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Excavation of a Roman tile kiln at Dockenfield, 2015

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In September 2015 trenches were excavated over the site of a late 3rd/early 4th century tile kiln close to the county boundary with Hampshire and about 1km east of the Roman pottery sites in the Alice Holt Forest. This is the first record of a tile kiln operating in or near the Alice Holt Roman pottery industry.

Introduction

In 1981 the authors had noted an extensive scatter of Roman tile on the recently ploughed western slope of a low hill just to the east of the village of Dockenfield (fig 1). The scatter consisted largely of pieces of *tegula* and other tile and brick; some of the former appeared to be wasters and the probable presence of a tile kiln on the site was reported to the Surrey Historic Environment Record (then the Sites and Monuments Record) and elsewhere (McWhirr 1984, 211). No further evidence for Roman activity was found in the field, which otherwise only produced a few sherds of medieval and later pottery and, from air photographs, evidence for several phases of ploughed-out field boundaries, some of which are shown on the tithe map of 1845.

In 2014, following a change of landowner, permission was given for a magnetometer survey over the area and this clearly showed two *c* 7m-long anomalies lying within what appeared to be a platform cut into the hillslope (fig 2; Graham & Graham 2015). The anomalies were interpreted as two tile kilns set into the hillslope. The landowner subsequently closed off the immediate area and, while the rest of the field was deep ploughed, this section was left undisturbed, which was fortunate as otherwise the surviving upper part of the kiln(s) would have been severely damaged.

In 2015, a joint excavation was arranged with volunteers and equipment from Surrey Archaeological and Basingstoke Archaeological & Historical Societies. This article presents the results of that work.

The site archive and finds will be deposited with the Museum of Farnham (acc no A015.11). This will include the pottery from the stokehole, which provides the basis on which the kiln is dated. Other Roman sites in Surrey have returned such wide radiocarbon dates as to be of little use and thermo-remanent magnetic dating would be unlikely to be reliable because the kiln is on a clay hillslope and shows signs of slight movement which, from experience elsewhere, would give misleading results.

Geology and topography

Lying on the western edge of the Weald and close to Alice Holt Forest, the underlying geology of the site is Gault clay, but this changes rapidly to the east where the clay meets the sands of the Folkestone Beds and to the west where it ends at the chalk of the Binsted ridge (fig 27).

The site (SU 82849 40394) lies on the western slope and slightly below the crest of a low hill, just to the east of the village of Dockenfield and close to the Surrey/Hampshire border.

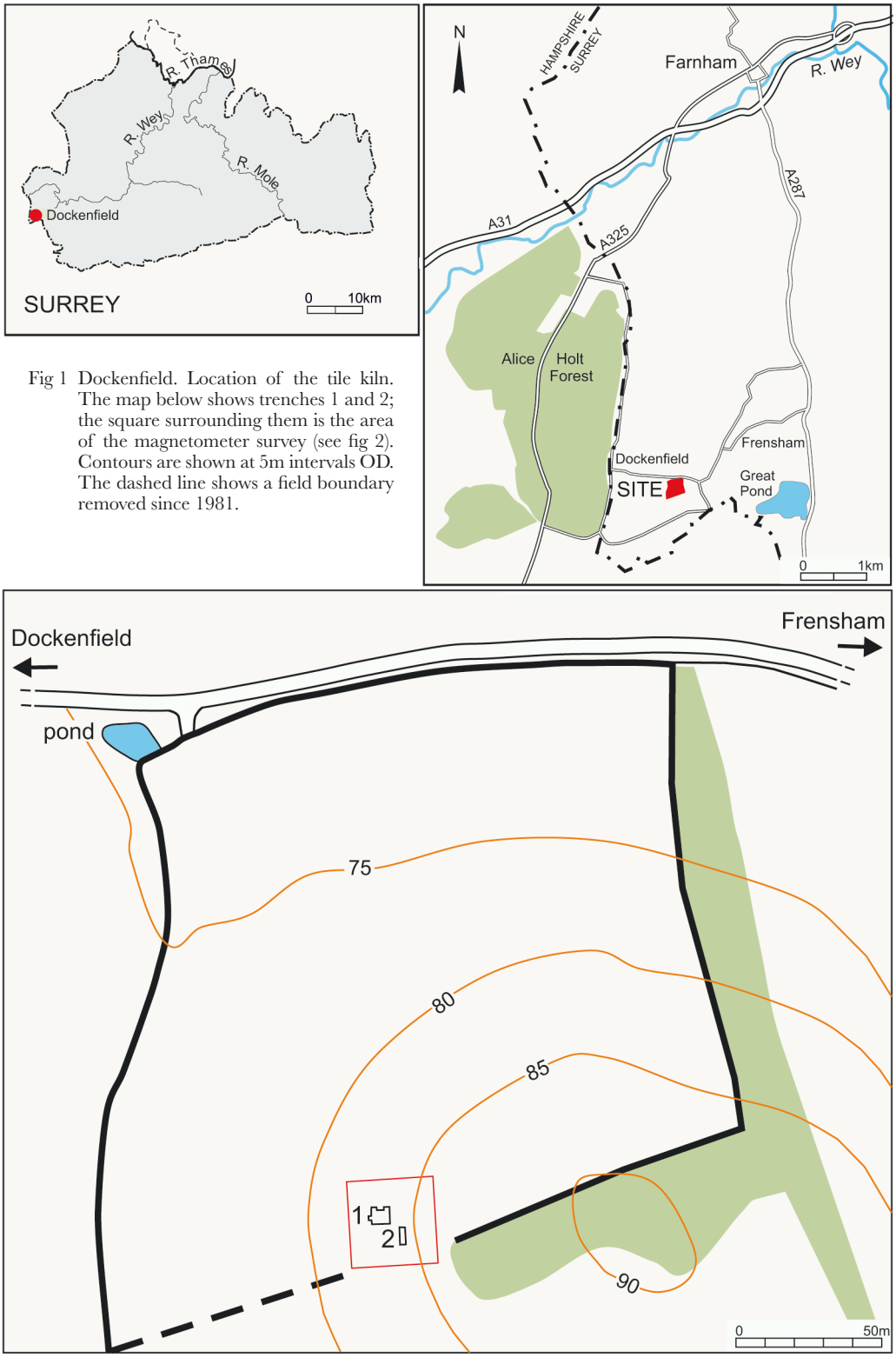


Fig 1 Dockenfield. Location of the tile kiln. The map below shows trenches 1 and 2; the square surrounding them is the area of the magnetometer survey (see fig 2). Contours are shown at 5m intervals OD. The dashed line shows a field boundary removed since 1981.

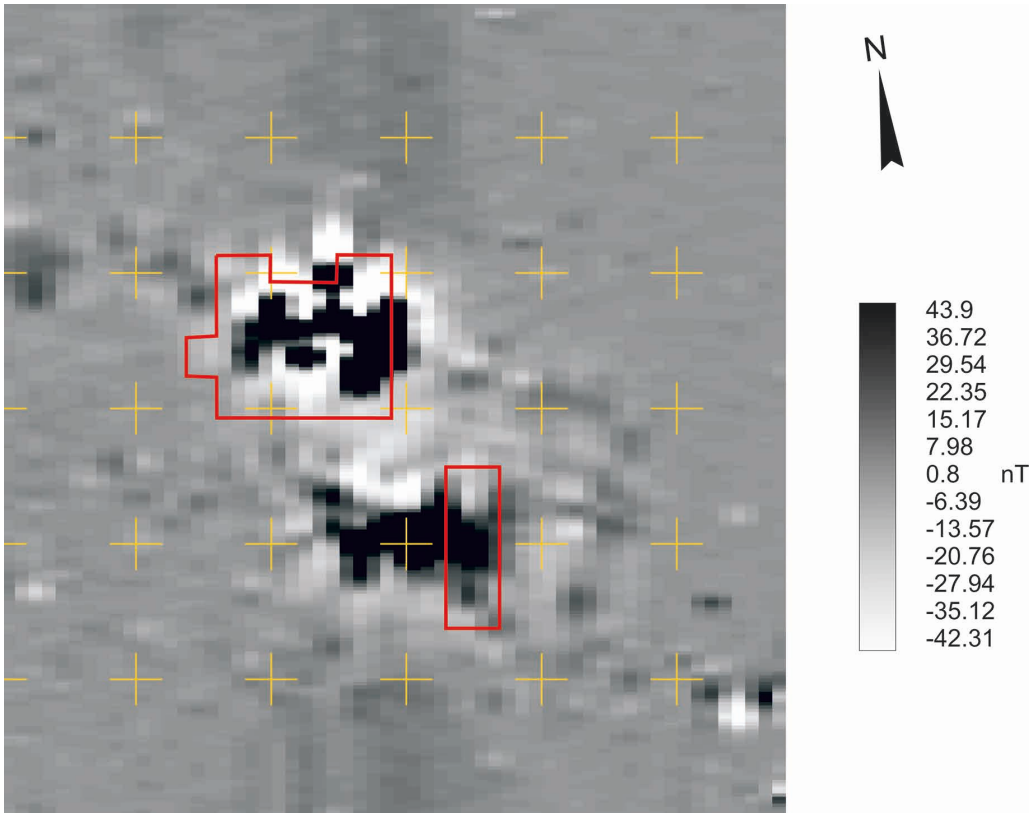


Fig 2 Dockenfield. Magnetometer survey. Trenches 1 and 2 are outlined in red. Yellow crosses mark the 30m survey squares.

The crest of the hill is shown on OS maps as being at 90m OD and the site of the kiln lies at about 83m OD. The position is exposed to the prevailing winds from the south-west.

The excavation

Initially, two parallel 6 x 2m trenches were opened across the top and bottom of the northern anomaly and a single similar-sized trench across the top of the southern one. In each case a layer of Roman tile was encountered just below the plough-soil at a depth of about 25cm. As walls began to appear in the northern two trenches it was decided to amalgamate the trenches in order to uncover the whole kiln (forming trench 1: 6 x 6.6m). The single southern trench (trench 2) showed no signs of walling and was therefore excavated as laid out (fig 2).

TRENCH 1 (figs 3–9)

This trench revealed the lower sections of a tile-and-brick-built kiln (figs 3–5) with a roughly square combustion chamber and five arched internal cross-walls serviced by a long, brick-built, arched fire tunnel with a stoke pit at the western end; the firing chamber and floor had not survived. The structure is very similar in design to other Surrey Roman tile kilns such as those at Reigate (Jones, in prep), Ashtead (Bird 2016) and Wykehurst Farm, Cranleigh (Goodchild 1937), albeit being smaller, simpler and rather later in date than the first two examples and is a Grimes (1930) type III square updraught kiln.

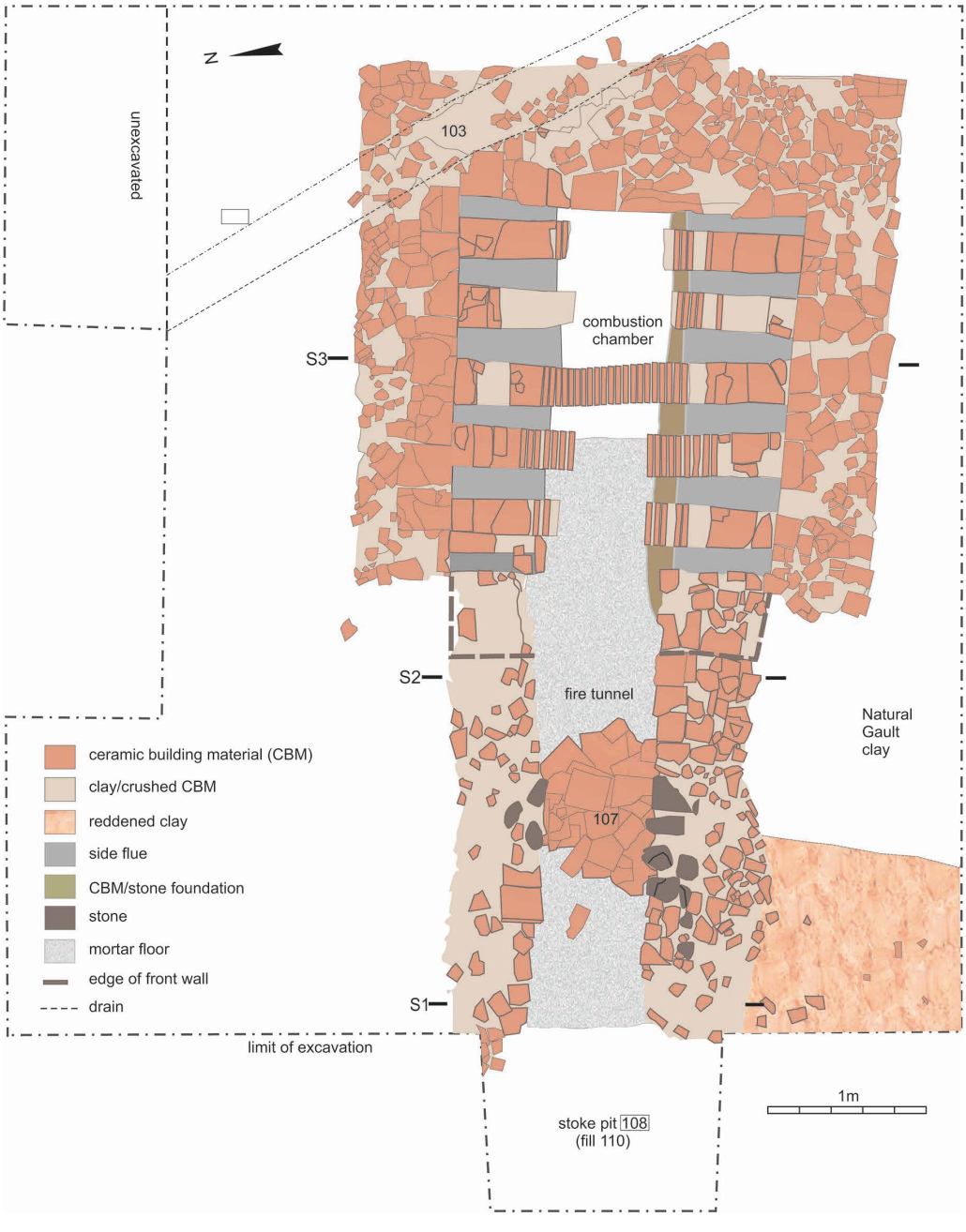


Fig 3 Dockenfield. Plan of trench 1.

THE STOKE PIT (fig 4)

This was only sampled in close proximity to the mouth of the fire tunnel and the horizontal extent of the pit is unknown. It had been backfilled during the Roman period with a 0.5m-thick layer of tile rubble mixed with a number of stones – the latter perhaps from part of the superstructure of a section of the fire tunnel (see below). Beneath the rubble/stone

layer was a deposit (110) of ash and charcoal mixed with the occasional sherd of grey ware pottery – in one case the rim from a beaker – but mainly consisting of small undiagnostic body sherds. Given the proximity to Alice Holt, this pottery is likely to be from that industry and the rim probably dates from the late 3rd/early 4th centuries. This ashy level presumably derives from the final or last few firings of the kiln and is surprisingly insubstantial at only 10cm thick. The ground was tested by soil auger to a depth of 0.5m below this level, but no further ash layers were found – only undisturbed Gault clay. This would imply that either the kiln was very short lived or, given the weight of other evidence to the contrary, that the stoke pit was, as might be expected, regularly cleaned out and the contents disposed of elsewhere.

THE FIRE TUNNEL (figs 4–7)

This was 2.3m long and varied in width from 0.77m at the stoke pit end to 0.58m at the interface with the end wall of the combustion chamber (fig 5). A similar narrowing of the

Fig 4 Dockenfield. Overhead photograph of trench 1; east is at the top.

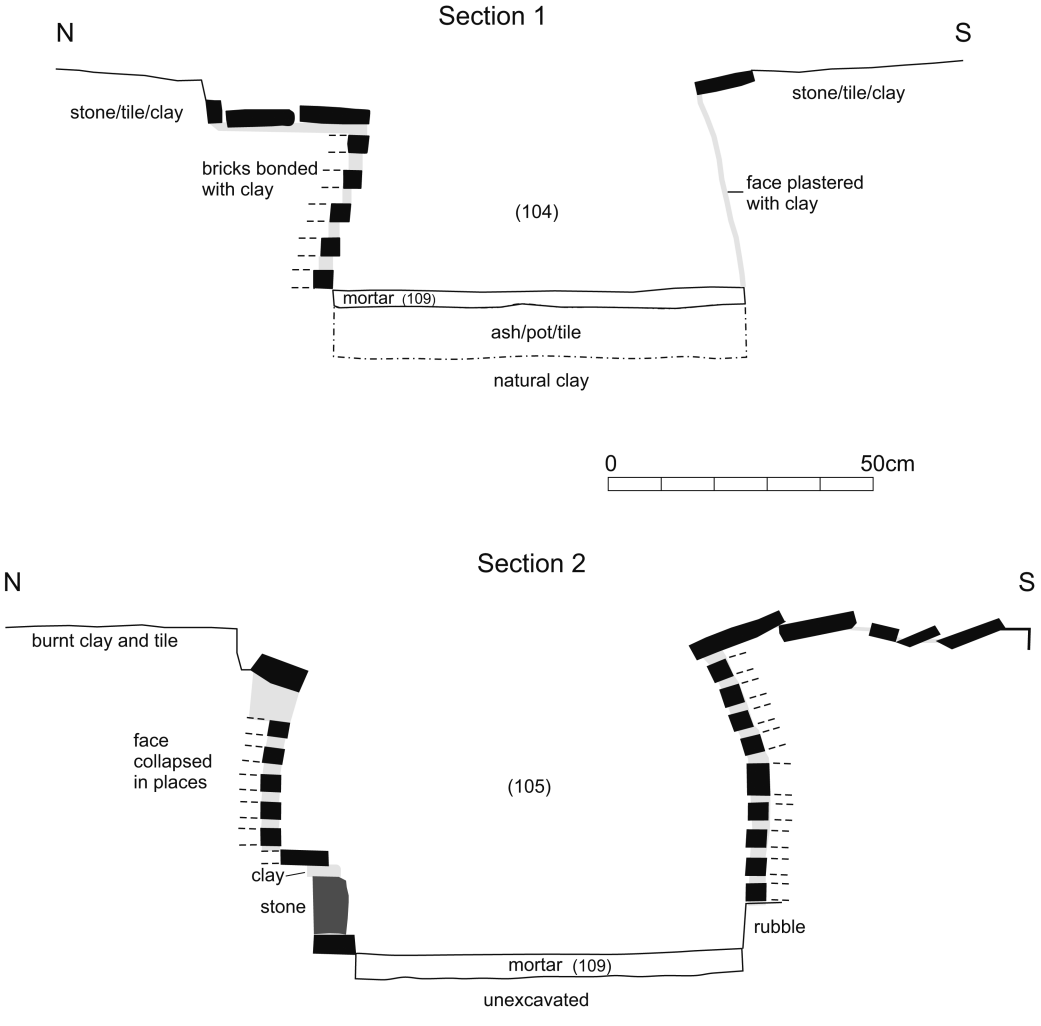


Fig 5 Dockenfield. Sections 1 and 2 across the fire tunnel.

flue has been noted in other kilns (eg at Reigate: Phil Jones, pers comm). The tunnel here, though now without the upper part of the arches, but presumably originally around 0.6m high internally had, for the most part, formed a continuous arched structure built of bricks with no evidence of butt joints anywhere along its length, except where it joined the kiln. The one exception to the brick construction of the flue came approximately one-third of the way along the length from the stoke pit, where the upper surviving level included two opposed sections of a single upper layer of four stones on one side, and three on the other (fig 3). This point along the tunnel was also partially blocked by a collapsed stack of bricks (107) (fig 6). The point also marked a change in the degree of burning on the internal walls – to the west the tunnel walls showed signs of reddening (fig 6), but on the kiln side the walls were blackened and vitrified in places (fig 7). Perhaps the stack of bricks had been used to narrow the original entrance to the fire tunnel in order to control air flow and then either collapsed when the kiln was abandoned or was pushed inwards when the fire tunnel was extended. Apart from the restricting stack of bricks, there was no sign of tiles/bricks from the upper sections of the arches having collapsed onto the tunnel floor. They had presumably

Fig 6 Dockenfield. View of the north face of the west end of the fire tunnel, showing the deliberate partial blocking of the flue – presumably a temporary part of the firing process.

Fig 7 Dockenfield. View of the north face of the east end of the fire tunnel.

been removed for use elsewhere when the kiln was demolished or had subsequently been ploughed away.

Another difference was that, between the blocking band of bricks and the stoke pit, the arched walls had no obvious foundations other than appearing to be set on or level with a layer of mortar, which also formed the floor of the tunnel. In contrast, on the kiln side, the walls were set on a foundation of a band of grey tiles, which in turn had been set on a layer of stones. Where this foundation survived intact it ended with a straight edge *c* 15cm into

the flue from the base of the arches (fig 5, section 2). This type of footing continued through into the combustion chamber though, as mentioned, the fire tunnel was butted onto the end wall of the combustion chamber and was not integral with it. The actual floor at this end of the tunnel, while missing in places, again consisted of a layer of mortar (109) similar to that at the stoke pit end. Where it was exposed it was clear that this mortar was underlain by a layer of ash, tile and pottery, indicating that the overlying floor was only the latest of an unknown number of refurbishments although no other indications of earlier floors were visible. Again, there was no sign of a drainage system as has sometimes been found in similar kilns (eg Reigate). Presumably the 13cm drop between the floor level at the eastern end of the combustion chamber and that at the stokehole end of the flue was adequate to keep the kiln drained. By comparison, the current hillslope drops 0.77m over the 7m length of the trench, giving an indication of the extent to which the ground had been levelled to make a platform for the kiln. Finally, the ground within the trench and to the south-west of the west end of the tunnel, level with the tops of the surviving walls, was reddened. It may well have been used as a working area or for the initial disposal of hot material, which had heated the underlying clay as no ash was noted – the original surface having probably been ploughed away. This, together with the other differences either side of the brick blockage, probably means that the tunnel on the downhill, western, side of the blockage is a later addition to the length and that prior to this the original tunnel may have ended in line with the eastern edge of the reddened area. It was not possible, without destroying a section of the fire tunnel floor, to check whether this section overlay an original stoke pit.

THE COMBUSTION CHAMBER (figs 4, 8 and 9)

Following the excavation of a platform cut deep into the slope, the combustion chamber walls were constructed in a single build of coursed bricks bonded with clay. These predominantly consisted of *c* 36 x 28 x 3–3.5cm-thick bricks (*lydions*), with the rear of the back and side walls infilled with a consolidated variety of tile rubble, giving an overall side wall width of 0.65m. However, the eastern back wall was thicker at 0.86m wide – presumably to take the downhill thrust of the hillslope into which the kiln had been set. This had been successful and, although the wall curved inwards, there were no signs of cracking or repairs (fig 9). The

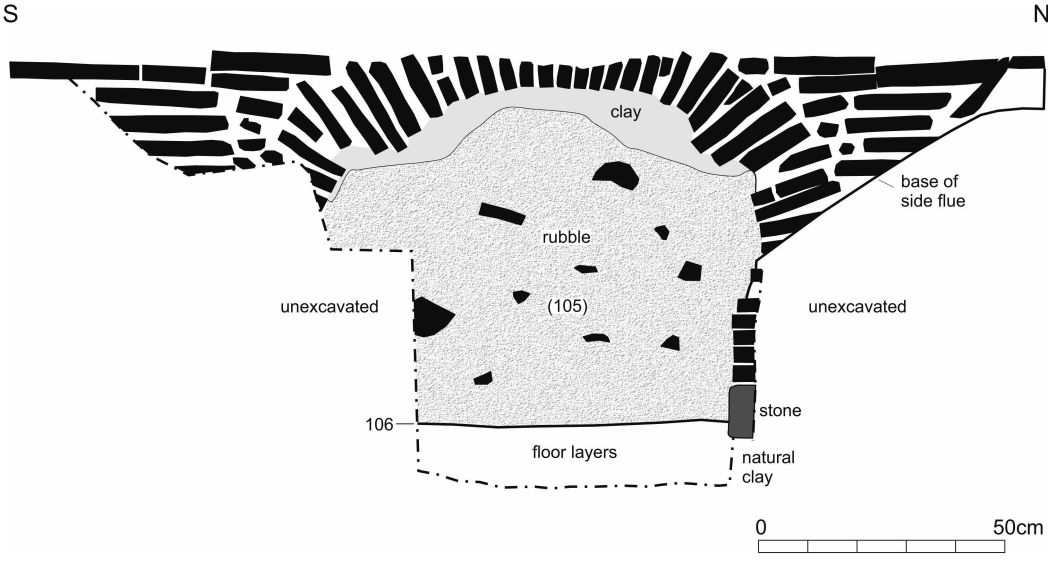


Fig 8 Dockenfield. Section 3 across the east face of the surviving cross-wall.

kiln had a separate and much shorter front wall, the ends of which only just reached their neighbours. The front wall therefore seems to have been added to the others or to have replaced an earlier wall of which no trace remained. The wall incorporated a tiled arch to allow the hot air to enter the chamber from the fire tunnel.

A final point worth noting is that the north-east and south-east outside corners of the chamber were both marked by single flat bricks, each of which lay at an angle of about 30° from horizontal. This gave the impression that both might have acted as post bases for some heavy wooden structure, although this is uncertain as no other signs of postholes/post bases were found within the trench.

The internal measurements of the combustion chamber were 2.36m for the north and south walls, 2.2m across the eastern, uphill, wall and 2m across the western wall, making the chamber slightly trapezoidal in shape. Five tile arched cross-walls divided the chamber, the central one of which remained intact (fig 8), albeit having lost the upper two-thirds of the height of the key tiles and immediate neighbours as a result of the plough damage that has affected the whole kiln. Each cross-wall varied slightly in width, but on average was about 0.3m wide with a gap between walls of around 0.2m, although the north-west arch was wider and seems to have been repaired. The surviving arch was 0.95m high from the mortar floor to the slightly collapsed underside of the top of the arch. As with the upper section of the fire tunnel, the arches were built on several layers of horizontally-laid bricks, in turn laid over a layer of stones. This footing, where it survived, again intruded beyond the base of the arches and into the kiln by about 0.15m. Under the cross flues on both sides of the chamber the ground had been shaped to form six side flues each with a slope of about 30° from the top of the foundation to the edge of the wall (fig 8). This slope was originally lined with tiles and was designed to allow the hot air to reach the periphery of the firing chamber. The lower floor of the combustion chamber was a continuation of the mortar floor noted in the fire tunnel, although it had been cut through and/or damaged along the majority of its length. Once again, the lower levels of the rubble backfill (105) contained the remains of the burnt sandy clay that may originally have coated the interior of the kiln.

Fig 9 Dockenfield. View of the inside face of the east wall of the firing chamber.

TRENCH 2 (fig 10)

This trench, again 6 x 2m, was laid across the top, eastern and uphill end of the second magnetic anomaly (fig 2). This had originally been interpreted as a second kiln, but none was found and, at least to the level tested, it turned out to be a laid working surface (202) of tile and brick rubble on the top of which was a thin scatter of daub (with, in one case, the

Fig 10 Dockenfield. Trench 2, surface 202, facing south.

impressions of burnt-out wattle), pottery and intrusive later material. Although no postholes were noted, it seems possible that despite a slope of *c* 6° across the 2m width of the trench, this surface might have been the site of a now undetectable timber and daub structure. If so, this would have acted as one of the ancillary buildings that must have once existed close to the kiln. An idea of the extent of the working surface can be estimated by looking at the results of the magnetometer survey. In any event the working surface and possible building must relate to a late phase in the life of the kiln as beneath the 18cm-thick layer of rubble was a filled-in pit or possibly pits (204 (fill 203), 205 (fills 206 and 207)) that contained yet more tile. These pits (possibly a single feature) were tested by a sondage to a depth of 0.86m below the modern ground surface, but continued downwards and outwards to an unknown extent. There is, therefore, still a possibility that a second, earlier kiln lies buried under this tile and brick debris. If that were the case it would suggest that the site functioned as an industry supplying tiles to a range of customers and perhaps worked over a longer period. The alternative explanation is that this feature or features represent earlier clay pits that were filled in to allow the construction of the later rubble working surface, but this is again uncertain and only further work in this area might provide answers to these questions.

Ceramic building material from trenches 1 and 2

A total of 757 pieces (1685.8kg) of ceramic building material (CBM) was recovered from all contexts. Of these, 122 pieces were retained for specialist examination (see report below). Pieces selected for retention included examples of different types of *tegula* cutaways, makers' marks, types of combing, vitrified/burnt (ie kiln) material and unusual pieces (piercings, very thick bricks).

The total CBM recovered from all contexts in trench 1 (the kiln trench) consisted of: 111 fragments (236.5kg) of tile; 3 (47g) possible tesserae; 112 fragments (103.8kg) of *tegulae*; 35 fragments (10.9kg) of *imbrices*; 42 pieces (7.49kg) of flue-tile; 337 pieces (1148.3kg) of brick; 1 (73g) possible antefix.

The ceramic building materials, by Sara Machin

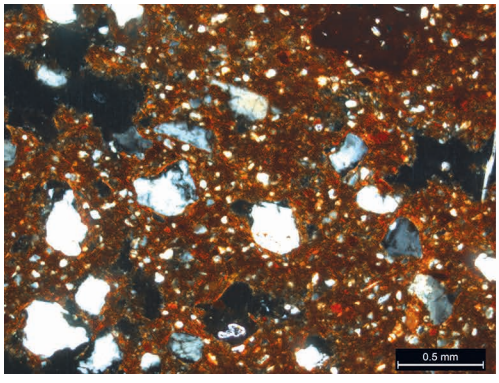
A total of 122 items were retained with a total weight of 42.512kg, from seven contexts across the two trenches excavated. From trench 1, the kiln, a total of 81 fragments (30,027g) were retained together with 29 fragments (8118g) from trench 2 and a further fifteen items

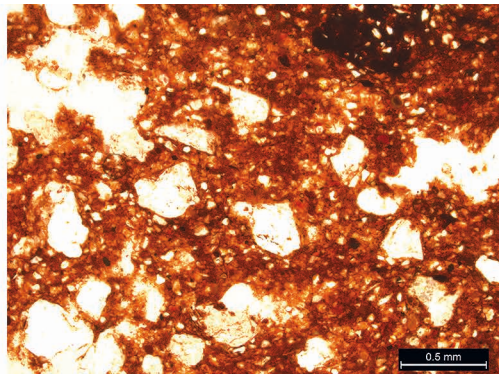
(4367g) of unstratified material. The average fragment weight was quite high (404.88g), indicative of a retention policy of retaining larger diagnostic or interesting pieces of CBM.

This report describes all the CBM retained during excavation; it does not include material recorded *in situ*, for example within the kiln structure, which is described elsewhere in this report. All the retained material was divided by form and recorded by weight and count. All forms are assigned according to the typology in Brodribb's *Roman Brick and Tile* volume (1987). Flat pieces greater than 30mm thick and without distinguishing features have been classified as bricks. There were few complete dimensions present meaning that only a few bricks were able to be speculatively assigned to specific form types eg *lydion*, *bessalis*. Flat pieces, measuring less than 30mm thickness, and without diagnostic features are recorded as tile. Some of the fragments recorded as tile will undoubtedly be *tegulae*, *imbrices*, and other forms. *Tegulae* were identified where a flange is present, there is clear evidence of a flange having been removed, or where a lower or upper cutaway can be identified. Any surface features including signatures, scoring and footprints were recorded. Lower cutaways and signatures are recorded by type per Warry (2006, 4, 149).

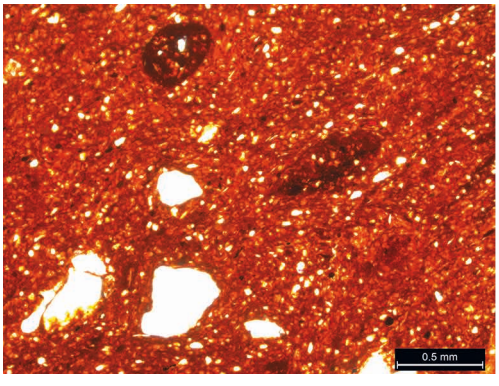
FABRIC

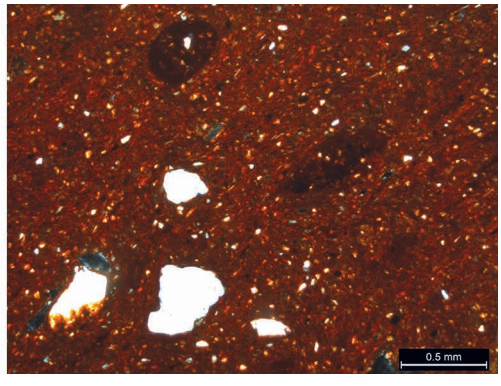
In hand specimen all the CBM is of similar composition, with two fabrics present distinguished by a higher proportion of larger quartz grains (0.2–0.5mm) resulting in a coarser fabric. Both fabrics are oxidised throughout. Some examples exhibit a variegated appearance with cream





Figs 11 and 12 Dockenfield. Fabric 1 in thin section (PPL & XP, x40 magnification).





Figs 13 and 14 Dockenfield. Fabric 2 (PPL & XP; x40 magnification).

silty pellets (<3mm) present. The fabrics are slightly micaceous with iron oxides (2–4mm) also visible.

Samples of material were taken from several bricks and tiles for thin-section preparation and petrographic analysis.

Two fabrics have been demonstrated petrographically in the assemblage. Fabric1, illustrated in figures 11 and 12, is a bi-modal fabric with two sizes of quartz grains visible in the photomicrograph. There are rare to sparse (2.5%) examples of coarse quartz sand present against a background of fine quartz silt (<0.05mm). Other minerals identified comprise moderate red iron-rich grains (10%) and sparse biotite mica (5%). The fabric is moderately heterogeneous, and a mid-orange colour in both plain polarised light (PPL) and crossed-polars (XP). There are a small number of clay pellets visible, which are distorted with diffuse boundaries. These are of the same colour or paler than the surrounding matrix, optically neutral and typically discordant with the matrix. The matrix is optically inactive, indicative of a high firing temperature. A small proportion of voids (2%) reflect the low porosity of the fabric; they exhibit no preferred orientation or alignment.

Fabric 2 (figs 13 and 14) typically has a paler, more heterogenous matrix. The matrix is mid-yellow/brown in PPL and XP, oxidised throughout. The matrix is moderately micaceous (10%) with greater optical activity than fabric 1, albeit still moderate. There is the same component of fine quartz silt as seen in fabric 1 together with a higher, moderate (<15%) proportion of medium quartz sand. There are moderate (10%) red iron-rich grains. The medium quartz sand is distributed throughout the fabric as well as found in discrete bands/layers. This larger quartz component could be a result of an anthropogenic addition of quartz sand to improve the clay during processing. Equally, it could be a remnant of naturally occurring quartzose veins in the source clay. There are pellets of highly birefringent pale yellowish/orange clay resulting in a more heterogenous appearance than fabric 1. These pellets are optically active with diffuse to merging boundaries, rounded equant shape with evidence of distortion demonstrating their plasticity when fired. The iron-rich grains in both fabrics have been identified as heat-altered glauconite grains (Basso *et al* 2008), indicating a glauconitic clay source.

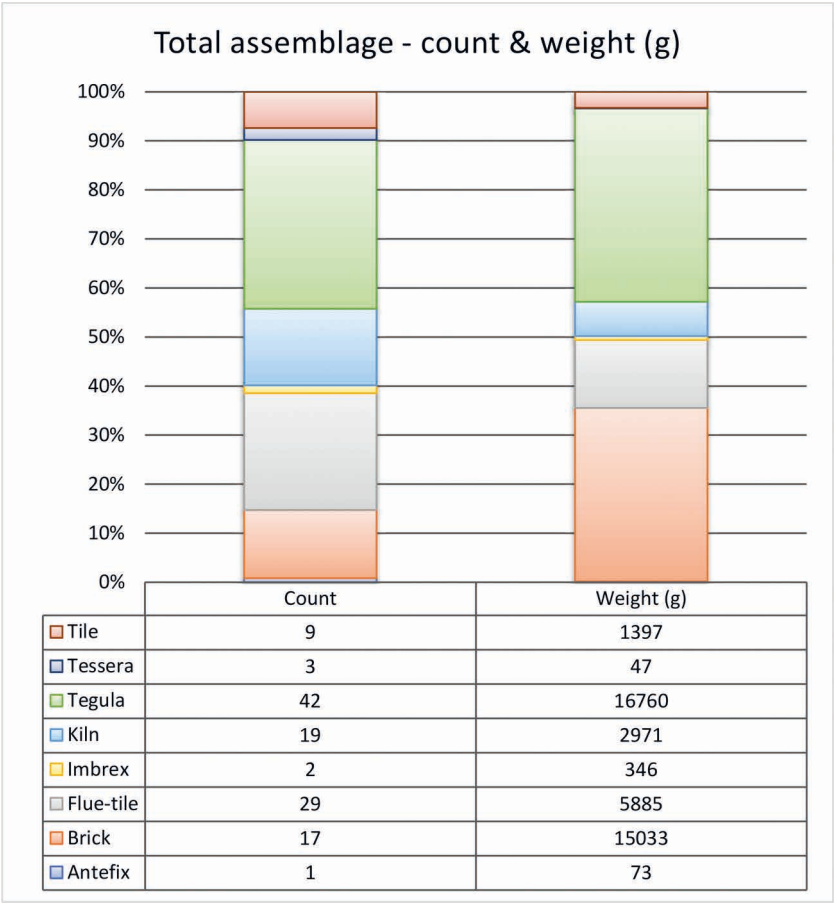
The differences between these two fabrics are indicative of both differences in the processing and weathering of the raw material, as well as natural variation in the raw material source clay. The presence of glauconite and quartz layers in the fabrics is indicative of the use of the local Gault clay, a pale to dark grey or blue-grey clay or mudstone, glauconitic in part, with a sandy base (www.BGS.ac.uk).

CBM FORMS (fig 15)

The assemblage is dominated by *tegulae*, both in count (34.4%) and weight (39.4%). Only seventeen fragments of brick were recorded (13.9% by count). However, a lesser degree of fragmentation results in a combined weight of over 15kg (35.4% by weight). Flue-tile accounts for 23.8% by count (13.8% by weight). The proportion of *imbrex* is relatively low when compared with *tegulae*, making up only 1.6% by count (0.8% by weight). As mentioned above, those fragments recorded as tile, being <30mm thick, could be fragments of *tegulae* or *imbrices*, these represent 7.4% by count (3.3% by weight). A small number of possible tesserae have been identified, which hints at preparation on site for a tessellated pavement, although these fragments could equally be tesserae-shaped fragments of broken roofing material.

Roofing

There are 42 *tegulae* and only two *imbrices* in the retained assemblage. The assemblage illustrated in figure 15 therefore does not represent a typical tile assemblage. The output of

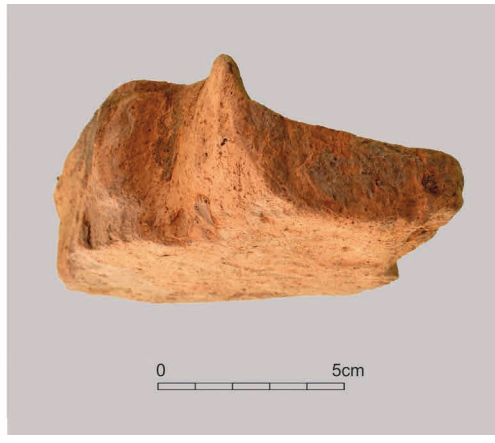


	Count	Weight (g)
Tile	9	1397
Tessera	3	47
Tegula	42	16760
Kiln	19	2971
Imbrex	2	346
Flue-tile	29	5885
Brick	17	15033
Antefix	1	73

Fig 15 Dockenfield. Proportion of total assemblage of CBM by form – count and weight.

the tilery would have had a higher proportion of *imbrices*. The roofing materials recorded on site are likely to represent tiles selected for the construction of the kiln, with curved *imbrices* being unsuitable for this purpose. Twelve *tegulae* were recorded as having lower cutaways present. These cutaways facilitate the overlap of *tegulae* on the roof and prevent water ingress. Examples of Warry (2006) Type B, C and D cutaways were identified, with one, six and seven examples respectively (figs 16 and 17). A number of fragments recorded as tile have been classified as roofing material owing to the presence of pre-formed nail-holes towards the edge of the tile used to fix the tile to the underlying roof structure. *Tegulae* with pre-formed nail holes are a mid-2nd century feature in London and other Roman sites in the South East (Betts 2017, 370).

One fragment has been identified as part of a possible antefix (fig 18), a ceramic ornament attached to the end of the lower course of *imbrices* at the edge of roofs. It is not possible to identify any decoration or motif on this fragment. Antefixes were typically made using a fired clay mould into which wet clay was pressed. The clay mould retains some porosity after firing so that when wet clay was applied to it the mould would absorb moisture from the surface, thus drying it. This allowed for the mould to be removed, leaving a clear rendition of the antefix without the need for moulding sand (G Taylor, pers comm).



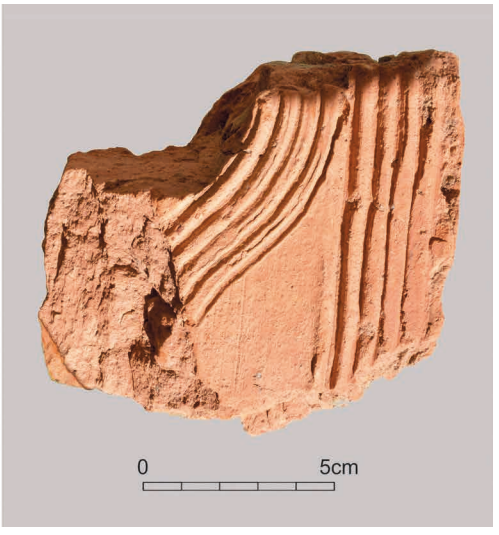
Figs 16 and 17 Dockenfield. Two lower cutaway examples B6 (left) and C5 (right) from (201).

Fig 18 Dockenfield. Possible antefix.

Bricks

Owing to a lack of complete dimensions surviving, none of the bricks recorded have been assigned to a specific type or function (Brodribb 1987, 3). Only one brick has a complete dimension that measures 265mm, less than one Roman foot. This could, therefore, be either a *pedalis* typically measuring 1ft^2 or a *lydion* (1ft x 1½ft). *Pedales* were typically used as the support for a stack of *bessales* used as *pilae* in a hypocaust but could equally be used for flooring. *Lydions* were used for a wide range of purposes, including flooring, but were considered most suitable for bonding courses in walls.

Three of the bricks were recorded to have been pierced; this is thought to have been part of the forming process to aid the drying and firing of the brick in the kiln (fig 19). Examples of this have been noted at other kiln sites, including Harrold (Brown 1994). Two bricks, in excess of 45mm thick, were recorded as having combed upper surfaces, to provide a key (fig 20). The thickness of these bricks suggests they would have been used as flooring with the key facilitating the application of mortar for a mosaic or tessellated pavement or for the application of *opus signinum*, a coarse mortar that includes crushed brick and tile which, when polished, provides a durable floor surface.



Figs 19 and 20 Dockenfield. (left) Pierced brick (105); (right) Combed brick (101).

A number of fragments of brick have been identified as kiln structure. These are all over-fired with some traces of vitrification. All were recovered from the fill of the fire tunnel and stoke pit within the kiln structure (104, 105).

Hypocaust

Box flue-tiles take the form of square or rectangular pipes, which were built into the walls allowing the hot air to rise from underfloor voids and transfer heat to the room through the hollow walls. Flue-tiles at Dockenfield were found to have been keyed either by scoring, with a diamond-and-lattice design, or combing (fig 21). The keyed surfaces would then have been plastered with the hot air heating the room space through the plastered surface. Keying with a diamond-and-lattice pattern was an early Roman tradition, lasting only until the early 2nd century in London. Their presence at Dockenfield implies a longevity of traditional methods, or may represent early Roman tile having been dumped onto the site from elsewhere.

Fig 21 Dockenfield. Example of combed flue-tile (105).

MARKINGS

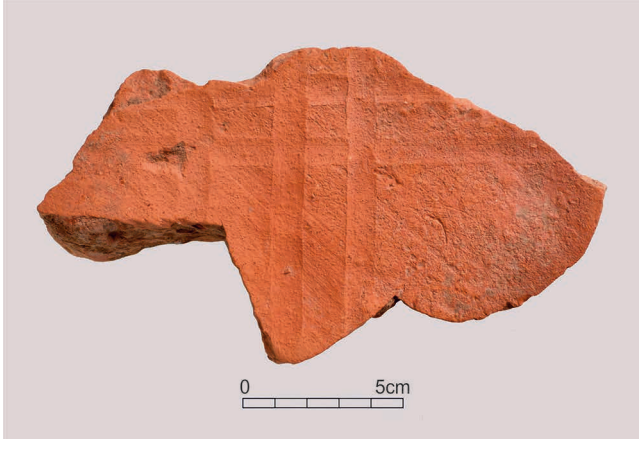
Signatures were recorded on a number of forms, including bricks and *tegulae*. These were typically semi-circular marks made using one, two or three fingers (fig 22). One example made with four fingers was recorded on a brick recovered from the plough-soil (104) and a brick with a cross made by two fingers ((101) fig 23). Grooves alongside the flange, made when the *tegula* was being formed and

neatened, were recorded on six examples, made with either one or two fingers. Makers' marks or tally marks, typically taking the form of Roman numerals, were recorded on the edges of two bricks (fig 24).

FOOTPRINTS

The footprints identified on bricks and tiles were recorded, including details of the metrics of the print, images, and identifications. It is acknowledged that all print measurements are *c* 10% smaller than when first impressed as a result of shrinkage during the drying process and firing (Brodribb 1987, 4). The prints have been divided into two categories: a) those made by ungulates, animals with hooves, cloven or otherwise and b) other mammals, including cats and dogs, wild animals and humans. No bird footprints were identified on the Dockenfield material.

There were a total of eight prints recorded comprising two ungulates, one boot print and five paw prints.



Figs 22 and 23 Dockenfield. Three finger semi-circular signature (104); cross signature (104).

Ungulates (fig 25)

Two ungulate prints have been recorded. One comprises two overlapping prints with a small gap between the toes of the hoof. The length of the print is incomplete; the gap between the toes measures 8mm. The small size of the print and sharpness of the impression suggest that it may have been made by a roe deer (K Barr, pers comm). The other ungulate print shows only the very tips of the hoof with a small gap of 3mm between the toes. It is a deep impression on wet clay and cannot be identified to species.

Other mammals

The other mammal prints include one identified as having been made by a dog, comprising four toe pads and claw marks.

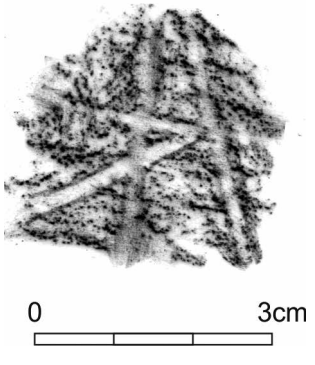
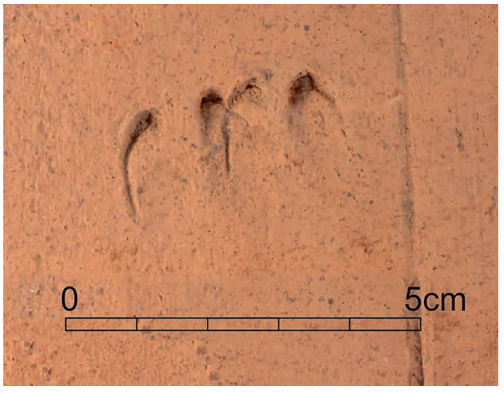


Fig 24 Dockenfield. Rubbing of a tally mark on a *tegula* fragment (201).



Figs 25 and 26 Dockenfield. (left) roe deer hoof print; (right) stoat paw print.

A very small roughly circular paw print, with five toes, was initially identified as having been made by a weasel. It is approximately 15mm wide. As weasel prints typically measure 10mm or less across, it is more likely to have been made by a stoat (fig 26).

A further three unidentified paw prints are present in the assemblage.

DISCUSSION

The kiln was producing a relatively limited range of products comprising the standard Roman forms of brick and roofing material, alongside material required for the construction of hypocaust heating. The kiln site at Scotland Farm (Graham 1971) located *c* 18km north-west of Dockenfield also produced a limited range of forms. This together with lack of occupation evidence in the environs of the kiln site was interpreted as evidence that the kiln was intended to supply tiles during a short-lived period of construction in the local vicinity. The 4th century date for production at Scotland Farm has been linked to local villa sites in Hampshire. There is also the potential for the tilery to have been supplying more distant markets in Roman towns such as Neatham, Winchester or Chichester. The author has compared the Dockenfield CBM with samples of CBM fabrics from Silchester. Some affinity was demonstrated with the SILCBM1 fabric (Machin 2018), which accounted for almost 50% of the Silchester material. This fabric has been provenanced to the London Clay Formation, the dominant local clay source that is glauconitic in part. This fabric is found throughout the life of the Roman town at Silchester during which time it could very well have been supplied from a number of local and more distant tileries, potentially including the one at Dockenfield.

The pottery, by Lyn Spencer and the SyAS Artefact and Archive Research Group

The post-medieval pottery was analysed by reference to the Museum of London (MoL) series for post-medieval pottery. The Roman pottery was analysed by reference to the London MoL series for Roman pottery with reference to the type series held by the Artefacts and Archives Research Group (AARG) at the Abinger Research Centre.

The total amount of pottery recovered was 88 sherds (787 g). The largest group of pottery was classed as SAND reduced ware and accounted for 44.3%. The date range for this type of pottery is 50–400. The next largest group was classed as AHFA (Alice Holt Farnham) ware and accounted for 42.1% of the pottery. The date for this group was 250–400.

ROMAN POTTERY

VCWS (Verulamium coarse white-slipped ware)
One small sherd (uncertain identification) in context 110 and formed 1.1% of the total number of sherds. This pottery has a date range of 70–200 and is early in the series. Coarse grains of quartz with a white slip. Mortarium.
AHFA (Alice Holt/Farnham)
Thirty-seven sherds in contexts 101, 104, 106, 110 and 201. These formed 42.1% of the total number of sherds. This pottery has a date range of 250–400 and is late in the series. One everted rim beaker and two non-specific jars together with small sherds. The later AHFA is a grey ware fabric with abundant well-sorted fine quartz. None of the samples had a white slip.
COAR (Coarse ware)
One sherd in context 110. This pottery has a date range of 50–400. This formed 1.1% of the total number of sherds. Form undetermined. A coarse form of reduced ware with large quartz grains.
OXID (Oxidised ware)
Four sherds in contexts 101, 105, 107. These formed 4.5% of the total number of sherds. This pottery has a date range of 50–400. Forms undetermined. These are unsourced highly oxidised sherds with varying sizes of quartz grains and have a red or orange coloration.
RWS (Red white-slipped ware)
One sherd in context 105. White slip. This pottery has a date range of 50–400. This formed 1.1% of the total number of sherds. Form undetermined. Unsourced oxidised ware with a white slip.
SAND (Reduced ware)
Thirty-nine sherds in contexts 101, 104, 106, 110. This pottery has a date range of 50–400. These formed 44.3% of the total number of sherds. Forms undetermined but probably jars. Unsourced reduced ware that varies in the amount and size of quartz grains. Generally grey or grey/brown.

POST-MEDIEVAL POTTERY

BORDG (Border whiteware – green)
One sherd in context 201. This formed 1.1% of the total sherds. This green-glazed post-medieval pottery has a date range of 1550–1700 and this example is early in the series. Form undetermined but is often tableware such as drinking jugs.
BSGSW (English Brown salt-glazed stoneware)
One sherd in context 101. This formed 1.1% of the total number of sherds. This post-medieval stoneware has a date range of 1675–1800. It has a brown glaze and is in a hard fabric; the most common forms are stoneware tankards with a date range of 1700–1800.

DISCUSSION

Most of the pottery was Roman with only two sherds of post-medieval wares. Alice Holt/Farnham pottery was expected on the site owing to the location, but a large percentage of the pottery was unsourced reduced and oxidised wares.

The rims in the assemblage were either part of jars or beakers. The pottery was abraded and consisted of small fragments.

In summary, the pottery in contexts 101 and 201 was a mixture of post-medieval and Roman sherds. Dates for contexts 104, 105, 106, 107 and 110 were late Roman but there was a possibly residual earlier sherd in context 110. The pottery from 203 and 206 was not sourced.

Stone from the tile kiln, by Peter Burgess and Emma Corke

The stone was of two types, one a very light-weight fine-grained slightly micaceous sandstone, and the other a much more coarse-grained, heavier sandstone.

The first is Malmstone/Reigate stone/firestone, part of the Upper Greensand (fig 27, 1). It has traditionally been used in kilns and furnaces because of its heat-retaining properties (NB it is not the same as 'hearthstone', although closely related). The nearest outcrop is about 3.5km to the west. It is a substantial deposit.

The second is a Lower Greensand, probably Hythe beds (fig 27, 2). It could also possibly be from the Bargate beds, but this is less likely – Bargate tends to be smaller-grained and less 'cherty'. The Hythe beds are the stone that forms Leith Hill, and often shows bedding-planes of 'chert'. It has no benefits in heat. The pieces from the kiln show clear signs of heat, having been burnt pink, and breaking more readily than an unburnt piece would. It is a good, strong, building material and was probably used purely for structural strength. The nearest outcrop of Hythe beds is about 3km to the south; Bargate is about 1 km closer in the same direction. To the north of the Bargate beds lie the Sandgate beds. It is not impossible that there might be bands of stone similar to these samples within these deposits, as the present authors have seen stone like this in the Sandgate beds. The fact that there was stone of this sort at Flexford (Calow, in prep) as well as Dockenfield makes it likely that it came from a reliable source, which the Sandgate beds would not be.

The kiln lies in the Gault clay (blue) (fig 27, 3). The area in which it lies (being very close to the Folkestone beds/Lower Greensand) is the lower Gault, which tends to be less sandy than the upper.

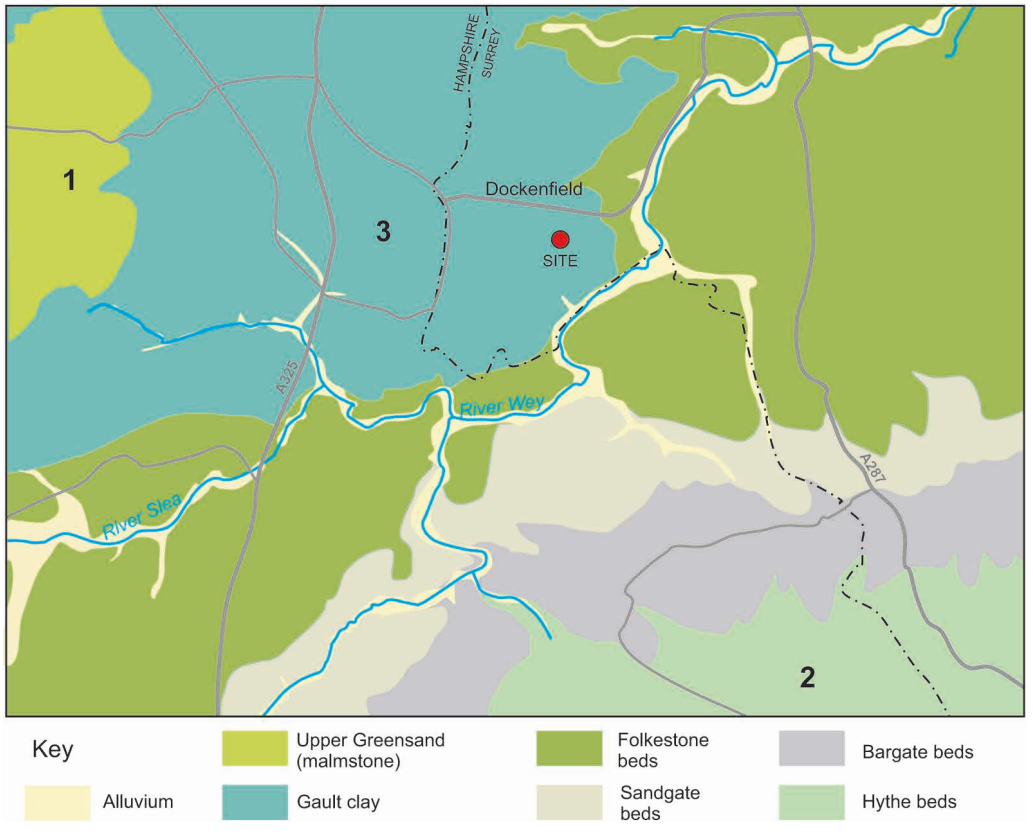


Fig 27 Dockenfield. Simplified geology map (based on mapapps.bgs.ac.uk/geologyofbritain/home.html).

Conclusions

The kiln itself conforms to the usual pattern of a developed Roman tile kiln, albeit smaller and simpler than those excavated at Ashtead, Reigate and Wykehurst Farm, Cranleigh, as well as being later in date; from the pottery, the kiln dates to the later 3rd and early 4th centuries. It gives the impression of being a 'country cousin' to those more industrial kilns. Nevertheless, the Dockenfield kiln was well built and showed evidence for having been fired and repaired on a number of occasions and extended in the case of the fire tunnel. It is interesting to note that at the 19th century pottery kiln at Wrecclesham (4.5km to the north) – in essence very similar in underlying design – the fire tunnel had to be completely rebuilt every year (Philip Harris, pers comm) and there is no obvious reason why this should not have been the same for a Roman kiln. Whatever the case, at the end of its working life, the upper parts of the kiln seem to have been demolished and the below-ground parts filled with rubble, although it is interesting to note that the undersides of the combustion chamber arches had been packed with worked clay (particularly well preserved under the surviving central cross-wall: fig 8, context 111). This suggests that the operators wished to preserve the arches from collapse, presumably to allow for a possible future reinstatement of the kiln. There was little sign of clay between the cross-walls, so it seems highly likely that the clay was deliberately placed. The kiln has subsequently suffered a degree of plough damage and its north-west corner has been cut by a shallow ditch or land drain (fig 3: 102), although with no discernible pipework. As a final point, it has been suggested, by David Bird, that the upper level of the outer walls of the combustion chamber shows signs of a circular footing having existed surrounding the core area (fig 4). If this were the case it would imply that the superstructure over the load was a dome rather than a barrel vault or a flat roof over raised side walls. The evidence is not clear, and the authors are unconvinced, but the suggestion remains a possibility.

The magnetometer survey showed neither signs of approach trackways nor any of the drying sheds and workshops that presumably once serviced the kiln apart, perhaps, from that in trench 2. From a practical point of view the flatter top of the hill, now under trees, might be a logical place for this type of activity to have been located. The lack of any detectable trackway means that either it has been destroyed by later ploughing or that work took place during the drier summer months. Experience in the spring of 2015 showed that the base of the hill becomes very wet in winter and is virtually impassable to wheeled vehicles. While the Gault clay would have provided adequate quantities of clay and fuel, a suitable source of water is less obvious. There is a pond at the base of the hill today (fig 1) and perhaps a similar feature existed in the Roman period.

While the kiln is intrinsically interesting so also is the question of the extent of the market for the tiles produced at Dockenfield. There are two small Roman farmsteads known in the immediate area, but neither show signs of having had tiled roofs (Frensham Manor: Howe *et al* 2001; Pitt Farm, Dockenfield: D Graham, site visit). However, there are a number of villas, some quite large, just over the border in Hampshire at South Hay (5.13km away), Wyck (7km), Coldrey (6.6km) and Crondall (7.5km) (Hampshire HER refs 39466, 17179, 17044 and 17493), to mention but a few. It may be that roof tiles were produced for one or more of these – the nearest known other tile kiln is at Scotland Farm, Odiham (Hampshire) 16km away (Graham 1971).

Alternatively, it is possible that the tiles went further afield to towns such as Neatham, Silchester, Winchester or Chichester as good road connections existed to all four. Nationally, there is evidence that tiles were regularly transported 25km or more from the production site (Warry 2006, 123; Betts 2017). Further work will be needed to answer these questions. At present the kiln at Dockenfield is the only one known to have operated in or close to Alice Holt and may well have been connected in some way to the operators of the pottery industry. However, it is worth noting that a survey of the pottery industry in the 1960s and 70s did produce evidence of tile waste associated with kiln dump 17 in the Abbott's Wood

section of Alice Holt, which might hint at the existence of another tile kiln (Lyne & Jefferies 1979, 6). Certainly, the tiles and bricks used to construct the Dockenfield kiln must have come from elsewhere, unless they were fired *in situ*, for which there is no evidence. Indeed, the importation of material to build the kiln might explain the presence of the hypocaust tiles and some '*tegulae* with preformed nail holes [which] are a mid-2nd century feature in London and other Roman sites in the South East' (see 'Roofing', above). These would either have come from an unknown external source or perhaps from an earlier kiln on the site if, as the magnetometry hints, such a kiln exists under the tile and brick rubble in trench 2.

As ever, much further work on site and elsewhere could be undertaken and, as usual, the excavation has raised as many questions as it has answered.

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All figures are by the main authors except for figures 4 and 10 by Nikki Cowlard and Emma Corke, figures 11–15 by Sara Machin and figures 19 and 20 by Isabel Ellis.

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