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The Henry Doulton & Co Terra Cotta Works 1876–1956: excavations at Hampton House, 20–21 Albert Embankment, Lambeth

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This article presents the results of excavations at Hampton House, 20–21 Albert Embankment, Lambeth, which uncovered buildings, kilns and flues associated with Henry Doulton's Terra Cotta Works, constructed in 1876–7. In the 1870s, Doulton began to expand their range of terracotta architectural mouldings, and by the 1880s had emerged as the leading manufacturer in London (Stratton 1986, 198). This boom in Doulton's business was demonstrated in three new buildings: a headquarters building on Black Prince Road, a showroom and offices for the Terra Cotta Works, built on the newly created Albert Embankment. To the south of the Terra Cotta Works offices the circular bases of two downdraught kilns were uncovered, each with a substructural exit flue leading towards a chimney located outside the site. Other flues show the works were modified during their lifetime; originally there were four kilns but by 1892, two smaller ones had been replaced with a third large kiln. It is not known when terracotta was last manufactured on the site, although research shows the lease on the works ran out in 1939. It had been assumed the final clearance of the site was linked to Doulton ceasing all production in London by 1956.

The subsequent demolition of Doulton's works and the kilns to ground level means that there is no reliable chronological relationship between the finds and the kilns at this site. The most reliable indications of the products used and made at the Terra Cotta Works are the kiln furniture, terracotta, faience and tiles found as wasters in the backfill of flues and demolition deposits. Some demolition material appears to contain a variety of Doulton material from across the site and products of the stoneware pothouse, further to the north. Some fragments of faience, tiles and terracotta are likely to be from the facade and interior of the Doulton offices and showrooms on Albert Embankment, which were built as new offices and also as a showcase for Doulton's architectural ceramics.

Introduction

Archaeological investigations were undertaken by MOLA (Museum of London Archaeology) in 2012 at Hampton House, 20–21 Albert Embankment, in the London Borough of Lambeth (TQ 30475 78562) (fig 1). Hereafter referred to as 'the site' it is bounded on the north by the Park Plaza Riverbank hotel, on the west by the Albert Embankment, on the south by further buildings and on the east by the National Rail viaduct.

An earlier archaeological field evaluation undertaken in June and July 2010 found the remains of a kiln base and flues relating to the late 19th century Doulton Terra Cotta Works (Mackinder 2010). In the light of these findings, CgMs Consulting provided a written scheme of investigation (CgMs 2012) for an excavation that took place between 30 July and 7 September 2012, in response to an archaeological condition (planning ref. 07/04264/FUL). Where possible the archaeology was fully recorded in plan, although investigation in the northern part of the excavation was limited by the presence of asbestos and live services. Following the demolition of Hampton House a watching brief was conducted in May 2014 (fig 2).

Throughout this report land use entities consist of Buildings (B), Structures (S) and Open Areas (OA). Context numbers cited in the text or tables appear in square brackets [11] and illustrated building material in angled brackets <T 1> with a concordance given in table 4 at the end of the report (see *Endnote*). The standard MOLA reference codes are quoted for ceramic fabrics and a fabric number used for recording building material. Detailed

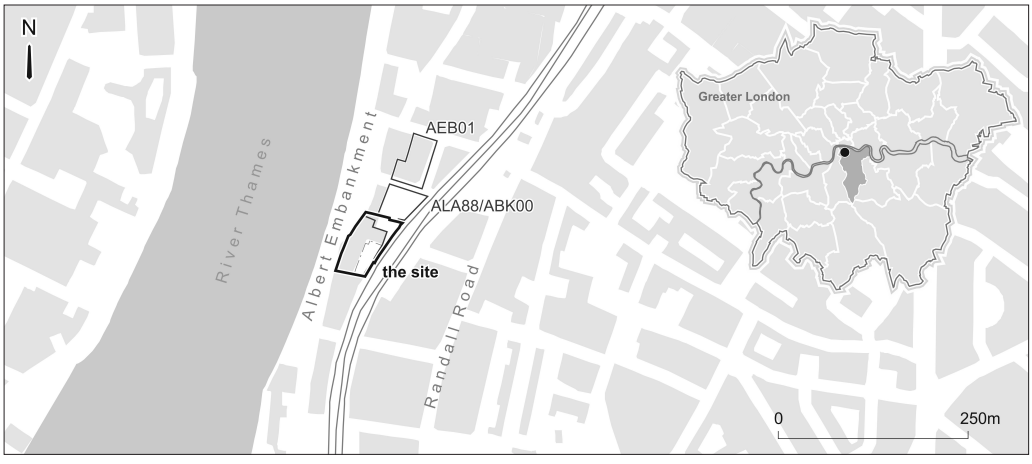

Fig 1 Doulton Terra Cotta Works. Site location map with nearby sites mentioned in the text (scale 1:10,000).

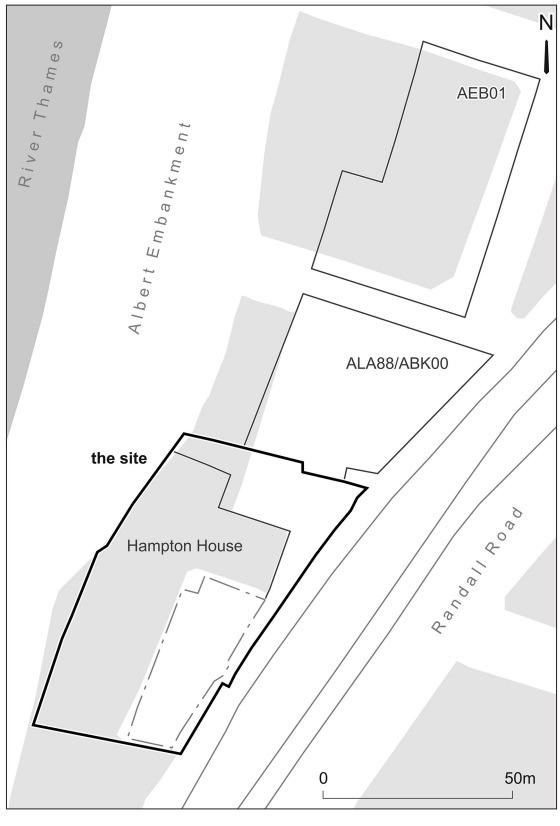

Fig 2 Doulton Terra Cotta Works. Trench location plan with nearby sites mentioned in the text (scale 1:2000).

descriptions of both are posted on the relevant pages of the MOLA website (www.mola.org.uk). Samples of the building material fabric types mentioned in the text can also be found in a fabric reference collection held by MOLA. All site records and finds will be deposited with the London Archaeological Archive and Research Centre (LAARC) under the site code HHX10. A full analysis report discussing the full range of pottery and vessels forms found on the site can be consulted in the site archive.

The association of different types of material from the various production phases at Lambeth in the same demolition fills demonstrates that these fills have a variety of sources from across the site and are not reliable as dating evidence. The ceramic building material and particularly the examples that are wasters are of intrinsic interest as products of the Doulton Terra Cotta Works.

Historical background

The more recent post-medieval history of the area to the south of Lambeth High Street shows that this area remained as open land in the 16th and 17th centuries, but by 1682 Morgan's map shows strip development had taken place to the west of the site along the frontage of the river Thames. Rocque's map of 1746 shows the site was partially occupied by a building fronting onto Back Lane, later Princes Street. This area has a long association with pottery production and in the late 17th century the Copthall pothouse was established nearby, followed by a wider proliferation of tin-glaze potteries in the area in the 18th century (Britton 1987). Examples of biscuit-fired wares (TGW BISC) from tin-glaze production found at this site are presumed to be from these nearby production sites (Pearce 2013) as were dumps of tin-glazed ware wasters, red earthenware wasters and pothouse material found during excavation to the north at Queensborough House (site code ALA88/ABK00, Tyler 2004; fig 2).

Horwood's map of 1799 shows the southern half of the site was mostly gardens with terraced housing along the corner of Princes Street (formerly Back Lane) and Andersons Walk. The northern half of the site was built up and belonged to Messers Randall and Suter, whom the *London Directory* of 1791 records as starch-makers. A document of 1898 refers to there once being 'two large new brick – houses, starch warehouses, store rooms, starch sheds, large – powder room, millhouses, yards and gardens' (LA: IV/124/2/13, 32). At Hampton House two 18th century brick buildings form the footings of a later brick building (B3; see fig 5) and which were probably part of these starch works.

A newspaper article in the *St James's Chronicle or the British Evening Post* (20–22 September 1798) refers to 'Suter and Randal' as being one of the top five importers of starch in London. The works was still present on the Greenwood 1827 map, but had been demolished by the time of the 1871 OS map.

From the mid-19th century, the character of the area changed dramatically with the building between 1845 and 1848 of a brick railway viaduct for the London and South Western Railway immediately east of the site (*Survey of London* 1956, 9). The Metropolis Management Act of 1855 called for the backfilling of cesspits with the imposition of a new piped sewage system from 1856 (Roebuck 1979, 51–4). With the creation of the Albert Embankment, between 1866 and 1870, the site was left sandwiched between the viaduct and the embankment, but it created an opportunity for Doulton to expand south of Lambeth High Street and to build the spectacular offices/studios and showrooms as a showcase for his company works. The Doulton family and the history of their pottery business in Lambeth has been covered comprehensively in previous publications (eg Eyles & Irvine 2002; Tyler 2005, 12–14), but the main points are summarised here.

John Doulton started a pothouse in Lambeth in 1815, and his son Henry Lewis Doulton built a series of kilns during the 19th century mainly for stoneware pottery (Tyler 2005) and ceramic drainpipes (Killock 2003). The excavations at 9 Albert Embankment (AEB01; fig 1, fig 2), *c* 50–100m north of the site, recorded three downdraught pottery kilns built between 1871 and 1880 replaced by five built *c* 1880–90, associated with stoneware production. All the kilns had circular bases and were of the downdraught type, with an exit flue leading out towards a chimney. The flues were backfilled with a mixture of whole stoneware bottles, kiln shelves, kiln furniture, refractory bricks and other debris (Tyler 2005).

Doulton began the manufacture of terracotta in the 1820s with architectural ceramics such as chimney pots, ridge tiles and garden urns. The manufacture of terracotta, especially

for architectural use, became an important part of Doulton's activities as demonstrated by reference to a large new kiln for firing terracotta sculpture being built in 1840 (Eyles & Irvine 2002, 28). This particular kiln was probably at the Lambeth High Street location rather than Albert Embankment. The interest in decorative architectural terracotta panels grew in the 1830s, reaching a peak in the 1880s when the demand for building material increased and terracotta detailing became a cheap economical form of decoration. From the late 1870s Doulton became the leading manufacturer and supplied many architects with decorative elements for public buildings (Atterbury & Irvine 1979, 69). In the 1870s Doulton increased its range of products to include architectural mouldings such as terracotta capitals, paterae, friezes and columns in response to the unprecedented rate at which buildings were being constructed and the need for economical materials that could be used instead of stone. By this period Doultons were producing good quality terracotta that was fired to a high temperature to withstand attacks by damp and frost (van Lemmen 2002, 19). In 1885, Henry Doulton constructed a house for himself incorporating 'profuse dressings in creamy-coloured terracotta, of a slight pink tinge' (Gosse 1970, 145). Identical coloured terracotta was made at Lambeth.

Doulton's production of terracotta and faience continued for well over a century. The boom period for terracotta was in the 1880s, by which time Doulton had emerged as the only major producer of terracotta in London (Stratton 1986, 198). Doulton was also the only firm to have any success in making more simple terracotta forms by extrusion and the first to develop glazed stoneware (including decorative faience) that could be coloured and yet resist frost (*ibid*, 211). Dating to this period is the lavishly decorated interior of Lloyds Bank (formerly the restaurant of the Royal Courts of Justice) on the Strand (constructed 1882–3). By the 1890s and early 1900s, Doulton's Lambeth factory was world renowned for its superb architectural decorations including the Winter Gardens, Blackpool and Harrods Meat Hall.

The success of Doulton particularly from the 1870s led to further expansion of the Lambeth premises and the creation of three new Italianate buildings to be used as a headquarters, showrooms, studios and offices. The OS 1st edition map of 1871 shows that the 18th century properties on the site had been cleared, allowing two elaborately decorated large buildings and a detached 200ft-high campanile-like chimney, partly inspired by the tower of the Palazzo Vecchio in Florence, to be constructed in 1876–7 (fig 3).

A third building, located at Lambeth High Street/Broad Street (now Black Prince Road), was a headquarters including a counting house, offices, library, museum, music and recreation rooms and a staff restaurant. It was extended in 1882 with additional artists' studios. All three buildings were in a 'modern Gothic style' with blue and red bricks with terracotta mouldings, columns, and foliation with coloured stoneware panels and bosses and hand-painted faience tiles for the 'Doulton' name panels (Eyles & Irving 2002, 43).

The two buildings fronting onto the Albert Embankment are shown on a Goad insurance plan of 1889 (fig 4) as the site occupied by the 'Henry Doulton & Co Terra Cotta Works'. The building to the north (referred to on several plans as 'Block A') was a five-storey building with, on the ground and first floors, 'Showrooms' and on the upper floors the 'Sanitary Engineering Works' and drawing offices. To the south ('Block B') was a seven-storey building with a boiler house and its own 120ft-high chimney. Just to the south were two large and two smaller kilns, and the 200ft-high detached chimney. The works originally manufactured terracotta, faience, tiles, stoves, fireplaces, 'vitreous fresco' and from the late 1870s onwards 'impasto ware' (Eyles 1965, 116).

The OS map of 1894–6 shows the same kiln layout as on the Goad insurance plan, but this may be wrong, as a measured plan in Lambeth Archives (LA: IV/124/1/3, 58–9) shows that by 1892 there were only three large kilns; the two smaller kilns had been replaced by a single one. The OS map of 1916 indicates ceramic production continued into the early 20th century although the premises are now referred to as 'Lambeth Pottery'. A Goad insurance plan of 1937 still shows three large kilns, but now with a single-storey structure labelled 'Ovens' around the detached chimney. The railway arches are labelled as 'Doulton & Co

Fig 3 Doulton Terra Cotta Works. a) View of the Doulton showrooms and offices on the Albert Embankment, taken from *The Builder* 2 August 1879 (courtesy of RIBA) and b) photograph of the disused buildings *c* 1950 (courtesy of the London Borough of Lambeth).

Stores', but they had in fact been leased from 1850 to Doulton for storage of clay or other safe materials, with the lease renewed in 1889 at £610 per annum (LA: IV/124/1/2, 109).

It is not known when production ended on the site; the desk-based assessment (MoLAS 2007) postulated it was soon after the 1914–18 war, certainly the lease on the arches had been given up in 1904/05 (LA: IV/124/1/19), suggesting storage was no longer required. The buildings were clearly retained as a letter to the Phoenix Assurance Co Ltd dated 23 August 1920 wanted to modify the fire insurance, it says Blocks A and B:

> were put up some 40–50 years ago in such a way as to act as an advertisement for our company and having regard to that particular object have served their purpose

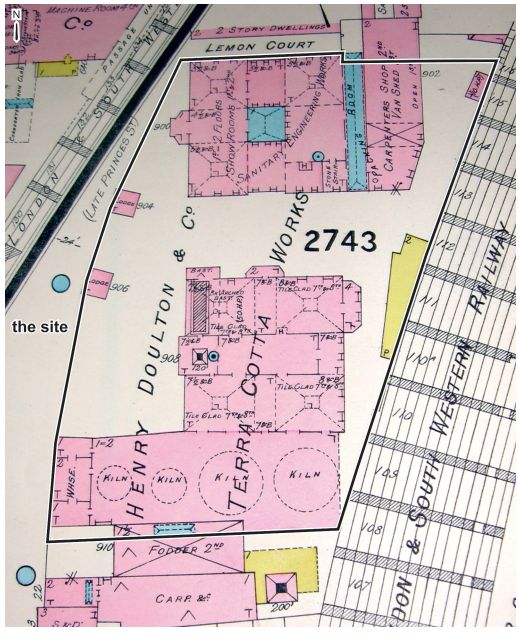

Fig 4 Doulton Terra Cotta Works. Goad's fire insurance plan of 1889.

very well. This, however, entailed a considerable extra expense in the erection of the premises, and the premises themselves, having regard to present day business conditions, are far from suitable for our, or, for the matter of that we believe any other business (LA: IV/124/1/20)

Another memo from R W B Buckland, dated 3 September 1920, says they were 'now insured against fire sufficient to re-erect a less ornate building on the site, which would be of greater commercial value'.

Doulton continued leasing the works: there was a lease of 35 years from 1891 for £1000 per annum followed by another for a further 12½ years that would take it up to June 1939 (LA: IV/124/1/3, 58–9). At present, there is no evidence for use of the terracotta works during the Second World War, although Doulton was producing laboratory porcelain vital for the war effort at the nearby art studios (Eyles & Irvine 2002, 235).

On the OS map of 1950 the Block A and B buildings remain but the area of the kilns is marked as 'ruin' and the terraced houses to the south have now been cleared, as several were indicated as severely damaged on the London County Council Bomb Damage Maps (Saunders 2005, sheet 89). The Doulton Company finally closed down all its operations in Lambeth in 1956, and the Block A and B buildings were demolished soon after, although the Doulton offices on Black Prince Road have survived to the present day. Hampton House was designed in 1958–9 by Frederick Gibberd and was erected by Wates Ltd.

Archaeological results

EARLY LAND USE

The earliest periods of land use (not reported in detail here) were natural deposits (OA1) and several 18th century brick buildings that were probably part of the Randall and Suter starch works. In the 19th century, a building (B3; fig 5), comprising a red and yellow brick wall built on concrete footings, was rebuilt on exactly the same footprint sometime later in the 19th century. This building was infilled with two distinct demolition dumps; the lower had seven

sherds of pottery (7 ENV, 1061g), dated broadly to *c* 1830–1900 by the presence of English stoneware with Bristol glaze (ENGS BRST). The finds are principally a mix of stonewares made at Doulton's pothouse and of tin-glazed ware wasters from earlier production in the vicinity and are residual. This building clearly pre-dated the Terra Cotta Works built in 1876–7, as a flue (S6; fig 5) had to be built around it.

Site preparation (Open Area 3)

In some areas of the site, demolition and make-up dumps were found below the surviving structures that comprised the Terra Cotta Works. These were 0.70–1.0m thick and often burnt red showing they had been subjected to intense heat. These dumps appear to be a combination of remains of demolished earlier structures and material brought to the site from other Doulton production sites. They include fragments of kiln furniture, such as kiln shelving, kiln props, trivets and a saggar, three decorated wall tiles (fig 30, <T 40>) and a biscuit-fired example (fig 31, <T 44>), the latter no earlier than 1891. A few pieces of salt-glazed drainpipe, manufactured from 1845 onwards, are also present. Some of the deposits in OA3 were poorly sealed and disturbed by later activity, which accounts for the recovery of a few finds dated after 1871.

Another dump included terracotta (fig 18, <T 11>; fig 19, <T 15>) and faience mouldings, part of a terracotta plaque (fig 21, <T 21>), plain glazed and biscuit-fired floor tile, decorated glazed (fig 30, <T 36>, <T 37>) and biscuit-fired wall tile, some stamped DOULTON. The latter are 1891 or later in date. Also present are firebricks stamped COWEN and STEPHENSON and stoneware drainage pipes. Many of the terracotta mouldings are smoke blackened, indicating that they came from a standing building rather than representing waste material from a kiln. The same may be true of a fragment of fine white marble, which may be a bathroom or kitchen fitting.

The kiln furniture includes saggars, rectangular setters similar to those used in the demolition of kiln Structure 10 at the Doulton's stoneware pothouse (Whittingham 2005b, 40, fig 45), and trivets. There are also various fragments of kiln shelving including examples pierced by round holes. Similar pierced fireclay slabs were recovered from the demolition of kiln Structure 11 at the stoneware pothouse (*ibid*, 38, fig 41).

A large quantity of pottery was recovered from OA3 (190 sherds, 121 ENV, 6973g). These include a high proportion of stoneware that was probably made in the Doulton pothouse (61% of all sherds), certainly after *c* 1830 (as shown by the presence of ENGS BRST) as well as up to and after the 1870s. This is confirmed by the presence of forms included in the Doulton and Watts 1873 price list (Green 1999, 366). The remaining pottery mainly represents domestic usage, but also includes tin-glazed ware that could have been derived from earlier production in the vicinity.

The presence of the biscuit-fired wall tiles, stamped DOULTON and dated 1891 or later, probably date the later phase of activity at the Terra Cotta Works (see below) to the very late 19th century and must be intrusive here.

THE DOULTON TERRA COTTA WORKS: OFFICES 'BLOCK B'

Part of the large brick-built offices of the Terra Cotta Works (B4; fig 5), referred to as 'Block B' on several plans, was investigated. A ground plan of the foundation walls with some internal room divisions was recorded as Building 4, although the presence of asbestos in some areas curtailed detailed recording. It was constructed mainly of yellow London stock bricks, probably from north Kent or south Essex. Inside the building there were at least six rooms (labelled A to F; fig 5). In several areas brick floors were recorded at a variety of levels; the highest being 3.50m OD in Room F and the lowest 2.72m OD in Room A.

The east wall included sharp-edged red bricks with fairly deep frogs in both top and bottom faces and the sills of four windows still survived. An inclined ramp led down to a

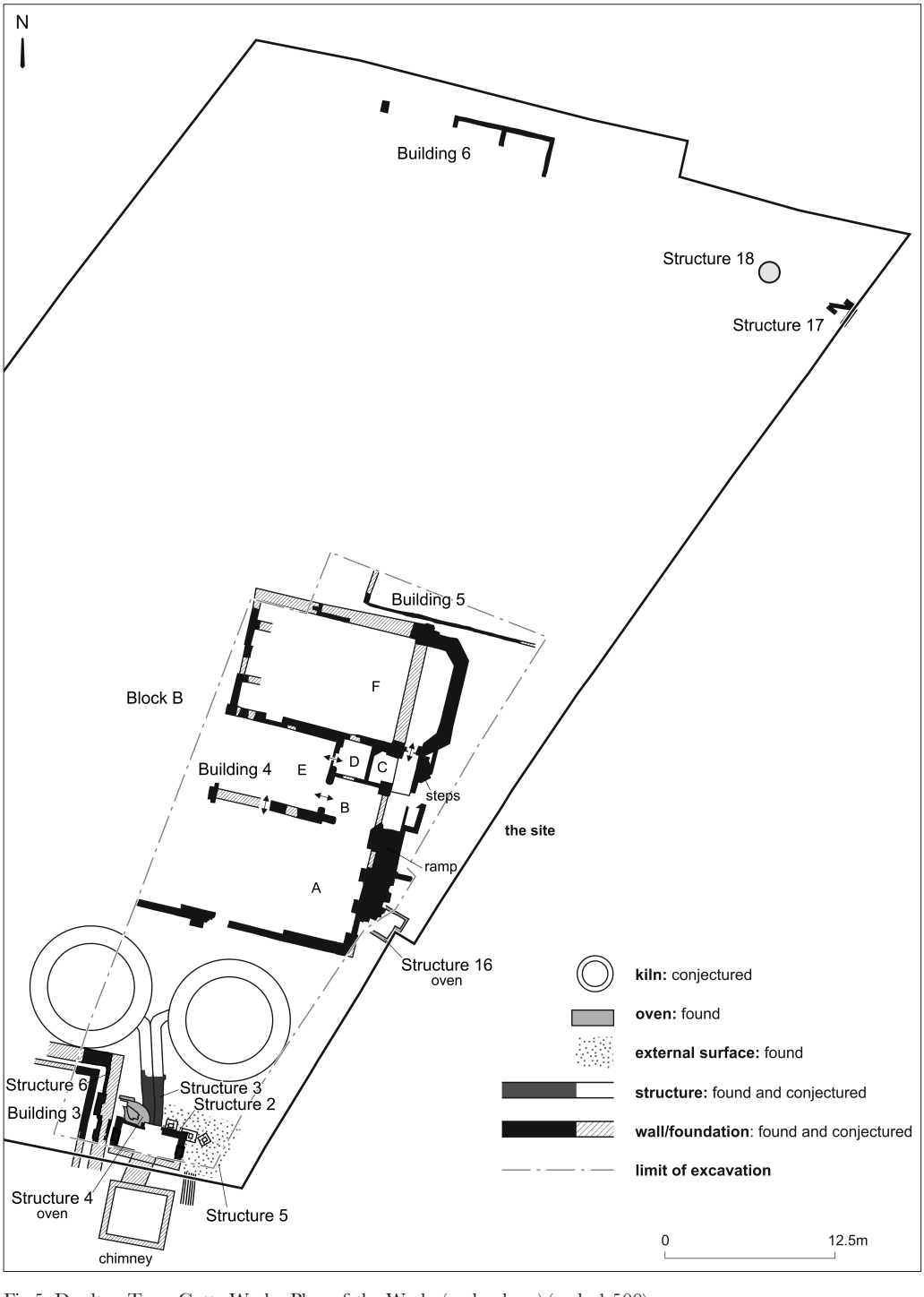

Fig 5 Doulton Terra Cotta Works. Plan of the Works (early phase) (scale 1:500).

flat area in front of a doorway into Room F. The ramp was constructed of grey engineering paving bricks, with an unusual 'bow tie'-shaped frog and were produced at Doulton's Rowley Regis factory near Birmingham after 1889. As this feature is seen only on the 1914 OS map, the ramp appears to have been an early 20th century addition. A set of brick steps was also located next to this door. At some time the south wall of Building 4 had been modified, with a section that contained four bricked-up circular holes where flues had once exited Room A (fig 10).

There are no indications as to the use of these rooms within the demolished building foundations. Various processes would have been carried out in the making of terracottas and tiles in this building and it is assumed that the indoor processes would have included throwing the clay on a wheel or pressing the clay slabs into tiles, drying, modelling of terracottas, decorating and glazing. With various floors to this building, it is difficult to know what processes were carried out on which level, but it can be presumed that these lower rooms were associated with clay being brought into the premises, possibly on carts using the ramped access and also possibly as drying areas and storage before being moved to the kiln for firing. The bricked-up flues exiting Room A imply that some heat source or fumes required venting from this building, and were possibly associated with drying areas.

In a biography of Sir Henry Doulton, written by his friend Edmund Gosse (Gosse 1970), there is an account describing how Doulton accompanied visitors on a tour of the Lambeth works. These may not have been the Terra Cotta Works, but are of interest in showing how and where some of the various processes took place. First he would 'take the party out into the yard where cartfulls of raw clay and other ingredients were deposited. Then to the grinding by machinery which reduced the material to a uniform texture, then they watched the 'wedging' of the clay by boys whose business it was to see all the air all pressed out [...] The next process to see was a man throwing the clay on the wheel and afterwards turn it to a true face with a lathe' (Gosse 1970, 109). The tour culminated in the studios, devoted to the decoration of the partially dried ware on its way to the kiln. By 1881 the number of skilled young women decorating and modelling had exceeded 200. 'In each room six to ten girls were employed under the supervision of an artist, who was herself occupied with decorated work of a higher and more independent order' (*ibid*).

Demolition deposits associated with the demolition of 'Block B' in the 1950s filled the basements and ramp associated with Buildings 4 and 6 (OA4). These contained a large quantity of material of mixed date. A large number of the terracotta and faience mouldings, fireplace mouldings, blue-glazed and biscuit-fired wall tile moulding were found in these demolition fills alongside firebricks stamped COWEN, STARWORKS/J*D/GLENBOIG and VC(or G?)C (fig 16).

A total of 43 sherds of pottery (28 ENV, 2884g) were recovered from these demolition deposits (OA4). As in other parts of the site, they consist of a mix of domestic waste and stonewares probably produced by Doulton, dating after 1830, and including types illustrated in the Doulton and Watts 1873 price list.

To the north of Building 4, there was an east–west yellow brick wall , over 3.0m long, that appears to be from another 19th century building or basement (B5; fig 5). The remains of another building (B6; fig 5) found in the watching brief were part of the 'Block A' showrooms. Both of these buildings had been severely truncated by the later construction of Hampton House. Both Buildings 4 and 6 appear on the Goad plan of 1889 (fig 4).

THE DOULTON TERRA COTTA WORKS: THE KILNS

Introduction

The kilns associated with the Terra Cotta Works were located outside and to the south of the offices/studios in 'Block B' (B4; fig 5) where presumably they formed less of a fire hazard. The numerous flues associated with these kilns seem to fall into two main phases of activity.

Fig 6 Doulton Terra Cotta Works. Overhead view of the site showing the kilns and the network of flues located outside Building 4 looking east.

The earliest phase was represented by a small brick-built structure (S2; fig 5) and double flues (S3; fig 5) associated with kilns that have been removed by later activity and three possible ovens (S4, S6 and S16; fig 5). The latest phase comprises two downdraught kilns (S7 and S8), and flues (S9–15; fig 10). The site has been heavily truncated down to the level of the kiln floors removing all traces of external walls, firing chambers and evidence of fireboxes (fig 6). The bricks and firebricks, which were used to construct the majority of the structures and kilns on site, are discussed separately.

Within the lifetime of the Terra Cotta Works it is evident that the kiln structures and associated flues were altered and modified regularly and that structural elements such as firebricks and kiln shelves were used repeatedly in different locations. The historic mapping, such as the OS map of 1894–6 and the Goad plan of 1889, show different arrangements of kilns to a plan of 1892 found in the Lambeth Archives (LA: IV/124/1/3, 58–9) and the Goad plan of 1937. The archaeological evidence shows that various phases of kiln structures and flues were modified and rebuilt on different alignments, although the re-use of firebricks and kiln shelving in these structures makes it difficult to be precise about their construction dates. What can be established is the sequence of these alterations.

Kilns – early phase (fig 5)

Vaulted brick structure (S2)

At the southern end of the site is a rectangular vaulted brick structure (S2; fig 5) of uncertain function. It was constructed of a mix of yellow London stock bricks and firebricks stamped COWEN. This was a small, but deep structure measuring 5.20m east–west x 2.20m north–south x 1.60m deep with a floor at 3.07m OD.

Fig 7 Doulton Terra Cotta Works. View of the double flues (Structure 3) looking south (0.5m scale).

Double arched brick flue (S3)

The north wall had an opening for a set of flues (S3; fig 5). In the east and west walls there were arched openings showing that at one time flues came into this structure. However, no evidence of these flues survived, presumably having been truncated by later activity, the arches then being bricked up. Although obscured by a later structure, there must have been an opening in the south wall that linked it with the large chimney known to be located a short distance to the south. This structure appears to be part of the chimney with hot air and fumes entering it from the kilns before exiting towards the chimney.

Sixteen sherds of pottery (13 ENV, 1759g) were recovered from the backfill of Structure 2, certainly dating after *c* 1830 and most likely after *c* 1870, based on forms listed in the Doulton and Watts 1873 price list.

A double brick flue (S3; fig 5, fig 7), probably serving kilns for which no structural evidence survived, led into the north wall of Structure 2. This included dark red London-made bricks with what appears to be the letter T in the base of each frog. The T probably represents the name of the brickmaker or the name of the brickworks. The western flue was 3.60m north–south x 0.60m east–west, and internally was 1.0m high x 0.32m wide. The eastern flue was 3.80m north–south x 0.60m east–west, and internally was 1.0m high x 0.45m wide.

Oven (S4)

A small brick structure, possibly an oven (S4; fig 5, fig 8), was built onto the north-west corner of Structure 2. This comprised a brick wall and central oval-shaped pedestal floor surviving up to 4.66m OD around which ran two small flues. Although truncated by later activity to the west an area of burnt floor was probably the firebox. The pedestal structure incorporated square and rectangular firebricks stamped COWEN. The flues sloped up to the full height

Fig 8 Doulton Terra Cotta Works. View of possible oven (S 4) built onto Structure 2, looking north (0.5m scale).

of the pedestal and led into what may have been the interior floor of a kiln made up of kiln shelves (type 3) re-used as kiln flooring. Although this flooring was laid over the northern wall of Structure 2, the two structures could have functioned together with hot air/fumes being drawn into Structure 2 towards the chimney. From the demolition backfill of this structure is a fragment of kiln shelving/flooring, a plain bluish-green tile and a fragment of shaped fireclay of uncertain purpose. The wall tile, lettered DOULTON on the base, has glaze over the broken edge and is clearly a kiln waster. Three fragments of salt-glazed drainpipe are also present.

Five sherds of pottery (5 ENV, 554g) were found in the possible oven, all stoneware, including ENGS BRST, so post-dating the 1830s, and including forms made after the 1870s.

Oven (S5)

Another possible oven (S5; fig 5, fig 9) was built against the north and east walls of Structure 2 (fig 9); however, there was no evidence that the two structures functioned together. This structure had a thick floor comprising two slabs of fireclay each 60mm thick over a third lower slab that was 80mm thick. The fireclay slabs had a series of holes running through the middle that would have aided the firing at the fireclay factory. Identical fireclay slabs were recovered from the demolition of a kiln at Doulton's stoneware pothouse that dated to the 1890s, where they are described as 'rectangular pierced shelves' (Whittingham 2005b, 38, fig 41). Underneath this floor were three flues that continued above the floor as rectangular brick 'boxes' measuring 1.18m long x 0.78m wide, 0.76m long x 0.72m wide and 0.78m long x 0.64m wide and all survived to 0.95m high. The flues were coated in a vitrified layer and were traced as far as the south-east corner of the site, presumably heading towards a chimney. The function of this structure is obscure; possibly it was an oven with an upper

Fig 9 Doulton Terra Cotta Works. View of floor of Structure 5 with one of three flues found below it and one of the three brick structures built on it, looking south (0.5m scale).

brick floor that has been been lost through truncation with the three flues removing waste hot air/fumes from it.

Arched brick flue (S6)

An arched brick flue (S6, fig 5) was built with a right angle to allow it to go around the existing Building 3. The total length recorded was 8.50m and the highest survival was at 4.59m OD. The flue incorporated voussoir bricks stamped COWEN and STARWORKS/ J*D/GLENBOIG. The latter gives a reliable date for the flue as the Starworks was only in operation between 1872 and 1882. Presumably this flue is from a kiln further to the west but not seen because of later truncation and is then heading towards the chimney.

A further three structures were found during the watching brief. Structure 16 was built directly against the viaduct, showing space was limited on the site. This was 2.30m long x 1.90m wide and constructed of firebricks. The upper parts of the northern and southern walls had traces of an arch, suggesting it once had a domed roof so was probably an oven. The west side appears to have been truncated by the ramp that was added to the east side of Building 4.

Also built against the viaduct was Structure 17, which comprised the remains of a brick floor and a wall. This matches a small structure on the Goad map labelled 'ENG', so was probably an engine shed that helped pump water from a nearby well. This well, Structure 18, was 1.65m in diameter and was over 6m deep and still had pipes *in situ* when found. Clearly, the Terra Cotta Works had its own water supply.

Kilns – later phase (fig 10)

Downdraught kilns (S7, S8)

Two downdraught kilns (S7 and S8; fig 10) were of a conventional plan whereby the heat is drawn up the inside of the kiln from fireboxes around its outer wall, into the centre and then down to ground level and out of the kiln via a central substructural flue and away to a chimney (fig 11). The air flow and draught of air could be controlled by a damper (fig 13) in the flue that increased or decreased the air flow by the extent to which it was open and therefore controlled the temperature within the coal-fired kiln. Specially designed kilns were essential for making good-quality terracotta. Various types of downdraught and muffle kilns were developed to precisely control the temperature and air supply. Terracotta was fired to a maximum temperature of between 1000 and 1259°C. Each firm had its own method of firing, but generally the temperature was increased over 8–12 days, then the kiln was allowed to cool for a further 2 days (Stratton 1986, 209–11).

The eastern kiln (S7)

The eastern kiln floor and base (S7; fig 10, fig 12) survived to its full diameter of 7.25m. The lowest part of the structure was made up of vitrified firebricks and stamped COWEN firebricks at 4.00m OD. An outer brick wall, also built with stamped COWEN firebricks, and surviving to 4.58m OD surrounded this. An arched brick flue constructed of COWEN and STEPHENSON firebricks, the latter probably no earlier than 1880, divided the kiln structure into east and west sections that were constructed differently. To the east large kiln bricks laid on end formed a sub-floor at 4.43m OD, above this a floor of fireclay slabs was laid with the highest surviving at 4.56m OD. To the west both stamped COWEN and HARPER/MOORES/STOURBRIDGE firebrick and unstamped firebricks were present. These formed a sub-floor above which was laid a floor of large rectangular fireclay slabs, the highest survival being at 4.55m OD (fig 12). As this was a downdraught kiln, hot air and fumes were removed through a series of vents into the central flue to an external chimney; it is clear that later truncation has removed the outer fireboxes that would have supplied the heat to fire the kiln.

Sealing this kiln there were some demolition deposits that included a number of terracotta and faience mouldings, two parts of a terracotta panel (fig 20, <T 18>, <T 19>), decorated (fig 29 <T 30>) and plain glazed wall tile and what appears to be machine-made roofing tile. There are also DOULTON stamped biscuit-fired wall tiles no earlier than 1891 in date. A cylindrical shaped, partly burnt, piece of sandstone would have been used as a kiln wedge. Salt-glazed drainpipe was also present.

Other finds included 33 sherds of pottery (27 ENV, 1077g), with a high proportion of ENGS BRST, as well as tin-glazed wares and factory-made refined earthenwares. A date in the 1870s or later seems most likely.

The western kiln (S8)

This second kiln base (S8; fig 10) , with a diameter of 9.0m, was constructed at the lowest point (3.90m OD) with a layer of firebricks that included stamped STARWORKS/J*D/GLENBOIG examples (fig 16, <T 3>) dating to 1872–82. The firebricks were stacked in layers separated by fine sand fired white by the high temperatures reached in this kiln. Above this was a floor at 4.06m OD with evidence of columns or stacks that once supported a floor that had collapsed as far as an inner brick wall. The collapsed material included a large fireclay slab with a thick layer of brown vitrification and a square stamped COWEN firebrick with the letter D below. This floor area was surrounded by an outer ring of concrete and burnt bricks at 4.53m OD that must have been where the fireboxes once stood. Again this was a downdraught kiln but the difference in construction with the suspended floor of

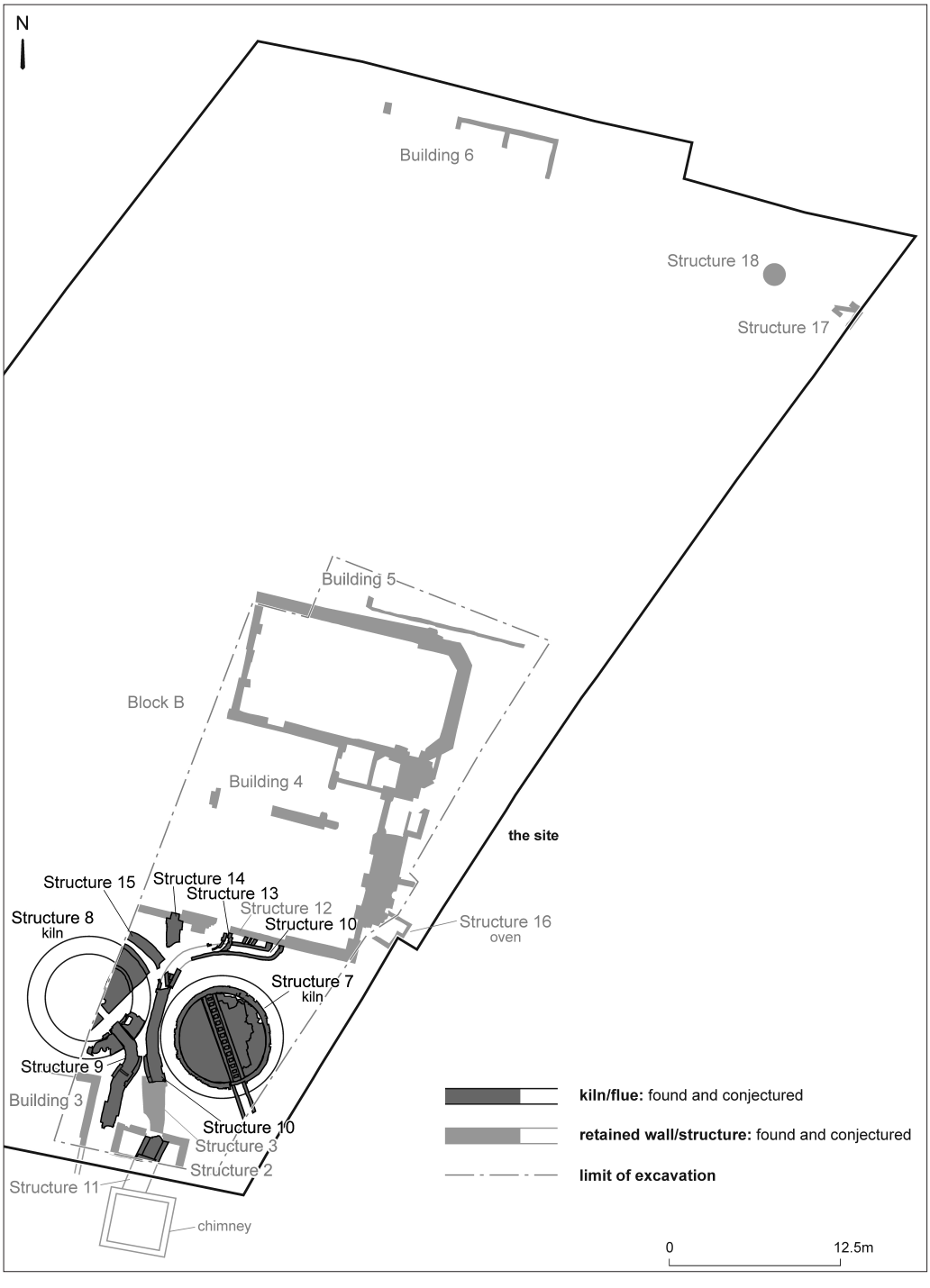

Fig 10 Doulton Terra Cotta Works. Plan of the works (later phase) (scale 1:500).

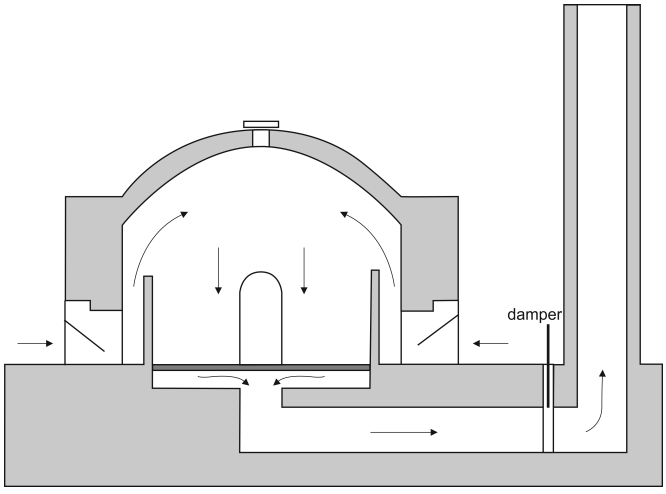

Fig 11 Doulton Terra Cotta Works. Cross-section through a typical downdraught kiln showing the passage of air drawn out through the chimney and the position of the damper that controlled this (after Hammond 1998, 22).

Fig 12 Doulton Terra Cotta Works. View of a section through the eastern kiln (S7), looking south-west.

this kiln when compared with the Structure 7 kiln may suggest a different heating process was taking place here. Unfortunately, the extent of the collapse meant no floor vents were seen, possibly they were spread across the whole suspended floor and not in a central row as found in the Structure 7 kiln.

Arched brick flue (S9)

In a modification of the previous flue (S6; fig 5) a new alignment of arched brick flue (S9; fig 10) leads away from one of the kilns (S8; fig 10), taking the hot air/fumes away to the

Fig 13 Doulton Terra Cotta Works. View of the damper gate in Structure 9 flue (0.5m scale).

chimney further to the south (fig 10, fig 14). This flue, 7.0m long x 0.90m wide, included a gate or damper *in situ* that would have been used to regulate the flow of air from the kiln and thus the temperature. This gate comprised two sections of fireclay set in a metal frame that was lowered and raised in a simple groove built into the side walls of the flue (fig 13). Although nothing survived there must have been an above-ground mechanism to operate the damper. Found in the demolition of this flue was an 83mm-thick slab of fireclay with a groove along one edge. Some of the fireclay is burnt black, suggesting this could be another type of kiln flooring or kiln shelving.

Arched brick flue (S10)

A long brick flue (S10; fig 10) ran the length of the site between the eastern and western kilns (S7 and S8; fig 10) and linked the chimney to the south side of the site with Building 4 ('Block B' of the Terra Cotta Works). It was recorded in two sections. The southern section was an arched flue 7.0m long x 0.60m wide with the highest survival at 4.47m OD. This incorporated stamped COWEN and STEPHENSON firebricks, the latter probably no earlier than 1880. This flue joined onto the eastern flue of double flue (S3), the western flue having now been blocked up. Where the two joined, and possibly as part of this later modification, the slots for a damper gate of similar construction to that in flue S9 (fig 13) survived on each side. The northern section of the flue (S10; fig 14) survived only as two parallel walls, the highest survival was at 4.53m OD with a floor at 3.91m OD. This flue was coming from an opening in the southern wall of Building 4, showing processes were taking place inside Room A that required hot air/fumes to be extracted from the building. This section was later modified with a thin brick wall being added to divide the original flue channel into two. Demolition deposits infilling this section of the flue included biscuit-fired wall tiles lettered DOULTONS, a faience moulding and a rectangular box-shaped terracotta

Fig 14 Doulton Terra Cotta Works. View of the various modifications to the northern end of flue Structure 10 associated with the south wall of Building 4, looking west (0.5m scale).

Fig 15 Doulton Terra Cotta Works. View of flue Structure 11 inserted into disused Structure 2 to join a re-used Structure 3 flue to the chimney, looking north (0.5m scale).

moulding partly covered by a pale matt brown glaze that is numbered 17(4?)? on one face. There were also a number of biscuit-fired wall tile mouldings, biscuit-fired wall (fig 32, <T 49>) and floor tile and decorated faience (fig 23, <T 24>).

At the southern end of the site this long flue (S10) re-used part of the double arched flue (S3; fig 7, fig 10), which in turn connected to a short stretch of arched flue (S11; fig 10, fig 15) that ran through the backfilled Structure 2 and connected to the chimney. This required a roughly constructed north–south wall to be built to the west of the flue (S11; fig 15) to prevent the loose backfill falling back into the area.

Brick arched flues (S12, S13, S14, S15)

On the south wall of the workshops/offices 'Block B' (B4) there were another three flues coming out of the south wall of Building 4 (fig 10). The first, Structure 12, was a small brick flue consisting of two channels, having a brick base at 4.04m OD. This flue (S12; fig 10) led into the long flue (S10). A second flue (S13; fig 10) was 2.10m long x 0.50m wide with two parallel walls built on a floor at 3.70m OD. This new flue (S13) was built with COWEN firebricks (see fig 16) joined with the long flue (S10) cutting off the original path of flues (S10) and (S12) into 'Block B' (B4) and blocking them from further use. Further to the west a third flue (S14; fig 10) also led out of 'Block B' (B4) into the long flue (S10). This was 2.50m long x 0.80m wide and included COWEN stamped rectangular and voussoir bricks. Its brick base at 3.77m OD lay at a similar level to flues S12 and S13. Any relationship between flue S13 and flue S14 was lost by later truncation. A final change occurred when another arched brick flue (S15; fig 10) was built around the northern edge of the western kiln (S8) cutting off the long flue (S10) to the south of flues S12, S13 and S14, making them redundant. The latest flue (S15) must have been used to remove hot air/fumes from a third kiln located further to the west on the 1889 Goad plan (fig 4) and truncated by the basement of Hampton House. Its total length as found was 5.0 x 0.80m wide and included firebricks stamped COWEN and STEPHENSON (fig 16, <T 1>, <T 2>); the latter are unlikely to date before 1880.

Ceramic building material, by Ian Betts

INTRODUCTION

The demolition of Doulton's works and the reduction of the kilns to ground level during this process means that there is no reliable chronological relationship between the ceramic building materials found at this site and the remains of the kilns. The most reliable indication of the products made at the Terra Cotta Works are the examples of wasters found in terracotta, faience and tiles that provide evidence for the type of product made at this site. Some demolition material appears to contain a variety of Doulton material from across the site and also products of the stoneware pothouse, further to the north. Some fragments of faience, tiles and terracotta are likely to be from the facade and interior of the Doulton offices and showrooms on Albert Embankment, built both as new offices but also as a showcase of the types of Doulton's architectural ceramics being made on this site.

Each category of building material is therefore discussed by category as an example of the products used in the Terra Cotta Works or produced there.

FIREBRICK

Firebricks from seven manufacturers were used on the site, principally in the two kilns (Structures 7 and 8) and associated flues. Six firebrick manufacturers can be identified by brick stamps and one further manufacturer of kiln shelving. Firebricks stamped STEPHENSON, COWEN and STARWORKS GLENBOIG are also known from Doulton's stoneware pothouse at 9 Albert Embankment and indeed the actual stamps used seem to be identical,

suggesting the stoneware and Terra Cotta Works were constructed within a relatively short period of each other. Bricks stamped COWEN are in the majority at both sites. One reason for the preference of the products of Cowen & Co is that Henry Doulton and Joseph Cowen Jnr had a successful working and business relationship (Brown 2005, 54).

Vast numbers of firebricks (refractory brick fabric 3261) were used in the kilns and flue structures found at the Terra Cotta Works. These are ideally suited for use in kilns as they were made primarily for industrial structures where they would be subject to intense heat. The extensive use of firebricks in Doulton's stoneware kilns has been discussed previously by Smith (2005, 32–6) who describes in detail their composition and origins. The use of Tyneside firebricks by London potters is also not surprising as coal to fuel the kilns was also imported into London from Tyneside (*ibid*, 34).

Cowen

The stamp refers to Joseph Cowen & Co of Blaydon-upon-Tyne who owned coalmines and firebrick plants at Blaydon Burn and Garesfield Lilley (County Durham), which operated between *c* 1823 and 1904. Various sizes of brick are present (table 1: see *Endnote*).

The letters on many COWEN stamped firebricks show various subtle differences in spacing and alignment (fig 16, <T 1>). This is rather puzzling; it is possible that, at least for certain firebricks, each letter was added individually. This would have been a laborious process, but would explain why certain letters can be slightly out of alignment with the others present. The alternative is that large numbers of near-identical stamps were employed. Because of these differences it is unclear how many stamps were used by Cowen & Co, although a square firebrick (context [88]) must have been marked with a separate stamp as it is significantly smaller than the rest. The individual letters are also notably different.

Another feature noted on some COWEN stamped firebricks is a thumb mark applied above the letter N. At first, this was thought to be accidental, but the presence of the same mark on a number of firebricks in the same position suggests it was deliberate. Perhaps it represents the signature mark of a particular maker. This would explain why not all stamped firebricks have this feature. Square firebricks marked COWEN can have a letter or number added below the stamp. The letters D and V and what may be a number 1 (or capital letter I) have been noted.

Stephenson

The Stephenson stamp (fig 16, <T 2>) probably refers to William Stephenson & Sons recorded as firebrick manufacturers at Old Throckley, Newcastle-upon-Tyne in 1880 and 1896. Two different stamps are present, perhaps representing two different batches of bricks. Three firebrick types are present: standard rectangular firebricks, voussoir firebricks and a large type of unknown form. The standard rectangular firebricks measure 235–236 x 112–117 x 61–65mm, the voussoir bricks, used in arch construction, measure 230–231 x 113–116 x 38–39 to 60–62mm, and the large incomplete firebrick of uncertain type measures over 270mm long x > 83mm wide and is 75mm thick.

Fig 16 Doulton Terra Cotta Works. Stamped firebricks used in the Doulton kilns and flues; Cowen (<T 1>), Stephenson (<T 2>), Starworks Glenboig (<T 3>) and VGC (<T 4>) (scale 1:4).

Starworks Glenboig

The firebricks have the words 'Starworks Glenboig' together with a small star and the letters J and D, the latter situated at each end of the stamp (fig 16, <T 3>). The Starworks was founded by James Dunnachie (hence the initials J D) in Glenboig, Lanarkshire in Scotland in 1872. In 1882 the fireclay works was amalgamated into the Glenboig Fireclay Works with Dunnachie as managing director. Standard size and voussoir firebricks were received from the Starworks brickyard. These measure: 232–237 x 111–114 x 62–65mm and 237 x 111–114 x 42–63mm respectively.

Lucas

A voussoir firebrick stamped LUCAS was found in unstratified material. It is uncertain whether this was used at the terracotta works, but it must have been used somewhere in the Lambeth factory. The location of the fireclay works producing bricks stamped LUCAS is currently unknown. The firebrick is 229mm long x 116mm wide x 39–59mm thick.

V(?G)C

There is only one firebrick with these letters, which measures 224 x 113 x 62mm (fig 16, <T 4>). There is a thumbprint, perhaps deliberate, to the left of the letter V. A brick stamp website (www.penmorfa.com/bricks/index.html; 7 January 2013) shows a brick stamped VGC, which may be from the same source. This is believed to be from the Victoria Garesfield colliery near Gateshead opened in 1870. Whellan's 1894 directory of County Durham mentions the production of firebrick at the colliery (www.dmm.org.uk/colliery/v002.htm; 7 January 2013).

Harper & Moores Stourbridge

Harper & Moores Firebrick Co. Ltd of Stourbridge was established at Leys Works, Brierley Hill, at Planet Works, Kingswinford, and at Green Lane Works, Kingswinford. There is only one firebrick from this manufacturer, a vitrified header from the sub-floor of kiln Structure 7. This measures *c* 316 x 158–159 x 153–156mm (not illustrated, letters very indistinct).

KILN FURNITURE

There are various fragments of kiln furniture (in fabrics 2586, 3064 near 3322, 3261, 3316, 3301, 3302, 3322), many of which have been identified at the adjacent Doulton stoneware pothouse (Whittingham 2005b). Some kiln furniture is made of fireclay, the same material used for firebricks, so it is not always certain whether these items belong under the category of kiln structure or kiln furniture. Definite kiln furniture associated with the terracotta factory include circular kiln wedges, rectangular setters, circular kiln props of various sizes, saggars and three-armed stilts. There are also various pieces of unidentified fired clay. Kiln shelves were frequently re-used and here Types 1, 2 and 3 can be seen to have been used in the floors of Structures 4, 5 and 7.

It is difficult to relate much of the kiln furniture to specific kilns, but at the stoneware pothouse solid shelves (type 1) were related to the earlier phase of production dating from the 1870s to the 1880s. Cylindrical kiln props, rolled wedges, stilts and shelf types 2 and 4 were assumed to relate to the later period of stoneware production between the 1890s and 1926 (Whittingham 2005b, 42).

Kiln shelving

Type 1: solid shelves

A large burnt fireclay slab was recovered from the floor of kiln Structure 7. This is 455mm long x 300–303mm wide x 87–89m thick. Part of what is probably a solid rectangular shelf was also present in the floor of Structure 5. This is 76mm thick.

Type 2: rectangular pierced shelves

Thick fireclay shelves pierced by holes 18mm in diameter were found in OA3 and the floor of Structure 5. One example from OA3 (context [2]) has scars marking the location of circular saggars or kiln props, one is 60mm in diameter, the other *c* 110mm. Similar shelving was used at Doulton's stoneware pothouse (Whittingham 2005, 38, fig 41).

Type 3: Solid interlocking rectangular shelves

One type of kiln shelving has protruding nibs and sunken grooves along the shelf edges (fig 17, <T 5>). This would have allowed each shelf to interlock with its neighbour. This shelving system was not recorded at the stoneware pothouse site. Nibbed and grooved shelving was found in the backfill of Structure 2, re-used in the floor of Structure 4 and in OA4. The most complete example is 192mm wide x 48mm thick. The length would have been > 222mm. Other pieces are between 48 and 60mm thick.

A small fragment of probable kiln shelving from the demolition of Building 4 (OA4), is 49mm thick and has the letters STOVE. A rectangular kiln shelf marked STOVE, although in a different style of lettering, was used in the Doulton stoneware pothouse. Here it was stated that the word STOVE may have been added as the firebrick was meant to be used as a stove back. This

Fig 17 Doulton Terra Cotta Works. Kiln shelf with protruding interlocking edge <T 5> (scale 1:4).

seems a little unlikely; it possibly represents the name of the fireclay manufacturer, although their location is unknown.

Type 4: thin shelves

There are at least two sizes of slab shelving, a larger type measuring 293–293mm wide x 26–28mm thick and a smaller type 230mm wide x 27–28mm thick. Both types were probably originally rectangular. Thin shelving was recovered from the backfilling of Structure 2 and demolition of Building 4 (OA4).

A number of thin slabs of kiln shelving have areas of green glaze. The presence of green glaze suggests the manufacture of pottery or another type of ceramic vessel, possibly green-glazed wall tiles. One shelf, from OA4, has what may be writing in the upper surface added before the block was fired and a small area of white clay attached.

Some kiln shelving found at the stoneware pothouse may have come from demolition of the terracotta works. According to Whittingham (2005b, 38) a fragment of rectangular kiln shelving associated with highly coloured glazes 'would be consistent with the firing of architectural ceramic mouldings or tiles'.

Setters

Elongated rectangular setters were recovered from the demolition of Structure 5 and in OAs 3 and 4. These are very similar in appearance to the examples from the stoneware pothouse illustrated by Whittingham (2005b, 40, fig 45). The Hampton House examples are 38–51mm wide x 12–17mm thick. Some of the setters from the demolition of Building 4 (OA4) could be circular. Circular setters were also used at the stoneware pothouse (*ibid*, 40, fig 44).

Props

Cylindrical kiln props were used to support shelves in the kiln. The more complete examples were recovered from the demolition of Building 4 (OA4) and in OA3. Table 2 (see *Endnote*) lists the size of the more complete examples. Similar props were employed at the stoneware pothouse (Whittingham 2005b, 41, fig 48).

Wedges

These are normally rolled pieces of clay that could be wedged between shelves or ceramic items in the kiln. A number were found at the stoneware pothouse (Whittingham 2005b, 41, fig 49). There are only two from the terracotta factory, a ceramic wedge from the demolition backfill of Building 4 (OA4) measuring 27 x 36mm (length >58mm), and an example cut from fine-grained sandstone from demolition above kiln Structure 7. This measures 41 x 33mm wide tapering to 33 x 26mm (length > 114mm).

Stilts

Machine-made three-armed stilts (also known as trivets) were not used in terracotta manufacture, but they may have been used in the manufacture of smaller wall and floor tiles. A rectangular kiln shelf with the remains of two stilts attached in circular pools of green glaze was found at Doulton's stoneware pothouse (Whittingham 2005b, 39, fig 42). It has been suggested that the use of trivets may relate to the firing of coloured architectural ceramics. There is no indication as to how the Terra Cotta Works examples, which all came from OA3, were used.

At least two sizes of stilt are present. The larger, with an arm length of 48mm, is numbered 7 with the letters W & S, presumably the initials of the manufacturer. The small stilt, which is more incomplete, is numbered 4 with the letters M & G. These numbers relate to stilt sizes. Similar numbered three-arm stilts were used by the 19th century pottery industry based in Tunstall, Staffordshire (Goodwin & Barker 2009, 55–6).

Saggars

There are only two definite saggars from the site; these were recovered from OA3. One has cream glaze on the inside with blobs of white glaze on the outside. This has an external diameter of 190mm (12mm thick) while the other is covered by light brown glaze. Other small curved fragments of glazed stoneware may also be saggars.

BRICK

Among the bricks present are deeply-frogged yellow London stock bricks (fabric 3035) from the south wall of Building 4 and Structure 2. They were also found as infilling in some of the terracotta blocks.

Dark red London-made bricks of 19th century date (fabric 3032) came from the rebuilt wall of Structure 2 and the twin brick flue of Structure 3. The latter have what appears to be the letter T in the base of each frog.

Engineering bricks

So-called 'blue' engineering bricks (in reality more a bluish-grey colour, fabric 3284) were manufactured at Henry Doulton's factory at Rowley Regis near Birmingham. They date from 1889 when the factory was enlarged to begin the manufacture of blue engineering bricks together with architectural terracotta, stoneware water pipes and chimney pots (Gosse 1970, 158). Production was begun principally to supply the Midland towns, but blue bricks could be transported to other areas of the country, including London, using the expanding rail network. These engineering bricks continued in production until the factory closed in 1910 (Pearson 2005, 456).

A number of frogged maroon and grey engineering bricks were recovered from Building 4 (OA4). These include two 'bullnose' bricks (Brunskill 1990, 94) with a curved end, one lettered DOULTON in the frog and a further brick with a chamfered header end. A further regular-shaped engineering brick is also stamped DOULTON.

Paving brick

Of similar bluish-grey colour, and probably from the Rowley Regis factory, is a rectangular paving brick (fabric 3284) from the loading ramp of Building 4. This has a frogged base with a groove in the top surface to create a non-slip surface. This paving brick measures 200 x 67 x 62mm.

TERRACOTTA

The majority of the architectural material found at this site was retrieved from demolition backfills of structural features; particular pieces of Doulton's architectural ceramics cannot be associated with either of the two kiln bases (S7 or S8). However, the significance of the architectural terracotta, faience and tiles lies in their attribution to Doulton's architectural ceramics department, individual artists and discovery at the site of Doulton's Terra Cotta Works. Some pieces are wasters and others come from demolition of the studios and office buildings on Albert Embankment.

Over 88 fragments of terracotta were recovered from the site, mostly from demolition dumps associated with Building 4 and Building 6 (OA4). Many of these have mortar attached and areas of external sooting, indicating use on the outside walls of a building. Doulton's headquarters building on Black Prince Road still survives richly embellished with decorative terracotta, faience and wall tiles.

The method of terracotta manufacture has been well covered elsewhere (Stratton 1986, 205–11; 1993, 31–40; van Lemmen 2002, 7–9) so only brief details are given here. The process was quite complex. Each shape was normally first modelled in clay that was then encased in plaster. When the plaster had hardened these became the moulds that could be used repeatedly to produce the same terracotta shape.

The clay used in London was principally ball-clays from Devon and Dorset; Doulton had their own clay pits near Poole, Dorset (Stratton 1986, 198). Clay was shipped along the south coast and up the Thames, where it was directly unloaded from boats to Doulton's riverside works. Grinding, screening, plugging and mixing were needed to work the clay into the required composition and consistency.

Each mould had its surfaces lined with strips of clay around 20–34mm thick, which resulted in one or two large hollow chambers. These chambers were necessary to ensure an even firing temperature and reduce the weight of each block. When the block was used in a building these chambers would have been filled with mortar and, in the case of some of the Hampton House examples, fragments of broken brick.

Numerous fingermarks on the inside of each chamber show where clay was pushed into the details of the plaster mould. Cross-pieces called straps were placed in the hollow chambers where necessary to provide rigidity. The larger terracotta blocks made by Doulton often have one strap to produce two hollow chambers.

After removal from the plaster mould each block would have been cut and trimmed to shape. It was at this stage that the holes seen in the sides of many terracotta blocks were added as well as those in the cross-pieces. Combed keying was often applied to the outside and acted as keying for the mortar used to attach each block. The next stages were drying, then firing.

Among the terracotta mouldings that can be identified are string courses, window mullions, plain columns and the tops of various decorated capitals (fig 18, <T 6>–<T 12>;

fig 19, <T 13>–<T 16>). There is also part of a heavily soot-blackened animal's head from a demolition dump in Building 4 (OA4) (fig 19, <T 17>). This is probably part of a winged grotesque similar to those found installed adjacent to the upper windows and on the roof of

Fig 18 Doulton Terra Cotta Works. Terracotta mouldings; capitals (<T 6>, <T 7>, <T 8>, <T 9>), ring shaft <T 10>, possible terminal (<T 11>) and string course <T 12> (scale 1:4, except <T 12> scale 1:8).

the headquarters building in Black Prince Road. Also present is a large terracotta medallion (fig 19, <T 15>) and what may be a decorative terminal (fig 18, <T 11>). Various terracotta terminals, medallion mouldings, plain and decorated string-course mouldings and decorated

Fig 19 Doulton Terra Cotta Works. Terracotta mouldings; string courses (<T 13>–<T 14>), medallion (<T 15>), window moulding (<T 16>) and probable winged grotesque (<T 17>) (scale 1:8, except <T 14> and <T 17> scale 1:4).

capitals are illustrated in a price list of Doulton products dated August 1903 (Doulton 1903, 66-4, 66-9, 66-10, 66-112, 66-120, 80-137). Two part-complete decorated capitals (fig 18, <T 6>) may be from a balustrade similar to those used on the headquarters building.

The more elaborate acanthus leaf capital (fig 18, <T 9>) is from a decorative window surround where it would have been used with two plain brown glazed columns separated by a decorated shaft ring (fig 18, <T 10>). A similar decorative arrangement is present on the headquarters building. This building also has a horizontal string course decorated with acanthus leaves. Part of an identical moulding was recovered (fig 18, <T 12>; fig 19, <T 13>). The site also produced pieces of window moulding (fig 19, <T 16>) and what may be part of a vertical column from a blind arcade on the corner of the building.

The same moulding could have been produced in pink (fig 18, <T 12>) or cream (fig 19, <T 13>). The headquarters building used alternating pink and cream terracotta for maximum decorative effect (fig 24). Other less prominent parts of the building employed only pink terracotta.

A number of mouldings have numbers or lettering in their outer side faces: noted are A E, D and 3.6 R (fig 19, <T 16>). These are some kind of manufacturing mark, but it is uncertain what they represent. A box-like piece of terracotta with a pale matt brown glaze surface from the demolition of Structure 10 has what appears to be the number 17(4?)? on one side.

Terracotta panel

Of particular interest from Hampton House are two parts of a decorated panel showing what appears to be a harbour scene with a lighthouse (fig 20, <T 18>) and what may be the stern of a ship (fig 20, <T 19>). This has mortar on the broken edge suggesting it was not used on a building but instead may represent a product of the Terra Cotta Works, which was broken and discarded on the site. This may be the work of George Tinworth, who often worked in pinkish fired clay (fabric 3318) similar to that used for this plaque. Tinworth began work for Doulton in 1867 and soon made his name as an outstanding modeller. This culminated in 1883 in a one-man show of his work on the walls of a gallery in Conduit Street (Gosse 1970, 119). His particular speciality was highly modelled terracotta panels showing biblical scenes that are found in churches throughout Britain (van Lemmen, 2002, 20). The terracotta plaque from the site is not quite up to the same standard as many of his biblical plaques (Gosse 1883), but it does share the same fine detail and moulded decoration in high relief. Tinworth's prestigious output includes the terracotta tympanum, showing Henry Doulton visiting his factory, located over the entrance of the former Doulton offices on the corner of Black Prince Road and Lambeth High Street (Tyler 2005, 14, fig 10). It is interesting to speculate that the two fragments of terracotta panel found during the excavation could have come from a similar panel located in one of the two large Albert Embankment buildings. However, it is equally likely they were intended for a building located elsewhere, but were discarded owing to some manufacturing fault.

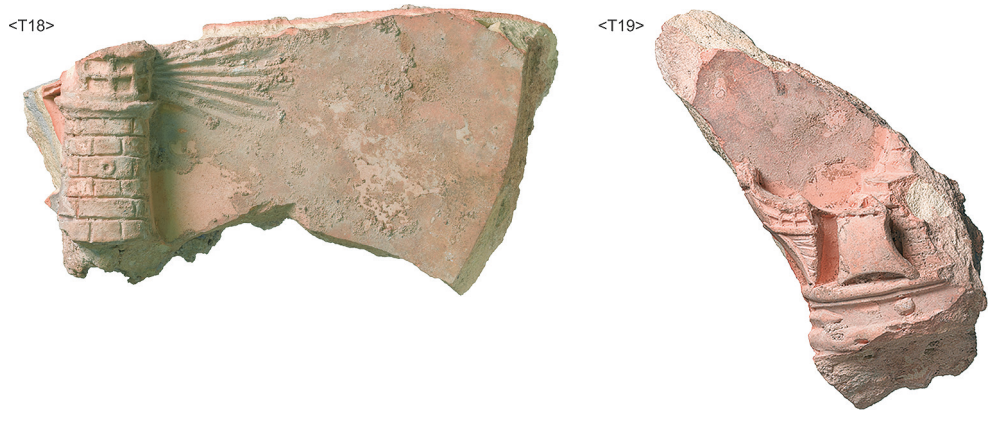

Fig 20 Doulton Terra Cotta Works. Terracotta panel portraying a harbour scene with lighthouse and ship (<T 18>, <T 19>) (scale 1:4).

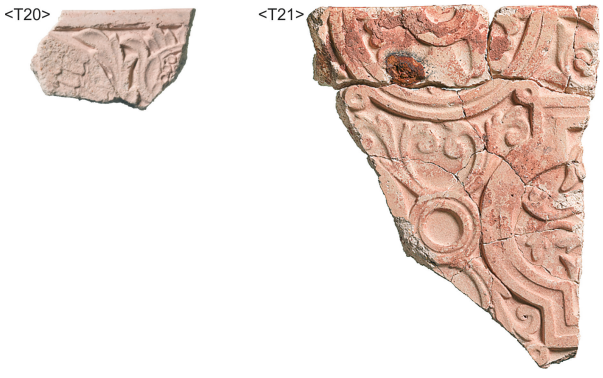

Fig 21 Doulton Terra Cotta Works. Biscuit-fired hand-carved terracotta plaque (<T 20>) and moulded terracotta plaque with interlocking circles (<T 21>) (scale 1:4).

Terracotta plaques

A design for a show card for the Lambeth Art Pottery reproduced in a December 1886 issue of Doulton's *Studio Notes* (Rose 2007, 100–6) records the manufacture of plaques, together with tiles, stoneware, terracotta for interior and exterior decoration and stoves. Parts of what appear to be three terracotta plaques were found in OA3, OA4 and from demolition material above kiln S7. All are biscuit-fired examples, which were intended to be glazed in a second firing, but possibly shattered during the first firing.

The probable plaque (fig 21, <T 20>), found associated with kiln (S7), is of exceptional quality having been hand carved. It is possible that this one-off piece is also the work of George Tinworth. Two other pieces of probable terracotta plaque were made using plaster moulds (Chris Blanchett, pers comm). One has a complex interlocking circular pattern (fig 21, <T 21>), while the other shows a small area of a leaf design.

Painted terracotta

More unusual is a fragment of terracotta (fabric 3318) with a hand-painted brown and blue floral pattern partly outlined in black in a similar manner to that used on various wall tiles (fig 22, <T 22>). The decoration is painted above a thin white engobe (slip) layer.

Fig 22 Doulton Terra Cotta Works. A decorated fragment of painted terracotta (<T 22>) (scale 1:4).

Extruded terracotta

More simple terracotta shapes could be manufactured by the extrusion method, which was introduced by Doulton around 1890. Extruded terracotta is made by forcing clay through a die as a continuous column and then cutting it with a wire into individual blocks. Doulton was the only British terracotta manufacture to use this technique (Stratton 1993, 35). A number of fragments of terracotta (fabric 3321) made by the extrusion technique were found in dumping in OA3 and the demolition of Building 4 (OA4). These can be distinguished by their smooth inside and smaller thickness (15–23mm). A finer clay (fabric 3321) was used for extruded products, which normally fired to a cream or white colour with an orange, red or brownish red fireskin. All the fragments of extruded tile seem to be of the same shape. Their purpose is uncertain, but they may have been intended to carry electrical or other types of cabling.

FAIENCE

Another name for glazed terracotta, where the glaze hides the colour of the clay, is faience. The glazed faience pieces (fabric 3317) from the site generally have decorative elements in blue, light blue, brown and white tin-glaze. These tend to be smaller in scale than the unglazed terracotta. They would have been manufactured using moulds in a similar fashion to terracotta. Initially faience was fired twice: first a biscuit firing then a second firing at a lower temperature with the glaze applied. The first firing was at a temperature of 1250–1280ºC (Eyles & Irvine 2002, 328). Single-fired faience was introduced in England in 1888 (Stratton 1993, 24). It is not certain whether this single-fired method was adopted by Doulton at Lambeth.

There are 42 pieces of faience from the site, most from demolition of Building 4 (OA4). Some are in the form of flat blocks with the decoration in raised relief and various types of vertical decorative column, one with what may be a representation of a palm tree and a small palmette (fig 23, <T 24>). There are also parts of a decorative cylindrical window

arch with light blue leaf decoration on a blue background (fig 23, <T 23>), similar to that which still exists on the former Doulton offices (fig 24). The blue-glazed flat blocks with raised leaf designs in brown have a letter B on their top surface, which is probably the initial of the designer (Chris Blanchett, pers comm) (fig 25, <T 25>, <T 26>). There are three designers of terracotta sculptures with surnames beginning with B, these being: Harry Barnard (1879–95), Arthur Beere (1877–81) and John Broad (1873–1919). Other terracotta sculptors working in the late Victorian–Edwardian period were Herbert Ellis (*c* 1877–1928), William Neatby (1890–1901), Arthur Pearce (1873–1930), F Pomeroy (?) and Francis Pope (1880–1925). Pearce played a major part in the development of hand-painted tiles and tile panels (Eyles & Irvine 2002, 186, 306–10).

The largest decorative element is a gold-painted block with an interlocking chain motif (fig 26, <T 27>). This appears to be from the top of an arch. It would have been a very expensive

Fig 23 Doulton Terra Cotta Works. Faience; glazed terracotta column from a window arch (<T 23>) and panel with palmette decoration (<T 24>) (scale 1:4).

Fig 24 Doulton Terra Cotta Works. Part of the terracotta decoration seen on the former Doulton offices (2013) on Black Prince Road is the same as used on Building 4.

Fig 25 Doulton Terra Cotta Works. Faience, part of two glazed terracotta panels with foliage, stamped with the designer's initial 'B' (<T 25>, <T 26>) (scale 1:4, details 1:2).

Fig 26 Doulton Terra Cotta Works. A terracotta block with chain link decorated in gold leaf (<T 27>) (scale 1:4).

piece of faience as the block would have been fired with a normal salt glaze and then re-fired with the best quality gold. This was applied as an amalgam of mercury and gold, the mercury being driven off during firing. The resulting dull surface was then burnished with an agate tool. For gilding, smaller muffle kilns or ovens were used, the wares being protected from the flames and smoke by an inner wall (Eyles & Irvine 2002, 328).

The lettering on the side of the gold-painted block reads HP A & G followed by a monogram. The letter G and the monogram may be the mark of George Tinworth. The use of gold would have created a similar decorative effect to the gilded Doulton stoneware set in the entrance of St Olave's House, Tooley Street, London constructed in 1932. These were designed by Frank Dobson (van Lemmen 2002, 34).

The gold-painted block is quite large (157mm wide x 70–80mm thick); Doulton spearheaded the production of larger forms of faience for commercial contracts. They advertised capitals, arches and other architectural elements for interior use (Stratton 1993, 101–2). It is possible therefore, that some of the faience made at Lambeth was also used as internal decoration.

A number of other pieces of faience have numbers or lettering in their back faces. Noted are: B, KK, NN and OO (fig 27, <T 28>, <T 29>). They probably represent some kind of manufacturing marks.

Faience fireplace mouldings

There are a number of rectangular mouldings (fabric 3318) with a brown lead-glazed surface from demolition of Building 4 (OA4). One has what appears to be the letters BN written in ink on the inside; this is probably an assembly mark. Chris Blanchett (pers comm) believes these are part of what were called 'faience fireplaces'. These probably date from the mid-1880s as Gosse (1970, 152) described the application of glaze to fireplaces and mantelpieces when exhibited by Doulton at the Manchester Exhibition of 1887 as 'very novel'. Some mouldings have rib decoration, which can be seen in various fireplace designs illustrated in an Edwardian price list (Doulton 1903, mantelpiece patterns 78, 90).

<T28>

<T29>

Fig 27 Doulton Terra Cotta Works. Examples of stamped lettering 'NN' and 'KK' on the backs of faience pieces (<T 28> and <T 29>) (scale 1:1).

TILES

A variety of floor and wall tiles are represented in the building material assemblage by biscuit-fired and waster products. In a publication of extracts from a company magazine called *Studio Notes* there is a reproduction of entries for a competition to design 'A Wall Decoration' (Rose 2007, 68–77). Of note in the ten designs submitted to issue 6 dated 6 December 1884 is the combined used of moulded terracotta blocks, glazed terracotta and painted tile. Doulton also produced mantelpieces making use of terracotta, 'Doultonware' (salt-glazed stoneware), mosaic and tiles (Atterbury & Irving 1979, 71). There was clearly a close association in the use of terracotta and tile within Doulton's architectural ceramics department and thus the biscuit-fired tiles and tiles wasters found at the Terra Cotta Works suggests that these tiles were made on these premises.

Floor tile

Glazed and biscuit-fired tile with round keying

There are a number of straight-edged floor tiles (fabric 3316), most with round keying holes 24–27mm in diameter in the tile base. The tiles vary in thickness from 18 to 24mm. A number of incomplete biscuit-fired floor tiles are rectangular in shape. They measure 76–78mm wide x 18–19mm thick. In the base is a lettered rectangular area, one starts with the word (D)OU(LTON) and the others finish with the word PATENT, suggesting the full wording is DOULTON PATENT.

There are also a number of probable square floor tiles. One biscuit example has an incomplete length/width of 134mm with a thickness of 20mm. Two floor tiles have a plain white glaze; one is clearly a waster as the glazed surface has been damaged during firing.

Square glazed floor tile

From a demolition dump (OA4) is a black-speckled turquoise-glazed fireclay floor tile (fabric 3261). This is 152mm square x 38mm thick and has a small patch of mortar on the top surface suggesting it has been re-used. The base is mostly covered by thick flinty mortar, but where this is missing there are round keying holes 32mm in diameter. The turquoise glaze shows no signs of wear suggesting it may never have been set into a floor.

Dark grey floor tile

From a demolition dump (OA4) is a worn dark grey floor tile (fabric 3284). This may be from Doulton's Rowley Regis factory near Birmingham (see above). The floor tile measures 151m square x 23mm thick.

Relief-moulded floor tile

A 42mm thick fireclay floor tile (fabric 3261) with a raised square pattern, for use as a non-slip floor surface, was recovered (OA4).

Wall tile

With the profits derived from the manufacture of terracotta, drainpipes and sanitary ware Henry Doulton set up an art pottery studio at the Lambeth factory in 1855–64 where students from Lambeth School of Art were encouraged to come and experiment with pottery and tilemaking. At first tiles were not made at Lambeth, so biscuit-fired wall tiles were supplied by other firms such as Minton & Co, Stoke-on-Trent and possibly George Woolliscroft & Sons from their Etruria and Hanley works in Staffordshire. These biscuit-fired tiles were purchased by Doulton so they could be decorated and glazed by their own workforce. Later, tiles were made at Lambeth. A number of biscuit-fired tiles from the site are labelled on the reverse DOULTONS PATENT SAFETY TILE BACK, lettering first introduced in 1891.

There are a number of different types of wall tile from the site based on decoration and keying type. Three types show hand-painted designs painted under a clear glaze. The fragmentary nature of these tiles means it is difficult to be certain how many different designs are represented.

Two watercolours by William Rowe show tile painting and production at the Lambeth factory (fig 28). More physically demanding tasks such as pressing the tile blanks were evidently carried out by men, while the painting of the tiles was often carried out by women (Eyles & Irvine 2002, 162). One woman known to have designed and decorated tiles was the talented artist Hannah Barlow. During the 1870s, Doulton also employed outside artists such as Helen Miles, the painter and book illustrator, to undertake commissions for hand-painted tiles (van Lemmen 2013, 196). A number of hand-painted tiles were found on the site.

Towards the turn of the 19th century and in the early years of the 20th century Doulton began to manufacture Art Nouveau tiles. At least one, probably more, of the Art Nouveau tiles from the site were designed by William Neatby, one of Britain's most prolific designers of Art Nouveau tile panels between 1895 and 1902 (van Lemmen 2013, 228).

Glazed tiles with horizontal rib keying

Six incomplete tiles (fabric 3316) have a series of raised horizontal ribs on the reverse. Between these ribs are the letters (fig 29, <T 30> and <T 31>:

DOULTON & Co
LAMBETH

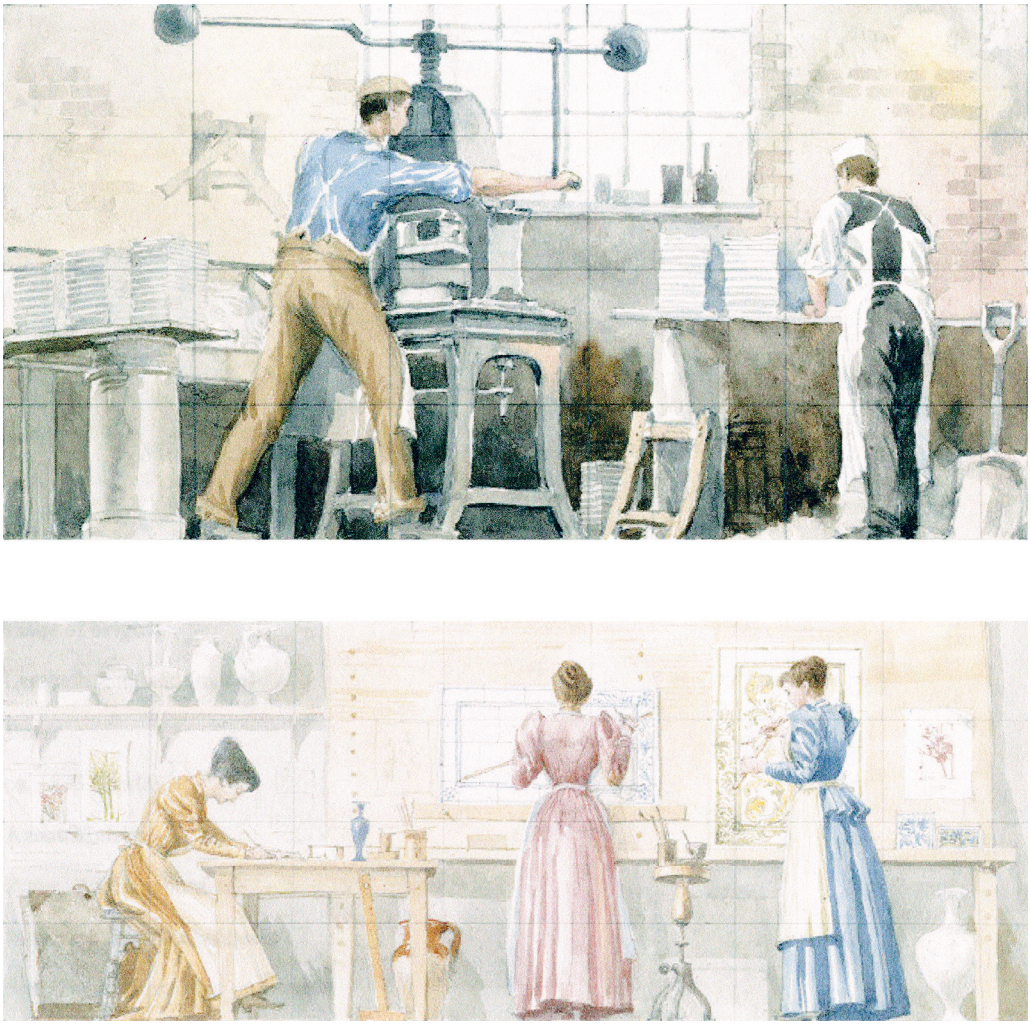

Fig 28 Doulton Terra Cotta Works. Two watercolour paintings from a series of twelve depicting the manufacturing processes at Doulton's Lambeth pottery works, Painted by William Rowe in 1893 entitled 'Tile making' and 'Painting tile panels' (© Victoria and Albert Museum, London).

Five show floral designs in brown, blue, yellow and green on a cream background (fig 29, <T 30>–<T 34>). The remaining tile shows a blue floral design on what appears to be a slightly discoloured white background (fig 29, <T 35>). One of the former (<T 32>) has a partly bloated and damaged top surface and is clearly a waster. This waster is stamped LAMBETH, confirming wall tiles were made by Doulton, perhaps in the Terra Cotta Works. Complete tiles with this design show a central flower set in a two-line border (http://www.tileheaven.co.uk/d/05248.htm; 5 November 2013). Complete tiles with what would appear to be design <T 34> show a three-leaf design with two or three detached flower petals also set in a two-line border (http://www.tileheaven.co.uk/deets/p0015.htm; 5 November 2013).

Glazed and biscuit-fired tiles with smaller square keying

The tiles with square keying (*c* 14mm square) are Minton tile blanks (fabric 3300) made in their pottery works in Stoke-on-Trent and brought to Doulton's London factory to be decorated (Chris Blanchett, pers comm). This would account for the circular black ink stamps on two tiles with the letters DOULTON (LAM) BETH (fig 30, <T 36>). As they were not made by Doultons their name could not be incorporated in the tile base during manufacture so had to be added later. Lockett (1979, 56) also states that Doulton used Craven Dunnill tile blanks, although none were found during excavation.

There are eight hand-painted wall tiles with square keying, the most complete of which are illustrated (fig

Fig 29 Doulton Terra Cotta Works. Glazed tiles with DOULTON & Co, LAMBETH backstamp (<T 30>–<T 35>) (scale 1:3).

Fig 30 Doulton Terra Cotta Works. Hand-painted tiles; <T 36>–<T 40> (scale 1:3) with detail of Doulton ink stamp on reverse of <T 36> (scale 2:1).

30). This includes tiles with a multi-coloured floral design, one of which has a Doulton ink stamp (fig 30, <T 36>–<T 37>). Four other tiles with square keying have at least two floral patterns in blue on white (fig 30, <T 39>, <T 40>), one of which is slightly blurred (<T 40>). It is possible that this is a flow-blue design where the glaze has been allowed deliberately to move to produce a slightly blurred softer decorative pattern. This tile has the remains of another (illegible) Doulton ink stamp and the letter X moulded inside one of the squares. Tile backs with the letter X moulded in the keyed base are a characteristic feature of certain Minton, Staffordshire tile blanks.

From demolition of Structure 5 are four plain white-glazed wall tiles with square keying, three of which have accidentally fused together during the firing process. One keying square has an X or K mark moulded in the base.

Glazed and biscuit-fired tiles with larger square keying

Two decorated tiles and a small number of biscuit-fired tiles (fabric 3300) are characterised by larger square keying marks (*c* 18mm square). It is not certain where these were made but they were possibly bought in from George Woolliscroft & Sons, who operated works at Etruria and Hanley in Staffordshire (Chris Blanchett, pers comm; Pearson 2005, 473–4). Doulton decorated one of these tiles with a brown, light brown and cream design dating to around 1900–05.

Unglazed relief-moulded tiles with round keying

There are the remains of seven different biscuit-fired relief-moulded wall tile designs, two of which show burning along one edge (fabric 3316). Another piece has a distorted upper surface. All these tiles were intended to be glazed, but are wasters discarded after the first biscuit firing.

Two tiles (fig 31, <T 41> and <T 42>) have more intricate designs suggesting a 1890s date. The remaining designs, which are more Art Nouveau in style, probably date to around 1900–05 (fig 31, <T 43>–<T 46>). One of these designs (<T 44>) may be the work of William James Neatby (Chris Blanchett, pers comm). A similar Art Nouveau tile by Doulton is illustrated by van Lemmen and Blanchett (1999, 6). Some of these have a bright honey-coloured glaze in the recessed areas of the pattern (http://www.tileheaven.co.uk/d/05195.htm, 5 November 2013). Neatby joined Doulton in 1890, becoming technical manager in the architectural department. His work is more closely linked with the Art Nouveau style that was becoming more fashionable *c* 1900 (van Lemmen 2002, 20–1).

Most of the decorated relief-moulded wall tiles have circular keying marks 18mm in diameter with the letters (fig 32, <T 47>–<T 48>):

DOUL
TONS
PATENT
SAFETY
TILE
BACK

The keying was made by pieces of carved rubber that were incorporated into the tile-pressing process. These rubber studs retracted from the tile when it was removed from the mould.

Two tiles with the same lettered backs were found on Doulton's stoneware pothouse, from kiln S14 dating from the 1890s and demolished by *c* 1926 (Whittingham 2005a, 43). These may have come from the same source as the examples from Hampton House, presumably the terracotta works. These tiles date from no earlier than 1891 when tiles stamped 'safety back' were first patented by Doulton (*ibid*, 48).

Relief-moulded tiles showing a flower head set in a twin circular border (fig 31, <T 45>) may represent a different batch or separate phase of production as these are lettered differently (fig 32, <T 49>):

DOUL
TONS
TILE
BACK

Fig 31 Doulton Terra Cotta Works. Relief-moulded wall tiles <T 41>–<T 46> (scale 1:3).

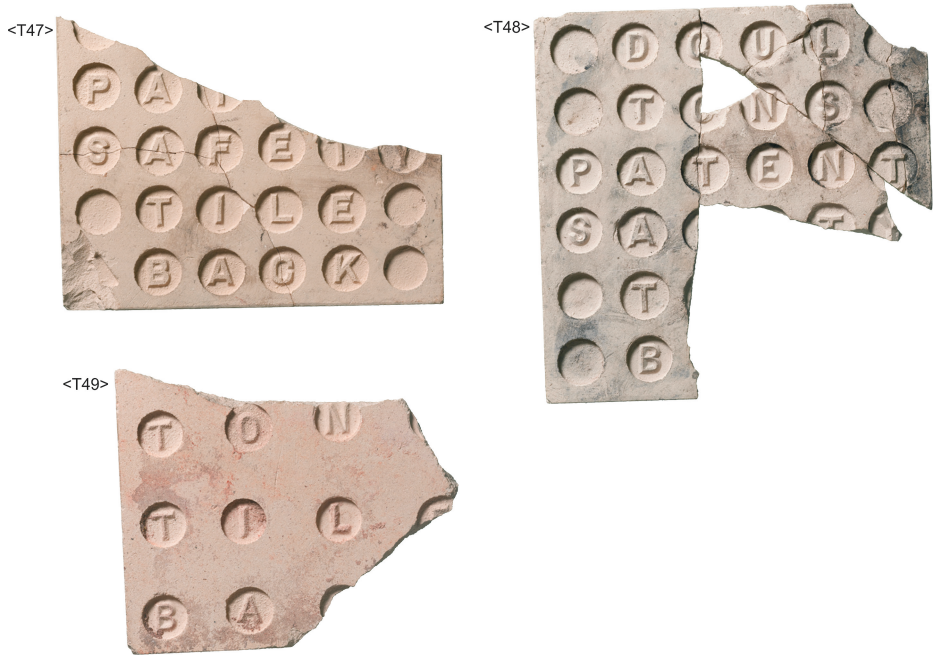

Fig 32 Doulton Terra Cotta Works. Circular keying marks on biscuit-fired plain (<T 47>–<T 48>) and relief-moulded (<T 49>) wall tiles (scale 1:3).

All circular keys have letters, the smaller number of keys being more widely spaced. These are the same size (18mm diameter) as those with the other type of lettered back. One part-complete tile would have been around 140mm (5½ inches) square (11mm thick). This seems slightly smaller than a tile with the other keying letters, which was probably *c* 150mm square (10mm thick).

A further biscuit-fired relief-moulded wall tile is slightly thicker that the rest. This has what appears to be a vertical fluted design beneath a raised semi-circular top border. This has the same size circular keying, but there is also a groove near the top edge underneath the raised border.

Plain glazed and unglazed tiles with round keying

Three square wall tiles of this type are glazed while the rest are biscuit fired (fabric 3316). The glazed tiles are plain pale cream (OA3), and plain greenish-grey (demolition of S7). Most are lettered on the back with DOULTONS PATENT SAFETY TILE BACK (fig 32, <T 47>, <T 48>). One incomplete biscuit-fired tile (OA3) is lettered on the base (not illustrated):

(TIL)E
(BA)CKP

The P is inverted at an angle of 45° to the other letters. Another tile has the letter F at the same angle. What this signifies is uncertain.

From the demolition of Structure 4 is part of a small rectangular tile (? x 39 x 10mm) with one circular keying hole lettered DOULT(ON) in the base. This has a plain bluish-green glaze covering the top and all four sides including one broken edge. This is a waster as there is a scar where the tile has attached to another tile during the firing. There is mortar on the back suggesting it could be used somewhere in the factory building, although it could not have been sold as a finished product.

Decorated relief-moulded wall tile

Inserted into the top of a terracotta block from OA4 is a square blue and pale blue tile with relief-moulded decoration (fig 33, <T 50>). The combination of moulded terracotta and glazed tiles with relief decoration can be seen with splendid effect in the entrance of St Paul's House in Leeds dating to 1878 (van Lemmen 2002, 19) and similar decorative elements are incorporated into the Doulton headquarters building of 1876–8 (fig 24).

Glazed and biscuit-fired wall tile mouldings

There are a number of glazed and biscuit-fired wall tile mouldings (fabric 3316) that were used to form raised decorative bands between wall tile panels, often in the form of a horizontal dado. Moulded tiles, similar to those found at Hampton House, can clearly be seen in a number of colour sketches of wall decoration designs submitted to Doulton's *Studio Notes* in December 1884 (Rose 2007, 72–7).

Two blue salt-glazed shallow mouldings with 25mm round keying holes were recovered from demolition of Building 4 (OA4) (fig 33, <T 51>). These tiles measure 76mm wide x 19mm thick and have brown glaze on

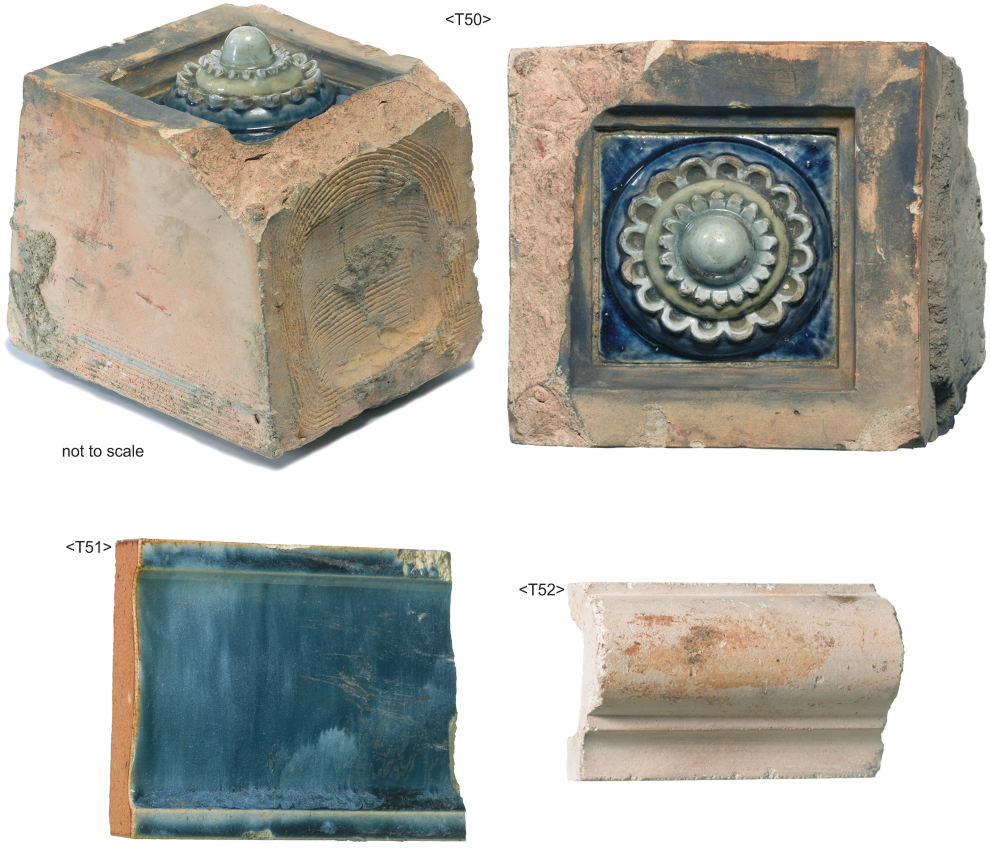

Fig 33 Doulton Terra Cotta Works. Relief-moulded tile and tile mouldings; <T 50> (scale 1:4; oblique view nts), <T 51>–<T 52> (scale 1:2).

the tile edges and base. There are also a number of biscuit-fired dust-pressed mouldings (it involved the use of specially prepared dust clay with a low moisture content, which was compacted under great force in a metal die in a large screw press: van Lemmen 2010, 17). These mouldings, which are 52mm wide x 33mm high, are hollow inside (fig 33, <T 52>).

Other plain glazed wall tile

From the demolition of Building 4 (OA4) is the corner of a 12mm-thick piece of cream stoneware with a black-glazed surface. This is not in a wall tile fabric and the back is unkeyed, but it would appear to be a wall tile (fabric 3316).

ROOF TILES

Pantile roofing

A few fragments of pantile were recovered from the site (fabrics 2275, 3202, 3259).

Pantiles were often used to cover the roofs of ancillary buildings, such as sheds, outbuildings and industrial/commercial premises. It is possible pantiles covered some of the workshop buildings at the Terra Cotta Works.

Other roofing

Fragments of flat dark red clay (fabric 3314) with a semi-circular cutaway area in one corner may be roofing tile. One fragment is lettered L? / ON. Some fragments have a blackened top surface, possibly soot deposits. These tiles were recovered from demolition of Building 4 (OA4) and kiln Structure 7.

Post-medieval pottery, by Jacqueline Pearce

INTRODUCTION

A large quantity of pottery was recovered during excavation (325 sherds, 229 ENV, 17036g), not including kiln furniture. A large proportion of this was made at the nearby Doulton pot works, with smaller quantities of ceramic waste derived from other pothouses operating in the immediate vicinity (principally stoneware and tin-glazed ware). The pottery is mixed in all features across the excavation area, and all contexts in which it was found have been given a latest date in the mid–late 19th century. In most cases, a *terminus post quem* of *c* 1830 has been recorded, based on fabric types, although a latest date in the last quarter of the 19th century is more likely on the grounds of forms. A similar pattern of disposal was observed in excavations at 12–18 Albert Embankment (Tyler 2004; Whittingham 2004).

STONEWARE PRODUCTION WASTE

English stoneware (ENGS) accounts for 59.7% of all pottery recovered from the site (55.5% ENV, 70% weight) – almost three times as many sherds as the next most common fabric type, London-area post-medieval redware (PMR: 16% SC, 18.3% ENV, 16.1% weight). There is some evidence that redwares of this kind were made at pothouses on the Albert Embankment (discussed below), but the third most common category of pottery, factory-made refined wares (13.8% SC, 14% ENV, 6.5% weight), was never produced by Doulton or any other manufacturer in this area, so must have come from consumer sites nearby. A breakdown of major fabric groups is given in table 3 (see *Endnote*). The discussion below focuses on the evidence for production, and particularly on pottery made in the Doulton pothouse; pottery that would have been used in a consumer context is treated separately, although much of the material would have been in contemporaneous use.

Stonewares with a brown salt-glazed finish (ENGS) and those with a liquid feldspathic glaze (ENGS BRST), the so-called 'Bristol' glaze, best known from its introduction at William Powell's Bristol potteries in 1835, although it was first used in London *c* 1831. These two stoneware types are the most common fabrics recorded on the site, although the former is more than twice as numerous as the latter. Salt-glazed stoneware continued in production at Fulham and other London pothouses throughout the 19th century, but after the 1860s was increasingly supplanted by 'Bristol' glaze (Green 1999, 159). Applied in a liquid state, this gave a smooth finish and pale beige colour over the stoneware body, which could be enhanced with a yellow ochre dip. The vessel forms from Hampton House largely conform to the range illustrated in Doulton and Watts' price list of 'general stoneware' for May 1873 (reproduced in Green 1999, appendix 18; Whittingham 2005a, fig 54).

OCCUPATION DEBRIS

The remaining pottery from the site was not made there, nor even in London, although it is mixed in with production waste from the Doulton pothouse. It consists principally of refined white earthenware, with either a plain white glaze (REFW) or transfer-printed decoration in underglaze blue, black or mauve (TPW2, 3 and 4). These wares provided the standard 'china' for households across the social spectrum and throughout London from the end of the 18th and throughout much of the 19th century. These are mostly tablewares and tea wares: plates, cups, jugs and mugs, decorated in popular patterns such as 'willow' and other Chinese-inspired designs. Made mostly at factories in the Midlands and North of England these wares were ubiquitous by the second quarter of the 19th century. Other refined earthenwares include yellow ware, some with mocha-type slip decoration. Sherds from a WC in industrial porcelain (contexts [25] and [7]) are decorated with a mauve transfer-printed design including bunches of grapes, possibly made at the Doulton works, well known for their sanitary wares by this date.

The pottery discarded as consumer waste was not made in the Doulton works for the most part, even though it was thrown away together with factory waste from Doulton. Whatever their source, these sherds were used together to consolidate the land for further building, an important function of discarded ceramics, especially in the vicinity of pothouses such as those that proliferated in this area of London during the 18th and 19th centuries.

Conclusions

The excavation has found a major part of the Henry Doulton Terra Cotta Works, constructed 1876–77, although the later structures tend to be dated by bricks to the 1890s. Remains found include two circular downdraught-type kilns, a series of brick flues that served these and another kiln known to have existed and the two ornate buildings that served as Doulton's offices/studios and showrooms. Previous excavations of Doulton works in the area also found downdraught kilns suggesting there was standardisation in the technology used. There was also evidence of earlier structures showing that a major reorganisation had occurred. A Goad insurance map of 1889 confirms there were at that time four kilns, two large and two smaller ones, but by 1892, only three large kilns were in operation. Smaller brick flues coming from the southern wall of Building 4 show firing processes were also taking place within that building. Although this building had a large chimney, suggesting industrial functions were taking place, clearly the use of the higher external chimney was also required. Although there were four openings, the sequence of flues found suggests no more than two were in operation at any one time. It would appear small items such as hand-decorated tiles or the production of glazed terracotta known as faience were being given a second firing at a lower temperature. Three other possible ovens that were found outside Building 4 may also have been used for this purpose.

Although the works were leased until 1939, the date when the kilns were last fired is unknown. Terracotta production had possibly ceased by the early 20th century, as by that time all the Doulton company works/pothouses at Lambeth were in decline. In 1914 non-stoneware production ended, with the stoneware pothouse closing in 1926, and this was followed by the production of drainpipes moving out of Lambeth in 1937. The Doulton Company had ceased all operations in Lambeth by 1956. The two large buildings and the kilns ('ruins' on the 1950 OS map) were demolished in the late 1950s.

Compared to the nearby stoneware pothouse excavation, the firebricks used in the Terra Cotta Works structures have a greater number of manufacturers. Overall, the majority were Cowen bricks, emphasising the strong links between Henry Doulton and Joseph Cowen Jnr of Blaydon-upon-Tyne previously noted (Tyler 2004, 52–3).

Impressive terracotta and glazed faience mouldings were recovered from demolition deposits, and although it is not possible to say whether these were made in the excavated kilns, they clearly derive from the facades of the buildings that were built to advertise Doulton's products. Some of their characteristic designs can be tentatively attributed to known individual artists working at the Terra Cotta Works. An impressive range of decorative tiles, some biscuit-fired, are also clearly the products of the architectural department at Doulton and are presumed to be the products of the Terra Cotta Works. Possibly these were being produced in Building 4 and required some additional firing to finish them.

Endnote

Tables 1–3 are available on the Archaeology Data Service website – http://archaeologydataservice.ac.uk. Select 'archives'; accept the terms and conditions; select 'Journals and series'; select 'Surrey Archaeological Collections', then 'volume 99'. The files are stored as supplementary material under the title of the article. Copies are also available from the Society's library at Castle Arch, Guildford GU1 3SX.

Table 4 Concordance of illustrated building material.

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<T 4>	<108>	Fig 16	<T 22>	<63>	Fig 22	<T 40>	<41>	Fig 30
<T 5>	<109>	Fig 17	<T 23>	<83>	Fig 23	<T 41>	<44>	Fig 31
<T 6>	<90>	Fig 18	<T 24>	<11>	Fig 23	<T 42>	<31>	Fig 31
<T 7>	<65>	Fig 18	<T 25>	<95>	Fig 25	<T 43>	<32>	Fig 31
<T 8>	<71>	Fig 18	<T 26>	<89>	Fig 25	<T 44>	<54>	Fig 31
<T 9>	<111>	Fig 18	<T 27>	<88>	Fig 26	<T 45>	<50>	Fig 31
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<T 11>	<58>	Fig 18	<T 29>	–	Fig 27	<T 47>	<100>	Fig 32
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<T 15>	<17>	Fig 19	<T 33>	<53>	Fig 29	<T 51>	<102>	Fig 33
<T 16>	<104>	Fig 19	<T 34>	<38>	Fig 29	<T 52>	<103>	Fig 33
<T 17>	<16>	Fig 19	<T 35>	<37>	Fig 29			
<T 18>	<85>	Fig 20	<T 36>	<34>	Fig 30			

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