

The re-excavation of a 17th-century stoneware kiln in Woolwich

Edward Biddulph and John Cotter

Introduction

In 1974 a stoneware pottery kiln was excavated at Woolwich Ferry Approach (since redeveloped) in south-east London. It was dated to c. 1660 and is believed to be the earliest evidence for stoneware production in England, preceding John Dwight's 1672 stoneware pottery at Fulham by as much as a decade.

The kiln was notable for its range of brown salt-glazed stoneware 'bellarmine' jugs. These are stylistically indistinguishable from *Bartmann* jugs imported from Germany, with many decorated with heraldic medallions and grimacing 'bellarmine' masks. There was evidence from the excavation, too, for attempts to produce highly decorated, blue-painted, Westerwald-style stoneware, though possibly this was in another, nearby, kiln.

The original excavation took place in the autumn of 1974, and post-excavation work three years later. A report on the kiln and the 60,000-plus sherds of pottery recovered from it and a later earthenware kiln that was also found was published in 1978,¹ and

an article on the pottery appeared in this magazine in the same year.²

As excavations came to an end, there was discussion about relocating the kiln, which was hoped would lead to the kiln's fuller investigation, preservation and eventual display. The go-ahead was quickly given, and the structure, once emptied of finds, was filled with protective polyurethane foam, isolated in a block of subsoil and natural Thanet sand, and confined within a wooden box with a steel framework base. Unfortunately, with insufficient time to prepare the entire structure for lifting, the kiln was cut off at the end of the firing chamber, and the stokehole was left *in situ*.

By April 1975, the kiln was ready to be moved. The 35-ton, room-sized crate was lifted on to a lowloader and transported to a storage depot, two miles away.³ Over the years, the block has been moved three times and for the last seven years has stood in a car park behind the Greenwich Heritage Centre (Figs 1 and 2).⁴

The hoped-for funding for the

preservation and display of the kiln remains never materialized, and so the landowners, Berkeley Homes Ltd, funded completion of the excavation, recording and reporting of the kiln. The re-excavation was carried out over a week in March 2017 by a team from Oxford Archaeology, 43 years after the original excavation (Fig 3). A number of visitors viewed the site, including members of the 1974 excavation team. By the end of the week, the kiln had been excavated, recorded, sampled, and surveyed using photogrammetric techniques.⁵ It was then dismantled and taken away for disposal.

Whether by accident or design, the block had been replaced in its original orientation, with the kiln aligned on a north-south axis, the narrower ('entrance') end pointing north towards the river Thames, and this orientation is retained in the description below.

The kiln

The firing chamber of the kiln was oval in plan and measured c. 3.2m long – originally c. 5.4m long with the



Fig 1: the soil block in its final location

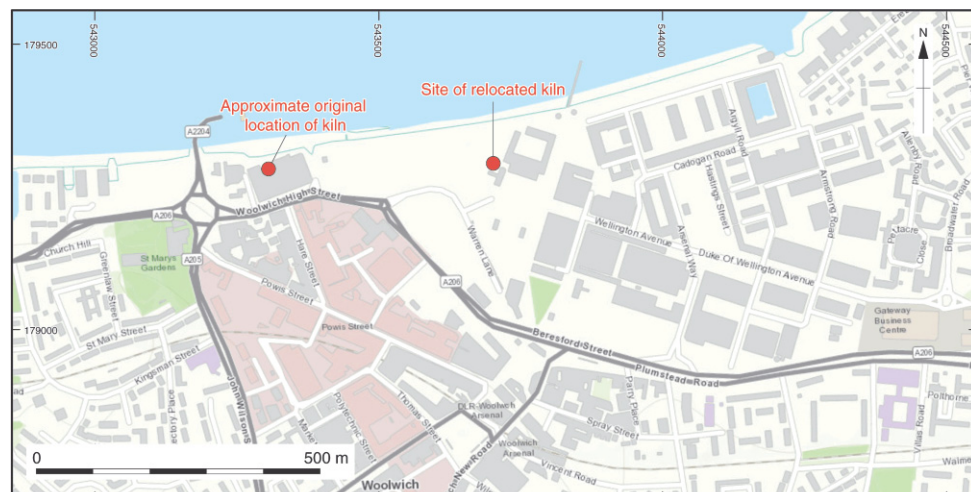


Fig 2: location of the site (contains Ordnance Survey data © Crown copyright and database right 2014 © OpenStreetMap and contributors)



Fig 3: excavating the soil block

stokehole – and up to c. 2.35m wide (Fig 5). The stratigraphic sequence of the kiln began with the construction cut (context 2) that was dug into the subsoil. The cut narrowed towards the base and sloped from north to south, being c. 0.8m deep at the south end of the chamber (Fig 7a). An earlier pit that had possibly been cut by the kiln – the relationship is unclear – had been preserved in the soil block. The pit produced abundant charcoal, three fragments of cattle bone, and 59 sherds of pottery from around 33 vessels, including wasters from an earlier kiln in the vicinity and two residual Roman sherds. The pit, noted during the lifting of the kiln, served as a useful sump at times of rainfall,⁶ but it is not apparently shown on the plans of the 1978 report.

Another feature, a posthole, to the south of the pit does not appear to have been excavated in 1974, although others were recorded and were thought to be associated with the kiln.⁷ While no dating evidence was recovered from the feature, the posthole seen during the re-excavation may well belong to the same posthole group.

The sides of the construction cut were lined with bricks and the vertical elements of the internal features of the chamber, also brick-built, were inserted (context 1). The kiln wall survived best on the east side of the cut. The west side, which had been removed almost entirely by later rubbish pits, was limited to a stack of bricks present in 1974, but no longer extant in 2017, and part of the west side of the ‘entrance’

end. The east wall, a single brick wide, comprised at least nine courses of bricks where the kiln was deepest. The lowest courses were laid as stretchers (that is, with bricks laid longitudinally), while the bricks in the upper part of the wall were laid as headers (that is, with the ends facing). All were bonded together with a clay mortar, and the interior face of the wall was ‘rendered’ with clay.

Nine brick samples were retained and recorded in detail. All are ordinary handmade unfrosted red brick, presumably made on-site, and typically 215–35mm

long, 105mm wide and 60–66mm thick. The bricks, made in a coarse, poorly mixed sandy brickearth fabric, are typical of most 17th-century bricks in London, including from the Great Fire of 1666.

The most striking feature of the bricks from the kiln walls is the marked colour zoning, from inner to outer surface, caused by the intense heat of the last firing (Fig 9a). This left the inner face of the wall, and all exposed surfaces of the firing chamber, brightly oxidised (orange) to a depth of c. 100–150mm, and beyond this a sharply demarcated zone of reduced dark grey or black extended into the surrounding ground to a maximum depth of c. 250mm. This zoned or ‘sandwich’ effect was most clearly seen on the surviving upper brick courses, particularly the uppermost course flush with the 1974 ground surface. The inner, orange, half of this was brittle, but relatively hard and intact, whereas the black outer half had

crumbled away like soft charcoal.

Two pedestals and three flues were formed by inserting four walls a single brick wide, the bricks laid as stretchers (Figs 7 and 8). The walls measured up to c. 22cm tall and were spaced at c. 25cm intervals. The east and central flues were well-preserved and recorded in detail; the more damaged west flue was not investigated, but its course could be traced by the foam packing inserted prior to the relocation of the kiln (Fig 5). A sandy silt soil, fired red by the use of the kiln, covered the base of the flues and infilled the pedestals and the gap between the external wall and the construction cut (context 3). The floor of the flues was then surfaced with sandy clay c. 30mm thick (context 11), while the tops of the pedestals were capped with more bricks (context 12). Despite the apparent robustness of the construction, a crack visible across the east pedestal – recorded in 1974 – points to structural damage after firing.

Brick samples from the base of the pedestals show that the bricks here are unusual in the variation of their thickness (up to 70mm) and are soft, pale grey-brown, crumbly and easily scratched with the fingernail. The bricks were almost certainly unfired or only slightly heat-altered, like very soft fired clay objects, rather than true ceramic. During the 2017 investigation, other apparently unfired bricks at the base of the east wall of the kiln were noted, raising the possibility that the kiln was made from unfired bricks, which were then given an initial firing to dry them out and bake them before they were ready to receive the first load of pottery. This initial firing may have been sufficient to fire the upper courses of brickwork, but the lowest courses were not properly fired. This may explain



Fig 4: kiln bar (note attached kiln furniture ‘buns’)

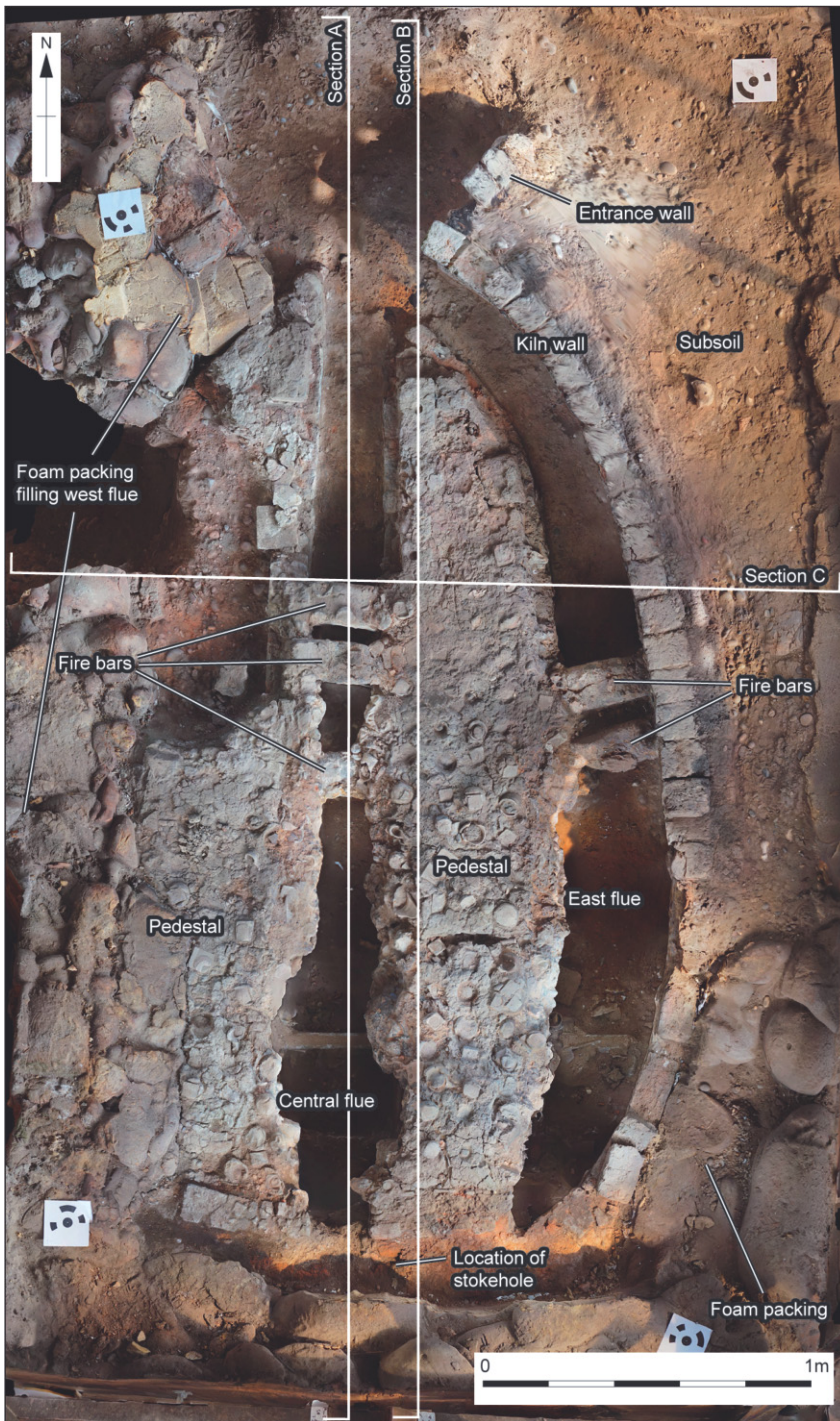


Fig 5: plan view of the kiln taken from the 3D photogrammetric model

why the external face of the kiln wall (that is, facing outwards into the natural soil) is so soft and black (Fig 10).

Five fire bars, recorded *in situ* in 1974, were found intact (contexts 13–17). Three of the surviving bars spanned the central flue, while the other two spanned the eastern outer flue. The ends of the fire bars rested on ledges and were bonded with clay luting and unfired clay buns (Fig 4). Brick ledges were seen on the sides of the east and west pedestals facing the central flue, while a slight ledge or

thickening of the clay ‘render’ was visible on the inner face of the east wall. The outer bars were higher at the east wall end than the pedestal end, the pedestal and the kiln floor may have slumped somewhat in the intense heat of the last firing.

In cross-section the fire bars are roughly sub-rectangular or kidney-shaped, with the upper load-bearing surface being the flattest part. They appear to have been crudely rolled or built up from slabs of clay, and are c. 120–140mm wide, with the longest

surviving to a length of 350mm. The bars are gently arched but the weight of the kiln load and the extreme heat of the last few firings flattened three of them, causing them to crack and buckle on the underside (Fig 4). The main cracks on all examples are roughly central and longitudinal and it is evident from glaze and firing colour differences that some bars had cracked or split and were subsequently re-fired.

This is the main piece of evidence that the kiln was fired at least twice, although the first firing may simply have been to fire the kiln bars and an empty kiln. The bars were probably covered with a thick final coating or slurry of semi-liquid clay which subsequently crackled and crazed, particularly on the underside. The bars also have an accidental purplish-brown or grey ash/salt glaze, which is thickest on the underside where it covers the crackled clay slip.

Traces of squashed clay buns are dotted over the upper surfaces, some with impressions of square pads (Fig 9b), and scraps of embedded pottery, including an inverted bellarmine neck. A near-complete, wheel-made stoneware kiln prop was found on its side on top of one of the bars, but may have slid onto it from the pedestal. This was one of 11 props recovered from the re-excavation



Fig 6: bases of two stoneware conical props

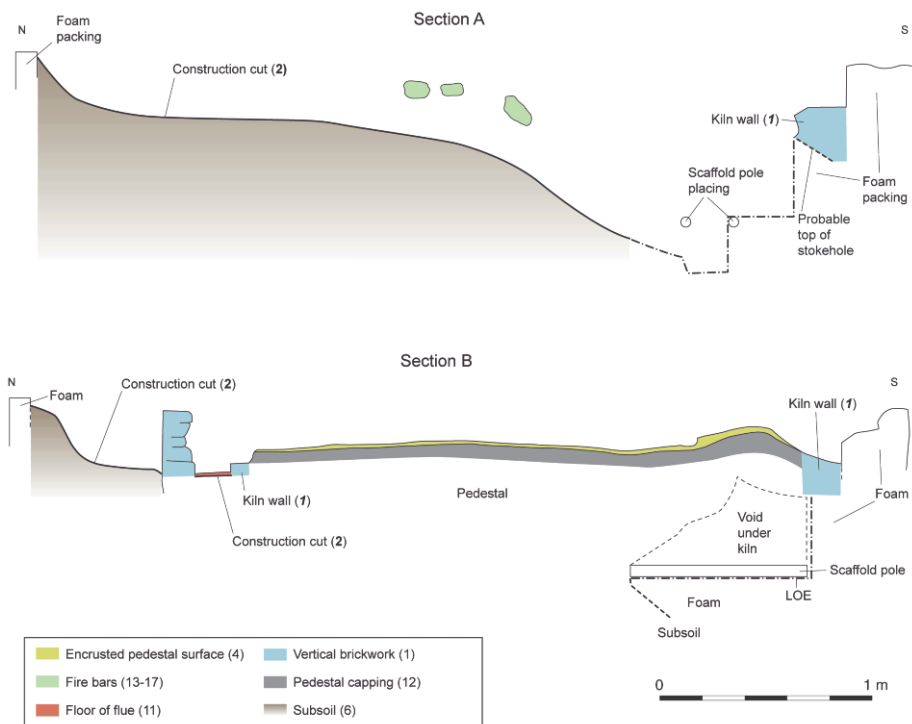


Fig 7: two profiles running north-south through the kiln: a) through the central flue; b) through the east pedestal

(Fig 6), and as noted in the original report, probably formed the first layer of the kiln stack to keep the vessels from touching the kiln floor.

The brick capping of the pedestals and the fire bars formed the raised floor that carried the pottery load. This floor was coated by a thick vitreous slaggy crust of fired clay, sand, fused kiln-furniture and broken stoneware pottery, melted and slumped in places (context 4). Roof tile, collected from the original excavation, may have been used to cover vent holes in the roof of the kiln.⁸ A further 10 pieces of flat roof tile were recorded during the re-excavation, but these had been set on their edge in a single or double row across the junction of the south end of the firing chamber and the stokehole, possibly to fill gaps which opened up after the initial firing.

The pottery and the date of the kiln

The date of the kiln still largely rests on the clay tobacco pipe dating of c. 1660–80 and the excavator’s reasonable argument that the kiln was short-lived and abandoned closer to 1660 than to 1680. The re-excavation produced a further 100 sherds of pottery from an estimated number of 57 vessels. All dated after c. 1480), apart from four sherds of residual late Iron Age and Roman pottery.⁹

Most pottery from the pit that seems to have been cut by the construction cut comprises jugs, bowls and jars in London early post-medieval redware (PMRE c. 1480–1650). Many of these are wasters from an earlier kiln. The previous excavations found large amounts of this ware, particularly in the backfill of a large square ‘Tudor’ pit, thought to be a settling tank for potter’s clay.¹⁰ There is also a rim sherd from a small globular or barrel-shaped mug in

black glazed redware (PMBL c. 1580–1700) with decorative shoulder cordons or ribbing.

Ceramics from the construction cut infill included a single piece of clay pipe stem, of broadly 17th-century date, (the only piece of clay pipe from the re-excavation). The pottery included five sherds of glazed post-medieval redware (PMR). Unfortunately, these are not very diagnostic or closely datable, but the extensive use of glaze and the very plain, somewhat heavily-potted look of these pieces might suggest a date in the second half of the 17th century. All the PMR sherds have a fine grey sandy material adhering to them – probably bonded to them during the firing of the kiln – although they do not appear to be wasters themselves.

The crust layer above the raised floor yielded parts of 17 brown salt-glazed stoneware vessels, though fragments of several other vessels remained embedded in the vitreous surface or stuck to fire bars. The stoneware comprises parts of two globular drinking jugs with cylindrical necks both with characteristic ring-stamped decoration on the neck.¹¹ There were also rims and necks from seven bellarmine-type bottles or jugs with collared or pulley rims,¹² and rims from two brown salt-glazed ovoid mugs, a characteristic Woolwich kiln form.¹³ These add very little to the published typology of these forms which was based on many more complete vessels than are present here.

A few individual fragmentary vessels embedded in the floor were sampled and identified as Woolwich grey stoneware (WOOLGS) dating between c. 1630–40 and 1680. However, none of the highly-decorated Westerwald-style stonewares (WOOLS), made at Woolwich and attributed to phase 1 production in the 1978 report, were noted in this assemblage.

Some unresolved questions

The 1978 report on the kiln concluded that ‘the stoneware kiln may have been built around 1660 or a little earlier and was demolished and backfilled around the early part of 1660 to 1680.’¹⁴ The newly excavated pottery (and one piece of clay pipe) confirms a broadly mid-17th-century date for the construction and use of the stoneware kiln, and provides additional evidence in the

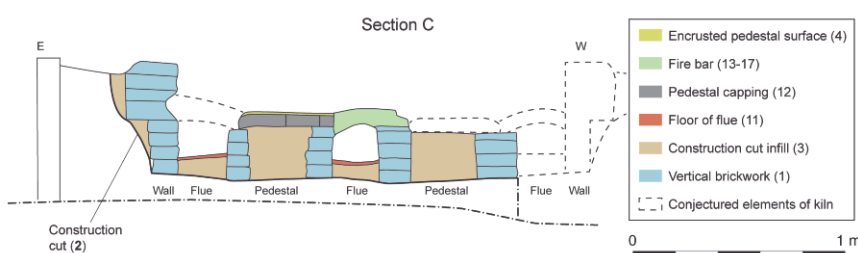


Fig 8: interpretative north-facing section through the firing chamber of the kiln



Fig 9: a) brick from kiln wall showing zoned firing colours; b) group of square pads with impressions of vessels

form of wasters for the existence of earlier earthenware kilns in the vicinity.

While the kiln's dating could not be refined further,¹⁵ its re-excavation completed the archaeological record of the kiln begun 43 years earlier. As a result much more is known about its construction. Questions remain, however. Though presumably covered by a brick arch, too little is known about the stokehole to the south of the firing chamber. The opposite end of the kiln, with its splayed opening, is also open to interpretation: did it function as a rather narrow loading entrance, or were the pots loaded from above and then covered with a temporary roof? That the kiln was an updraught kiln is fairly certain, with a heat source



Fig 10: view of north-facing section through the firing chamber of the kiln. Note the differentially fired bricks of the kiln wall.

coming from the stokehole in the south and passing through the firing chamber. The heat probably escaped through a vent or vents in the roof, but some German kilns had a solid chimney stack or vent at the opposite end of the kiln.

Could the 'entrance' be the remains of something of this sort? What of the individuals who built the kiln and operated it? Were German potters responsible for the pottery production of the stoneware kiln? And why was the kiln apparently short-lived? The mass of fused pottery, the cracks evident in the fire bars and firing chamber, and the slumping of the kiln floor and pedestal hint at structural failure that may have caused the kiln to be abandoned.¹⁶

Acknowledgements

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Thanks also to members of the 1974 excavation team who visited the site

and shared their very helpful memories. The original excavation was directed by Alice Pandrich. The re-excavation was carried out by Lee Sparks and Richard Harriss. Benjamin Brown undertook the photogrammetric survey and 3D modelling. Lee Broderick identified the animal bones, and John Cotter recorded the pottery, bricks, fired clay and stone objects. The figures were prepared by Markus Dylewski and Magdalena Wachnik. The project was managed by David Score.

Edward Biddulph is a senior project manager at Oxford Archaeology responsible for managing post-excavation projects. He is also a Roman pottery specialist.

John Cotter is a specialist in medieval and post-medieval pottery, clay pipes and ceramic building materials at Oxford Archaeology. He has studied and published numerous ceramic assemblages from excavations across southern England.

1. S Pryor and K Blockley 'A 17th-century kiln site at Woolwich' *Post-Medieval Archaeol* 12 (1978) 30–85.

2. K Blockley 'Post-medieval pottery production at Woolwich' *London Archaeol* 3 (6) (1978) 153–8.

3. J Price 'The Woolwich project: the removal of a 17th century stoneware kiln' in R Payton (ed) *Retrieval of objects from archaeological sites* (1992) 93–104.

4. The archive will be deposited with the Museum of London under accession code WOK17.

5. A 3D model of the kiln based on the photogrammetric survey can be viewed on Sketchfab: <https://skfb.ly/699Vt> [accessed 21 January 2018].

6. *Op cit* fn 3, 96.

7. *Op cit* fn 1, 39.

8. *Op cit* fn 1, 57–8.

9. The sherds, weighing 2,629g, were fully catalogued using MoL form and fabric codes. See MOLA 'Medieval and post-medieval pottery codes' (2014): <http://www.mola.org.uk/medieval-and-post-medieval-pottery-codes> [accessed 21 January 2018]

10. *Op cit* fn 1, 39–41.

11. *Op cit* fn 1, fig. 11.40.

12. *Op cit* fn 1, figs 10.32–34, 11.36–37 and 11.41–42.

13. *Op cit* fn 1, fig 11.38.

14. *Op cit* fn 1, 61, 63.

15. Samples were apparently taken from about eight bricks in 1974 for archaeomagnetic dating, but the results of this do not seem to have been published.

16. A note on the re-excavation of the kiln appears in the Medieval Pottery Research Group Newsletter (J Cotter 'The re-excavation of the Woolwich stoneware kiln (c. 1660): an interim summary' *MPRG Newsletter* 87, 2–4). Full reports on the finds recovered from the re-excavation are available to download from the Oxford Archaeology Library: <https://library.thehumanjourney.net/3300/> [accessed 21 January 2018].