

Late prehistoric settlement and post-medieval industrial activity on the route of the A3 Hindhead Improvement Scheme

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with contributions by

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A programme of archaeological works, undertaken in advance of improvements to the A3 London to Portsmouth road at Hindhead, Surrey, saw the investigation of 21 mitigation sites along the proposed 6.7km route between Bramshott Common and Thursley.

Although archaeological remains were relatively sparse along much of the route, a number of discoveries were made that add to the known archaeology of this part of Surrey. These included residual Neolithic finds, and the discovery of a small Middle/Late Bronze Age settlement towards the northern end of the route.

The examination of peat deposits in Boundless Copse demonstrates initial formation in the Early–Middle Saxon period, and contains a record of local heathland expansion, development of beech woodland and increase of pastoral activity during the Late Saxon/medieval period. Field boundaries and land use divisions of probable post-medieval date were examined at various points along the route, and a number of lime kilns, shown to date from the early 17th to early 18th centuries, were excavated.

Introduction

A programme of archaeological works undertaken in advance of improvements to the A3 London–Portsmouth road at Hindhead revealed evidence for prehistoric settlement and post-medieval industry and land use (Wessex Archaeology 2011). The new road runs for 6.7km between Bramshott Common (SU 86762 33525) to just south of Thursley (SU 90720 39420), and includes a 1.9km tunnel by-passing Hindhead and the Devil's Punch Bowl (a Site of Special Scientific Interest) (figs 1 and 2). The works, based on the results of a desk-based assessment (Wessex Archaeology 2004) and the details of the proposed construction impact, involved the investigation of 21 mitigation sites (M1–M21) (Wessex Archaeology 2007). The works comprised documentary research, geophysical survey, earthwork survey, geoarchaeological auger survey, trench evaluation, excavation, and watching brief.

GEOLOGY, TOPOGRAPHY AND LAND USE

The route, on the north-western edge of the Weald, lies mainly on the Cretaceous Hythe Sandstone Beds of the Lower Greensand, resulting in acidic sand and sandy loam soils; Wealden Clays extend close to the route from the east and south-east (BGS 1981).

The new tunnel passes beneath the dramatic local topography of the Devil's Punch Bowl, Hindhead Common and Gibbet Hill (the second highest point in Surrey). The ground along the route rises gradually from *c* 170m OD at Bramshott Common, to 211m OD at the point where the road enters the southern portal of the tunnel via a cutting into the side of the Nutcombe Valley in Tyndall's Wood. The road emerges from the tunnel at Boundless Copse at *c* 180m OD, and gradually descends via an embankment across the Boundless Valley, then passes through a further cutting to rejoin the present A3, at *c* 130m OD, to the south of Thursley.

A number of small streams rise close to the bottom of Gibbet Hill, flowing northwards into the catchment area of the Upper Wey Valley, a tributary of the river Thames, and

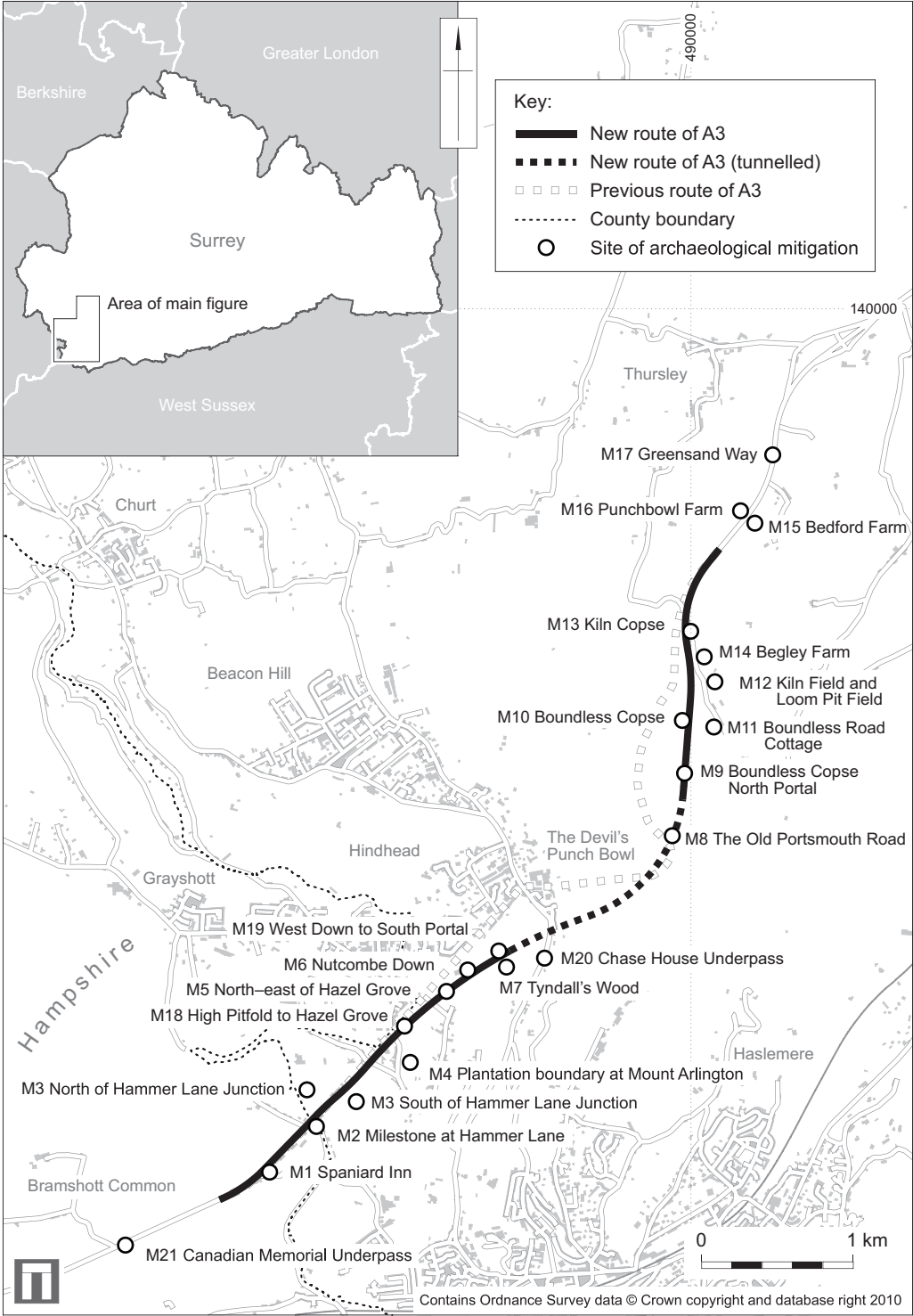


Fig 1 A3 Hindhead. The locations of mitigation sites along the route of the A3 Hindhead Improvements.



Fig 2 A3 Hindhead. The topography of the route.

southwards towards the headwaters of the Sussex Arun. Dry valleys indicate the presence of former streams.

The soils support large areas of acidic heathland common, much of which has reverted to birch and pine woodland owing to the lack of grazing in modern times. The largest area of undeveloped heath is Hindhead Common. There are also areas of forestry plantation, as well as mainly pastoral farmland on the better soils. There has been some encroachment of the route onto private gardens and playing fields towards its southern end.

ARCHAEOLOGICAL BACKGROUND

The desk-based assessment of the archaeological potential of the proposed route (Wessex Archaeology 2004) identified a relatively low number of known archaeological and historical sites within a 1km-wide study corridor along its length, although the landscape is known to have been exploited from the Mesolithic to the post-medieval and modern periods. The relatively low number of archaeological finds from these periods reflects in part the low level of arable cultivation and the extensive heath and woodland cover, conditions that militate against the discovery of archaeological sites.

A high proportion of the sites are landscape features of post-medieval and later date, reflecting the division of the landscape between the unenclosed common and the enclosed mixed farmland flanking it and encroaching onto it. Examination of historic maps and documents indicates that some of the surviving land boundaries date from at least the mid-18th century, but may have their origins in the medieval period. These include hollow-ways, field systems and possible strip lynchets. A number of post-medieval farms in the area may also have their origins in the medieval period.

Post-medieval kilns and kiln-related pits and field names are recorded close to the route, and the London to Portsmouth turnpike road, the precursor to the recently closed A3 road, is now designated as BOAT 500 (By-way Open to All Traffic). At the southern end of the route is the site of the former Connaught Hospital where numerous Canadian service personnel recuperated during the First and Second World Wars. The site also has a memorial to commemorate those who died following the influenza pandemic of 1918–20.

METHODS

Fieldwork

A combination of geophysical survey (Archaeological Surveys Ltd 2006; Stratascan 2007) and walkover/earthworks survey (by Wessex Archaeology) identified potential archaeological features to be investigated through evaluation trenching. A total of 269 evaluation trenches were dug; 385 trenches had been proposed, comprising a 4% sample of the previously unassessed land along the route, but various site hazards and obstructions, poor or disturbed ground conditions, existing trees, and the pronounced topography prevented the excavation of the remaining trenches. The trenching was supplemented with a combination of mechanical and hand auger environmental sampling to aid the understanding of buried deposits. Where significant archaeological remains were identified these areas were subject to excavation; the works concluded with watching briefs.

Radiocarbon dating, by Chris J Stevens

Seven radiocarbon dates were obtained, three from archaeological features, and four from peat deposits in M9 (tables 1 and 7 (see *Endnote*, below). The samples were identified and submitted to the Scottish Universities Environmental Research Centre, East Kilbride (SUERC) (five samples), and Rafter, New Zealand (NZ) (two samples). All the radiocarbon determinations were calibrated using the program OxCal 4.1.7 (Bronk Ramsey 2001; 2009) and the IntCal09 Northern Hemisphere calibration curve (Reimer *et al* 2009). The calibrated

dates are quoted in the form recommended by Mook (1986) using the 2σ calibrated range (95.4%) with the end points rounded outward to 10 years.

RESULTS

The works identified activity along the route dating from the Neolithic through to the post-medieval period, with particular concentrations of activity in the Middle/Late Bronze Age in the form of a small settlement in M15/M16, and in the post-medieval period with the identification of four lime kilns in M14 and M16. However, only seven of the 21 mitigation sites produced finds, and the overall artefact assemblage was small (table 2).

NEOLITHIC (4000–2200 BC) AND EARLY BRONZE AGE (2200–1600 BC)

Evidence for Neolithic activity consists solely of residual worked flints (analysed by Matt Leivers) recovered from later features, almost all from the Middle/Late Bronze Age settlement in M15 (below) (figs 1 and 3). Nearly half was recovered from pit 3006 (during the evaluation of the site), and consisted of flakes, a very minor blade component, a core, an end scraper and a flake struck from a polished axe. Although the pit also contained later Bronze Age material (see below), this small group of flints is comfortably Neolithic (probably Middle or Late) in date, and therefore residual. The remaining flints from M15 are similar, but undatable in isolation.

A small quantity of Neolithic worked flint was also recovered from M3, M12 and M16 (fig 1).

A single abraded sherd of grog-tempered pottery (also from pit 3006, in M15), is of possible Early Bronze Age date, and is also residual.

MIDDLE–LATE BRONZE AGE (1600–700 BC)

Sites M15 (Bedford Farm) and M16 (Punchbowl Farm)

Middle/Late Bronze Age activity was initially identified during the evaluation on both sides of the route towards its northern end. The area to the south-east, in M15, was further investigated with the excavation of a site measuring $c 82 \times 40\text{m}$ (0.30ha) centred on SU 90430 38430 (fig 3). This revealed an area of settlement focused on a crest of high ground at a height of $c 148\text{m OD}$, which sloped noticeably downwards to the south-east. Truncation by recent ploughing and previous road construction had resulted in areas largely devoid of archaeological features in the central part of the site and along its north-western edge.

Approximately 30 postholes, most under 0.5m in diameter, and 50 small domestic rubbish pits, up to $c 0.7\text{m}$ wide and 0.24m deep (but most considerably shallower) were identified. They displayed no obvious patterns, although the positions of a number of pits/postholes suggest a possible roundhouse (Structure A), 6.77m in diameter, comprising two substantial, possibly entrance postholes (40062 and 40066) at the south and east, and a number of smaller postholes (40068, 40056, 40044 and 40042) at the north and west. This structure may have been partially enclosed by fence-lines, $c 27\text{m}$ long to its north-west and 5m long to the north-east.

Approximately 40 features (and a number of tree-throw holes) contained datable material, including pottery in the Deverel-Rimbury and post-Deverel-Rimbury traditions. Although the pottery belongs to the Middle and/or Late Bronze Age, the features are considered as a single phase, since the similarity of the flint-tempered fabrics and dearth of chronologically diagnostic forms make more precise phasing unreliable. The site appears to represent a relatively short-lived settlement occupied around the Middle–Late Bronze Age transition, in the mid-2nd to early 1st millennium BC, although the recovery of fired

Table 1 Radiocarbon determinations for archaeological features

Site	Feature (context)	Sample material	Lab code	$\delta^{13}\text{C}$ (‰)	Date BP	Calibrated date (2 σ ; 95.4%)
M12	Pit 15104 (15105)	<i>Quercus</i> sapwood	SUERC-36565	-26.3	1230 $\pm$ 35	cal AD 680-890
M15	Pit 3006 (3008)	<i>Triticum dicoccum</i> (grains)	SUERC-36566	-23.5	2880 $\pm$ 35	1200-930 cal BC
M16	Tree-throw hole 16304 (16305)	Pomoideae roundwood	SUERC-36561	-26.1	3095 $\pm$ 35	1440-1260 cal BC

Table 2 Finds totals by material type and by site (number/weight in g)

Area	Evaluation							Mitigation		Total
	M3	M11	M12	M14	M15	M16	M18	M15	M16	
Pottery	18/212	2/3	22/212	3/13	121/1369	69/836	3/21	943/11,389	13/388	1210/14,307
Prehistoric	-	-	18/184	1/3	115/1121	1/6	-	879/11,238	-	1014/12,550
Romano-British	-	-	2/6	-	1/1	-	-	-	1/37	4/44
Medieval	-	-	-	-	-	-	-	86/242	-	86/242
Post-medieval	18/212	2/3	1/15	-	1/32	68/830	3/21	1/7	12/351	106/1471
Ceramic building material	16/488	3/294	6/133	2/36	1/44	14/559	3/1012	-	101/22,317	146/24,883
Fired clay	-	1/7	5/65	-	7/562	-	-	72/3058	-	85/3692
Clay pipe	-	-	-	-	-	6/11	1/3	-	2/19	9/33
Stone	1/9	-	2/46	-	-	1/5	-	1/75	-	5/135
Worked flint	1/37	-	1/5	-	42/295	1/29	-	25/308	-	70/674
Burnt flint	-	-	2/143	-	5/99	-	-	6/82	-	13/324
Glass	49/1525	1/1	-	-	-	-	2/165	-	-	52/1691
Slag	3/305	-	-	-	-	-	-	-	-	3/305
Metalwork (no of objects)	5	-	-	-	-	1	-	-	-	6
Copper alloy	-	-	-	-	-	1	-	-	-	1
Iron	5	-	-	-	-	-	-	-	-	6
Animal bone	-	-	-	-	1/1	-	-	7/7	1/10	9/18

clay triangular loomweights, a type generally dated as Iron Age, may perhaps extend that period.

There were two significant groups of features to the north-east and south-west of Structure A. These included pit 3006 to the north-east, which (in addition to residual Neolithic and Early Bronze Age material (above)) contained 64 sherds (745g) of Middle/Late Bronze Age pottery, and charred emmer grain, which produced a radiocarbon date of 1200–930 cal BC (SUERC-36566, 2880 ± 35 BP) (table 1).

The settlement appears to have been more extensive, as a sherd of coarse, flint-tempered pottery was also recovered from a possible pit (or tree-throw hole) (16304) *c* 60m to the north-west, on the opposite side of the road, in M16. Although undiagnostic in form, it is dated on fabric grounds as Middle/Late Bronze Age. A sample of Pomoideae charcoal from the feature's charcoal-rich fill (16305) produced a radiocarbon date of 1440–1260 cal BC (SUERC-36561, 3095 ± 35 BP) (table 1).

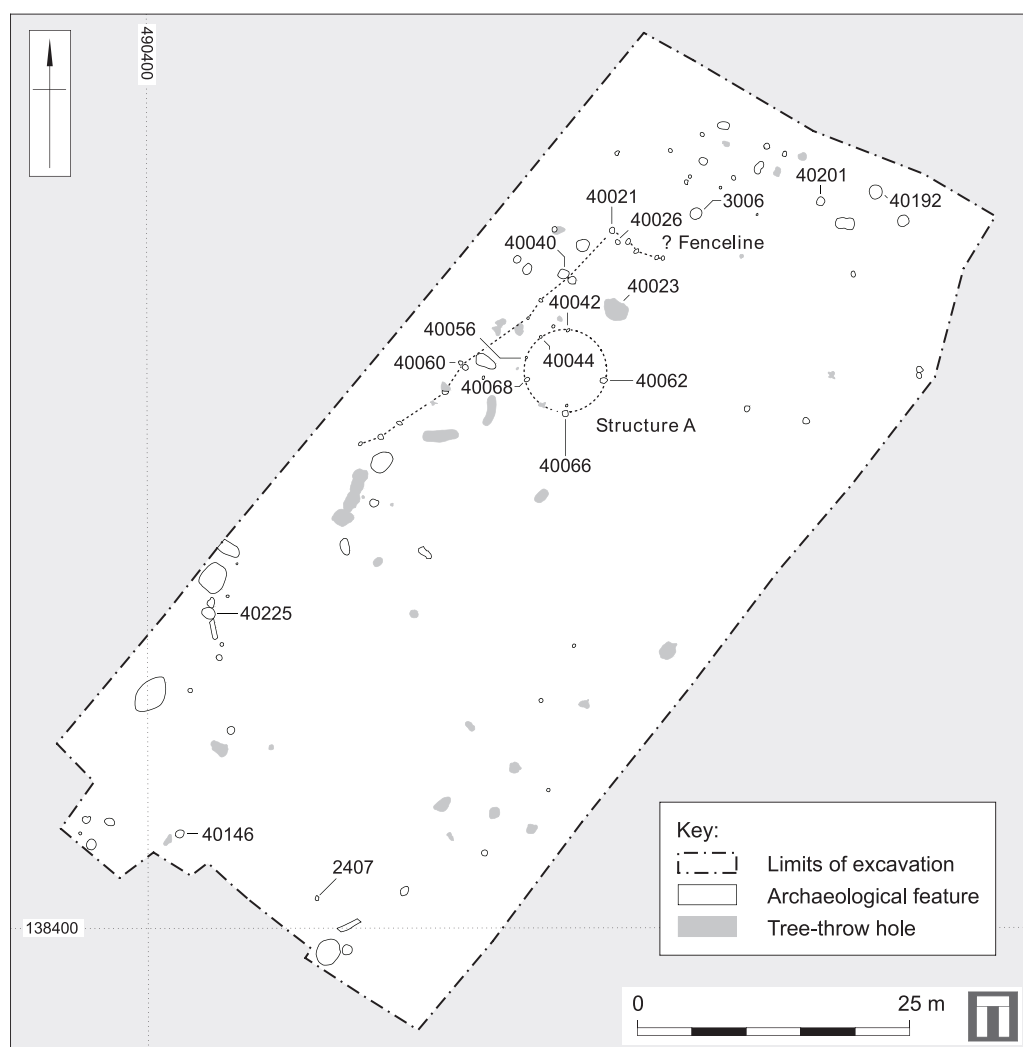


Fig 3 A3 Hindhead. The M15 (Bedford Farm) excavation area: plan of the Middle/Late Bronze Age settlement.

Sites M12 (Kiln Field and Loom Pit Field) and M14 (Begley Farm)

These two adjacent mitigation sites lay *c* 1km south of M15/M16, and produced a small quantity of Middle/Late Bronze Age pottery from a pit (15104), a tree-throw hole and the subsoil in M12, and from a layer of colluvium (26202) in M14. However, it is probable that the sherd in charcoal-rich pit 15104 is residual (see below).

Bronze Age pottery, by Matt Leivers

Over 98% by weight of the prehistoric pottery came from the Middle/Late Bronze Age settlement at M15/M16 (995 sherds, weighing 12,365g); the remainder (nineteen sherds, 187g) came from sites M12 and M14. The material dates primarily from the Middle and Late Bronze Age, and its condition was generally moderate. The assemblage was analysed in accordance with the nationally recommended guidelines of the Prehistoric Ceramics Research Group (PCRG 2011). There were very few reconstructable profiles, despite the occurrence of probable single-vessel deposits. Nine fabric groups were defined. The prevalence of flint-tempered fabrics makes a chronological division by fabric impossible. The breakdown of ceramics by fabric group is given in table 3; fabric descriptions are given in Appendix 1 (see *Endnote*).

Table 3 Prehistoric pottery fabrics by chronological period

Fabric	No of sherds	Weight (g)	ASW* (g)
FL1	309	3190	10.32
FL2	149	1605	10.77
FL3	296	4345	14.68
FL4	127	2260	17.80
FL5	172	1764	10.26
GR1	1	22	22
IO1	3	25	8.33
QU1	40	211	5.27
QU2	3	10	3.33
Total	1014	12,550	12.38

* Average sherd weight

Sites M12 and M14

In M14 a tiny, abraded body sherd from colluvium 26202 in trench 262 is in a coarse, flint-tempered fabric, which is likely to be of Late Bronze Age date.

The assemblage in M12 (from trenches 145, 147 and 262) consists largely of sherds in flint-tempered fabrics, with a smaller proportion of sandy wares that could fall later in the post-Deverel-Rimbury tradition. Within the group of flint-tempered wares, the coarser end of the spectrum (three sherds from subsoil 14702 and pit 15104 – almost certainly residual in this context – see below) includes fabrics with frequent but relatively well sorted inclusions that are typical of the Deverel-Rimbury ceramic tradition of the Middle Bronze Age, while finer variants (two sherds from tree-throw hole 14704) are likely to fall later in the ceramic sequence, within the Late Bronze Age. Fourteen sherds from posthole 14504, probably all from the same vessel – a small, tub-shaped form with applied bosses below the rim – could be a transitional Middle/Late Bronze Age type (fig 4, no 1); similar vessels have recently been recorded from Heathrow and Stansted, in both instances appearing anomalous within the ‘standard’ Deverel-Rimbury repertoire (Leivers 2008).

Site M15

Pottery recovered from the truncated features of the settlement in M15 consists of a single sherd in a grog-tempered fabric (from pit 3006) that might belong to an earlier ceramic

tradition than the rest of the material. The sherd is small and heavily abraded; dating is dependent solely on fabric type, and an Early Bronze Age date might be appropriate. The rest of the assemblage belongs to the Middle and/or Late Bronze Age – it is not always possible to assign sherds to one or the other of these periods owing to the similarity of the flint-tempered fabrics and largely undifferentiated jar forms.

Middle Bronze Age

The assemblage can be divided into two basic vessel types, which correspond to the standard division of Deverel-Rimbury ceramics into coarser, Bucket-shaped jars and finer, Globular vessels.

Bucket-shaped jars tend to have the thickest walls and to be the most coarsely tempered. Surfaces can be slipped, smoothed, wiped, or – very rarely – burnished, but are more often left rough, with temper protruding through the surface even on many of the better-finished examples. Walls are usually straight. Decoration is uncommon, limited to some finger-impressed rims and a single instance of a stick impression below a rim. Rims are generally simple and upright, either rounded or flattened. More elaborate forms are scarce, but include one with a slight bevel. Where there is any evidence, indications are in favour of coil- or slab-building (the latter best seen in the jar fragments from posthole 40021).

Globular vessels generally represent the fineware component of the Deverel-Rimbury tradition, distinguished by an overall higher investment of labour in temper preparation, vessel forming and surface treatment – typically these are thinner-walled vessels in better-sorted fabrics, with a smoothed or burnished surface finish. In this assemblage, none is decorated. Globular urns were present in postholes 40040 and 40026.

In addition to these basic types, there is a single instance of a thin, small-diameter rim that may derive from a small bowl or cup (in posthole 40060). ‘Knobbed cups’ are known in Surrey and from the London Thames (Needham 1987, 111).

Notable deposits came from two pits at opposite ends of the site. The largest group (210 sherds) came from pit 40146 at the south-west, and consisted of fragments of two jars. One comprised most of the base and lower wall; the other, portions of the base and wall. Both had clearly been deposited already broken, and as waste: a number of sherds from each had been burnt, while others were in much better condition. Pit 40201 at the north-east contained 34 sherds from a single vessel, a tub-shaped jar with internal residues (fig 4, no 2). Base, body and rim sherds were present, but again only portions of the vessel, suggesting already-broken waste.

Late Bronze Age

This material consists largely of sherds in flint-tempered fabrics, with a smaller proportion of sandy wares. The flint-tempered wares include both fine and coarse variants; the latter occur in jar forms. The finer wares and the sandy wares are used for necked sharp-shouldered bowls – for instance in pit 40225, and (from evaluation trenches in M15 outside the excavation area) subsoil 1102, and pits 2407 and 3804. Both fabrics and forms find parallels within the post-Deverel-Rimbury ceramic tradition of the Late Bronze Age to Early Iron Age. It is impossible to tell from this small sample, however, whether there is a chronological sequence here, represented by a gradual transition from purely flint-tempered fabrics to a mixture of flint-tempered and sandy wares, or whether the assemblage is broadly contemporaneous across the site.

The assemblage is for the most part very fragmentary, so there are few reconstructable forms. Among the jars, one convex form with a wiped exterior, an inturned rim and a single square pre-firing perforation c 6mm wide (not illustrated), is the most reconstructable (from posthole 40026; fig 4, no 3); one from pit 3006 has an applied cordon; others have gritty bases and/or finger-smeared surfaces. Rims tend to be either upright and simple or inturned,

some with shallow finger impressions on the top (eg tree-throw hole 40023), or slashes (eg pit 40225).

Notable deposits came from three features at the northern end of the area (pits 3006 and 40026; tree-throw hole 40023), and one pit in the south-west 40225. Pit 3006 contained small fragments of seven vessels, including finger-smeared jars, one with an applied cordon. Tree-throw hole 40023 contained over 1kg of sherds probably deriving from three or four vessels, including a jar with a wiped exterior and rim with shallow finger-tip impressions. Posthole 40026 contained substantial portions of one or two fineware jars and the wiped convex jar (fig 4, no 3). Pit 40225 contained substantial portions of three vessels: a jar with a slashed rim (fig 4, no 4), a second jar (fig 4, no 5), and a shouldered bowl (fig 4, no 6).

In M16, a single sherd of coarse, flint-tempered pottery from tree-throw hole 16304 is undiagnostic but dated on fabric grounds as Middle/Late Bronze Age.

List of illustrated vessels (fig 4)

- 1 Pottery record number (PRN) 128, Middle Bronze Age jar, context 14505, posthole 14504 (M12)
- 2 PRN 100–2, Middle Bronze Age jar, context 40202, pit 40201 (M15)
- 3 PRN 65, Late Bronze Age jar, context 40033, posthole 40026 (M15)
- 4 PRN 109–10, Late Bronze Age jar, context 40226, pit 40225 (M15)
- 5 PRN 112–3, Late Bronze Age jar, context 40226, pit 40225 (M15)
- 6 PRN 111, Late Bronze Age bowl, context 40226, pit 40225 (M15)

Fired clay

Parts of at least four triangular loomweights, all from M15, were recovered. This loomweight type is generally dated as Iron Age suggesting that occupation may have continued into the Iron Age, although some examples associated with post-Deverel-Rimbury ceramics could be earlier. A sharply right-angled ‘corner’ fragment of fired clay, also from M15, has a perforation or wattle impression, but is of unknown function. Other fragments are undiagnostic; most came from M15 and are assumed to be of later prehistoric date on the basis of the associated pottery.

Four fragmentary curved surfaces from M12 may be part of an object, perhaps another loomweight.

Charred plant remains from site M15, by Sarah F Wyles and Chris J Stevens

Thirty-six bulk samples were taken from the Middle/Late Bronze Age settlement at M15 for the recovery of charred plant remains and charcoal. On the basis of their assessment, five of the samples, from four pits, were selected for the further analysis of charred plant remains (table 4: see *Endnote*). Standard methods were followed, with the plant identifications using the nomenclature of Stace (1997) and the traditional cereal classification outlined in Zohary and Hopf (2000). The assemblages were dominated by cereal remains and hazelnut shell (*Corylus avellana*) fragments.

Grains and chaff elements of barley (*Hordeum vulgare*), and hulled wheat (*Triticum dicoccum/spelta*) were recovered from all four pits, with barley grains being particularly prevalent in pit 40040. Grains and chaff of emmer wheat (*T. dicoccum*) were also identified in all four pits, with a single glume of spelt (*T. spelta*) identified from pit 3006. Apart from in pit 40225, glume bases outnumbered grains of hulled wheat. The weed seed assemblages were all typical of waste, rough or cultivated ground, and possibly heathland.

The samples probably derive from general crop waste, which includes dehussing waste, as spikelets/grain are taken from storage on a regular basis and processed for clean grain. There is also evidence for the exploitation of the hedgerows/scrub, with the presence of fragments of hazelnut shell and fragments of hawthorn (*Crataegus monogyna*) stone. Both were probably collected for food, the latter possibly with wood collected as fuel, since Pomoideae charcoal (which includes hawthorn) was recovered from some of these features (see below).

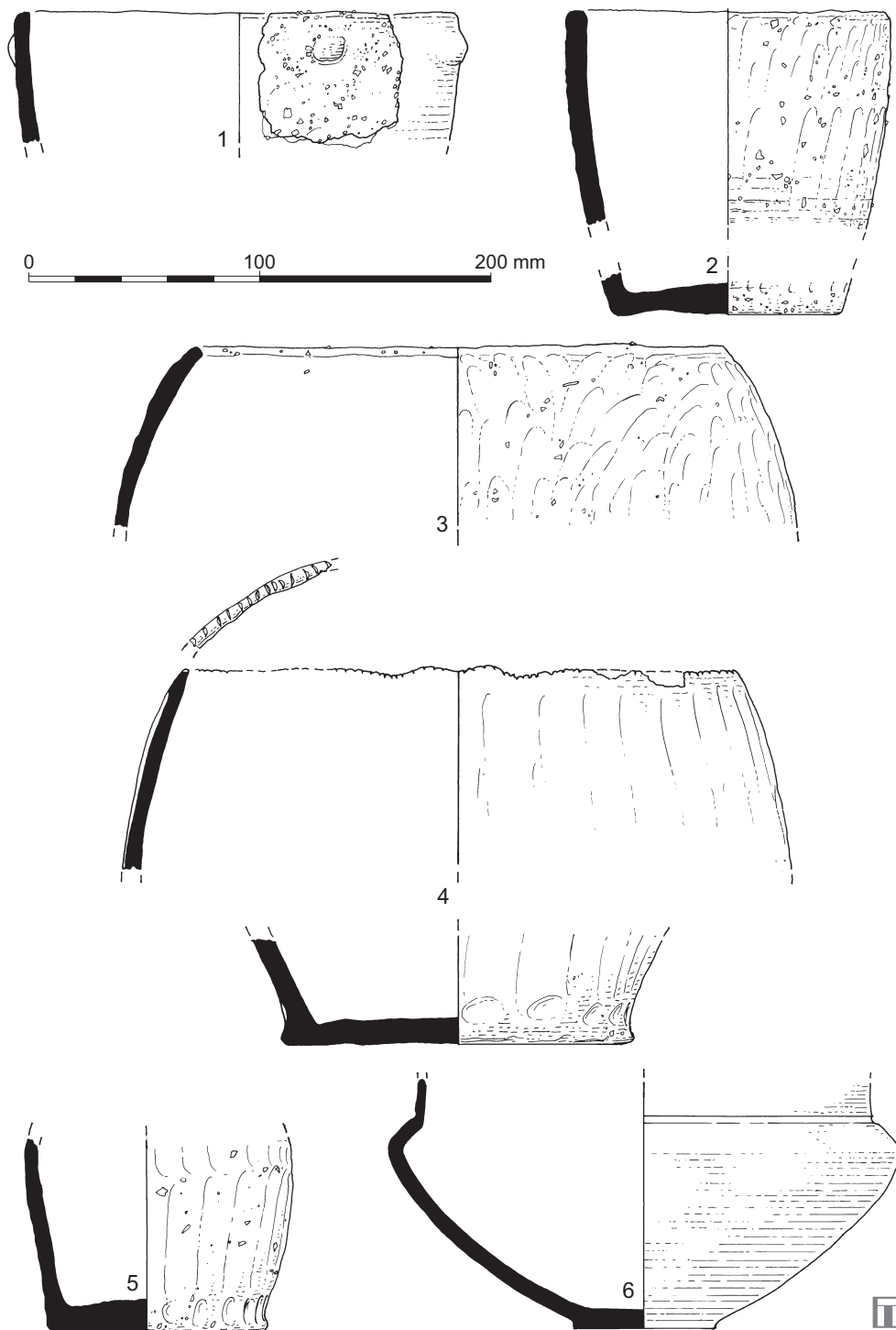


Fig 4 A3 Hindhead. Prehistoric pottery.

The assemblages from contemporary sites in the general area are often rather small, such as Frith End, Bordon (Stevens forthcoming) and Easton Lane, Winchester (Carruthers 1989), both in Hampshire. However, the results from this site fit with the general pattern, with often larger amounts of barley, and with emmer often the dominant hulled wheat in the Middle Bronze Age; for example, emmer chaff was recorded in large quantities from Stocks Down Cottages, Meonstoke (Wessex Archaeology 2006). Spelt is often commoner in the Late Bronze Age, although an early date of 1890–1690 cal BC (SUERC-32886, 3470±30 BP) is recorded from Monkton Road, Minster (Barclay *et al* 2011).

Capsules of bell heather (*Erica cf. cinerea*), a heath species, were recorded in three pits. Two pits also contained a number of grass (Poaceae) and false oat-grass (*Arrhenatherum elatius var. bulbosum*) basal culm nodes, all possibly representing the clearance of areas on the settlement edge, and/or the collection of heathland material for fuel.

Wood charcoal from site M15, by Catherine Barnett

Three pit samples from the Middle/Late Bronze Age settlement at M15 were analysed for charcoal (table 5: see *Endnote*) using standard methodology. Pit 40192 contained only large quantities of oak, but the assemblages from pits 3006 and 40225 had a minimum of six taxa, dominated by oak at 63–65%, with hazel and lesser quantities of Pomoideae (apple, pear, whitebeam etc), alder, ash and birch. The area exploited for fuel was mainly open deciduous woodland, although small quantities of alder indicate the occasional use of wetlands. The results are comparable with broadly contemporary features at Frith End, Hampshire (Barnett forthcoming).

Hazel roundwood cut at *c* 10 years formed 19% of the assemblage from pit 40225, hinting at coppice rotation in the local woodland to increase timber productivity and predictability. Such management has been well documented from the analysis of waterlogged roundwood from Bronze Age trackways, such as those of the Somerset Levels (Orme & Coles 1985).

ROMANO-BRITISH (AD 43–410)

No Romano-British features were identified, and only four sherds were recovered (table 2), two from M12, and one each from M15 and M16. All are coarsewares; the sherd from M16 is a rim from a necked, everted rim jar of 1st/2nd century AD type.

SAXON (AD 410–1066) AND MEDIEVAL (1066–1500)

No finds or features belonging to the Saxon period were found during the course of the fieldwork, and there was only a single find of medieval pottery. Activity in the Saxon period is nonetheless suggested by a radiocarbon date of cal AD 680–890 (SUERC-36565, 1230±35 BP) obtained from a sample of oak sapwood charcoal from charcoal-rich pit 15104, in M12 (table 1); the pit also contained a residual sherd of Middle/Late Bronze Age pottery and a piece of unidentifiable iron.

Peat deposits from site M9, by Michael J Grant, David Norcott and Chris J Stevens

Peat deposits were found in the valley bottom in the northern tunnel portal area of Boundless Copse (M9) (figs 1 and 2). A series of boreholes were taken, one of which (Core 2) was selected for analysis (table 6: see *Endnote*). This revealed a podzolic palaeosol overlain by a series of peat deposits. Radiocarbon dating indicates that peat formation started during the Early to Middle Saxon period, dated cal AD 580–680 (NZA-29068, 1403±35 BP), and continued through the medieval period (table 7: see *Endnote*). Peat formation is interrupted by an organic rich colluvial deposit, bracketed by two Saxon radiocarbon dates (NZA-29068 and NZA-29067), implying local catchment disturbance during early peat development.

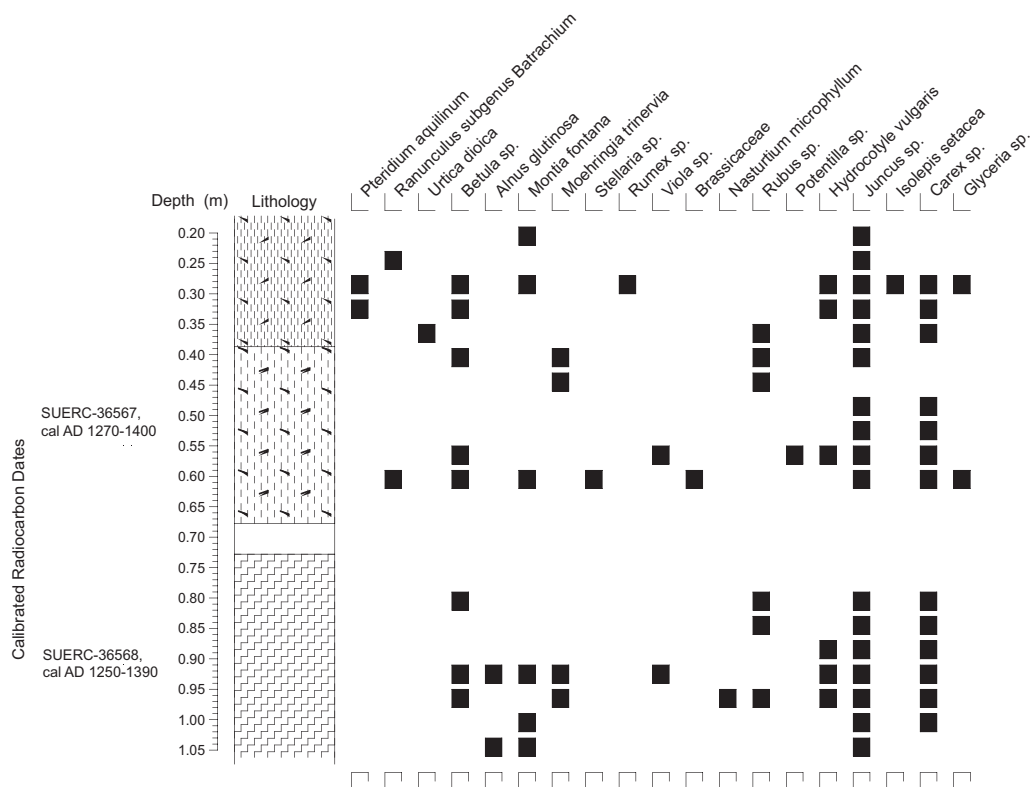


Fig 5 A3 Hindhead. Plant macrofossils from peat deposits (Core 2) in M9 (Boundless Copse North Portal). Table 6 for lithology and table 7 for radiocarbon dates can be found in the online supplement (see *Endnote*).

The waterlogged plant remains, from the peat above the colluvial layer (fig 5), are generally indicative of wet open woodland and scrub, consisting of alder (*Alnus glutinosa*) and birch (*Betula* sp.), with patches of longer rush/sedge grassland. The main seeds present were those of rush (*Juncus* sp.), sedge (*Carex* sp.) and birch, with other wetland species including blinks (*Montia fontana*), water crowfoot (*Ranunculus* subgenus *Batrachium*), marsh pennywort (*Hydrocotyle vulgaris*) and sweet-grass (*Glyceria* sp.).

The pollen evidence (fig 6) also indicates a local presence of alder and birch within the valley, with oak (*Quercus*) probably more extensive on the drier margins associated with an understory of hazel (*Corylus avellana*) and holly (*Ilex aquifolium*). Changes within the local vegetation through time are apparent, seen notably in the fluctuations in birch and alder, indicating changes in the on-site vegetation cover. The observed increases in grasses (Poaceae, zones BC-2, -4, -5 and -6) are likely to be a composite response from changing local wetland, driven by local hydrology, and dryland vegetation. Increases in grasses, particularly towards the top of the sequence, coincide with increases in sweet-grasses, sedges (Cyperaceae) and fern spores (Pteropsida (monoete) indet.), and a reduction in alder, implying an increase in damp rush/sedge grassland at times of reduced alder canopy cover.

There are several notable changes in the vegetation throughout the pollen sequence. Increases in heath (*Vaccinium*-type) and heather (*Calluna vulgaris*) occur in pollen zones BC-1 and -2 indicating local expansion of heathland. Previous pollen investigations in the area, notably from Thursley Common (5km to the north), were undated and probably contain a large truncation in the pollen sequence, leading Moore and Wilmott (1976) to speculate that the presence of Bronze Age barrows in the area may indicate a Bronze Age date for heathland expansion.

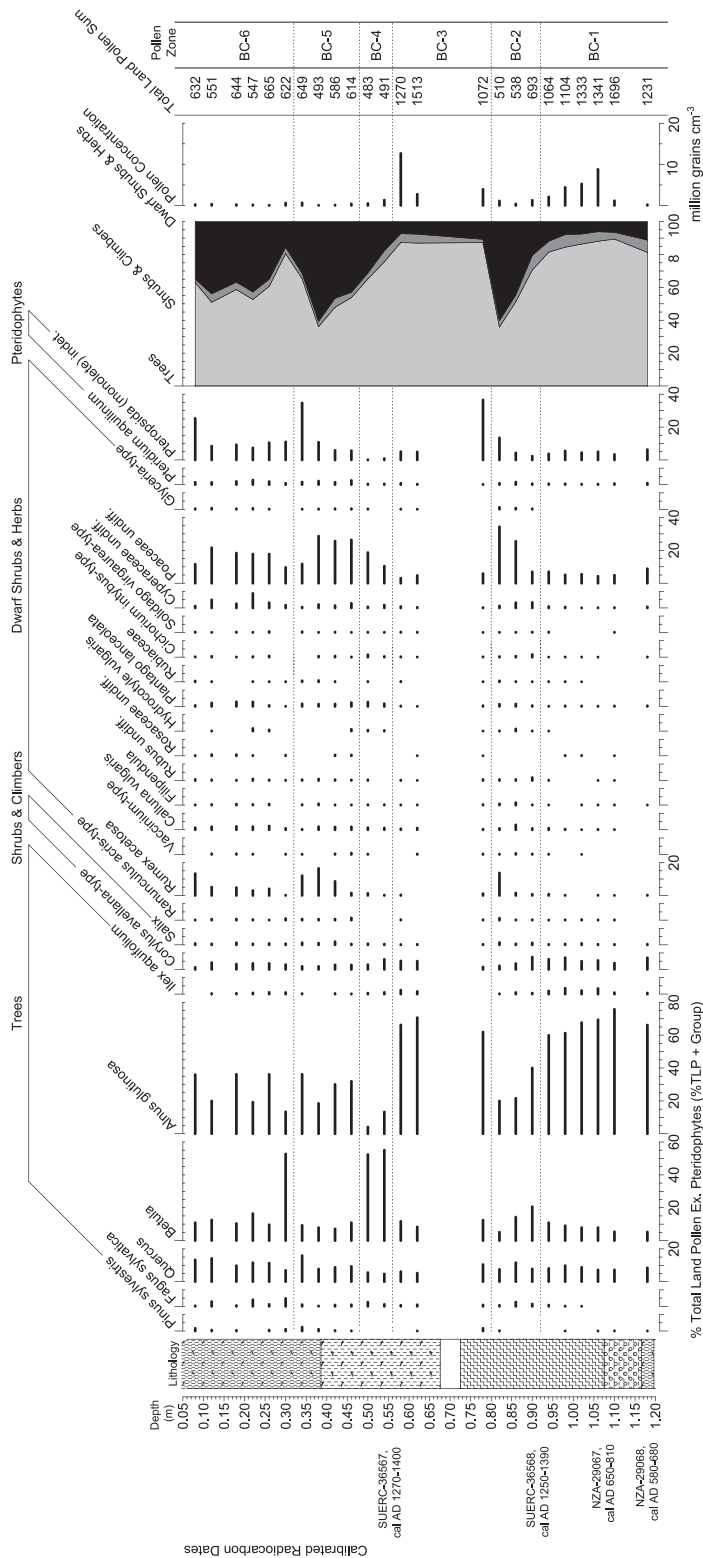


Fig 6 A3 Hindhead. Summary pollen diagram (selected taxa) from Core 2 in M9 (Boundless Copse North Portal). Standard preparation was used (Moore *et al* 1991) using 2cm³ of sediment and *Lycopodium* spores added to allow calculation of pollen concentrations (Stockmarr 1971). Nomenclature follows Bennett (1994) with the exception of Poaceae, which follows Küster (1988). A total land pollen (TLP) sum excluding pteridophytes was used. Pollen diagram was produced in Tilia v. 1.7.16 (Grimm 2001), with pollen zonation produced using CONISS (Grimm 1987). Table 6 for lithology and table 7 for radiocarbon dates can be found in the online supplement (see *Endnote*).

More recently, a dated pollen sequence from Conford (Groves 2008; Groves *et al* 2012) (9km to the south-east) records some initial heathland development during Late Neolithic and Late Bronze Age (Groves *et al* 2012) with major heath expansion recorded during the early medieval period, broadly synchronous with the Late Saxon/early medieval heath development recorded at Boundless Copse. One possible cause of heath expansion in this area could have been the establishment of Woolmer Forest (close to the western edge of the study corridor) as a royal hunting forest (Currie 2000), which is likely to have significantly increased grazing activity. Increases in bracken (*Pteridium aquilinum*), ribwort plantain (*Plantago lanceolata*) and common sorrel (*Rumex acetosa*), all commonly associated with disturbed ground, imply increases in grazing pressure. It is not possible to determine the full extent of Woolmer Forest, but it could be expected to have spread into parts of the surrounding manors at its height in the 12th and early 13th centuries (*ibid*).

There are also changes in the dryland woodland with the expansion of beech (*Fagus sylvatica*). Beech is highly dependent on ground disturbance for establishment (Björkman 1999; Watt 1923), and activities such as pannage (feeding by domestic pigs on acorns and beechmast) may particularly have favoured it. Holly may have further helped the expansion of beech as it is known to act as a nursery to protect young beech seedlings and saplings. Although the timing of the expansion of beech in southern Britain is asynchronous, in the Weald a major expansion of beech has been observed beginning c. AD 800 (Waller & Schofield 2007; Waton 1982).

Towards the top of the pollen sequence alder is seen to reduce (zone BC-5) and implies that the valley's wetland vegetation changed from being dominated by birch and alder into open damp grassland, with alder receding towards the valley's spring-fed stream where it was found at the time of sampling. Grazing would have helped maintain the open damp grassland.

Woodland components, notably oak and beech, continue throughout the whole sequence implying local stands of woodland remained at this location throughout the medieval period. Prior to the construction of the new road tunnel, there was a dense stand of coppiced sweet chestnut (*Castanea sativa*) and extensive stands of pine (*Pinus sylvestris*). The absence of any notable increases/presence of these species towards the top of the pollen sequence (zone BC-6) therefore implies that the record does not extend up to the 19th century.

Medieval activity

A number of undated hollow-ways, field boundaries and lynchet features, in or near M3, M5, M6, M7, M10 and M19, were identified from previous surveys and fieldwork (Bartlett-Clark Consultancy 1995; Mouchel 1994) as potentially of medieval date. However, the subsequent walkover and auger surveys showed that the possible lynchets in M19 were of natural origin and the result of slumping of material downhill towards the valley base and the creation of small natural platforms.

The only medieval find from the route was a jar with a sharply out-turned rim in a hard sandy fabric (86 sherds, 242g) (table 2), recovered from the subsoil in M15.

POST-MEDIEVAL (AD 1500–1800)

Many of the earthwork features observed and investigated in M1, M3, M10, M11 and M15 are likely to be post-medieval. The earthen bank-and-ditch field boundaries observed in M10 were associated with a number of ceramic field drains dating to the mid–late 19th century.

Post-medieval industrial activity

There is a notable occurrence of fieldnames in the northern half of the route containing references to kilns, loom-pits, clay pits and coppiced woodland. At least one brick kiln is

recorded close to M11 on the Thursley tithe map and apportionment of 1846–9, and previous work in the area of M10 had noted the extant remains of a possible lime kiln (Wessex Archaeology 2004, site WA31). Site visits in 2006 and 2007 investigated the remains, revealing that they comprised two lime kilns (of flare kiln type, the visible remains of which are often referred to as ‘scoop and mound’), and an associated loading area and trackway. The remains are undated, although this kiln type usually dates to the late 18th to mid-19th century.

Three previously unknown flare-type lime kilns – Kilns 1 and 2 in M16, and Kiln 3 beside Boundless Road adjacent to M14 – were excavated. Archaeomagnetic dating indicated that their last firings occurred between the early/mid-17th century and the early 18th century (GeoQuest Associates 2007a; 2007b). A fourth lime kiln (Kiln 4), with circular brick- and sandstone-lined chamber, *c* 3m in diameter, was observed in a watching brief during the excavation of a narrow pipe trench in the northern half of M16, but not further investigated. All these kilns occupied prominent positions immediately alongside roads, allowing easy access and distribution.

Kiln 1

Following the identification of a kiln in evaluation trench 159 (at SU 90124 38148, 162.9m OD), an area (8 x 30m) was opened around it for excavation.

Kiln 1, built within an almost circular construction cut (15906), 3.5m in diameter and 1.2m surviving depth, comprised a chamber (or pot) of sandstone blocks (15930) lined internally with unfrogged bricks (15924) (figs 7 and 8). The floor of the chamber consisted of a concrete-type layer (15925), and around its edge there was a brick ‘bench’ 0.4m wide and 0.2m high. At some stage, the floor had been raised, using bricks, to a level flush with the top of the bench. The brickwork was heavily vitrified. Traces of lime clinker were evident around the bench and on the floor. The arched drawhole, for firing and drawing the lime, had collapsed, and there was a small raking area, 1.5m long and 2.5m wide, at the south-east, facing the road.

The kiln was filled with loose brick demolition material. Little datable material was recovered, although fragments of two chafing dishes, recovered from the earliest backfill deposit, gave a potential 16th–17th century date for the kiln’s use. The archaeomagnetic analysis of samples of the brick lining (15924) produced a date range for the last firing of 1715–35 (GeoQuest Associates 2007a). This is earlier than the usually assumed late 18th–early 19th century date for a Surrey brick kiln of this design (Williams 1989; 2008).

Kiln 2

Another kiln was identified in the adjacent trench 254, *c* 60m to the north-east (at SU 90164 38194, 160.7m OD), and an area 13 x 19m was opened around it for excavation.

Kiln 2 comprised a subrectangular construction cut (25425), 3.5m long x 2.6m wide, containing a pot of rough sandstone blocks (25427); the drawhole had been completely demolished. No brickwork was evident and the floor consisted of the natural geology. The kiln appeared to have been backfilled mainly with natural sandy silt, containing only a few sandstone blocks. No datable finds were recovered, but the archaeomagnetic analysis of samples of the sandstone pot wall (25427), and burnt clay within it, produced a date range for the last firing of 1610–60 (GeoQuest Associates 2007a).

Kiln 3

The construction cut for Kiln 3 (25514), which lay *c* 700m south of Kiln 1 (at SU 90013 37461), was 3.1m wide (the western side of the kiln was not exposed) and 1.2m surviving depth, suggesting that, here too, the upper part had been demolished. The kiln was of

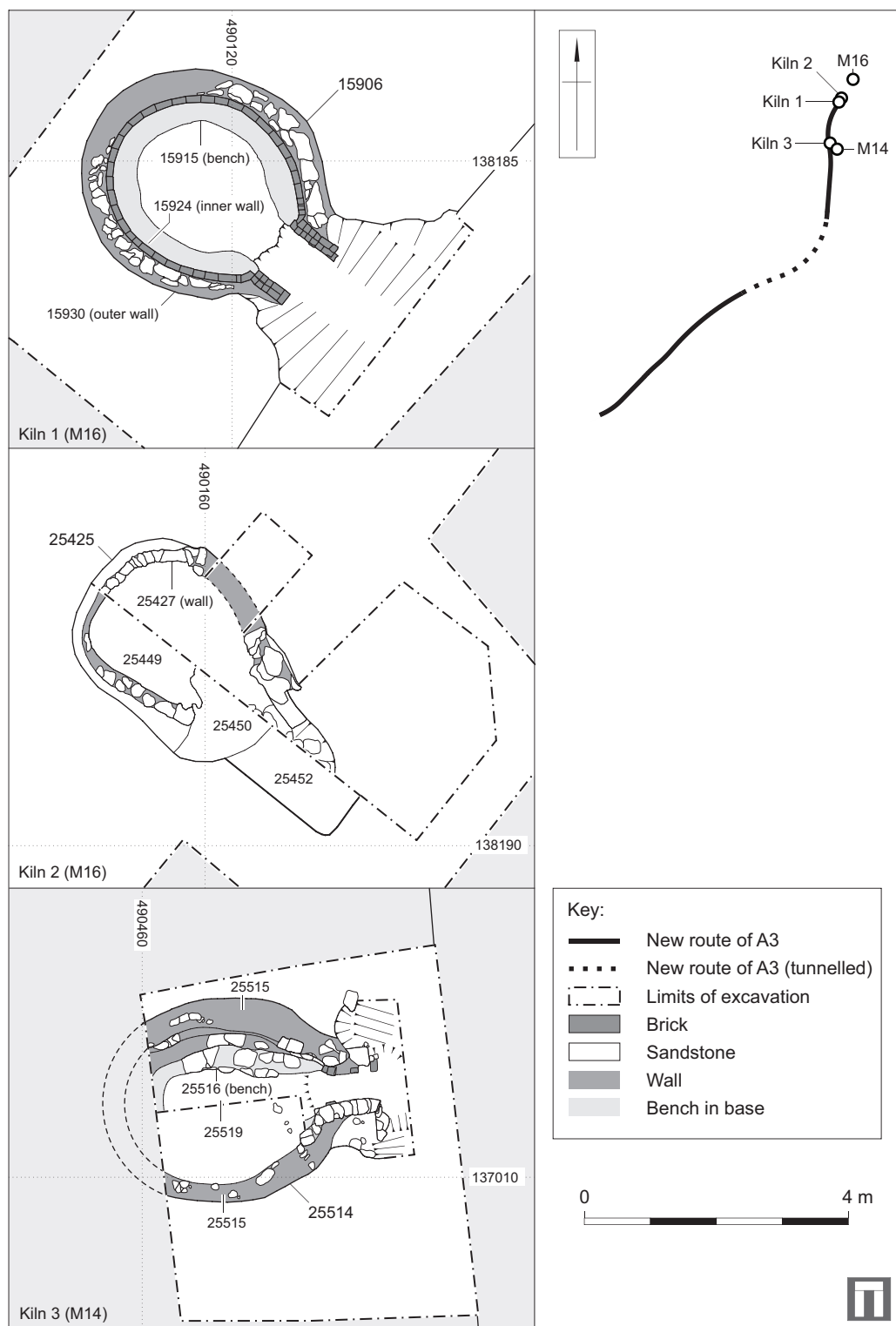


Fig 7 A3 Hindhead. Lime kilns 1–3.



Fig 8 A3 Hindhead. Lime kiln 1 being sampled for archaeomagnetic dating; note the structure of the kiln.

a similar form to Kiln 2, although its slightly oval pot (25515), built of roughly-shaped sandstone blocks, without a brick lining but with a low sandstone bench around its base, was better preserved. The sandstone was heavily vitrified, and the floor of the pot consisted of baked sandy clay. There was a low step up from the floor of the pot to that in the east-facing drawhole, which was $\approx 0.8\text{m}$ long and 0.9m wide and had a lining of unfrosted brick, apparently unmortared. The stone and brick outside the drawhole are probably the remains of a front wall or buttressing, usually found on such Surrey kilns (R Williams, pers comm).

A thin layer of compacted kiln waste (25519), consisting of burnt clinker and charcoal, covered the floor and extended eastwards out of the kiln, lying 0.4m below the modern

surface of Boundless Road; it was overlain within the kiln by demolition rubble. No datable artefacts were recovered, but the archaeomagnetic analysis of samples of sandstone, fired clay and brick from the kiln structure produced a date range for the last firing of AD 1620–75 (GeoQuest Associates 2007b).

Charcoal from the lime kilns, by Catherine Barnett

Samples were taken from Kilns 1 and 3 and analysed for charcoal (table 8: see *Endnote*). The charcoal proved varied, with a minimum of eleven taxa in Kiln 1, and six in Kiln 3. Kiln 1 was dominated by hazel (29%), Pomoideae (apple, pear, whitebeam etc), oak and elder were common, with lesser quantities of alder, ash, birch, holly, elm and walnut. All are native apart from walnut, with *Juglans regia* introduced to Britain during or before the Romano-British period (cf Godwin 1975, 248) and *J. nigra* in the early 17th century. Its presence in the fuel assemblage indicates a willingness to use all available wood in the kilns, including prunings.

Kiln 3 was dominated by birch (50%) and beech (25%), with hazel, ash, oak and holly. An indication of management by coppicing is given by the same-age (3–5 years) birch roundwood in Kiln 3, confirmed by the presence of a piece with the heel divided by a coppice scar. Given the wide range of variation in the taxa, the fact that the assemblage broadly matches the trees and shrubs seen in the pollen sequence suggests that much of the wood was probably collected locally.

Post-medieval pottery, by Lorraine Mephram

A total of 106 sherds (1471g) of post-medieval pottery were recovered, comprising mostly coarse redwares (94 sherds, 1291g), stoneware (3/126g), white saltglaze (1/7g) and modern refined whitewares (8/47g) (table 2). Most of the redwares came from M16, including two chafing dishes (from Kiln 1) with the most likely source for these wares being the Surrey/Hampshire border industry, comprising a number of pottery kilns in the Farnham and Farnborough area that were producing both white- and redwares. The chafing dish, a vessel comprising a bowl set on a pedestal base, designed to hold charcoal or embers for keeping food warm or for cooking, is represented within this industry in the later 16th and 17th centuries (Pearce 1992, 22, nos 186–93).

Landownership and occupancy around the lime kiln sites, by John Chandler

Kilns 1 and 2 lay adjacent to the A3 on its northern descent from Hindhead Common, while Kiln 3 adjoined Boundless Copse further south. The 1846 Thursley tithe map and apportionment revealed the principal landowner of the farmland and woodland adjacent to Hindhead Common to be Lord Middleton of Peper Harow, while a few parcels of land belonged to the Trustees of Odiham School. The land was farmed by several tenants.

Middleton acquired his Thursley holdings piecemeal early in the 19th century, indirectly from the lord of Witley manor (Thursley originated as a chapelry of Witley and lay within Witley manor). Witley manor had been acquired in the late 16th century by Henry Bell, before passing through marriage to the Webb family in 1763. The lords of the manor oversaw, *inter alia*, the exploitation of commons and waste in Thursley, including Hindhead Common, and through their courts controlled agriculture on the manor.

From the confusing mass of deeds that either survives at Surrey History Centre or are transcribed by Woods (GodM: Woods *c* 1900) emerges an impression of dynasties of small farmers, inter-marrying, buying and selling to each other within Witley and Thursley, and occupying or putting tenants into the various holdings, which appear to have practised a mixed farming regime.

Limeburning at Thursley

The origins and purpose of limeburning at Thursley, and the names of some of the participants, are contained within an agreement made in January 1634 between the lords of Witley manor, Henry Bell and Anthony Smith, and representatives on behalf of their tenants, including Thomas Matchwick, Thomas Shudd and John and Richard Stilwell (SHC: G5/4/6). The tenants, their farmers and the poor of Thursley were to be permitted to take heath (ie bracken or furze) and turf (ie peat) from the manorial commons and waste for their own use to heat their houses and to burn lime. More specifically the tenants shall or may hereafter 'att their free will and pleasure make lymkills [*sic*] upon the commons and waste of this manor for accommodation and bettering of their lands and dwellings within the manor so it may be without apparent prejudice to the lord or other tenants and may have liberty to dig sand lome stones and gravel according to the ancient customes'. In return, the lords were permitted to enclose for their own use a piece of Witley Heath, and the tenants and lords undertook not to sell turf 'away' (presumably outside the manor).

More than twenty years later, in September 1656, this arrangement was contested by the lord, who had, following the agreement, enclosed a boggy part of the heath called Pudmore, and drained it in order to cut peat. This had continued until a dispute with the tenants some two years previously, apparently over who had rights to dig this peat, and in consequence a commission of enquiry was held a year later, in September 1657.

The minutes of this commission, including witness depositions (SHC: G70/38/4, and slightly unreliable transcript 333.32) show that witnesses were asked a series of questions, including whether they remembered Witley and Thursley 'before the lime was used there for the dressing and manuring of their lands' and 'before any heath was cut from the waste of the manor for the burning of lime and how long ago was that?'.²

The most specific reply came from John Punter, then aged 64, who said that he knew the parishes before any lime was used for the dressing and manuring of land, and the first time he knew it used for this purpose was about 56 years ago (ie 1601, when he was 8 years old), and then it was burnt with wood. The first load of turf cut in the parish was about 50 years ago (1607), so far as he remembered.

William Bide, a weaver of Witley, about 58 years old, also said that he remembered before lime was used in the parish, and other witnesses thought that it began about 40 years previously, so presumably in the period c 1610–20.

William Bide also recorded the names of those who 'cutt and taken heath from the waste of the said manor for the burnenge of lyme. And that Henry Roaker and John Denyer aforesaid have made lyme kills upon the ground or waste of the said manor'.

Since there seems to have been no incentive for the witnesses to either exaggerate or underestimate the length of time that limeburning had taken place, and since they roughly agreed about it, this document may be accepted as good evidence that the practice began at Thursley between about 1600 and 1620, that initially wood was used for firing, but from about 1620 peat and bracken taken from the manorial waste were also used.

The 1634 agreement was presumably an attempt on the part of the manor court to legitimise and regulate this novel use of the waste, and to put the new technique to good use for the advantage of everyone – the lord could enclose and exploit part of the waste, enterprising tenants could build lime kilns on the waste, and the resulting lime would be used to improve the fertility of the manor's agricultural land. After the agreement, if we are to believe William Bide, limeburning became general and at least two named tenants had built lime kilns.

Henry Roaker and John Denyer both came from long-established Witley and Thursley families with interests in the area around Hindhead Common, and when Denyer refused to pay Roaker the tithe due on an acre of land, Roaker went to law, and took him to answer before the King's Bench (SHC: 1304/1).

Whereas Roaker's sphere of activities seems to have been centred largely further north within the two parishes, other named defendants at the 1657 enquiry were more directly

concerned with the farms beneath Hindhead Common. The Shudds and Stilwells farmed at Highfield, and the Stilwells also owned land at Frith and Emley. Madgwick (Matchwick) was later the owner of Begley. The Stilwells and Denyers were related by marriage (GodM: Woods *c* 1900, 321A).

In any case, Bide's evidence suggests that limeburning had become normal practice by local farmers and landowners between the 1630s and 1650s, so it should be no surprise to find lime kilns close to these holdings.

The outcome of the 1657 commission is not recorded, so it must remain speculative whether or not an unfavourable outcome forced the defendants to abandon for a time their lime kilns. Nor is it possible to say whether the bad blood between Roaker and Denyer over tithes in any sense lay behind the 1656–7 dispute. However, the fact that the enquiry took place suggests that some problem had arisen over the way in which limeburning was being conducted, and that either the problem or its consequences may be the explanation for the very early abandonment of the excavated Kilns 2 and 3 at around this time.

Two further points should be made about the 1634 agreement and its aftermath. The first is that, while it seems clear that the predominant use of the lime was to spread on the fields in order to improve them, the wording stated 'for accommodation and bettering of their lands and dwellings', which may suggest that lime was also being used in building construction and repair.

The second point is that the positions of the excavated kilns are significant. Although adjacent to enclosed fields of established landholdings, they all lay on roadside waste, which would have been regarded as common land, and so covered by the terms of the 1634 agreement. Since good access was obviously required for a lime kiln, to bring chalk or limestone and firing, and to remove the lime, their siting made excellent sense, and a roadside bank was commonly used. Presumably, too, such lime kilns could have been built and operated by anyone who enjoyed common rights, and not necessarily the tenants of adjacent landholdings.

The 1634 and 1657 documents allow us to suggest an approximate date and context for the construction of Kilns 2 and 3, and a possible explanation for their abandonment, but it is clear that limeburning in kilns continued or resumed in Thursley and Witley thereafter. The analysis of material from Kiln 1 suggests a last firing date between 1715 and 1735, although it is not clear whether it was in use concurrently with Kiln 2 or replaced it after Kiln 2 became damaged or unusable.

Discussion

The fieldwork has confirmed the previous assessments of low archaeological potential of the route, due in part to the presence of modern managed woodland, agricultural activity and earlier road building and development. However, within a small number of areas, especially within the open farmland in the northern half of the route, the fieldwork uncovered significant archaeological evidence of both prehistoric activity and post-medieval industrial activity, making an important contribution to the existing archaeological knowledge of the local area and wider region.

PREHISTORIC SETTLEMENT AND FARMING

The residual Neolithic flintwork recovered from M15 parallels the small numbers of flint findspots of this date previously found on Thursley Common (Graham *et al* 1999), as well as in the Gibbet Hill and Grayshott areas. Despite the lack of evidence for Neolithic features, it potentially provides evidence of a precursor to the Bronze Age settlement in the area, or at least the movement of people through the landscape.

No Bronze Age sites or finds were identified in initial archaeological assessment of the route. However, the preponderance of heathland barrows is noted in the Surrey Archaeological

Research Framework (Bird 2006), and Early/Middle Bronze Age barrows and artefact spreads are known on Thursley Common (Graham *et al* 1999; Graham *et al* 2004), and on Ludshott Common and Weavers Down near the southern end of the route (Surrey HER).

The location of the settlement at M15/M16, on the lower slopes of the Greensand Ridge, had been suggested as the likely location for Neolithic or Early Bronze Age occupation, based on the finding from Thursley Common to the north (Graham *et al* 2004), but apart from a scrap of possible Early Bronze Age pottery, all the evidence points to activity around the Middle–Late Bronze Age transition, but possibly extending into the Iron Age.

However, owing to truncation the nature and extent of the settlement is unclear, although the finds and environmental remains provide some information about its occupants' lifestyle and activity. The recovery of fragments of fired clay loomweights indicates weaving and thus animal husbandry, with the keeping of sheep/goats for wool, or perhaps even the trade in wool, yarn and the animals themselves – although no animal bones survived the acidic Greensand soils. The remains of emmer wheat and spelt provide some indication of crops being grown and processed; wild resources were also exploited (hazelnut shell and a hawthorn stone). The wood charcoal indicates the exploitation of the local open deciduous woodland and heathland as well as wetland habitats of the local rivers, possibly involving woodland management through coppicing.

ROMANO-BRITISH, SAXON AND MEDIEVAL

The absence of dated features from these periods is consistent with previous findings. The four sherds of Romano-British pottery recovered were all from sites (M12, M15 and M16) in the northern half of the route, and within 3km of Thursley. Romano-British pottery and a number of Roman coins have previously been found towards the north of the route, and the small concentration of finds, human cremated remains and building material found around the villages of Thursley and Churt suggest settlement in the area, but this is yet to be confirmed. Relatively little evidence has been found in this part of Surrey for non-villa rural settlements.

While no Saxon finds, and only a single medieval pottery vessel, were recovered, some activity is indicated by the Saxon radiocarbon date from the pit with a charcoal-rich fill (in M12), as well as by the palaeoenvironmental evidence from the peat deposits in Boundless Copse (M9). Disturbance to the landscape during the Saxon period is indicated by the colluvial deposit laid down in the early stages of peat development, and the pollen evidence indicates grazing at this time. The peat deposits also provided information about the local environment in the Saxon and medieval periods, giving valuable insights into the nature, and timing, of heathland and beech woodland development in the Hindhead area, possibly related to the local establishment of Woolmer Forest during the early medieval period.

POST-MEDIEVAL LAND USE

The nature of the post-medieval findings falls into two main categories: agricultural/woodland division and 'industrial/agricultural' processing activity.

As previously noted, field boundaries, possible traces of ridge-and-furrow cultivation, and hollow-ways were found across the full length of the scheme, in areas M1, M3, M4, M10, M11, M14, M15 and M18. In many cases these features were undated, but were often orientated in relationship with existing field boundaries and other features, many of which show little change from that shown on Rocque's map of 1768 (Wessex Archaeology 2004, fig 12.6).

The earthwork survey and evaluation in M10 identified agricultural enclosures divided by bank-and-ditch earthworks with no evidence of settlement. The historic map evidence indicates that some of the larger earthworks were in place by at least the second half of the 18th century.

It is likely that the earthworks are post-medieval in date with further formalisation of the fields taking place in the mid-19th century during the period of parliamentary enclosure. The recovery of ceramic land drains dating to the mid-late 19th century is consistent with presumed date of the fields. The Thursley tithe map of 1846–9 shows the land parcels were used for a combination of arable farming and pasture, as well as woodland for coppicing, for the production of fuel to supply the local brick and lime kilns.

POST-MEDIEVAL INDUSTRIAL ACTIVITY

Two lime kilns of probable 18th–19th century date were investigated near M10 in 2006–7, having previously been described by Wainwright (1986, 50, no 40), one of them, of sandstone and brick, similar to Kiln 1. At least one brick kiln was recorded on the Thursley tithe map. Furthermore, the field name evidence from the tithe apportionment implies that lime production was, or had been, widespread in Thursley. The name *Kiln Field* occurs eight times in the parish, and there are two instances of *Loompits* and one each of *Kiln Coppice* and *Stone Quarry*. However, some of these names may refer to brick kilns, since the names *Brick Kiln Meadow* and *Brick Kiln Rough* were also found.

Surrey HER has records of c 40 lime kilns (and 37 brick kilns). Although very few of these are recorded in Waverley Borough, which covers the route, the district council's Heritage Features Project recorded a total of 35 derelict lime kilns within the Borough (R Williams, pers comm). As in Sussex, very few of these sites have been excavated, and on the basis of artefactual material and historic mapping an 18th–19th century date is assumed. However, archaeomagnetic dating from two of the newly-identified lime kilns indicated final firings of the early/mid-17th century, making them some of the earliest excavated kilns on the Weald of Surrey and Sussex.

It has been suggested (Holt 1971, 25) that 'it is possible that the soil quality in this area was so poor that it was in constant need of improvement' with the use of lime to neutralise and improve the condition of the acidic soils reclaimed from former heathland; and 'it became the practice for each farm to have its own kiln, and many other sites on road verges, commons and wastelands were utilized'. Lime was also used extensively in the production of lime mortars and renders, and as a flux to remove impurities during iron production.

Although mineral dressings for agricultural improvement were known and applied in the medieval period, and lime kilns were in use for the building industry, the production of quicklime through limeburning for agricultural purposes is thought to have originated in the area in the 16th century, and it was described by John Norden in 1614 in these terms: 'in some parts of Sussex [...] the poore husbandmen and Farmers doe buy and digge and fetch limestone, 2, 3 and 4 miles off, and in their fields build lime kilns, burn it and cart it on their fields to their great advantage' (quoted by Holt 1971, 24; see also Williams 1989, 6–7). This observation, it should be noted, coincides precisely with the witnessed commencement of limeburning at Thursley.

Whether or not soils north of Hindhead Common were so infertile, it clearly seemed worthwhile to local farmers to take the trouble to produce lime to improve them. The opportunity to do so was provided not by any local source of chalk, which was often carted some distance (Crocker 1999, 8), in the Hindhead area from the North Downs about 11km away, but of a ready source of firing, the peat, furze and wood freely available on the manorial waste. That chalk was burnt to make lime at Thursley is proved by the will of William Boxhold, 'husbandman' of Thursley, who in 1636 had a quantity of 'chalk to make lyme' (SHC: G1/1/88, quoted by Gorton 2005, app 1).

Geographically, the Hindhead kilns lie within an area of surviving or recorded lime kilns on Wealden sites, which have been studied more in Sussex than in Surrey (Holt 1971; Martin 1997; Williams 2004). However, very few of these 'flare' type kilns, built and operated by farmers to produce agricultural lime for their own use, have been excavated using modern scientific techniques. Kilns 2 and 3 are of particular interest because of the very early date

at which scientific analysis shows they went out of use. This interest is enhanced by the survival of the documents described above, which suggest the date and circumstances of their creation, operation and possible abandonment, and names some of the individual farmers and landholders who may have been involved in making and using them.

Kiln 1, in particular, is remarkably similar in size, construction and layout to a surveyed lime kiln in Ebernoe, West Sussex, which is thought to date from the 18th century (Martin 1997). Williams (2004, 8 and 12) describes such kilns as having a 'thick sandstone wall with brick used for lining the pot and for construction of a front wall with a single arched draw-hole [...] the pot was almost vertical-sided, narrowing only slightly at the rim and the base [...] a ledge or bench ran around the inside; (and) with the help of a wooden frame or iron horse the initial load of chalk was formed into a dome resting on this ledge'. It is clear that this type of construction was typical of the 18th century, but the excavation of Kiln 3 suggests it had its origins in at least the early 17th century.

The kilns appear to fall into two broad groups: well-built durable brick-lined kilns (Kilns 1 and 4) and cruder sandstone kilns (Kilns 2 and 3). This pattern matches the results of a study of limeburning in South Wales (Manning 2000), where there was often a clear distinction between 'commercial kilns' designed for the long-term supply of lime, and the smaller, rougher 'farm kilns' with a very localised distribution of the lime. However, the documentary research has indicated that this distinction is not so clear cut with the Thursley kilns.

The archive

The archive, which includes copies of the unpublished Wessex Archaeology reports listed in the bibliography, has been deposited at the Museum of Farnham under accession no WAVMS AO13.11.

Endnote

Appendix 1 and the tables listed below are available on the Archaeology Data Service website - <http://archaeologydataservice.ac.uk>. Select 'archives'; accept the terms and conditions; select 'Journals and series'; select 'Surrey Archaeological Collections', then 'volume 98'. The files are stored as supplementary material under the title of the article. Copies are also available from the Society's library at Castle Arch, Guildford GU1 3SX.

Table 4 Charred plant remains from the Middle/Late Bronze Age settlement (M15)

Table 5 Wood charcoal identifications from the Middle/Late Bronze Age settlement (M15)

Table 6 Description of sediment sequence obtained from Core 2 in Boundless Copse, described according to Hodgson (1997). The surface of the core was at an altitude of 174.91m OD, located at SU 89960 36530

Table 7 Radiocarbon dates obtained from peat deposits, Core 2, Boundless Copse (M9)

Table 8 Post-medieval wood charcoal identifications from Kilns 1 and 3

Appendix 1: Fabric descriptions for Bronze Age pottery

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