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THE PROOF HOUSE AND LATER WORKS AT TOWER WHARF, HM TOWER OF LONDON: AN ARCHAEOLOGICAL INVESTIGATION

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SUMMARY

In 2010–11 MOLA (Museum of London Archaeology) were commissioned by Historic Royal Palaces to carry out archaeological work following demolition of the Tower Wharf Café at HM Tower of London. A number of brick and masonry walls were revealed which by comparison with cartographic evidence can be confidently identified as part of the late 17th-century reorganisation of the defences and construction of the Proof House. Various phases of brick building are probably associated with a small arms factory erected during the Napoleonic Wars in 1803.

A major masonry wall running north–south across the wharf was built off the existing moat wall to the Tower to defend the east end of the wharf. This wall can be seen in the earliest reliable plan of the Tower by the Board of Ordnance in 1681–2 showing the new defences as planned by Sir Bernard de Gomme. The remains of a masonry building with a series of steps leading down to two stone slab floors are part of the rebuilt Proof House that was originally built by the Ordnance Board in 1682. The Proof House was built against the moat wall and the west face of the defensive wall. A series of later brick buildings are probably part of an early 19th-century small arms factory, which can be seen depicted in the foreground of a contemporary painting by T and W Daniell. The factory incorporated the Proof House into its plan and was later used as a storehouse until its demolition in the late 19th century.

A deep brick chamber recorded under the vaults beneath the approach road to Tower Bridge was part of an existing 19th-century storm drain located between Tower Wharf and St Katherine's Dock. Part of the Victorian guardhouse was located beneath these vaults.

INTRODUCTION

Tower Wharf is located to the south side of the HM Tower of London, in the London Borough of Tower Hamlets at TQ 33705 80426. The site is bounded by Tower Bridge Approach to the east, the roadway from the East Gate to the south, an area of grass to the west and the moat wall to the north (Fig 1). The site was occupied by the Tower Wharf Café, which was built in the 1970s and extended into the arches under Tower Bridge Approach. Demolition of the existing café canopy, a kiosk and the building of a new café required archaeological monitoring as the Tower of London is a UNESCO World Heritage Site and a Scheduled Ancient Monument (Greater London No. 10).

Following the granting of Scheduled Monument Clearance (S00005149 Nov 2009), the site was excavated as a condition of planning consent (demolition of café and archaeological excavation PA/09/02342 Dec 2010). At the same time repair work on the adjacent moat wall was being carried out;

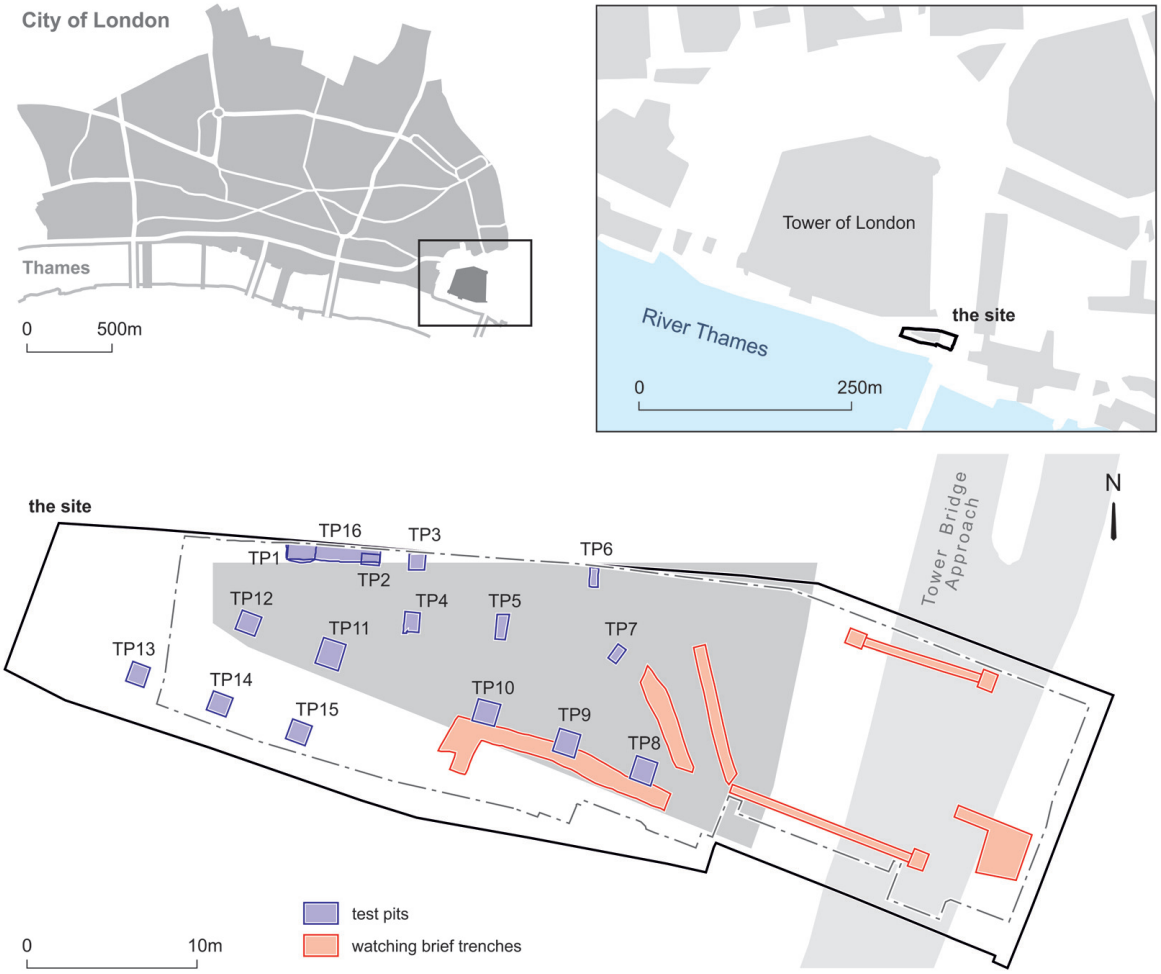

Fig 1. Location of the MOLA archaeological investigations, test pit (TP1–16) and watching brief areas at Tower Wharf 2010–11 (scale 1:500, insets 1:10,000, 1:50,000)

this involved dismantling parts of the moat wall, removing tree roots that had caused damage and rebuilding it.

Archaeological investigations (site code TOL109) were conducted in several phases between 22 February 2010 and 1 December 2011 (Fig 1). This began with ground reduction of *c.*0.35m using a small machine to remove slabs and make-up for the old café canopy. A series of 1.00m deep test pits (TP1–7) were then dug to investigate selected archaeological features. A further series of test pits (TP8–15) were investigated as a result of the 1970s concrete foundations being removed. In addition, the removal of three tree stumps by a stump grinding machine was monitored to prevent any damage taking place to nearby archaeological remains.

Later a phase of ground reduction took place for the new café foundation trenches, a new terrace area and new drainage. A strip next to the moat wall (TP16) was also reduced in order to relieve pressure on the back of the moat wall when its inner face was being dismantled and rebuilt by the stone masons. A watching brief was conducted during this work and on new drainage trenches dug within the vaults beneath Tower Bridge Approach.

During the archaeological work, all archaeological remains revealed were recorded and where necessary some deposits (usually demolition material) were removed. All upstanding archaeology was covered in geo textile (terram) before reburial beneath the new building. A small assemblage of pottery, clay tobacco pipe and accessioned finds were found but have little relevant association with

the structures reported here. Full assessment reports and identifications have been made of these finds and will be curated as part of the site archive at HM Tower of London.

The archaeological sequence is divided into periods and described in terms of land use such as Buildings (B) and Structures (S). The period definitions are specific to the site and do not directly equate to similarly numbered periods on adjacent sites. The accompanying plans (Figs 2 and 6b) illustrate the principal developments. Within the text, numbers in square brackets ([1] *etc*) refer to contexts.

HISTORICAL BACKGROUND

There are numerous studies of the Tower of London (*eg* Parnell 1983; Impey & Parnell 2006) and more recently the archaeology of the moat (Keevill 2004), but very little has been published on the development of Tower Wharf to the south of the Tower. This article will discuss the relevant material from the recent MOLA (Museum of London Archaeology) excavations which relates solely to changes in the defences and buildings found on the Tower Wharf.

The historical background of the site was set out by Graham Keevill's specification (2009, section 2.2) and can be summarised here as follows:

> Although the building of a 'King's Quay' is mentioned at this location from as early as 1228, this does not relate to the structure of the wharf itself. The origins of the existing structure date from the 1270s, when a short length of quay (a timber structure) was built out from the south-west flank of the Lion Tower as far east as the Byward Tower. In 1338 an earth and timber wall was built between the 'Watergate' (presumably St Thomas's Tower) and the 'Postern beneath the King's mint', that is the Byward Postern (Allen Brown & Colvin 1963, 726–7). This may have been a dam associated with water management but forms a precursor to the extension of the wharf along this route later in the century.

Construction of the wharf expanded rapidly from the 1360s. In 1365–6 work began on stonework for the wharf with large quantities of Kentish ashlar, ragstone, chalk and lime being bought for the purpose. In 1369 payment was made to ditchers for 'making a certain ditch for the wharf' (Keevill 2009, section 2.2) which may be a reference to digging away the former foreshore from the base of the outer curtain wall making a more effective moat between the outer curtain wall and the wharf. The final construction phase of the wharf was commissioned in 1389 with a contract to build 'a wharf with two side walls' in stone extending 'from the corner of the east end of the wall of the Tower facing St Katherine's as far as the watergate of the said Tower' (*ibid*).

By 1400 a group of buildings had been constructed at the eastern end of the wharf and these were to survive in one form or another until at least 1874, latterly being used as storage and workshop space by the Board of Ordnance. By 1898 the wharf had been cleared of buildings (Parnell 1998, 60). Alterations to the defences and the various buildings constructed on the wharf after the 17th century are documented in several historical sources, which will be referred to in the following discussion where they relate to the archaeological structures found.

The area occupied by the café canopy was open ground during the 20th century, with a mixture of concrete paving, grass and late 19th-century tree planting. To the east, Tower Bridge was constructed during 1886–94.

ARCHAEOLOGICAL BACKGROUND

Previous archaeological interventions within the area of Tower Wharf have taken place intermittently and on a small scale, consisting of watching briefs, plus monitoring the excavation of trial pits, and drilling of boreholes. However, these investigations have confirmed the later medieval date of the first wharf wall, the industrial usage of the wharf, and that the 19th-century and earlier buildings survive at shallow depths below the existing ground surface. The ground level of the site before the redevelopment started was situated at *c*.5.2m OD.

The vaults under Tower Bridge Approach on the north side of the East Gate were converted into a café in 1971–2, with an external canopy with concrete foundation pads and

associated drainage. Ground investigations in the form of boreholes and one trial pit dug during the construction of the café canopy revealed an accumulation of between 2.4m and 5.2m of brick rubble sloping down towards the river, which is probably infill related to the various phases of Ordnance buildings on the wharf (Keevill 2009). This rubble overlay peat and/or soft clay deposits, identified as Thames foreshore material, which lay at *c.*4–5m below the ground surface (*c.*+1.2m to +0.2m OD).

Within the current site Oxford Archaeology carried out an archaeological watching brief and subsequent excavation after the collapse of a section of moat revetment wall in February 2003. The excavation revealed part of the primary wharf wall at *c.*3.2m OD, which is thought to date to the late 14th century, as well as late 15th-century structural additions (Davies & Norton 2004). Associated features suggest evidence of 15th- and 16th-century ordnance manufacture and remnants of 16th- and 17th-century buildings.

An excavation was also carried out by Oxford Archaeology immediately to the south-east of the site in 2008 (Cook & Hiller 2008). Two trenches were dug to a maximum depth of 0.6m, revealing remains of brick-built walls as well as a vault and 17th-century deposits.

To the immediate south of the site Pre-Construct Archaeology Ltd carried out an archaeological watching brief in 2009 (Watson 2009). This investigation revealed 18th- and 19th-century brick walls *c.*0.4m below current ground level as well as small areas of masonry and possible surfaces.

THE ARCHAEOLOGICAL SEQUENCE

Late 14th to Late 17th Century (Period 1)

The Tower's southern moat wall appears to have been built in 1389 as part of Tower Wharf (Keevill 2009, 12). The work carried out by Oxford Archaeology in 2004 found a chalk and flint wall which may have been part of this late 14th-century moat wall (Davies & Norton 2004, 7). The current moat wall had been rebuilt and refaced possibly in the 17th century as part of a scheme proposed in 1666 by the Chief Ordnance Engineer, Sir Bernard de Gomme, to refortify the Tower. In this remodelling of the Tower defences the outer edge of the moat wall was redefined in masonry between 1672 and 1683 (Keevill 2004, 14).

In the recent MOLA investigation generally only the higher levels of the outer (south) face of the moat wall were exposed and recorded (S1, Fig 2). The most significant finding was the difference seen in relation to the north–south defensive wall (S2). To the west of this wall (S2) the moat wall was faced with large tooled Reigate blocks that coincided with the location of the 18th-century Proof House (B1) and slightly smaller neatly faced blocks which are presumably the facing for the open Proof Yard located behind it. The moat wall to

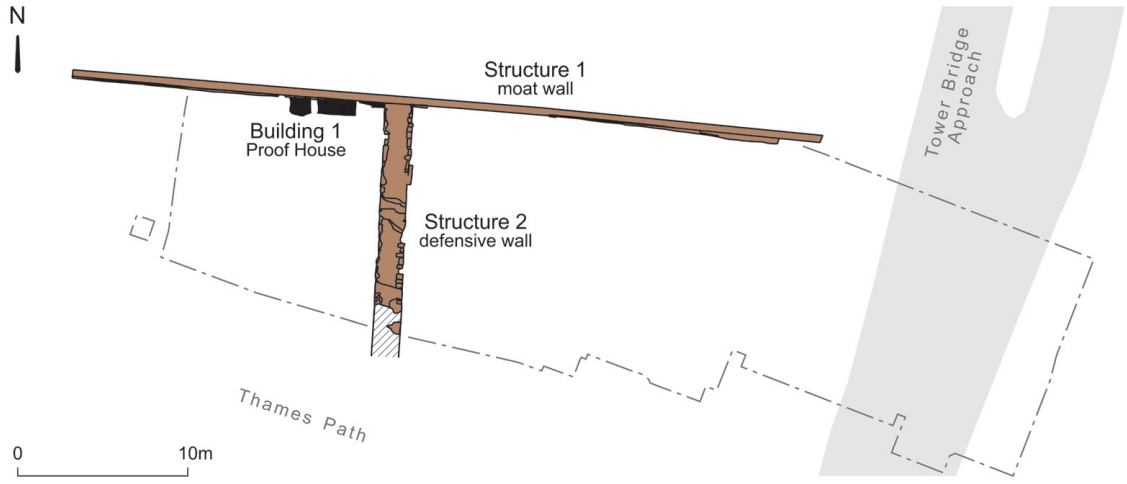

Fig 2. Moat wall (S1), defensive wall (S2) and Proof House (B1) (period 1) (scale 1:500)

the east of Structure 2 (where it survived the 2003 collapse) was noticeably more patchy with different sizes and types of stone (mainly ragstone and greensand). It also included some brick repairs that were a mix of reused medieval examples and post-medieval bricks of probably 18th-century date. Several large medieval bricks seen in this wall are similar in size to those used at Billingsgate (BIG82) and Holywell Priory (HLW06), which are dated to around *c.*1380–1450 (Betts 2011). These bricks are made with similar brick-earth to other London-made bricks, but can be distinguished by their unusually large size. The moat wall example measured 251–252mm in length by 56–60mm in thickness (no breadth measurements were present), almost all other Tudor bricks are below 236mm in length.

A further section of moat wall was examined during repairs to the wall required due to damage caused by tree roots. In 2010 a section of the inner (north) face of ragstone was dismantled exposing an inner core comprised mainly of fragments of greensand with occasional ragstone and brick fragments set within a yellow sandy lime mortar containing crushed shell inclusions (Fig 3). This wall core had a distinct lift recorded at *c.*4.20m OD, implying that it was built up as the inner and outer faces were being constructed.

A north–south aligned masonry wall, constructed mainly of ragstone from Kent and Reigate stone from Surrey (S2, Figs 2 and 4), was built on to the south side of the moat wall. The exposed portion of this truncated wall was 1.60m wide and 13m long (though it continues to the south on contemporary plans), with its highest survival at 5.01m OD. Examination of the upper parts suggests that neither face was original: to the west were large tooled ragstone blocks which may be refacing associated with the construction of the 17th-century Proof House, and to the east greensand blocks probably represent 18th- or 19th-century refacing.

Fig 3. Moat wall (S1) dismantled showing facing associated with the Proof House (B1), looking south-east (0.2m scale)

Fig 4. Defensive wall (S2) after initial stripping of 1970s café building (yellow sand in background is area of 2004 moat wall collapse), view looking north-east (0.5m scale)

This structure is interpreted as the north–south defensive wall first shown in this area of the wharf on the Board of Ordnance plan of the Tower in 1681–2 (Keevill 2004, 149, fig 114), though there is no evidence of the gate shown on this or other contemporary plans. A 1679 report on the Tower defences had recommended that the Iron Gate and the defensive wall located at the east end of Tower Wharf be demolished and replaced by a wall with a gate slightly further to the west. It is documented that this wall, which was built in 1680, was 5ft (1.52m) thick and 10ft (3.04m) high with a yard attached to the west. The 1681–2 plan of the Tower shows this north–south wall cutting off the wharf situated in almost the same place as the Chief Ordnance Engineer Sir Bernard de Gomme had proposed in 1666.

A 'Proof House' and 'Charging House' were built by the Ordnance Board in August 1682 on Tower Wharf to replace facilities the Ordnance lost with the sale of the old Artillery Ground in Spitalfields (Impey & Parnell 2006, 68). Proof can either be testing the quality of gunpowder (Crocker 1999, 20) or the process of testing the safety of a gun barrel by firing it with an over-pressure charge of gunpowder (Worshipful Company of Gunmakers). Charging was the filling or loading of gunpowder.

The Holcroft-Blood 1688 bird's-eye view (Impey & Parnell 2006, 63, fig 70; Fig 5) shows a narrow masonry building abutting the west side of the north–south defensive wall (S2). In this view the building has a sloping lead covered roof and there is a smaller fenced off building (presumably the Charging House) to the south of the gate.

18th-Century Proof House (B1, Period 2)

The Proof House (and the Charging House) was pulled down and replaced in 1709 by a larger building and yard costing £400 (J Spooner, pers comm). A later plan of the

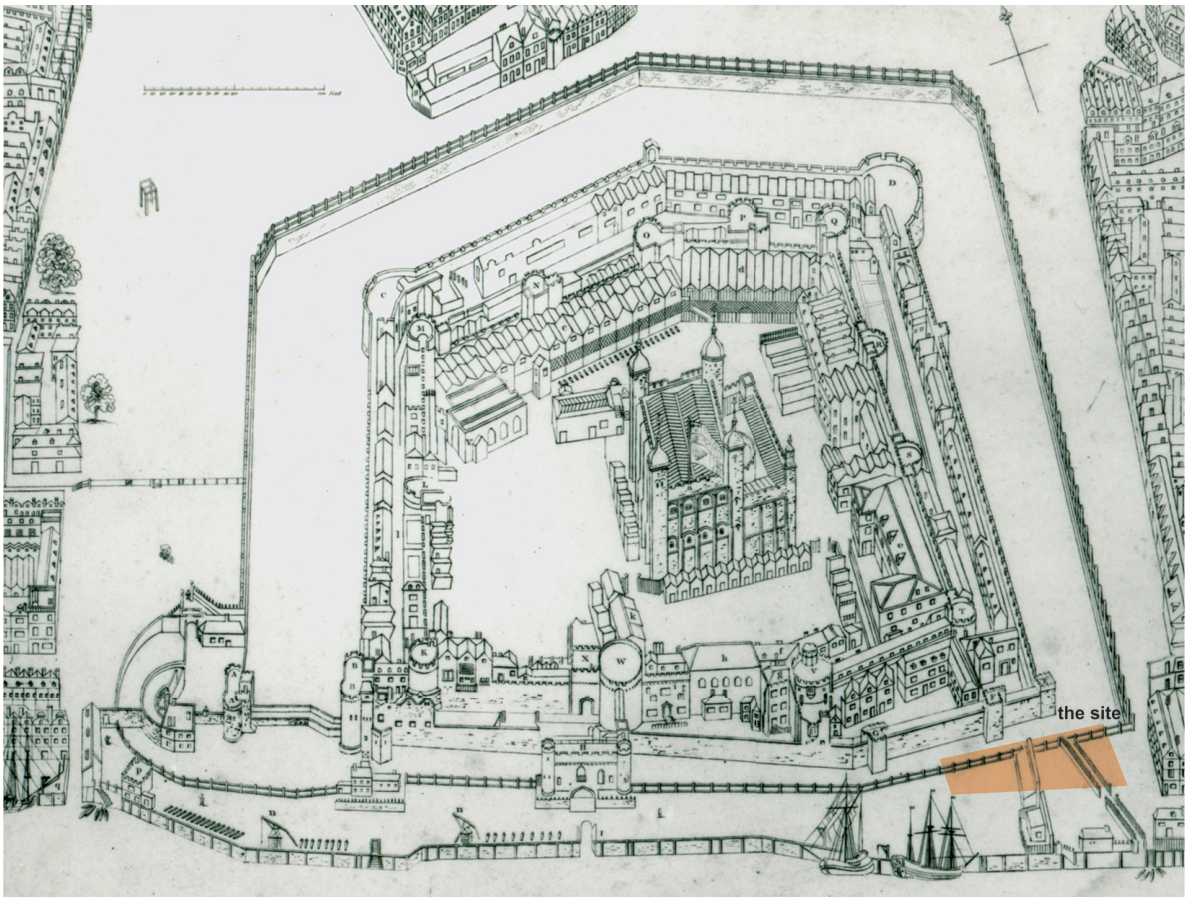

Fig 5. 'Draught of the Tower raised in perspective' by Ordnance engineer Holcroft-Blood, dated to 1688 (and here in a copy of 1815), with the site superimposed (© Historic Royal Palaces)

east end of Tower Wharf in 1742 shows the new Proof House built was now against the moat wall (S1) and the west face of the defensive wall (S2), with a 'Smiths Shop' and a 'Wheelwrights Shed' built against the east face (Fig 6a).

Some archaeological evidence of the Proof House (B1, Fig 2) survived with a set of masonry steps (Fig 7). The highest at 4.18m OD led down to the stone slabs paving a cellar floor at 3.55m OD. This was built above an earlier rendered floor, presumably also of stone, lying at 3.35m OD. This earlier floor was associated with a row of vertically set (ceramic) peg roof tiles (0.26 x 0.15m and 12mm thick), also covered by the render to 3.93m OD, that were lining the faces of both the moat wall (S1) and defensive wall (S2). This tiling may be a form of waterproofing intended to keep water out of the cellar of the building where the gunpowder was stored. A layer of demolition debris seperated these two cellar floors. Part of the south face of the moat wall (S1) and the west face of the defensive wall (S2) had been refaced when the Proof House and its yard were built.

The repair work to the inner moat wall (S1) also revealed a section of smaller blocks, possibly Portland limestone, with small tool marks located beneath the large tooled Reigate blocks. These blocks had not been seen previously as the south face of the moat wall was obscured by the layer of vertical tiles and render. There was also a distinct step in the build, which probably coincides with the floor slabs of the Proof House (B1) to the south.

Early 19th-Century Additions (Period 2)

During the early 19th century a series of red brick-built buildings, identified archaeologically (B2–B8, Fig 6b), formed part of the 'Arms Manufactory' built at the eastern

Fig 6. (a) Plan of the east end of Tower Wharf dated 1742, with site outline superimposed to show position of the Proof House and defensive wall (S2) (The National Archive, WORK 31/215); (b) 19th-century additions, Buildings 2–9 and Structures 3–7 (periods 2 and 3); (c) OS first edition 1874 map showing the 19th-century storehouse at Tower Wharf (site outline, scale 1:500)

Fig 7. Stone steps built against the moat wall (S1) leading down to the stone floor of the Proof House (B1), looking north (0.5m scale)

end of Tower Wharf (Impey & Parnell 2006, 68). A view of the Tower of London from the east painted by T and W Daniell in 1804 (Fig 8), shows the Proof House still standing, but it had become incorporated with these new brick buildings lying to the south and to the east of the defensive wall (S2). No contemporary plan of the 'Arms Manufactory', that produced small arms until 1815, has come to light (*ibid*, 69).

Following a fire that destroyed the Tower's Great Storehouse, part of the former small arms factory became a storehouse in 1841, which was built over the site of the former Wheelwrights Shed. This storehouse was thought to be demolished in the 1860s, but it is clearly still indicated on the 1874 Ordnance Survey (OS) map (Fig 6c). This complicated sequence of buildings is decribed below.

Building 2

Only one north–south aligned brick-built wall (1.27m long x 0.36m wide, highest survival at 4.31m OD) was found, but this was definitely a separate building when compared to the overlying one (B3, Fig 6b). This building (B2) may be part of a small building seen within the Proof Yard on a 1742 plan of the east end of Tower Wharf (Fig 6a).

Building 3

Building 3 was built against the moat wall and was at least 17m long and 3m wide (Fig 6b). It comprised a north–south brick wall (1.60m long x 0.22m wide, highest survival at 4.66m OD) and an east–west brick wall (2.25m long x 0.33m wide) which continued to the east and west. This building was divided into two rooms by a further north–south brick wall 2.80m long x 0.23m wide (Fig 9). The eastern room had three areas of surviving brick-paved floor (situated between 4.54m OD and 4.60m OD) and a drain. The western room had a suspended timber floor as the slots for its floor joists had been cut into the face of the moat wall. A stone block may have served as a threshold for the west room.

Fig 8. View of the Tower of London from the east in 1804 by T and W Daniell, with the buildings of the 'Arms Manufactory' in the foreground (London Metropolitan Archives, City of London, Collage record no. 31828)

Fig 9. Walls of Building 3, with joist slots cut into the moat wall (S1) (background) and the earlier wall of Building 2 partially exposed (right), looking north (0.5m scale)

Building 4

This building comprised an east–west brick wall (over 1.10m long x 0.50m wide, highest survival at 4.20m OD) that continued to the west in TP13 (Figs 1 and 6b). Further to the east in TP14, it appeared to have been robbed out. To the north of this wall was a brick-paved floor at 4.32m OD, and a possible surface at 4.19m OD to the south of it. This building could be part of the structures seen to the west of the Proof Yard on the 1742 plan of the east end of Tower Wharf (Fig 6a). Cutting through this building was a large pit measuring 2.80m x 2.70m. As it was only possible to excavate a small part of this feature, its function could not be established.

Building 5

Building 5 comprised a north–south brick wall (2.0m long x 0.74m wide, highest survival at 4.63m OD) that continued further south (Fig 6b). Also thought to be part of this building was a separate fragment of north–south brick wall (1.60m long x 0.87m wide) that appears to be the facing of a masonry wall 0.45m wide. Both the brickwork and the associated masonry continued further south. This building had a brick-paved floor at 4.64m OD that abutted the defensive wall (S2) and included a burnt area that suggests the location of a possible fireplace (Fig 10). This building shows some correlation with the storehouse seen on the 1874 OS map (Fig 6c).

A 1970s drainage trench exposed deposits below this floor; these include a possible gravel surface at 4.50m OD and a burnt rubbly dump, [28], at 4.20m OD. A blue on white tin-glazed tile was recovered from dump [28]. This measures 123mm in length by 11–12mm in thickness. It is not certain if this tile was used as flooring or walling, although blue and white flower vase tiles were used as flooring in London. This example has a damaged top surface, but it is uncertain if this is the result of wear. The tile shows part of a common flower vase design with barred ox-head corners made at both the Pickleherring and Rotherhithe pothouses in

Fig 10. Walls of Building 5 built against the east side of the defensive wall (S2); the possible fireplace base is in the foreground, right-hand side, looking north (0.5m scale)

London. The complete design can be seen on a tile in Betts and Weinstein (2010, 120–1, no. 162). This example probably dates to the period *c.*1618–50.

Building 6

Building 6 also showed some correlation with the 19th-century storehouse, and comprised elements of an L-shaped external brick wall built against the moat wall (S1) and the defensive wall (S2) (Fig 6b). This building had several internal walls and traces of a brick-paved floor at 4.61m OD. A brick-built base or buttress at 4.64m OD and measuring 0.90m east–west x 0.60m north–south was also built against the east side of the defensive wall (S2), though how it relates to the walls further to the east is not clear.

Building 7

Building 7 comprised a north–south brick wall (2.60m long x 0.65m wide, highest survival at 4.70m OD), the north end of which was butted against the moat wall (S1) and an east–west brick wall (1.46m long x 0.44m wide, highest survival at 4.68m OD) (Fig 6b). Two more east–west brick walls were internal and included a possible threshold between two rooms (Fig 11).

Some activity post-dating Building 7 was recorded. This comprised a pit measuring 0.80m in diameter, a small brick pad and a brick and masonry wall running north-west to south-east. It is the only wall found on this alignment and its function is unclear.

Building 8

The northern wall of Building 8 consisted of a short fragment of a partly robbed out east–west wall (1.30m long x 0.50m wide), constructed of a mixture of bricks and masonry (Fig 6b). It was possibly related to a robbing cut recorded further to the west. The southern wall of this building was very fragementary. It consisted of another east–west masonry wall (0.35m long x 0.45m wide), the eastern end of which abutted an east–west brick wall (0.60m long x 0.58m wide). These masonry walls contained a mixture of Reigate stone from Surrey, Caen stone ashlar from Normandy and what may be burnt Hassock sandstone rubble from Kent.

Fig 11. Walls of Building 7 built against the moat wall (S1), with Develin Tower in the background, looking north (0.5m scale)

The building may relate to the open space located between several open-sided sheds on the 1742 plan (Fig 6a). However, it could also be part of the 19th-century storehouse as this was also built around an open space (Fig 6c). The mixed construction of this walling and its robbed condition hinders its dating and architectural interpretation.

Structure 3: Culvert

A north–south aligned brick-lined culvert (0.60m long x 0.50m wide x 0.45m high) was located between Buildings 6 and 7 (Fig 6b). It drained northward in line with a bricked up outlet seen in the face of the moat wall.

Structure 4: Drain

The remains of a small east–west brick-lined drain extending over 8.0m was recorded in TP9 and TP10 at 4.40m OD (Fig 6b). This drain had been cut through a series of surfaces. It was unclear whether it was internal or external, lying to the south of Building 8 at 4.59m OD.

Fig 12. Brick-built chamber (S5) with tunnel entrance, looking north-west (0.5m scale)

Other Activity

Three truncated north–south aligned brick walls, [120], [121] and [122], found at between 4.60m and 4.70m OD, were seen in new drainage trenches dug within the vaults beneath Tower Bridge Approach (Fig 6b). Although there was not enough information to assign them to a building or any other structures they are all 19th-century in date.

Late 19th-Century Activity (Period 3)

Building 9

The construction of Building 9 differed significantly from the other buildings, as it was built of yellow stock bricks founded on deep concrete footings (Fig 6b). As one brick was noted with a possible lettered frog, a Victorian or later date is suggested. This building consisted of an L-shaped arrangement of three adjoining fragments of brickwork with a maximum height of 4.72m OD. More concrete footings recorded further south probably represent the continuation of the western wall of this building.

Structure 5: Brick Chamber

During the watching brief monitoring the construction of new drainage trenches within the vaults below Tower Bridge Approach, a deep brick-built chamber, [123], was revealed below the modern concrete floor (Figs 6b and 12). The removal of this floor meant it became partly infilled by rubble. Because of safety considerations it was not possible to fully investigate the chamber as planned (Keevill 2011); all observations had to take place from the top.

When originally found, granite setts, thought to represent a road or courtyard, were visible below the modern concrete floor at *c.*4.85m OD. Whether this surface capped the brick chamber was not established; there may have been a brick roof or metal grille. An area of concrete 2.50m north–south x 0.45m east–west was removed and the actual brick structure was found to continue beyond this area. The chamber's dimensions were 1.46m north–south x 1.44m east–west meaning the walls were *c.*0.50m thick. The highest survival was at 4.20m OD. When originally found a tape was used to establish

the chamber was at least 4.00m deep with a soil deposit at *c.*1.10m OD, suggesting the true base had not yet been reached. The chamber was constructed entirely of yellow stock bricks (measuring 0.11m wide x 0.07m thick x 0.25m long), in English cross bond (alternating courses of stretchers and headers). The type of brick used is indicative of a date of 1840 or later.

In the northern end of the western wall of the chamber was an arched opening (*c.*2.0m high and 0.70m wide) representing the start of a tunnel or passageway leading westwards, the far end of which was blocked by brick rubble. At the western end of the southern wall of the chamber, towards its top, there was a neatly made 'step' (0.60m long and 0.25m deep). It seems unlikely this was to gain access and instead may have been a light well for the chamber. It also seems unlikely that access to such a deep structure was via the top of this chamber as no steps or ladder was visible in the brick faces. However, metal fittings, possibly for iron rungs, were noted next to the base of the arched tunnel, suggesting the tunnel was used to reach a vertical ladder that provided access to the interior of the chamber.

The brick chamber was constructed at a different alignment to the vaults built below Tower Bridge, showing this was a pre-existing structure in use until 1886 when construction of Tower Bridge began. As the tunnel extending westwards from the chamber was blocked by brick rubble, this suggests the foundations of Tower Bridge cut through an existing structure. When the 1874 OS map is overlain with the route of Tower Bridge Approach it shows a change in the angle of the approach compared with the pre-existing road system. This means the granite setts found above the chamber are probably part of the road surface between the various buildings on Tower Wharf and those of St Katherine's Dock.

It appears that the brick chamber is not part of the 19th-century small arms factory or the later storehouse located on Tower Wharf. Its great depth and location under the roadway suggests that it was probably part of a storm water drainage system and was originally covered by a metal grille. However, it is unlikely to be related to Joseph Bazalgette's great sewage system begun in 1859, as a map (Halliday 1999, 80–1) shows his 'Low Level' sewer passes some distance to the north of the Tower of London.

Tower Bridge Post-1886

Structure 6: Concrete Surface

There was a concrete surface (S6) at *c.*4.50m OD that was edged with yellow bricks (Fig 6b). This feature was found lying parallel to Tower Bridge suggesting that it was related to its construction.

Structure 7: Guard Room Passageway

During the watching brief monitoring the construction of the northernmost drainage trench within the vaults below Tower Bridge Approach, directly under the modern slab a north–south aligned yellow brick wall, [124], was discovered at 4.98m OD (Fig 6b). This wall was 0.40m wide and continued further north and south. It was identified on a 19th-century plan (not illustrated), as part of a passageway that went from the guard room to the ablution's room of the Victorian guardhouse that was originally located in the vaults below the newly built Tower Bridge.

DISCUSSION

The archaeological investigations, though limited by a reduction in ground level of *c.*0.35m, and in several areas up to a maximum of 1.00m deep, revealed evidence of various 19th-century and earlier buildings on Tower Wharf.

The earliest structure examined was part of the late 14th-century moat wall (S1) (Fig 2). This stretch of the moat wall appears to have been rebuilt during the late 17th century. About the same time the moat wall was rebuilt, in 1680 another defensive wall (S2) was built perpendicular to it. Very little pottery was found during the excavation; of the 32 sherds nearly all are of 16th- and 17th-century domestic pottery. The largest assemblage, ten sherds dated *c.*1630–1700, was found in a dump, [55], on the east side of the defensive wall (S2), and may date its refacing with greensand. A further dump is certainly of later 18th-century date and possibly as late as the mid-19th century, so is probably associated with demolition of buildings in that area of the site.

Building 1 is on the site of the Proof House that was built in 1682, against the west face of Structure 2 (Fig 6b). The remains found probably represent the Proof House that was rebuilt in 1709 and shown on a map of 1742 (Fig 6a), with cellar steps adjacent to the moat wall (S1). Only a small portion of Building 2 was found, but based on the same map it appears to be part of a small building within the Proof Yard (Fig 6a and b).

The 1804 T and W Daniell painting of the Tower from the east (Fig 8) shows a large number of brick buildings within the area of the site, confirming that Buildings 3–7 are part of the small arms manufactory (Fig 6b). Although Building 2 had now been replaced by Building 3, evidence from cartographic sources show the Proof House (B1) was still standing. It appears that elements of Buildings 5 and 6 were reused as part of the new storehouse built in 1841, and while no plan has been found showing this storehouse, elements of these buildings appear to have been incorporated into the storehouse shown on the 1874 OS map (Fig 6c). The phasing of Building 8 is a little problematic; it may relate to 18th-century activity before the small arms manufactory phase or it may be part of the later 19th-century storehouse (Fig 6). The distinctive remains of Building 9 may post-date the demolition of the storehouse, but it does not appear to relate to Tower Bridge. Demolition deposits sealed all these 19th-century buildings, and dating evidence, where found, was unsurprisingly limited to the late 18th to mid-19th century.

The only correlation between this fieldwork and the Oxford Archaeology work (TOL92) carried out in 2004 (Davies & Norton 2004) was discovery of the brick culvert (S3) with culvert [3061] and part of Building 6 with wall [3067]. Because of the limited depth of the current fieldwork there was no equivalent to the cobbled surface found at *c.*3.40m OD or to the chalk and flint masonry representing the earlier phase of the moat wall.

A deep 19th-century brick chamber (S5) found within the vaults under Tower Bridge Approach was probably part of a storm water drainage system under the street to the east of Tower Wharf and not part of the small arms manufactory or later storehouse (Fig 6b).

The remains of a concrete surface (S6) may be related to the construction of Tower Bridge. The only feature that is definitely related to Tower Bridge was a north–south yellow brick wall (S7), that was part of the Victorian guardroom.

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