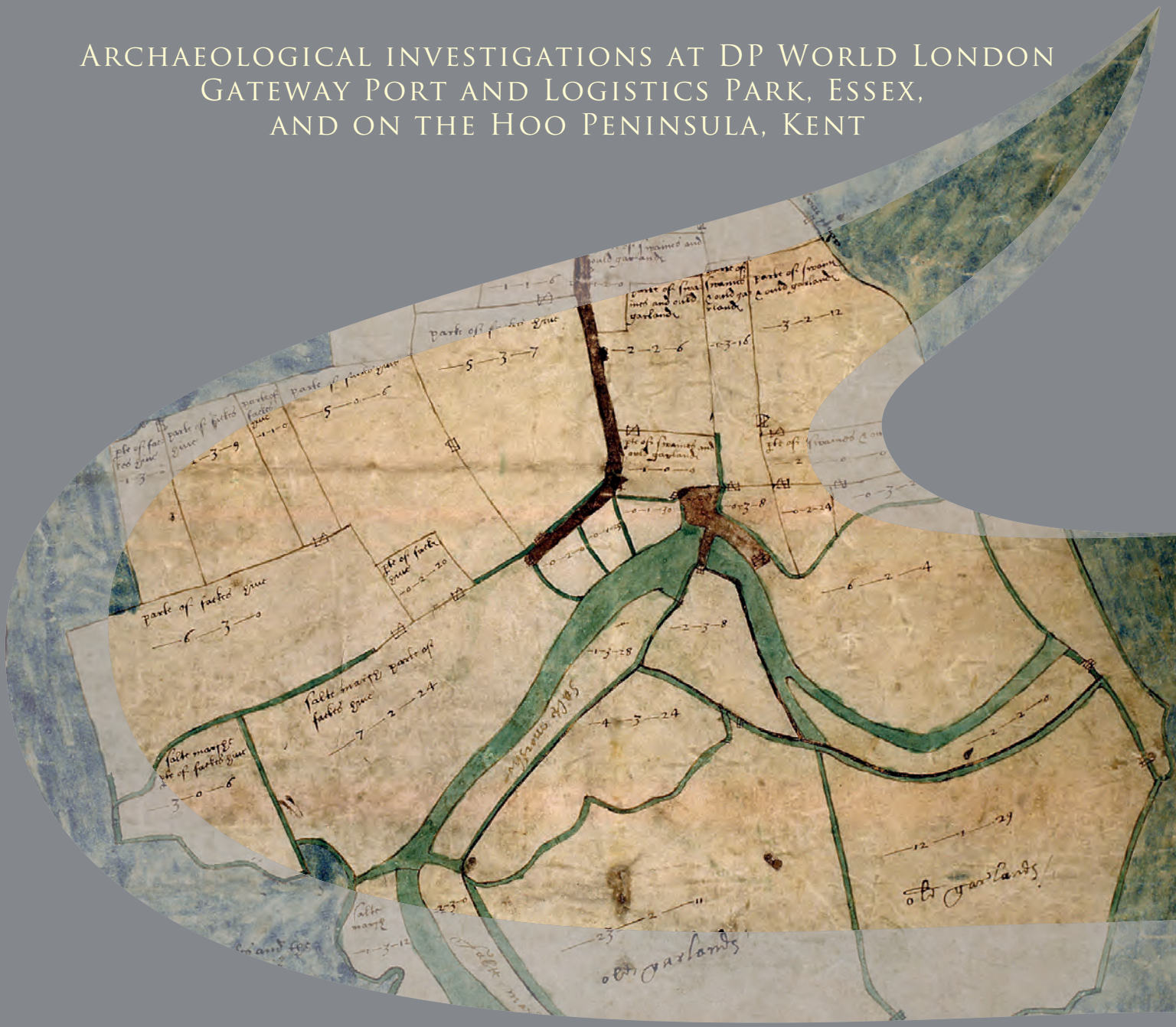
London Gateway

Settlement, farming and industry from prehistory to the present in the Thames Estuary

Archaeological investigations at DP World London Gateway Port and Logistics Park, Essex, and on the Hoo Peninsula, Kent



Specialist Report 5
Fired Clay
by Cynthia Poole

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Introduction

Fired clay was recovered from excavation and evaluation trenches in the Access Road (COARD12) and Pipeline Diversion (COLP15) sites. Both areas occupied broadly the same general location to the west of Great Garlands Farm.

A modest assemblage, in total 1225 fragments weighing 13,647g, was recovered by hand excavation, together with a small proportion from sieved residues. The assemblage is summarised by date in relation to site and area or trench in Table 5.1. Much fired clay cannot be dated, especially structural material, and is reliant on associated datable artefacts to be phased. However, a significant number of fired clay items in this assemblage are of diagnostic middle-late Bronze Age or early Iron Age forms, predominantly portable items of oven or hearth furniture, much of it relating to salt working. The dating is dependent on a combination of diagnostic forms and association of non-diagnostic pieces with other datable artefacts.

The condition of the material was variable but included a significant number of well-preserved diagnostic or identifiable forms. Abrasion varied considerably, with the heaviest tending to occur on structural material from ovens and hearths and the lightest on portable items of furniture, suggesting that these were deliberately deposited or rapidly discarded into features following breakage or disuse. The overall mean fragment weight (MFW) is low-to-average at 11g and as a preliminary indicator could suggest that little identifiable material was present. However, this is skewed by sieved material, which if excluded, increases the MFW to 28g, which is well above average and more consistent with the quantity of diagnostic pieces.

Methodology

The assemblage has been fully recorded on an Excel spreadsheet in accordance with guidelines for ceramic building material set out by the Archaeological Ceramic Building Materials Group (ACBMG 2007), which, while not specifically intended for fired clay, provide appropriate guidance. The record includes standard quantification

divided by form and fabric, details of the general condition, surfaces and finish, dimensions as appropriate and organic impressions, supported by additional notes and descriptions. Fabrics were characterised on the basis of macroscopic characteristics, supplemented with a x20 hand lens for finer inclusions. A small quantity of non-diagnostic material has been discarded mainly amorphous scraps, but otherwise all material has been retained.

Fabrics

The majority of the fired clay is made in a fine sandy micaceous clay containing variable densities of coarser quartz sand and sporadic grits of flint and quartzite (fabric Q), equivalent to fabric FC3 at Stanford Wharf Nature Reserve. A proportion of these also contained added organic temper, generally in the form of fine chaff or chaff and crushed straw (Fabric QV). A few pieces were made in a smooth silty micaceous clay (Fabric A), one example having additional chaff temper. A coarse flint-tempered fabric (B), similar to Stanford Wharf fabric FC4, was used exclusively for furniture – a pedestal and some fragments of flat plates. Such a fabric has been commonly observed to have been used for late Bronze Age perforated plates at numerous sites around the Thames Estuary and lower Thames valley (Champion 2014, 284). The fired clay from the Access Road excavations was assigned to the fabric categories used for the Stanford Wharf assemblage (Poole 2012). Most of the fired clay was assigned to the sandy clay fabric (FC3), which utilised brick earth clays. Only two pieces and briquetage sherds were assigned to different fabrics: one was organic tempered (FC2), one contained burnt flint grit (FC4) and the briquetage included a chaff tempered silty clay (X2), a sandy fabric (X3) and a sandy fabric tempered with coarse burnt flint grit (X7).

Middle Bronze Age

Oven/hearth furniture (Fig. 1, nos 1-3)

A significant group of oven or hearth furniture was recovered from the Access Road Area A from the fill (1003) of pit 1004. This consisted of five cylindrical drum-shaped pedestals of middle-late Bronze Age type and an unusual conical pedestal or support, presumably of the same date. The cylindrical pedestals had straight or slightly barrel-shaped profiles with flat ends pierced by an axial perforation measuring 18-23mm

diameter (Fig. 1, nos 1-2). They measured 110mm-120mm in diameter by 80-83mm tall. All five were very similar in character, suggesting that they were made as a group. Flat ends have been used to differentiate middle from late Bronze Age varieties. However, in the experience of the author, this cannot be universally applied, and indeed in this case the associated pottery is of middle Bronze Age date. The conical pedestal (Fig. 1, no. 3) may be near-complete, but it is possible it had a longer columnar stem that has broken and become worn and what is preserved is just the foot of a much taller pedestal. Two additional small broken fragments with converging surfaces may derive from similar objects.

Examples are not common from Essex and most have been found in the south-west of the county. Two similar examples were found in a late Bronze Age posthole and pit on the Grays bypass (Major 1988, 94) and one at the North Ring Mucking (Bond 1988, 37-8). The cylindrical pedestals, though traditionally regarded as loomweights, have more recently been found associated with evidence for middle and late Bronze Age pottery production at Bestwall Quarry, Dorset (Woodward 2009, 291-9) and late Bronze Age pottery production at Tinney's Lane, Sherborne, Dorset (Best and Woodward 2012). A group of cylindrical perforate blocks from Tolgarrick, Cornwall, found in a circular structure associated with Trevisker ware pottery, were all heavily fired with partly vitrified surfaces and may have been utilised in conjunction with metal working (Poole forthcoming). This object type is commonly found on Bronze Age settlements and it is likely that it had a generalised function as oven or hearth furniture and were not exclusive to craft or industrial activities, such as pottery production. The association here with the conical pedestal is further confirmation of their function as oven or hearth furniture rather than loomweights. The conical pedestal is not a standard form found in Bronze Age fired clay assemblages. It has characteristics in common with some of the pedestals used in salt working in the late Bronze Age and Iron Age and this may be an early example of briquetage furniture, though no evidence of salt discolouration was noted.

The group of fired clay was found in a small bowl-shaped pit (1004) measuring 0.55 by 0.6m and 0.15m deep. The objects were packed with a large quantity of broken Deverel-Rimbury pottery in a charcoal-rich clay containing burnt unworked flint and burnt bone. The bone could not be identified as either human or animal but had been subjected to intense combustion from its colour. There was no *in situ* burning visible around the pit, suggesting that this material had been brought from elsewhere and

deliberately deposited in the pit. Although the bone could not be identified as human, it is possible this is pyre debris. If so, the association of the clay artefacts is of interest, as it may indicate that they were utilised in some manner in the construction of the pyre or to support the bier. Fired clay associated with cremations generally takes the form of small amorphous scraps, presumably scraped up from the burnt ground surface of the pyre base and rarely are artefacts associated.

Catalogue of illustrated material

Fig. 1, no. 1. Cylindrical pedestal. Squat cylindrical pedestal with flat ends and convex curving sides forming barrel shaped profile; 50% complete. Roughly central axial cylindrical perforation 23mm dia. Diameter: 115mm; height: 80mm; weight: 586g. Fabric: FC3. Date: Middle Bronze Age. Context 1003, fill of pit 1004 (COARD12)

Fig. 1, no. 2. Cylindrical pedestal. Squat cylindrical pedestal with flat ends and convex curving sides forming barrel shaped profile; 50% complete. Roughly central cylindrical axial perforation 21mm dia. Diameter: 83mm; height: 115mm; weight: 560g. Fabric: FC3. Context 1003, fill of pit 1004 (COARD12)

Fig. 1, no. 3. Conical pedestal. It has a flat base that had been pressed onto a smooth surface sprinkled with chaff, leaving impressions in the surface, and is fired orange-red. From the oval base the clay had been drawn up and moulded to a conical knob with finger mark depressions and hollows in the surface. The upper part was asymmetrically placed, so the foot splayed out more towards one end. The top was broken, but the side surfaces appear to be starting to curve in to an apex suggesting little was missing, but this may be the effect of wear and it is possible it had a longer stem and is an early form of a cup pedestal. Foot: length: 84mm; width: 62mm. Top: length: 38mm, width: 32mm; extant height: 54mm; weight: 165g. Fabric: FC3. Context 1003, fill of pit 1004 (COARD12)

Late Bronze Age – early Iron Age

Fired clay that can be assigned to the late Bronze Age – early Iron Age on the basis of intrinsic characteristics or associated pottery was found widely distributed across the area with three major concentrations in Access Road Area A, and Pipeline Diversion Site B and Trench 27. All the associated pottery from Site B and Area A is of late Bronze Age date. No pottery was recovered from Trench 27 and dating is reliant on the fired clay and briquetage. A high proportion of the assemblage includes salt working accessories and briquetage vessels. Other items of oven/hearth furniture and structure may also have been used in the salt-working process but are not specialised salt-

working forms and may represent other activities on the sites.

Briquetage furniture

Briquetage accessories and vessels representative of salt working were recovered from Area A, Site B and Trench 27. The assemblages from the three areas are distinct, comprising different forms, suggesting that they are not precisely contemporary. The diagnostic fired clay assigned to this period comprises fragments of briquetage furniture, which have been dated as late Bronze Age based on their associations at other sites.

Cup pedestals with splayed bases (PD23) (Fig. 2, nos 4-8)

This was the most common variety of briquetage furniture found and accounted for all the examples from Trench 27 and a large proportion of examples from Site B, including all the unstratified examples. All the examples from Trench 27 were made in fabric Q, together with one from Site B, the majority from Site B being made in fabric QV. This type has a narrow cylindrical stem, which widens abruptly at the base to a circular splayed foot with wedge-shaped profile and at the top into a shallow circular cup with a concave surface. The objects are generally neatly made with smooth regular hand-moulded surfaces. The central stem measures 20-25mm in diameter widening to 28-33mm at the ends where it joins to the foot and cup. The foot ranges in size from 45 to 60mm in diameter and is between 3 and 7mm thick. The cup survived sufficiently to measure on only one example, which had a diameter of *c* 50mm. The most complete example came from gully 2710 with both foot and stem up to the junction with the cup surviving (Fig. 2, no. 8). It had a length of 60mm, suggesting that the full height of this pedestal was in the region of 80mm. The cup end appears to be quite shallow and was probably designed to hold a larger briquetage evaporating cup, rather than containing the brine itself. Most were fired to red, orange and reddish brown, sometimes with a black core and only rarely exhibiting salt-coloured mottles of lavender, pale pink or cream. It is clear from one that the foot and the stem were made as separate units and luted together (Fig. 2, no. 4).

Cup pedestals with tapered base (PD24) (Fig. 3, nos 9-12)

All three examples of this type were found in the fill (3220) of ditch or pit cluster 3221 on Site B. This type had a cylindrical stem tapering to a pointed base and at the top

joined a circular shallow cup. The stem measures 30-36mm at its thickest at the top and 120mm in length to the base of the cup. The cup measures *c* 60-65mm in diameter and was designed to hold a separate briquetage evaporating vessel, as lavender and white salt discolouration occurred over the outer surface of the cup suggesting that the brine had dripped down the exterior.

Pedestal with spatulate end (PD25) (Fig. 3, no. 13)

A single fragment may come from a pedestal with a spatulate end (from context 3202, a fill of hollow 3201), a form that is similar to the other cup pedestals, but the lower end differs in form as the cylindrical stem flattens to become a wide flat thin end. Very little survives except for a short section of stem with sub-rectangular cross-section measuring 20 by 29mm. This and the tapered type above must both have been set into the clay floor of the salt-evaporating hearth to secure them in a vertical position.

Props and supports (Fig. 4, no. 14)

The group of fired clay from pit 1027 (Area A), recovered entirely by sieving, comprised a variety of hand-moulded items associated with one of the briquetage sherds. These include fragments of flat plaques or possibly oven lining, a hand-squeezed lump and two small props or pedestals. The general character of these pieces is similar to the furniture commonly associated with salt working made by pressing the soft unfired clay into place as needed to stabilise containers and fired during the evaporation or drying process.

The hand-squeezed lump had one fairly flat burnt surface and was rounded on the opposite side drawn up into a knob. It was made in an orange brown sandy fabric containing small flint grit and had cerise mottles. It measured 47mm wide and 40mm high. The two props or supports were roughly pyramidal in shape with a flat base and measured 38-40mm long, 22-35mm wide and 256-27mm high.

One piece (Site B, ditch 3206) made in fabric A has a roughly triangular form measuring 14mm thick and 34mm wide (Fig. 3, no. 13). It has one flat or slightly convex surface and one smooth concave surface, which both appear to result from the clay being pressed up against another object, probably the combination of structure and vessel. The fragment is similar to briquetage clips and was probably used to secure or stabilise an evaporating vessel during use.

Briquetage vessels (Fig. 4, nos 15-17)

Only two small sherds (5g) of briquetage from flat-walled vessels were recovered from Site B (3216) though they are too small to assign to any known form. They measured 6mm and 8mm thick and one had a flat rectangular rim profile (type R6) (Fig. 4, no. 15). They were made in fabric X2, a pinkish red fine sandy micaceous clay mixed with high density of chaff temper surviving as impressions up to 8mm long.

Trench 27 produced a group of 25 fragments (108g) of briquetage sherds in the form of thin flat slabs of uniform thickness of 11-13mm with roughly moulded surfaces. Several pieces have a flat moulded edge or rim (type R6), sometimes slightly thickened on one side (type R1) (Fig. 4, no. 16). They were made in coarse sandy fabric X3 and fired to red, orange and brown at the surface with contrasting black core.

Three sherds of briquetage were recovered from Area A. Two (context 1029, a fill of posthole 1027, and context 10030, a fill of ditch 10029) were flat-walled vessels measuring 5mm and 9mm thick made in an organic tempered fabric (X2) and a sandy fabric (X3). The sherd from 10030 is associated with a conical fragment of fired clay, which may be the end of a horned or conical pedestal, and fragments probably from a hearth or oven structure with typical of salt-working colours of pink and lavender. The third came from the base angle of a circular flared vessel (Area A, context 1035, fill of posthole 1033) measuring *c* 200mm in diameter (Fig. 4, no. 17) and was made in a sandy flint gritted fabric (X7). The reddish orange colour and lack of white salt glaze or other salt colours suggests that this may be a salt mould rather than an evaporating vessel. Flint-tempered briquetage was not found at Stanford Wharf Nature Reserve (Poole 2012), suggesting that this is of an earlier date, possibly of Late Bronze Age or Early Iron Age when flint tempered ceramics and fired clay are more common.

Oven/hearth furniture

LBA cylindrical perforated block (PD21)

A single fragment from context 3207, an upper fill of ditch 3206 from the Pipeline Diversion, has been tentatively assigned to this form. The fragment retains only a curved plano-concave moulded surface that appears to form the surface of a perforation 25mm in diameter through an object over 42mm thick. It is thought most likely to represent the centre of a middle or late Bronze Age cylindrical perforated block, though this must remain uncertain with no other surfaces surviving. Whilst other forms such as

a thick perforated plate of Iron Age form is a possibility, all other fired clay from the context is of late Bronze Age types. Better preserved examples of cylindrical perforated blocks were found at the Access Road Area A site (above) in a middle Bronze Age context.

Perforated plates and miscellaneous plaques (Fig. 5, nos. 18-20)

Fragmentary examples of late Bronze Age perforated plates were recovered from Trench 32 within the Pipeline Diversion, either within fill 3207 of ditch 3206 or as unstratified finds. These were made in sandy chaff-tempered fabrics (fabrics QV and V), only one of which contained angular burnt flint grit, though not in the density that is more typical of these plates. These measured between 12mm and 24mm thick, but other dimensions were all incomplete. The perforations on the pieces from 3206 measured 14-15mm and 30mm in diameter set between 23mm and 40mm from the plate edges.

The best-preserved piece was a corner fragment measuring 14-21mm thick and greater than 75mm in length. Based on the arrangement of perforations in better preserved examples, it is estimated to have had width of *c* 150mm and a length of up to 200mm. It has fairly even flat moulded surfaces with finger-marks from smoothing on the underside. The corner is well rounded, the end edge flat, and the side edge typically grooved or concave. One perforation measuring 25mm in diameter survived, set 22m from end edge and 40mm from the side edge and had a slightly thickened halo of clay pushed out around underside.

An example (context 3220, fill of ditch 3221) with remains of two perforations had burnt grey surfaces and was associated with a plain fragment, possibly from a perforated plate with salt whitening on the surface.

A single unstratified fragment (62g) from Site B (Fig. 5, no. 20) may derive from a perforated plate of Iron Age date. It had a well finished slightly undulating upper surface pierced by regular well finished cylindrical perforations of which two survive. These measure 32mm and 34mm in diameter and are set 17mm apart. The underside is roughly flat but irregular from thickened rims of surplus clay forming an aureole around the perforations. The plate measures 32-39mm thick. It was made in sandy organic fabric QV, with voids from chaff or straw inclusions up to 8mm in size. The characteristics of this piece are more typical of Iron Age plates. This type of object is more commonly associated with pottery kilns where the perforated plate would form

the suspended floor of the upper chamber.

Miscellaneous fragments (13 fragments, 67g) from Site B of thin, flat slabs of clay with an even moulded surface on both sides and measuring 12-20mm thick may also be pieces of perforated plates of the type described above, especially those made in the flint-tempered fabric B. Others were made in fabric Q and QV. Some had possible salt discolouration with pale pink and whitish mottles.

Oven/hearth structure

Structural fired clay

There was little evidence of structural fired clay (15 fragments, 97g) from the Pipeline Diversion and no features could be interpreted as oven or hearth bases. The small quantity of material from Site B that could be classified as oven or hearth structure takes the form of thin slabs of fired clay up to 20mm thick with a single flat moulded surface. Some pieces had patches of salt whitening on the surface suggesting they derived from the wall lining of salt evaporation hearths. They were made in fabrics Q and QV.

Oven wall and integral pedestal (Fig. 6, no. 21)

The largest group of oven or hearth structure (208 fragments, 6047g) came from Access Road Area A within in the fill (1014) of small pit 1012. This consisted of large roughly shaped block and probably all derived from a single broken structure. This can be divided into pieces with a single roughly moulded flat surface up to 80mm thick, which probably derive from the wall structure of a hearth or oven. The largest piece has two roughly moulded surfaces at right angles. One of these surfaces has been moulded around a large rectangular opening with straight flat bevelled surfaces, forming an internal corner. This possibly formed the rim around the upper corner of a rectangular semi-enclosed hearth/oven with walls 70-120mm thick. Associated with this were pieces with a curving convex surface, some of which also had a flat surface at right angles (Fig. 6, no. 21). These are best interpreted as fragments of a large bollard-type pedestal *c* 160mm in diameter at the top that formed an integral element of the oven structure. Firing was variable with colours varying between cherry-red, orange-brown and black at the surface, while the core was poorly fired to a purplish/maroon grey colour. Apart from the fired clay, no other finds were recovered from the pit and the feature is assigned to this phase by its association with features that have produced late

Bronze Age pottery. The implication of an integral pedestal within an oven suggests that the fired clay derived from a dual-chambered structure, normally present in specialised structures such as pottery kilns. Cylindrical pedestals were found in the Roman pottery kilns at Mucking (Jones 1973, 15-17 and fig.2) and it is possible this group of fired clay could be later in date, though if this is the case the absence of any later pottery in the area is surprising.

Most other pieces interpreted as oven or hearth structure have only a single moulded surface, except for two with a small stem impression (7mm in diameter) on the back and one with straw impressions. Some pieces had the distinctive pink or lavender colouring typically associated with salt working, suggesting that they may have derived from a salt working hearth. It is likely that most of the non-diagnostic material derives from oven or hearth structures.

Discussion

The assemblage of fired clay and briquetage is a significant group of material comprising a number of diagnostic pieces of late Bronze Age type, all of which may be associated with salt working. Although salt working sites are well known along the Essex coast in the form of the 'red hills', much of the evidence from these is of middle/late Iron Age and Roman date, whilst evidence of earlier salt production is much rarer and on a smaller scale. This group of material is a significant addition to the sites, producing evidence for late Bronze Age salt production in this area.

Comparable late Bronze Age briquetage has been found at Mucking (Jones 1977; Barford 1985), where cup pedestals, rods with pointed ends and spatulate ends are essentially equivalent to types PD24 and PD25. Exact parallels of the type PD23 cup pedestals with a circular splayed foot have not been found. Pedestals with a rectangular section, more like the examples with spatulate ends, and examples with 'fishtail' or horned ends were found in a Bronze Age context at Crouch Site 2, Woodham Ferrers (Barford 1995, 161-164).

How the groups of briquetage found in the London Gateway excavations should be interpreted is uncertain. Whilst most of the items relate to the evaporation process, the sites are located on the terrace gravels or head deposits not on the alluvium and as such are some distance from the nearest salt water, though this may have been more accessible in the first millennium than it is today. With no evidence of settling tanks or hearths present at any of the areas, there is no certainty that evaporation was taking

place, though some elements of the assemblage such as the small props and squeezed lumps that were pushed into place and fired during the evaporation process suggest that it must have been occurring relatively close by. The briquetage at Mucking was found some 2km distant from the nearest salt water source and it was suggested by Jones (ibid.) that the collection of material could represent the location where salt equipment was made, though it could also be argued that sites slightly inland may represent the secondary phase of drying and packaging of the salt.

The small, perforated plates are a common occurrence on late Bronze Age sites around the Thames Estuary and the lower Thames valley. A recent study of these artefacts (Champion 2014) has concluded they were associated with cooking, in particular baking of bread. Although Champion notes that these plates have been found in association with briquetage at several sites, he rejects a function associated with salt production based on the absence of any of the colours and salt residue typically associated with salt production. Certainly, none of the definite examples from London Gateway have evidence of salt discolouration.

Catalogue of illustrated material

Fig. 2, no. 4. Cup and stem of pedestal with splayed foot (type PD23). Ht: >51mm, stem dia: 20x22mm, foot: 54x42mm dia, 5mm th; fabric: FC3/Q. Context 2702, fill of gully 2701, Trench 27 (COLP15)

Fig. 2, no. 5. Splayed foot of cup pedestal (type PD23). Ht: >13mm, stem dia: c 25mm, foot: 55mm dia, 4mm; fabric: FC3/Q. Context 2702, fill of gully 2701, Trench 27 (COLP15)

Fig. 2, no. 6. Cup and top of stem of pedestal with splayed foot (type PD23). Ht: >27mm, stem dia: 24, 30mm, cup dia: c 50mm; fabric: FC3/Q. Context 2702, fill of gully 2701, Trench 27 (COLP15)

Fig. 2, no. 7. Central stem of ?cup pedestal (type PD23?). Ht: >30mm, stem dia: 24mm; fabric: FC3/Q. Context 2702, fill of gully 2701, Trench 27 (COLP15)

Fig. 2, no. 8. Stem of cup pedestal with splayed foot and base of cup surviving (type PD23). Ht: 60mm, stem dia: 22mm, foot dia: 33mm; fabric: FC3/Q. Context 2711, fill of gully 2710, Trench 27 (COLP15)

Fig. 3, no. 9. Stem of cup pedestal with tapered foot (type PD24). Ht: 120mm, stem dia: 20-30mm, foot pointed, (cup missing); fabric: FC3/Q. Context 3220, fill of ditch 3221 (COLP15)

Fig. 3, no. 10. Stem and base of cup of pedestal with tapered foot (type PD24). Ht: >40mm, stem dia:

36mm, (foot missing), cup dia: 60-65mm; fabric: FC3/Q. Context 3220, fill of ditch 3221 (COLP15)

Fig. 3, no. 11. Pedestal central section of columnar stem with circular section (type PD24?). Stem dia: 28mm; fabric: FC3/Q. Context 3202, fill of hollow 3201 (COLP15)

Fig. 3, no. 12. Fragment from central section of cylindrical pedestal with lavender salt discolouration over part of surface. Width:>34mm (est. dia. *c* 45-50mm); fabric: FC3/QV. Unstratified, Site B (COLP15)

Fig. 3, no. 13. Pedestal stem with rectangular section (possibly spatulate end) (type PD25?). Stem: 20mm thick, 29mm wide; fabric: FC4/B. Context 3202, fill of hollow 3201 (COLP15)

Fig. 4, no. 14. Luting or clip. Roughly triangular fragment pressed between two objects resulting in smooth concave surfaces. Th: 14mm, width: 34mm, length: >30mm; fabric: FC1. Context 3207, fill of ditch 3206 (COLP15)

Fig. 4, no. 15. Briquetage vessel. Rim type R6 of flat wall of slab made vessel. Th: 6-8mm; fabric: X2. Context 3216, fill of pit 3217 (COLP15)

Fig. 4, no. 16. Briquetage vessel. Rim type R6 of flat wall slab made vessel. Th: 11-13mm, length: >33mm; fabric: X3. Context 2702, fill of gully 2701 (COLP15)

Fig. 4, no. 17. Briquetage vessel. Base angle of a circular flared vessel. Diameter of base: *c* 200mm; height: >27mm; wall thickness: 7-10mm; weight: 11g. Fabric: X7. Context 1035, fill of posthole 1040 (COARD12)

Fig. 5, no. 18. Perforated plate (type OPP3). Corner fragment of rectangular perforated plate, with one edge grooved; pierced by perforation 25mm dia. Th: 14-21mm, width: >70mm, length: >75mm; fabric: FC4. Unstratified, Trench 32 (COLP15)

Fig. 5, no. 19. Perforated plate (type OPP3). Perforated plate with narrow flat edge and pierced by two perforations 14-15mm dia. Th: 13-18mm, width: >40mm, length: >87mm; fabric: FC2. Context 3220, fill of ditch 3207 (COLP15)

Fig. 5, no. 20. Perforated plate (type OPP1). Fragment with smooth undulating upper surface and rough irregular underside with thickening around the base of two perforations 32 and 34mm dia. Th: 32-39mm, width: >35mm, length: >80mm; fabric: FC3. Unstratified, Trench 32 (COLP15)

Fig. 6, no. 21. Kiln pedestal. Fragment from top of cylindrical bollard type pedestal with flat top surface and convex sides probably integral to the kiln structure. Th: >60 mm, dia: c 160mm; fabric: FC3. Context 1014, fill of posthole 1012 (COARD12)

Roman period

Fired clay from this period was nearly all confined to Pipeline Diversion Site A (Trench 26) and Trench 25). The material was recovered from a variety of features, comprising ditches, pits and postholes, many of which also contained quantities of ceramic building material. Most of the fired clay at Site A came from features phased to the Roman period, although a few contexts may be slightly earlier in date. Redeposited late Bronze Age-early Iron Age pottery was found in pit 2635/2640 and it is possible that some fired clay could be earlier in date, but there is no intrinsic evidence to suggest this except for one tiny fragment (from context 3304, a fill of ditch 3306) in fabric B, which could derive from a late Bronze Age perforated plate. All the remaining fired clay from Site A is regarded as Roman.

All the fired clay appears to be structural in origin most probably derived from an oven structure. Much of this (251 fragments, 1123g) had only a single flat or slightly curving moulded surface, varying from fairly smooth and regular to rough and uneven, sometimes with finger-marks. These were up to 50mm thick and are likely to be fragments of wall or lining from an oven. Most were made in fabric Q, fired to red-orange, apart from one fragment in a chaff-tempered fabric (QV). Some of the material from pit 2640 had pale pink lavender and white salt discolouration on the surface. One small scrap had a patch of vitrification.

There were also a significant number of pieces with wattle impressions (37 fragments, 1360g), which are likely to derive from the oven superstructure. These were found in pits 2635/2640 and 2651, posthole 2661 and hollow 2651. They are all moderately to heavily worn and as a result preservation was relatively poor. Most were made in fabric Q and one group in QV. Some pieces were fired to purplish red and cerise, which might indicate salt discolouration, but this may also occur as the result of using saline clays from salt marsh environments and need not necessarily indicate salt production. The outer surface, where it survived was similar in finish to plain pieces described above and 16 wattle impressions survived on the interior. On some pieces the wattles were visibly interwoven and included both horizontal rods and vertical sails. The rods measured 11-22mm in diameter with the main peak at 17mm diameter and the sails 24-25mm (Fig. 7). The rod sizes are above average, compared to a more typical 12-15mm peak for most oven structure. This suggests that the structure represented was

more substantial than normal. While wattle-supported structure is often assumed to represent the walls of ovens or kilns, there is little evidence from *in situ* structures that wattle supports were necessary for the walls and an alternative interpretation is as suspended floor within a dual chambered oven or kiln structure.

The fired clay suggests that some type of oven structure was in use in the area and this is supported by the quantity of burnt debris recovered. A significant proportion of the Roman tile had been burnt to some extent. It is possible that the tile and fired clay derived from a single structure, the walls hypothetically constructed of courses of tile and with a suspended floor constructed on a supporting framework of wattles, possibly a hurdle. This is discussed in greater detail in relation to the tiles and tile structure (Poole, Specialist Report 4). It was suggested at Stanford Wharf Nature Reserve that the late Roman tile-built oven (Biddulph *et al.* 2012, 129-30) was used for salt evaporation in lead pans and it is possible the tile structure at Site A had a similar function.

Oven/hearth furniture

Fired clay found within a watching brief area of the Access Road may also be late Iron Age-Roman in date. Fragments made in a fine sandy chaff tempered fabric (FC2) appear to form part of a thin-walled tubular or tapered vessel with a simple rounded rim at one end (Fig. 6, no. 22). It measures *c* 40-50mm in diameter and has walls 13-16mm thick. The inner moulded concave surface is fired to a light yellowish-brown colour changing abruptly to red at the exterior. The outer surface is smooth plano-convex, but appears worn, possibly having lost the original moulded surface during use. The function of this piece is uncertain, but it is most likely some sort of crude vessel, possibly briquetage associated with salt production or an unused crucible. It was found in the fill (10033) of a small pit (10032), which measured 0.3m in diameter and 0.17m deep and contained a high density of charcoal. The pit probably formed an oven or hearth base. Although the feature is phased as medieval, the small sherd dated *c* 1480-1600 may be intrusive and the feature could be of late Iron Age or Roman date, which would be more compatible with the fired clay.

An item from the topsoil (10002) in Area G may be a late Iron Age or Roman oven plate. It forms part of a plain flat slab 20mm thick made in fabric FC3 with roughly finished flat surfaces and faint organic impressions on one side. Plain plates of circular or rectangular form are most commonly found in the late Iron Age-Roman period.

Catalogue of illustrated material

Fig. 6, no. 22. Vessel rim. Fragments from thin walled cylindrical or funnel-like vessel. Th: 13-16mm, dia: c 40-50mm; fabric: FC2. Area A WB. Context 10033, fill of pit 10032 (COARD12)

Medieval period

A small quantity of fired clay (8 fragments, 31g) was recovered from the Access Road Area A Watching Brief by hand excavation, together with a further 63 fragments (202g) from sieved samples from contexts dated to the medieval period. None of the fired clay is intrinsically datable and some could be residual. Although fired clay continued in use during the medieval period, its use declined and there are no diagnostic forms that can be attributed to this period. The fired clay can be classified as structural, though little shape or form survived. All the material was made in sandy and sandy chaff-tempered fabrics FC2 and FC3. Scraps from pit 10038 were largely amorphous, though some pieces had lavender and cerise salt discolouration and were mixed with granules of fuel ash slag. The discolouration may indicate the use of saline salt marsh clays, rather than necessarily imply salt production.

Fragments from pit 8063 included a fragment with an irregular surface covered with impressions of roughly parallel narrow monocot stems 1-2 mm wide. Clay had possibly been daubed over a bed of straw or grass, possibly thatch where smoke escaped through the roof of a cottage.

Hearth or oven base 10011 produced fragments with a single rough flat moulded surface, all with some blackening and burning. They measure 18-26mm thick and were made a fine chaff tempered sandy fabric (FC2). They probably represent remnants of oven wall lining from the structure. The feature measured 2.2m in diameter and 0.32m deep and had evidence of *in-situ* reddening and burning of the surrounding natural and the basal layer (10016) contained a high density of charcoal from the firing of the feature together with most of the fired clay.

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Fired Clay Table

TABLE 5.1: QUANTIFICATION OF FIRED CLAY BY SITE AND PERIOD

Site	Code & Area		MBA	LBA	LBA-EIA	IA	Preh-Ro	RB	Med	Sub-Total	Total
Access Road	COARD12 Area A WB	Nos			14				87	101	802 9953g
		Wt g			66				294	360	
	COARD12 Area A	Nos	76	74	22					324	
		Wt g	2350	500	215					8876	
	COARD12 Area B	Nos								469	
		Wt g		368						368	
	COARD12 Area G	Nos		630						630	
		Wt g					2			2	
	COARD12 Area H	Nos					62			62	
		Wt g		4					3	7	
		Nos		12					13	25	
Pipeline Diversion	COLP15 Site A & Tr25	Nos		1				288		423	423 3694g
		Wt g		2				2483		3694	
	COLP15 Site B	Nos		60	9	5	4			78	
		Wt g		470	79	213	182			944	
	COLP15 Tr27	Nos			50					50	
		Wt g			257					257	
	COLP15 Tr31	Nos					6			6	
		Wt g					8			8	

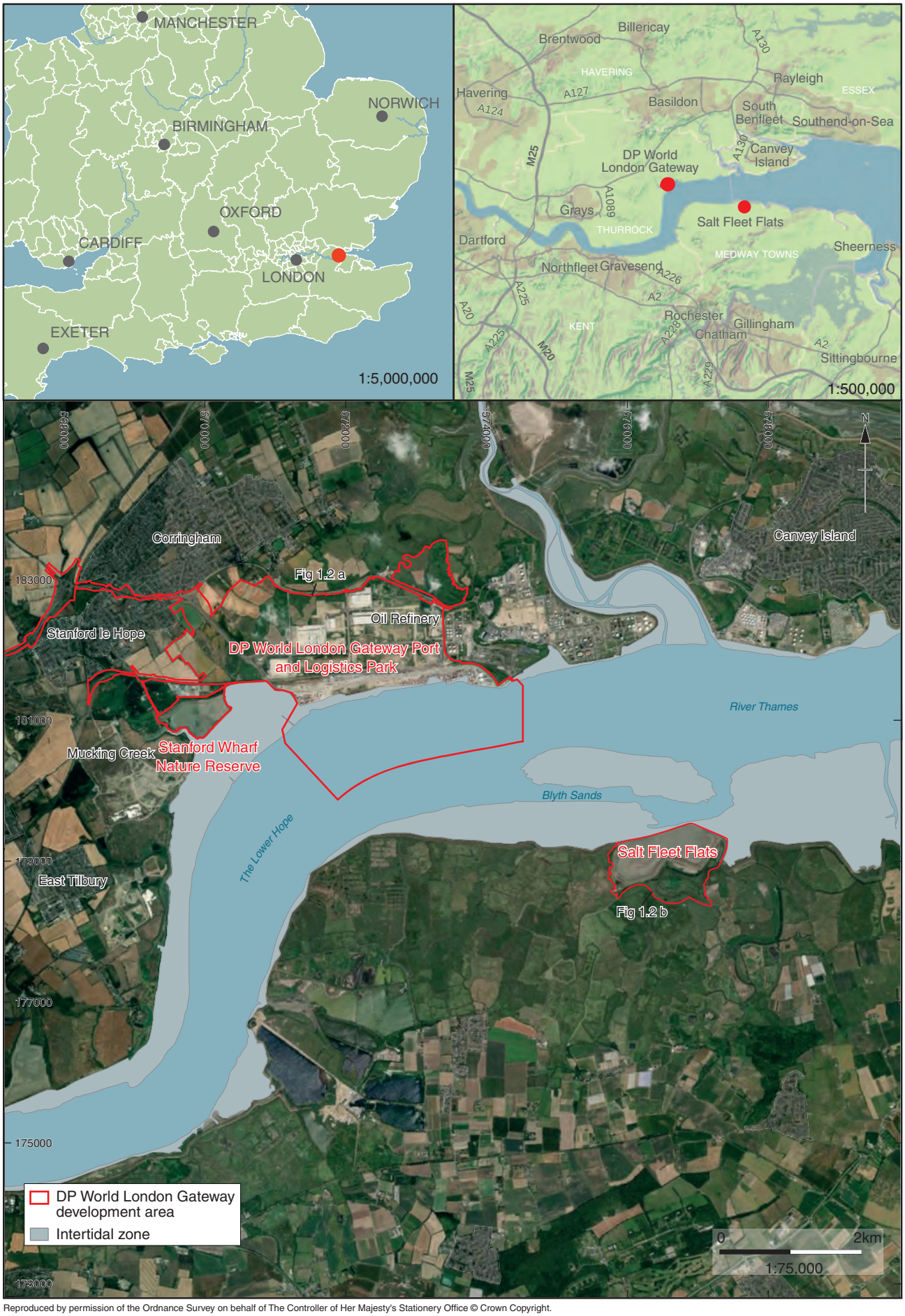

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Figure 1: Nos 1-3, Middle Bronze Age fired clay artefacts

Figure 2: Nos 4-8, late Bronze Age/early Iron Age briquetage pedestals

Figure 3: Nos 9-13, late Bronze Age/early Iron Age briquetage pedestals

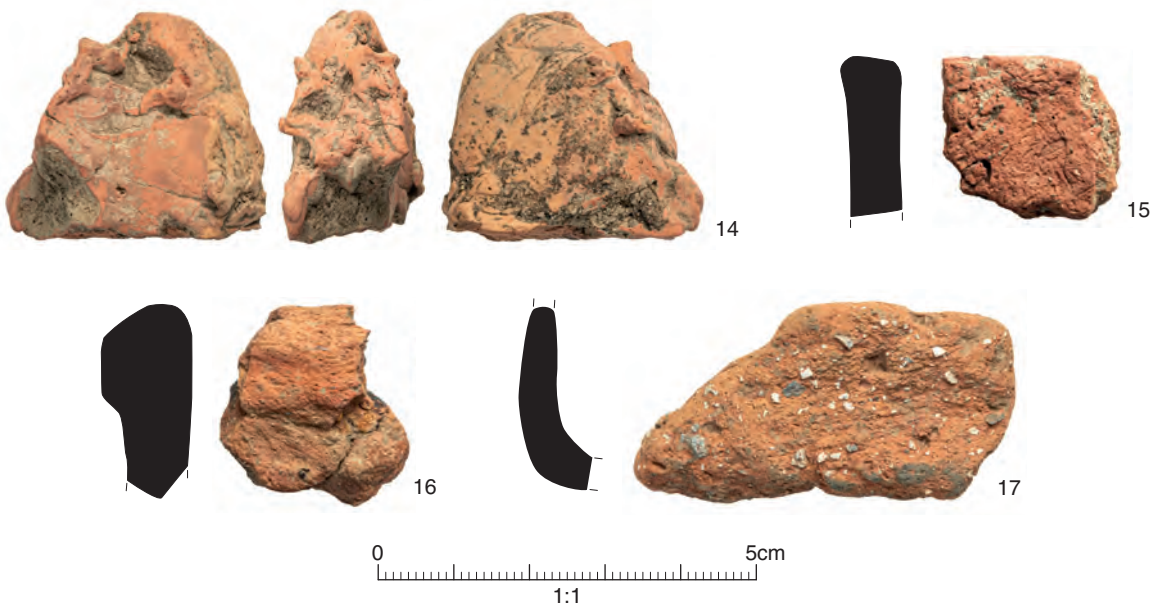


Figure 4: Nos 14-17, late Bronze Age/early Iron Age briquetage

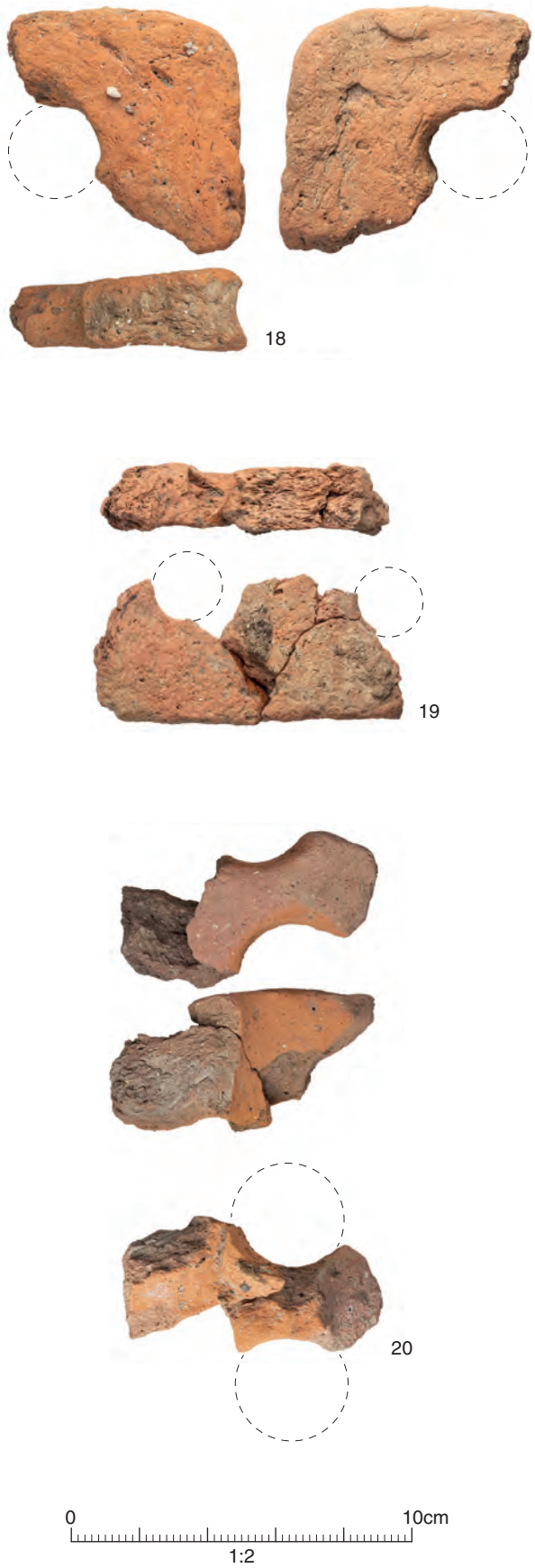
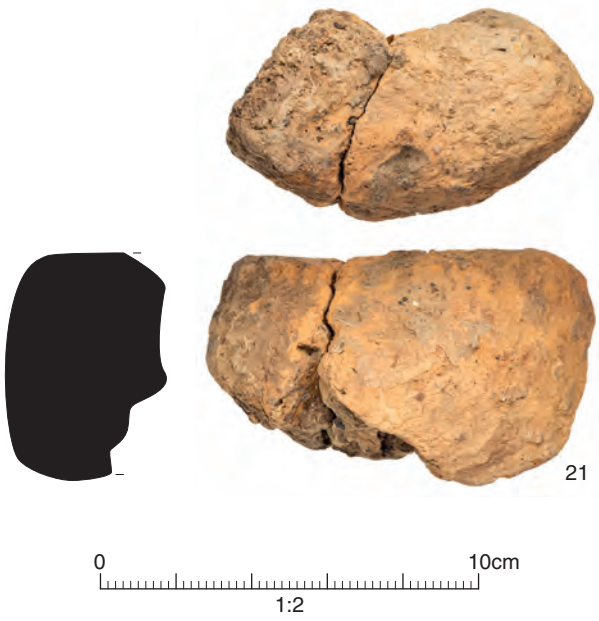


Figure 5: Nos 18-20, late Bronze Age perforated plates



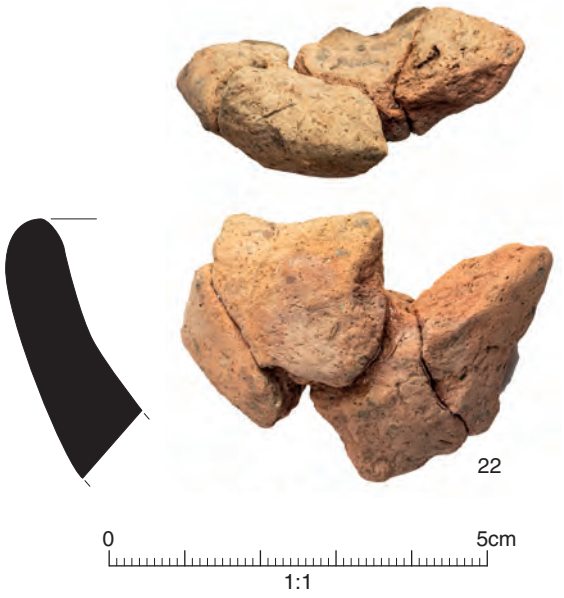
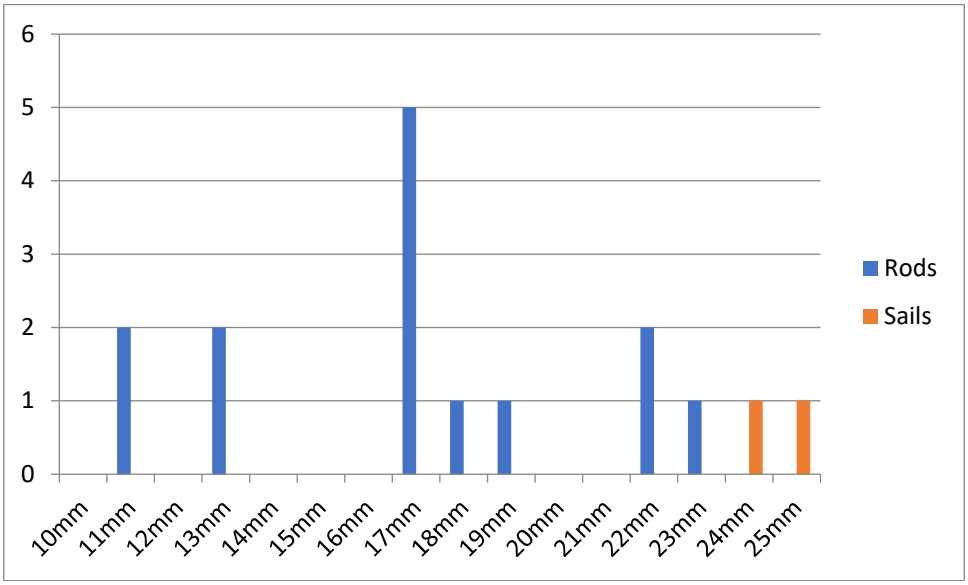


Figure 6: Nos 21-22, Roman fired clay

FIGURE 7: WATTLE SIZES AND QUANTITY FROM ALL ROMAN FIRED CLAY FROM PIPELINE DIVERSION SITE A (COLP15)



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