while the brick tax was still in force.

The Pugmills

3.7.5 Pugmill 1: A large sample of brick comprising 27 bricks and 4 paviours was taken from different elements of the structure, with most coming from the floor, floor repairs and edging.

However, all the bricks are very uniform frogged bricks of Type 3 with a Type A frog (most FR1) and two of type 4 (FR2). Within the Type A frogs, there were four sufficiently similar to suggest the same kick (FR1–kickA) may have been used to produce the frog (ctx 4068, 4069, 4160) and a further group of five indicative of a different mould (FR1–kick C) (ctx 4142, 4163). There were also six bricks (ctx 4066, 4067, 4069, 4166) that appeared somewhat cruder on account of the fabric, which contained coarse cindered fragments, giving them the clinkerish look of London stocks, though it is thought in these cases to result from overfiring, rather than the deliberate addition of breeze, though it is possible some combustible waste had been incorporated in the bricks. In general, the bricks from Pugmill 1 are very uniform in type and character, with no suggestion of different periods of construction. Many having been very heavily worn on the exposed surface, which is often the stretcher face; the plan confirms that most were laid on edge. Four plain paviours were retained from contexts 4162 and 4167. A peg and nib tile came from demolition layer (2895) overlying the pugmill. The nib tile is probably of early–mid 20th century date. Fragments of roof tile with a channelled underside probably of early 20th century date were in the brick wall 4142, which formed part of the internal mechanism of the pugmill.

3.7.6 Pugmill 2: A total of 25 bricks, including two hollow bricks and 10 paviours, were collected as a sample. The paviours were all plain and measured 25–55mm thick, 100–110mm wide and 219–250mm long. Three appeared to be overfired, having areas of vitrification or distortion. Heavily worn stretcher faces occurred on five and one was heavily battered and scored, all resulting from use in the mill floor (4103, 4106, 4108, 4182). The bricks comprise a mix of solid and frogged bricks, plus two hollow bricks. The hollow bricks (2896) are unusual and may have been intended for use as drain tiles, but came from the destruction layer overlying the pugmill, so it is not known how they were used. The solid bricks are all type 1, except for a single partial type 2, which measures 63mm thick by 102mm wide. The type 1 bricks measure 61–72mm thick, 100–114mm wide and 216–242mm long. Twelve type 1 bricks were very heavily worn on one or both stretchers, ends or surfaces, the evidence suggesting some bricks were turned over once excessively worn or reused in a different part of the structure. Areas of the mill producing worn bricks and paviours were the floors (4182–3, 4186–7) and steps to and floor of the central mechanism (4094–5). The frogged bricks comprised four of type 3 (Frog A-FR1) measuring 62–70mm thick, 107–112mm wide and 228–235mm long and one type 4 (Frog A-FR4) measured 65 by 106 by 233mm. The three frogged bricks (type 3 and 4) used in the steps (4094) and floor repair (4183) of the central mechanism were all worn on the upper surface. The type 4 brick was used in the repair to the floor of the central mechanism, suggesting the more clearly defined frog (A-FR2) may be a later type than the main group A frogs.

The Drying Sheds

3.7.7 Shed 0: All seven bricks sampled were solid type 1 bricks measuring 66–70mm thick by 107–119mm wide and only one complete length of 235mm. Several appeared to be rather soft and underfired, suggesting they may have been “common place” bricks. Half a peg tile had also been used in one brick pad. The character of the bricks is consistent with the early date of the structure.

3.7.8 Shed 1: A large number of bricks and paviours was sampled totalling six paviours and 46 bricks, of which four were frogged and five with bases obscured by mortar have been treated as solid bricks in the analysis. The 42 solid type bricks measured 65–73mm thick, 111–

117mm wide and 228–243mm long. The majority were complete through damage to the corners was fairly common. Hack marks were common, but few kiss marks were observed. Grey vitrified headers, which appear to be an effect of the primary firing, were common. The frogged bricks were of type 3 (Frog A-FR1) with one type 8 (Frog A-FR6) and measured 66 and 70mm thick, 108–114mm wide and 231 and 235mm long. The paviours were all plain and measured 50–55mm thick, 111–117mm wide and 229–232mm long. Four had hack marks present.

3.7.9 Shed 2: A similar number of bricks and paviours were sampled from shed 2 and comprised 33 solid bricks, 13 frogged and 2 paviours. The solid bricks included both type 1 and type 2 bricks, the latter possibly being of slightly earlier date. Type 1 measured 63–70mm thick, 105–114mm wide and 225–235mm long. Hack marks occurred on thirteen bricks and included one diagonal example, which are likely to be earlier than the longitudinal type that is dominant. The same brick had diagonal kiss marks, whilst a second had the more usual crosswise kiss mark. Several had headers fired silvery grey. Five type 2 bricks occurred and measured 61–70mm thick, 112–115mm wide and 225–228mm long. Two had longitudinal skintling, but no kiss marks were present; three appeared rather battered, and all were abraded to varying degrees, suggesting re-use from an earlier structure. Thirteen frogged bricks were retrieved from the structure comprising 11 of type 3 and two of type 9. The type 3 (all Frog A-FR1) measured 64–70mm thick, 108–115mm wide and 224–240mm long; six had hack marks and four had kiss marks. The type 9 bricks with frog type B (FR7) measured 65 and 70mm thick, 107 and 116mm wide and 231mm long, and one had hack marks. Two plain paviours were sampled from the floor of the shed; both had hack marks and measured 52–3mm thick, 117mm wide and 232–4mm long.

3.7.10 Shed 3: A sample of 24 bricks was taken from shed 3 from the brick pads and footings; all were of type 3, ie frogged, except for one solid voussoir brick in brick pad 251. This measured 66 to over 101mm thick, 77mm wide and over 165mm long and had presumably been reused from one of the kilns, or was surplus from there. The frogged bricks measured 64–68mm thick, 107–118mm wide and 230–241mm long and all had the standard type A frog though nine of these were identified as having a similar form (kick A). Longitudinal hack marks were present on 15 bricks and cross-wise kiss marks sometimes in conjunction with pressure marks occurred on ten bricks. Seven partial peg tiles were also sampled from the brick pads; all were of fairly uniform size measuring 13–14mm thick, 156–172mm wide with one length of 268mm. The predominance of frogged bricks and the absence of solid bricks would suggest this structure should come fairly late in the sequence of drying sheds, but instead the stratigraphic evidence suggests it followed Shed O. However, there is some evidence for rebuilding or repair at a later stage in its use and the character of the bricks would support this.

3.7.11 Shed 4: Only two solid type 1 bricks were sampled from this shed (ctx 263). Only one was complete, which measured 73mm thick, 103–7mm wide and 232mm thick; the second fragment measured 74mm thick. The complete brick had crosswise pressure marks and kiss marks on both stretchers, whilst the fragment had longitudinal hack marks.

3.7.12 Shed 5: A small quantity of bricks and a paviour were retrieved as a sample from four piers (795, 798–800) and all but one of the bricks sampled was incomplete. This was largely due to the significant proportion of broken bricks used in the construction of the brick piers of this structure. The paviour measured 58mm thick by 108mm wide. The bricks comprised

five solid of types 1 and 2 and one frogged of type 3. The two type 1 bricks measured 65–6mm thick, 113–6mm wide and 225mm long. The three half bricks of type 2 measured 63–71mm thick and 112–4mm wide and two had vitrified headers. The type 3 frogged brick measured 69mm thick and 114mm wide and had hack marks on one stretcher face. All though Shed 5 is late in the sequence of buildings, the assemblage of bricks is more consistent with an early date. However, the quantity of broken brick utilised in the pads suggests this had been re-used from an earlier structure.

3.7.13 Burgess Hill: A range of material was recovered from Burgess Hill from structures and features. The assemblage from this area includes four paviours, five solid and four frogged bricks of types 1, 2, 3 and 4, which accord in size and character with the products from the brickworks. There is also an extra-thick brick from this area, which in terms of fabric is the same as the brickworks' products, though nothing equivalent was retained from the brickworks area. A firebrick may have been acquired from the brickworks, though none with the same stamp of "FRYER" were found there. The patterned paving block is of a very similar fabric to the brickworks products, but the stamp indicates that this was made by the High Brooms Brick Company at Tunbridge Wells. This is likely to post-date the operation of the Castle Hill brickworks and it is unsurprising that there are products at the Burgess Hill site from elsewhere. Other CBM found at Burgess Hill points to the same mix of material from the brickworks as well as elsewhere. Roof tile and field drains largely derive from the Castle Hill brickworks, though some may come from other local production sites. Material brought in from outside the area include stoneware sewer pipes, sanitary ware, wall tiles and stoneware sink or trough.

3.8 Conclusions

3.8.1 The technology used at the brickworks appears to have relied on hand-made products for much of the early life of the brickworks, certainly until the repeal of the brick tax. Even after this there is nothing to suggest that brick and paviour production changed significantly, and though some minor changes can be discerned, there is only very minor evidence of the use of machinery to assist drain or brick production. It is possible that the standard solid type 1 and 2 bricks were the earliest form. Type 2 were somewhat cruder in finish, possibly made in wooden moulds and may predate type 1, whilst the type 1 which generally are more regular with sharper arrises, and are harder and better fired, were probably made in moulds with a metal lining around the top. It is possible the type 2 were clamp fired prior to the construction of the kilns. This is also likely for the bricks used for the construction of kiln 3, though the general character of the bricks is little different to solid bricks found in other structures. Although a single frogged brick was found in Kiln 3, the frogged bricks would appear to be a slightly later development with their use in greater quantities in the later structures, Kilns 1 and 2 and Pugmill 1. However, this distinction is not so apparent for the drying sheds, especially if Shed 3 is an early structure, as it would seem only frogged bricks were used in its construction, though these might all relate to a later phase of rebuilding. Whilst it is tempting to try and tease out some development in the form of the frogs from the shallow poorly defined to more distinct clearer shapes, there are too few of the possible later types to test such a hypothesis. Had it been possible to compare a much greater number of the frog types tentatively identified during analysis, it might have been possible to establish a development of frog types in more detail and with greater certainty, but the sample recovered is insufficient.

So too, the bricks used in the construction of sheds cannot provide any indication of the sequence of the drying sheds, because of the re-use of material.

3.8.2 Other products during the first half of the 19th century were also handmade and appear to have been predominantly roof tile and horseshoe type field drains. The stack of peg tile in the annex of kiln 1 provide firm evidence for the production of peg tile at the brickworks, including the specialised variety for oast houses. It is possible that few products of later phase production have survived, but there are some indicators that there were developments and improvements in production with some mechanisation introduced. This can be seen in the changes in field drain from the hand-made drain tiles to extruded, wire-cut pipes of various sizes. The whelms may have been machine pressed, and the ornate roof finial and ridge crest must have been made in special moulds. Documentary evidence of sales of the brickworks in the late 19th and early 20th century describes the range of products produced there, and the range of roof furniture made was displayed on the roof of the office as advertisements of their wares during the later years of production (Botany 1969). What has been recovered must represent only a small part of their output.

3.8.3 The original impetus to set up the brickworks may have been largely to provide bricks for building work on the Summerhill Estate during the earlier 19th century. The earliest phase of production must have utilised clamps, at the very least to produce the bricks needed for the first kiln to be built, but it is possible clamp firings were used more generally to produce bricks for buildings constructed on the Summerhill Estate during the early 19th century. The construction of the kilns may indicate output was increased and put on a more commercial footing and with the construction of two kilns would have allowed production to run more continuously. One impetus to improve the facilities may have been to produce drain tiles for the Estate. The foundation of the Royal Agricultural Society in 1838 fostered a general interest in land drainage, and much of the discussion of tile drainage in the mid-19th century centred around reducing the price of production to make it affordable on a large scale. This, together with public funding of drainage schemes, provided an incentive for tile makers to adopt machinery for the production of drain tiles (Watt 1990, 105–7), and this may have been the impetus for the expansion of the Castle Hill brickworks, if there was a drive on the Somerhill Estate to agricultural improvement and drainage.

3.9 Retention and discard

3.9.1 The 42 items selected for photography also represent a suitable selection of material to form the ceramic building material archive for retention. All of the other ceramic building material can be discarded.

3.10 CBM tables

Table 4: Quantification of forms by site area

	Brick		Paving block		Paviour		Whelm		Total	
Sites	**Nos**	**Wt (g)**	**Nos**	**Wt (g)**	**Nos**	**Wt (g)**	**Nos**	**Wt (g)**	**Nos**	**Wt (g)**
Burgess Hill	4	3162	0	0	1	1458	0	0	5	4620
Burgess Rough Barn	1	2775	0	0	0	0	0	0	1	2775
WC2 brickworks	259	654463	0	0	47	99831	3	5193	309	759487
Other	7	9821	1	3286	2	3353	0	0	10	16460
Total	271	670221	1	3286	50	104642	3	5193	325	783342

Table 5: Quantification of brick forms and subtypes

Forms	**Types**	**Nos**	**Wt (g)**
Brick	Solid	152	381043
Brick	Frogged	98	246313
Brick	Firebrick	9	19096
Brick	Hollow	4	7382
Brick voussoir	Solid	2	3130
Brick voussoir	Frogged	1	3500
Brick voussoir	Firebrick	7	10430
Paving block	Patterned	1	3286
Paviour	Plain	50	104642
Whelm	Junction	1	2064
Whelm	Single channel	2	3129
	Total	327	784015

Table 6: Summary of frog types, sizes and characteristics

Group	Sub-type	Ids	Nos	Length	Width	Depth	Shape	Profile	Structure	Comment
A	FR1	Ids. 10, 76–7, 80–1, 88–93, 96–9, 111–2, 116–7, 122, 141–7, 152, 164–78, 187, 202, 207–222, 241, 246, 248, 250, 286–9, 292–5, 298, 300, 302–5	82	146–187	47–78	5–15	Sub-rectangular	dished	Kiln 3 (1); Pugmill 1 (24); Pugmill 2 (4); Shed 1 (3); Shed 2 (11); Shed 3 (23); Shed 5 (1); Sheds gen (4); Cottage (2); Workshop (6); Burgess Hill & Rough (3)	Irregular; often poorly defined
A	FR2	Id.19, 23, 299, 301, 312, 316, 351	7	155–180	62–69	11–14	Rectangular	concave	Kiln 1 (2); Pugmill 1 (2); Pugmill 2 (1); Workshop (1) Burgesss Hill (1)	Edges more clearly defined
A	FR3	Id.18	1	180	58	10	Rectangular	Dished with steep sides	Kiln 1	Edges more clearly defined
A	FR4	Id.32	1	~	70	13	Rectangular	concave	Kiln 2	
A	FR6	Id.136	1	c170	c65–70	6	Rectangular	Shallow V	Shed 1	
A	FR8	Id.223 & 224	2	105	55	9	Rectangular with rounded corners	concave	Workshop; several visible in photo of Kiln 2	Edges more clearly defined
B	FR5	Id.315	1	164	45	21	Narrow slot	U; flat sloped ends	Workshop	Clearly defined
B	FR7	Id.153 & 155	2	>73; 133	47; 42	10; 11	Narrow slot	U; flat sloped ends	Shed 2	Clearly defined
									A type B is also visible in photo of kiln 2	

Table 7: Summary of all the firebricks (all are from Kiln 2, except Id25 from Kiln 1 and Id400 from Burgess Hill)

Id	Cntxt	Nos	Wt (g)	Type	TH	W	L	Fab	Stamps
25	1744	1	2809	voussoir	45–63	114	230	A	"PEARSON /… [OG]E" (or ?ACE)—most probably should read '[STOURBR]DGE'
28	1781	1	1804	standard	66	106+	>145	C	"[HIC]KMAN & Co / [STO]URBRIDGE"
29	1781	1	2679	standard	62	107	235	A	Set in rectangular cartouche 101mm x28mm: "R•BCo"
30	1781	1	1350	voussoir	40–61	106+	>155	A	"[?R or K or H?…] : B : C" set in rectangular cartouche
31	1781	1	923	voussoir	41–59	103+	>106	A	"[?R or K or H?… : B]: C" - same stamp as Id.30
35	1785	2	3395	standard	68	115	240	C	"BEST 6 / STOURBRIDGE"
468	1785	1	598	thin	21	115	>140	C	none
36	1785	2	2721	voussoir	50–62	111	230	A	"COWEN"
37	1785	2	2627	voussoir	48–61	112	230	A	"COWEN"
38	1785	1	3047	standard	64	111	240	A	"COWEN"
39	1785	1	2644	standard	61	114+	233	A	"R•BCo" in rectangular cartouche
40	1785	1	3082	standard	58–60	116	235	A	"R•BCo" in rectangular cartouche
41	1785	1	1847	half-brick	69	59	234	C	" [….]FFORD / […DG]E" possibly 'STAFFORD/STOURBRIDGE'
400	90038	1	2245	standard	62.5	115	>175	D	"FRYE[R]" only half the of the final R is present

Table 8: Dimensions and features of complete and near-complete peg tiles

Id	Cntxt	Th	Width	Length	Peg holes	P-h size	Margins/indented border
27	1744	10	160	>222	Circular	7mm dia	IBs/wiped 13–17mm w
415	1930	12	165	262	Diamond	9x13mm	IBs 13 & 16mm wide
416	1948	13	163	263	Square skewed	9x10mm	
420	2615	11–12	154	>203	Square	11–12mm w	IBs 8 & 16mm wide
423	2615	11–12	157	252	Square skewed	10mm	Wiped LH margin 23mm w.
437	2921	13	165	268	Diamond	9x10mm	
438	2922	14	171	>165	Diamond	9mm	IBs 8 & 16mm w
443	3003	15	130–164	264	Square	9.5mm	Wiped RH 9–22mm; IB LH 0–9mm w
444	3003	15	130–163	264	Square skewed	8x11, 9mm	Wiped RH 9–22mm; IB LH 0–9mm w
445	3003	14–15	131–165	265	Diamond	9x10mm	Wiped RH 10–23mm, IB LH 10mm w
446	3003	15	131–165	264	Square	8x9mm	Wiped RH 22mm;LH 10mm w
470	1785	12	166	>196	Diamond	9x10–11mm	IB 10 & 14mm w
413	1921	12	165	>184	-	-	IB 11–15 & 13–16mm
420	2615	11–12	154	>203	Square	11–12mm w	IB 8 & 16mm
422	2622	12	157	>125	Diamond	10mm	-
433	2896	12.45	164	>160	-	-	Cement tile; channelled underside
435	2920	13, 14	172	>105	Square skewed	10.5mm w	-
436	2921	13	170	>156	Diamond & square	8x10mm w	-
438	2922	14	171	>165	Square skewed	9x9.5mm	IB 8 & 16mm
439	2922	13	170	>160	Square skewed	10 & 15x10mm	IB 8 & 15mm
447	3095	14	162	>155	-	-	IB 10 & 18mm
448	3300	13	164	>155	Diamond	11 x10–12.5mm w	IB 9 & 23mm
452	3321	12, 13	166	>100	-	-	Wiped margins 10mm both sides
290	4142	10	170	>205	-	-	Channelled underside
291	4185	13	160	>150	Diamond	9–10mm w	IB 15mm both sides

Table 9: Kiln 1 summary of bricks sampled

Id	Cntxt	Nos	Wt (g)	Form	Type	TH	W	L	Fab	Comments
18	1717	1	3,500	Voussoir Frogged	Type 5	66–91	120	235	B3	Type A (FR3)
19	1717	1	2,885	Frogged	Type 4	68	109	232	B1	Type A (FR2)
20	1730	1	2,642	Solid	Type 1	75	113	>222	B3	Hack marks visible
21	1730	1	1,042	Solid	Type 1	73	117	>117	B3	none
23	1744	1	3,095	Frogged	Type 4	68	111	233	B2	Type A (FR2)
24	1744	1	2,641	Paviour	Plain	52	112	232	B2?	
25	1744	1	2,809	Firebrick	Voussoir	45–63	114	230	A	Partial stamp poorly/incompletely impressed.: "PEARSON /… [DG]E"
44	1798	1	1,953	Whelm	Single channel	64	114	230	B3m	Single U-profile channel running longitudinally
45	1798	1	2,064	Whelm	Junction	63	115	235	B2f-m	T-shaped channel junction. Hack marks visible
350	789	1	378	Hollow	Rectangular	>57	>80	>105	B3f	walls 22mm thick.
475	789	1	75	Hollow	Rectangular	-	-	-	B2f	walls 19/22mm th

Table 10: Kiln 2 summary of bricks sampled (excluding firebricks—see Table 4)

Id	Cntxt	Nos	Wt (g)	Form	Type	TH	W	L	Fab	Comments
12	797	1	982	Paviour	Plain	48	>116	>160	B1f	
26	797	1	1375	Solid	voussoir	65–85	119	>110	B2f	Hack marks present
32	1781	1	1263	Frogged	Type 6	66	116	>117	B2	Frog A (FR4)
33	1781	1	1204	Frogged	Type 6	>59	116	>135	B2	Possibly same frog type as Id32

Table 11: Kiln 3 summary of bricks sampled

Id	Cntxt	Nos	Wt (g)	Form	Type	TH	W	L	Fab	Comments
181&182	3094	1	3231	Solid	Type 1	68	112	250	B3	
184	3200.3	1	2990	Solid	Type 1	62	116	245	B3	Hack mark present
185	3200.3	1	2986	Solid	Type 1	65	113	230	B3	
186	3202	1	2205	Plain	(Type 1c)	53	113	229	B3	
187	3202	1	2844	Frogged	Type 3	69	113	230+	B3	Frog type A (FR1)
188	3235	1	2810	Solid	Type 1	66	112	226	B3	Hack mark present
189	3235	1	2970	Solid	Type 1	65	114	235	B3	Hack mark present
190	3236	1	3160	Solid	Type 1?	71	111	222	B3	Kiss marks
191	3236	1	3130	Solid	Type 1	67	110	225	B3	Hack mark present
192	3237	1	3015	Solid	Type 1	69	110	235	B3	Hack mark present
342	3239	1	2875	Solid	Type 1	66	115	232	B3	
343	3239	1	2906	Solid	Type 1	66	115	234	B3	Hack mark present
193	3243	1	2955	Solid	Type 1	68	108	223	B3	
194	3243	1	2924	Solid	Type 1	68	107	228	B3	
344	3244	1	2762	Solid	Type 1b?	71	114	>205	B3	Hack mark present
345	3244	1	3220	Solid	Type 1b?	71	112	236	B3	
195	3247	1	3024	Solid	Type 1	67	115	242–246	B3	
196	3247	1	3077	Solid	Type 1	70	113	248	B3	Hack mark present
198	3249	2	2970	Solid	Type 1	65	115	239	B3	
199	3249	1	1600	Solid	Type 1	67	c120	>150	B3	
200	3249	1	917	Solid	Type 1	64	>105	>120	B3	

Table 12: Summary of brick and CBM types and their location

		Brick (Fabric B)					Firebrick			
Site	**Paviour**	**Solid type 1**	**Solid type 2**	**Type 3 Frog A**	**Type Frog B**	**Voussoir**	**Standard & other**	**Voussoir**	**Drains**	**Other**
Kiln 1	1	2		3		1		1	2 whelms; 2 circular	Peg tile; malting kiln floor tiles; 2 square hollow bricks;
Kiln 2	1			2 (FR8)	*	3	4 & 2	4		Finial; floor; peg tile
Kiln 3	1	22		1					1 horseshoe	1 peg tile (sole for drain tile)
Pugmill 1	6			26 (FR1 x24, FR2 x2						6 roof
Pugmill 2	10	18		5 (FR1 x4, FR2)						[2 hollow bricks in overlying layer]
Shed 0		7								1 peg tile
Shed 1	6	43		4						3 peg tile
Shed 2	2	29	4	11	2					
Shed 3				24		1				7 peg tile
Shed 4		2								
Shed 5	1	4	1							
Sheds area	2	1		4					1 horseshoe, 1 circular	Roof tile fragments
Workshop	12	6		7	3				2 horseshoe	2 peg tile; floor tile
Cottage	3	1		2					1 whelm, 1 circular, 1 circular socketed	Floor quarry
Burgess Hill, Rough & Farm	1 + 9 fragments; 1 paving block	1 + 42 frags		1			1		1 tunnel & frags, Stw sewer	1 large brick; roof, sanitary ware, wall

4 METAL FINDS

By Ian R. Scott

4.1 Introduction

4.1.1 There are 290 metal finds, predominantly iron, but including 33 non-ferrous objects. The finds have rapidly scanned, identified where possible, and briefly recorded.

4.2 Burgess Hill

4.2.1 The 16 metal finds from this site are all from modern or probably modern contexts and few of the finds are closely datable (Table 13). The spanner (No. 1) from fill 106 of ditch 110 is not a factory made drop forged spanner but looks to be specially forged tool made for a specific purpose. It cannot be dated closely. The heel iron from fill 108 of ditch 110 is almost certainly of later 19th- or earlier 20th-century date. Amongst for finds from context 112 is at least one modern drawn wire nail.

4.3 Burgess Rough Platform

4.3.1 There are 51 metal finds, but these include 27 undiagnostic lumps and small fragments from a modern metalled surface 1201, and another 13 small fragments from context 1197 in ditch 1196 (Table 14). The main interest is in the nine horseshoes or horseshoe fragments. Two horseshoes (Nos 2–3) and three fragments (Nos 4–6) were recovered from context 1191, which was from a run off layer from a metalled surface. Other horseshoes came from metalled layer 1201 (No. 10), ruts 1217 (fill 1218) (No. 13) and 1226 (Nos 15–16). The horseshoes are all of post medieval form, although those from context 1226 are probably more closely datable to the later 17th or 18th century. The main finds from this site comprise the post-medieval horseshoes, which have been X-rayed and are shown as a group (Plate 464).

4.4 Well Wood evaluation

4.4.1 The only metal find is a late post medieval or later horseshoe from the fill of a modern ditch 23007 (Table 15).

4.5 IA7 (WC6b-c)

4.5.1 The only finds come from fill 1149 of ditch 1148 and comprise two post-medieval horseshoes and some small undiagnostic iron fragments (Table 16). The complete horseshoe (No. 1) and the fragment (No. 2) have been X-rayed.

4.6 IA1 (WC1)

4.6.1 The only metal find is length poorly preserved thick wire (Table 17). Not closely datable.

4.7 Castle Hill Brickworks (WC2)

4.7.1 WC2–BR Kilns, WC2–Sheds and WC2–T1: The finds from site WC2 comprise 164 objects and form the largest assemblage of the metal finds from the A21 scheme (Table 18).

4.7.2 WC2–BR-Kilns: There are only 15 objects from this part of the site, but they include two quite large hanging brackets (Nos 3–4), an X-shaped wall plate with attached tie (No. 5),

and three S-shaped wall tie plates (No. 6) and the metal facing (No. 10) for a stokehole arch. The arch facing (no. 10) was clearly part of the kiln structure (Plate 465). The wall tie plates may have been part of the kilns or of other structures on site. The hanging brackets may also have come from structures associated with the brickworks. There is an iron lever lock key from context 1915 (No. 11), and an almost complete galvanised bucket (no. 12) from context 3033.

4.7.3 WC2–NW of kilns: There are just three objects from fill 706 of modern ditch 705. These comprise a possible fountain pen cap (No. 14), a fragment of a 'Brasso' tin (No. 15) and a length of iron pipe (No. 16).

4.7.4 WC2–Sheds: there are 144 metal objects and most were recovered from layers 2895 (n= 12), 2896 (n=22), 2897 (n=34) and layer 2963 (n= 12). Another 13 finds came from context 2801. Many of the finds consisted of nails, bolts and miscellaneous pieces of metalwork.

Finds from use of the brickworks

4.7.5 From context 277 there is drop hinge pintle (No. 21) and from brick hearth 296 there is a heavy cast iron fire bar of distinctive triangular cross-section with five triangular notches (No. 22), one of several found in this feature (Plate 466). Context 709 produced a galvanised nail for fixing roofing felt (no. 24). There is part of a cast iron ploughshare from context 792 (No. 35). Other finds include a merchant navy button (No. 40) and part of a cast iron cobbler's last (No. 52) from context 2801.

4.7.6 Of particular interest is a heavy rectangular plate (no. 133) with nails and a heavy pivot which was found in the centre of pugmill 4137, and almost certainly formed part of the mechanism of the pugmill. This has been X-rayed, showing the casing for holding the central iron pivot driven into the base of the wooden central upright to enable it to rotate (Plates 464 and 465). The paddles for mixing the clay into a pug would have been attached to this upright, and a similar arrangement presumably existed at the top to keep the pole steady. A reconstruction of the pugmill in action showing how this plate and pivot was used is illustrated in Allen and Martin (forthcoming).

Finds from demolition layers

4.7.7 From context 2895 there are bolts with cut 1030–1210 threads for nuts (nos 60–61), there is the empty case of a pocket watch (No. 58), and two wheels from a 20th-century pushchair with white rubber tyres (Nos 68–69). Context 2896 produced part of an aluminium screw cap (No. 70), drawn wire nails (No. 75), a cavity wall tie bar of mid-20th-century date (No. 87) and a windlass (No. 88). The latter has the remains of a two-piece pressed metal pulley and rubber coated wire rope. It may have been used to open and close a skylight or window. It could possibly be part of the fittings of the brickworks.

4.7.8 From context 2897 there is a clockwork mechanism (No. 89), three copper-alloy eyelets from a tarpaulin (Nos 91–92), a frame from large purse or small handbag (No. 94) and a teaspoon (No. 97) of 19th- or 20th-century date. There are numerous nails and pieces of cast iron pipes and guttering (Nos 112–13) parts of two horseshoes (Nos 116–17) and small pair of pincers or tin snips (no. 118). Context 2963 produced an iron casting of uncertain purpose (No. 121), folding edge pieces of thin sheet iron (Nos 122–23), a piece of angle iron possibly an offcut from a fence post (No. 126), a piece of cast-iron guttering (No. 128), a small pick or hammer (No. 129) and a small chisel (No. 131). From context 2986 comes what appears

to be the metal dome from a bicycle bell (No. 132). All these finds suggest an early to mid 20th-century or later date for these layers.

4.7.9 WC2–T1: The only find is a Royal Artillery cap badge (No. 135) dating to the first half of the 20th century.

4.7.10 Context 2801 represents a number of layers of redeposited clay laid down during its use, as does layer 2866. Much of the material from the WC2 sites is from demolition deposits, in particular context 2895 covering the pugmill, and 2897 covering the workshop, and possibly context 2896. Given that the brickworks operated from the early 19th century until the 1930s it is difficult to distinguish between material associated with the operation and demolition of the brickworks, and any later deposition of material. Much of the metal is not readily datable and that which can be dated is only broadly datable.

4.7.11 However, there are some objects which can be confidentially assigned to the brickworks. These included some structural items such as the wall ties (Nos 5–6) and wrought iron arch facings (No. 10) which are illustrated (Plate 465), and were presumably added to protect the bricks at the edge of the arches from damage from shovels used to load wood onto the fires in the flues, and to rake out the ash. There is also an example of a fire bar (No. 22) from hearth 296 (Plate 466) and a part of the pugmill mechanism (No. 133) (Plates 467 and 468), a reconstruction of which in use has been included in Allen and Martin (forthcoming).

4.8 Castle Hill Wood

4.8.1 The five iron objects include a cast iron mile post and possible parts of three horseshoes. X-ray of the horseshoes will be carried out to assist in their dating. The most interesting object is the cast iron mile post with a cast inscription of the Tonbridge Turnpike Trust that reads ‘TONBRIDGE | TRUST | TURNPIKE’ (Table 19).

4.8.2 The Turnpike post (No. 5) is included in the forthcoming monograph. The Tonbridge Turnpike Trust was established in 1709 and continued to operate until at least the 1840s. It ran from Sevenoaks, and equates to the present day A21 and A2014.

4.9 Burgess Hill Farm

4.9.1 There are 35 metal objects from this site (Table 20). These include a number of more recent objects including a Hermesetas tin (No. 1), the English Electric electrical component (No. 2) and drop forged spanner (No. 3) from context 90078, and a small screwdriver with plastic handle (No. 9) from context 90080. There is a heavy bar with cut threaded at each end (No. 16) and a heel iron (No. 17) from context 90093, and a penny of Edward VII (No. 26) from context 90218.

4.10 Burgess Rough Barn

4.10.1 The heavy copper-alloy casting (No. 1) looks to be part of an industrial machine or an engine although its precise identification is uncertain (Table 21). The copper-alloy collars (No. 3) wrapped around waterlogged wood are of a suitable size for the ferrules from walking sticks.

4.11 Unstratified

4.11.1 The soldier is hollow cast and might well be a product of William Britain, the company that developed hollow casting. It dates after 1893.

4.12 Discussion

4.12.1 As a preliminary to any further work beyond the scope of this project, a small number of objects would benefit from radiography. These include the horseshoes and horseshoe fragments from context 3371 (No 132), and 2897 (Nos 118–119), a small pair of pincers from context 2897 (No. 120), the probable pugmill mechanism (No. 151) from context 4137, the large iron casting (No. 134) from context 4185 and the knife handle (No. 136) from context 4188.

4.12.2 A small selection of material from the brickworks could benefit from some additional research. These include structural elements such as the tie bars and tie bar plates (Nos. 144–5) and facings and tie bars for the arched stoke holes (Inv. No. 153). The example of a fire bar (No. 155) and the possible pugmill mechanism (No. 151) could be further researched and published with appropriate illustrations.

4.12.3 The horseshoes from the project would be worth publishing as a group together with the Tonbridge Turnpike Trust milepost. The Tonbridge Trust operated the precursor to the A21 during most of the 18th century and the first part of the 19th century. Some research into the route of the Tonbridge turnpike would be appropriate.

4.13 Metal finds tables

Table 13: Burgess Hill metal finds

Context	Description	Count	Date	Inv. No.	Box
106	1) Spanner. Circular section handle changing to rectangular near head/jaws; slightly curved. Has offset rectilinear jaws. Fe. L: 167mm. 2) L-shaped drop hinge pintle or pivot. Fe. L: 255mm; Ht: 85mm; L of pintle: 60mm	2		80	FE 02
108	3) Two lengths of rod or bar, now laminated. Fe. Not measured. 4) Heel iron, somewhat encrusted, no visible nail holes. Fe. 69mm x 73mm.	3		81	FE 02
112	5) Collar, Fe. W: 40mm; D: 78mm; 6) Oval flat object with rectangular cut-out, possibly a link. Fe. L: 90mm; W: 48mm; Th: 6mm; 7) Tapered fragment, possibly nail; 8) 8 x mixed nails, including at least one drawn wire nail. Not measured	11		82	FE 02

Table 14: Burgess Rough Platform metal finds

Context	Description	Count	Date	Inv. No.	Box
1158	1) Disc-shaped fe fragment, encrusted with corrosion product. Possible top of cylindrical tin can? D: 58mm	1		95	FE 02
1191	2) Horseshoe, complete, with very worn toe. Broad branches tapering to squared heels with a small internal angle. No calkins. X-ray shows rectangular nail holes, three on one branch and four on the other. L: *c* 109mm; W: 108mm	1	Post-med. to early 18th century	25	FE 01
1191	3) Horseshoe, complete but with some wear. The branches appear broad with wide webs towards the toe and taper to one square heel and one rounded heel. The x-ray shows three worn rectangular nail holes on one branch and four on the other. The x-ray also suggests that the shoe is unusual in its structure, which is not reflected in its appearance to the naked eye. No calkins. L extant: *c* 112mm; W: 108mm	1	Post medieval (to early 18th century)	26	FE 01
1191	4) Horseshoe fragment comprising one broad branch tapering slightly to square heel. Worn toe. No calkins. X-ray shows two, possibly three, rectangular nail holes. L extant: 112mm	1	Late medieval or post medieval (to early18th century).	27	FE 01
1191	5) Horseshoe fragment comprising part of a branch with square heel. No calkins. One eroded nail hole visible, possibly rectangular, which would make it post medieval rather than medieval. L extant: 79mm	1	Possibly post medieval (to early 18th century)	28	FE 01
1191	6) Horseshoe fragment, comprising one very worn and eroded branch and part of the toe. Probable square	1	Post medieval	29	FE 01

Context	Description	Count	Date	Inv. No.	Box
	heel. The one clear nail hole is eroded but is rectangular. L: *c* 112mm; W extant: *c* 93mm				
1191	7) 5 x small amorphous lumps. Undiagnostic.	5		96	FE 02
1197	8) 1 x fragment or amorphous lump. Not magnetic. Sample <1038>	1		140	FE 06
1197	9) 7 x small lumps/fragments. 2 x magnetic, 5 x non-magnetic.	7		141	FE 06
1201	10) Horseshoe, complete. Broad branches tapered to square heels, encrusted. No calkins. Nails visible, and x-ray shows rectangular nail holes, three on one branch and four on the other. L: *c* 122mm; W: 124mm.	1	Post medieval (to early 18th century)	30	FE 01
1201	11) Amorphous lump, magnetic; 2) *c* 20 small fragments and lumps some highly magnetic. Undiagnostic	21		97	FE 02
1201	12) Six amorphous lumps. Some magnetic. Undiagnostic	6		98	FE 02
1218	13) Horseshoe, complete. Broad branches slightly expanded heels with internal angles. Worn at toe. Worn fullering linking rectangular nail holes. There appear to be three nail holes on each branch. extant: 114mm; W: *c* 128mm.	1	Probably late 17th- or early18th-century	31	FE 01
1218	14) 1 x small amorphous fragment, slightly magnetic.	1		100	FE 02
1226	15) Horseshoe, almost worn away at the toe. X-ray shows rectangular nail holes with fullering, with three nail holes one branch and four on the other. One branch is less strongly curved. Heels angled on the inside margin. L: *c* 125mm; W: 123mm	1	18th century	32	FE 02
1226	16) Horseshoe, narrow shoe with gently curved and tapered branches and squared heels with slight internal angles. Rectangular nail holes, but no fuller. L: *c* 125mm; W: 105mm	1	18th century	33	FE 02

Table 15: Well Wood (evaluation) metal finds

Context	Description	Count	Date	Inv. No.	Box
23008	1) Horseshoe of the form known as a 'keg shoe with side (or quarter) clips' for a draft horse. The shoe has non-tapering branches with four rectangular nail holes in each branch. The branches are thick (*c* 14–15mm) and end in rounded heels each pierced with a large circular hole into which a peg was driven or screwed to give the horse extra traction. There are two quarter clips (showing as semi-circular indentations on the x-ray) located one either side of the toe of the horseshoe between the first two nails on each side. Specialised shoe. L: 130mm; W: 125mm.	1	late post medieval /modern	34	FE 01

Table 16: IA7 metal finds

Context	Description	Count	Date	Inv. No.	Box
1149	1) Horseshoe, complete. Broad branches (max *c* 37mm wide) with slightly widened and angled heels. No calkins. Three nail holes on one side and four on the other branch, all are rectangular and linked by fullering. L: 134mm; W: 125mm Probably late 17th- or early18th-century.	1	Probably late 17th- or early18th-century	23	FE 01
1149	2) Horseshoe branch, tapered to narrow square heel. Three extant rectangular nail holes. L extant: 107mm	1	Probably 17th- or 18th-century	24	FE 01
1149	3) 7 x small fe frags. (Magnetic.) Undiagnostic. Not measured.	7		93	FE 02
1149	4) Fe fragment, undiagnostic. Not measured.	1		94	FE 02

Table 17: IA1 metal finds

Context	Description	Count	Date	Inv. No.	Box
652	Length of wire, bent. Fe. D: 5–6mm	1		86	FE 02

Table 18: Castle Hill Brickworks metal finds

Context	Description	Count	Date	Inv. No.	Box
	WC2–BR Kilns				
290	1) object of uncertain function, cylindrical handle or grip with thin probe-like point extending from one end. Fe. L: 143m (Crotchet hook?)	1		85	FE 02
1001	2) Curved length of fe rod, perhaps part of a handle. L: 74mm	1		92	FE 02
1781	3) Hanging bracket U- or V-shaped, with nuts and bolts for attachment. L: *c* 380mm; W: 330mm	1		142	FE 07
1781	4) Hanging bracket U- or V-shaped, with nuts and bolts for attachment. L: *c* 380mm; W: 360mm	1		143	FE 07
1781	5) X-shaped plate with central hole for wall tie. Part of broken tie in situ. Cross: 290mm x 300mm; Tie L extant: 440mm. Tie secured to late by nut.	1		144	FE 07
1781	6) 3 x S-shaped plates for wall ties. Two complete, one missing an end. Single hole near the centre. Fe. L: 460mm; W: *c* 250mm.	3		145	FE 07
1781	7) Rectangular plate. No nail holes. Fe. L: 370mm; W: 100 to 110mm; Th: 12mm.	1		146	FE 07
1781	8) Foot or support. Slightly tapered rectangular section bar. At the wider end, there is a threaded terminal with a washer and square nut. The threaded portion separated by a flange from the rectangular section stem. The narrower end is formed into a flat oval angled foot. No nail hole. Fe. L: *c* 320mm.	1		147	FE 07

Context	Description	Count	Date	Inv. No.	Box
1781	9) Long rod (*c* 2350mm) bent, with small loop or hook at one and a short right angle section at the other end. Function unclear.	1		152	pallet
1781	10) Metal facing for an arched stokehole. Wide long strip forming J -shape. The long straight arm has a hole roughly midway along its length and second towards its end. Through the latter the tapered end of another strip is inserted and secured by a nut. The other end of the secondary strip is split with one length turned up and one turned down. There would have been at least three more of these secondary strips which were tied into the brickwork around an arched stokehole. The long arm is now bent. J-shaped strip but originally formed a complete arch - L: *c* 1420mm. Attached strip L: *c* 660mm.	1		153	pallet
1915	11) Key with oval bow, solid stem or shank and rectangular bit. The latter is encrusted with corrosion. Fe. L: 131mm	1		101	FE 02
3033	12) Bucket, almost complete. Galvanised with welded vertical seam and wire reinforced rim. It has an applied foot ring. Slightly crushed and lacking handle. Although one cast (non-ferrous) handle mount is still attached. Fe. Ht: *c* 265mm; D: *c* 340mm x 290mm.	1	20th-centtury	150	FE 07
3303	13) Nail or bar fragment, encrusted. Fe. L: 58mm.	1		131	FE 06
	WC2–NW of Kilns				
706	14) Cap for fountain pen, with small cu alloy band inside from the pen barrel. L: 58mm; D: 12mm. Band D: 11mm.	1	late 19th- or 20th-century	36	CA 01
706	15) fragment of a 'Brasso' can with printed colour labelling. Brasso was introduce by Reckitt & Sons in 1921. Not measured.	1	20th-century	37	CA 01
706	16) 1) Fe pipe. L: 123mm; D: *c* 32mm; 17) Strip, thick, Fe, bent. L: *c* 100m; W: 52mm; Th: 10mm.	2		87	FE 02
	WC2–Sheds				
271	18) 1) Nail, tapering square section stem, possibly flat circular head, poorly preserved. L: *c* 130mm; 19) Nail, tapering square section stem, possibly flat circular head, poorly preserved. L: *c* 85mm; 20) Rode tapering at one end, L: originally *c* 360mm; D: 16mm	3		83	FE 02
277	21) Drop hinge pintle. Fe. L: 210mm; Ht: *c* 85mm; L of pintle: *c* 55mm	1		84	FE 02
296	22) Fire bar, triangular section with five triangular notches. L: *c* 520mm; W: *c* 60mm; Ht: *c* 90mm	1		155	pallet
354	23) Iron plate over drain 354	1		156	pallet
709	24) 1) Galvanised nail, modern, used for fixing roof felt; 25) Nail fragments, not measured.	3		88	FE 02
739	26) 1) Nail (or bolt) with domed head, heavily encrusted with corrosion. Fe. L: *c* 100mm; 27) Nail small head tapering rectangle section stem. Fe. L: 70mm; 28) Nail now laminated and incomplete.	3		89	FE 02
740	29) furniture tack with a hollow domed head. Cu alloy. Not closely datable. L: 11mm.	1		38	CA 01

Context	Description	Count	Date	Inv. No.	Box
740	30) 1) 3 x nail or nail stem fragments, encrusted. Fe. Not measured. 31) Angular fragment, slightly magnetic. Undiagnostic. Not measured. 32) Slag, not magnetic. Sample <1026>	5		137	FE 06
740	33) 14 x small fragments, including 12 nail stem fragments. All fe. Not measured. Sample <1026>	14		138	FE 06
740	34) 2 x nail stem or bar fragments, 1 x strip fragment. Not measured. Sample <1026>	3		139	FE 06
792	35) Part of a cast iron plough share. Incomplete, not measured. 19th-century or later	1	19th-century or later	90	FE 02
798	36) 1) length of rod or thick wire, curved. D: *c* 9mm' 37) Nail small T- head tapered square section stem. Incomplete. Fe. L extant: 85mm. 38) Nail, small head, square section stem, tapered point. Fe. L: 67mm. 39) Nail flat circular head. Incomplete. Fe. Not measured.	4		91	FE 02
2801	40) Small hollow two-piece shank button with embossed fouled anchor, but no crown. Maker's or supplier's name on the back of the button is not legible. Merchant Navy button, post 1900. Cu alloy. D: 15.5mm	1	20th-century	39	CA 01
2801	41) Length of twisted cu alloy wire rope. D: 2.5mm	1	late 19th- or 20th-century	40	CA 01
2801	42) 1) Nail T-head. Fe. L: 67mm; 43) pin or peg with domed head and circular section stem. Fe. L: 58mm. 44) pin or peg with domed head and circular section stem. Fe. L: 82mm. 45) Bar fragment. Fe. L: 88mm; 46) Drawn wire nail, eroded. L: 100m; 47) U-staple. Fe. L: 85mm	6		54	FE 03
2801	48) cut nail, chisel tip. Fe. L: 64mm; 49) Large nail tapered stem, encrusted head. Fe. L: *c* 130mm; 50) Nail with T-head, and tapered rectangular section stem. Fe. L: 1088; 51) L-shaped clamp or holdfast, rectangular section. Fe. L: 81mm. 52) Cobbler's last, fragment comprising one arm. L: 102mm; W: 110mm	5		55	FE 03
2866	53) plain circular cast shank button, with wire shank and loop. slightly domed face. Cu alloy. D: 14mm.	1		41	CA 01
2866	54) 1) Nail small head, possibly T. Fe. L; 114mm; 2) Nail stem, rectangular section. Fe. Not measured. 55) Nail, incomplete, possibly modern drawn wire, but poorly preserved. Fe. Not measured. 56) Rod or wire fragment, laminating. Fe. Not measured. 57) Rod or wire fragment. Fe. D: 5mm; L: 97mm.	5		56	FE 03
2895	58) Watch case for a pocket watch. The case is empty with no evidence for the movement or the face. The back of the watch survives. The watch probably had a stem wind	2	later 19th- or	43	CA 01

Context	Description	Count	Date	Inv. No.	Box
	mechanism and therefore dates from after c1850. Case D: 54mm. Cu alloy, possibly originally plated. 59) Rectangular buckle? Rectangular frame (36mm x 27mm) with three bars or prongs on each long side not quite meeting in the middle of the frame. Cu alloy.		20th-century		
2895	60) Bolt, short flat head, cut thread terminal. Fe. L: 85mm; 61) Bolt, hexagonal head, cut thread terminal. Fe. L: 82mm. 62) Bolt of pin with straight circular section stem and domed head. Fe. L: 170mm. 63) Strip or binding of rectangular section with hole at each end. L: 160mm; W: 33mm. 64) Length of wire or a drawn wire nail, encrusted. Fe. not measured; 65) Nail, small head tapered rectangular section stem. Fe. L: *c* 108mm.	6		57	FE 03
2895	66) strut or angle bracket. Square section bar with angled pierced flanges at each end. Nail holes presumed but not visible. Fe. L: *c* 380mm; cross section 24mm x 24mm	1		58	FE 03
2895	67) Bolt with domed head and circular section stem with no taper. Some encrustation. Fe. L: *c* 190mm	1		59	FE 03
2895	68) Small spoked wheel with remains of solid white rubber tyre. Pushchair wheel. Fe with some rubber. D: 132mm. Cf Inv No 61	1		60	FE 03
2895	69) Rim with traces of white rubber tyre from a small spoked wheel as Inv No. 60. D: 133mm.	1		61	FE 03
2896	70) aluminium screw cap for a jar or wide necked bottle, now crushed. D: *c* 45mm.	1	20th-century	44	CA 01
2896	71) Thin rod slightly tapered at on end with possible screw thread or inscribed lines at one end; broken at the other end. The rod is bent. Extant L straightened: *c* 380mm. Not closely datable.	1		45	CA 01
2896	72) Nail encrusted, and eroded. Small head, probably complete. Fe. L: 77mm	1		62	FE 03
2896	73) Short bolt with circular section stem and domed head. L: 74mm.	1		63	FE 03
2896	74) Fragment of rectangular section tin can, perhaps for corned beef or spam. One end only, heavily encrusted. Fe. 84mm x 50mm.	1	late 19th to 20th-century	64	FE 03
2896	75) 3 x drawn wire nails: 132mm; 104mm; 107mm. Fe	3		65	FE 03
2896	76) Handle or grip? Stem of square section with D-shaped handle at one end, and tapered to circular section (possibly with cut thread) at the other end. L: 225mm; W of handle: 86mm. X-RAY	1		66	FE 03
2896	77) Pipe, encrusted. Fe. D: *c* 18mm.	1		67	FE 03
2896	78) Drop hinge pintle. Fe. L: 140mm; Ht: 90mm.	1		68	FE 03
2896	79) Strip, half round section. Fe. L: 147mm	1		69	FE 03
2896	80) 1) Strip, encrusted. Fe. L: 155mm; W: 28mm. 2) encrusted rod or possibly pipe. Fe. L: *c* 190mm.	2		70	FE 03
2896	81) rod fragment, encrusted. Fe. Not measured	1		71	FE 03
2896	82) strip, encrusted. Fe. L: 153mm; W: 26mm	1		72	FE 03
2896	83) Object with narrow pipe or tube at its centre. Appears to wire, perhaps a spring, wrapped around the pipe. Part of an outer casing survives with a copper alloy band at one	1		73	FE 03

Context	Description	Count	Date	Inv. No.	Box
	end. Purpose uncertain. Fe and Cu alloy. L: 57mm; Inner D: 12.5mm; Outer D: 23mm; D of cu alloy band: 19mm.				
2896	84) Bolt, with long circular section stem and domed head. Fe. L: *c* 240mm.	1		74	FE 03
2896	85) Length of rod, bent. Fe. D: 6.5mm.	1		75	FE 03
2896	86) Bolt, encrusted, probably hexagonal head. Fe. L: *c* 110mm	1		76	FE 03
2896	87) Cavity wall tie, formed from galvanised strip. A type no longer in current use. Fe. L: 200mm.	1	mid 20th-century	77	FE 03
2896	88) Windlass. Comprise rectangular frame with a pulley made of two pressed steel halves, with cranked axle with two handles with rubber grips. There are the remains of steel rope with rubber casing attached to the remains of the pulley wheel. L: *c* 410mm; Overall W with handles: *c* 290mm.	1	20th-century?	148	FE 07
2897	89) Clockwork mechanism? Rectangular frame with central cross bar cut from sheet cu alloy, with a spindle through the cross piece. The spindle has two toothed wheels, attached (D: 23mm & 32mm). The mounting frame (67mm x 59mm) is pierced with at least 5 nail or pin holes.	1		46	CA 01
2897	90) possible bottle cap non-ferrous possibly aluminium. D: 32mm	1		47	CA 01
2897	91) Two cu alloy eyelets from canvas vehicle tilts or from a tarpaulin. D: 29mm.	2		48	CA 01
2897	92) 1) Cu alloy eyelet. Cf Inv No. 48. D: 30mm; 93) Bullet-shaped ferrule or chape? L: 32mm; D: 13.5mm x 11.5mm	2		49	CA 01
2897	94) Two pieces of the frame from a large purse or small bag. The two pieces are formed from folded crimped sheet cu alloy with a small knobbed catch on each side of the frame. Each side measures *c* 165mm long. Cu alloy	1		50	CA 01
2897	95) 1) cu alloy tube of oval cross section formed from rolled sheet cu alloy and curved perhaps to form a handle. L: 118mm; W: *c* 80mm; D: 14mm x 11mm. 96) Length of non-ferrous pipe possibly plated cu alloy. L: 104mm; D: 11mm Sf 2894	2		51	CA 01
2897	97) Teaspoon with 'Fiddle' pattern handle. Cupro-nickel? L: 125mm.	1		52	CA 01
2897	98) Length of broad thin strip somewhat encrusted. L: *c* 440mm; W: 35mm.	1		78	FE 03
2897	99) File. Incomplete. Straight sided rectangular section hand file. Not hand made. L extant: 140mm; W: 23mm. Fe.	1		102	FE 04
2897	100) bar or rod, encrusted. Fe. Not measured.	1		103	FE 04
2897	101) Strip or binding. No obvious nail holes. Fe. L extant: 215. W: 41mm; Th: 5mm	1		104	FE 04
2897	102) Strip or binding, encrusted. Fe. No obvious nail holes. L: 195mm; W: 41mm; Th: 5mm	1		105	FE 04
2897	103) Strip, irregular, possible eroded. No visible nail holes. L: 270mm; W: 35mm - 40mm	1		106	FE 04
2897	104) Two nails, small heads, chisel tips. L: 106mm; 95mm	2		107	FE 04
2897	105) nail with large slightly domed sub-square head, and relatively short stem with chisel. L: 74mm	1		108	FE 04

Context	Description	Count	Date	Inv. No.	Box
2897	106) 1) Nail, small square head, chisel tip. L: 93mm. 107) 2 x fragments of encrusted fe bar or nail. Not measured	3		109	FE 04
2897	108) Wire, possibly folded to form a handle. Laminating. L extant: *c* 130mm	1		110	FE 04
2897	109) Wire with possible loop at one end wrapped around a thick piece of fe. L extant: 105mm.	1		111	FE 04
2897	110) 2 x fragments of a possible bucket handle, both curved and ending in loops at one end. One fragment has non-ferrous ring (possibly cu ally) attached to the its loop. L: 210mm. The second piece has a fragment of cu alloy attached to its loop. L: 252mm.	1		112	FE 04
2897	111) Fe plate, almost rectangular with two adjacent straight edges. No obvious nail holes. 120mm x 80mm	1		113	FE 04
2897	112) Fragment of cast iron half round guttering. Not measured.	1		114	FE 04
2897	113) Fragment of cast iron rainwater pipe fused to possible bracket fragment. Not measured.	1		115	FE 04
2897	114) Oval fe link or buckle frame fused to fragment of thin fe sheet. Could be chain link or buckle fragment. L of oval link: 66mm	1		116	FE 04
2897	115) Rectangular fe plate with domed centre and fixing points at each end. Might benefit from x-ray. L: 255mm x 120mm.	1		117	FE 04
2897	116) Horseshoe, one branch with calkin at the heel. Encrusted. X-ray required. L extant: 165mm	1		118	FE 04
2897	117) Horseshoe, complete. Encrusted with little detail visible. X-ray required. L: *c* 145mm; W: *c* 130mm	1		119	FE 04
2897	118) Small pincers, or possibly small tin snips. Encrusted and fused in an open position. X-ray possibly required. L: *c* 170mm	1		120	FE 04
2897	119) Strip, no nail holes visible. L: 462mm; W: 66mm to 70mm.	1		149	FE 07
2963	120) Sheet fe, encrusted. Possibly part of a flattened tin or box. Note measured	1		121	FE 05
2963	121) Fe casting, L-shaped fragment, possibly originally a hinged fitting. There is one extant pivot on the shorter arm of rectangular section. Longer arm is incomplete and wider. Function uncertain. L: 130mm; W: 77mm.	1		122	FE 05
2963	122) Folded edging formed from thin fe sheet. 2 x frags. Not measured. Cf Inv No 124.	1		123	FE 05
2963	123) Folded L-section edging formed from thin fe sheet. L: *c* 310mm; W: 35mm. Cf Inv No 123.	1		124	FE 05
2963	124) 1) Fe strip of rectangular section. L: 255mm; W: 18mm 125) Bracket formed from straight fe rod, flattened at one end to form flanges. At one end the flange forms possible hook. The other end is flattened and formed into a curve and attached to a curved flat fragment of fe. L: 212mm.	2		125	FE 05
2963	126) Short piece of angle iron, possibly cut from a fence post. Not measured.	1		126	FE 05
2963	127) Corner fragment of fe plate with angled corners. Extant L: 118mm; Extant W: 89mm.	1		127	FE 05

Context	Description	Count	Date	Inv. No.	Box
2963	128) Cast fe half round rainwater guttering. W: 109mm	1		128	FE 05
2963	129) Small pick or hammer. Octagonal section hammer head and circular section pick. Oval eye with slight flange. L: 187mm	1		129	FE 05
2963	130) 1) fe rod fragment. Some lamination. [Possible hints of spiral cuts suggesting that it might be part of a round file?] L: 105mm; D; 10mm; 131) Small chisel of square cross section with tapered chisel end. The stem narrows towards the head which is slightly battered. L: 168mm; Stem: 13mm x 12mm section.	2		130	FE 05
2986	132) Hollow domed object, very like a bicycle bell. D: 64mm	1		79	FE 03
4137	133) Rectangular plate with four large nail along one edge. There is a hole roughly half along the plate close to one end. This appears to have a lip with a fragment of pipe or thick bar inserted. An x-ray would clarify whether or not there is a pipe. L: 470mm; W: 155mm. Pipe(?) sticks out *c* 180mm. Spacing of nails: 110mm; 120mm 135mm. From Pugmill 4137	1		151	FE 07
4185	134) Large iron casting, encrusted. X-ray? 200mm x 130mm x *c* 160mm	1		134	FE 06
4185	135) Fitting comprising fe tube with large oval loop attached at one end. L: *c* 185mm	1		135	FE 06
4188	136) Knife handle comprising tapered fe plate tang with two bone handle plates secured by 3 pins or rivets. X-ray. L: 76mm.	1		136	FE 06
	WC2–T1				
2872	137) Royal Artillery cap badge. Embossed brass badge comprising an artillery piece with the motto 'UBIQUE' above surmounted by a 'Tudor' crown. Below the gun is the legend 'QUO FAS ET GLORIA DUCUNT' although the first two words are missing. The wheel of the gun is a separate casting attached by a single rivet. The crown is incomplete and now detached from the badge. The vertical strip which attached to the cap, was originally fixed to the back of the crown. The 'Tudor' crown indicates that the badge must date from just before the Great War until the accession of the present monarch. L extant: *c* 46mm; Ht: *c* 46mm. Sf 242.	1	First half of the 20th century	42	CA 01

Table 19: Castle Hill Wood metal finds

Context	Description	Count	Date	Inv. No.	Box
3371	1) Horseshoe, single branch, with rounded heel, but no obvious nail holes. X-Ray. L extant: 102mm. 2) Curved fragment, possible fragment of horseshoe, but little survives. Not measured. 3) Corroded and encrusted lump. Not measured.	3		132	FE 06
3373	4) Curve trip, probably heel of horseshoe. L extant: 63mm.	1		133	FE 06
3365	5) Cast iron mile post with cruciform base plate. Ht: *c* 1080	1		154	pallet

Table 20: Burgess Hill Farm metal finds

Context	Description	Count	Date	Inv. No.	Box
90078	1) Hermesetas' tin	1	20th-21st C	1	CA 01
90078	2) Electrical component, cu alloy connecting plates flanking three ceramic discs. Engraved: ENGLISH ELECTRIC FUSE' and 'JP 200A'	1	20th-21st C	8	CA 01
90078	3) Small spanner, double ended. Modern drop forged spanner. L: 125mm	1		9	
90079	4) T-head nail, bent and encrusted. Fe. handmade. L: *c* 70mm. 5) Short nail or pin with small flat head. Fe. Handmade. L: *c* 45mm' 6) Small nail with thin tapered rectangular section stem and small flat head. Fe. Handmade. L: 48mm.	3		10	
90080	7) Fe wire U-staple. L: 35mm; 8) length of thin fe wire. Not measured	2		11	
90080	9) Small screwdriver with eroded moulded (plastic?) handle and thin straight stem. L: 134mm. 10) Cast iron pipe fragment. Not measured. 11) Encrusted curved fe strip. Not measured. 12) encrusted angled fe fragment. Not measured.	4		12	
90081	13) Fe structural fitting comprising thick curved L-shape strip with a thread rod at one end. L: 195mm; W: *c* 155mm.	1		13	
90082	14) Purse frame for small purse. 4 x frags. L: 75mm. Modern.	1	20th-21st C	3	CA 01
90082	15) 2 x refitting flat fe frags, encrusted. Possible cast iron. Purpose uncertain. L: *c* 225mm. X-ray might help identification of function.	1		14	
90093	16) Length of thick threaded rod with collar at mid-point, encrusted, with heel iron (see 17) fused by corrosion. L; 165mm. 17) Heel iron (see 16) L: 45mm; W: 80mm. 18) length of small bar or nail. L: 75mm. 19) narrow fe strip frag. L: 73mm; W: 7mm. 20) Large handmade nail with flat oval head and chisel tip L: 135mm. 21) Large handmade nail with small slightly domed head and chisel point. L: 105mm.	6		15	
90176	22) Fe bar or rod frag. Encrusted. L: *c* 140mm	1		16	
90179	23) Small fe nail, encrusted. probably hand wrought. L: 50mm	1		17	
90179	24) Nail, probably modern drawn wire nail. L: 130mm	1		18	
90179	25) Two refitting fragments of cu alloy tube or pipe. L: 38, D: 7mm.	1		53	
90218	26) Edward VII penny dated 1902, last number not clear	1	1902 or later	4	CA 01
90218	27) Nail encrusted with chisel tip. Fe. L: *c* 70mm. 28) Nail, encrusted, possibly incomplete. L extant : 52mm. 29) Nail encrusted, L : *c* 62mm.	3		19	
90220	30) 2 x fe sheet frags. Not measured. 31) 2 x cast iron pipe frags. Not measured. 32) small oval section drawn wire wood nail. L: 41mm	5		20	

Context	Description	Count	Date	Inv. No.	Box
90220	33) Long tapering fe spike. L: 330mm	1		21	

Table 21: Burgess Rough Barn metal finds

Context	Description	Object Count	Date	Inv. No.	Box
2605	1) Heavy copper alloy casting. Function uncertain	1	l. 19th-21st C	5	FE 03
2621	2) Fe sheet frags (x 4) Undiagnostic	4		6	FE 03
2621	3) 2 x cu alloy collars on fragments waterlogged wood. On collar is damaged revealing some form of woven fibrous binding around the wood. Purpose unclear.	2		7	CA 01

Table 22: Unstratified metal finds

Context	Description	Count	Date	Inv. No.	Box
u/s	1) Lead toy soldier mounted figure, hollow cast. Horse's head and rider's body missing. Pb. L: 49mm	1	19th-century	35	CA 01

5 VESSEL AND WINDOW GLASS

By Ian R. Scott

5.1 Introduction

5.1.1 There are 255 pieces of glass, which comprise mainly vessel glass and much of which comes from Burgess Hill Farm. All the glass is post-medieval, and except for a single wine bottle, which may be late 18th century, is all 19th or 20th century in date.

5.2 Burgess Hill

5.2.1 There are 10 sherds of vessel glass, including a fragment from a 1980s Unigate 'Dumpy' milk bottle (context 105). All the glass is of late 19th- or 20th-century date (Tables 23 and 24).

5.3 Burgess Hill Farm

5.3.1 There are 168 pieces of glass from Burgess Hill Farm, including just five pieces of window glass (Table 25). The vessel glass comprises some late 19th-century vessel glass, including three sherds from a bottle made in a three-piece Rickett's type mould (context 90045, No. 1) but also a good quantity of 20th-century glass including milk bottles (contexts 90079 and 90080 Nos 7, 9, 11; context 90179, No. 17). The earliest glass present is a sherd from a late 18th- or early 19th-century wine bottle, which was probably made in a dip-mould and came from context 90242 (No. 37).

5.4 Burgess Rough Barn

5.4.1 A single vessel sherd with part of an embossed 'E' or 'F' not closely datable (Table 26).

5.5 Middle Lodge Balancing pond

5.5.1 A single undiagnostic sherd, probably vessel glass (Table 27).

5.6 Translocation (WCPemW)

5.6.1 Two refitting sherds of window glass date to the late 19th or more probably 20th century (Table 28).

5.7 Brickworks (WC2–BR; WC2–Sheds; WC2 north)

5.7.1 The glass from WC2–BR comprises 21 pieces of glass but includes 18 pieces of modern window glass (Table 29). The only vessel glass includes a complete screw top jar for MACLEAN BRAND STOMACH POWDER (No. 1, context 706), which was introduced in 1930 and was available at least until the 1950s. The other vessel glass comprises a sherd from the rim of a wide neck machine moulded jar (No. 4, context 798) and a body sherd from a polygonal section jar or bottle. Both vessels are of 20th-century date.

5.7.2 There are 39 pieces of glass from WC2–Sheds including six pieces of window glass. Much of the glass (17 pieces) comes from context 2897. The glass includes several complete vessels, and appears to be exclusively of 20th-century date.

5.7.3 There are just three pieces of glass from WC2 north including a complete machine moulded wine bottle with champagne finish (context 2309) of 20th-century date, and a complete cut glass ball stopper from a late 19th-century decanter (context 2302).

5.8 Well Wood evaluation

5.8.1 The nine small pieces of glass from the Well Wood evaluation are very mixed, and comprise little more than small body sherds or chips of glass, and are probably mostly recent and much battered, and therefore probably re-deposited (Table 30).

5.9 Glass tables

Table 23: Burgess Hill glass

Context	Description	Count	Date	Inv No	Box
105	1) Sherd from heel of a moulded cylindrical bottle in blue green glass. Not closely datable. 2) Body sherd from modern cylindrical bottle in colourless glass. 3) thin-walled sherd from modern 'Unigate Diaries' 'dumpy' bottle introduced in 1980.	3	late 20th century	24	GL 01
108	4) Body sherd from modern cylindrical bottle in colourless glass. 5) Body sherd from square or rectangular section bottle with chamfered corners. Pale green glass. 19th-century or later. Has frosted finish both inside and out. 6) Neck and finish from a small bottle. Possibly a small spirits bottle. Has probably moulded rather than tooled lip and string rim. Late 19th or early 20th century. 7) Sherd from rim, neck and shoulder of a cylindrical jar with short wide vertical neck and out turned rounded lip. Machine moulded.	4	20th-century	25	GL 01
112	8) body sherd from rectangular section medicine bottle in pale blue glass. Probably 19th- or early 20th-century. 9) conical foot of a small stemmed wine glass. Colourless. Not closely datable. Colourless glass.	3	late 19th- to early 20th-century?	26	GL 01

Table 24: Burgess Rough Platform glass

Context	Description	Count	Date	Inv No	Box
1150	1) Flaked fragment, probably not glass.	1		31	GL 01

Table 25: Burgess Hill Farm glass

Context	Description	Count	Date	Inv No	Box
90045	1) 3 x sherds probably from the same cylindrical bottle in pale blue green (aqua) glass. Mould line indicates that it was made in a 3–piece Rickett's-type mould.	3	1830 to late 19th-century	3	GL 02
90045	2) Ink bottle of 'cotton reel' type, green glass. Moulded with large crudely formed 'C' on the base. The vertical neck is moulded as is the finish/rim.	1	late 19th- or early 20th-century	4	GL 02
90045	3) body sherd from medicine or tonic bottle with line indicating dosages. Flat octagonal bottle in section? Blue green glass. Embossed '] SPO['.	1	late 19th- or early 20th-century	5	GL 02
90078	4) window glass, large piece of modern glass probably float glass	1	20th- to 21st-century	10	GL 02

Context	Description	Count	Date	Inv No	Box
90078	5) window glass, small piece possibly modern	1	19th- to 20th-century	11	GL 02
90079	6) 4 x frags from the neck and finish of moulded milk bottle of late 20th-century form. Colourless with hint of yellow green. 7) 25 x frags from an early wide mouth moulded milk bottle with 9 x sherds with traces of printed brick red lettering similar sherds from context 90080 No.9 (Inv No. 6/2) and 90080 no. 11 (Inv No 13/2). Colourless glass	29	mid 20th-century or later	12	GL 02
90080	8) 14 x sherds forming most of the body of oval section bottle with short vertical neck and square hand tolled finish. The bottle lacks a base (but see No. 10). The vertical mould lines indicate that it was made in a mould. Pale blue glass. 9) body sherd from a milk bottle in colourless glass. Has printed brick red lettering: ' D]AIRY | . B]RIDG[E ' Possibly a Tunbridge Wells dairy. Cf milk bottle sherds from context 90080 (Inv No. 13/2) and from context 90079 with brick red lettering Inv No. 12/2)	15	late 19th- or early 20th-century	6	GL 02
90080	10) base of oval section bottle (see No. 8) for other sherds from this bottle); 11) Sherd from a milk bottle with printed brick red lettering: 'BURGESS ['. Much of the printing is missing but the name is just visible. Cf context 90079 no.7 and context 90080 no.9 for similar lettering. 12) Complete small machine moulded jar embossed: 'CHESEBOROUGH | MANFG. CO. CD. | NEW-YORK'. Probably a jar for Vaseline which Cheseborough developed and manufactured. Machine moulded. 13) piece of modern window glass, possibly float glass.	4	20th-century	13	GL 02
90081	14) fragment of thick window glass. Modern with some superficial weathering	1	20th-century	14	GL 02
90082	15) fragment of undiagnostic green glass, probably vessel.	1		7	GL 02
90176	16) body sherd from square bottle, colourless. 2) small body sherd from wine bottle, dark green. 3) small body sherd pale blue.	3		17	GL 02
90179	17) 8 x sherds most refit, from a wide necked moulded milk bottle in colourless glass. Only the base is missing Probably machine mould. Embossed on front: ' B. DAVIES & SON | PURE MILK | 3D CHARGED | IF BOT NOT RETD '	8	Post Great War	8	GL 02
90179	18) base of cylindrical wine bottle made in Rickett's type 3–piece mould.	1	1830 to late 19th-century	9	GL 02
90179	19) body sherd from cylindrical bottle or jar, pale green with hint of blue. 20) 6 x thin walled body sherd from a cylindrical vessel, strong green with a hint of blue.	7		18	GL 02
90191	21) small fragment of possible window glass, with iridescent weathering. Possibly post medieval.	1		19	GL 02
90208	22) neck of slim moulded bottle and 3 body sherds possibly from same bottle. Corked or crown cork closure. Colourless. Late 19th- or early 20th-century;	50	late 19th to 20th-century	15	GL 02

Context	Description	Count	Date	Inv No	Box
	23) small rim sherd from cylindrical ?vessel, with faintly etched lettering: 'FIREPROOF | . .]ST CRYST[AL | DENMA[RK '. 3) sherd from shoulder of cylindrical bottle made in a dip mould? Colourless. 24) 7 x sherds from cylindrical tubing or vessel, colourless. 25) 9 x sherds with neck shoulder changes of angle, colourless. 26) 28 x thin walled curved body sherds in colourless glass.				
90208	27) Moulded cylindrical jar, 3 refitting sherds for complete rim and 2 refitting body sherds but also 4 more possible sherds. Blue green; 28) medicinal tonic, almost complete, flattened octagonal with recessed side panels embossed: 'A. J. WHITE LTD'. 4 refitting sherds forming most of body, plus neck and shoulder sherd. vertical hand finished rim. Blue green, 29) Medicinal tonic. 5 x similar sherds, also 4 x small flat embossed sherds possibly from same bottle. dark blue green. 30) Medicinal tonic ,3 x shoulder sherds in pale blue green glass. 31) 2 x body sherds with vertical mould lines from large bottle. Blue green.	29	late 19th- or early 20th-century	16	GL 02
90218	32) 5 x sherds, no refits, in dark green glass, possibly from a single cylindrical wine bottle. One sherd from a conical pushup. May have been made in a dip mould and therefore mid 18th to early 19th century	5	mid 18th- to early 19th-century	2	GL 02
90220	33) sherd from sauce bottle, square or rectangular with recessed panels, blue green, Moulded. 34) 2 x sherds colourless moulded vertical side vessel with short fluting near base. 35) body sherd embossed '.]PRESS' perhaps 'Express Dairies'? 36) plain colourless body sherd from cylindrical bottle. 37) thin walled sherd in dk olive green glass possible wine bottle.	6		1	GL 02
90242	37) Sherd from heel and body of later 18th- or early 19th-century cylindrical wine bottle with marked basal sag. Weathered and laminated surfaces. Probably made in a dip mould. Dark green.	1	late 18th- or early 19th-century	59	GL 02

Table 26: Burgess Rough Barn glass

Context	Description	Count	Date	Inv No	Box
2621	1) small body sherd with a single extant embossed 'E' or 'F'. dark green	1		23	GL 01

Table 27: Middle Lodge Balancing Pond glass

Context	Description	Count	Date	Inv No	Box
1850	1) small sherd of dark opaque glass possibly from vessel. Not closely datable.	1		32	GL 01

Table 28: Translocation (WCPemW) glass

Context	Description	Count	Date	Inv No	Box

489	1) Two refitting pieces of very window glass forming corner of larger pane. Very pale green. 123mm x 74mm; Th: 7.5mm	2	late 19th- or 20th-century	27	GL 01

Table 29: Brickworks: WC2—BR; WC2—Sheds; WC2 north glass

Context	Description	Count	Date	Inv No	Box
	WC2—BR				
706	1) complete screw top jar for MACLEAN BRAND STOMACH POWDER. Jar manufactured by United Glass Bottle (UGB). This product was introduced in 1930 and available at least until the 1950s	1	mid 20th-century	28	GL 01
740	2) 17 pieces of window glass, very regular probably modern. All very pale blue green. Some small pieces. Some differences in thickness: Th: 2mm; some 2.5mm; one piece 3mm. 3) One piece of window glass, colourless with hint of yellow with regular surfaces, probably modern. Th: 2.5mm	18	mid 20th-century or later	29	GL 01
798	4) Sherd from rim, neck and shoulder of a cylindrical jar with short wide vertical neck and out turned rounded lip. Machine moulded. Colourless glass. 5) Body sherd in colourless glass form a bottle or jar with polygonal section body with chamfered corners. Trace of embossed lettering: '. . DIST . . ' Probably 20th-century	2	20th-century or later	30	GL 01
	WC2—Sheds				
2801	6) Sherd from rim, neck and shoulder of a cylindrical jar with short wide vertical neck and out turned rounded lip. Machine moulded. 20th-century. Colourless glass.	1	20th century	33	GL 01
2801	1) Small bottle or phial, with slightly tapered cylindrical body and straight vertical neck. The bottle has been formed in two-piece mould with separate base plate. The neck has mould lines but the top has been hand tooled to a flat finish. Second half of the 19th century	1	2nd half 19th or very early 20th century	34	GL 01
2846	7) small piece of very pale blue green almost colourless glass with regular smooth surfaces. Th: 2mm. Modern	1	20th century	35	GL 01
2866	8) Complete small pill bottle with screw cap closure, machine-moulded. Embossed UGB for United Glass Bottle on base. 20th century	1	20th century	36	GL 01
2886	9) 'Cotton reel' ink bottle, machine moulded. Almost complete. 20th century. 10) Small sauce bottle, machine moulded with cork closure. 4 sherds, comprising neck, part of shoulder, body and base. Square section bottle with opposed indented sides with embossed lettering. One fragment reads 's]AUCE, the second fragment from the opposite side reads 'DADDI[es'. 'Daddies Sauce' was introduced in 1904.	5	20th century	37	GL 01
2895	11) base of cylindrical machine moulded bottle, in colourless glass. Makers and mould marks on the base have been partly obscured by the suction scar when removed from the machine; 12) base of cylindrical bottle of slightly large diameter in colourless glass. This has arks on the base similar to no.1, but clearer. These have not been identified. 13) Two colourless body sherd from two different cylindrical bottles. All 20th-century or later	4	20th century	38	GL 01

Context	Description	Count	Date	Inv No	Box
2896	14) Neck and rim from a wide necked jar in near colourless glass. The rim is square and the jar was probably closed by a metal cap. Machine moulded. 20th-century	1	20th century	39	GL 01
2896	15) Neck and finish of bottle with internal screw thread in pale green glass. The bottle would have been close by a hard rubber screw cork. The bottle was machine moulded but the rim and internal screw thread were formed using a finishing tool. Later 19th and very early 20th century.	1	late 19th and very early 20th century.	40	GL 01
2896	16) Sherd from the neck of bottle made in a mould. The mould line does not extend the full height of the sherd suggesting this had an applied and hand-tooled rim or finish. Pale green glass. Mid to late 19th century	1	mid to late 19th century	41	GL 01
2896	17) large body sherd from cylindrical bottle in colourless glass. Probably machine moulded but there is a lack of diagnostic features.	1	late 19th or early 20th century.	42	GL 01
2896	18) Window glass with regular flat surfaces. Very pale blue green. Probably late 19th or 20th century	1	late 19th or early 20th century	43	GL 01
2897	19) part of the base of cylindrical bottle in colourless glass with hint of green. Machine moulded. Part of an embossed label on including ' T[onb[RIDGE WE[lls '	1	20th century	44	GL 01
2897	20) Sauce or coffee bottle. Large body from a square section bottle with chamfered corners. Probably machine moulded but no mould lines. No base. Colourless Probably 20th century.	1	20th century	45	GL 01
2897	21) Body sherd of amber glass probably from a beer bottle. No diagnostic features, but probably 20th-century. 22) Base of a square coffee or sauce bottle in colourless glass, embossed 'A B [C' for the Albion Bottle Company which was established in the Midlands in *c* 1929 by the Standard Bottle Company and HP Sauce Ltd. It traded until *c* 1980. 23) Vessel body sherd with moulded trellis pattern with alternate lozenges filed. From small bottle or more probably from a jar. Machine moulded in colourless glass. 24) Piece of plain window glass, colourless with hint of green. Modern. 25) Small sherd of vessel glass with signs of melting. It has a frosted or acid etched surface. Not closely datable.	5	20th century.	46	GL 01
2897	26) Upper portion of a small 'Vaseline' petroleum jelly jar in colourless glass. The jar has a metal screw cap. With printed details indicating the it is a product of the Chesebrough Manufacturing Co Ltd. Early jars had embossed lettering, this is not embossed and has a metal cap of a type current in the 1950s.	1	mid 20th century	47	GL 01
2897	27) Small bottle of thin oval cross section with quite long neck with screw cap closure. Colourless glass. Machine moulded.	1	20th century	48	GL 01
2897	28) Small machine moulded cylindrical bottle perhaps for sauce. It has lost its neck and finish. Colourless glass.	1	20th century	49	GL 01
2897	29) Coffee or sauce bottle, square section, machine moulded with screw thread finish. Colourless glass.	1	20th century	50	GL 01

Context	Description	Count	Date	Inv No	Box
2897	30) Small cylindrical phial, machine moulded and embossed 'ALEX PARSONS'. Colourless glass. Alex. Parsons was a medical supplies company based in Chadderton, Lancashire. Their products include Oil of Eucalyptus, Iodine, and Fullers Earth ointment, but also non-clogging machine oil for sewing machines. This phial is probably for iodine. The company was certainly active in the mid 20th century.	1	mid 20th century	51	GL 01
2897	31) Small jar of square cross-section with screw thread. Colourless glass. Machine moulded. No markings	1	20th century	52	GL 01
2897	32) Moulded jar for fish paste or similar product. Of hexagonal section, all the panels bar one are decorated with reeding. The odd panel has limited decoration but is largely plain. And presumably had a paper label. The jar has a square section rim and would have been closed by a metal cap and seal. The Registered Design number 684057 indicates that the design was registered in 1921. Colourless glass.	1	early to mid 20th century	53	GL 01
2897	33) Moulded jar for fish paste or similar product. Of tapering cylindrical section with some reeded decoration with plain circular panel for a printed paper label. The jar has a square section rim and would have been closed by a metal cap. Machine moulded, the embossing on the base has been obscured by machine's suction scar. Colourless glass	1	20th century.	54	GL 01
2897	34) Medicine bottle, machine moulded in colourless glass. Rectangular section with three recessed faces. The front recessed panel has a small embossed running fox above an embossed triangle framing the words 'WALFOX BRAND'. The bottle has a square rim and had corked closure. Walfox Ltd were manufacturing chemists based in Batley, Yorkshire. The company began seems to have begun trading in 1928 and by the 1950s had changed its name to Howard Lloyd and Co Manufacturing Chemists, Batley. Mid 20th century	1	early to mid 20th century	55	GL 01
2897	35) Medicine bottle, machine moulded in colourless glass. Rectangular section with chamfered corners. The bottle has rounded shoulders. The bottle has a screw cap closure. The base is embossed with a large number ' 75 ', flanked by a smaller ' 6 L ' and VB or V8 with an oval. 20th century.	1	20th century	56	GL 01
4185	36) 4 pieces of window glass (3 refit), with smooth regular surfaces, colourless with a hint of green. Modern glass. Th: 2.6mm	4	modern	57	GL 02
	WC2 north				
2302	37) cut glass decanter stopper, complete. Long necked ball stopper, the ball is hollow and has cut facets with small ovals above	1	late 19th C	20	GL 01
2309	38) complete wine bottle, machine moulded. 'Champagne' finish, and pushup with large mamelon. Dark green with hint of blue	1	20th C	21	GL 01
2316	39) body sherd from a wine bottle, dark green.	1		22	GL 01

Table 30: Well Wood evaluation glass

Context	Description	Count	Date	Inv No	Box
23008	1) small body sherd from an 18th- or early 19th-century wine bottle. Dark olive green glass. 2) small wine-coloured or purplish body sherd from a vessel; 3) small vessel sherd with mould line in green glass; 4) Sherd of pale green glass with deep moulded grooves and ridges. Vessel? 5) Small thick walled colourless sherd; 6) small light green body sherd; 7) Pale blue green chip, possibly thick window glass; 8) Small pale blue green chip, undiagnostic. 9) thick sherd of window glass (Th: 9mm) with fine reeded decoration on one face, very pale green. Probably modern.	9	undated	58	GL 02

6 CLAY TOBACCO PIPES

By John Cotter

6.1 Introduction and methodology

6.1.1 Fourteen pieces of clay pipe, weighing 56g, were recovered from 13 contexts. These have been spot-dated and catalogued in some detail. The catalogue records the quantity of stem, bowl and mouth fragments, the overall fragment count, weight, and comments on condition and any maker's marks or decoration present. The comments field has been expanded in this instance to include additional information on parallels and any other observations worthy of note. The few pipe bowls present were catalogued using a series of form codes based on Atkinson and Oswald's (1969) London pipes typology with bowl types assigned to an abbreviated code (eg AO22). Maker's marks were identified from the Kent section of the list of makers published in Oswald's (1975) national survey.

6.2 Summary of the assemblage

6.2.1 In total, there are five pieces of pipe bowl (from five pipes) and nine stem pieces but no mouth pieces. The earliest pieces (17th- and 18th-century stems) are in a very worn condition whereas the majority of later (19th-century) pieces are in a fresh condition although a couple of pieces from the brick kilns are clearly burnt. Three of the five bowls recovered are complete but with only short lengths of stem still attached. The longest detached stem fragment is only 50mm long. Despite the small size and variable condition of the pipe assemblage it produced a number of useful closely datable pieces—including two with makers' marks—and two highly decorated or unusual pipes. Full catalogue details are available in the project archive. The following summary is arranged by site area and in roughly chronological order.

6.3 Burgess Rough platform

6.3.1 Two pieces (3g) are both stem fragments in very poor condition. These comprise a small piece or scrap of stem from context 1201, probably 17th century, and a larger piece from 1122, probably of late 17th- or early 18th-century date.

6.4 Burgess Hill Farm

6.4.1 Four pieces (24g) were recovered from context 90242 (a redeposited natural levelling layer in yard) produced a complete 18th-century pipe bowl with small circular heel of squared side profile (Fig. 136, No. 1). The bowl form is closest to AO26 (*c* 1730/40–1800). On the sides of the heel the maker's initials 'H/G' in raised moulded letters. Very probably the mark of a certain Howe Green (II) of Rochester (*c* 1761–1780), otherwise of Howe Green (I) recorded in the Maidstone Polls in 1761 (Oswald 1975, 175). They were presumably father and son (though which was which is uncertain). The rim is probably wire-cut but partially finger-smoothed, and there is 25mm of stem attached. Otherwise the bowl is plain. It is fairly fresh but speckled with rusty brown post-deposition staining. Three other pieces of stem, all late 18th or 19th century, also derive from this site.

6.5 WC2 Brickworks

6.5.1 Seven pieces (28g), all 19th century in date, include four pipe bowls. From WC2 Sheds, context 2954 (a cleaning layer), came a broken bowl profile of spurred type (AO28, *c* 1820–1880) with the maker's mark 'P/R' on the spur, very probably that of Phillip Richmond of Tonbridge, active *c* 1845–1851 (Oswald 1975, 176). The pipe has faint moulded oakleaf decoration on the seams although most of the front part is missing. Also from the sheds (2897) a complete 'fancy' pipe bowl of AO30 form (*c* 1850–1910) copying the round-based wooden briar pipes that were coming into fashion (Fig. 136 No. 2). However, this example is unusually small (rim diameter 18mm, height 28mm) and is probably best identified as a child's bubble pipe. The bowl is held by a claw-like rib, front and back, textured to resemble a ?bird's claws, and the round base has a small 'foot' allowing it to be rested on a flat surface; this consists of a transverse rod or comma-shaped scroll which fades into the stem further back. The sides of the scroll bear finely notched decoration. As the piece is dark brown and clearly burnt it may have fallen into the brick kilns.

6.5.2 A second complete 'fancy' pipe bowl of the same date and form (AO30) was recovered from Drying Shed 1 (context 1921). This has finely detailed moulded decoration and is in remarkably fresh condition. The decoration comprises downward-pointing scale decoration all over the upper three-quarters of the bowl, while the rounded base and first 10mm of attached stem are decorated to resemble a twig or plant stem with fine longitudinal striations and tiny pores (Fig. 136 No. 3). This type of decoration scheme is common for the period (eg Atkinson and Oswald 1969, fig. 13, top-right); in some cases, the scales represent pinecones, in others fish scales, and sometimes just ornamental scales or tiles. The fourth bowl, which is broken and burnt, came from made ground around the footings of a brick kiln (1915). It is from a very damaged spur-type bowl with a chipped spur and with 36mm of stem still attached. The spur has possible traces of a maker's mark (part of the surname initial?) but is too damaged and scorched to be certain of anything more. The surviving piece of bowl appears to have a trace of moulded foliage decoration down the back seam. The fragment is scorched red-brown all over externally, including over the breaks, and it seems likely it was burnt in the kiln. Three other small stem fragments from this area are broadly 19th century in date.

6.6 IA4 Heathland Creation Area

6.6.1 This site produced one piece (1g) of fresh 19th-century stem.

6.7 Catalogue of illustrated pipes

6.7.1 Context (90242). Howe Green bowl (*c* 1761–1780). It is possible that this mark and its association with this bowl form has never been previously illustrated. Fig. 136 No. 1.

6.7.2 Context (2897). Complete 'fancy' pipe bowl (*c* 1850–1910), probably a child's bubble pipe. Fig. 136 No. 2.

6.7.3 Context (1921). Complete 'fancy' pipe bowl (*c* 1850–1910) with finely detailed pinecone decoration. Fig. 136 No. 3.

7 WORKED FLINT

By Mike Donnelly

7.1 Introduction

7.1.1 The excavations brought to light a medium-sized assemblage of 814 flints (Table 31). The majority of the assemblage came from an *in-situ* flint scatter with much of the remainder originating from a putative second scatter formed from residual pieces found in nearby features. These scatters were clearly of late Mesolithic date and are a good match for similar slightly atypical assemblages from southeast England that, where dated, tend to be very late Mesolithic (between 5200 BC and 4000 BC). Away from this main concentration, flint was actually quite scarce, but most of this residual material was also early in date. However, period-specific artefacts were very rare in this assemblage, so much of the dating is based on technological indices.

7.2 Methodology

7.2.1 The artefacts were catalogued according to OA South's standard system of broad artefact/debitage type (Anderson-Whymark in Allen *et al.* 2013, Appendix 2; Bradley 1999), their general condition noted and dating attempted where possible. During the assessment additional information on condition (rolled, abraded, fresh and degree of cortication), and state of the artefact (burnt, broken, or visibly utilised) was also recorded. Retouched pieces were classified according to standard morphological descriptions (eg Bamford 1985, 72–77; Healy 1988, 48–9; Bradley 1999). Technological attribute analysis was initially undertaken and included the recording of butt and termination type (Inizan *et al.* 1999), flake type (Harding 1990), hammer mode (Onhuma and Bergman 1982), and the presence of platform-edge abrasion.

7.3 Provenance

7.3.1 Although 814 flints could be seen as a considerable number for an upland area in the High Weald, the vast majority of the flints came from one *in-situ* flint scatter in area IA4 and its associated old ground surface (630/814, 77.40%) (Table 32). In addition to this, a further 92 flints (11.30%) came from features just over 70m to the north-east, and these probably formed the remnants of a second late Mesolithic scatter, and 6 flints were found at the east edge of IA4. Away from the main concentration of material, a further 25 flints were found scattered across the excavation areas in IA4. Very often these were tool or core heavy, in effect the more obvious pieces, supported by low numbers of sieved chips and debitage flakes from sampled contexts. Very few of these areas contained potential *in situ* flintwork. Many did contain objects of early date, however, indicating a low level and most likely intermittent presence here during early prehistory.

7.3.2 The *in situ* scatter (2753) was found on/in a weathered remnant old land surface and had been moved by worm-sorting into the underlying natural. Several additional flints were found as outliers to the main scatter. Cut features accounted for another 13.64% of the assemblage, while natural features/tree-throw holes had 5.90% and topsoil/subsoil horizons had just 2.70%. Negative features consisted of pits (7.62%), ditches (5.90%) and a single example from a posthole (0.12%). Five of the 62 flints recovered from pit fills were from

environmental samples taken from the shallow flat-bottomed fire pits found throughout this project, but all five were probably residual.

7.3.3 In terms of spatial patterning, nearly all the flints were from area IA4 (752/814, 92.38%), the main scatter (2753) coming from Fairthorne Junction. IA4 also contained the second disturbed scatter, numerous flints coming from the sub-circular enclosure and adjacent features to the north-west. Outside IA4 the numbers of flints were low, the largest groups coming from IA5 (14/814, 1.73%) and IA3 (9/814, 1.1%).

7.4 Raw material and condition

7.4.1 The assemblage tended to be in good condition with fresh or lightly edge-damaged lateral margins and light cortication (Table 33). As would probably be expected, the figures for the *in-situ* scatter revealed a much higher percentage of fresh material and less overall cortication, while the remainder of the flints displayed heavier levels of edge damage and are more corticated. This remainder also included nearly all the flints that could be considered to be in poor condition. Still, the figures for the remainder also indicate that the bulk of the flintwork has not moved far from its original depositional context. This suggests that some of the larger assemblages from pits and tree-throw holes may be contemporary with those features.

7.4.2 In general, the flint was of good quality. Cortex type was recorded on 156 of 364 significant pieces (42.86%). The cortex was in a variety of conditions including chalk (69), weathered chalk (19), weathered/thin (47, North Downs flint most likely), thermal (9, clay with flints), rolled (5), indeterminate (4) and three examples of Bullhead Beds cortex (Dewey and Bromehead 1915). This indicates that the flint was recovered from a wide range of sources. Although most of the flint would have been from secondary sources, primary recovery could also have taken place by quarrying from outcrops, or recovery of raw nodules from cliff falls. All the thermal pieces were from scatter 2753 indicating that they were utilising at least some material from the clay-with flints. However, the scatter also made use of at least one nodule of flint with moderately thick chalk cortex.

7.5 The assemblage

7.5.1 The ratio of blade to flakes in the assemblage gave a moderate figure of 27.07% (98/362). Rather surprisingly, this figure was slightly lower for the *in-situ* Mesolithic scatter 2753 (25.90%, 65/251). Although lower than generally considered typical for the Mesolithic period (Ford 1987), figures in the region of 25% are actually quite common on late Mesolithic sites, especially where flint may not be immediately available. Similar figures were very common at Bexhill in East Sussex, where a very large number of flint assemblages shared this and other traits with scatter 2753. The remainder of the assemblage gave a blade index of very nearly 30% (29.73%, 33/111), but much of this was from features near to scatter 2357 that had between them a blade index of 37.5%, while the assemblage from the remaining features/contexts had an index of 21.85%. This is still a reasonable percentage of blades and highlights the probability that much of the background scatter of material from the A21 is Mesolithic or certainly early prehistoric in date.

7.5.2 A selection of the key pieces is illustrated (Fig. 137). Cores (10) and their related specialist preparation and maintenance debitage (7) accounted for 4.21% of the assemblage, just 1.58% of scatter 2753 and 6.45% of the remainder. Classic Mesolithic core types were

largely absent with only one (atypical) single platform bladelet core from the scatter (Fig. 137, c25), while a complex bladelet core was recovered as the sole find in nearby tree-throw hole 2258. The majority of the cores in the assemblage were flake cores including several small Levallois cores (Fig. 137, c25 and c1). The latter are generally considered to be late Neolithic or early Bronze Age in date and are often related to the production of biface and formal tool blanks. However, such cores are common at Bexhill in flake-heavy flint scatters radiocarbon-dated to the late Mesolithic, and were probably converted from blade cores too small to produce further blade blanks through heavy rejuvenation to maximise returns from cores/nodules. Here, one Levallois core from scatter 2753 (Fig. 137, c356) had several near refits to it but also appeared to have been the core from which several blades and long flakes were knapped. As such, other complex flake cores from the project may also be Mesolithic in date.

7.5.3 The assemblage as a whole had a fairly average tool percentage of 4.95%. However, this masked a very varied picture for the key components of the assemblage, the flint scatter and associated features having very low tool percentages (scatter 2752–3 has just 1.12%), while the dispersed background scatter had an extremely high tool percentage (19.75%). Clearly there must have been a degree of selective recovery here, tools and cores being far more easily recognised, resulting in inflated numbers in the overall assemblage. In contrast to the blank composition that suggested a largely early date for the assemblage, the tools do suggest a range of periods. This includes some retouched blades and a burin (Fig. 137, c314) that may well date to the late/terminal Upper Palaeolithic or (more likely) the early Mesolithic, as well as several knives of Neolithic or early Bronze Age date and a few very expedient tools on thick flakes that may date to the mid-late Bronze Age or later. The main scatter 2753 is clearly dated to the late Mesolithic by the presence of two classic late Mesolithic microliths forms, a scalene triangle (Fig. 137, c503) and a short crescent (Fig. 137, c50).

7.6 Key contexts

7.6.1 The key collection from the A21 assemblages was flint scatter 2753 and its associated contexts (cleaning/surface layer 2752 and old ground surface 2756). These three contexts accounted for 77.40% of the total assemblage (Table 34). The second set of key contexts consist of an adjacent pit (341), tree-throw hole (329) and ditch (359) that all contained early prehistoric flintwork of similar character. Of these the ditch was Iron Age, and the struck flint was therefore residual. It seems likely that these features indicate a second scatter on the old ground surface disturbed by later features. The final feature with an assemblage of any significance was pit 1415 that contained six flints and was located at the far end of IA4, some 135m east of the main scatter.

Flint Scatter 2752/2753/2756

7.6.2 Flint scatter 2753 was gridded up into 1m squares and was excavated in 50mm spits. All flints more than 10mm long were surveyed in by GPS, while small chips and burnt unworked flint were bagged by the metre square. The scatter formed an almost 'reverse-S' shaped spread of flints centred around a slight hollow in the natural that was filled with remnant old ground surface (Fig. 138). The initial cleaning of this flint rich surface was given the context number 2752 while a smaller patch of surviving old-ground surface around 5m to the NNE was labelled 2756.

7.6.3 In total, 630 flints were recovered, including 16 from the old ground surface away from the main body of the scatter. The scatter was comprised of 268 significant pieces (>10mm Long), 329 chips (281 sieved) and 23 pieces of larger irregular waste. The assemblage had a moderate blade index of 25.90% (65/251), contained mostly flake cores and had a very low tool count at just three pieces: two microliths (Fig. 137, c503 and c50) and a notch (Fig. 137, c29). The assemblage also contained five microburins, four of which are illustrated (Fig. 137, c5, c509, c107), indicating microlith production on site.

7.6.4 The assemblage displayed high levels of burning (30.95%) and breakage (38.81%), but there was no obvious pattern to the spread of burnt or broken material. The percentage of burnt pieces per square varied from as low as 17% to 46%. Levels of breakage also failed to reveal any obvious patterning, albeit with far more variability in grid squares. For example, grid square 99–T was directly west of grid squares 100–D and 100–L, and these three gave figures of 12.5%, 83.3% and 35.7% respectively. Levels of fine chips also showed great variety but little pattern, and there was not even a direct correlation between squares with more significant pieces and numbers of chips. All the above may suggest that the scatter was disturbed, although the fresh condition of the material suggests that any disturbance is likely to have been during prehistory, rather than more recent reworking or truncation. Alternatively, the scatter may have been made up of a series of very small knapping events with very localised patterning that is not immediately observable at the scale of one metre.

7.6.5 There are several points of interest in the flints from scatter 2753. In terms of the debitage, the length to breadth ratios show a very low percentage of material defined as narrow, that is with blade dimensions and ratios greater than or equal to 2:1, and a far larger percentage of broad/squat flakes with a ratio of less than 1:1. Similar ratios were obtained from the smaller assemblage from features 329/341/359 at IA4. Such figures are very far removed from typical Late Mesolithic assemblages such as the Sussex site of Streat Lane (Butler 2007) and are in the range more usually associated with later prehistoric assemblages (Table 35), such as the middle Bronze Age Site A on the A2 excavations in North Kent (Anderson-Whymark and Donnelly in Allen *et al.* 2012, 48-62). The ratios are, however, very similar to those from the axe/adze working site of Finglesham in east Kent (Butler 2014). They are also very comparable to several Late Mesolithic flint scatters from Bexhill some 25 miles to the south-east. It should be noted that both Streat Lane and Finglesham used a sub-sample of 100 pieces for their metric study.

7.6.6 The main reason for the low length/breadth ratio would appear to be that blade cores were converted into Levallois style cores in their final stages of reduction. The site contained significant assemblages from three or four cores/nodules, with a single final, Levallois core from each group, all of which had earlier blade removals from proper prepared single platform blade cores. Slightly higher levels of complex, faceted and dihedral platforms (8.25%) was also evident in this and other similar assemblages than would be expected in a typical narrow blade Late Mesolithic site. The method of working a Levallois core is actually quite similar to the preparation and shaping that went into creating axe/adzes, so the technique was clearly known to late Mesolithic groups. Adze working would also generate very squat debitage such as that found at Finglesham, Kent (Butler 2014) with a blade index of just 9.4% and a very similar length–breadth ratio figures to our scatters (Table 35), but there were no adzes here and the cores that were recovered suggest that the nodules were not large enough for adze production. Some of the illustrated worked-out adzes from the late Mesolithic site of Darenth,

in northwest Kent actually look very much like Levallois cores (Philp *et al*. 1998, fig 11:47) and that site also saw the use of probable anvil-knapped bipolar cores (ibid. fig 11:55), another method of maximising returns from a flint core more commonly found in northern Britain, where flint is generally far more scarce.

Feature 2750

7.6.7 This small putative feature was located just 2m north of scatter 2753 and may well simply be another hollow containing remnant old ground surface with flintwork, possibly part of that scatter prior to its isolation through truncation. However, multiple scatters at a single location are common and scatters are usually quite small in scale, so 2750 may well represent a separate event. Only two flints were recovered by hand and these were supplemented by material from a bulk sample. In total, two blades, a flake and eight sieved chips were present alongside two very small fragments of burnt unworked material.

Tree-throw hole 329, pit 341 and ditch 359

7.6.8 Three features all located within 7m of each other yielded small but significant flint assemblages. Taken together, the flints amounted to 80 pieces with low levels of tools, clear Mesolithic material and a blade-based industry. Tree-throw hole 329 may have been contemporary with the flint assemblage but it is more likely that this natural feature cut the soil on which the scatter lay or was contained. The tree-throw hole contained thirteen flints comprising eight flakes and five blade forms, but was not sampled, and probably had a far richer assemblage. It had a high blade index of 38.46% and lacked formal tools or tool debitage.

7.6.9 Pit or tree-throw hole 341 lay south-east of 329 and contained thirty-three flints, the vast majority of which originated from an environmental sample. It is unfortunate that this feature was not fully excavated, as it seems likely that this feature would have produced more struck flint. The assemblage consisted of seven flakes four blades and 22 sieved chips for a blade index of 36.36%. Again, there were no tools present.

7.6.10 Ditch cut 359 contained thirty-four flints with pieces present in all four of its fills, although nineteen flints came from the basal fill 363. There were eight in the second fill 362, only one in fill 361 and six in the final fill (360). The flints from this feature were clearly part of the same technological industry and share many features in common, such as colour, inclusions and cortex type. The assemblage consisted of nineteen flakes and ten blades, giving a high blade index of 34.48%, together with a broken awl formed on a large blade, a utilised blade with a unmodified awl-like tip (Fig. 137, c245) and a classic proximal/right microburin (Fig. 137, c235). The assemblage also contained one core rejuvenation flake (Fig. 137, c247), a piece of irregular waste and a small chip. Unfortunately, these flint-rich fills were not sampled for micro-debitage.

7.6.11 The fact that no flints were recovered from two adjacent interventions excavated by the same individuals does suggest a discrete spread of flint very similar in size to the typical small flint scatters found at Bexhill and generally elsewhere. The flints from features 329, 341 and 359 share many similarities in colour and cortex, and there is a probable near-refit between blade segments c248 from ditch 359 with blade c210 and flake c213 from tree-throw hole 329. It would seem very likely that these three assemblages formed part of the same scatter, now largely lost. This scatter is clearly late Mesolithic in character as with scatter 2753

but is noticeably more blade-based. However, it displays a more complex platform typology (dihedral/faceted percentage 18.18%), suggesting that many of these pieces were knapped from complex multi-platform and Levallois-type cores similar to those in scatter 2753. Moreover, it also produced very similar length/breadth ratio figures (although many of the blade forms were broken, this is quite common for blade-based assemblages and would factor into most of the statistics presented).

7.6.12 The likelihood is that despite the differences in blade percentages between these features and scatter 2753, these two scatters are probably part of the same industry and may well have been contemporary or very closely related in date. The slight differences in technology may relate to different activities being carried out between the two scatters.

Pit 1415 and topsoil/subsoil 1401/1402

7.6.13 A group of tree-throw holes and pits was identified in a small area at the eastern end of IA4. Most of the features did not contain flintwork but one large complex tree-throw hole pit contained a small assemblage of residual flint. The assemblage consisted of four flakes, a bladelet and an awl on a preparation flake. The included one flake of Bullhead Beds flint (Dewey and Bromehead 1915), and another piece of Bullhead flint, a core rejuvenation flake, was recovered from the topsoil in this location. The topsoil and subsoil in this location contained a total of six pieces, including a notch in addition to the core rejuvenation flake. The assemblage lacked fully diagnostic pieces, but the general character suggests an early prehistoric date. Bullhead Beds material was utilised throughout prehistory but saw increased favour in the early Neolithic period and was very often used in the production of regular blades for use as microdenticulates. If not of similar date to the larger scatters, it is possible that these flints may be of (early) Neolithic date.

The scattered flints

7.6.14 The tools consisted of a well-made knife on a core preparation flake from ditch 2237 and a later prehistoric looking denticulate on a heavy preparation flake from natural feature 2229. A large blade that had very heavy cortication and edge damage was recovered from the subsoil in WC5 and is probably of early date.

7.7 Refitting

7.7.1 A couple of refitting flakes were identified during the assessment of the material. A further refitting exercise was carried out on material from the two scatters as well as for flints from nearby features but no additional refits were identified. However, it was clear from the distinctive composition of the flint of levallois core 356 (Fig. 137, c356) and the very similar composition of numerous flakes that that these had been struck from this core, despite the lack of direct refits. The reasons for this are unclear and may be complex, however, the partial preservation if the sites would be the most likely reasons for the lack of good refits, as would the high probability that this was a short stay camp in which items were produced for use elsewhere. Still the near refits and the refits identified during the assessment phase prove that the scatters are *in situ*.

7.8 Minor assemblages

Robingate Wood

7.8.1 Three flints were recovered from here including two found in an environmental sample from fire pit 909. These consisted of an inner flake and a piece of irregular waste, neither of which is diagnostic. A utilised inner blade was recovered from colluvium 916 and displays platform abrasion that is very typically early prehistoric in date.

Middle Lodge Balancing Pond in WC6b-c

7.8.2 Seven flints were recovered from various contexts in this area. Pit 1849 contained three flints consisting of two undiagnostic inner flakes and a blade that displayed platform abrasion and was clearly early prehistoric in date. Pit 1808 contained a soft-hammer struck inner bladelet that was also early prehistoric in date while ditch 1806 contained an undiagnostic flake. Ditches 1804 and 1863 contained flake tools; ditch 1804 had a well-made heavily backed knife on an inner flake and ditch 1863 had a denticulate on a broken side trimming flake that is shaped in a way that suggests it was originally an awl/denticulate combination tool. The fine knife is likely to be Neolithic in date, and although such heavy regular backing can also be found on late/Terminal Upper Palaeolithic pieces, these are much rarer than Neolithic backed pieces, so a Neolithic date appears more likely.

IA5–WC6a

7.8.3 A small assemblage of 14 pieces was recovered from this area. Most of the flints were recovered from environmental samples taken from tree-throw hole 415 and fire pits 143 and 419, as well as hand-recovered material from pits 438 and 467. The assemblage from tree-throw hole 415 is not diagnostic of date, consisting of just four flakes, an awl on a side trimming flake and four small sieved chips. This material is in varied condition, suggesting that it is residual, or at least has a residual element. Fire-pit 413, which overlay feature 415, contained a pot lid fragment that had flaked off of a genuinely worked piece, while fire-pit 419 had just two small sieved chips. Pit 438 contained a denticulate on a side trimming blade with quite fine working inside of larger arced denticulations. This piece is quite likely to be early prehistoric in date. Pit 467 contained another early piece, a partially crested blade displaying a dual crest on quite a large blade (Fig. 137, c263). In the absence of other dating from these features, there is a chance that they may represent pits of Neolithic or (less likely) Mesolithic date.

Well Wood

7.8.4 A single inner flake was recovered from the subsoil here.

IA3 and IA3–WC5 Pond

7.8.5 These two adjacent areas produced 9 struck flints, the majority from IA3. The assemblage here is very tool and core heavy (4/19, 21.05%). It includes ten flakes and three blade forms, giving quite a low blade index (for the A21) of 23.08%. The core was another example of a Levallois core, which as discussed above, could date to either the late Mesolithic or late Neolithic periods. Also recovered was a multiple angle burin on a backed blade from pit 2505. This piece is clearly early in date and most likely belongs in either the early Mesolithic or (less likely) the late/terminal Upper Palaeolithic.

Burgess Hill Farm

7.8.6 This area contained just four flints but three were blades indicating an early date and the fourth was a complex tool of probable Neolithic or early Bronze Age date. One of the

blades was retouched and displayed an abraded platform while another inner blade had probably been utilised. The complex tool consisted of an awl and a denticulate on a heavily retouched side trimming flake. The denticulated retouch alternated between its ventral and dorsal side while the awl projection was to the lower right of the piece.

7.8.7 All these finds were recovered from post-medieval contexts associated with the farm buildings on this site and although it is possible that material may have been brought in from elsewhere, it is more likely that an early prehistoric site of unknown scale existed here and has been largely destroyed by the farm complex. Neolithic activity was recorded during excavations on Castle Hill above the site (Money 1975), so the flintwork may be related to this nearby site.

Burgess Rough Platform

7.8.8 Just two flints were recovered from this location. A multi-platform core was recovered from ditch 1154 while a retouched flake was found in ditch 1204. Neither piece is fully diagnostic, but both display technological characteristics that more strongly suggest a later prehistoric date for these flints.

Castle Hill

7.8.9 A single side trimming blade was recovered from modern cut 3364.

WC2 North and WC2 Brick Works

7.8.10 Seven flints were recovered from here including just one retouched blade from the Brick Works area, clearly an early prehistoric find. The remaining six pieces consisted of three flakes, a blade and a backed knife on a side trimming flake. The knife is a naturally backed example with quite fine scaler, partially invasive retouch along its left edge with a slight snap at its distal left end. This piece is very likely to be Neolithic or early Bronze Age in date.

WC1

7.8.11 The three flints from this area consisted of an inner flake (topsoil 605), piercer on a side trimming flake (unstratified at this location) and a core on a flake (Pit 658). The piercer is of a squat hard-hammer struck form typical of later prehistoric assemblages.

Unstratified

7.8.12 Two unstratified flints included a crude backed knife on an inner flake that was very likely middle–late Bronze Age in date.

7.9 Discussion

7.9.1 Struck flint was recovered from almost all the sites along the scheme, testifying to a background level of earlier prehistoric activity throughout. The distribution of previous findspots had been concentrated at the south end of the scheme. The main period represented was clearly the later Mesolithic, and the favoured location appears to have been the plateau east of Fairthorne Junction halfway along.

7.9.2 Despite its small size the flint assemblage from the A221 excavations is important for a number of reasons. Firstly, the late Mesolithic flint scatters in area IA4 represent a key element of the late Mesolithic landscape of south-east England. While findspots of Mesolithic flint are not uncommon, the recovery of a relatively undisturbed scatter of late Mesolithic

date using modern techniques, and the identification of another, albeit disturbed, are much rarer. Such inland surface sites add to a growing variety of types of sites becoming known in the later Mesolithic in Kent and East Sussex. It is likely that the lack of previously identified sites of this period may relate to the use in the late Mesolithic of a very different reduction strategy than what is expected of Mesolithic industries, and one that would generate a decidedly non-Mesolithic signature as a background scatter, fieldwalking collection or residual material on later period sites.

7.9.3 Of secondary importance is the recurring presence of small amounts of early material from many of the excavation areas along the A21 scheme. This indicates that the majority of the landscape was exploited at one time or another during early prehistory and counters the often-held assumption that early activity is rare in certain parts of south-east England, and West Kent in particular. Clearly many of these identified activity areas could date to the early Neolithic rather than to the Mesolithic period, but either way, such sites are important and not frequently identified along major infrastructure corridors. Many of these very small collection of blade forms and tools are in areas of heavy disturbance such as the WC2 Brick Works or the farm complex at Burgess Hill, and activity at these sites may originally been far more substantial.

7.9.4 Later Neolithic or Early Bronze Age material was also widely distributed along the scheme, though in extremely small numbers. Finally, the general lack of later prehistoric material is unusual and may suggest that any exploitation of the interior in later prehistory may have been intermittent in nature or perhaps very strongly related to particular industries such as metalworking or charcoal burning, or practices (such as those associated with burnt mounds) that rarely generate any significant flint assemblage.

7.10 Summary

7.10.1 The A21 flint assemblage mostly belonged to one largely *in situ* flint scatter, with another disturbed scatter of similar date close by. The late Mesolithic scatters were small in scale and probably represented short stays at a preferred location, possibly on a route way between two valley systems allowing access to the coast. The scatters have a very atypical reduction sequence that until recently would not have been recognised as Mesolithic, making these sites significant elements of an emerging very late Mesolithic type of industry that has been described as a flake-based microlithic industry. The remainder of the assemblage was sparse but indicated fairly consistent low levels of early prehistoric activity across most of its excavation areas. This includes some Neolithic material, which can be interpreted as the residue of exploitation of the landscape around Castle Hill, where Neolithic occupation has been recognised from earlier excavation (Money 1975).

7.11 Worked flint illustrated catalogue (Fig. 137)

c356 Levallois flake core, context 2752 vicinity of flint scatters

c121 core rejuvenation flake, scatter 2752

c29 notch on inner flake, scatter 2752

c247 core rejuvenation flake, ditch fill 363

c244 retouched blade with awl-like tip, ditch fill 363

c263 dual partial crested blade, pit fill 468

c314 multiple angle burin on backed blade, pit fill 2500

c25 single platform bladelet core, scatter 2752

c1 Levallois flake core, scatter 2752

c503 scalene triangle microlith, late Mesolithic, scatter 2752

c50 crescent microlith, late Mesolithic, scatter 2752

c5 proximal right microburin, late Mesolithic, scatter 2752

c509 proximal right microburin, late Mesolithic, scatter 2752

c107 distal left microburin, late Mesolithic, scatter 2752

c235 proximal right microburin, late Mesolithic, ditch fill 362

7.12 Worked flint tables

Table 31: The flint assemblage

Type	Quantity/Percentage
Flake	264
Blade	39
Bladelet	59
Blade index	27.07% (98/362)
Irregular waste	28
Chip	60
Microburin	5
Sieved chip 10–4mm	82
Sieved chip 4–2mm	240
Core rejuvenation flake	5
Crested blade	2
Core single platform blades	1
Core other blades	1
Core multi-platform flake	3
Core levallois flake	3
Core on a flake	1
Core fragment	1
Microlith	2
Awl	3
Piercer	1
Denticulate	3
Burin	1
Notch	2
Knife backed	3
Knife other	1
Retouched flake	1
Retouched blade	2
Retouch other	1
Total	814

Burnt un-worked	28 / 2g
No. burnt (%)	216/814 (26.54%)
No. broken (%) (not including waste)	164/404 (40.59%)
No. retouched (%) (not including waste)	20/404 (4.95%)

Table 32: The flint assemblage by context type and by area

Feature type	Total	Percentage
Flint scatter	614	75.43
Flint scatter (Old Ground Surface)	16	1.97
Pits and fire-pits	62 (57/5)	7.62
Ditches	48	5.90
Postholes	1	0.12
Tree-throw holes/natural features	41(28/13)	5.03
Topsoil/subsoil/colluvium	22 (11/10/1)	2.70
Modern features	7	0.86
Unstratified	3	0.37
Total	814	[100]
Area	**Total**	**Percentage**
IA4	762	92.38
IA5 WC6–A	14	1.73
IA3–WC5 Balancing Pond	1	1.35
IA3	8	0.98
Burgess Hill Farm	4	0.49
Burgess Rough Platform	2	0.25
Miscellaneous	5	0.61
Middle Lodge balancing pond	7	0.86
Robingate Wood LD	3	0.37
WC1	1	0.12
WC2	7	0.86
Total	814	[100]

Table 33: Flint by condition and cortication

Total assemblage					
	Total	**%**	**Cortication**	**Total**	**%**
Fresh	295	64.83%	None	68	18.63%
Light	141	30.99%	Light	270	73.97%
Moderate	16	3.52%	Moderate	24	6.58%
Heavy	2	0.44%	Heavy	2	0.55%
Rolled	1	0.22%	Very heavy	1	0.27%
Total	455			365	
Scatter 2753					
	Total	**%**	**Cortication**	**Total**	**%**
Fresh	225	71.88%	None	61	25.52%
Light	82	26.20%	Light	166	69.46%
Moderate	5	1.60%	Moderate	12	5.02%
Heavy	1	0.32%	Heavy	0	
Rolled	0		Very heavy	0	
Total	313			239	
Remainder					
	Total	**%**	**Cortication**	**Total**	**%**
Fresh	70	49.30%	None	7	5.56%
Light	59	41.55%	Light	104	82.54%
Moderate	11	7.75%	Moderate	12	9.52%
Heavy	1	0.70%	Heavy	2	1.59%
Rolled	1	0.70%	Very heavy	1	0.79%
Total	142			126	

Table 34: Flint assemblage by concentration

Type	Scatter 2753	Feature 2750	Ditch 359	Pit 341	Tree-throw hole 329	Remainder
Flake	186	1	19	7	8	43
Blade	17	2	9		2	9
Bladelet	48		1	4	3	3
Blade index	25.90% (65/251)	66.67% (2/3)	34.48% (10/29)	36.36% (4/11)	38.46% (5/13)	21.82% (12/55)
Irregular waste	23		1			4
Chip	58		1			1
Microburin	4		1			
Sieved chip 10–4mm	78			4		
Sieved chip 4–2mm	203	8		18		11
Core rejuvenation flake	3		1			1
Crested blade	1					1
Core single platform blades	1					
Core other blades						1
Core multi-platform flake	2					1
Core Levallois flake	2					1
Core on a flake						1
Core fragment	1					
Microlith	2					
Awl			1			2
Piercer						1
Burin						1
Denticulate						3
Notch	1					1
Knife backed						3
Knife other						1
Retouched flake						1
Retouched blade						2
Retouch other						1
Total	630	11	34	33	13	93
No. burnt (%)	195/630 (30.95%)	2/11 (18.18%)	7/34 (20.59%)	2/33 (18.18%)	2/13 (15.38%)	8/93 (8.60%)
No. broken (%) (not including waste)	104/268 (38.81%)	2/3 (66.67%)	17/32 (53.13%)	3/11 (27.27%)	7/13 (53.85%)	31/81 (38.27%)
No. retouched (%) (not including waste)	3/268 (1.12%)	0	1/32 (3.13%)	0	0	16/81 (19.75%)

Table 35: Length–Breadth ratios from scatter 2753

Ratio (Length : Breadth)		Scatter 2753		Scatter 329/341/359		Finglesham, Mesolithic		Streat Lane, Late Mesolithic		A2 Site A, Middle Bronze Age	
		N	%	N	%	N	%	N	%	N	%
Broad	<0.5	2	27.84	0	32.26	1	32	0	18	44	35.48
	<1	47		10		31		18			
Medium	1–1.5	59	53.98	9	45.16	31	54	19	40	64	51.61
	1.5–2	36		5		40		31			
Narrow	2–2.5	22	18.18	4	22.58	7	14	18	42	16	12.90
	>2.5	10		3		7		24			
Total		176	[100]	31	[100]	100	[100]	100	[100]	124	[100]

8 STONE OBJECTS

By Ruth Shaffrey and Hugo Lamdin-Whymark

8.1 Character of the assemblage

8.1.1 A total of 12 items of worked stone were amongst the assemblage of stone submitted for analysis. Stone fragments recovered from a further 41 contexts are all unworked and are not from unusual stone types that would represent imported material. The worked stone includes three objects, including one pebble hammer. The two other artefacts are a slate pencil (from external surface 2954 in brickworks sheds area) and a whetstone (from below the concrete floor 90093 of the barn). Slate pencils are typical finds from 19th and early 20th-century archaeological contexts and may have been in use for note taking in the brickworks. The whetstone is of circular section (Plate 469), which is more typical of post-medieval or modern whetstones, but also demonstrates some battering at the narrow end, suggesting it may have been multi-purpose. It is made from a very fine-grained beige micaceous sandstone, which could be Reigate stone.

8.1.2 Other stone is structural in origin. Three cubes of ironstone, which resemble tesserae, are likely to be hardcore from the nearby track (found in ditch fill 1149) whilst four fragments of slate could be broken pieces of roofing, but are too small to be diagnostic (2866). Two pieces of white marble were also found, one curved piece with a fixture perforation in one side and one flat slab with a shaped edge, presumably wall veneer or similar. The origin of neither of these is clear but both were found in 19th/early 20th-century contexts (90093 and 90220) and are likely to represent post-medieval or modern use.

8.1.3 A large quantity of burnt sandstone was found together with abundant charcoal in two adjacent pits and a gully in IA3. A sample of the charcoal was dated to the middle Bronze Age, and these stones appear to represent a 'burnt mound'. The sandstone is of local origin, coming from the Greensand of Kent. A collection of 100+ tiny fragments of dark red-brown stone were also recovered from one of the pits during sieving of sample 1077 from context 2062. These fragments are of ironstone and ferruginous sandstone, bands of which occur in the Greensand of Kent. They are unworked and although some of the stone may be burnt by association with the burnt mound, it is naturally a dark reddish-brown colour so it is not possible to be sure. The occurrence of ironstone in small quantities such as this is not an indication of iron-working.

8.2 Pebble hammer

8.2.1 A pebble hammer was recovered as an unstratified find from area WC5A at site IA3 (context 1009; SF4). The artefact, which measures 72.8mm long, 50.3mm wide by 20.2mm thick and weighs 106g, was manufacture from a well-rounded flattened ovoid pebble of mid grey quartzite with a thin buff-coloured surface staining (Plate 470). Although comparatively rare, quartzite pebbles can be found in gravels across southern Britain, including Kent. The pebble exhibits a centrally located circular hourglass-shaped perforation measuring 22–23mm diameter at its mouth and 12.9mm by 13.9mm at its centre. The surface of the perforation has been ground smooth, but slight traces of pitting remain visible. These suggest the perforation was produced by pecking with a hammerstone rather than boring. The centre of the perforation exhibits a polished band probably caused by friction against a handle. The

surface of the artefact has a low to moderate polish, which is not unusual for unworked quartzite pebbles, but the surface sheen has been enhanced by handling and use, particularly toward the ends; no striations were observed to indicate deliberate surface grinding and polishing. Occasional surface marks and iron-stained streaks indicate contact with agricultural machinery. Both narrow ends of this artefact exhibit use-wear that takes the form of finely pecked facets c.22mm long by 8mm wide, which probably result from delicate use as a hammer. These areas of use-wear exhibit a slight asymmetry indicating the orientation of hafting (ie the bevel is on the lower edge facing the handle).

8.2.2 About 710 examples of pebble hammers have been recorded in Britain, with examples widely distributed across England and Wales, extending as far north as Aberdeenshire (Roe 1979, 40). The majority of these tools were manufactured from quartzite pebbles, although some were made from raw materials commonly used for axeheads. Rankine (1949) demonstrated Mesolithic associations for quartzite pebble hammers with hourglass perforations, comparable to the current example, found in south-east Britain. The dating of this class of artefacts is, however, not entirely straightforward and typologically similar artefacts may also have been used in the Neolithic or Bronze Age. Roe (1979, 36) highlights examples manufactured from raw materials sourced from Neolithic axe quarries and notes the recovery of fragments from Neolithic sites, such as Durrington Walls and Windmill Hill. However, no secure Neolithic or Bronze Age associations have been identified and the chronology of these artefacts remains unresolved.

8.3 Discussion

8.3.1 The stone assemblage is small and from modern contexts. Other than two items, it therefore has little potential to contribute to our understanding of the site. However, the pebble hammer is an unusual find, and as it is likely to be Mesolithic in date. The whetstone comes from a 19th/early 20th-century context at Burgess Hill Farm, so is not of similar significance, though of local interest.

8.4 Stone finds tables

Table 36: Worked stone types and context

Ctx	Function	Notes	Lithology	Size	Wt (g)	Context Date
90093	Whetstone/ pestle	Circular sectioned tapered whetstone/pestle. Fatter end is broken. Narrow end is battered with some sharpening marks across it	Very fine grained beige slightly micaceous sandstone	Measures >92mm long x 25–35mm diameter	136	19th/ early 20th C
1149	Cubes	Fragments of ironstone include three roughly cube shaped resembling tesserae	Ironstone		30	18th C

2866	Possible roofing	Slate fragments, no evidence of use	Slate	Measures	52	20th century
90093	Architectural	Curved piece with fixture perforation in one side	White marble with slight grey mottling	Measures	421	19th/ early 20th C
90220	Moulded architectural piece	Flat slab with one shaped edge. Presumably facing?	White marble	Measures	1716	19th/ early 20th C
2954	Pencil	Neat pencil with circular section and both ends pointed through use	Slate	Measures 49mm long x 5mm diameter	3	19th/ early 20th C
1009	Pebble hammer	See above	Quartzite, beige	Measures 72 x 49mm x 18mm thick	106	Modern

9 INDUSTRIAL WASTE

By Lynne Keys

9.1 Introduction and methodology

9.1.1 A small quantity of material (8.6kg), initially identified as iron slag, was recovered by hand on site and from soil samples processed after excavation. For this report, it was examined by eye and tested with a magnet. The material was categorised on the basis of morphology, with a magnet used to test for iron-rich material in samples and to detect smithing micro-slags in the soil adhering to slags. Each slag or other material type in each context was weighed except for smithing hearth bottoms, which were individually weighed and measured for statistical purposes. Quantification data and details are given in Table 36 in which weight is shown in grams, and length, breadth and depth in millimetres.

9.2 Discussion by period and area

9.2.1 The assemblage is not of any particular significance. Those few diagnostic slags recovered were produced by iron smithing which had found its way into various fills and layers over time. There is no evidence for ironworking on the site, and even the non-diagnostic material deposited on the 18th-century road was brought from somewhere else for re-use here.

Middle Bronze Age

9.2.2 The samples from features of this date contained mostly heat-magnetised grit and specks of fired clay.

9.2.3 Context (2062) contained a small quantity of an iron-rich burnt stone of local geological origin, and some possible iron flakes. The iron occurs naturally in the local geology, and is not iron ore. It has been burnt by the same process that created the other burnt stone on the site (see Stone report above).

Iron Age

9.2.4 The sampled material contained only heat-magnetised natural grit and tiny specks of fired clay. No slag or evidence of any industrial activity was present.

Roman

9.2.5 One smithing hearth bottom was recovered from IA4 Enclosure ditch (context 353), showing that some reworking of metal objects was being carried out on the site. This material is not of particular significance for the Roman period, where such smithing hearth bottoms are common, and in the absence of associated hammerscale, this object was clearly redeposited in this context. Larger slags such as smithing hearth bottoms were frequently thrown into ditches and other cut features, so they did no become trip hazards in occupation areas. It is even possible that the smithing occurred in the Iron Age rather than the Roman period.

Medieval

9.2.6 The medieval material derived from IA4 (contexts 1418 and 1453). Most of this was heat-magnetised natural material and ferruginous concretion; there was only one diagnostic flake of hammerscale from smithing, which came from a tree-throw hole.

9.2.7 Material from context (1401), the sub-soil over a tree-throw hole, contained a small fragment of the black, glassy, unidentified slag which was associated with the 18th century road or rut infill. Nothing of this character was recovered from the samples from the tree-throw hole, suggesting that the material in the subsoil did not derive from the feature beneath.

18th century

9.2.8 The 18th century material derived from Burgess Rough. The material consisted mainly of unidentified non-ferrous slag (just under 5kgs). It was black, opaque, almost glass-like or newly polished dark flint in appearance, with extremely tiny white inclusions (possibly silica) and frequent small voids which were probably originally caused by air bubbles. It had been broken into medium sized and smaller lumps either by deliberate crushing or by re-deposition activity. Whatever this slag may be, it was not associated with any focus of metal, glass or other industrial features, but was serving as metalling on a road. In view of this, it is likely to have been imported from a site nearby as waste to be re-used for metalling.

19th century

9.2.9 Material from the drying shed and other close-by features consisted of 2.77kg of slag and other material represent small quantities of re-deposited smithing slag, but there is no other evidence for ironworking from this site, and the smithing could potentially have occurred at an earlier date. One fragment of glassy slag similar to that of 18th-century date from Burgess Rough was found in a layer underlying the drying sheds.

9.3 Industrial waste tables

Table 37: Assemblage quantification spreadsheet

cntxt			smpl	Identification	wt (g)	L (mm)	B (mm)	D (mm)	comment
353				smithing hearth bottom	252	85	70	45	
522			1011	iron-rich undiagnostic	12				>10mm
667			1145	heat-magnetised material	4				2–0.5mm. No slag; just tiny grit & fired clay
740			1026	burnt coal	4				>10mm
740			1026	burnt coal	23				10–4mm
740			1026	heat-magnetised material	4				10–4mm. Iron flakes, two tin/silver flakes (not hammerscale), burnt coal, iron rivet
740			1026	heat-magnetised material	76				4–2mm. Iron flakes, two large distorted spheres, iron slivers, etc.
740			1026	iron-rich undiagnostic	12				>10mm
740			1026	non-diagnostic	25				tiny frags. non-ironworking slag (black & glassy, with small round air bubble pockets)
740			1026	non-diagnostic	66				>10mm. tiny frags. non-ironworking slag (black & glassy)
798				smithing hearth bottom	520	130	100	55	
798				Undiagnostic	583			90	incomplete smithing hearth bottom?
798				Undiagnostic	655			80	
798				Undiagnostic	803				includes some tiny frags of coal
1104			1031	heat-magnetised material	20				2–.05mm. No slag, but reddish material: fines from ore roasting?
1149				non-diagnostic	1166				non-ironworking slag (black & glassy, with small round air bubble pockets)
1191				iron-rich undiagnostic	73				
1191				iron-rich undiagnostic	243				tool?
1191				non-diagnostic	1220				non-ironworking slag (black & glassy)

cntxt			smpl	Identification	wt (g)	L (mm)	B (mm)	D (mm)	comment
1197			1038	heat-magnetised material	15				2–0.5mm. Tiny frags unident black glassy slag; natural grit & ferruginous concretion; charcoal etc. All very tiny
1197			1038	heat-magnetised material	33				2–0.5mm. No slag; just tiny grit & fired clay
1197			1038	heat-magnetised material	50				4–2mm. Tiny frags of the black & glassy unident. slag; tiny undiagnostic slag; natural grit
1201				Stones	15				x3
1201				non-diagnostic	1108				non-ironworking slag (black & glassy, with small round air bubble pockets)
1224				Coal	1				
1224				ferruginous concretion	6				
1224				magnetised stone	167				Ironstone? Geolog ident required
1224				non-diagnostic	764				non-ironworking slag (black & glassy)
1311			1050	heat-magnetised material	6				2–0.5mm. Grit, fired clay, etc.
1401				non-diagnostic	112				non-ironworking slag; black & glassy
1418			1044	heat-magnetised material	12				natural grit, fired clay, ferruginous concretion, etc.
1453			1147	heat-magnetised material	7				2–0.5mm. One hammerscale flake, fired clay, grit
1824			1049	heat-magnetised material	10				2–0.5mm. Grit, fired clay, etc.
2029			1068	heat-magnetised material	7				2–0.5mm. Grit, fired clay, charcoal frags
2029			1068	Undiagnostic	298			50	>10mm; stone incorporated; part of smithing hearth bottom?
2047			1074	heat-magnetised material	4				2–0.5mm. Grit, fired clay, etc.
2062			1077	heat-magnetised material	89				10–4mm. Burnt stone (ore?), magnetic ?ironstone flakes, iron ?flakes, fired clay
2065			1069	heat-magnetised material	13				2–0.5mm. Grit, fired clay, etc.

cntxt			smpl	Identification	wt (g)	L (mm)	B (mm)	D (mm)	comment
2313				Undiagnostic	0.5				
2320			1051	heat-magnetised material	32				2–0.5mm. No slag; just tiny grit & fired clay
2746			1114	Undiagnostic	0.5				10–4mm
2962				non-diagnostic	92				non-ironworking slag (black & glassy)
				Total weight	8.6kg				

10 LEATHER FROM THE CASTLE HILL (IA2) BRICKWORKS

By Quita Mould

10.1 Introduction

10.1.1 This report is based on an examination of the leather recovered from the Castle Hill brickworks (IA2). A full catalogue record of the material has been made, noting all the diagnostic features present, measurement of relevant dimensions and species identification where possible.

10.2 Methods

10.2.1 All measurements are in millimetres. '+' indicates an incomplete measurement. No allowance for shrinkage has been made. Leather species were identified by hair follicle patterns using a low-powered magnification. Where the grain surface of the leather was heavily worn, identification was not always possible. The grain pattern of sheep and goat skins are difficult to distinguish, and have been grouped together as sheep/goat when the distinction could not be made. Similarly, the term bovine has been used when uncertainly arose between mature cattle hide and immature calfskin. Shoe-bottom components and repairs are assumed to be of cattle hide unless stated otherwise.

10.3 Summary

10.3.1 The remains of five, or possibly six, shoes were recovered from the site of the Castle Hill WC2 brickworks. Their condition varied from wet (Cat No. 7), damp (Cat No. 1) to dry (cat no. 2–6). None of the shoe parts found from this site are complete, or near complete, so that it is not possible to estimate the equivalent modern shoe sizes or suggest the gender of the wearers, however, the hobnailed welted shoe (Cat. No. 7) and the derby boot (Cat. No. 1) are likely to have been worn by those engaged in heavy outdoor work.

10.3.2 The earliest in date is the remains of a shoe of welted construction (Cat No. 7), of adult size, comprising part of a wide shoe bottom and fragmentary remains of the upper of bovine leather. The toe and part of the forepart of the shoe bottom are missing but it appears to have been made straight, that is, not shaped for a left or a right foot. This feature, and other constructional details present on the shoe bottom (insole with raised rib seam changing to edge/flesh seam at the seat, impression from bracing thread, and impression from a separate D-shaped heel) are compatible with a date in the 18th or early 19th century. No toe shape, seams or other features have survived on the fragmentary remains of the shoe upper, so that few diagnostic features survive to allow closer dating. The leather of the shoe is heavily pitted from microbial action or a very hostile burial environment. Rows of vertical iron hobnailing present at what remains of the tread of the shoe bottom indicate that this was a practical shoe intended for heavy, outdoor work and may well have been worn by a labourer at the brickworks. It was found in fill 4192 of a pit stratified beneath the 'making shed' of the brickworks. The fill 4192 comprised principally of crushed ceramic building material but also contained some 19th century pottery; the shoe (Cat No. 7) is likely to date no later than the first quarter of the 19th century.

10.3.3 Two broken shoe soles, one for a left foot shoe (Cat. No. 4) and one for a right (Cat. No. 5), but not a pair, were found, along with a broken area of lasting margin from a shoe

upper (Cat. No. 6), in a demolition layer 2897 over Pugmill 1 in the brickworks. The shoe soles (Cat. No 4 and 5) are made of a black material, thought to be rubber or a synthetic rubber. One (Cat. No. 5) has a separate, low (3/4 inch), stacked leather heel with a rubber/synthetic rubber top piece, nailed to the sole. The other (Cat. No. 4) has nailing where a similar heel had been attached. Each has a deep stitching channel where the upper or a welt had been stitched to the sole. One sole (Cat. No 5) has an impressed stamped mark at the seat beneath the heel, the other (Cat. No. 4) has a moulded-makers or supplies mark at the waist, both suggesting a 20th century date. The stitched construction and separate stacked leather heels indicate that the soles were from shoes and not 'Wellington boots' but the type of shoe is uncertain. In contrast, part of the lasting margin broken from a shoe upper (Cat. No. 6) comes from a shoe of brass rivetted construction. Riveted construction was commonly used on lower cost work wear in the Victorian period (*c* late 1850's onward) through to the first part of the 20th century. Iron nails also present suggest that this shoe had a separate heel, or a repair patch attached. The lasting margin of the upper (Cat. No. 6) may come from the oval toe area of a left foot shoe, but so little of the upper survives above the lasting margin that this is far from certain. If it is from the toe area, then the shoe is relatively narrow and no larger than a small adult/adolescent size (note the caveat in the first paragraph of the summary). Where the grain pattern has survived the leather is dark brown/black in colour and appears to have had a polished surface. Much of the grain surface is lost leaving the underlying flesh surface exposed, like Cat. No. 2 below, suggesting it had been exposed to the elements after deposition. The upper (Cat. No. 6) does not appear to belong to either of the shoe soles (Cat. No. 4 and 5) found in the same context.

10.3.4 The oval toe area of a shoe vamp (Cat. No. 2) and small fragments broken from a shoe sole (Cat. No. 3) made of a black material, thought to be rubber or synthetic rubber, were found in demolition fill 2896 over Pugmill 2 in the brickworks. The toe area (Cat. No. 2), probably a broken toe cap, is of chestnut-brown coloured leather, the grain pattern only surviving in protected areas at the lasting margin and under the lapped seam, most of the upper surface being lost. The synthetic sole fragments (Cat. No. 3) are heavily worn and include what appears to be an oval toe area, though whether they belong to the same shoe as the toe cap (Cat. No 2) is far from certain. It is possible that the sole fragments (Cat. No. 3) come from one of the two rubber/synthetic rubber soles found in the demolition material over Pugmill 1. The demolition layer 2896 contained late 19th-century pottery which may suggest a 20th-century date. The rubber/synthetic rubber sole fragments would suggest a 20th century date for the demolition layer 2896 while the heavily weathered condition of the shoe upper supports the notion that some items suffered exposure to the elements after deposition.

10.3.5 Part of the upper from a derby boot (Cat No. 1) was found in the fill 706 of a recent boundary ditch north of the WC2 brickworks. Only the tongue and front opening with seven lace holes with brass eyelets survive, still joined together with fragments of the round-sectioned leather lace. The derby boot is a practical, outdoor, labourer's working boot, it is a long-lived style worn throughout the Victorian period and the first half of the 20th century and changed little. What remains of this derby boot upper appears to be of 'black grain' leather; an example of black grain leather with eight lace holes made in Northampton in 1927 is part of the collection of the Northampton Shoe and Boot Museum (Swann 1984, 67, fig.

55b). The boot may well have been worn by a worker at the brickworks but whether during the 19th or the 20th century is unknown.

10.4 Leather finds catalogue

10.4.1 No. 1: Leather front lacing derby boot, incomplete, foot unknown (context 706, WC2)

The left and right side front opening and tongue of a front-lacing boot upper. The complete left side of the front opening of the quarters or leg of a boot with seven lace holes with brass eyelets, torn away from the rest of the upper. The lace holes have a lining on the interior. Also, a small fragment from the right side front opening with three lace holes surviving. These are attached to a complete round-ended tongue with integral wings fitting below the front opening with matching lace holes. The front openings of the quarters/legs are still attached to the wings of the tongue with small lengths of the round-sectioned lace remaining, lace *c* 4mm in diameter. The leather of the quarters/leg is textured and appears to be 'black grain'. Leather Black/very dark brown bovine 2mm thick. Height of left front opening 160mm, tongue length 123mm

Condition: damp, but not wet, dirty with much soil with fine plant rootlets present

10.4.2 No. 2: Leather upper fragments, incomplete, foot unknown (context 2896, SF2875)

The oval toe area broken from a shoe vamp with a flat (unmoulded) lasting margin, pleated around the toe area, and comprising a single row of small holes spaced *c* 6mm apart. Torn/broken away from the rest of the upper along a roughly straight line across the toe joint area with a very small area of vertical, straight, double-stitched lapped seam present on the right side. The remains of the seam suggest this is a toe cap that has been torn away along the seam to remove it from the shoe upper. Incomplete. Leather is brown in colour, sheep/goatskin *c* 2mm thick, most of the grain surface is now missing but it survives in small areas and along the lasting margin where it has been protected. Surviving length *c* 61+mm, width across great toe joint *c* 97mm.

Also, a fragment from the other side of the vertical, double-stitched lapped seam, the protected area of the lapped seam preserves the original chestnut brown colour. Incomplete. Surviving length *c* 54+mm

Condition: dry, dirty with soil adhering

10.4.3 No. 3: Rubber/synthetic rubber shoe sole fragments, incomplete (context 2896)

Worn sole fragments of a black material probably rubber/synthetic rubber, likely to be broken from SF2894 [2897] but not actual joins found. The largest fragment comes from an oval-shaped toe area, now broken into two pieces. Incomplete. Toe area surviving length 72+mm, width *c* 70mm, 3mm thick; 38+x27+x3mm; 18+x10+2mm.

Condition: dry

10.4.4 No. 4: Rubber/synthetic rubber sole, incomplete, left foot, adult size (context 2897, SF2894, bag 1, WC2 sheds)

Sole lower tread, medium waist and seat, the toe and upper tread area broken off. Seam comprising a row of holes, spaced 6mm apart, within a deep stitching channel on the under-side. Iron nail shanks present at the seat to attach a separate heel and present at either side of the lower tread. An oval maker's/supplier's mark present at

the waist area, not stamped but raised in relief indicating that the synthetic sole had been moulded, reading OURATA/PHILLIPS (exact lettering of 'ourata' uncertain). A group of three circular moulded rings at the upper seat, each 15mm in diameter, and a heavily worn example at the lower tread. Incomplete. Material of the sole is man-made (thought to be rubber or a synthetic rubber), black, brittle, 5mm thick. Surviving length 148+mm, waist width 50mm, seat width 60mm

Condition: dry

10.4.5 No. 5: Rubber/synthetic rubber sole, incomplete, right foot, adult size (context 2897, SF2894, bag 1, WC2 sheds)

Sole lower waist area and seat, the toe, tread and upper waist area broken off. 'Seam' of small holes in a deep channel on the lower face. Remains of a leather midsole or insole of cattle hide 3mm thick preserved around the corroded iron nails protruding through to the upper face of the seat area from the attachment of the heel. The upper face of the sole seat stamped (impressed) STYLE 248/YOUTHS 4–5. Incomplete. Material of the sole is man-made (thought to be rubber or a synthetic rubber), black, brittle, 5mm thick. Surviving length 126+mm, lower waist width 62mm, seat width 64mm.

Separate, D-shaped, stacked leather heel of three lifts with a black rubber/synthetic rubber top piece attached with at least nine iron nails. Complete. Heel height 21mm

Condition: dry

10.4.6 No. 6: Leather shoe upper, riveted, incomplete, foot unknown (context 2897, SF2894, Bag 2, WC2 sheds)

The lasting margin from the either the oval toe or the back part of a shoe upper, irregularly broken off a maximum of *c* 38mm above the lasting margin. The last margin has an outer row of small round holes spaced 6mm apart, several with metal (brass) rivets present, inner row of more widely spaced iron nail holes. Broken away at the waist area, no seams survive. May come from an oval toe area of a left foot shoe or, alternatively, a long one-piece quarter. A small area of compacted leather, 3.5mm thick, from the midsole/insole remains adhering to the upper face of the lasting margin on the inside of the shoe upper extending inward from the lasting margin for a distance of *c* 30mm. The impression from a woven textile lining is present on the upper side of the lasting margin (interior of the shoe) on one side. Incomplete. Much of the grain surface has delaminated from the upper leaving the brown, flesh side exposed, the grain surface surviving principally at the lasting margin. The leather is dark brown/black in colour and the surface is cracked suggesting it was polished, bovine 2mm thick (not the same colour as the top cap SF2875, above). Surviving length 135+mm, width *c* 82+mm

Condition: dry

10.4.7 No. 7: Leather welted shoe, incomplete, foot unknown, adult size (context 4192, SF240)

Sole, the right side of a wide tread, wide waist and seat present, the toe and left side of the forepart torn off and the lower edge of the seat is worn away. Grain/flesh seam

stitch length 5mm. Holes made by vertical rows of hobnails visible in the remaining tread area, with the iron shank of one nail *in situ*. The impression made by a D-shaped heel lift is present on the seat and the impression of bracing thread visible on the flesh side. Incomplete. Surviving length 199+mm, waist width 57mm, seat width 67mm. Leather cattle hide 5mm thick

Fragment of a D-shaped heel lift. Insole, waist and seat area present, torn away obliquely across the lower tread. A raised rib seam changing to an edge/flesh seam, stitch length 8mm around the seat. Incomplete. Surviving length 128+mm, waist width 40+mm, seat width 52mm. Leather 4mm thick

Approx. 13 very heavily pitted fragments of shoe upper, including 2 areas from the vamp and fragments of lasting margin from around the toe and the right side of the quarters or possibly the heel stiffener. Incomplete. Upper leather bovine 3mm thick, grain pattern preserved in small areas of the vamp and the lasting margin. Largest vamp fragment 112+x108+mm. The shoe is likely to have been made straight (not shaped for a right or left foot).

Condition: wet, washed, some additional washing undertaken. The leather of both the upper and shoe bottom notably pitted and holed from microbial action.

11 WORKED WOOD

By Alison de Turberville, with a contribution by Julia Meen and Sheila Boardman

11.1 Introduction

11.1.1 A total of 12 fragments of worked timber, mostly waterlogged, were recovered. All pieces were examined, and any features noted including the presence of tool marks and type of moulding (if present). The results are given in Table 38. Seven of the timbers have been photographed (see volume 4, Plates 471–477). Identifications of the timber species were by Julia Meen and Sheila Boardman.

11.2 Wood species identifications

11.2.1 A small portion of each timber was removed, briefly frozen, and thin sections made of the transverse surface using a scalpel. The thin sections were examined at x10–40 magnification using a LEICA EZ4D stereo microscope. The results are shown in table 39.

11.2.2 Most of the timbers could be identified as oak (*Quercus*) due to large earlywood vessels (ring porous) and clear compound rays. Although the timber from context 2629 was clearly a ring porous wood, no compound rays could be seen in the sections examined. Therefore, an identification of sweet chestnut (*Castanea sativa*) could be ruled out, although, given that the other timbers from the cattle lodge are oak and that sweet chestnut is much less commonly found, oak is the more likely identification. The timbers from contexts 4151, 4152 and 4188 were identified as pine (*Pinus* sp.) due to characteristics including a sharp transition from the earlywood to the latewood, transverse tracheids, occasional resin canals and large pinoid pits. One of the fragments from 4151 had ray tracheids with toothed walls characteristic of *Pinus sylvestris* (Scots pine), and it is likely that the other fragment examined was of the same species.

11.3 Discussion

11.3.1 This is a small collection, the only coherent groups being those from Burgess Hill Farm (three from the cattle lodge and one gatepost) and from the Castle Hill brickworks (three associated with stokehole covers, one each from Kilns 1, 2 and 3 and one from the making shed). Three of the former were quartered timbers, the fourth possibly so, indicating the utilitarian character of the cattle lodge in comparison to the barn and farmhouse at Burgess Hill Farm. In contrast, all the structural timbers from the brickworks were squared.

11.3.2 The smaller timbers from the pond may well have derived from Burgess Hill Farm not far to the north. Their character was utilitarian. Those from the ditch or trackway at Fairthorne Junction, which included a possibly decorated fragment, could have come from any of the buildings noted on historic maps along the A21 in the vicinity.

11.3.3 Oak is the most common species used for structural timbers at most periods in the past. If upright 2629 is Sweet Chestnut rather than oak, this is less common. Sweet Chestnut is either a Roman or more recent introduction, but its use in post-medieval structures such as these would not be particularly unusual. The use of coniferous wood becomes much more common in the later part of the post-medieval period, so its occurrence at the brickworks is unremarkable.

11.4 Worked wood tables

Table 38: Summary of worked wood remains

Context	Material	Structure	Description	Date
458	Oak Timber	None. Discarded in ditch or trackway	Two small triangular fragments of worked timber measuring 28 x 4–12 x 90mm and 20 x 40 x 11–85mm. Both fragments broken at wider end suggesting they formed a tip of larger piece. One fragment has raised central detail on one side and raised lip on reverse; other fragment is plainer. Unknown use but appear decorative.	Post-Medieval
2093	Oak Timbers	None. Discarded in pond.	Three pieces of worked timber. i) Long section of flattish wood measuring 520 x 100–140 x 35mm. Upper face smooth, lower is uneven. Possible board or plank. Plate 471. ii) Long stake measuring 410 x 40 x 35mm with four smooth worked faces and a pointed end. Small semi- circular cut to one face. Plate 472. iii) Tapered section of wood with one flat surface and a rounded surface to rest. Possible rebate on upper face. Probable fragment of fence. Plate 473.	Medieval/ post-medieval
2627	Oak Timber	Upright post, cattle lodge	Two fragments of timber measuring 270 x 140 x 30mm and 80 x 110 x 10mm. Both pieces have one end cut, and one fragment has a radial flat side, suggesting a quartered timber. The remaining sides are frassed.	Post-Medieval
2629	Oak or Sweet Chestnut Timber	Upright post, cattle lodge	Large section of quarter cut timber measuring 6000 x 250 x 240mm. Two smooth faces and one rounded face. One cut end with calcified deposit on and other end frassed.	Post-Medieval
2632	Oak Timber	Upright post, cattle lodge	Large section of quarter cut timber measuring 260 x 220 x 150mm. Two smooth faces and one rounded face. Rounded face has possible adze marks. Plate 474.	Post-Medieval
90172	Oak Timber	Gatepost, Burgess Hill Farm	Very large section of quartered timber measuring 740 x 280 x 260mm. Not waterlogged. Two flat faces with no obvious tool marks. One further face has a very large knot and is rounded. End is cut. Low value building material due to large knot in wood.	Post-Medieval
3093	Oak Timber	Upright post for stokehole cover Kiln 2	Irregular shaped piece of wood measuring 480 x 100–280mm. Larger end cut, smaller end frassed. Possible cut marks to worked faces. Plate 475.	Post-Medieval
3094	Oak Timber	Upright post for stokehole cover Kiln 3	Squared section of timber measuring 180 x 150 x 155mm. One edge chamfered, possibly not due to wear rather than deliberate.	Post-Medieval

Context	Material	Structure	Description	Date
			Three smooth faces, remaining face is smooth but not flat and has rebate measuring 45–55mm x 110. Plate 476.	
3206	Oak Timber	Support for Kiln 1 stokehole cover	Section of post measuring 230 x 115 x 110mm. Square in profile with one cut end and two deep, rounded and angled grooves on opposing faces. One groove measuring approx. 40mm deep, the other 21mm. Plate 477.	Post-Medieval
4151	Pine timbers	Base of pugmill	Fragments of plank or roughly squared timbers measuring up to 1000 x 350 x 400mm	Post-medieval
4152	Pine timber	Base of pugmill	Small section of plank measuring 450 x 350 x 40mm. Fragmented on lifting. One end cut square, other broken,	Post-Medieval
4188	Pine Timber	Base of oven or hearth, making shed	Fragment of roundwood measuring 105 x 20mm diameter. No bark, one end tapered with a curved cut, other end broken. Probably fuel.	Post-Medieval

Table 39: Summary of wood species identifications

Context	Description	Species
2093	Large timber, IA3 pond	*Quercus*
2627	Block in base of posthole in barn	*Quercus*
2629	Post bases of barn, Burgess Hill Farm	*Quercus/Castanea*
2632	Post bases of barn, Burgess Hill Farm	*Quercus*
3093	Vertical post supporting stokehole cover for kiln 2	*Quercus*
3094	Vertical post supporting stokehole cover for kiln 3	*Quercus*
3206	Stokehole cover support for kiln 3	*Quercus*
4151	Plank or squared post in sheds area	*Pinus sylvestris*
4152	Plank in sheds area	*Pinus*
4188	Wood in base of brick-lined oven or hearth 2947 in making shed	*Pinus* roundwood

12 RADIOCARBON DATING

By Rebecca Nicholson

12.1 Introduction

12.1.1 Thirty samples were submitted for radiocarbon dating by Accelerator Mass Spectrometry (AMS). Twenty two of these were single samples of charcoal from archaeological features that were submitted to the Scottish Universities Environmental Research Centre (SUERC) and processed using the methods described in Dunbar *et al.* (2016). The laboratory maintains a continuous program of internal quality control in addition to participation in international inter-comparisons (Scott *et al.* 2010). These tests indicate no laboratory offset and demonstrate the validity of the precision quoted. A further three samples, two of oak (*Quercus*) heartwood charcoal and one of ivy (*Hedera*) charcoal, were sent for AMS radiocarbon dating to Beta Analytic, who maintain similar controls.

12.2 Methods and materials

12.2.1 The selection of material represents the shortest-lived wood that could be identified in the sample flots. If roundwood was present this would have been selected and noted in Table 38, but in most cases only heartwood was identified, and in some cases the selection of oak (*Quercus*) heartwood could not be avoided, although the old wood effect must be acknowledged since oak trees can live for several hundred years. Other taxa selected include beech (*Fagus* sp.), apple/pear/hawthorn-type (Pomoideae), hazel (*Corylus* sp.), birch (*Betula* sp.) ivy (*Hedera* sp.) and maple (*Acer* sp.).

12.2.2 Additionally, four single samples of waterlogged plant remains and one sample of charred seeds were submitted to the Scottish Universities Environmental Research Centre, from channels found at the north-west end of the scheme.

12.2.3 The resulting dates are conventional radiocarbon ages (Stuiver and Polach 1977), quoted in accordance with the international standard known as the Trondheim convention (Stuiver and Kra 1986). The measured δ13C values used in the calculation of the result are within the typical range for seeds and wood from terrestrial plants (Bowman 1990, 23). The calibrated dates have been calculated using the datasets published by Reimer *et al*. (2013) and the computer program OxCal v4.3.2 and v4.3.4 (Bronk Ramsey 1995; 1998; 2001; 2009; 2017). The calibrated date ranges cited are quoted in the form recommended by Mook (1986), with the end points rounded outward to five years as the error is <25 years and otherwise to 10 years. The date range has been calculated according to the maximum intercept method (Stuiver and Reimer 1986).

12.3 Results from initial dating

12.3.1 Sample 1074, from layer 2047 close to the base of pit 2045 thought to be part of a burnt mound, has been dated to the middle Bronze Age (1400–1200 cal. BC) from hazel charcoal. Uncoppiced hazel has a natural lifespan of around 80 years and coppiced stems would be considerably younger, so this suggests that the date of the pit complex in IA3 is consistent with its provisional interpretation as a burnt mound.

12.3.2 Radiocarbon dating has been used to date a class of regular shallow pits with *in-situ* burning on the base and sides, which have been labelled fire-pits. Two of these were dated as

middle Iron Age in the preliminary investigations (Beta-405801 and 405802) and further selections were made for dating because although distributed along the full length of the scheme no other dating evidence was obtained.

12.3.3 Initial brief assessment of the charcoal recovered from the fire-pits suggested that those of Iron Age date are associated with samples that are predominantly of oak charcoal, while those of medieval date are from samples that contain primarily beech (*Fagus*) or birch (*Betula*), and this correlation was largely confirmed by the further radiocarbon dating, although one further dated sample showed that oak charcoal was still used in the medieval period.

12.4 Radiocarbon dating table

Table 40: Radiocarbon dating results

Lab. Number	Sample	Context	Feature Type and location	Material	$\delta^{13}C$ (‰)	Radiocarbon Age (BP)	Calibrated date (at 95.4%)
SUERC-73962 (GU44325)	1018	434	Pit 435, IA5	*Quercus* charcoal	-23.7	4693±30	3630–3580 cal. BC (11.9%); 3530–3370 cal. BC (83.5%)
SUERC-90238 (GU53058)	1004	340	Lower fill of pit 341 IA4	*Corylus* charcoal	-24.8	3287±23	1620–1505 cal. BC
SUERC-73972 (GU44331)	1044	1418	Pit or tree-throw 4017, IA4	*Betula* charcoal	-24.9	850±30	cal. AD 1050–1080 (5.2%); cal. AD 1150–1260 (90.2%)
SUERC-90237 (GU53057)	1069	2065	Fill of pit 2063, IA3	*Corylus* charcoal	-25.8	2280±21	400–355 cal. BC (75.5%), 290–230 cal. BC (19.9%)
SUERC-90242 (GU53059)	1057	2117	Fill of pit 2116, IA3	*Quercus* charcoal	-25.1	2145±21	355–300 cal. BC (20.8%), 230–220 cal. BC (0.3%), 215–100 cal. BC (74.3%)

SUERC-90235 (GU53055)	1047	1814	Fill of pit 1813, Middle Lodge	*Fagus* roundwood charcoal	-24.9	332±20	cal. AD 1485–1645
SUERC-90228 (GU53051)	1085	2512	Burnt mound pit 2099, lower fill IA3	*Betula* charcoal	-24.3	3125±22	1450–1370 cal. BC (71.3%), 1350–1300 cal. BC (24.1%)
SUERC-90232 (GU53052)	1086	2501	Burnt mound pit 2099, upper fill IA3	*Acer* charcoal	-26.1	3113±22	1435–1300 cal. BC
SUERC-73970 (GU44329)	1074	2047	Burnt mound pit 2045, lower fill IA3	*Corylus* charcoal	-25.7	3034±30	1400–1200 cal. BC
SUERC-90233 (GU53053)	1076	2050	Burnt mound pit 2045, recut fill IA3	*Betula* charcoal	-26.3	3045±22	1395–1335 cal. BC (37.6%), 1325–1225 cal. BC (57.8%)
SUERC-73969 (GU44328)	1007	323	Enclosure IA4	Pomoideae charcoal	-26.3	2130±30	350–300 cal. BC (10.5%); 210–50 cal. BC (84.9%)
SUERC-73964 (GU44327)	1006	353	Enclosure IA4	*Quercus* charcoal	-24.4	1836±30	cal. AD 80–250
SUERC-73971 (GU44330)	1072	2067	Ditch IA3	*Quercus* charcoal	-23.9	2048±28	170 cal. BC–cal. AD 20
Beta-405801	1016	416	Firepit 417, IA5	*Quercus* charcoal	-27.0	2210±30	380–190 cal. BC
Beta-405802	1020	909	Firepit 908,	*Quercus* charcoal	-26.1	2240±30	390–340 cal. BC (25%); 330–

			Robingate Wood				200 cal. BC (70.4%)
SUERC-73959 (GU44322)	1039	66004	Firepit 66003, Potter's Wood	Pomoideae charcoal	-27.0	2063±28	170 cal. BC–cal. AD 10
SUERC-73963 (GU44326)	1041	74005	Firepit Middle Lodge	*Quercus* tree bud charcoal	-26.7	2068±30	180 cal. BC–cal. AD 10
SUERC-75173 (GU45040)	1051	1320	Firepit 1318, IA7	*Quercus* charcoal	-25.3	2249±30	400–200 cal. BC
Beta-565026	1001	321	Firepit 320, IA4	*Hedera* charcoal	-28.8	910±30	cal. AD 1030–1210
SUERC-74085 (GU44320)	1010	701	Firepit 702, IA2	*Fagus* charcoal	-26.8	782±29	cal. AD 1220–1300
SUERC-73960 (GU44323)	1042	1408	Firepit 1407, IA4	*Betula* charcoal	-25.8	843±30	cal. AD 1050–1080 (2.3%); cal. AD 1150–1270 (93.1%)
SUERC-73961 (GU44324)	1114	2746	Firepit 2745, IA4	*Fagus* charcoal	-27.6	827±27	cal. AD 1160–1270
SUERC-74743 (GU44321)	1068	2029	Firepit 2028, IA3	*Betula* charcoal	-25.2	899±26	cal. AD 1040–1210
SUERC-90236 (GU53056)	1182	1511	Fire pit 1510 IA7	*Fagus* roundwood charcoal (8 growth rings)	-26.0	777±32	cal. AD 1200–1290
SUERC-90234 (GU53054)	1019	454	Fire pit 453, IA5	*Betula* charcoal	-26.3	857±26	cal. AD 1050–1080 (5.4%), cal. AD 1150–1260 (90%)
SUERC-75175 (GU45043)	1170	20007	Lower channel fill WC1	*Quercus* acorn cup	-25.2	849±31	cal. AD 1050–1270
SUERC-75176 (GU45044)	1166	20006	Upper channel fill WC1	Twig with buds	-27.7	718±31	cal. AD 1220–1390

SUERC-94076 (GU55251)	1166	20006	Upper channel fill WC1	Charred glume bases & rachis:Triticum spelta	-24.6	642±24	cal. AD 1275–1400
SUERC-76048 (GU45612)	1176	20103	Lower channel fill WC1	Twig	-29.6	116 ± 35	cal. AD 1670–1780 (33.1%); cal. AD 1800–1940 (62.3%)
SUERC-75174 (GU45041)	1174	20109	Upper channel fill WC1	*Corylus* nutshell and *Ranunculus* seeds	-25.3	217±30	cal. AD 1640–1940

12.4.1 A graph showing the date ranges of samples from the burnt mound, pits, firepits, enclosure ditches and from the western channel is illustrated as Figure 140.

12.5 Final results and Interpretation

Early Pits and tree-throw holes

12.5.1 Sample 1018, from pit 434 in IA5 provided a middle Neolithic date of 3530–3370 cal. BC. This feature was thought to be a fire-pit but does not have *in-situ* burning. The sample comes from an otherwise undated feature but is situated within an area which has also produced struck flints of Neolithic date. Although the dated material is oak heartwood, and ancient oaks may live for over 300 years, it is probably unlikely that the real date of deposition falls later than the end of the middle Neolithic.

12.5.2 Dating of sample 1004 from pit or tree-throw hole 341 (Area IA4) was carried out because the feature had produced Mesolithic flintwork in fairly fresh condition, and it was hoped that a date for the Mesolithic activity might be obtained. The hazel charcoal from the lower fill has however been dated to the early-middle Bronze Age, suggesting that the flint is residual within this feature.

Burnt mound

12.5.3 Samples dated from the burnt mound features in IA3 came from two pits: samples 1085 and 1086 came from pit [2099] while sample 1074 came from the fill of pit [2045] and sample 1076 came from the recut of this feature. The calibrated date ranges are shown in Figure 139. Radiocarbon determinations from both samples from pit [2099] indicate that this feature may be of earlier date than pit 2045, although there is a significant overlap. The charcoal that was dated from pit 2099 is birch (*Betula* sp.) and maple (*Acer* sp.). Typically a veteran field maple (*Acer campestre*) will be 100–200 years of age (https://ati.woodlandtrust.org.uk/how-to-record/species-guides/field-maple/consulted 5/3/20), so in this case the sample may have a significant "old wood" effect. Birch trees, however, rarely live beyond 100 and mature trees are usually no more than 60–80 years old.

12.5.4 Sample 1074, from fill (2047) which came from a layer close to the base of pit [2045] thought to be part of a burnt mound, has been dated to the middle Bronze Age (1400–1200

cal. BC) from hazel charcoal. Uncoppiced hazel has a natural lifespan of around 80 years (https://www.woodlandtrust.org.uk/visiting-woods/trees-woods-and-wildlife/british-trees/native-trees/hazel/ consulted 10/1/20) and coppiced stems would be considerably younger. The date of both features from IA3 is consistent with their interpretation as part a burnt mound complex, originally in use between 1450 and 1395 cal. BC. The consistency in the dates of the lower and upper fills of pit [2099], despite the possible "old wood" effect, suggests that this feature was of earlier date than pit [2045], but given the overlap in dates between the two features, both could have been in use at the same time.

Firepits

12.5.5 Radiocarbon dating has been used to date a class of regular shallow pits with *in situ* burning on the base and sides, which have been labelled firepits. Two of these were dated as middle Iron Age in the preliminary investigations (Beta-405801 and 405802) and further selections were made for dating because although distributed along the full length of the scheme no other dating evidence was obtained.

12.5.6 The results demonstrate that the firepits are not all of one date, but appear to cluster in two parts, the first of the mid-late Iron Age, the second to the medieval period mid-11th to mid-late 13th centuries AD (most likely mid 12th-mid-late 13th century). The division between the dates of these two groups is clearly shown in Fig. 2. Although some of these radiocarbon determinations were from oak heartwood charcoal, the later Iron Age date of 180 cal. BC–cal. AD 10 (SUERC-73963, from Middle Lodge) came from a tree bud and so can be considered to be particularly accurate.

12.5.7 The first of these fire pit groupings is broadly contemporary with the occupation of the hillfort(s) at Castle Hill where, from the excavation in the 1970s, two radiocarbon determinations were obtained by the British Museum from charcoal recovered the buried ground surface under the ramparts (Money 1975, 64). These determinations were 2265 +/- 50 and 2178 +/- 61 BP, which when calibrated using OxCal 4.3.2 give dates of 405–200 cal. BC and 385–55 cal. BC respectively. The Iron Age dates are also broadly consistent with the earlier date from the large circular enclosure at IA4 (SUERC-73964 and SUERC-73969 in the table above) indicating contemporary activity in the hinterland of the hillfort.

12.5.8 The second, medieval, group of dates from the firepits in IA4 are consistent with the date from the pit containing pottery at the IA4 Heathland Creation area (SUERC-73972), indicating a focus of activity at this time. The date for the pit at the Heathland Creation area is consistent with the later of the proposed dates for the associated pottery, which was Saxo-Norman.

12.5.9 The assessment and analysis of the charcoal recovered from the firepits has demonstrated that those of Iron Age date have samples predominantly composed of oak (*Quercus*) charcoal, while the charcoal from firepits of medieval date is primarily beech (Fagus) or birch (*Betula*), although the medieval date from ivy (*Hedera*) is associated largely with oak (*Quercus*) charcoal. This issue is discussed further in the reports on charred plant remains and charcoal.

Enclosure ditches and boundary ditches

12.5.10 An Iron Age-determination for the field system in IA3 (SUERC-73971), which was dated from charcoal taken from the base of ditch cut [2066], is later than that from pit

2063 adjacent, but similar to that from the firepit in Potter's Wood, also close by. As the dated material from the ditch was oak heartwood charcoal, given the "old wood" effect the date of the feature may be slightly later, and a Roman date is also a possibility. The two radiocarbon determinations obtained from the circular enclosure at IA4 (SUERC-73964 from fill 323 in the south-east terminal and SUERC-73969 from fill 353 on the south) are Iron Age and Roman respectively. The earlier date comes from Pomoideae charcoal recovered from the basal fill at the terminus, the later date from oak heartwood charcoal recovered from a secondary fill that also contained iron slag. In both cases the dates provide a *terminus post quem* for the filling of the ditch, but given the material dated from (353) in particular, it is possible that the real age of the secondary fill is later than cal. AD 80–250.

Other pits

12.5.11 Charcoal from pit 2063 (fill 2065) in IA3 was dated to help clarify the date of part of a pottery vessel found within it, which had been variously attributed to the early Bronze Age and early Iron Age. Hazel charcoal from the lower fill produced a middle Iron Age radiocarbon determination.

12.5.12 Samples from two further pits, both undated by artefacts but containing charcoal assemblages, were also submitted for radiocarbon dating. These pits were selected on the basis of the composition of the charcoal within them, that from pit 2116 in IA3 being dominated by oak charcoal, that from pit 1813 in IA7 by beech charcoal, in order to test whether the chronological distinction found between firepits with charcoal of these different compositions was also reflected in pit assemblages on the site. Hazel charcoal was used to date pit 2116 due to its shorter lifespan, and returned a Middle Iron Age date, while beech from pit 1813 (IA7) provided a late 15th-mid 17th century AD date. The determination upon was obtained from a piece of small beech roundwood with 8 growth rings and so can be considered highly accurate.

Channels

12.5.13 The samples from the more westerly channel (20007 and 20006) indicated accumulation in the medieval period, and bracketed the 12th to 14th centuries AD. These included a medieval date for spelt wheat, a crop rarely grown in Britain in this period. The samples from the eastern channel gave a range in the post-medieval–modern period. The deposits from the western channel cover the same time period as those of the later group of fire-pits from the scheme.

13 CHARRED PLANT REMAINS AND CHARRED AND WATERLOGGED WOOD (EXCLUDING FIRE-PITS)

By Julia Meen

13.1 Introduction to the assessment

13.1.1 Fifty-six samples were processed for charred plant remains, and an initial assessment of 41 samples was undertaken in three phases in 2015 and 2016 (see archive). The assessments were aimed primarily at identifying potential material for radiocarbon dating, and to assist in determining which of the samples from the charcoal-rich fire-pits should be prioritised for immediate analysis. Following on from this, 17 fire-pit samples were prioritised for analysis. During detailed post-excavation assessment of the archaeological features, samples from two further fire-pits were identified among the processed samples, so these were also analysed, bringing the total to 19.

13.1.2 Of the remaining 37 samples, several were from the upper fills of fire-pits whose main fills had been analysed. As analysis had provided sufficient information for these features, assessment of these samples was not carried out. In addition, further examination of several of the sampled features indicated that these were undated tree-throw holes, so these were also excluded from assessment.

13.1.3 All the samples that were dependent on radiocarbon dating proved to be ancient, and these were all included in the assessment. Overall, the current assessment looked in greater detail at a total of 28 samples.

13.2 Methodology

13.2.1 Bulk samples taken for the recovery of charred plant remains were processed by water flotation using a modified Siraf-style flotation machine. Volumes of processed sediment for each sample are given in Table 41. The flots were collected on a 250µm mesh and the heavy residues were sieved to 500µm and dried in a heated room, after which the residues were sorted by eye for artefacts and ecofactual remains. The dried flots were scanned using a Leica stereo-microscope at approximately x15 to x40 magnification. A selection of charcoal fragments from each sample was analysed on the transverse, radial and tangential sections, as required, using a Brunel metallurgical SP-400 microscope at up to x200 magnification, to identify species. Charcoal identifications were made with reference to Schweingruber (1990); plant nomenclature follows Stace (2010).

13.2.2 Assessment aimed to see whether any charred plant remains were present in the assemblages, to characterise the range of wood taxa within the charcoal assemblage, and, where samples are undated, to ascertain if suitable material for radiocarbon dating is available, or if the species included recent introductions. Quantities of species present are presented in Table 42. Potential for further analysis for both charred plant remains and charcoal was classified for each sample using the following criteria:

- A, High potential: further work likely to produce data highly relevant to research questions as defined for the site, and of regional or even national significance

- B, Good potential: further work is justified as the data will contribute to the full understanding of the site
- C, Limited potential: material is present but further work is unlikely to add significantly to the results of the assessment, although the assessment data may be included and referred to in the analysis report
- D, No potential: no or insignificant remains were present, or, where the context is particularly significant but the amount of material suitable for analysis is small, all potential work has been undertaken at assessment stage

13.2.3 In all cases, the nature of any proposed further analyses is described in the report below but in each were beyond the scope of this project.

13.3 Mesolithic?

Pit 341, samples 1003 and 1004

13.3.1 Two samples were processed from the fills of pit/tree-throw hole 341, which contained struck flints of Mesolithic date. Both flots were strongly dominated by modern roots, as well as frequent modern seeds and invertebrates. The charcoal in both samples is present in low quantity and is generally of small size, so that few pieces were available for identification. Therefore, all potentially identifiable items have been examined at this stage, and there is no scope for further work on this material. In both samples the charcoal was a mixture of oak (*Quercus*), including mature heartwood, and hazel (*Corylus avellena*), although there is the possibility that this material too is intrusive. A single charred tuber or rhizome was recovered from sample 1003.

13.3.2 Hazel roundwood charcoal from sample 1004, context 340, was submitted for radiocarbon dating, although it was accepted that the presence of the modern material demonstrates that intrusive material has entered the deposits. The charcoal returned a date of 1620–1500 cal BC at 95% confidence, ie of the start of the Middle Bronze Age, showing the presence of activity at this date on the site, although not of the same date as the struck flints. It is likely that the struck flints are residual, but possible that the charcoal could be intrusive.

13.4 Neolithic

Pit 434, sample 1018

13.4.1 The charcoal from this sample was highly encrusted with a mineral precipitate and floated poorly due to being much denser than usual; therefore, charcoal of identifiable size was only recovered from the heavy residues. All the examined items were oak, with the majority clearly heartwood on the basis of visible tyloses within the vessels. A scan was made of all potentially identifiable charcoal (ie those fragments greater than 2mm) and no obviously non-oak was observed.

13.4.2 Although it is likely further analysis will corroborate that the sample is all-oak, as a context firmly securely dated to the Neolithic the assemblage is significant and it is suggested a further 28 pieces are identified in addition to the 22 items already identified, to create a more valid dataset of 50 items. This further analysis would determine whether any traces of non-oak are present and may provide further evidence of slow grown wood, which may be come from trees grown in closed or otherwise resource restricted conditions.

13.5 Middle Bronze Age

Burnt mound, samples 1074 and 1077

13.5.1 No charred plant remains were present in either of the samples from the burnt mound.

13.5.2 The charcoal in both samples is often heavily mineral concreted or even apparently mineralised; and many of the larger pieces are crumbly and turn to powder when fractured. These factors mean that the charcoal is frequently indeterminate. In sample 1074, at least three taxa are present—oak, hazel and hawthorn type (*Pomoideae*). In sample 1077, it may be significant that the range of taxa appears to differ slightly, with beech (*Fagus sylvatica*) roundwood and field maple (*Acer campestre*) alongside oak, probable hazel and hawthorn type.

13.5.3 There is potential for some further work for both samples. For sample 1074, 23 items have already been examined, so it is suggested that at least 27 more pieces are examined to take the dataset up to 50 if not 100 pieces; there should be sufficient charcoal in the 4–2mm fraction of the flot to achieve this. Further work on sample 1077 would be worthwhile to investigate whether the apparent difference in composition when compared to 1074 is valid. Again, sufficient charcoal is available to bring the total up to 50 or even 100 items if required.

13.5.4 Further samples from these features should be processed to see if preservation of charcoal is better, and if charred seeds may survive in any of these. As only two samples have been assessed, questions such as whether the two main pits within the burnt mound contain different mixes of charcoal, or whether the composition of the samples varies over time (ie from the lowest to uppermost deposits within the pits), have not yet been examined, and should be addressed in further analysis.

13.6 Middle Iron Age

Pit 2065, sample 1069

13.6.1 This sample is from a pit which dates to the Middle Iron Age. Aside from a single seed of bedstraw (*Galium* sp), no charred plant remains were present. Abundant charcoal was present, largely dominated by mature oak, with a little hazel (non-roundwood). Several of the oak fragments are vitrified, and some have notably closely spaced growth rings.

13.6.2 Hazel charcoal was submitted for radiocarbon dating, and returned a date of 400–230 cal BC at 95% confidence. As the hazel was not roundwood, an offset of 50 years or more should be allowed for the date of the context containing the charcoal. The pit is therefore of the same period as the earlier group of firepits along the scheme.

13.7 Late Iron Age

Field-system ditches 2118 and 2066, samples 1060 and 1072

13.7.1 Sample 1060 was exclusively composed of abundant charcoal. The assemblage was examined quite comprehensively during the first phase of assessment, so no further work was carried out during the current stage, besides a further scan which confirmed that all material is oak. Several of the oak fragments are vitrified and some are heartwood. As mature oak-rich charcoal assemblages are characteristic of the fire-pits dated to the mid to late Iron Age, this material may potentially be derived from the same source. In sample 1072 charcoal was even more abundant, but was more often distorted or heavily vitrified, making it much more

difficult to identify. Examination of charcoal in the 4–2mm size range indicates that there are occasional occurrences of diffuse porous taxa, with hazel and field maple provisionally identified.

13.7.2 As the work already undertaken on sample 1060 strongly suggests that the sample contains mostly oak, the only further work would be to identify the few non-oak taxa at the analysis stage.

13.8 Late Iron Age/Roman

Circular enclosure, samples 1007, 1005 and 1006

13.8.1 Sample 1007, from an enclosure fill dated to the Late Iron Age, produced a small flot with no charred macrofossils. Charcoal was mostly oak, but occasional diffuse porous wood, including hazel, was present.

13.8.2 Of the two fills from Late Iron Age or Roman contexts in the circular enclosure, sample 1005 contained no charred material and can be discounted. In contrast sample 1006 contained frequent charcoal, of which all examined pieces were oak, mostly heartwood. A small number of charred macrofossils were also present, including seeds of bramble (Rubus sp), a fragment of hazelnut shell, charred buds and a fruit stone.

13.8.3 Recommendations for samples from the circular enclosure: charcoal from sample 1007 was generally of small size, but 21 pieces were examined for the assessment and sufficient is available to bring the total up to 50 pieces and, as a securely dated fill from the earliest phase of the enclosure, it is suggested this further analysis be undertaken. Sample 1005 can be discounted as it contains no identifiable material. Further work on the charcoal from sample 1006 is probably of limited value, but the results of the assessment can be included in the analysis report.

13.8.4 Sample 1006 contains a small number of charred plant remains, and as the flot was scanned quite thoroughly, further detailed sorting is unlikely to increase this number. The few pieces that have been recovered will however require more detailed identification and this small piece of additional work should be included in the analysis.

13.9 Medieval

Tree-throw/pit complex samples 1146, 1147, 1045 and 1044

13.9.1 Of the four samples assessed from this complex, charred plant remains were only recovered from sample 1147, and this consisted only of rare hazelnut shell fragments.

13.9.2 One of the aims of the assessment was to establish whether there are differences in wood species composition between the samples in the group. The four samples all contain the same three taxa—oak, beech and birch—in varying proportions, with the exception of sample 1045 which contains no beech, and sample 1146 which contains no birch. Further analysis would be required to be absolutely certain that these species were absent, but the assessment does suggest the four samples can be considered as broadly similar in character, and despite their differences they fit into the beech/oak/birch grouping proposed for the medieval fire-pit samples that have already been analysed. It may be that this material has a similar derivation to the analysed fire-pit samples, but the similarity could equally reflect the change in woodland composition that has been discussed in the fire-pit analysis report and

observed in pollen records from elsewhere in the Weald (Waller and Schofield 2007, 367–384).

13.10 Undated pits from across the site

13.10.1 The undated pit samples can be divided into two groups based on the charcoal taxa they contain. The first group is dominated by or is exclusively oak, sometimes with traces of other taxa, often including birch. The second group is dominated by beech with a little birch. These two groupings match the two groups identified in the analysed fire-pit samples, where those samples radiocarbon dated to the mid to late Iron Age fell into the 'oak/mostly oak' group and the samples dated to the high medieval period belonged to the 'mostly beech' group. It is tempting to suggest that the division of the assessment pit samples follows the same chronological pattern, but without independent dating this can only be hypothesised.

Group 1: Pit samples dominated by or exclusively oak

Pit 467, samples 1022 and 1023; undated but contains a flint blade

13.10.2 Both samples from this undated pit are composed entirely of charcoal, with abundant material in each. All the fragments examined during the initial phase of assessment were oak, and a thorough scan of the remaining material in both samples, and identification of a small number of additional fragments less than 4mm in size from sample 1023, showed that they are clearly made up purely of oak charcoal. The only roundwood in either of the samples was a single very small roundwood twig from sample 1023, which was mostly pith and so not identifiable. This twig is probably of insufficient size for radiocarbon dating. As the two samples have been satisfactorily characterised at assessment stage, further work is not recommended.

Pits 2116, 666 and 2111; samples 1057, 1145 and 1061

13.10.3 These three samples contained only oak charcoal, with many or most of the fragments identified clearly heartwood. In the first two samples charcoal is abundant but is more limited in the third. However, although sufficient charcoal is available for further analysis, it is unlikely that much valuable data would be gained. The present assessment, which included a scan of the whole of the assemblages, has established that the deposits are very homogeneous in character.

Pits 364, 2104, 1824 and 471; samples 1008, 1058, 1049 and 1024

13.10.4 These four samples contain mostly oak, with a smaller proportion of other taxa. Sample 1008 is a mixture of mature oak, birch and probable willow/poplar (*Salix/Populus*) (although the presence of heterogeneous rays makes an identification of willow, Salix, more probable). Mineral precipitate on many fragments in this sample has resulted in many provisional or indeterminate identifications. In sample 1058, mineralisation is a much greater problem, with a high proportion of the fragments in what appears to be a rich flot almost fully mineralised, so that identification is frequently impossible. A single 2mm legume (*Vicia*/*Lathyrus*/*Lotus* type) and a charred grass seed was extracted from this sample, but the rest of the flot was thoroughly checked and no other charred plant remains were present.

13.10.5 Sample 1049 included occasional fragments of birch and probable field maple, but it should be noted that the given proportion of non-oak in the sample will be over-

exaggerated by the deliberate selection for assessment of items that looked unusual. A scan of the majority of the flot suggested that the sample is overwhelmingly oak.

13.10.6 In sample 1024 a number of the fragments were difficult to identify to species, due to encrustation or distortion. In some of the oak charcoal the growth rings were notably closely spaced.

Group 2: pit samples dominated by beech

Pit 1813, sample 1047

13.10.7 This sample was dominated by beech, with a little oak and alder/birch, with the features necessary to distinguish these two taxa absent or obscured on the two examined fragments. Part of what appears to be an acorn cup was recovered, and it was noted that numerous small fragments of leaf and other fine plant parts were present.

Pit/tree-throw 914, sample 1025

13.10.8 This sample was particularly abundant for charcoal. No oak was amongst the selection of pieces examined, but the sample was strongly dominated by beech, including roundwood. There were frequent fragments of bark in the sample.

13.11 19th century

Kiln samples 1155 and 1152

13.11.1 Sample 1155 produced an abundance of waterlogged wood (Table 43). The pieces were well preserved and were often of large size. Waterlogged wood in general is less likely to fragment compared to charcoal and does not suffer the shrinkage that is caused by the charring process, and therefore waterlogged material provides a closer approximation to the size of the original wood assemblage. Fifteen items were selected for wood identification, and where possible, notes regarding diameter in cross section, number of annual growth rings, and other features were recorded.

13.11.2 All the examined material was roundwood, usually with a complete or near complete cross- section preserved, and with both bark and pith present. The wood was notably straight and usually without side branches. In several items it was noted that the first couple of growth rings were relatively widely spaced in comparison to later rings, which became narrower, indicating that the first year or two's growth was comparatively fast and then slowed. Taken together, these features may be suggestive of coppicing.

13.11.3 Coppicing involves the deliberate cutting of tree branches from the base or 'stool' of the tree. In many tree species native to Britain, including oak, hazel and alder, this form of management stimulates rapid regrowth of fresh shoots from the cut stool. This regrowth tends to produce characteristically long, straight poles, with growth fastest in the first couple of years after cutting (reference). Coppicing may be carried out in a system of 'drawing'—where poles of similar size are harvested at the same time—or 'clear felling', where all the regrowth in a parcel of woodland is cleared at the same time, on a regular rotation. Drawing is likely produce a crop of poles of similar size, whereas clear felling will produce a crop in which all the poles are the same age and therefore, have the same number of annual rings, the exact number depending on the length of the rotation.

13.11.4 Oak made up almost half of the identified pieces. The oak roundwood tended towards the higher end of the range in both size and number of growth rings, although not consistently for either. The examined oak branches were up to 15mm in diameter and some had at least 12 rings. Much of the oak roundwood looked very similar to the oak from sample 1152. Several different diffuse porous taxa appear to be present: alder, hazel, probable cherry/blackthorn, and one other which is currently unidentified. The examined items did not reach the size of some of the oak pieces, falling within the range 6–10mm, and with 4–8 annual growth rings.

13.11.5 The >4mm flot from 1152 is entirely made up of charcoal and appears to be all Roundwood (Table 44). It is a mixture of thin, straight sticks (3–5mm in diameter) and slightly wider roundwood (up to 11mm across). Approximately 100 items are available in this size range. The 4–2mm fraction contains approximately 500 pieces of charcoal. These appear to mostly be fragments of the small straight twigs as well as fragments of the larger roundwood seen in the larger fraction. Again, most of the roundwood is straight and unbranched, but there is the occasional gnarly, more natural looking twig. The <2mm fraction contains occasional modern bramble (*Rubus* sp.) seeds, some bark fragments, and rare well preserved, charred tree buds. No other charred plant remains were present.

13.11.6 It was noted that several of the pieces had wide-spaced first and sometimes second growth rings, similar to those in sample 1155 and indicative of rapid regrowth, presumably after cutting back. Several pieces from sample 1152 had the large vessels of the earlywood at the very outer edge of the cross section. This suggests that the cutting of the branches occurred during the spring, when the earlywood is laid down.

13.11.7 Recommendations for the 19th-century kiln samples: with only a small selection of the wood from the two samples examined, it is difficult to see any definite trends. It is also worth noting that the waterlogged material, being unburnt, may be unrepresentative of the material used as fuel and may be a small sized, discarded fraction of a larger sized wood harvest. However, this assessment demonstrates that suitable material is available for further analysis from both samples, and that they have the potential to reveal detail regarding woodland management at this time. These initial findings raise the question of whether oak was being cut on a different rotation compared to the other tree species in the woodland, providing older, larger wood products perhaps to meet different resource demands. Demonstrating woodland management would require identification, measurement and recording of a wider selection of the wood, particularly in the waterlogged sample, which would also benefit from a careful examination of each piece to see if any characteristic signs of coppicing were present. These might potentially include fragments of the coppice stool left at the base of the pole.

13.11.8 It would also be worth investigating contemporary documentary records further to see if anything survives that might shed light upon the woodland management system, and whether the woodland was serving a wider area than the brickworks, or whether the suspected range of coppicing practices was all aimed at activities connected with this industry.

13.12 Waterlogged Plant and Insect Remains from medieval and later channels in WC1

By Sharon Cook

Introduction

13.12.1 Test-pitting at IA1 highlighted an area with evidence for preservation of waterlogged plant and insect remains (Meen in OA 2016, Appendix B) and in 2017 this area was trenched specifically to sample for waterlogged material. The aim was to establish the depth of organic material present, its state of preservation and stratigraphic complexity, and to establish the potential for radiocarbon dating to date the sequence and establish its duration. Two channels (20009 and 20101) were revealed in the trenches, and column and incremental samples were taken from these for environmental assessment.

13.12.2 The first objective following excavation was to determine the number of deposits that contained waterlogged plant and insect remains, and an impression of their state of preservation. Good preservation had been established in the sample retrieved from Test Pit OA1, which it is clear came from the eastern channel, but the stratigraphic position of this deposit was not established at the time. No previous examination of the waterlogged material in the western channel had been undertaken.

13.12.3 The second objective was to establish how many deposits might contain material suitable for radiocarbon dating.

Methodology

13.12.4 One litre of each sample was processed using the wash-over method with the flot and residue processed to 250µm and kept wet. A small sub-sample (*c* 5ml) of each flot was examined using a low power (x10) binocular microscope to establish whether waterlogged plant remains survived, whether insects were likely to survive, and to establish the potential for extraction of material for radiocarbon dating of the deposits. Due to the very small fraction of the material examined in detail at this stage, the unprocessed samples were also scanned by eye to look for insect remains. All plant identifications are currently provisional.

Results

13.12.5 The results of the brief assessment of the flots can be seen in Table 45. Waterlogged plant remains in good condition were observed in all the samples except for <1164> and <1165> from deposits 20004 and 20005 in the upper part of channel 20009. The seeds observed mostly consist of waterborne species such as gypsywort (*Lycopus europaeus*) and water-plantain (*Alisma plantago-aquatica*) and tree seeds such as acorn (*Quercus* sp.), hazelnut (*Corylus avellana*) and beech (*Fagus sylvatica*) which are likely to have been growing at the channel edge. Wood fragments are largely robust, with a large proportion comprising twigs and small branch fragments, some of which may be suitable for species identification. Leaves that are almost complete in sample <1176> may also be identifiable to species.

13.12.6 Insects in identifiable condition were noted within most samples, and it is to be assumed that the remaining samples (apart from <1164> and <1165>) are likely to also contain identifiable material.

13.12.7 Following this brief assessment a sample for radiocarbon dating was taken from two stratigraphically distinct deposits in each channel to clarify the date and duration of accumulation of the deposits in the channels. The radiocarbon dating established that the deposits containing preserved waterlogged plant remains in Channel 20009 are of medieval date, while those in Channel 20101 are of post-medieval date, and that there is a substantial gap between the date ranges (see Radiocarbon Report, Section 10).

Recommendations

13.12.8 All of these samples contain material in sufficiently good condition that more detailed work for species identification of local flora and extraction and identification of insect material would yield further information about the contemporary environment. Where waterlogged preservation is good, as in these samples, it is also probable that pollen preservation will be good, and pollen analysis of selected samples is also recommended.

13.12.9 Given the late date of the deposits in Channel 20101, however, further work on the deposits in this channel is not appropriate, and it is recommended that analysis is limited to the medieval samples from Channel 20009.

13.13 Charred Plant Remains and waterlogged wood tables

Table 41: Summary of charred plant remains and charcoal by context

Sample No.	Context	Feature	Date	Floated Vol.	Flot charcoal >4mm	Flot charcoal 2–4mm	Res charcoal >4 mm	Comments Charred Plant Remains	Comments Charcoal
1003	339	Pit 341	Mesolithic	40L	1	8	0	Flot strongly dominated by fine modern roots. Frequent modern intrusive material, including modern seeds (*Betula, Polygonum aviculare*) and modern invertebrates. Frequent fungal bodies. There is a single charred tuber/rhizome, which may be possible to C14, although there is a high risk of intrusion.	Charcoal rare and usually very small, plus high risk it may be intrusive. 9 items examined; no further material of sufficient size available for analysis
1004	340	Pit 341	Mesolithic	40L	3	8		Flot strongly dominated by fine modern roots. Frequent modern intrusive material, including modern seeds. Frequent fungal bodies. No charred plant remains present.	Charcoal generally rare and fragmented, only a small number of sufficient size; no further material available for analysis.
1018	434	Pit 435	Neolithic	35L	150	500	2	Very rooty flot. No charred plant remains.	Charcoal only in 10–4mm and 4–2mm. Charcoal usually mineral encrusted. All potentially identifiable charcoal (ie >2mm) scanned and no obviously non-oak was observed. One of the oak fragments had notably closed spaced rings. Majority of examined oak was heartwood.
1074	2047	Burnt Mound	Middle Bronze Age	4L	23	200		No charred plant remains present.	Charcoal often heavily mineral concreted or even apparently mineralised. The 10–4mm charcoal in particularly is often crumbly and turns to powder, so a high proportion is indet. However, the 4–2mm charcoal is often more robust, with a higher proportion of identifiable pieces, and a higher proportion of Corylus.
1077	2063	Burnt Mound	Middle Bronze Age	20L	72	500	100	Frequent modern seeds and plant stems/roots. 100% of flot scanned - no charred plant remains present.	Some of the charcoal is heavily mineral encrusted or mineralised, and so is less suitable for species ID.
1069	2065	Pit	Prehistoric	40L	300	1000	500	Single seed of *galium* sp - otherwise no charred plant remains.	Flot exclusively charcoal. Several of the oak fragments are vitrified; a couple have notably closely spaced growth rings.
1060	2119	Ditch 2118	LIA	8L	200	1000	26	100% of flot scanned - no charred plant remains present.	Flot exclusively composed of charcoal. Charcoal examined quite comprehensively during initial assessment, so no further work done here - further scan made it clear that all material was oak. Several of the oak fragments are vitrified and some are heartwood.
1072	2067	Ditch 2066	LIA	20L	500	1000	1000	No charred plant remains present.	Charcoal >4mm examined quite comprehensively during initial assessment and all appeared to be oak, although some heavily vitrified and/or distorted.
1007	323	Circular Enclosure	LIA	7L	11	39	2	Small flot. 100% scanned - no charred plant remains.	1x *Pomoideae* and 1x *Corylus/Alnus* previously identified but sent for dating. Abundant modern root. Otherwise dominated by

Sample No.	Context	Feature	Date	Floated Vol.	Flot charcoal >4mm	Flot charcoal 2–4mm	Res charcoal >4 mm	Comments Charred Plant Remains	Comments Charcoal
									charcoal, mostly fragmentary. Some charcoal mineral encrusted and/or vitrified making identification more difficult.
1005	313	Circular Enclosure	LIA/Roman	15L	0	0	0	Very small, rooty flot. Initial assessment is sufficient as no further work is possible.	Abundant modern root, plus insect eggs, modern seeds. Charcoal flecks only, of non-identifiable size.
1006	353	Circular Enclosure	LIA/Roman	12L	100	500		1x charred Rubus seed, 1x fragment HNS, charred buds, 1x ?fruit stone (possible with outside as well?)	6 items charcoal examine in initial assessment, plus further 14 in further assessment. All identifiable pieces are oak, with a high proportion of these clearly heartwood.
1022	468	Pit		34L	300	>1000		2 fragments of charred root/plant stem recovered.	Flot composed almost entirely of charcoal. Majority of items are clearly oak even from superficial scanning of material during initial assessment. No roundwood noted. No further assessment carried out at second phase as satisfied sampled fully characterised.
1023	470	Pit		18L	>500	>1000		No charred plant remains noted.	2 large bags of charcoal. Initial assessment demonstrated flot is entirely composed of charcoal, with all examined items oak, and no roundwood noted. Further assessment concentrated on items <4mm, scan of this fraction and examination of a smaller number of extra fragments shows this fraction is also composed of fragmentary oak charcoal. Single very small roundwood twig found, mostly pith so could not ID, probably of insufficient size to date.
1146	1471	Tree Hole/Pit	Medieval	40L	500	>1000	40	Some modern root. Fungal bodies. Abundant charcoal; no other charred plant remains.	16 items assessed for initial assessment; one further ID carried out on a roundwood piece during second assessment.
1147	1453	Tree Hole/Pit	Medieval	40L	500	>1000	19	No previous assessment carried out. Whole of >2mm flot scanned; rare HNS fragments extracted. Portion of <2mm flot scanned.	Over half the examined oak fragments were clearly heartwood, and a couple had closely spaced rings indicative of slow grown wood. Only one piece of roundwood was observed: Fagus roundwood, with pith and bark and 4 growth rings.
1045	1420	Tree Hole/Pit	Medieval	34L	500	>1000	5	No charred plant remains - flot entirely charcoal.	Provisional IDs from initial assessment checked and modified where necessary. No roundwood observed.
1044	1418	Tree Hole/Pit	Medieval	40L				No charred plant remains - flot entirely charcoal.	No further work on top of the original 8 fragments examined during the initial assessment. Little roundwood noted.
1008	365	Pit 364		1.2L	159	500	20	No charred plant remains - flot entirely charcoal.	8 items examined during initial assessment; further 9 items examined and initial identification checked during second phase of assessment. Mineral encrustation makes identification more difficult and causes some items to be indet
1058	2106	2104		20L	82	200	22	Single 2mm legume (Vicia/Lathyrus/Lotus), charred grass seed	Although the flot appears rich, much of the 'charcoal' is part mineralised and unsuitable for species ID. The fragment counts reflect numbers of non-mineralised fragments. All of the

Sample No.	Context	Feature	Date	Floated Vol.	Flot charcoal >4mm	Flot charcoal 2–4mm	Res charcoal >4 mm	Comments Charred Plant Remains	Comments Charcoal
									examined oak charcoal was heartwood, and several fragments had closely spaced growth rings.
1057	2117	Pit 2116		10L	1000	10000	100	No charred plant remains - flot entirely charcoal.	Large flot. 15 pieces fully examined; scan of remainder of flot suggests all material is oak. All oak or cf oak; several of the examined pieces oak heartwood.
1047	1814	Pit 1813		20L	500	1000	45	Partial acorn cup extracted from flot. Small fragments of charred leaf and other fine plant parts present occasionally.	Flot dominated by beech, with a little oak (the examined item was vitrified) and alder/birch - on the two items examined these two taxa could not be distinguished
1049	1824	Pit 1818		18L	1000	10000	33	No charred plant remains - flot entirely charcoal.	Half of the oak fragments were clearly heartwood. No roundwood noted.
1145	667	Pit 666		12L	500	1000	100	No charred plant remains - flot entirely charcoal.	Much of the charcoal in large fragments - many large pieces recovered from heavy residues. Almost all of the closely examined oak is clearly heartwood. Scan of rest of flot indicated no non-oak. No roundwood.
1024	473	Pit 471		40L	200	1000	34	No charred plant remains - flot entirely charcoal.	All of the examined oak charcoal was heartwood, and in some the growth rings were notably close together. A number of the items were difficult to identify to species, due to encrusted or being twisted
1025	915	Pit 914	40L	5000	20000	200	No CPR	N/A	Very large flot (charcoal counts estimates). Contains frequent bark fragments.
1061	2113	Pit 2111		8L	56	200	48	No charred plant remains - flot entirely charcoal.	All examined charcoal pieces oak; majority clearly heartwood

Table 42: Quantification of CPR and charcoal by context

Sample No.	Context	Feature	Potential CPR	Potential Charcoal	Quercus	cf Quercus	Fagus	cf Fagus	Betulaceae	Betula	cf Betula	Corylus	cf Corylus	corylus/Alnus	cf Corylus/Alnus	Alnus/Betula	cf Salix/Populus	Acer	cf Acer	Pomoideae	cf Pomoideae	ring porous	diffuse porous	indet	not sure	total examined
1003	339	Pit 341	D	D	3 (h)							1	1									1		3		**9**
1004	340	Pit 341	D	D	4 (h)	1						3	1	1												**11**
1018	434	Pit 435	D	B	20 (h)	1																			2	**22**
1074	2047	Burnt Mound	D	B	8 (h)	2						2	1	1						1	2	1	1	4		**23**
1077	2063	Burnt Mound	D	B	8 (h)		3 (r)							2				2	2	2			1			**20**
1069	2065	Pit	D	B - needs C14 dating	16 (h)	2						2		1										1		**22**
1060	2119	Ditch 2118	D	B/C	12 (h)	1																		2		**15**
1072	2067	Ditch 2066	D	B/C	5	6							1						1					5		**18**
1007	323	Circular Enclosure	D	B	11 (h)	3 (h)							1		2						1		1	2		**21**
1005	313	Circular Enclosure	D	D																						
1006	353	Circular Enclosure	C	D	18 (h)																			2		**20**
1022	468	Pit	D	C	8 (h)																					**8**
1023	470	Pit	D	C	7	1																		2		**10**
1146	1471	Tree Hole/Pit	D	D	2 (r)	3	8	1															1	2 (r)		**17**
1147	1453	Tree Hole/Pit	D	D	13 (h)		4 (r)			2																**19**
1045	1420	Tree Hole/Pit	D	D	10 (h)	2				5	1												1	1		**20**
1044	1418	Tree Hole/Pit	D	D	3 (r,h)		4			1																**8**
1008	365	Pit 364	D	D	6 h	1			1 r	2	1						2						2	2		**17**
1058	2106	2104	D	D	13 h					1		1														**15**
1057	2117	Pit 2116	D	D	13 (h)	2																				**15**
1047	1814	Pit 1813	D	D	1 h		12									2										**15**
1049	1824	Pit 1818	D	D	12 (h)					1	1								1							**15**
1145	667	Pit 666	D	D	16 (h)																					**16**
1024	473	Pit 471	D	D	8 h								1									1	2	3		**15**
1025	915		D	D			11 (r)	1		2	1															**15**
1061	2113	Pit 2111	D	D	14 (h)																			1		**15**

Table 43: Waterlogged wood from 19th-century sample 1155 (3086)

Taxon	RW?	Bark/Pith?	Diameter	No. growth rings	Notes
Quercus	roundwood	bark and pith	14mm	at least 12	Very straight, without branching. Faster growth in first two years, then slowing. Very similar to charred oak twigs in sample 1152.
Quercus	roundwood	bark and pith	14mm	*c* 9	Long straight roundwood branch (pole?). Knots at base - where other branches were cut?
Quercus	roundwood	bark and pith	11mm	7	Cut close to early wood growth
Quercus	roundwood	bark and pith	15mm	at least 11	
Quercus	roundwood	bark and pith	15mm	8	Straight, unbranched.
cf *Quercus*	roundwood	bark and pith	7mm	5	
cf *Quercus*	roundwood	bark and pith	9mm	9	
Alnus	roundwood	bark and pith	8mm	c. 6	
Alnus	roundwood	bark and pith		4	First two rings, especially the first, fast grown
Alnus	roundwood	bark and pith	6mm	4	
Corylus	roundwood	bark and pith	8mm	4	
cf *Prunus*	roundwood	bark and pith	10mm	8	Straight. First couple of growth rings wider spaced, then narrowing.
cf *Prunus*	roundwood	bark and pith	10mm	*c* 6	Straight
Unid.	roundwood	bark and pith	6mm		Diffuse porous, isolated vessels, small pits. Looks similar to *Salix/Populus* on TS but pitting far too small. Possible cut mark at unsampled end. Difficult to see growth rings.
Unid.	roundwood	bark and pith	8mm		Same as above?

Table 44: Waterlogged wood from 19th-century sample 1152 (3041)

Taxon	RW?	Bark/Pith?	Diameter	No. growth rings	Notes
cf *Quercus*	roundwood	pith, no bark		at least 4	Fast growth in first two years. Ring porous, uniseriate, dendritic latewood but no compound rays - identified as Quercus as Schweingruber (1990) has oak roundwood without compound rays
cf *Quercus*	roundwood	bark and pith		2	Very straight twig
cf *Quercus*	roundwood	pith, no bark		3	Cut close to growth ring, suggestive of spring cutting.
cf *Quercus*	roundwood	bark and pith		4	Fast grown first year
cf *Quercus*	roundwood fragment	pith and fragment bark		3	Cut on edge of final earlywood vessels

Taxon	RW?	Bark/Pith?	Diameter	No. growth rings	Notes
Corylus	roundwood fragment	no pith or bark		at least 7	
Corylus	roundwood	no pith or bark		at least 9	
Alnus	roundwood twig	bark fragment and pith	3mm	3	Very straight twig, no forks. Cut on edge of final earlywood vessels.
Unid.	roundwood	bark and pith		3	Quite isolated vessels, semi ring porous, shiny texture in TS, large pitting.
Unid.	roundwood	bark and pith		3	Same as other unknown. Fast grown first year.

Table 45: Summary assessment of waterlogged plant remains from channels in WC1 pond

Sample no.	Context no.	Feature no.	Depth (m)	Flot vol. (ml)	Comments
1164	20004	20009	0.25–0.3	<5	Little material, black flecks of charcoal. Unsuitable for further work. Occasional fibrous fragments. No seeds noted.
1165	20005	20009	0.40–0.45	15	Roots and fibrous material. Small twigs not suitable for species ID. No seeds in scanned
1166	20006	20009	0.5–0.55	250	Wood and twig fragments suitable for species ID. Leaf fragments. Small tree buds with potential for C14. Insects present and identifiable. Occasional seeds incl. *Rumex* sp. & *Carex* sp. *Characeae* (stonewort) algae.
1167	20006	20009	0.6–0.65	200	Mostly woody material with leaf fragments. Wood not suitable for species ID. Moss fragments. Fagus sylvatica nuts suitable for C14, also tree buds (species not identified). No small seeds in scanned portion.
1168	20007	20009	0.8–0.85	150	Mostly wood fragments including twigs, some large enough for species ID. Roots and other fibrous material. Insects present and identifiable. No seeds in scanned portion.
1169	20007	20009	1.05–1.1	100	Mostly wood fragments including twigs, some large enough for species ID. Fungal fruiting bodies. Roots and fibrous fragments. No seeds in scanned portion.
1170	20007	20009	1.1–1.2	150	Mostly wood fragments including twigs, some large enough for species ID. Tree bud suitable for C14. Occasional seeds (5 in scanned portion) incl. Lycopus europaeus.
1174	20109	20101	0.2–0.3	100	Fine roots and fibrous material with occasional wood fragments not suitable for species ID. Fragments of CBM noted in residue. Occasional seeds incl. Ranunculus sp. Occasional insect fragments and ?mites.

1175	20104	20101	0.4–0.45	175	Rich in wood fragments including twigs, some suitable for species ID. Very fine root fragments and leaf fragments. Moss and occasional nematode eggs. Occasional seeds including *Lycopus europaeus*.
1176	20103	20101	0.5–0.6	>1000	Rich in compressed plant material, mostly leaves and roots. Leaves v well preserved, some may be identifiable. Some small twigs too small for species ID. Acorn fragment extracted for C14. Insect fragments noted.
1177	20102	20101	0.7–0.8	100	Woody fragments and small twigs not suitable for species ID. Leaf fragments. Fungal fruiting bodies. Insect fragments noted. Occasional seeds incl. *Sambucus nigra*, cf *Festuca pratensis* and Cirsium dissectum.

13.14 Charred plant remains and charcoal: prehistoric to post-medieval—further analysis

13.14.1 Detailed assessment was undertaken on twenty-eight of the non-firepit samples, excluding some samples from undated tree-throw holes. This demonstrated that while charcoal was present in most samples, other charred macrofossils were almost absent; the only non-charcoal plant remains to justify further recording are from the Roman fill of the sub-circular enclosure in IA4 (sample 1006). Eight samples were selected for charcoal analysis: Neolithic pit 434 (sample 1018), two samples from each of middle Bronze Age burnt mound pits 2099 and 2045 (samples 1085 and 1086, and samples 1074 and 1076), ditch 2118 from the late Iron Age field system (sample 1060), and two samples from the later Iron Age - Roman sub-circular enclosure (samples 1006 and 1007).

13.14.2 Assessment of the samples from two palaeochannels of the river Bourne showed that the lower two fills of the medieval sequence exposed in Section 20000 have good preservation of waterlogged plant remains. Both subsamples from these contexts were analysed to characterise any changes in vegetation composition at the site during this period.

13.14.3 In addition, two samples from the nineteenth century brickworks were selected for further work, as they appeared to consist of small roundwood of fairly uniform size and number of growth rings. This raised the question of whether wood was being managed through a coppicing system in order to provide fuel for the brick kilns. The wood in sample 1152, from the floor of the south-west flue in Kiln 2 is preserved through charring, while sample 1155 is from waterlogged context 3086, a layer of brushwood just beyond the stoking area of Kiln 3, and is uncharred.

Methodology

13.14.4 Samples were processed for charred plant remains and charcoal by water flotation using a modified Siraf style flotation machine, with the recovered charred plant remains ("flots") collected on 250µm mesh and the heavy residues sieved to 500µm. A one litre subsample was processed from each of those contexts selected for analysis of waterlogged plant remains, using the "wash-over" method of hand flotation, with flots and residues collected on 250µm meshes. The charred macrofossils from sample 1006 and the waterlogged plant remains from samples 1170 and 1166 were extracted using a Leica stereo-microscope at up to x40 magnification, and identified with reference to published guides (eg Cappers *et al*) and the modern comparative collection held at OA South. Nomenclature for plant taxa follows Stace (2010).

13.14.5 Wood identifications were made on the basis of diagnostic anatomical features, as described in Schweingruber (1990) and Hather (2016). Charcoal was fractured on the transverse, radial and tangential sections, as required, and examined using a Brunel metallurgical SP-400 microscope at up to x400 magnification under reflected light. Waterlogged wood was frozen to aid thin-sectioning, with sections mounted onto slides and examined under transmitted light. In addition to species identification, it was recorded where the fragment derived from roundwood (ie, it is from a branch or twig rather than trunkwood), the presence of heartwood (indicated by the development of vessel tyloses), and features such as closely spaced growth rings, which can be indicative of growing conditions. Wood from the two brickworks samples was recorded in closer detail to collect evidence for possible

management, including number of growth rings, diameter in cross section, and presence of bark and pith.

13.14.6 The charcoal identifications from all samples are given in Table 46, the charred plant remains in Table 47 and the waterlogged plant remains from the medieval palaeochannel are in Table 48.

Charcoal from Neolithic pit 434

13.14.7 Analysis confirmed that the charcoal assemblage is exclusively oak, mostly heartwood, and some fragments have very closely grown rings. This indicates that the wood was growing slowly, producing limited xylem tissue each year. Slow growth can be a result of restricted resources, such as might be caused by competition from neighbouring trees in closed woodlands, or by climatic factors.

Early Bronze Age pit 341

13.14.8 Two samples (1003 and 1004) were processed from the fills of pit/tree-throw hole 341, which contained struck flints of Mesolithic date. However, radiocarbon analysis of hazel charcoal from sample 1004 returned an early middle Bronze Age date of 1620–1505 cal. BC (SUERC-90238 (GU53058); 3287±23BP), indicating that these flints are residual. The presence of abundant modern material—mostly modern roots, but also frequent modern seeds and invertebrates—demonstrates that intrusive material had also entered the deposits. While charcoal was sparse and generally of small size, a few pieces were suitable for identification and were a mixture of oak (*Quercus*), including mature heartwood, and hazel (*Corylus avellena*). A single charred tuber or rhizome was also recovered from sample 1003.

Charcoal from middle Bronze Age burnt mound pits

13.14.9 The charcoal samples from the burnt mound come from two adjacent pits, 2099 and 2045. Radiocarbon dates from two fills in each pit were dated, and provide a date range of 1450–1300 cal BC for 2099, and of 1400–1220 cal BC for pit 2045. Although the date ranges overlap, the more likely range for 2099 is between 1450 and 1370 cal BC, whereas the emphasis of the dates from pit 2045 is on the later half of its range (see Radiocarbon report). One of the aims of the analysis was therefore to look for differences in the composition of the assemblages between the two pits.

13.14.10 The four burnt samples contain a range of taxa in varying proportions, but the variations are probably not great enough to be considered significant. Oak, field maple (*Acer campestre*), hazel, birch (*Betula* sp.), willow/poplar (*Salix/Populus*) and *Maloideae* charcoal were found in samples from both pits, although sample 1085 (pit 2099) additionally contains blackthorn (*Prunus spinosa*) and lime (*Tilia* sp.) What may be more significant is that, while oak was abundant in all four samples, the two from pit 2045 are mostly heartwood, yet heartwood is rare in the oak from sample 1085 and was not observed at all in sample 1086 (also from pit 2099). This is the opposite trend to what would be expected if there was increased pressure on the availability of mature oak, and is in agreement with the pollen evidence that oak woodland was extensive in the local landscape in this period (Rutherford, section 16 below). It may simply reflect the earlier fuelwood collector's preference for using easily obtained collected smaller branches. However, this distinction between the two pits perhaps supports the suggestion that they were not in use simultaneously.

13.14.11 Also of note is the use of lime, which was also present in the pollen from pit 2099 (ibid). Lime tends to be underrepresented in both pollen and charcoal assemblages, being an insect-pollinated tree whose charcoal tends to crumble easily, as well as being a poor fuelwood. Its presence as pollen and charcoal therefore suggests it was growing locally and was probably quite common. Lime struggles to recolonise secondary woodland, but is considered to have been a significant element of mid-Holocene primary woodlands (Grant *et al.* 2011), and its decline across lowland Britain during the late Neolithic to the late Bronze Age is generally attributed to clearance of primary woodland. Elsewhere in the Weald, the lime decline has been dated to 2000BC at both Brede Bridge and Pannel Bridge, but both Peasmarsh and Lea Farm show continuing high values for lime pollen after this date, indicating variations in the extent of clearance across the area (Waller and Schofield 2007).

Charred plant remains and charcoal from later Iron Age ditch 2118 and the later Iron Age and Roman sub-circular enclosure

13.14.12 Most of the assemblage from ditch 2118 (sample 1060) consists of oak, mostly heartwood, with two fragments of holly (*Ilex aquifolium*). Oak heartwood also predominates in the two assemblages from the circular enclosure. In the secondary fill (sample 1006, dated to cal. AD 80–250 (1836 ±30 BP; SUERC-73964 (GU44327)) all identifiable charcoal is oak, and all heartwood. The basal fill (sample 1007), while dominated by oak heartwood, does also contain small quantities of other taxa. Most are of the Betulaceae family, and include hazel, probable birch, and hazel/alder (*Corylus/Alnus*). A fragment of Maloideae charcoal was also identified; this is a subgroup of closely related, anatomically similar taxa in the Rosaceae family that includes hawthorn, apple (*Malus* sp.) and whitebeam (*Sorbus* sp.). This sample was dated to 210–50 cal. BC (2130 ±30 BP; SUERC-73969 (GU44328)).

13.14.13 A few non-charcoal plant remains were recovered from sample 1006: a single seed of bramble (*Rubus* sp.), a stone of hawthorn (*Crataegus* sp.), a fragment of hazelnut shell (*Corylus avellana*) and two seeds of corn spurry (*Spergula arvensis*). The first three of these may represent foraged wild foods, while the fourth is a common seed of arable fields, found mostly on sandy soils. No cereals were however found. The presence of charcoal of hazel and, very possibly, hawthorn does mean that these their nuts/stone could have arrived in the ditch after being collected incidentally alongside the wood.

Late Iron Age and Medieval fIre-pits

13.14.14 Numerous charcoal-rich pits with evidence of *in situ* burning, described as 'fire-pits', were excavated across the site. Radiocarbon dating revealed that these fire pits fall into two distinct groups, of Iron Age and medieval date. The charcoal assemblages from a total of nineteen firepit samples were analysed, revealing that the chronological division is mirrored by a split in the wood taxa they contain: those of Iron Age date consist almost entirely of oak, while beech is the dominant species in the medieval samples, supplemented by a little oak and birch, although charcoal from one oak-dominated firepit (sample 1001 from layer 3021 in firepit 320) was dated to the medieval period. The full results of this work are presented in the assessment below (see also Meen 2019), and a summary has been published (Meen in Allen 2021).

13.14.15 It was unclear whether this reflected a change in the preferred choice of fuelwood or a shift in woodland composition between the later prehistoric period and the Saxon period. A tentative link was made with the medieval glass industry, as the Weald was

one of the main centres of glass production in England and is known to have favoured beechwood fuel, and certainly exploited beech ash as a source of alkali.

13.14.16 Radiocarbon dates were subsequently obtained on charcoal from two other pits, neither of which were firepits, but one of which was dominated by oak (pit 2116), the other (pit 1813) by beech and birch. Pit 2116 gave a date range of 215–100 cal. BC (SUERC-90242 (GU53059); 2145±21BP) and pit 1813 a range of dates to cal. AD 1485–1645 (SUERC-90235 (GU53055); 332±20BP). This supports the view that the use of beech in later times represents a shift in woodland composition rather than specific fuelwood selection; the slightly later date of pit 1813 compared to the other beech-dominated samples suggested that beech continued to be an important resource at the site into the post-medieval period.

13.14.17 Analysis of pollen from middle Bronze Age burnt mound pit (2515) found that oak pollen comprises over a third of the total pollen sum; it was argued that this is evidence that oak was 'a significant component of the arboreal landscape' (Rutherford, section 16 below). Beech pollen was not observed in this sample. In contrast, pollen from a sequence through the medieval palaeochannel in WC1, dated AD 1050–1270 at the base of layer 20007 and AD 1220–1390 at the top of overlying deposit 20006 (see Radiocarbon report, section 12), reveals that by this time woodland composition was in flux (ibid.). It shows an overall reduction in arboreal pollen between, but this was largely due to a reduction in hazel and alder pollen; this period saw an actual increase in the proportion of both oak and beech pollen, building on low values for oak and only trace amounts of beech pollen at the base of the sequence. Despite the initial low values for beech pollen, beech was clearly growing very close to the channel at this time, as a beech fruit scale was recovered from bulk sample 1170 at the base of the pollen sequence (see below). The pollen and waterlogged plant remains therefore support the hypothesis that beech was growing in the area in the medieval period, and became an increasingly important part of the landscape as the period progressed.

Waterlogged plant remains from medieval channel sequence

13.14.18 Medieval date ranges have been obtained for samples of waterlogged seeds from the bottom and top of the waterlogged fills (see above). Any changes in composition of the waterlogged plant assemblages between these two samples thus reflect local vegetation change during the medieval period, and can be directly compared with the pollen record from the same sequence (Rutherford, section 16 below). More than one sample was taken from each of the two main waterlogged fills, but only the richest, which were the lowest within fill 20007 (sample 1170) and the uppermost within fill 20006 (1166), were fully analysed.

13.14.19 Table 48 quantifies the waterlogged plant remains identified from both samples and Figure 141 shows the relative proportions of plant taxa (calculated from absolute counts of seeds) that are associated with distinct ecological groupings. In this case, almost half of the macrofossils from the channel belong to taxa which are habitat specific. As is to be expected from a channel, the most strongly represented grouping is of aquatic and damp ground taxa, with the proportion at around 17% of the total in both samples. Sedges (*Carex* spp.) and rushes (*Juncus* sp.) are the most common taxa in both assemblages, and presumably would have been growing at the margins of the channel.

13.14.20 Figure 141 also illustrates a large rise in the number of plants associated with cultivated, waste or open ground habitats, with overall seed numbers in this category almost doubling by the top of the sequence. This rise is mostly accounted for by the increase in two

plants, nettle (*Urtica dioica*) and knotweed (*Persicaria* sp), which, together with a rise in grasses (Poaceae), indicates an expansion of waste ground. However, there is also a greater diversity of arable weeds, including corn marigold (*Glebionis segetum*), wild radish (*Raphanus raphanistrum*) and scarlet pimpernel (*Anagalis arvensis*).

13.14.21 In parallel with the rise of open ground taxa is a decline in tree, scrub and hedgerow taxa. The basal sample includes fruits of birch (*Betula* sp.), alder (*Alnus glutinosa*), whole, immature nuts of hazel (*Corylus avellana*), and, as noted above, a fruit scale of beech (*Fagus sylvatica).* While birch seeds disperse on the wind and may have come from further afield, the heavy hazelnuts and beech scale must have been growing close to the channel, whether on the site itself or further upstream. Only two alder seeds and a single seed of birch are present in the upper sample.

13.14.22 These trends agree with the results of the pollen from this sequence (Rutherford, *infra*). While the two forms of evidence have different sized catchments, both point to extensive woodland cover in the early part of the sequence. Arboreal pollen is dominated by hazel and alder, with birch and beech also represented. As the pollen sequence progresses, there is a drop in hazel and alder pollen, while grass and cereal pollen increases. The waterlogged plant remains provide further evidence that the local environment became increasing open through the medieval period, with areas of waste ground and arable cultivation.

13.14.23 Direct evidence of cereal cultivation at the site was recovered from upper sample 1166, in the form of a large number of spelt wheat glume bases (*Triticum spelta*). These were absent from context 20007, but a scan of the second sample from fill 20006, sample 1167, found it also contained a small number. The majority of the glume bases are waterlogged, with occasional charred examples. The grains of glume wheats are enclosed in hulls which need to be removed before the grain can be processed further, and the discarded glume bases are extremely common on later prehistoric and Roman sites in Britain, albeit more usually charred. However, by the medieval period, glume wheats had been supplanted in Britain by the free-threshing bread wheat (*Triticum aestivum*) and, less commonly, by rivet wheat (*Triticum turgidum*). The presence of spelt in this medieval context is therefore unusual.

13.14.24 A medieval date for the cultivation of spelt wheat was confirmed by radiocarbon dating of charred examples of glume bases and rachis fragments, which gave a date range of cal. AD 1275–1400 (Beta-94076 (GU55251); 642 ± 24 BP). Emmer wheat (*Triticum dicoccum*) has been found at sites of Saxon date in the Thames Valley (Pelling and Robinson 2000) and has been attributed to the influx of settlers from Saxony, where emmer continued to be cultivated. Following the Norman conquest, such cross-continental connections were increasingly strengthened as the medieval period progressed, and spelt could have been brought to England by landowners, farmers or merchants in a similar way; spelt was certainly being grown in parts of mainland Europe at this time (R. Pelling, pers. comm.). This evidence is therefore not entirely unexpected, but is highly significant, as confirmed spelt cultivation in Britain in the medieval period is very rare, and provides welcome confirmation of such contacts in agricultural practice.

Table 46: Wood charcoal identifications from further analysis

	Sample No.	1018	1060	1006	1007	1085	1086	1074	1076
	Context No.	434	2119	353	323	2512	2501	2047	2050
	Cut No.	435	2118			2099		2045	
	Feature Type	Pit	Ditch	Circular Enclosure		Burnt Mound Pit		Burnt Mound Pit	
	Period	Neolithic	LIA	ER	LIA	MBA		MBA	
	Calibrated Date	3530–3370 cal. BC		AD 80–250	210–50 cal. BC	1450–1370 cal. BC	1435–1300 cal. BC	1400–1200 cal. BC	1325–1225 cal. BC
	Charcoal >4mm	150	200	100	11	100		23	100
	Charcoal 4–2mm	500	1000	500	39	500	50	200	500
Prunus spinosa L.	blackthorn					1			
Prunus sp.	blackthorn/cherry					1			
Maloideae	hawthorn/whitebeam/apple				1	4	1	2	1
cf Maloideae	cf hawthorn/whitebeam/apple						2	4	
Quercus sp.	oak	47 (h)	46 (h)	48 h	51 (h)	58 (h)	33	28 (h)	82 (h)
cf *Quercus* sp.	cf oak	1	1		3		1	2	
Betulaceae	birch family				5				
Betula sp.	birch					7			2
cf *Betula*	cf birch				1				1
cf *Alnus glutinosa* (L.) Gaertn.	cf alder						2		
Corylus avellana L.	hazel				1	6		2	1
cf *Corylus avellana* L.	cf hazel				1			1	
Corylus/Alnus	hazel/alder				1				
cf Corylus/Alnus	cf hazel/alder				1				
Salix/Populus	willow/poplar					3			
cf *Salix/Populus*	cf willow/poplar							1	
Acer campestre L.	field maple					17 (r)	4		8
cf *Acer campestre*	cf field maple								1

Tilia sp.	lime					2			
Ilex aquifolium	holly		2						
ring porous								1	
diffuse porous					1		5	2	1
indet		2	1	2	4		2	7	3
TOTAL		**50**	**50**	**50**	**70**	**100**	**50**	**50**	**100**

h = heartwood, r = roundwood

Table 47: Charred plant remains from sample 1006

		Sample No.	**1006**
		Context No.	**353**
		Cut No.	
		Period	**ER**
		Radiocarbon Date	**AD 80–250**
		Sample Vol.	**12L**
Crataegus sp.	hawthorn	fruit stone	1
Rubus sp.	bramble	seed	1
Corylus avellana L.	hazel	nutshell fragment	1
Spergula arvensis L.	corn spurrey	seed	2
indet		tree bud	3

Table 48: Waterlogged plant remains from the medieval channel sequence
*Key: * <10; ** 10–50; *** 50–100*

		Sample No.	1166	1170
		Context No.	**20006**	**20007**
		Fraction analysed	**50%**	**100%**
CHARRED		**Radiocarbon date**	**cal. AD 1220–1390**	**cal. AD 1050–1270**
Triticum spelta	spelt wheat	glume base	17	
Triticum sp.	wheat	grain	2	
Poaceae	grass	seed	2	
WATERLOGGED				
Cultivated plants				
Triticum spelta	spelt wheat	glume base	165	
Cereale	cereal	detached coleoptile	1	
Plants of waste, cultivated or open ground				
Urtica dioica L.	common nettle	seed	22	7
Raphanus raphanistrum L.	wild radish	seed capsule fragment	1	
Persicaria sp.	knotweed	seed	20	3
Persicaria cf *maculosa* Gray	redshank	seed		1
cf *Polygonum aviculare* L.	knotgrass	seed fragment	1	
Agrostemma githago L.	corncockle	epidermis fragment	1	
Chenopodium/Atriplex	goosefoot/orache	seed	2	1
Anagallis arvensis L.	scarlet pimpernel	seed	1	
Plantago major L.	greater plantain	seed	1	8
cf *Lamium* sp.	dead-nettle	seed		1
Anthemis cotula L.	stinking chamomile	seed	3	3
Glebionis segetum (L.) Fourr.	corn marigold	seed	1	
Aethusa cynapium L.	fool's parsley	seed	1	
cf *Anethum graveolens* L.	dill	seed	1	
Grassland plants				
Leontodon sp.	hawkbit	seed	1	
Wood, scrub and hedgerow plants				
Fragaria cf *vesca* L.	wild strawberry	seed	1	2
Fagus sylvatica L.	beech	fruit scale		1
Betula sp.	birch	seed	1	7
Alnus glutinosa (L.) Gaertn.	alder	seed	2	1
Corylus avellana L.	hazel	whole immature nut		2
Corylus avellana L.	hazel	nutshell fragment		1
Oxalis acetosella L.	wood-sorrel	seed	2	
Wet ground and aquatic plants				
Ranunculus subgenus *Batrachium*	crowfoot	seed	4	
Lycopus europaeus L.	gypsywort	seed	1	15
Alisma plantago-aquatica L.	water-plantain	seed	3	2

cf *Alisma plantago-aquatica* L.	water-plantain	seed		1
Potamogeton sp.	pondweed	seed	12	
Juncus sp.	rush		**	***
Eleocharis palustris (L.) Roem & Schult	common spike-rush	seed	2	
cf *Eleocharis palustris* (L.) Roem & Schult	cf common spike-rush	seed	1	
Carex sp.	sedge	seed	12	9
Plants from broad ecological groupings				
Ranunculus acris/bulbosus/repens	meadow/bulbous/ creeping buttercup	seed	10	6
Rubus sp.	bramble	seed	15	33
Viola sp.	violet	seed	7	2
Hypericum sp.	St John's-wort	seed		3
Epilobium sp.	willow-herb	seed	6	
Rumex sp.	dock	seed	10	7
Stellaria sp.	stitchwort	seed	11	2
Cerastium sp.	mouse-ear	seed	3	
Solanum dulcamara L.	bittersweet	seed		7
Prunella vulgaris L.	Selfheal	seed	7	2
Mentha sp.	Mint	seed	2	9
Cirsium arvense (L.) Scop.	creeping thistle	seed		1
Lapsana communis L.	nipplewort	seed	2	1
Sonchus sp.	sowthistle	seed	2	
Sambucus nigra L.	elder	seed	1	5
Apiaceae	carrot family	seed	2	1
Daucus carota L.	wild carrot	seed	5	1
cf *Daucus carota* L.	cf wild carrot	seed		2
Poaceae	grass (small)	seed	4	
Poaceae	grass (medium)	seed	11	6
Poaceae	grass (large)	seed	3	
indet		seed	3	7
Buds			***	***

Charcoal and waterlogged wood from the 19th-century brickworks

13.14.25 Two samples associated with the nineteenth century brickworks contained large quantities of thin, straight wood that looked as if it might come from a deliberately managed source, rather than being brushwood or a natural accumulation of twigs. The wood in sample 1152 came from context 3041 within the flue of Kiln 2 and was preserved through charring, while sample 1155 came from context 3086, a layer at the end of the stokehole of Kiln 3, and was preserved through waterlogging. The species identifications and measurements of the charcoal from sample 1152 are given in Table 49, those of the waterlogged wood in sample 1155 in Table 50.

13.14.26 The most common roundwood taxa in sample 1152 is oak, at 78 of the 107 pieces examined: next is hazel (11 pieces), alder (5), willow/poplar (3), field maple and birch

(2 each) and finally dogwood (*Cornus* sp.), with a single piece identified. Most of the roundwood is straight and unbranched, and in the majority of pieces, both the pith and bark were preserved so that measurement could be made of the full cross section. It could be seen in a high proportion of pieces that the large vessels of the earlywood were at the very outer edge of the cross section, indicating that cutting of the branches occurred during the spring, when the earlywood is laid down. It was also observed that several of the pieces had wide-spaced first and sometimes second growth rings, indicative of rapid regrowth, presumably after being cut back.

13.14.27 The pieces of waterlogged wood from sample 1155 were well preserved and were often of large size. All of the examined material was roundwood, usually with a complete or near complete cross-section preserved, and with both bark and pith present. The wood composition was similar to that of sample 1152, with oak making up over half of the examined pieces. Small quantities were also identified of hazel, alder, ash (*Fraxinus excelsior*), rose (*Rosa* sp) and probable hawthorn type and willow/poplar. As with the charred material, the wood appeared to have been cut early in the year whilst earlywood was being laid down. Waterlogged wood in general is less likely to fragment compared to charcoal and does not suffer the shrinkage that is caused by the charring process, and therefore waterlogged material provides a closer approximation to the size of the original wood assemblage. However, unburnt material, which by its nature was never used as a fuel, may be unrepresentative of the material used as fuel and may be a small sized, discarded fraction of a larger sized wood harvest.

13.14.28 The measurements of the roundwood diameter and number of growth rings can be used to assess whether the wood came from a deliberately managed supply. The most common form of woodland management is coppicing, which involves the deliberate cutting of tree branches from the base or 'stool' of the tree. In many tree species native to Britain, including oak, hazel and alder, this form of management stimulates rapid regrowth of fresh shoots from the cut stool. This regrowth tends to produce characteristically long, straight poles, with growth fastest in the first couple of years after cutting (Rackham 1977, 67, although see critique in Out *et al.* 2013, 4084).

13.14.29 Coppicing may be carried out in a system of 'drawing'—where poles of similar size are harvested at the same time—or 'clear felling', where all the regrowth in a parcel of woodland is cleared at the same time, on a regular rotation (Rackham 1977, 67; Peterken 1987, 18). Drawing is likely produce a crop of poles of similar size, whereas clear felling will produce a crop in which all the poles are the same age and therefore, have the same number of annual rings, the exact number depending on the length of the rotation.

13.14.30 Measurement of both diameter and ring number was possible on 89 of the examined charcoal pieces. In 90% of cases, the ring count was four or fewer, and none of the pieces had more than seven rings. Figure 142 shows the frequency of ring count occurrence for oak, hazel alder and birch. The median diameter across all taxa was 4.46mm, with a standard deviation of 3.51. Figure 143 plots the diameter of the measured oak roundwood and shows it has a bimodal distribution, with the largest peak around 3.5mm and a smaller, more dispersed peak from *c* 8–11mm. These figures show that while the wood for the most part falls within a narrow range for both ring count and diameter, they are not uniform to the extent that they are indicative of cyclical cutting on a formal management system, nor are they of a practical size as a cultivated resource.

13.14.31 However, the wood clearly derives from deliberate cutting; two of the waterlogged pieces have tapered ends which appear to be cut marks, while the wide early rings of several pieces are indicative of rapid regrowth following pruning. In a high proportion of the examined pieces of both the charred and waterlogged material, the wood was cut in the spring during earlywood formation, so that the wood may have even all been cut in a single episode. This all points towards the regular maintenance of a hedge; if carried out once a year, concentrating on cutting back regrowth, it would show a comparable pattern of small branches and twigs of similar, but not identical, size and age. The taxa in both samples are all commonly found in hedgerows. The diversity of the assemblage and in particular the occurrence of dogwood, a slow coloniser which modern hedgerow surveys have found only occurs in hedges of older age and high species diversity (Reece 1990), indicates the cuttings are from a well-established hedgerow.

Table 49: Species identification and measurements of charcoal from sample 1152

Taxon	RW?	Pith	Bark	Diameter	No. growth rings	Notes
cf Quercus	rw	p			at least 4	Fast growth in first two years
cf Quercus	rw	p	b		2	Very straight twig
Unsure	rw	p	b		3	Quite isolated vessels, semi ring porous, shiny texture in TS, large pitting.
cf Quercus	rw	p	b		3	Cut close to growth ring, suggestive of spring cutting.
Unsure	rw	p	b		3	Same as other unknown. Fast grown first year.
Corylus	rw				at least 7	
cf Quercus	rw	p	b		4	fast grown first year.
Corylus	rw				at least 9	
cf Quercus	rw	p	b		3	Cut on edge of final earlywood vessels
Alnus	rw	p	b	3mm	3	Very straight twig, no forks. Cut on edge of final earlywood vessels.
Quercus	rw	p	b	>12.96	≥3	
Alnus	rw	p	b	6.66	4	
Quercus	rw	p	b	10.23	4	Cut at start of 4th ring
Quercus	rw	p	b	8.96	3	Cut at start of 3rd ring
Quercus	rw	p	b	8.76	3	Cut at start of 3rd ring
Quercus	rw	p	b	>3.73	2	Cut at start of 2nd ring
Quercus	rw	p	b	5.76	1	
Quercus	rw	p	b	7.34	2	Cut early in 2nd ring
Alnus	rw	p	b	11.84	2	Cut late in 2nd year
Salix/Populus	rw					No pith or bark; twisted and uneven
Corylus	rw	p	b	3.22	5	
Quercus	rw	p	b	2.72	3	
Quercus	rw	p		>8.78	≥4	
Quercus	rw	p	b	9.6	3	Cut early in 3rd ring
Quercus	rw	p		≥10.42	3	
Quercus	rw	p	b	3.9	2	Cut early in 2nd ring
Pinus sylvestris	non rw					
Quercus	rw	p	b	3.41	≥2	
Quercus	rw	p	b	3.46	4	Cut at start of 4th ring
Quercus	rw	p	b	8.92	3	Cut early on 3rd ring
Quercus	rw	p	b	3.62	3	Cut early on 3rd ring
Corylus	rw	p	b	2.63	4	
Quercus	rw	p	b	3.97	2	
Acer campestre	rw			>17.18		

Quercus	rw	p	b	8.7	4	Cut early on 4th ring
Quercus	rw	p	b	2.76	3	
Quercus	rw	p	b	1.87	4	Cut early on 4th ring
Quercus	rw	p	b	2.79	3	
Quercus	rw	p	b	7.58	3	4th growth ring just starting to develop at bark line
Quercus	rw	p	b	1.46	1	
Quercus	rw	p	b	2.78	2	
Quercus	rw	p	b	3.55	2	Cut early on 2nd ring
Quercus	rw	p	b	2.95	2	
Corylus	rw	p	b	2.04	3	
Quercus	rw	p	b	1.87	2	
Quercus	rw	p	b	11.44	5	Cut right at start of 5th ring
Quercus	rwf					
Quercus	rw	p	b	5.05	3	Cut early in 3rd ring
Quercus	rw		b	> 2.12	≥2	
Quercus	rw	p	b	5.44	2	
Salix/Populus	rw	p	b	2.96	1	
Quercus	rw	p	b	3.98	4	3rd ring very narrow; cut early on 4th ring
cf Quercus	rw	p	b	4.82	3	Cut early on 3rd ring
indet	rw	p	b	2.31	1	Mostly pith and phloem, very little xylem tissue
Quercus	rw	p	b	7.18	6	2nd ring very narrow; cut very early in 6th ring
Indet	rw	p	b	1.66	1	Little xylem tissue
Alnus	rw	p	b	≥4.46	≥1	
Quercus	rw	p	b	2.97	2	Cut very early in 2nd ring
Quercus	rw	p	b	10.98	3	Cut early in 3rd ring
Corylus	rw				≥4	
Quercus	rw	p	b	2.22	3	Long straight twig. Cut right at start of 3rd ring
Quercus	rw	p	b	2.24	3	Cut early in 3rd ring
Acer campestre	rw	p	b	5.8	5	Cut early in 5th ring
Quercus	rw	p	b	5.78	3	Cut early in 3rd ring
Quercus	rw	p		>7.98	≥2	
Betula	rw		b	>7.74	≥2	
Quercus	rw	p	b	4.57	2	Cut early on 2nd ring
Quercus	rw	p	b	3.09	4	Narrow 3rd ring. Cut early on 4th ring
Quercus	rw	p	b	11.12	2	
Quercus	rw	p	b	5.06	3	
cf Corylus	rw	p	b	3.14	1	
Quercus	rw	p	b	3.42	5	
Quercus	rw	p	b	4.32	3	Cut early in 3rd ring
Quercus	rw	p	b	3.57	3	Long straight twig
Quercus	rw	p	b	9.24	3	
Corylus	rw	p	b	1.67	3	Cut early in 3rd ring
Quercus	rw	p	b	11.36	2	
Quercus	rw	p	b	2.8	≥3	Final rings contracted, so difficult to tell how many
Quercus	rw	p	b	2.72	3	Cut early in 3rd ring
Quercus	rw	p	b	2.57	3	Cut early in 3rd ring
Quercus	rw	p	b	10.94	2	Large 1st ring
Quercus	rw	p	b	4.05	4	Cut early in 4th ring
Salix/Populus	rw	p	b	2.91		
Quercus	rw	p	b	>12.32	5	Cut at start of 4th ring
Quercus	rw	p	b	4.55	3	Cut early in 3rd ring
Quercus	rw	p	b	11.1	3	Cut early in 3rd ring

Quercus	rw	p	b	18.06	7	Knotted piece of roundwood
Quercus	rw	p	b	10.88	2	
Quercus	rw	p	b	5.35	3	Wide 2nd ring. Cut early on 3rd ring
Quercus	rw	p		>14	≥5	
Quercus	rw	p		>7.62	≥2	
Corylus	rw	p	b	7.64	3	Cut late in final ring
Quercus	rw	p	b	3.92	3	
Quercus	rw		b	9.56	3	
Betula	rw	p	b	2.23	4	
Quercus	rw	p	b	2.52	3	Cut early on 3rd ring
cf Cornus	rw	p	b	3.26	3	
Alnus	rw		b	7.04	3	
Quercus	rw	p	b	8.39	4	3rd ring very narrow, cut right on earlywood of 4th ring
Corylus	rw				≥6	
Quercus	rw	p	b	8.26	3	Cut early in 3rd ring
Quercus	rw	p	b	2.77	3	Long straight twig. Narrow first two rings. Cut right at start of 3rd ring
Quercus	rw	p	b	3.78	5	Cut during earlywood
Quercus	rw	p	b	4.12	3	Third ring just starting to develop. Straight twig
Corylus	rw		b		≥3	
Alnus	rw	p	b	11.22	2	
Quercus	rw	p	b	10.86	4	
Quercus	rw	p	b	4.82	3	Cut early in 3rd ring
Pinus cf sylvestris	non-rw					Sharp early latewood transition; no resin canals visible; subtle tooth shaped protrusions in tracheids; large pitting in crossfield

Table 50: Species identification and measurements of waterlogged wood from sample 1155

Taxon	RW?	Pith	Bark	Diameter	Length	No. growth rings	Notes
cf Quercus	roundwood	p				at least 4	Fast growth in first two years. Ring porous, uniseriate, dendritic latewood but no compound rays - identified as Quercus as Schweingruber (1990) has oak roundwood without compound rays
cf Quercus	roundwood	p	b			2	Very straight twig
Unsure	roundwood	p	b			3	Quite isolated vessels, semi ring porous, shiny texture in TS, large pitting.
cf Quercus	roundwood	p				3	Cut close to growth ring, suggestive of spring cutting.
Unsure	roundwood	p	b			3	Same as other unknown. Fast grown first year.
Corylus	roundwood fragment					at least 7	
cf Quercus	roundwood	p	b			4	fast grown first year.
Corylus	roundwood					at least 9	
cf Quercus	roundwood fragment	p	b			3	Cut on edge of final earlywood vessels
Alnus	roundwood twig	p	b	3mm		3	Very straight twig, no forks. Cut on edge of final earlywood vessels.

Quercus	rw	p		12.86	39.42	10	
Fraxinus	rw	p	b	8.32	36.03	9	
Quercus	rw	p	b	11.81	80.5	5	Slightly bent, no uniform
Maloideae	rw	p	b	4.82	86.83	c. 5	
Quercus	rw	p	b	11.11	34.72	10	Cut early on 10th ring
Quercus	rw	p	b	6.3	51.99	7	Tapered end, possibly cut. Cut early in 7th ring
cf Salix/Populus	rw	p	b	8.56	44.01	3	tapered at one end with clean break, appears to have been cut
Rosa sp.	rw	p		8.11	29.48	4	Cut close to 4th ring
Quercus	rw	p		13.77	46.14	≥7	rings get successively narrower
Diffuse porous	rw	p	b	5.71	79.08		S-shaped piece
Alnus	rw	p	b	7.25	45.82	4	Long, straight. Rings get successively narrower
Quercus	rw	p		14.18	55.1	≥9	long, straight, unbranched
Quercus	rw	p	b	12.35	57.51	6	Cut right at start of 6th ring. Fork at end.
Quercus	rw	p	b	7.92	38.87	7	Cut at start of 7th ring
cf Quercus	rw	p		3.89	35.32	3	

14 WOOD CHARCOAL FROM THE LATE PREHISTORIC AND MEDIEVAL FIRE-PITS

By Julia Meen

14.1 Introduction

14.1.1 Environmental samples from several fire-pits along the A21 scheme were processed as excavation proceeded. Brief assessments of the floated charred plant remains from these features were carried out prior to the start of the post-excavation assessment (see 13.1.1 above), confirming that they all contained abundant charcoal, but very few other charred plant remains. Initial radiocarbon dating of two examples returned Iron Age dates, confirming their ancient origin. The brief environmental assessment was considered sufficient to confirm the similar character of the fills of all of this type of feature, and so it was decided that, in view of the apparent significance of this category of feature, full analysis of the charcoal from these features would be undertaken at this stage (Detailed Scope of Post-Excavation Assessment, section 4.96). Seventeen samples were identified for analysis (ibid.). During the post-excavation assessment, two further features from which environmental samples had been taken and processed were also identified as fire-pits, so as a result 19 samples were analysed, and the results are described in this report.

14.1.2 A further unexpected phase of fieldwork was required in September and October 2017, and this revealed another fire-pit in IA7 (WC6B-C). Following agreement from the Principal Archaeologist and the Balfour Beatty Environmental Manager for the A21 scheme, the fill of this fire-pit (sample 1182 from context 1511) has also been analysed and included in this report, making a total of 20 samples in all.

14.1.3 Charcoal from a further ten fire-pits was submitted for radiocarbon dating. All of the additional samples provided dates and showed that the fire-pits belong either to the mid–late Iron Age (400 BC–AD 40) or to the medieval period (AD 1050–1270). For details of the dates see Table 40 and Fig. 140.

14.2 Aims

14.2.1 The fire-pits are presumed to relate to some type of industrial activity being carried out within the woodland, which used wood or wood charcoal as a fuel and created large deposits of fuel residue that survive within the pits. Radiocarbon dating shows that these features date to at least two different periods: the mid–late Iron Age and the high medieval period (11th to 13th century). Analysis of the charcoals from a selection of these fire-pits was undertaken to ascertain whether there are any differences in wood species composition between pits of different date or location across the scheme, which might relate to deliberate selection of particular fuels to suit certain industries, or to changing woodland composition over time. Analysis also aimed to look at the character of the wood: whether the charcoal derived from brushwood, mature trunkwood or converted timbers, whether it included smaller kindling, and to establish whether wood from a managed wood source (eg coppice) was being used. The results are described below and tabulated in Table 51.

14.3 Methodology

14.3.1 Seventeen samples were selected for full analysis, on the basis of initial assessment (see section 13.1.1) and prioritising the eight which had been radiocarbon dated as well as

others from primary fire-pit fills. A further three samples were later added. Fifty charcoal fragments were randomly selected from each sample, ensuring that a mixture of larger (>4mm) and smaller (4–2mm) fragments were studied to avoid any biases resulting from differing species fragmentation. Each fragment was fractured on the transverse, radial and tangential sections as required and examined using a Brunel Metallurgical SP-400BD microscope at up to x400 magnification. Identifications were made with reference to Schweingruber (1990). Characteristics such as presence of heartwood (indicated by the presence of tyloses within vessels), signs of vitrification, and the presence of especially closely spaced annual rings (which are indicative of slow grown wood) were noted. Roundwood was recorded in greater detail, with presence of pith and bark, diameter in cross section, and minimum numbers of annual rings recorded where possible. For sample 1114 where it was clear a high proportion of the charcoal was roundwood, the number of examined fragments was increased to 100, on the basis that a larger sample size might provide evidence of selection based on size/age and possible woodland management practices.

14.3.2 The charcoal species identified in the analysis from the fire-pit samples are given in Table 49 below, together with the radiocarbon date ranges of the dated samples. All radiocarbon dates are quoted as calibrated ranges using OXCAL to 2σ (95%) confidence and rounded out to the nearest 10 years.

14.4 Results

WC3

14.4.1 Sample 1031, from fill 1104 (undated), produced a small flot with a limited number of charcoal pieces of identifiable size. Few of these were greater than 4mm in size, and the small size of most of the pieces meant that definite identification to species was not always possible. Furthermore, over half overall of the potentially identifiable pieces were recovered from the heavy residue. These pieces were often mineral encrusted, causing them to not properly float, and this encrustation further hampered identification. Over one fifth of the examined fragments were consequently indeterminate. The remainder were dominated by oak (*Quercus*), many of which were clearly heartwood. A smaller number were alder (*Alnus glutinosa*) or probable alder, and a similar number were beech (*Fagus sylvatica*).

IA3

14.4.2 The charred material from sample 1068, from fill 2029 (radiocarbon dated to cal. AD 1040–1210) was often mineral encrusted. As a result, the charcoal was denser than normal and did not float well, so that only highly fragmentary charcoal was present in the flot, almost all were too small to be identifiable. However, a number of fragments were recovered from the heavy residues. More than half of the identifiable fragments were oak (*Quercus*), with the majority clearly heartwood. The remainder were diffuse porous taxa, which were sometimes difficult to identify to species as the mineral encrustation often obscured diagnostic features. However, beech (*Fagus*) was the second commonest taxa, followed by birch (*Betula*), with occasional provisional identifications of *Pomoideae* (a group which includes hawthorn and other anatomically similar taxa) and field maple (*Acer campestre*).

IA4

14.4.3 Sample 1001, from fill 321, (radiocarbon dated to cal. AD 1030–1210) contained almost exclusively oak (*Queircus*) charcoal. More than half of the 50 examined fragments

contained tyloses within the vessel cavities, characteristic of heartwood. Several of the fragments had closely spaced growth rings, indicating that the wood was slow-grown, and a small number of fragments had a glassy, vitrified appearance, possibly related to high temperature burning or industrial processes. A single fragment of roundwood, possibly beech (*Fagus*) or ivy (*Hedera*) was also present and this was radiocarbon-dated to cal. AD 1030–1210.

14.4.4 From sample 1011, from fill 522 (undated), only oak charcoal was identified. Just under half of these were clearly heartwood and many fragments had closely spaced rings indicative of slow grown wood; however, the proportion of fragments with these characteristics is likely to be underestimated, as where small fragments were identified it was difficult to see whether they were heartwood or to see enough of the transverse section to determine whether the rings were closely spaced. Fragments of bark, and pieces of charcoal with the bark still attached, were noted.

14.4.5 Sample 1114 from fill 2746 (radiocarbon dated to cal. AD 1160–1270) was strongly dominated by charcoal of beech (*Fagus sylvatica*), with around one quarter of examined beech fragments in the form of roundwood and the remainder with no evidence of curvature, suggesting that they come from larger branches or trunkwood. Of the 19 items of roundwood, further characteristics regarding diameter, presence of bark and pith, and number of annual growth rings, were recorded in all but three cases. The roundwood pieces generally fell into one of two categories: small twigs 2–6mm in diameter, with 1–5 growth rings, usually present as complete twig sections with bark and pith intact; and small to medium branchwood, usually present as a fragment rather than the entire cross section with pith and/or bark often missing, so that a full count of annual rings and measurement of the diameter could not be made, but with a minimum of 10 growth rings. The full quantification of the roundwood pieces in this sample is as follows:

14.4.6 Small twigs (nine items):

- Bark and pith present; 3mm diameter; four growth rings
- Bark and pith present; 2.5mm diameter, ?one growth ring
- Bark and pith present; 3mm diameter; four growth rings
- Bark and pith present; 5mm diameter; four growth rings
- Pith present; scraps of bark present; 5mm diameter; five growth rings
- Bark and pith present; 6mm diameter; five growth rings
- Bark and pith present; 2.5mm diameter; five growth rings
- Bark and pith present; 4mm diameter; four growth rings
- Bark and pith present; 2mm diameter; one growth ring
- Small to medium branchwood (seven items):
- Fragment; no pith or bark; at least 15 growth rings
- Fragment; bark but no pith; at least seven growth rings
- Fragment, bark and pith present; 12 growth rings

- Fragment; no pith or bark; at least 11 growth rings
- Fragment; pith but no bark; forked twig; at least 17 growth rings
- Fragment; pith but no bark; at least 21 growth rings
- Fragment; no pith or bark; at least two growth rings

14.4.7 Three small twigs of oak were also recovered from this sample, with similar dimensions and numbers of growth rings to the beech twigs. A small number of possible ivy (*Hedera helix*) fragments need to be further verified.

14.4.8 Sample 1088 from fill 2274 (undated) was split fairly evenly between charcoal of oak and beech, with occasional items of alder (*Alnus glutinosa*) and birch (*Betula* sp.). It was notable that there appeared to be a higher proportion of beech amongst the 4–2mm fragments, whilst the larger charcoal fragments were more biased in favour of oak, perhaps indicating that the beech was more susceptible to fragmentation. Most of the oak was clearly heartwood, with several pieces vitrified, and several pieces had closely spaced growth rings. The beech charcoal was a mixture of roundwood and non-roundwood; the five roundwood fragments were recorded as follows:

- Fragment; no pith or bark; at least 17 annual rings
- Fragment; bark but no pith; at least 12 growth rings
- Twig; diameter 4mm; eight growth rings
- Twig; diameter 2.5mm; five growth rings
- Twig; pith and bark; five growth rings

14.4.9 Again, there appears to be a mixture of larger branches and small twigs, although these twigs may well have been snapped off of the larger branches rather than having been deliberately collected.

HCA/IA4

14.4.10 Sample 1042 from fill 1408 (radiocarbon dated to cal AD 1050–1270) was split between birch (*Betula* sp.), the more dominant taxa, and to a lesser extent, oak, including much heartwood. Beech charcoal was also present rarely. None of the fragments were noted as being from roundwood.

IA5

14.4.11 Sample 1013, from fill 414 (undated), is dominated by oak charcoal, is majority of which is heartwood. Several of the heartwood fragments have closely spaced rings, indicating that they are from slow grown wood. Two of the oak fragments had curvature but were not from small roundwood; these did not contain pith or bark, so no estimate of age could be made. A further oak twig had both pith and bark preserved and had a diameter of 3mm and three growth rings. A much smaller proportion of hazel (*Corylus avellana*) charcoal was present in the assemblage, including one fragment of roundwood.

14.4.12 Sample 1015 from fill 421 (undated) is entirely composed of oak charcoal, with the majority of identified fragments clearly heartwood. A small number of fragments had closely spaced growth rings, indicating that they came from slow grown wood.

14.4.13 All identifiable fragments from sample 1016 from fill 416 (radiocarbon dated to 380–190 cal. BC) were oak, many of which were clearly heartwood. A small number of fragments had closely spaced growth rings, indicative of slow grown wood. A small twig, of 3mm diameter, was not identifiable to species, and a fragment of indeterminate bark was also present.

14.4.14 Sample 1019 from fill 454 (radiocarbon dated to cal. AD 1050–1260) contained abundant charcoal, often as large, chunky fragments, perhaps suggesting a primary deposit or dump. The assemblage was dominated by birch (*Betula*), with a smaller proportion of beech (*Fagus*). The assemblage is notably distinct from the other charcoal assemblage from the site in that no oak at all was identified. Roundwood was found rarely, but where present, in one piece each of beech and birch, it was as larger roundwood.

WC6C

14.4.15 Sample 1012, from fill 804 (undated), contained only oak charcoal. Tyloses, indicating heartwood, were visible in the vessels of all but one fragment, pointing to a homogeneous deposit of mature oak.

14.4.16 Sample 1048 from fill 1810 (undated) was entirely composed of oak charcoal, almost all of which contained tyloses within their vessels which indicated that they were heartwood.

14.4.17 Sample 1050 from fill 1311 (undated) was strongly dominated by oak charcoal, over half of which was clearly heartwood. A small number of these fragments were vitrified. A single fragment of beech was also present.

14.4.18 Sample 1051 from fill 1320 (2249 ±30 BP) was similarly dominated by oak charcoal, with the majority of examined fragments clearly heartwood.

WC6B-C

14.4.19 Almost all the charcoal from sample 1041, from fill 74005 (radiocarbon dated to 180 cal. BC–AD 10), was identified as oak, with the exception of three fragments which could not be identified to species (one of which was distorted due to vitrification). Of the 47 identified oak fragments, 36 had clear evidence of tyloses within the vessels, indicating heartwood; 18 were concreated with an iron precipitate; five had closely spaced annual rings, indicative of slow grown wood; seven were vitrified; and one was a fragment of roundwood, with both pith and bark preserved, allowing a count of three growth rings.

14.4.20 Sample 1182, from fill 1511 (radiocarbon dated to cal. AD 1200–1290) was dominated by charcoal of beech, a minority of which was roundwood. A small number of oak fragments, all of which were heartwood, and a single fragment of birch, were also noted. The five beech roundwood fragments were further recorded as follows:

- Roundwood fragment; pith; no bark; approx. 12 growth rings
- Roundwood; bark and pith present; eight annual rings
- Roundwood fragment—further measurement not possible
- Roundwood; bark and pith present; 12mm diameter; 14 growth rings
- Roundwood; bark and pith present; 8mm diameter; 14 growth rings

WC2 BR

14.4.21 Sample 1010, from primary pit fill 707 (radiocarbon dated to cal. AD 1220–1300), was dominated by charcoal of beech (*Fagus*), with both roundwood and non-roundwood present. The flot was very large and composed entirely of charcoal, including some large fragments. The vast majority of fragments are non-roundwood beech, suggesting that they derive from trunk or larger branchwood. Some roundwood is present, including medium branches (>17 growth rings) but also a number of small twigs. In one case it can be seen how one of these twigs is still attached to a larger branch, so it may be the case that the twigs derive from larger branches that have not been stripped down. A piece of bark was also noted, suggesting whole branches or twigs rather than converted wood. These smaller twigs often have both pith and bark and have between three and seven growth rings but are generally of very similar size (3mm diameter). A single hazel twig was of similar diameter. This might suggest that, were the twigs deliberately collected for example for kindling, that they were selected for size rather than age, although the limited number of them may argue against deliberate collection. The eight beech roundwood fragments with measurable characteristics were recorded as follows:

- Fragment; bark and pith; 17 growth rings
- Small branch; bark present; at least 11 growth rings
- Junction of small roundwood twig coming off larger branch
- Twig; bark and pith; five growth rings; diameter approx. 3mm
- Twig; pith and bark present; five growth rings; diameter approx. 3mm
- Twig; bark and pith present; three growth rings; 3mm diameter
- Twig; pith but no bark; five growth rings; 3mm diameter
- Twig; pith but no bark; seven growth rings; 3mm diameter
- There are also a small number of oak fragments, including heartwood.

Robingate Wood

14.4.22 Sample 1020 from fill 909 (radiocarbon dated to 390–200 cal. BC), was strongly dominated by oak charcoal, almost all of which was clearly heartwood. A single fragment of diffuse porous charcoal was not well enough preserved to be identified further. A fragment of conifer wood was also present. It is provisionally suggested that yew (*Taxus*) is the most likely candidate, but the angled spiral thickenings which would confirm this identification could not be observed.

Potters Wood

14.4.23 Sample 1039 from fill 66004 (radiocarbon dated to 170 cal. BC–AD 10) was strongly dominated by oak charcoal, much of which was clearly heartwood. Several of the oak fragments had closely spaced rings, suggesting they were from slow grown wood. A small proportion of the assemblage consisted of diffuse porous taxa, including field maple (*Acer campestre*) and hawthorn type (*Pomoideae*), as well as in indet type with scalariform perforation plates, most likely one of the *Betulaceae* (hazel, alder, birch, etc.).

14.5 Discussion

Exploitation of mature oak woodlands in the mid–to–late Iron Age

14.5.1 Two groupings of the fire-pits can be suggested. The first is characterised by a dominance or exclusivity of oak charcoal. This group includes all the samples radiocarbon dated to the Mid to Late Iron Age (Fig. 140). The oak charcoal often has tyloses within their vessels, indicative of heartwood. Roundwood was rarely present. The physiological changes that cause heartwood formation occur only in oak trees over 35 years old (Cowgill 2003, 51), so the presence of mostly oak heartwood suggests that a mature oak woodland was being exploited for fuel, rather than collection of younger branchwood from a managed system. Of the twelve samples that can be placed in this group, seven included oak with closely spaced rings. This is indicative of slow grown wood and might be expected within a closed woodland with high competition for resources; it is the opposite of what would be expected wood taken from a managed woodland, where quickly regenerating branches produce widely spaced rings. The indications are, therefore, that fuelwood was being taken from mature oaks, with large branches being cut or whole trees being felled to meet fuel demands. This suggests that woodland was in good supply at this time. Cato recommended that Roman farmers should manage their woodlands carefully to ensure firewood supplies, and there is evidence that the Romans coppiced British woodlands for both construction materials and to fuel their kilns and furnaces (eg at Farmoor in Oxfordshire; Lambrick and Robinson 1979). Dark has suggested that woodland management would have been essential in order to supply the increasing industrial and domestic demands of the Romano-British period (Dark 2000, 121). However, there is little conclusive evidence for the practice from the Iron Age. It may well be that the woodlands of the Weald were still so extensive by the late Iron Age that the local population felt no urgency to conserve them.

14.5.2 Pollen records from several sites close to Rye give an indication of Holocene vegetation change in part of the High Weald (Waller and Schofield 2007) and highlight the impact human activity has had on the composition of woodland in the area. These records identify a first episode of clearance dated to around 2000BC, with arboreal pollen values falling and an inferred shrinking of the lime dominated forest. However, the records then point to a period of relative continuity in woodland composition and extent that lasts from the Late Bronze Age all the way to the Saxon period. Values for oak remain fairly constant, even during the Late Iron Age and Roman period, a time in which iron production was a major industry in the Weald and would have placed a great demand for oak fuel. Conversely, there was no indication of woodland expansion at the end of the Roman period (ibid.).

14.5.3 Two of the oak-dominated samples also produced medieval radiocarbon dates, indicating that some mature oaks survived in the medieval local landscape, and were still being harvested for fuel.

Beech and Birch: medieval fuels

14.5.4 The second group of samples that can be distinguished is characterised by the presence of beech (*Fagus sylvatica*) in almost and in some, the additional presence of birch (*Betula* sp).

14.5.5 Three samples are strongly dominated by beech, with a little oak: 1010, 1114 and 1182, from IA5, IA4 and WC6c-b respectively; all three of these have been radiocarbon dated to the high medieval period (AD 1220–1300, 1160–1270 and 1200–1300).

14.5.6 Sample 1068, from IA3 and dated to cal. AD 1040–1210, was dominated by mature oak, with lesser quantities of beech and birch. A further sample from IA4, sample 1088, has a fairly even mixture of beech and oak; this sample has not been radiocarbon dated.

14.5.7 Two samples are notable for being dominated by birch: 1042 (from HCA/IA4) and 1019 (from IA5). Sample 1042, which is mixed with mature oak (and a little beech), is radiocarbon dated to cal. AD 1050–1270. 1042; sample 1019 apparently contains no oak at all, being mixed with a small quantity of beech, and is radiocarbon dated to cal. AD 1050–1260.

14.5.8 This group are therefore all radiocarbon dated to the medieval period, and none of the samples dated to the late Iron Age.

14.5.9 The pollen records from the Rye area discussed above show an increase in beech pollen values around AD 700. There is no corresponding evidence for woodland regeneration which, Waller and Schofield (2007, 381) suggest, 'implies a change in the character of human activity in the Weald, rather than its removal'. They suggest that this change in activity was the development of a system of wood pasture in the High Weald. Grazing of pigs in woodland encourages beech at the expense of other trees, as pigs tend to both avoid consuming beech and cause ground disturbance, which beech seeds require for their development (ibid.). A change in woodland composition to beech in the first millennium AD has been observed at other sites in southern England, for example during the Roman period at Epping Forest, Essex, where the shift has also been attributed to grazing pressures (discussed in Dark 2017).

14.5.10 The division between oak-dominated mid–to–late Iron Age charcoal deposits and beech containing High Medieval charcoal deposits probably reflects, therefore, the shift in woodland composition from an oak dominated mature forest in the later prehistoric period, to a beech dominated wood pasture from the Saxon period onwards. However, the pollen record from the current site is needed to see if this theory holds true. This does not rule out specific selection of particular wood taxa for their fuel properties: the dominance of beech in at least three of the medieval samples suggests beech was being deliberately chosen. A tentative link with glassmaking is possible, as beech is known to have been favoured for the production of potash (Charleston 1991), but further contextual and documentary research is needed to clarify this.

14.6 Table of charcoal and radiocarbon dates from fire-pits

Table 51: Charcoal species from fire-pit samples and their radiocarbon dates

Sample No.	**1031**	**1068**	**1001**	**1011**	**1088**	**1114**	**1042**	**1013**	**1015**	**1016**
Context	**1104**	**2029**	**321**	**522**	**2274**	**2746**	**1408**	**414**	**421**	**416**
Site area	**WC3**	**IA3**	**IA4**	**IA4**	**IA4**	**IA4**	**HCA/IA4**	**IA5**	**IA5**	**IA5**
C14 date		AD 1040–1210	AD 1030–1210			AD1160–1270	AD1050–1270			380–190BC
Wood species										
Conifer (? Taxus)										
Quercus	19 (h)	19 (h)	44 (h)	45 (h)	19 (h)	2 r	19 (h)	42 (h)	50 (h)	45 (h)
cf Quercus	10	3 (h)	4 (h)	1	2	1 r		1 r		2
Corylus avellana								5		
cf Corylus avellana								1 r		
Corylus/Alnus	1									
Alnus glutinosa	1				1					
cf Alnus glutinosa	2									
Betula		2			5		27			
cf Betula		2			2		1			
Fagus	5	7			17 (r)	88 (r)	2			
cf Fagus	1					3 (r)				
Pomoideae						2				
cf Pomoideae		2								
Acer campestre										
cf Acer campestre		1								
cf Hedera						3				
Hedera/Fagus						1				
Diffuse porous		3								
indet roundwood (Fagus? Hedera?)			1							
indet	11	1	2	4	4		1	1		1

Sample No.	1031	1068	1001	1011	1088	1114	1042	1013	1015	1016
Context	**1104**	**2029**	**321**	**522**	**2274**	**2746**	**1408**	**414**	**421**	**416**
Site area	**WC3**	**IA3**	**IA4**	**IA4**	**IA4**	**IA4**	**HCA/IA4**	**IA5**	**IA5**	**IA5**
C14 date		AD 1040–1210	AD 1030–1210			AD1160–1270	AD1050–1270			380–190BC
Wood species										
indet bark										1
cf root										1
slow grown oak?			#	#	#			#	#	#
fe precipitate?										
vitrification?	#		#		#	#	#			
oak roundwood?						#		#		

Table 51 (continued): Charcoal species from fire-pit samples and their radiocarbon dates

Sample No.	1019	1010	1012	1020	1039	1041	1182	1048	1050	1051
Context	**454**	**701**	**804**	**909**	**66004**	**74005**	**1511**	**1810**	**1311**	**1320**
Site area	**IA5**	**WC2 BR**	**WC6C**	**RG**	**PW**	**WC6b-c**	**WC6b-c**	**WC6C**	**WC6C**	**WC6C**
C14 date	AD 1050–1260	AD 1200–1300		390–200BC	170BC-AD10	180BC-AD10	AD 1200–1290			400–200BC
Wood species										
Conifer (? Taxus)				1						
Quercus		5 (h)	50 h	48 (h)	41 (h)	49 (h, r)	3 (h)	50 (h)	44 (h)	48 (h)
cf Quercus									3	1
Corylus avellana										
cf Corylus avellana										
Corylus/Alnus		1								
Alnus glutinosa										
cf Alnus glutinosa										
Betula	37 (r)						1			
cf Betula										
Fagus	9 (r)	43 (r)					43 (r)		1	

Sample No.	**1019**	**1010**	**1012**	**1020**	**1039**	**1041**	**1182**	**1048**	**1050**	**1051**
Context	**454**	**701**	**804**	**909**	**66004**	**74005**	**1511**	**1810**	**1311**	**1320**
Site area	**IA5**	**WC2 BR**	**WC6C**	**RG**	**PW**	**WC6b-c**	**WC6b-c**	**WC6C**	**WC6C**	**WC6C**
C14 date	AD 1050–1260	AD 1200–1300		390–200BC	170BC-AD10	180BC-AD10	AD 1200–1290			400–200BC
Wood species										
cf Fagus	1						1			
Pomoideae	1				1					
cf Pomoideae										
Acer campestre					1 r					
cf Acer campestre										
cf Hedera										
Hedera/Fagus										
Diffuse porous				1	3		1			
indet roundwood (Fagus? Hedera?)										
indet	1				4	3			2	1
indet bark	1	1								
cf root										
slow grown oak?					#	#				
fe precipitate?						#				
vitrification?						#			#	#
oak roundwood?						#				

15 ANIMAL BONES

By Lee Broderick

15.1 Introduction

15.1.1 Prevailing soil conditions meant that very few animal bones were recovered. Most of the faunal remains recovered were principally from recent depositions. The collected assemblage was assessed at Oxford Archaeology using a comparative reference collection.

15.2 Summary

15.2.1 Most of the sites produced small quantities of indeterminate mammal bones, with a few bones of cattle and sheep/goats (Table 52). One domestic fowl bone was recovered from Burgess Hill and one from a rabbit from Burgess Rough Barn. The Middle Lodge evaluation site yielded several sheep/goat bones as well as specimens of pig and dog.

15.2.2 The largest assemblage came from the WC2BR kilns, equating to nearly half the total assemblage (98 specimens in total). These included several more rabbit specimens which may be from a collapsed burrow (several whole skulls were present), as well as the remains of a pig recorded as an animal burial by the excavator. Given the age and location of this deposit it probably represents the disposal of deadstock. Documentary information suggests that the site of the brickworks became a piggery in the middle of the 20th century, and the pig skeleton may well have derived from this phase of site use.

15.2.3 Overall, the assemblage represents the scant background signature of a variety modern activities spread over a large area. Given that, it is impossible to say anything further about the data.

15.3 Animal bone table

Table 52: Summary of animal bones from all the A21 sites

Taxa	Burgess Hill	Burgess Hill Farm	Burgess Rough Barn	Burgess Rough Platform	IA3	Middle Lodge Balancing Pond	Middle Lodge Evaluation	WC2BR	WC2BR kilns	WC2 sheds
Cattle		1		1				2	2	3
sheep/goat		1					11	1	2	
Pig							2		14	2
Dog							1			
Rabbit			1						14	
Total mammal	*0*	*2*	*1*	*1*	*0*	*0*	*42*	*3*	*32*	*5*
Bird								1		
Goose									1	
domestic fowl	1									
Total bird	*1*	*0*	*0*	*0*	*0*	*0*	*0*	*1*	*1*	*0*
Unidentified	5	6	1	3	3	1	28	9	65	21
Total	5	8	1	4	3	1	42	13	98	26

16 POLLEN ANALYSIS

By Mairead Rutherford

16.1 Introduction

16.1.1 One sub-sample from the lowest deposit from the 'burnt mound' complex and four sub-samples from the medieval palaeochannel sequence were submitted for palynological analysis. Radiocarbon date from the pits associated with the 'burnt mound' complex have indicated a middle Bronze Age date range (1450–1200 cal. BC). This complex is considered to be a significant discovery for Kent and the south-east region because it is the first to be found in the High Weald of Kent and because it has the potential to provide information about the contemporary environment. The medieval channel sequence has been broadly dated to the later 11th to 14th centuries.

16.2 Methodology

16.2.1 The samples for pollen assessment were prepared using a standard chemical procedure (method B of Berglund and Ralska-Jasiewiczowa 1986), using HCl, NaOH, sieving, HF, and Erdtman's acetolysis, to remove carbonates, humic acids, particles > 170 microns, silicates and cellulose, respectively. The samples were then stained with safranin, dehydrated in tertiary butyl alcohol, and the residues mounted in 2000cs silicone oil. Slides were examined at a magnification of 400x by ten equally-spaced traverses across at least two slides to reduce the possible effects of differential dispersal on the slides (Brooks and Thomas 1967) or until at least 100 pollen grains were counted. If sufficient pollen was present, the assemblages were analysed until between 300–500 grains were counted (including trees, shrubs, herbs and spores). Pollen identification was made following the keys of Moore *et al.* (1991), Faegri and Iversen (1989), and a small modern reference collection. Identification of non-pollen palynomorphs (NPP) follows van Geel and Aptroot (2006). Plant nomenclature follows Stace (2010).

16.2.2 Pollen data are presented as percentage diagrams using the computer programs TILIA and TGView (Grimm 2011). The percentage values are based on a total land pollen (TLP) sum that includes trees, shrubs, herbs and fern spores. Rare pollen types (single occurrences of taxa) are marked on the diagrams using a symbol. Deteriorated grains and microscopic charcoal particles are expressed as percentages of TLP plus the respective sum to which they belong. Context numbers are shown on the pollen diagram (Figs 144 and 145).

16.3 Results

16.3.1 All samples contained good pollen assemblages, of variable mixed preservation.

'Burnt mound' complex, Site 5 <1085> (*2515*)

Description of pollen assemblages

16.3.2 Tree and shrub pollen comprise approximately 54% of the total pollen counted, herbs 26% and ferns approximately 20% (Fig. 144). Tree pollen is dominated by oak (*Quercus*; 35% of the total pollen sum), followed by hazel-type (*Corylus avellana*-type; approximately 10% total pollen count) with fewer counts of birch (*Betula*), pine (*Pinus*), alder (*Alnus*), lime (*Tilia*), holly (*Ilex*), ash (*Fraxinus*), ivy (*Hedera*) and heather (*Calluna*). A diverse herb assemblage is also recorded, including abundant grasses (Poaceae, approximately 10% of the total pollen

count), ribwort plantain (*Plantago lanceolata*), docks/sorrels (*Rumex*-type), goosefoot family (Amaranthaceae, formerly Chenopodiaceae, including taxa such as good king henry, fat-hen and many-seeded goosefoot), dandelion-type (*Taraxacum*-type), daisies (Asteraceae, a large group including taxa such as hawkbits, oxtongues and sow-thistles), carrot family (Apiaceae, including diverse plants such as cow parsley, pignuts and water-dropworts), buttercup-type (*Ranunculus*-type), pinks (Caryophyllaceae), mugworts (*Artemisia*), meadowsweets (*Filipendula*), cinquefoils (*Potentilla*-type), pea family (Fabaceae, including vetches, clovers and peas) and redshank (*Persicaria maculosa*). Several grains of Cereal-type pollen / large grass pollen are recorded within the sub-sample.

16.3.3 Fern spores are also recorded and include, in particular, bracken (*Pteridium aquilinum)*, with fewer counts for common polypody (*Polypodium vulgare),* and monolete ferns (Pteropsida). Microscopic charcoal particles are commonly recorded.

Interpretation of pollen assemblages

16.3.4 As only one spot-sample is available from the base of the sequence, any interpretation of the pollen assemblages derived from that sample is limited to a snap-shot of the vegetation types present at that time. The base of the sequence was the only part felt on site to be suitable for pollen preservation, and so the overlying deposits were not sampled.

16.3.5 The pollen data from this one spot-sample may be interpreted to suggest that a mosaic of landscapes existed during the middle Bronze Age at this site. Pollen from trees is overwhelmingly dominated by oak, suggesting development of local or regional oak woodland, or both. Although this pollen type is dispersed by wind, the abundance of oak (when compared with other wind dispersed tree pollen such as alder and hazel-type) suggests that oak was a significant component of the arboreal landscape, or that stands of oak may have existed closer to the site. Oak may have occurred as a (dominant) constituent of mixed deciduous woodlands; other trees/shrubs comprising this woodland probably including hazel-type, alder, birch, ash, lime and holly. Coniferous pine trees were also present, probably regionally, as the pollen of pine is very easily wind transported and if growing locally, would be expected to contribute greater numbers to the overall tree/shrub assemblage. The openness of the woodland is indicated from pollen of ash and holly, trees that takes advantage of open spaces, and the occurrence also of ivy, which may possibly indicate opportunistic presence in a more open woodland (Garbett 1981). Heather is derived from acid moorland, suggesting either the existence of moorland nearby or deliberate collection of heather, perhaps for specific purposes (for example, bedding, roofing).

16.3.6 Pollen of herbs accounts for just over a quarter of the total pollen count and is dominated by grasses, indicative of open areas including, for example, along field edges or hedgerows, trackways, on rough or waste ground, as well as, potentially, of cleared areas within or adjacent to woodlands. A wide variety of other herbs is also recorded, including those associated with disturbance, such as ribwort plantain, docks/sorrels, mugworts and pollen of the goosefoot family. Ribwort plantain has been interpreted as an indicator of grazing pressure (Tipping 2002) and is commonly found in grassy areas (Stace 2010) and may be indicative of wet meadows/pastures (Behre 1981). However, no fungal spores associated specifically with grazing animals, have been recorded in the pollen profile and therefore cannot further support use of the land for grazing.

16.3.7 Low numbers of cereal-type pollen grains, the dimensions of which include probable occurrences of barley (*Hordeum*-type) as well as wheat/oats (*Triticum/Avena*-type), are also recorded. Cereal-type pollen may be indicative of arable agriculture in the vicinity or local cereal processing, or cereal-type pollen grains may have entered the sequences along with straw or animal dung. The dimensions of cereal-type pollen overlap with those of wild grasses, such as sweet-grasses (*Glyceria* spp.), which are known to occur in damp areas (Stace 2010). Cereal-type pollen may be distinguished with careful identification and within the context of the overall pollen assemblage (Anderson 1979; Tweddle *et al.* 2005; Joly *et al.* 2007). The occurrence of pollen of redshank and goosefoot family, which grow on waste, open or cultivated ground, and mugworts, found on waste / grassy places, support an interpretation of open ground, that may have been suitable for low-scale arable cultivation.

16.3.8 The assemblage also includes fern spores, comprising bracken, common polypody and monolete ferns, all of which are common components of understory woodland and epiphytic on woodland trees. Bracken is known as an aggressive invader of open spaces (Wiltshire 2008) and may thrive in woodland edge locations, from where it might have been collected, potentially for use as bedding for people or litter for animals. Bracken is also known to grow preferentially in areas subject to burning (Innes 1999). Moderate to common counts of microcharcoal particles also suggest burning, which could have originated from local wood burning, for example, as a product of using domestic hearths or for heating water. Microcharcoal particles could also have been wind derived from a regional source.

16.3.9 Summary of results of spot-sample from the base of the 'burnt mound' complex:

- Evidence for mixed deciduous woodlands, of which oak would be the major component.
- Evidence for existence of openness in the woodland canopy.
- Evidence for open, probably cleared, grassy areas, which could have been used for low scale cereal-type cultivation and potentially for grazing animals.
- Evidence for burning events, based on microcharcoal records.
- Evidence for damp ground, supporting plants such as meadowsweet and docks/sorrels as well as trees including alder.

Medieval channel, site 29 monolith series <1161><1162><1163>; deposits (20006)(20007)

Pollen taphonomy from palaeochannel sequences

16.3.10 The taphonomic processes leading to the accumulation and preservation of pollen in alluvial sediments are complex and pollen may derive from a variety of sources. For instance, it may represent airborne pollen or water transported pollen; pollen derived from pastoral and arable environments, from fen-carr woodlands, from aquatic and mire communities, from wet meadows or from grassland areas subject to flooding. Pollen could be derived from upstream and/or downstream, eroded from older alluvial sediments or derived from anthropogenic activities, such as coppicing or pollarding or crop processing, or as a result of animal trampling. Despite these difficulties, valuable palaeoenvironmental data can be obtained from alluvial deposits and palaeochannel sequences, especially, in an archaeological setting, when layered deposits are available for analysis. Pollen analysis is of particular value,

as regularly spaced samples through continuously deposited sediments provide a more coherent picture of palaeoenvironmental change.

Description of pollen assemblages

16.3.11 From the profile analysed for pollen from the palaeochannel, tree pollen accounts for just under 70% at the bottom, to approximately 30% at the top, of the total pollen counted (Fig. 145). The deepest sub-sample is dominated by hazel-type (*Corylus avellana*-type) pollen, with significant counts also for pollen of alder (*Alnus*). Other tree types represented include oak (*Quercus*), birch (*Betula*), heather (*Calluna*) and pine (*Pinus*) with occurrences only of beech (*Fagus*), holly (*Ilex*) and ivy (*Hedera*). Following a gap in sub-sampling of approximately 0.4m, the pollen profile shows a decrease in overall tree pollen, to approximately 40% of the total pollen counted, declining to 30% in the topmost sub-sample analysed. This decrease in tree pollen may be attributed largely to a decrease in hazel-type and alder. Values for pollen of oak and beech increase towards the top of the profile and there are sporadic occurrences of ash (*Fraxinus*), honeysuckle (*Lonicera*), willow (*Salix*), lime (*Tilia*) and walnut (*Juglans*).

16.3.12 Pollen of herbs includes primarily pollen of grasses (Poaceae), dandelion-type (*Taraxacum*-type), daisies (Asteraceae, a large group including taxa such as hawkbits, oxtongues and sow-thistles), ribwort plantain (*Plantago lanceolata*), common knapweed (*Centaurea nigra*), sedges (Cyperaceae), cabbage family (Brassicaceae, a large group including plants such as garlic mustard, cabbages and radishes) and goosefoot family (Amaranthaceae, formerly Chenopodiaceae, including taxa such as good king henry, fat-hen and many-seeded goosefoot). Other herbs include occurrences of the pollen of pinks (Caryophyllaceae), the pea family (Fabaceae, including vetches, clovers and peas), hoary/greater plantain (*Plantago media/major*), knotgrass (*Polygonum aviculare*), docks/sorrels (*Rumex*-type), willow-herbs (*Epilobium*-type), buttercup-type (*Ranunculus*-type) and mugworts (*Artemisia*).

16.3.13 Cereal-type pollen, the dimensions for which suggest grains of both barley (*Hordeum*-type) and wheat/oats (*Triticum/Avena*-type), or large grass pollen, is absent from the deepest sub-sample but present consistently through the rest of the analysed section. Fern spores are also recorded and include decreasing levels of common polypody (*Polypodium vulgare),* increasing spores of bracken (*Pteridium aquilinum)* and varying quantities of monolete ferns (Pteropsida). *Sphagnum* moss spores are present in low numbers and there is a record for pollen of the aquatic plant, lesser bulrush (*Typha angustifolia*). Fungal spores of *Cercophora* (HdV-112) are present in small quantities within deposit 20006. Microcharcoal particles increase from low levels to moderate levels through the sequence sub-sampled. Pollen grains that are unidentified through deterioration (crumpled, concealed or broken) represent approximately 10% of the total pollen count.

Interpretation of pollen assemblages

16.3.14 The arboreal pollen data may be interpreted to suggest declining woodland abundance, from the bottom to the top of the section analysed from the palaeochannel deposits. In particular, values for pollen of hazel-type fall significantly through deposit 20007. However, the overall composition of woodland taxa increases, to include a range of trees and shrubs, in particular, beech and oak, with occurrences also of ash (*Fraxinus*), honeysuckle (*Lonicera*), willow (*Salix*), lime (*Tilia*) and walnut (*Juglans*). Pollen from several of these taxa

may have been derived from managed woodland or ornamental gardens and may have arrived at the site via fluvial transport from elsewhere in the catchment.

16.3.15 Overall declining numbers of tree/shrub pollen are matched by increasing values of herbs, in particular grasses. These data suggest increasing openness in the surrounding landscape, with evidence of both possible arable and pastoral cultivation. Cereal-type pollen, which is absent in the deepest sub-sample but present in the remaining overlying sub-samples, may be indicative of arable agriculture or cereal processing in the catchment; the pollen grains, whose dimensions suggest pollen of barley (*Hordeum*-type) as well as wheat/oats (*Triticum*/*Avena*–type), may have been fluvially transported. Alternatively the cereal-type pollen here may be attributable to wild grasses of similar dimensions, such as sweet-grasses (*Glyceria*-type) (Andersen 1979, Tweddle *et al.* 2005, Joly *et al.* 2007). Sweet-grasses are aquatic or marsh plants that grow on mud or in shallow water, marshes and wet meadows (Stace 2010). Support for potential arable land in the catchment may be derived from pollen of the goosefoot family, which potentially includes many species of waste or cultivated ground, for example, many-seeded goosefoot, fat-hen (Stace 2010), and from pollen of knotgrass, although knotgrass is also known from fallow land, footpaths and ruderal communities (Behre 1981).

16.3.16 The pollen data suggest an increasingly open palaeoenvironment, supporting herb-rich grassland. Ribwort plantain, for example, is commonly found in grassy areas (Stace 2010) and may be indicative of wet meadows/pastures (Behre 1981). Wet fields and meadows adjacent to a channel may have been used as pasture-land; the occurrence of low numbers of the coprophilous fungal spore *Cercophora* (HdV-112), may support animals grazing; however, these fungal spores can also occur on decaying wood (van Geel and Aptroot 2006). Sedge pollen, also present in the assemblage, derives from plants of aquatic or wet areas and willowherbs are largely known from damp ground but can also occur on cultivated or waste land (Stace 2010). There is an isolated occurrence of pollen from the aquatic plant, lesser bulrush, known to grow in or by reed-swamps, slow rivers and ponds (Stace 2010). Pollen of plants that grow in grassy places, rough ground and waysides are also well represented and include common knapweed, dandelion-type and buttercup-type.

16.3.17 Ferns, including common polypody and bracken are common components of understory woodland but also occur on woodland edges. Bracken is known as an aggressive invader of open spaces (Wiltshire 2008) but is also known to grow preferentially in areas subject to burning (Innes 1999). Bracken may possibly have used as bedding for people or litter for animals. Microcharcoal particles suggest burning episodes, with some evidence for an increase in such events towards the top of the section analysed. These particles could have originated from wood burning (possibly of hazel-type and alder, as values for the pollen of these tree types decreases towards the top of the diagram, coincident with increasing levels of microcharcoal) or as a product of using domestic hearths or ovens or could possibly have been derived from an industrial source, for example, from iron or pottery industries. The particles may have been wind derived or may have arrived at the site via fluvial transport.

16.3.18 Summary of results of pollen analysis through the medieval palaeochannel:

- Woodland clearance is evident, with decrease in hazel-type and alder woodlands.
- Although the overall percentage of woodland cover is interpreted as reduced, the variety of different tree types is seen to increase, suggesting possibly managed

woodlands, and perhaps planting of trees of ornamental value such as beech and walnut.

- Reduction in woodland cover within the catchment of the channel is offset by an expansion of open, grassland areas.
- Such open areas could have been used for both arable and pastoral farming.
- There is evidence for wet or damp ground, supporting plants such as lesser bulrush and sedges.
- Small to increasing amounts of microcharcoal suggest that activities concerned with burning wood (for example, for use in domestic fires or hearths or perhaps utilising wood for industrial activity) may have occurred within the catchment.

16.4 Discussion

Vegetational history

16.4.1 Pollen sequences from the mid-late Holocene from the Rye area (East Sussex) provide an overview of the vegetation and land-use changes on the edge of the Weald (Waller and Schofield 2007). In brief, the lime-dominated woodlands of the mid-Holocene were initially exploited in the Neolithic but more extensively cleared from the beginning of the Bronze Age. A regional increase in pollen of beech during the late Bronze Age is thought to reflect the use of the Wealden woods for pasture. The pollen diagrams for Rye do not provide evidence that wood required to service the iron industry during the Roman period resulted in widespread woodland clearance. During the Anglo-Saxon period, the data are interpreted to infer land-use continuity but there is evidence during the early Medieval period of a second increase in beech pollen. This has been interpreted as evidence for the presence of wood pasture in the Weald and corresponds with historical evidence. It is also concluded that a large part of the well-wooded High Weald is therefore considered to be ancient, being formerly exploited as seasonal pasture and coppice (ibid.).

Middle Bronze Age

16.4.2 Previous palaeoenvironmental work from the broader area around Kent and the Weald has been interpreted as providing evidence for late prehistoric changes to the terrestrial environment (Champion *et al.* 2011). Palaeoenvironmental work from a small number of lowland mires suggest extensive woodland clearance for agriculture during the Bronze Age (Scaife 1987, 142–4). A famous site, from eastern Kent, is that of Frogholt (Godwin 1962), where an undated pollen diagram suggested intensive clearance for agriculture. More than 40 years later, at nearby Saltwood Tunnel, Kent (Riddler and Trevarthen 2006), an extensive late Bronze Age field system was excavated less than 2 km from the Frogholt site. In East Kent, at Weatherlees Hill on the south coast of the Isle of Thanet, there is also evidence for intensive clearance in the late Bronze Age and Iron Age (Scaife 1995, 303–13). A brief pollen analysis of a possible Middle Bronze Age (pond) feature from Foster Road, Ashford, reported pollen evidence for open herbaceous grassland, damp/wet rough pasture, with mixed, oak-dominated woodland. There was also evidence for arable and pastoral farming (Allen 2006). Detailed pollen work from Romney Marsh, in particular for the Pannel Valley, records a phase of woodland removal during the middle Bronze Age, that cleared lime from

the valley. Subsequent low tree pollen values were interpreted as indicative of open areas that were maintained into the Iron Age (Waller 2002).

16.4.3 The single spot sample from the base of the 'burnt mound' complex at IA3 on the Tonbridge-to-Pembury A21, therefore adds to limited previous work for west Kent. The pollen data from this spot sample provide evidence for a landscape comprising mixed but dominantly oak woodland, with open, grassy areas, suitable for both low-scale arable and pastoral farming.

Medieval palaeochannel (11th to 14th centuries)

16.4.4 The Weald is a landscape of fields, woodlands and parklands and of medieval forests (Bannister 2017). The small irregular fields, typical of the Weald, are generally thought to be medieval in origin dating from the 12th and 13th centuries (Harris 2004, 49–50). The medieval woodland economy of Kent included the conversion of wood pastures to enclosed woodland, to address the demand for wood around the coast of Kent and East Sussex (Witney 1990). The few sites recording pollen sequences during the medieval period show that the landscape of the Weald comprised a mosaic of open ground, fields and woodland. There was a diversity of trees including oak, elm, beech, hornbeam and ash, all managed and exploited for the iron industry (Rippon *et al.* 2015, 133).

16.4.5 Pollen profiles from the short section available through the medieval palaeochannel sequence at site 29 (WC1), from the A21 Tonbridge-to-Pembury excavation, may be interpreted as evidence for a reduction in woodland cover (from approximately 70% to 30%) during the time represented by the diagram. The pollen study also provides evidence for expansion of more open, grassy environments with potential for both arable and pastoral farming. There is evidence also for woodland management, including increases in oak and beech trees, while hazel-type and alder decline.

17 INSECT REMAINS

By Enid Allison

17.1 Introduction

17.1.1 Five sub-samples from the fills of the two palaeochannels discovered at site IA1 were submitted for the examination of insect remains. Radiocarbon dates (see above) indicated that the waterlogged fills of the earlier channel spanned the later 11th to the end of the 14th centuries.

17.2 Methods

17.2.1 Four of the samples had volumes of 5l and the fifth a volume of 4l. Hand-flotation of the samples to 0.25mm was carried out by OA staff. Paraffin flotation to extract insect remains was subsequently carried out following the methods of Kenward *et al*. (1980). Recovery was on 0.3mm mesh. The paraffin flots were scanned briefly in industrial methylated spirits (IMS) using a low-power stereoscopic microscope (x10). Insect remains were present or common in three of the flots, while the remaining two contained negligible amounts of material.

17.2.2 For the three samples that were analysed, sclerites of terrestrial beetles (Coleoptera) and bugs (Hemiptera) were removed from the paraffin flots onto moist filter paper for examination (x10–x45). Identification was by comparison with modern insect material and with reference to standard published works. Minimum numbers of individuals and taxa of beetles and bugs were recorded, and taxa were divided into broad ecological groups for interpretation based on Kenward *et al*. (1986), Kenward (1997) and Smith *et al*. (forthcoming). Aquatic taxa were subtracted from the rest of the assemblage to calculate percentages for particular ecological groups among the terrestrial fauna, based on numbers of individuals. Nomenclature of Coleoptera and Hemiptera respectively follows Duff (2018) and the systematic lists compiled from various sources on the British Bugs website (Bantock and Botting 2019). Information on ecology has been obtained from Cox (2007), Duff (2012), Le Quesne 1960, Luff (2007), Morris (1997, 2002, 2008, 2012), and Nau (2004) unless otherwise stated.

17.2.3 Abundance of insects other than beetles and bugs has been recorded semi-quantitatively on a three-point scale: + (1–3 individuals), ++ (4–10), +++ (11–50). Other invertebrate remains have been recorded as present or common. The extracted insect material is currently stored in vials of IMS.

17.3 The insect assemblages

17.3.1 The main statistics for the two assemblages that contained over a hundred individuals are shown in Table 53. Lists of insects recorded from each sample are provided in Table 54.

17.3.2 Insect remains were present in low concentrations in the lowermost sample that was radiocarbon dated to cal. AD 1050–1270 (context 20007, sample <1170>). A small assemblage of 29 beetles and bugs of 25 taxa (six individuals per litre) was recovered. Four of these were water beetles, including *Ochthebius bicolon* found in damp mud by running water. Occasional water flea ephippia were also present. Terrestrial insects included two species of weevils with leaf-mining larvae (*Orchestes* spp.), indicating the presence of trees beside the channel, and *Ocys harpaloides*, a ground beetle found under bark or under stones on damp soils. *Orchestes*

quercus is specifically associated with oak (*Quercus*). *Microplontus melanostigma* found on mayweeds (*Matricaria* and *Tripleurospermum*) is suggestive of disturbed ground. Several synanthropic beetles were suggestive of the introduction of occupation waste into the stream at some point (*Coprophilus striatulus*, *Oxytelus sculptus* and *Cryptophagus*). *Ptilinus pectinicornis*, which has wood-boring larvae and often infests structural timber, may have arrived with this material, although it frequently attacks deciduous trees in natural situations. Two samples from later parts of the same deposit (context 20007, samples <1169> and <1168>) produced only occasional undiagnostic water beetle leg segments.

17.3.3 Considerably larger assemblages of beetle and bugs (100–200 individuals) were recorded from two samples (<1167> and <1166>) from context 20006. Material from the uppermost of these was radiocarbon dated to cal. AD 1220–1390. In sample <1167> aquatic beetles accounted for 11% of the whole assemblage and they included two species of riffle beetles (*Elmis aenea* and *Oulimnius*) suggesting clean, clear running water, while *Ochthebius dilatatus* and *Heterocerus* are typical of waterside mud. The aquatic weevil *Eubrychius velutus* lives on water milfoil (*Myriophyllum*), *Conomelus anceps*, a small planthopper, on rushes (*Juncus*), and *Notaris acridulus* is primarily associated with reed sweet-grass (*Glyceria*) and perhaps other semi-aquatic grasses. *Contacyphon* found on waterside plants near shallow water was quite common. Several taxa were indicative of the presence of trees close to the channel. The most numerous of these, accounting for 10% of the terrestrial fauna, were *Orchestes* weevils: *Orchestes quercus* is associated with the foliage of oak. An oak pinhole borer *Platypus cylindrus* was also recorded; this beetle makes tunnels initially into oak sapwood and subsequently into the heartwood (Bevan 1987, 42). The red-legged shield bug *Pentatoma rufipes* is usually associated with oak and elm (*Ulmus*). There were suggestions of disturbed or cultivated ground from *Phyllotreta* spp. and *Ceutorhynchus* which predominantly feed on crucifers (Brassicaceae), and hints of grassland habitats from taxa such as *Sitona* which is associated with Fabaceae, *Longitarsus*, apionid weevils, and perhaps some of the click beetles (Elateridae) that were not closely identified. *Aphodius* dung beetles made up 3% of the terrestrial fauna.

17.3.4 A range of synanthropic beetles indicated the introduction of occupation waste into the channel, at least some of which was from within buildings. A typical 'house fauna' (Kenward and Hall 1995; Carrott and Kenward 2001) consisting of *Xylodromus concinnus*, *Crataraea suturalis*, *Ptinus*, *Cryptophagus* spp., *Atomaria* and *Latridius minutus* group, together accounted for 8% of terrestrial insects. Woodworm (*Anobium punctatum*) and powder-post beetles (*Lyctus linearis*) were probably associated with this component as both can be serious pests of structural timber. The assemblage from sample <1166> was very similar in composition and implications to that from <1167>. Aquatic insects were proportionally better represented (20% of the whole assemblage), but this appears to be because *Eubrychius velutus*, found on water milfoil (*Myriophyllum*), was notably common with 9 individuals. Other water beetles included *Hydraena pulchella* or *pygmaea* associated with clean, running water habitats. Duckweed (*Lemna*) growing on the water surface in places was indicated by the tiny aquatic weevil *Tanysphyrus lemnae. Donacia simplex* is usually associated with bur-reeds (*Sparganium*) and *Chaetocnema arida* group with rushes (*Juncus*) and grasses. Evidence for trees, including oak, growing close to the channel came from *Orchestes* species and bark beetles (Scolytini). One of the latter, *Dryocoetes villosus,* will attack several tree species but is most commonly associated with oak. Scarabaeoid dung beetles (Geotrupinae,

Aphodius spp.) made up 5% of the terrestrial fauna. A small house fauna (3% of terrestrial insects) and other synanthropes typically associated with occupation waste suggest that limited amounts of such material, including litter from within buildings, was entering the stream.

17.4 Conclusions

17.4.1 The samples are from a water channel and there may have been transport of some insect remains and other biological material along its length; any transported material would tend to settle out in places where the water was flowing more slowly. The evidence obtained from these samples therefore potentially pertains to conditions upstream of the sampling point.

17.4.2 Evidence from the lowermost fill (20007) was limited by the small size of the assemblage, although there were good indications for the presence of trees, including oak, growing close to the channel, and for the limited entry of occupation waste at some point.

17.4.3 Aquatic beetles from the two larger assemblages representing the later fill (20006) included species indicative of clean, clear, running water, and several taxa suggesting waterside mud. Water milfoil (*Myriophyllum*) was specifically indicated by the aquatic weevil *Eubrychius velutus* and there were indications of tall vegetation at the water margins that included bur-reeds (*Sparganium*), rushes (*Juncus*), and semi-aquatic grasses such as reed sweet-grass (*Glyceria*). Duckweed was probably present on the surface of slower-moving water or in backwaters. There was good evidence for the presence of trees alongside the channel, and specifically for oak. Evidence for other habitats was limited however, although there were suggestions of disturbed ground and grassland, mainly in sample <1167>. Scarabaeoid dung beetles made up 3 - 5% of the terrestrial fauna, suggesting low-level grazing on adjacent land (Smith *et al*. 2010; 2014), although some species overwinter in flood debris (Jessop 1986, 19–25).

17.4.4 Decomposer beetles with synanthropic associations were recorded in small numbers from all three samples. Significantly, both samples from context 20006 included 'house faunas' characteristically associated with litter in ancient buildings. This component made up 8% of terrestrial insects in sample <1167> and 3% in sample <1166>, suggesting that limited amounts of occupation waste had regularly entered the channel, perhaps upstream. The insect evidence was insufficient to suggest direct dumping of significant amounts of organic occupation waste at the sampling point.

Table 53: Main statistics for the insect assemblages with >100 individuals from channel 20009

	20006 <1167>	**20006 <1166>**
Total beetle and bug individuals	199	110
Total beetle and bug taxa	115	82
Aquatics (proportion of whole fauna)	11%	20%
TERRESTRIAL BEETLES AND BUGS		
Decomposers:		
Dry decomposers	5%	3%
Foul decomposers	4%	6%
Eurytopic decomposers	16%	16%
Total decomposers	25%	25%
Grain pests	0%	0%
Wood-associated	2%	3%
House fauna	8%	3%
Scarabaeoid dung beetles	3%	5%
Damp ground/waterside	11%	10%
Plant-associated, including trees	28%	23%
Tree foliage taxa	10%	7%
Outdoor taxa (oa + ob)	48%	46%
SYNANTHROPES		
Facultative synanthropes	10%	8%
Typical synanthropes	5%	7%
Strong synaanthropes	0%	0%
Total synanthropes	15%	15%

Table 54: Insects and other invertebrates recorded from channel 20009

Sample	20007 <1170>	20006 <1167>	20006 <1166>
Sample volume	5 litres	5 litres	5 litres
ANNELIDA			
Oligochaeta sp. (earthworm) egg capsules	-	-	P
CRUSTACEA			
Daphnia sp. ephippia	P	C	C
Cladocera sp. ephippia	-	-	P
INSECTA			
DERMAPTERA (earwigs)			
Dermaptera sp. [u]	-	+	-
HEMIPTERA: HETEROPTERA (true bugs)			
Pentatomidae (shield bugs)			
Pentatoma rufipes (Linnaeus) [oa-p]	-	1	1
Pentatomoidea spp. [oa-p]	-	2	2
Lygaeidae (ground bugs)			
Lygaeidae sp(p). [oa-p]	2	-	1
Corixidae (water boatmen)			
Corixidae spp. [oa-w]	-	-	1
Saldidae (shore bugs)			
Saldidae sp. [oa-d]	-	1	1
HEMIPTERA: HOMOPTERA			
Delphacidae (leafhoppers)			
Conomelus anceps Germar [oa-p]	-	1	-
Delphacidae spp. [oa-p]	1	3	1
Auchenorhyncha spp. [oa-p]	1	2	1
Psylloidea (jumping plant lice)			
Trioza sp. nymphal skin [oa-p]	-	-	+
COLEOPTERA (beetles)			
Haliplidae (crawling water beetles)			
Haliplus sp. [oa-w]	-	1	1
Noteridae (burrowing water beetles)			
Noterus clavicornis (De Geer) [oa-w]	-	-	2
Dytiscidae (diving beetles)			
Agabus bipustulatus (Linnaeus) [oa-w]	-	1	1
Hydroporinae spp. [oa-w]	-	-	1
Dytiscidae spp. [oa-w]	-	1	-
Carabidae (ground beetles)			
Loricera pilicornis (Fabricius) [oa]	-	1	-
Clivina sp. [oa]	-	1	1
Trechus sp. [oa]	1	-	-
Bembidion (*Metallina*) *lampros* or *properans* [oa]	-	-	1
Bembidion (*Philochthus*) *guttula* or *mannerheimi* [oa]	1	-	-
Bembidion (*Philochthus*) sp. [oa]	-	-	1
Bembidion spp. [oa]	-	2	-
Ocys harpaloides (Audinet-Serville) [oa]	1	-	-

Sample	20007 <1170>	20006 <1167>	20006 <1166>
Sample volume	5 litres	5 litres	5 litres
Tachys sp. [oa]	-	1	-
Pterostichus melanarius (Illiger) [ob]	-	2	-
Pterostichus strenuus (Panzer) [oa]	-	1	-
Pterostichus madidus (Fabricius) [ob]	-	1	-
?*Pterostichus* sp. [ob]	2	-	-
Agonum sp. [oa]	1	-	-
Paranchus albipes (Fabricius) [oa-d]	-	2	-
Carabidae spp. [ob]	-	1	-
Helophoridae (grooved water scavengers)			
Helophorus aequalis or *grandis* [oa-w]	-	1	-
Helophorus spp. [oa-w]	1	4	2
Hydrophilidae			
Laccobius sp. [oa-w]	-	1	-
Hydrobius fuscipes (Linnaeus) [oa-w]	-	1	-
Anacaena globulus (Paykull) [oa-w]	-	2	1
Anacaena sp. [oa-w]	-	1	-
Cercyon analis (Paykull) [rt-st]	-	1	-
Megasternum concinnum (Marsham) [rt-sf]	-	1	-
Histeridae (clown beetles)			
Histeridae sp. [u] (small)	-	-	1
Hydraenidae			
Hydraena pulchella or *pygmaea* [oa-w]	-	-	1
Hydraena spp. [oa-w]	-	1	2
Limnebius spp. [oa-w]	1	-	-
Ochthebius bicolon Germar [oa-w]	1	-	-
Ochthebius dilatatus Stephens [oa-w]	-	1	-
Ochthebius c.f. *minimus* [(Fabricius) oa-w]	1	-	-
Ptiliidae (featherwing beetles)			
Ptenidium sp. [rt]	-	8	1
Acrotrichis sp. [rt]	-	-	1
Silphidae (sexton beetles)			
Phosphuga atrata Linnaeus [u]	-	3	1
Staphylinidae (rove beetles)			
Xylodromus concinnus (Marsham) [rt-st-h]	-	4	-
Anthobium sp. [oa]	1	-	-
Lesteva longoelytrata (Goeze) [oa-d]	2	7	5
Metopsia clypeata (Müller) [rt]	-	1	-
Proteinus sp. [rt]	-	-	1
Micropeplus fulvus Erichson [rt-sf]	-	2	-
Pselaphinae spp. [u]	-	-	2
Tachinus subterreaneus (Linnaeus) [u]	-	1	-
Crataraea suturalis (Mannerheim) [rt-st-h]	-	2	1
?*Cypha* sp. [u]	-	1	-
Cordalia obscura (Gravenhorst) [rt-sf]	-	-	1

Sample	20007 <1170>	20006 <1167>	20006 <1166>
Sample volume	5 litres	5 litres	5 litres
Aleochariinae spp. [u]	-	18	7
Coprophilus striatulus (Fabricius) [rt-st]	1	-	1
Syntomium aeneum (Müller) [oa]	-	-	2
Carpelimus ?*bilineatus* or ?*erichsonii* [rt-sf]	-	-	2
Carpelimus spp. [u]	-	6	5
Aploderus caelatus (Gravenhorst) [rt]	-	1	-
Platystethus arenarius (Geoffroy in Fourcroy) [rf]	-	1	1
Anotylus rugosus (Fabricius) [rt-sf]	-	3	1
Anotylus sculpturatus group [rt-sf]	-	-	1
Oxytelus sculptus Gravenhorst [rt-st]	1	-	-
Scydmaeninae spp. [u]	-	1	-
Stenus spp. [u]	-	1	2
Lathrobium spp. [u]	-	6	3
Lobrathium multipunctum (Gravenhorst) [u]	-	2	-
Astenus sp. [rt]	-	1	-
Paederinae sp(p). [u] (small)	-	1	1
Gyrohypnus angustatus Stephens [rt-st]	-	-	1
Gyrohypnus fracticornis (Müller) [rt-st]	-	-	1
Xantholinus longiventris Heer [rt-sf]	1	-	-
Xantholinini sp. indet. [u]	-	1	-
Heterothops sp. [u]	-	1	-
Gabrius sp. [rt]	-	-	1
Staphylininae spp. [u]	-	1	1
Geotrupidae (dor beetles)			
Geotrupinae sp. [oa-rf]	-	-	1
Scarabaeidae (dung beetles and chafers)			
Acrossus rufipes (Linnaeus) [oa-rf]	-	1	-
Aphodius ?*fimetarius* (Linnaeus) [ob-rf]	-	-	1
Melinopterus prodromus or *sphacelatus* [ob-rf]	-	-	1
Nimbus contaminatus (Herbst) [oa-rf]	-	-	1
Aphodiinae spp. and sp. indet. [ob-rf]	-	5	-
Serica brunnea (Linnaeus) [oa-p]	-	-	1
Scirtidae (marsh beetles)			
Contacyphon sp. [oa-d]	-	5	2
Scirtidae sp. [oa-d]	-	1	-
Elmidae (riffle beetles)			
Elmis aenea (Müller) [oa-w]	-	1	-
Oulimnius sp. [oa-w]	-	1	-
Heteroceridae (mud beetles)			
Heterocerus sp. [oa-d]	-	2	-
Elateridae (click beetles)			
Elateridae spp. [ob]	1	5	2
Elateridae spp. (larval apices) [ob]	-	+	+
Cantharidae (soldier beetles)			

Sample	20007 <1170>	20006 <1167>	20006 <1166>
Sample volume	5 litres	5 litres	5 litres
Cantharidae spp. [ob]	-	-	1
Bostrichidae (powderpost beetles)			
Lyctus linearis (Goeze) [l-st-h]	-	1	1
Ptinidae (spider and woodworm beetles)			
Ptinus ?fur (Linnaeus) [rd-sf-h]	-	-	1
Ptinus sp. indet. [rd-sf-h]	-	1	-
Anobium punctatum (De Geer) [l-sf]	-	1	-
Ptilinus pectinicornis (Linnaeus) [l-sf]	1	-	-
Monotomidae			
Rhizophagus sp. [rt-sf]	-	1	-
Monotoma picipes Herbst [rt-st]	-	-	1
Cryptophagidae (silken fungus beetles)			
Cryptophagus spp. [rd-sf-h]	1	5	1
Atomaria spp. [rd-sf-h]	-	1	-
Nitidulidae (sap and pollen beetles)			
Nitidulidae sp. [u]	-	1	-
Latridiidae (minute brown scavenger beetles)			
?Stephostethus angusticollis (Gyllenhal) [rt-sf]	-	1	-
Latridius minutus group [rd-st-h]	-	1	-
Enicmus sp. [rd-sf]	-	-	1
Corticaria spp. [rt-sf]	-	3	-
Corticariinae sp. indet. [rt]	-	-	1
Scraptidae (false flower beetles)			
Scraptidae spp. [u]	-	-	1
Chrysomelidae (seed and leaf beetles)			
Donacia simplex Fabricius [oa-p-d]	-	-	1
Chaetocnema arida group [oa-p]	-	1	1
Longitarsus sp. [oa-p]	-	2	-
Phyllotreta nemorum group [oa-p]	-	1	1
Phyllotreta sp. [oa-p]	-	1	-
Chrysomelidae spp. and sp. indet. [oa-p]	-	3	1
Apionidae			
Apionidae spp. [oa-p]	-	2	-
Erirhinidae (wetland weevils)			
Notaris acridulus (Linnaeus) [oa-p-d]	-	1	-
Tanysphyrus lemnae (Paykull) [oa-p-w]	-	-	1
Curculionidae (weevils)			
Mecinini spp. [oa-p]	2	-	-
Orchestes quercus (Linnaeus) [oa-p-t]	2	5	2
Orchestes sp. [oa-p-t]	1	13	4
Ceutorhynchus sp. [oa-p]	-	1	1
Microplontus melanostigma (Marcham) [oa-p]	1	-	-
Eubrychius velutus (Beck) [oa-p-w]	-	4	9
Phyllobius or *Polydrusus* sp. [oa-p]	-	1	-

Sample **Sample volume**	20007 <1170> 5 litres	20006 <1167> 5 litres	20006 <1166> 5 litres
Barypeithes sp. [oa-p]	-	5	1
Sitona sp. [oa-p]	-	2	1
Platypus cylindrus (Fabricius) [l]	-	1	-
Dryocoetes villosus (Fabricius) [l]	-	-	1
Scolytinae sp. [l]	-	-	1
Curculionidae spp. and sp. indet. [oa-p]	-	3	-
Coleoptera spp. and sp. indet. [u]	-	4	2
DIPTERA (flies)			
Bibionidae sp. leg spines	-	-	+
Diptera spp. adults	-	+	-
Diptera spp. puparia	-	+	-
HYMENOPTERA (bees, wasps and ants)			
Formicidae spp. (ants)	+	++	+
Hymenoptera Parasitica spp.	-	++	++
TRICHOPTERA (caddis flies)			
Trichoptera sp. wing fragments	-	-	+
Trichoptera sp. larval fragments	-	+	-
ARACHNIDA			
Acarina spp. (mites)	P	C	C
Aranae sp. (spiders)	-	P	-
TOTAL INDIVIDUALS BEETLES AND BUGS	29	199	110
Concentration of beetles and bugs per litre	6/L	40/L	22/L

Ecological codes shown in square brackets are : d - damp ground/waterside, h - house/building, l - wood, oa - outdoor taxa not usually found within buildings or in accumulations of decomposing matter, ob - probable outdoor taxa, p- plant-associated, sf - facultative synanthropes, st - typical synanthropes, t - tree foliage, u - uncoded, w - aquatic. Abundance of insects other than adult beetles and bugs has been estimated as + 1–3, ++ 4–10. Abundance of other invertebrates has been recorded as present (P) or common (C)

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