

# AN ARCHAEOLOGICAL INVESTIGATION IN THE EAST WING OF SOMERSET HOUSE, CITY OF WESTMINSTER

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## SUMMARY

*Investigations within the basement of the East Wing of Somerset House recorded evidence for activity spanning from the Saxon period to the 19th century. Middle Saxon deposits and refuse pits confirmed that the site lay within the settlement of Lundenwic. By the late 12th or 13th century there was evidence of external levelling deposits and pitting. However, there was no evidence of buildings on site until either the 15th or early 16th century when a series of chalk rubble cellar wall foundations were constructed; by this date the area south of the Strand was occupied by the residences of two bishops, several inns and a church. Brick and masonry foundations representing part of the cellars under the southern range of the Lower Court of the palace of Somerset House, principally constructed in 1547–51 by Edward Seymour, Lord Protector and Duke of Somerset, were discovered. Later foundations incorporating reused Tudor architectural stonework probably represent alterations made during either the 17th or early 18th century. The Caen stone tramline mullion segments found amongst the reused material probably originally belonged to one or more large oriel bay windows in the Tudor palace. During 1776–85 the palace was demolished and government offices were constructed on its site. A number of features relating to the construction of the basement of the East Wing of the new Somerset House were recorded including an extensive network of underfloor drainage culverts. During the late 19th century a network of underfloor brick- and tile-lined flues was constructed within the basement.*

## CIRCUMSTANCES OF THE FIELDWORK

King's College London commissioned Pre-Construct Archaeology Ltd (PCA) to undertake an archaeological watching brief and excavation within the East Wing of Somerset House (Grade I Listed Building), Strand, in the City of Westminster, between October 2010 and November 2011 (Fig 1). The area of the site lies within an Archaeological Priority Zone, as defined by the City of Westminster, between the Embankment and the Strand with the River Thames c.90m to the south (centred at TQ 3078 8082). The watching brief and excavation were undertaken as part of the redevelopment of the basement of the East Wing (Fig 2). This fieldwork consisted of the lowering of the floor level within a number of the existing basement rooms down to the new formation level of the new floor (often only c.30cm below the existing one), and the installation of some new lift pits and light wells. Therefore, much more archaeological material was recorded than was actually excavated and consequently the amount of dating evidence recovered was very limited.

The archive comprising written, drawn and photographic records and artefactual material from the site will be deposited at the Museum of London's Archaeological

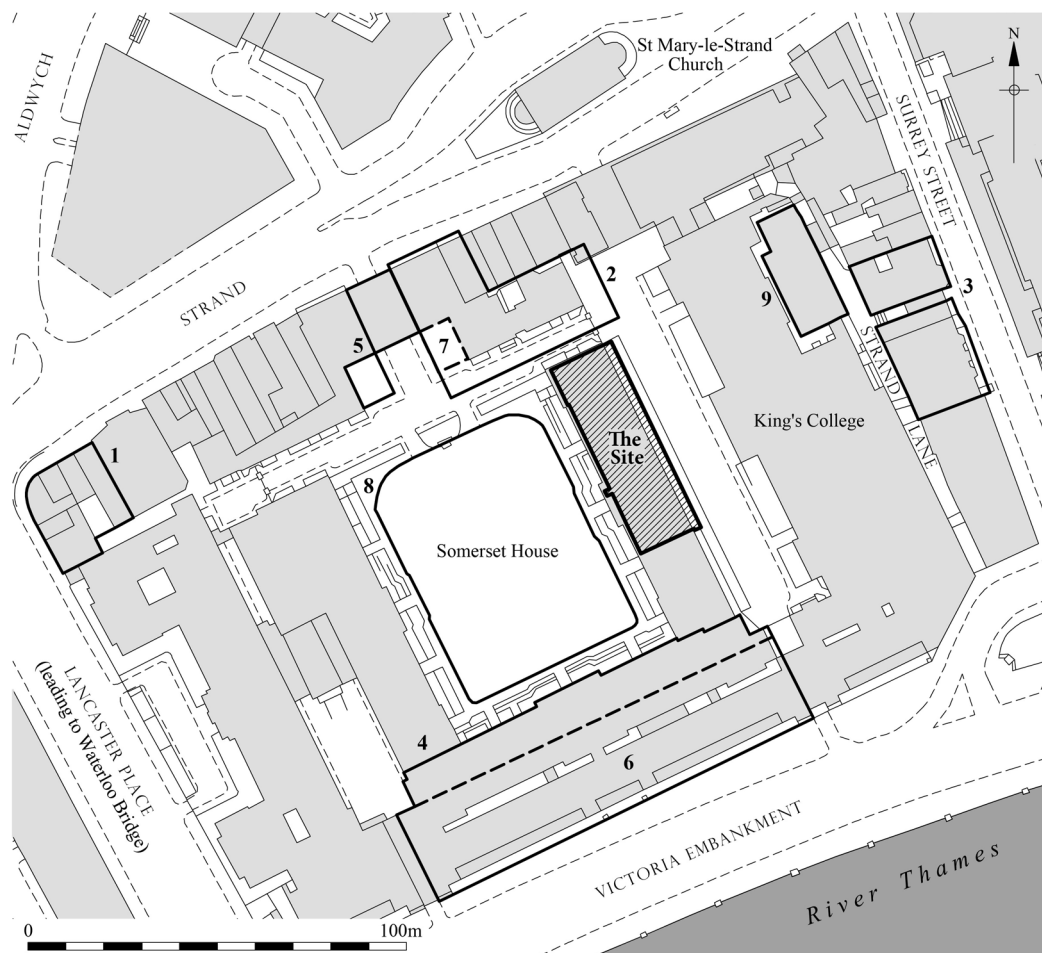


Fig 1. Site location and other sites mentioned in the text. Key: 1. 138 Strand (STN87); 2. Somerset House, Strand (SOM88); 3. King's College, 156 Strand (KIL90); 4. Somerset House, Strand (SST96); 5. Courtauld Institute of Art (North Wing), Somerset House, Strand (SRD97); 6. Somerset House, Strand (SMH97); 7. Courtauld Institute of Art, Somerset House, Strand (CTI98); 8. Somerset House, Strand (SRA99); 9. King's College, Strand, Strand Lane (KCL01) (© Crown copyright 2013. All rights reserved. Licence no. PMP36110309) (scale 1:2000)

Archive (LAA), Mortimer Wheeler House, 46 Eagle Wharf Road, London N1 7ED, under site code EAF10, where it may be consulted by prior arrangement. Within the text, numbers in square brackets ([1] *etc*) refer to contexts and those within angle brackets (<1> *etc*) denote small find (Sf) numbers. Details of the Middle Saxon pottery fabrics are given in Table 1. Detailed descriptions of the medieval and post-medieval pottery fabrics, plus the ceramic building material fabric codes are posted on the Museum of London Archaeology (MOLA) website.<sup>1</sup>

## GEOLOGY AND TOPOGRAPHY

The geology of the area of the site is indicated by the British Geological Survey (2004) 1:50,000 Series Sheet 256 (North London) as lying on the boundary between Eocene London Clay overlain by Pleistocene Taplow Terrace Gravels on the northern half of the site. The southern half of the site is indicated as being covered by Holocene Thames alluvium and the northern part as capped by brickearth. The area of the site lies between the Strand to the north and

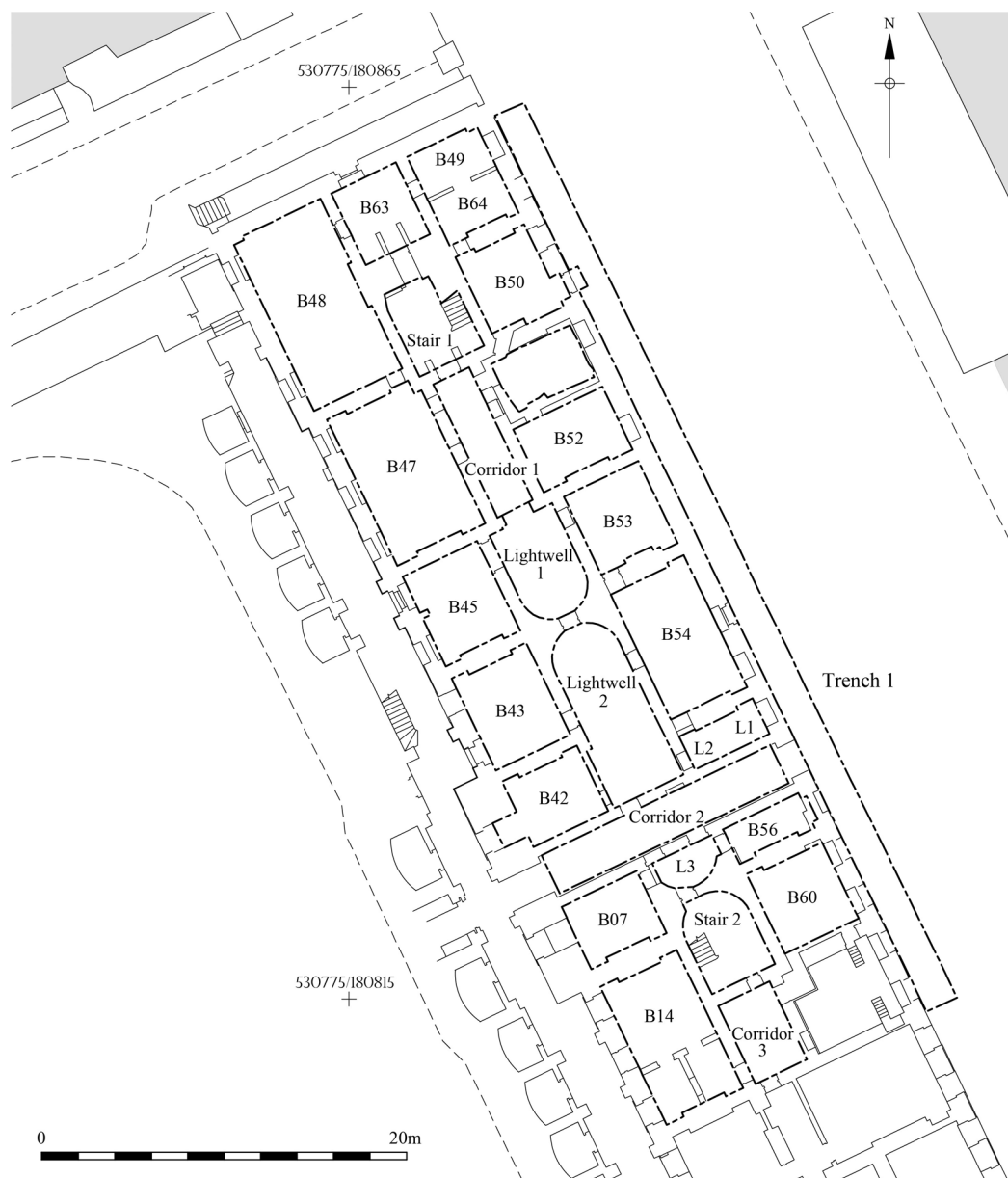


Fig 2. Trench location within the East Wing of Somerset House, showing room numbers (scale 1:400)

Victoria Embankment to the south (Fig 1). Beyond this lies the River Thames *c.*35m from the southern wing of Somerset House. The ground surface slopes steeply from the Strand southwards to the River Thames. Previous archaeological investigations located truncated brickearth under the

North Wing of Somerset House adjacent to the Strand frontage at 9.98m OD (probably truncated from *c.*11.22m OD), overlying terrace gravels (Cowie & Blackmore 2012, 92). The 2010–11 fieldwork revealed truncated London Clay at 5.22m OD (see below).

## ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

### *Prehistoric and Roman*

Very little evidence for either prehistoric or Roman activity has been recorded within the vicinity of Somerset House despite only being c.1km west of the Roman city of Londinium. Residual Roman finds, however, are common within later deposits suggesting that some activity was occurring locally, perhaps along the Strand which follows the line of the Roman road from London to Cirencester (Gloucestershire) (Margary 1955, 51).

### *Saxon*

The main Middle Saxon settlement in London, known as Lundenwic, was located in the area of modern-day Covent Garden, on Aldwych to the east, and along the Strand. Indeed, a number of sites have recorded evidence of Saxon activity in close proximity such as at Globe House (Bowsher 1999). A sequence of foreshore deposits and a possible Saxon structure were also encountered at Arundel House to the east (Proctor 2000). Previous archaeological work at Somerset House itself and in the immediate vicinity also recorded Saxon activity, including pitting (Fig 1, nos 1–3, 7 and 9; Cowie & Blackmore 2012, 92, 319–20). It has been suggested, therefore, that the site lay in close proximity to the waterfront of Lundenwic (Gifford & Partners 2005).

### *Medieval*

From the late 12th century the riverside and Strand frontage were popular locations for the London residences of those seeking influence at Westminster, then the centre of royal government (Croot 2009, 9). Great houses constructed nearby included the inns of the bishops of Exeter, Bath and Wells, Llandaff, Chester, Worcester, Norwich and Durham.

### *Post-Medieval*

Somerset House (known as Somerset Place during the 16th century) was built by Edward Seymour, Lord Protector and Duke of Somerset, on the south side of

the Strand on land previously occupied by various properties (Thurley 2009, 3). These properties included residences belonging to two bishoprics: Chester Inn and Worcester Inn; a chancery inn known as Strand Inn; a public inn called the Goat; plus the parish church and churchyard of St Mary of Strand (Croot 2009, 9).

The palace was principally constructed between 1547 and 1551, and made use of the stone from the buildings which were demolished on the site together with masonry from the priory church of St John of Jerusalem, Clerkenwell, and the cloister and charnel house of St Paul's Cathedral, both of which were also demolished (Thurley 2009, 16–17). The palace consisted of two adjoining courts or courtyards (Fig 3); the main Outer Court was on the Strand and it was entered from a gatehouse on the road. The Inner Court was located to the east of the main one as the steep slope down to the Thames meant it was cheaper to do this rather than go to the expense of terracing the whole area to create a uniform ground level (*ibid*, 17). Accounts for the works state that construction cost over £10,000, with the amount spent on masonry, bricks and tiles being relatively small, reinforcing the suggestion that large amounts of materials were reused from demolished buildings (*ibid*, 19). The palace displayed a range of Renaissance architectural features which had been used in England from c.1515. The façade of the palace probably represented a new departure for English architecture with the use of bay windows furnished with a rare type of mullion known as a tramline mullion (*ibid*, 23).

After the Duke of Somerset's fall from power and his subsequent execution in January 1552, the unfinished palace passed to the Crown. After its construction was completed in 1553, it became the residence of Princess Elizabeth, the future Queen Elizabeth I, until her accession in 1558. As queen she preferred to live at the palaces of Whitehall or St James, while using Somerset House for occasional meetings of her council and as a lodging-house for foreign diplomats.

Following the death of Elizabeth in 1603, her successor, James I of England and VI of Scotland, gave the house to his consort,



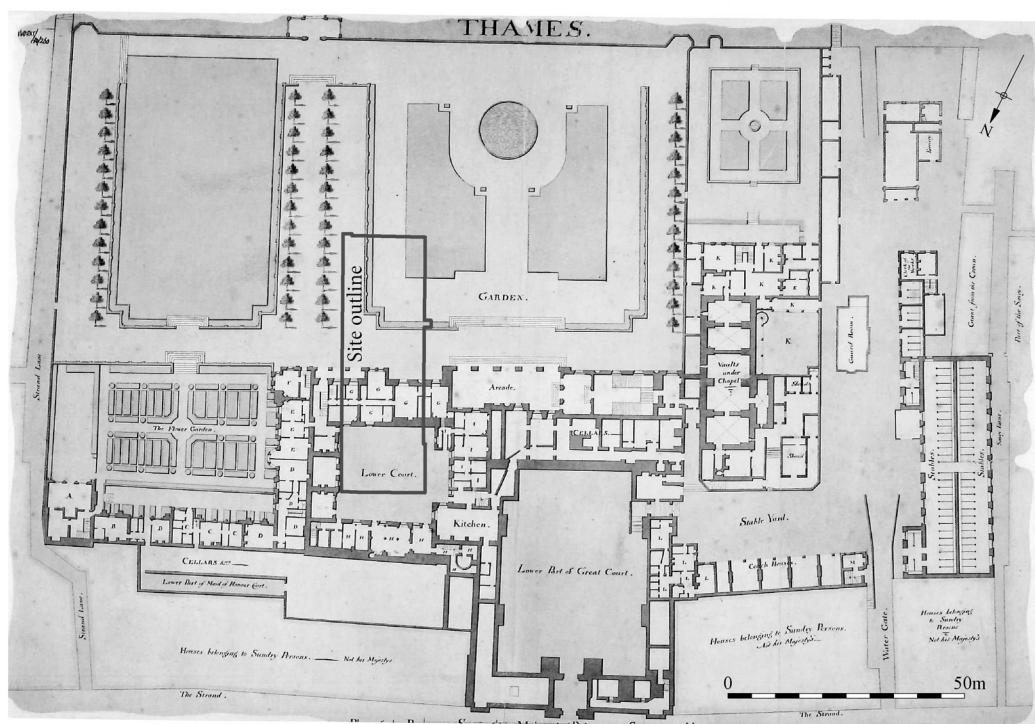


Fig 3. Kenton Couse's basement storey plan of Somerset Palace in 1775, showing the site location, north is towards the bottom of the plan (The National Archives, ref WORK30/260)

Anne of Denmark, who took up residence and entertained there on a lavish scale, renaming the palace Denmark House. It became the centre of English social and artistic life (Weinreb *et al* 2008, 849). Anne initiated a major reconstruction of the palace from 1609 to 1614 costing over £45,000, much of it to Inigo Jones's design. The Great Court was remodelled with the west range completed; the east range was virtually rebuilt three storeys high to match the west; and the Great Hall to the south was modernised. The Inner Court to the east was also subject to extensive remodelling and a range of buildings including a cross gallery and a library were constructed to the east of it (Thurley 2009, 35–6).

In Charles I's reign the palace underwent further building and redecoration, overseen by Inigo Jones, with the major works including alterations to the Queen's, Henrietta Maria, Bedchamber and the construction of a Catholic chapel (Thurley

2009, 45–56). Following the Restoration in 1660 further building work was undertaken with the construction of a new block of rooms, including a new Presence Chamber and Privy Chamber, on the south side of the Great Hall (*ibid*, 63–5). Stables and coach houses were also built during Charles II's reign to the north and west of the chapel (*ibid*, 70–1).

The 18th century saw the palace fall gradually into ruin. In 1730 Anne of Denmark's Bedchamber and Privy Chambers on the east side of the Inner Court collapsed and the southern and eastern walls of the court had to be rebuilt. The decision was finally taken in 1775 to demolish the palace after George III agreed that the site should be given over to public offices, with the provision that Buckingham Palace should take the place of Somerset House as the official dower house for the queen (Thurley 2009, 75–6).

The new purpose-built government offices

were designed by Sir William Chambers with work beginning in 1776. The North Wing was completed by 1780 and the East Wing by 1785. During 1829–31 King's College was built next door to the East Wing of Somerset House (Weinreb *et al* 2008, 462) (Fig 1). In 2009 the East Wing, which had been previously used as government offices, was leased to King's College.

## THE ARCHAEOLOGICAL SEQUENCE

### *Period 1: Solid Geology – London Clay*

The earliest deposit encountered during the fieldwork was Eocene London Clay (see above). Recorded at a height of 5.22m OD this deposit was only encountered within one of the basement rooms during the watching brief (B63), at the northern end of the East Wing (Fig 2). As this deposit had been truncated by later activity, the overlying terrace gravel was absent. Therefore, the original ground level of this area cannot be determined, but it must have been at least 4m higher.

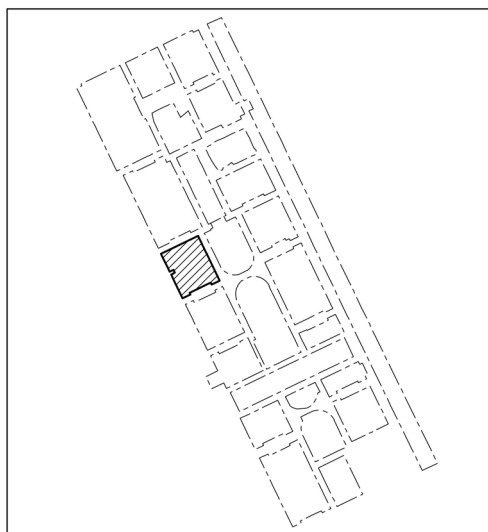
### *Period 2: Middle Saxon (AD 600–800)*

The vast majority of the East Wing basement rooms investigated during the watching brief were not excavated to a deep enough level to encounter any earlier remains, and instead were excavated to the new formation level (see above). The main exception to this was Room B45, where an archaeological sequence beginning with the Saxon period was excavated. However, the full depth of the Saxon sequence here was not determined. The earliest deposits examined were a sequence of dumped levelling layers located at 5.23m OD, deposits [111] and [100]. These had a combined thickness of 0.45m and continued below the excavation limit. The uppermost of these two levelling deposits, [100], contained a limited amount of residual Roman building material, including two fragments of box flue tile (see Hayward below). A small faunal assemblage recovered from deposit [100] consisted of cattle, sheep/goat and pig bones (see Rielly below).

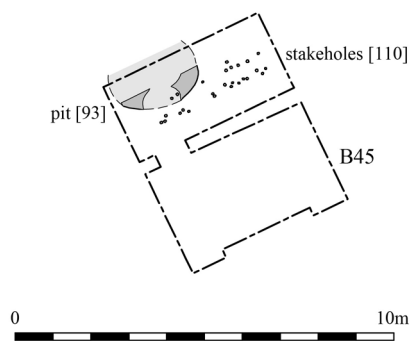
Cutting through these two levelling deposits was a rubbish pit, [93] (Figs 4 and

5). Only the southern portion of this oval-shaped feature survived within the excavated area; with recorded dimensions of 2.22m east–west by 0.60m north–south and 0.60m deep, it would appear that at least half of this pit lay further north outside the limit of excavation. If the recorded dimensions reflect at least half the size of the original feature, then this pit would have been a relatively large feature. The pit had two distinct fills, [94] and [99], which contained a rich artefactual assemblage including more residual Roman building material and a small group of Middle Saxon pottery (see Sudds below). The pottery consisted predominantly of imports including a sherd from a burnished North French/East Belgium hard greyware (NFEBB) vessel and a possible North French greyware (NFGWC) pitcher, together with a distinctive regional oolitic limestone-tempered ware vessel (MSOLC/D). Also recovered from this pit was an unusual assemblage of pieces of fired clay and six fragments of Middle Saxon loomweights (see Sudds below).

This Middle Saxon pit also yielded an interesting assemblage of animal bones along with valuable environmental evidence. The assemblage of animal bones was very similar in nature to the one recovered from layer [100], through which the pit was cut. This included minor quantities of cattle, sheep/goat and pig along with a few chicken bones and a single bone of a house mouse. Also recovered were a number of fish bones including eels, salmon and roach (see Rielly below). Pollen recovered was indicative of a damp, open environment dominated by grasses and other herbaceous taxa; represented by the dandelion family (Lactuceae), grasses (Poaceae), fat hen (*Chenopodium*-type) and knapweed (*Centaurea nigra*). The fern *Dryopteris* type (eg buckler fern) was also present. The charred grain assemblage from the pit was dominated by caryopses of barley (*Hordeum* sp) along with small amounts of wheat (*Triticum* sp) and oat (*Avena* sp). Infrequent hazelnut (*Corylus avellana*) was also present. A small assemblage of wood charcoal was also recovered from the pit which consisted of oak (*Quercus* sp), hazel (*Corylus avellana*), willow/poplar (*Salix/Populus* sp) and cherries/sloe (*Prunus* sp) (Young *et al* 2012).



*Fig 4. Period 2, Middle Saxon features in Room B45 (scale 1:200)*



*Fig 5. (below) Saxon and medieval pits [93], [84] and [89] in Room B45, facing south-west (0.5m scale)*



Also recorded cutting layer [100] were two parallel lines of small stakeholes, [110], aligned east–west (Fig 4). The two lines were approximately 0.28m apart; the northern alignment consisted of nine stakeholes and the southern alignment 17. Located at 5.20m OD, all the stakeholes were circular in shape measuring 0.06m in diameter by 0.30m deep. They all contained an identical dark greyish brown silty clay fill, from which no anthropogenic material was recovered. These deposits represent the degraded remains of the original driven timbers. The dimensions of these stakes imply that they would have formed a relatively lightweight structure such as a wattle fence. Although no datable material was recovered from this group its position in the stratigraphic sequence strongly suggests it is of Saxon date.

### ***Period 3: Medieval (c.1240–1400)***

#### ***Levelling Deposits***

Sealing the Saxon deposits in Room B45 was a levelling layer, [79] (not illustrated). This deposit was only recorded in the northern half of the room, an area which measured 3.05m east–west by 1.20m north–south by 0.15m thick, with a top height of 5.38m OD. It contained pottery which dated to c.1080–c.1350 including London-type ware (LOND), both with white slip decoration (LOND WSD) and green glaze, and with north French-style decoration (LOND NFR), and redeposited Roman building materials. A number of fragments of glazed medieval ceramic roof tile dated c.1240–c.1600 provide a terminus post quem of 1240 for the deposition of this layer. A small assemblage of residual Saxon pottery, consisting of the locally produced chaff-tempered ware (CHFS) and two regionally traded Ipswich ware (IPSC, IPSM) vessels, was also recovered.

This levelling layer also produced a relatively large assemblage of animal bones, largely consisting of cattle and sheep/goat in approximately equal numbers, but also with some pig, hare and chicken. Environmental results from this deposit were similar in nature to that which was recovered from the Saxon pit and suggests that the environmental

conditions of the site had changed little from the Saxon to medieval periods. Again the pollen was dominated by herbaceous taxa including the dandelion family (Lactuceae), grasses (Poaceae), fat hen (*Chenopodium*-type) and knapweed (*Centaurea nigra*), which are indicative of a damp, open environment dominated by grasses and other herbaceous plants (Young *et al* 2012).

In Room B47, to the north of Room B45 (Fig 6), a number of levelling deposits were also recorded, [138], [136] and [126] (not illustrated), which apparently dated to the medieval period. However, these deposits were not excavated as they were located at the formation level of the basement development. Levelling layer [138] was located in the northern half of Room B47 and had surviving recorded dimensions of 4m east–west by 2.70m north–south at 5.77m OD. No artefactual material was recovered from this deposit. However, as it was cut by pit [141], which contained pottery of 13th- and 14th-century date, it is assigned to this period.

Located in the southern half of the room was a sequence of two levelling layers of possible medieval date. Only limited areas of these deposits were exposed and recorded; [136] measured 0.50m by 0.44m and [126] measured 0.54m by 2.75m at a general height of 5.80m OD. Neither of these levelling layers yielded any artefactual material and therefore remain undated. However, these deposits were cut by a Tudor wall foundation and therefore presumably of medieval date.

#### ***Pitting***

Cutting through levelling deposit [79] in the northern half of Room B45 were two intercutting rubbish pits (Fig 6). Pit [84] was oval in shape with recorded dimensions of 1.00m east–west by 0.90m north–south, with a depth of 0.40m and a top height of 5.42m OD. It was backfilled with two distinct deposits, [87] and [85]. These fills contained various residual finds including fragments of Roman tile, plus pieces of Middle Saxon quernstone and two sherds of North French greyware (NFGW). However, the presence of fragments of medieval glazed ceramic peg tile confirmed its true date.

Pit [84] contained a relatively large assemblage of animal bones, consisting of



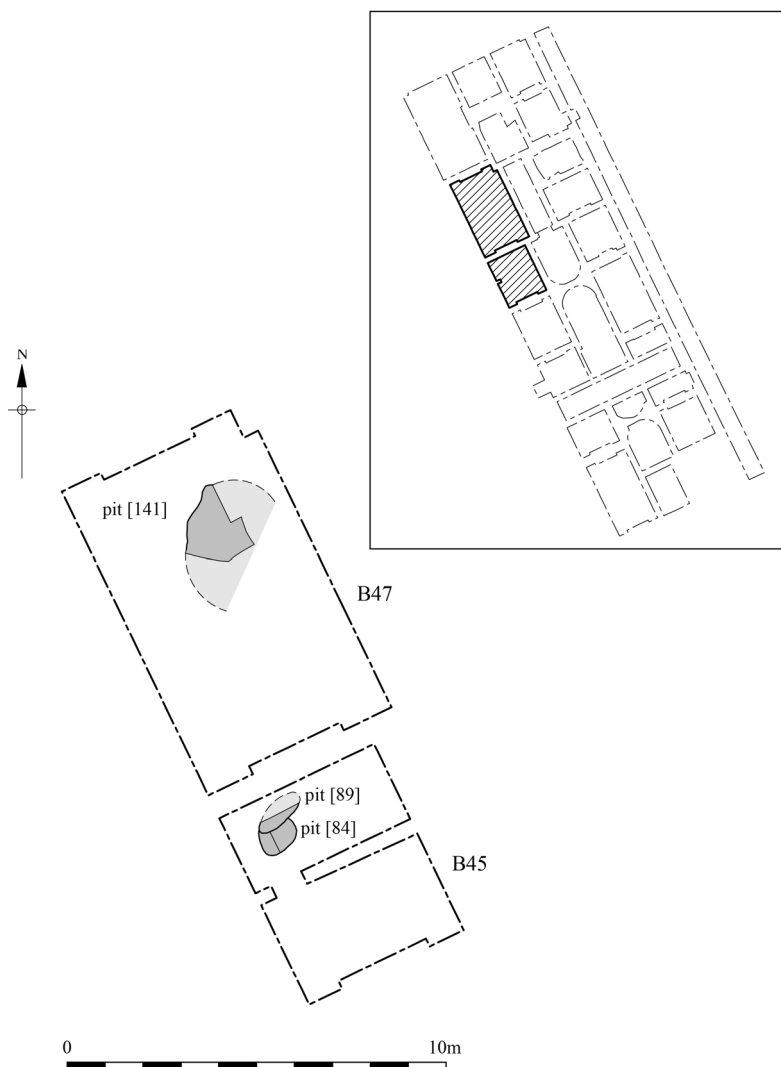


Fig 6. Period 3, medieval features in Rooms B45 and B47 (scale 1:200)

equal numbers of cattle and sheep/goat along with some pig, hare and chicken. The cattle remains represent a diverse range of skeletal parts whereas the sheep/goat group is almost devoid of upper limbs, suggesting the preferential usage of lesser quality meat cuts (see Rielly below). Pollen recovered from pit [84] illustrates an open environment dominated by grasses and other herbaceous plants. The taxa recorded included the dandelion family (Lactuceae), grasses (Poaceae), charlock (*Sinapis*), thistle (*Cirsium*), mugwort (*Artemisia*), ribwort plantain (*Plantago lanceolata*), fat hen (*Chenopodium*-type), knapweed (*Centaurea*

*nigra*) and the sedge family (*cf* Cyperaceae) (Young *et al* 2012).

Cutting through pit [84] was a second pit, [89] (Fig 6). Only a small area of this pit was recorded in the northern area of Room B45, measuring as seen 1.25m east-west by 0.32m north-south, by 0.20m deep, but it continued north outside the excavation limit. No artefactual material was recovered from this feature.

Cutting layer [138] in Room B47 was a large rubbish pit, [141], which measured 2.72m east-west by 2.02m north-south (Fig 6). It was only partially excavated as it was situated at formation level. Partial excavation



produced a small pottery assemblage including London-type ware (LOND), both with white slip decoration (LOND WSD) and green glaze, and with north French-style decoration (LOND NFR), dated to *c.*1180–*c.*1270.

### *Levelling Deposits*

Sealing the two intercutting medieval pits in Room B45 were two levelling layers, [72] and [71] (not illustrated), which were only recorded within the northern half of Room B45. These deposits had a combined thickness of 0.25m with a highest level of 5.62m OD. They were most likely preparatory works for medieval buildings known to have been located along the southern side of the Strand from the 12th century onwards. Pottery recovered from the earlier of these two deposits, [72], included the handle of a London-type ware (LOND) jug and the body sherd of a south Hertfordshire-type grey ware (SHER) vessel, which dated to *c.*1170–*c.*1350. This date was confirmed by the ceramic building material assemblage from both deposits which included fragments of residual Roman tiles and bricks but was dominated by glazed medieval peg tiles dated to *c.*1180–1450.

Both these levelling layers contained a moderately sized assemblage of animal bones once again dominated by cattle and sheep/goat in equal numbers, plus some pig, hare and chicken.

Pollen from these layers provides evidence for an open environment dominated by grasses and other herbaceous plants. The taxa recorded included the dandelion family (Lactuceae), grasses (Poaceae), charlock (*Sinapis*), thistle (*Cirsium*), mugwort (*Artemisia*), ribwort plantain (*Plantago lanceolata*), fat hen (*Chenopodium*-type), knapweed (*Centaurea nigra*) and the sedge family (*Cyperaceae*) (Young *et al* 2012).

### ***Period 4: Late Medieval/ Early Post-Medieval (c.1400–1547)***

The next period of activity relates to a series of wall foundations and associated deposits, which appear to pre-date the construction of the Tudor palace. These trench-built masonry wall foundations were all

fragmentary and severely truncated making their original plan difficult to determine. The top level of these fragments of masonry varied from 5.76m to 5.90m OD. Also, as many of these foundations hardly extended above formation level, only small portions of them were excavated and the opportunities to recover dating evidence were minimal. The depth of these foundations below the existing basement suggests that they were part of cellared buildings.

### *Levelling Deposits*

In the central part of the site in Lightwell 1 (Fig 7), two levelling layers, [196] and [199], were only recorded in plan and not excavated as they were located at the formation level (not illustrated). Both deposits were recorded at 5.51m OD and neither yielded any artefactual material. However, they probably represent ground preparation works prior to the construction of a series of wall foundations (see below). Similar deposits were recorded in the northern part of Room B52 as well as probable levelling layers [78], [77] and [80] at a general level of 5.80m OD which also yielded no artefactual material.

### *Wall Foundations*

Cutting through the levelling layers in Lightwell 1 was a wall foundation, [191], which was constructed predominantly of roughly hewn chalk blocks and some ragstone blocks bonded with a soft brown gravelly sandy lime mortar containing numerous flint, chalk and ragstone inclusions suggesting either a late medieval or early post-medieval date (Figs 8 and 16). It was aligned north-west to south-east, 1.70m long and L shaped with evidence of a corner at its southern end and a western continuation. Only the western and northern faces of the foundation, which consisted of roughly faced blocks of chalk and ragstone, were observed as the other faces were truncated by later activity. The western continuation of this foundation, [70], was recorded in Room B45 directly to the west, where a 3.30m length of walling was observed (Fig 7). The full width of this foundation was largely obscured by a Tudor masonry addition, [69], to its southern side

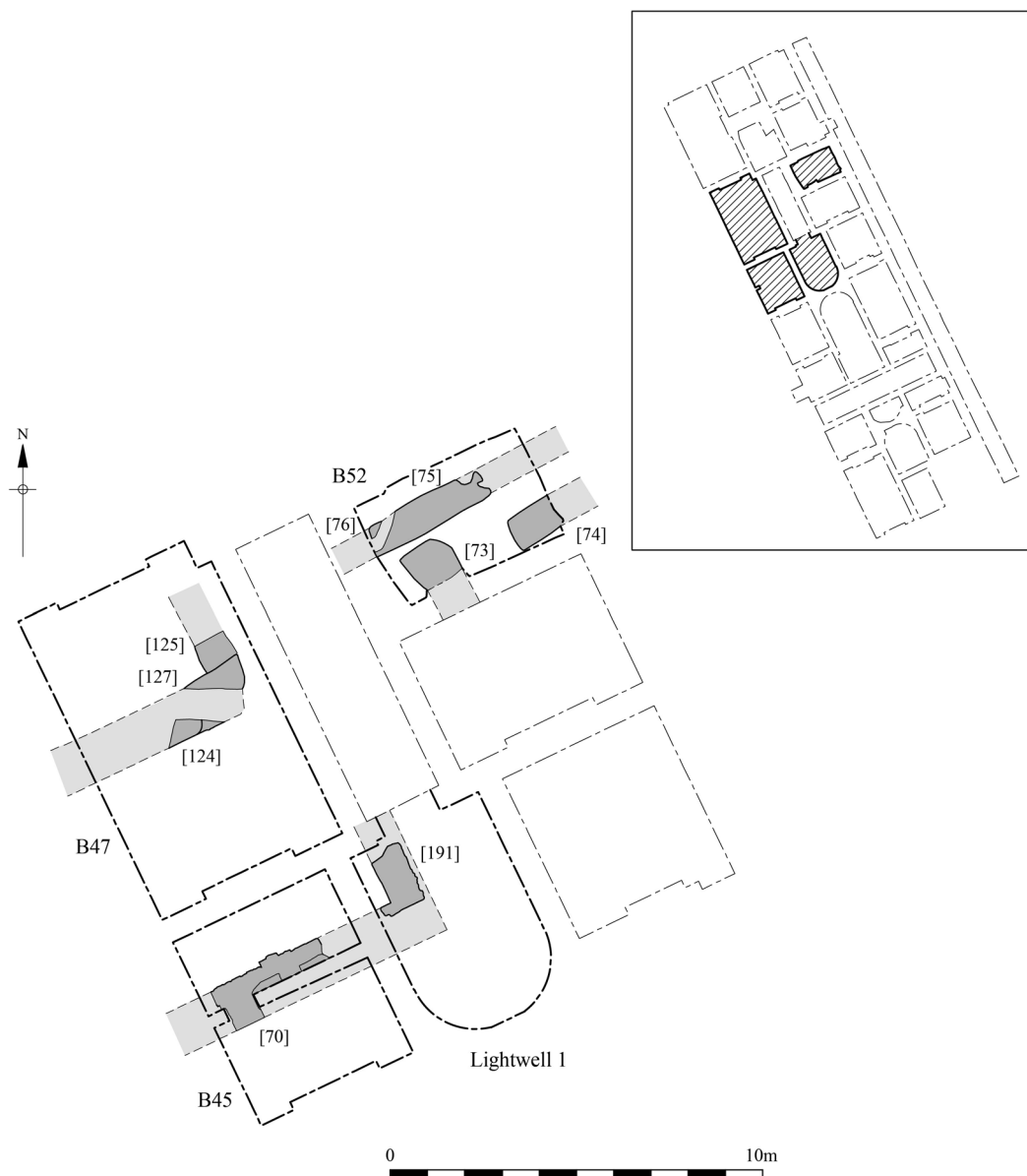


Fig 7. Period 4, late medieval/early post-medieval wall foundations in Rooms B45, B47, B52 and Lightwell 1 (scale 1:200)

(*cf* Fig 9), but it was at least 1.30m wide. The chalk blocks in the northern face of this foundation were more neatly squared off and finished than those used in the rest of the masonry.

To the north in Room B47 two bisected fragments of a single wall foundation cut through the levelling layers and medieval pit

[141] (*cf* Figs 6 and 7). Wall [124]/[127] was constructed of roughly hewn chalk blocks bonded with the same soft brown gravelly mortar as foundation [191]. This foundation was *c.* 2.50m long, 1.40m wide and was aligned north-east to south-west (Fig 17). Abutting the northern side of foundation [124]/[127] was a second footing, [125] (Figs 7 and 17).



*Fig 8. Period 4, chalk wall foundation [191] in Lightwell 1, facing north-west (0.5m scale)*

It was constructed of roughly hewn blocks of Reigate and Hassock stone, without any bonding material or mortar. The presence of both Hassock and Reigate stone suggests a date after 1500 for its construction (see Hayward below). This masonry foundation appeared to be on a north-west–south-east alignment, perpendicular to [124]/[127]. Unfortunately, neither the location of the eastern face of [125] nor its northern extent could be determined due to later activity; its recorded length was 0.84m and it was at least 0.90m wide.

To the north-east in Room B52 were three more small fragments of wall foundations (Fig 7). The largest of these, [75]/[76], was aligned north-east to south-west. It was constructed from roughly hewn chalk blocks bonded with the same brown gravelly lime mortar as the other foundations. This foundation was 3.54m in length and may have once continued further west, but no

continuation of it was found in Corridor 1. This foundation was 0.94m wide. Located further south were two more wall foundations, [73] and [74], which were both constructed from roughly hewn chalk blocks bonded with brown gravelly mortar. Foundation [73] measured 1.10m by 1.30m and it apparently was aligned north-west to south-east, but the small surviving area made this difficult to determine. The northern portion of this masonry appeared to have a butt-end just short of foundation [75]/[76]. Foundation [74] appeared to be aligned north-east to south-west and was 1.40m long terminating at its western end and apparently continuing beyond the excavation limit to the east. This foundation was of a similar width to the others at *c.*1m.

These masonry foundations appear to represent the remains of one or more medieval buildings aligned north-west to south-east, perpendicular to the Strand. These buildings were demolished prior to the construction of the Tudor palace, but elements of them may have been selectively reused as part of the foundations of the palace (see below).

### ***Period 5: The Tudor Palace (c.1547–1609)***

#### ***Levelling Deposits***

In Room B60, a levelling layer, [175] (not illustrated), was observed at a level of 3.90m OD. A single sherd of the base of a Frechen stoneware (FREC) bottle was recovered from the top of this layer, dating to *c.*1550–*c.*1700, suggesting that it was deposited during or after the late 16th century. Similar deposits, [194], [195] and [197], were observed in the eastern half of Lightwell 1, which had a top height of 5.45m OD. Layer [197] contained fragments of Kentish ragstone rubble which may represent debris connected with the construction of the Tudor palace. Other probable contemporary levelling layers were observed in Corridor 2 as [185], Room B45 as [97] and [86], at heights of between 5.0m OD and 5.40m OD respectively, and as [59] in Room B52, at 5.85m OD. All these layers were discovered at formation level and therefore were not excavated. A small assemblage of ceramic building material was recovered from [86] including medieval

splash glazed and early post-medieval peg tiles dated to *c.*1480–*c.*1700. The combination of this dating evidence and that the deposit is stratigraphically earlier than a Tudor wall, [50] (see below), suggests that it represents ground levelling prior to the construction of the Tudor palace during 1547–53 (see above).

### *Wall Foundations*

A number of truncated and fragmentary wall brick and masonry foundations were recorded throughout the basement. They are interpreted as part of the cellars under the southern range of the Lower Court of the Tudor palace of Somerset House, along with some lengths of garden walling. All the bricks used in these foundations were red Tudor bricks dating to *c.*1450–*c.*1700, which were not widely used in London until after 1500 (see Hayward below). These bricks were bonded by a brown sandy or gravelly sand lime mortar. The top level of these walls varied from 5.75m to 5.85m OD. These foundations survived to varying heights above the new formation level, so only limited portions of them were excavated and examined.

Cutting the levelling layers in Lightwell 1 was a wall foundation [192]/[193] aligned north-west to south-east which was bisected by later activity (Figs 9 and 16). The southern section of wall ran for 1.77m in length and had a surviving width of 0.90m; however, the eastern face of the wall had been removed, so its true original dimensions could not be determined. The northern section of the wall was very fragmentary and both its face edges were missing; it survived as a fragment measuring 1.00m long by 0.90m wide. The walls were constructed of bricks with the western part faced with Kentish ragstone ashlar blocks and mouldings. The southern face of the wall was also faced with Kentish ragstone ashlar blocks, illustrating that the western and southern sides were true edges.

To the east in Room B53 were two brick and masonry walls, [40] and [41], which may have abutted wall [192]/[193]. Wall [40] was aligned north-east to south-west; it was *c.*4m long by 1.20m wide (Fig 9). Its northern half was constructed of bricks and the southern half was constructed of Kentish ragstone ashlar blocks and architectural

mouldings, which formed a neat external face, similar to wall [69] in Room B45 (see below). A secondary phase of this wall, [41], was recorded directly south of wall [40]. It ran on the same alignment and projected 0.40m south from the original wall. Wall [41] was constructed of identical brickwork with a southern face built of Kentish ragstone ashlar blocks and mouldings. It may represent a refacing of the original wall.

In Room B52 there was a north-east–south-west aligned wall, [50], 3.50m in length and 0.80m wide (Fig 9). The eastern continuation of this wall had been removed by the foundations of the present basement (Period 7). It was constructed of bricks bonded with a hard white clinker lime mortar probably dating to the 18th century, which may represent a later repointing. However, this seems unlikely as it clearly pre-dates the basement (Period 7). A small remnant of a possible brick-paved cellar floor, [51], extended 0.20m north of the wall, [50], and survived for a length of 1.40m at 5.83m OD. To the west of wall [50] was a north-west to south-east aligned length of brick-lined drain, [49] (Fig 9). It was 1.70m long and consisted of two parallel lining walls surviving to a height of 0.20m with a base paved with early post-medieval ceramic peg tiles, [60]. It had an overall width of 0.76m and its interior was 0.29m wide. This drain apparently cut through Tudor wall [50], suggesting that it was a later alteration to the palace. The backfill of it contained a single sherd of residual medieval Kingston-type ware (KING) and an assemblage of ceramic building material which included reused post-medieval peg tiles, plus Tudor and transitional bricks which provided a terminus post quem of 1750 for the deposition of this fill. This brick drain is of interest as it is the only such feature recorded within the Tudor palace. The extant Somerset House basement possesses a network of drainage culverts (see Period 7) and it is assumed that a similar network existed under the Tudor palace.

The walls described above when overlaid on Kenton Couse's plan of the basement and principal floor of 1775 (Fig 10; Thurley 2009, 126, cat 33a, 33b) appear to represent part of the central room in the southern range of buildings in the Lower or Inner Court. Wall [40] probably represents part of the original

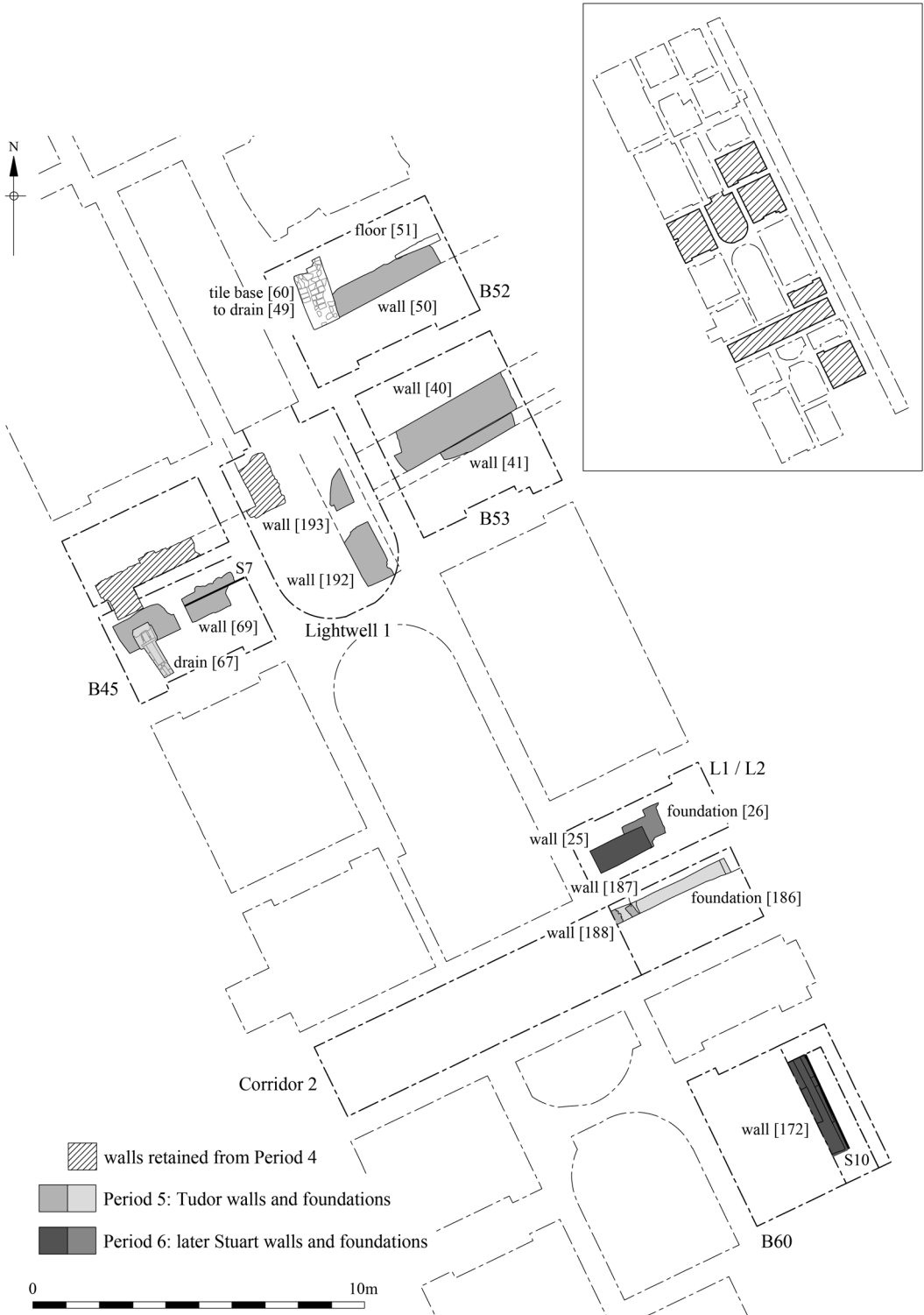


Fig 9. Period 5, Tudor palace foundations, and Period 6, Stuart alterations (scale 1:200)



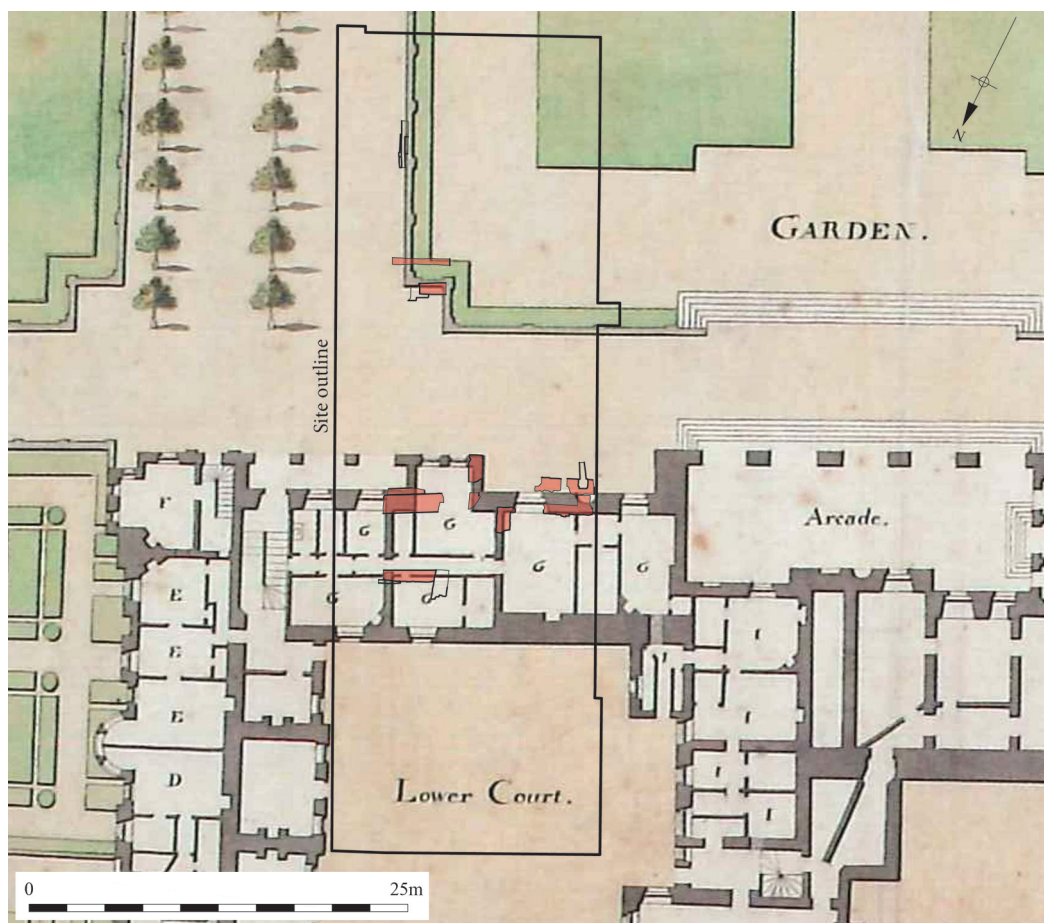


Fig 10. Periods 5 and 6 palace walls overlain on Kenton Couse's basement storey plan of 1775, north is towards the bottom of the plan (scale 1:500) (The National Archives, ref WORK30/260)

southern or external wall of this room, while walls [192]/[193] possibly formed part of a projecting architectural feature such as a bay window situated within the southern wall. Wall [50] appears to be the foundation of an internal dividing wall. This ground storey room was originally the Privy Chamber, and during the late 17th and 18th centuries it was known as the Great Bed Chamber (*ibid*, figs 5, 7, 11, 17, 18 and 21), although annotated as the Dressing Room by Couse.

A substantial masonry wall, [69] (Figs 9, 11, section 7, and 12), was constructed on the southern side of the earlier chalk foundation, [70] (Period 4, see above), to apparently allow its reuse as part of the palace. This masonry was c.4m long by

2.50m wide and was constructed of Kentish ragstone and Hassock stone. Along the southern side of the wall was a basal plinth, [98] (Fig 11), which was built of Kentish ragstone, mouldings and ashlar blocks. This wall represents part of the southern outer wall of the Lower Court. It was originally the Presence Chamber of the Tudor palace and later known as the Withdrawing Room or Drawing Room (Fig 3; Thurley 2009, figs 5, 7, 11, 17, 18 and 21).

To the south of the site in Corridor 2, a north-east to south-west aligned masonry foundation, [186] (Fig 9), cut through levelling layer [185]. This foundation was constructed of moderately sized blocks of roughly hewn Kentish ragstone and chalk

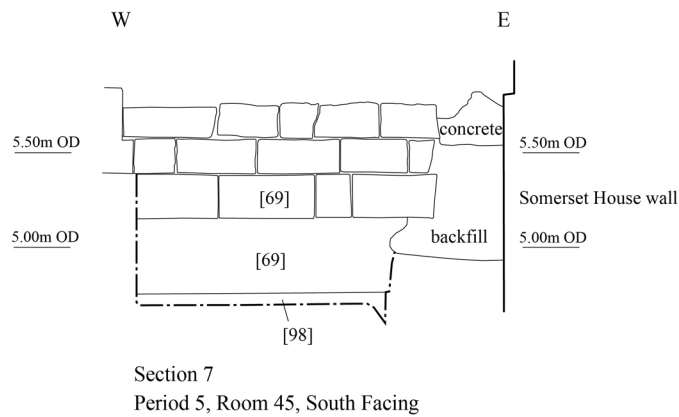


Fig 11. Section 7, wall [69], and section 10, wall [171]/[172]/[173] (for section locations see Fig 9) (scale 1:40)

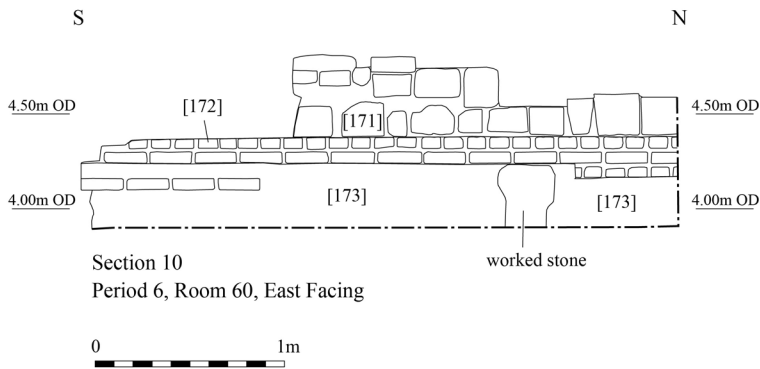


Fig 12. (below) Tudor masonry wall [69] in Room B45, facing west (0.5m scale)





rubble blocks bonded by brown sandy lime mortar and measured 3.80m long by at least 0.46m wide. It appeared to terminate at its eastern end. However, it was difficult to be sure due to later disturbance. Located directly adjacent to the western end of foundation [186] were what appeared to be two parallel lines of brick walling, [187] and [188], aligned north-west to south-east, set approximately 0.30m apart. Both walls were bonded with similar mortar to the adjoining masonry foundation. Wall [188] had a single course of roughly hewn chalk blocks lain upon the top of its brickwork. These truncated foundations represent part of an external garden wall of Somerset House, as illustrated on Couse's plan of the basement and principal floor of 1775 (Fig 10).

#### ***Period 6: The Stuart Palace (c.1609–1776)***

Truncated and fragmentary brick and masonry structures, which are interpreted as later alterations to the Tudor palace, were observed in two rooms within the basement of the East Wing.

Cutting the levelling deposit in Room B60 was a north-west to south-east aligned wall foundation (Figs 9, 11, section 10, and 13). This foundation, which measured at least 4.60m in length with a width of 0.60m, consisted of three distinct portions. Its lowest element was constructed of rubble and reused architectural stonework, including lengths of Tudor-style bay window mouldings and gutterings produced in Caen and Bathstone, [173]. Its middle section consisted of a levelling or bonding course of up to three courses of red Tudor bricks, [172]. The top portion of this foundation was constructed of a mixture of rubble masonry, plus reused architectural stonework and ashlar blocks, [171]. This material included more Tudor-style bay window components, such as an ornate Caen stone moulding (see Hayward below). Cartographic sources confirm that this composite foundation represents part of an external garden wall situated south of the Tudor palace (Fig 10). The reuse of Tudor-style masonry in this garden wall suggests that it was not constructed as part of the Tudor palace and therefore is likely to be



*Fig 13. Masonry walling [171] over brickwork [172], built on wider masonry foundation [173] in Room B60, facing south (0.5m scale)*



*Fig 14. Masonry wall foundation [26] in L1/L2, facing north-east (0.5m scale)*

part of one of the 17th-century alterations (see above).

To the north in Room L1/L2 was a masonry foundation, [26], upon which was built a rectangular 0.34m high, block of brickwork, [25], constructed of red Tudor bricks, bonded by a hard grey cream lime mortar, which suggests an 18th-century date (Fig 14). Aligned north-east to south-west, this badly truncated wall foundation measured at least 1.72m long by 1m wide. The masonry foundation, [26], had a top height of 4.34m OD and was constructed predominantly of reused architectural stonework and ashlar blocks derived from various sources (see Hayward below). Amongst the reused material were more fragments of Tudor-style bay window, including numerous sections of tramline mullions, cornices and sills. The combination of the reused Tudor architectural stonework and this particular mortar type suggests that this particular fragment of garden wall situated south of the palace represents an 18th-century alteration (Fig 10).

Recorded in Room B45 was a short length of external drain, [67] (Fig 9). It was aligned north-west to south-east and flowed southward. It was exposed for a distance of c.1.70m and was 0.62m wide. The northern end of this drain, which appeared to possess an opening (into which some form of downpipe would originally have fed), abutted the southern or external face of palace wall [69]. It was constructed of reused red Tudor bricks, plus some transitional post-Great Fire bricks (post-1666). Some reused Kentish ragstone rubble blocks were used as a capping to the structure. A clinker-rich lime mortar apparently bonded the brickwork of the drain and probably dates to the 18th century. This drain is interpreted as an 18th-century addition to the palace, intended to remove roof water.

### ***Period 7: Government Offices (c.1776–1840)***

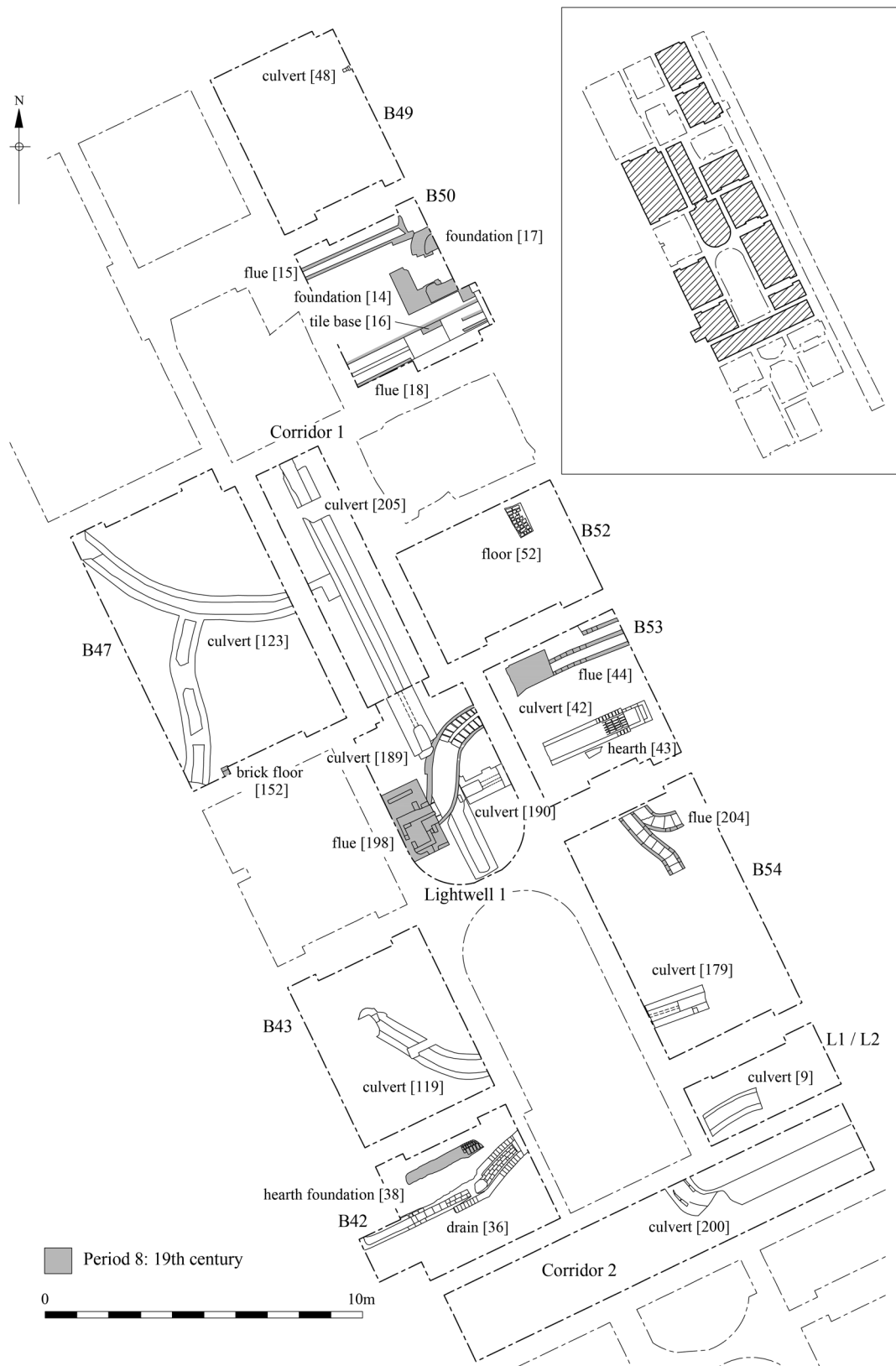
#### ***Dump/ Levelling Deposits***

Recorded throughout many of the basement rooms during the watching brief were various dumped and levelling deposits (not illustrated) interpreted as debris derived from the demolition of the Tudor palace and the construction of the extant East Wing of Somerset House during 1776–85 (see above). Many of these deposits were unexcavated as they lay below the formation level of the new basement. Therefore, very few finds were recovered from these layers and they cannot be precisely dated. The few datable finds recovered include a rare, late 17th-century English tin-glazed ware (TGW) candlestick. The vast majority of these levelling layers were stratigraphically earlier than the culverts (described below) and the basement foundations of the standing building (Fig 2).

#### ***Culvert Network***

Recorded running throughout the basement of the East Wing was a network of domed brick-built drainage culverts (Figs 15–17). This extensive network appeared to have a central spine which ran through the centre of

*Fig 15. (facing) Period 7, drainage culverts and other features, and Period 8, flues and other additions (scale 1:200)*







*Fig 16. Multi-period activity in Lightwell 1: Period 4, chalk wall foundation [191]; Period 5, wall foundation [192]/[193]; Period 7, brick culverts [189] and [190]; and Period 8, brick flue [198], facing north-west (0.5m scale)*

the basement, with a number of connecting ducts running through various basement rooms, roughly north-west to south-east, before exiting both to the east and west. The internal base of the culverts, where exposed, suggested that the offshoots channelled the water down to the central spine of the system which then fed the waste water from north to south, with a top height of 5.47m OD to the north-west in Room B47 and a lowest height of 4.80m OD in Room B42 to the south (Fig 15).

These various interconnecting culverts were all of very similar construction. Generally the culverts were 0.75m wide and 0.45m high. They were all constructed of purple stock moulded post-Great Fire bricks, with clinker inclusions, which conformed to the brick size legislation act of 1775. These bricks consisted of both frogged and



*Fig 17. Period 4 masonry foundations [124], [127] and [125] bisected by a Period 7 brick drainage culvert [123] in Room B47, facing north-west (0.5m scale)*

unfrogged examples. Some of these culverts contained yellow London stock bricks, which were widely used from c.1840 onward, suggesting some later alterations or repairs were made to the network of culverts. Stock bricks, identical to the purple ones used in the original build of the culvert, can also be seen within the basement walls of the extant Somerset House, which confirms that these culverts are contemporary with the standing building. The backfill of the culvert, [123], in Room B47, contained pottery dating to the mid-19th century, confirming when the network went out of use.

Also recorded were two other contemporary features. In the southern half of Room B52 there was a small remnant of a brick-paved, basement floor, [52] (Fig 15), at 5.83m OD, constructed of a single course of reused thin post-Great Fire bricks, bonded with a hard creamy grey, lime mortar, indicative of either a late 18th- or early 19th-century date. In Room B53 there was a small fragment of brickwork, [43], which measured 0.60m by 0.21m. It was constructed of the same brick and mortar types as the culverts and is interpreted as a hearth foundation.

### ***Period 8: Late 19th-Century Alterations***

A series of brick features and structures of late 19th-century date were also observed, mainly consisting of a network of brick-lined flues or ducts with brick and peg tile-paved bases (Figs 15 and 16). These flues were recorded within at least four rooms of the basement. Many of these structures were double flues, having two internal channels running alongside one another. These structures were generally constructed of wide frogged post-Great Fire bricks, narrow post-Great Fire bricks and yellow London stock bricks (post c.1840). The brickwork was bonded with a hard clinker lime mortar, which along with some types of brick used suggests a late 19th-century date.

These flues contained black sooty/ash residues, suggesting that heat or smoke had passed through them and that they formed part of an underfloor heating system (see discussion and conclusions below). One structure, flue [204] in Room B54, had its capping still extant and had been constructed in the same manner as its base. An associated

square brick-built structure, flue [198] in Lightwell 1, into which one of these double flues ran was clearly integral to the heating system and may have represented the location where the hot air passing through the flue structures was directed upwards.

A handful of other brick-built features dating to the 19th century were also observed within the basement of the East Wing. Recorded in the northern extreme of Room B42 was a hearth foundation, [38], located against the northern wall of the room (Fig 15). Located in Room B47 was a small area of paving, [152], which may have been another hearth foundation located against the southern wall of the room. Recorded in Room B50 was an L-shaped brick foundation, [14], of unknown function.

## **FINDS REPORTS**

### ***The Middle Saxon Pottery***

#### *Berni Sudds*

A small assemblage of Middle Saxon pottery was recovered, amounting to 11 sherds, weighing 390g (Table 1). Eight sherds were recovered residually within deposits dated to the medieval period or were unstratified. Just three were retrieved from a Period 2 pit, [93] (Fig 4). The remaining assemblage recovered during excavations, comprising a further 163 sherds weighing 5,528g, is of medieval and post-medieval date, but is not considered here.

The Saxon pottery was classified and dated according to the framework set up by Lyn Blackmore based upon findings from a number of Lundenwic sites (Blackmore 1988a; 1989; 2003; 2012). The assemblage was quantified for each context by fabric, vessel form and decoration using sherd count (with fresh breaks discounted), estimated vessel numbers and weight. Examples of the medieval and later pottery fabrics can be found in the archives of PCA and/or the Museum of London (LAA). A full catalogue of the pottery, including the later material, can be found in the site archive.

#### *Pit [93]*

Three sherds of Middle Saxon date were recovered from the fill of pit [93], attributed

Table 1. The Middle Saxon pottery by fabric, date range, sherd count and minimum number of vessels (MNV)

Fabric code	Expansion	Date range (c.AD)	Sherd count	MNV
CHFS	chaff-tempered ware: abundant organic temper in London clay/brickearth matrix with moderate quartz sand (up to 1mm) with sparse flint/chert	450–750	2	2
IPSC	Ipswich coarse ware	730–850	1	1
IPSM	Ipswich intermediate ware	730–850	1	1
IPSF	Ipswich fine ware	730–850	1	1
MSOLC/D	oolitic limestone-tempered ware	600–850	1	1
MSSF	shell-tempered ware	770–850	1	1
NFEBB	North French/East Belgium hard greyware, frequently burnished	600–850	1	1
NFGW	North French greyware	600–850	2	2
NFGWC	North French greyware: very fine, hard and thin-walled	600–850	1	1

to Period 2, including two imports (NFEBB; NFGWC) and a distinctive regional oolitic-limestone tempered vessel (MSOLC/D). The latter contains abundant poorly sorted inclusions, including quartz, rounded fragments of oolitic limestone, shelly limestone, flint and iron ore. The parent clay (Reading Beds type) suggests a potential source within the London basin, somewhere to the north-west (Blackmore 2012, 246; L Blackmore, pers comm). The two remaining sherds are both imports: a sherd from a burnished North French/East Belgium hard greyware (NFEBB) vessel and a possible North French greyware (NFGWC) pitcher. Imports represent commonplace finds across Lundenwic, typically occurring as tablewares for the serving of liquids (Blackmore 1988a, 89).

*Residual Middle Saxon Pottery*

The residual assemblage is comprised of local, regional and imported fabrics commonly found across Lundenwic. The locally produced pottery is comprised of early chaff-tempered ware (CHFS), representing the most prevalent type of pottery in Lundenwic during the mid-7th to mid-8th century (Blackmore 2012, 233). Chaff-tempered ware went into decline following the introduction of Ipswich ware from c.AD 730 (*ibid*), represented in the residual assemblage by three vessels (IPSC; IPSM; IPSF) with the latter tradition dominating

assemblages in Lundenwic by c.AD 750 (*ibid*, 237). Typologically later fabrics are represented by a single small body sherd from a shell-tempered ware vessel (MSSF), dating from the late 8th, or possibly even 9th century (*ibid*, 247). Finally, the imported wares comprise two sherds of North French greyware (NFGW), one with a band of rouletted decoration to the shoulder (Fig 18).

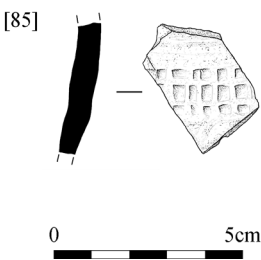


Fig 18. Residual Middle Saxon North French greyware (NFGW) sherd with a band of rouletted decoration [85] (scale 1:2)

*The Loomweights*

Berni Sudds

A total of 11 fragments of loomweight, representing nine individual semi-complete weights typologically of Saxon date, were recovered from five contexts attributed to Periods 2 and 3 (Table 2).

The majority of the weights are in Fabric



Table 2. Distribution and quantification of loomweight fragments

Period	Context	Form	Fabric	No. of fragments	Weight (g)	Diameter (mm)	Height (max mm)	Cord mark
2	[94]	bun-shaped	2	1	238	142	46	
2	[94]	intermediate	1a	1	148	116	60	
2	[94]	intermediate	1a	1	109	112	44	
2	[94]	annular	1a	1	157	128	40	Yes
2	[99]	intermediate	1a	2	207	128	45	
2	[99]	annular	1a	2	244	136	43	
3	[71]	annular?	1a	1	81	0	36	
3	[72]	intermediate	3	1	158	122	59	Yes
3	[79]	intermediate	1a	1	107	118	45	

1a, having a fine micaceous body containing some sand and flint with added organics (Blackmore 1988b, 111, table 13; Goffin 2003, 216; Riddler 2004, 20; Keily 2012, 218–22). This is the most common loomweight fabric type identified in Lundenwic, although other rarer variants are also represented (Fabric 2 and 3). The weights would have been manufactured within the settlement from the local brickearth and thus variability is encountered within these fabric groupings, particularly given the piecemeal nature of production.

The current classification of loomweight forms was developed by Hurst who identified three types reflecting differences in date and to some extent manufacture (1959, 23–4). Annular types, made from a coil of clay are Early Saxon, intermediate types and bun-shaped/biconical examples, each made from a ball or disc of clay with the hole pushed out, are of Middle and Late Saxon date respectively (*ibid.*, 23–4; Riddler 2004, 19; Walton Rogers 2007, 30; Blackmore 2008, 195–6). In the years since this typology was created, particularly within Lundenwic, various sub-classifications have been created largely within the intermediate category, but the main types still remain valid (Goffin 2003, 218; Keily 2012, 222). Of course, as with fabric, given the piecemeal nature of production, not all weights fit neatly within the typology with individual examples displaying characteristics typical to more than one form type (Blackmore 1988b, 111; 2008, 196; Goffin 2003, 218; Keily 2012, 222). Nonetheless, amongst the nine weights recovered, three are annular, five are intermediate and one is bun-

shaped, although within the intermediate category both tall and near-annular examples are evident.

The dating of the form types has also been subject to revision as, although largely chronologically successive, the three forms occur together in Middle Saxon deposits from Lundenwic and appear to have been in use at the same time (Hurst 1959, 24; Blackmore 1988b, 112; 2008, 196; Goffin 2003, 220; Riddler 2004, 19, 22). This also appears to be the case at Somerset House, with all three types represented in pit [93] (Period 2, fills [94] and [99]), dated *c.*AD 600–800, and provides further confirmation that although annular types are typically Early Saxon they continue to be used in the Middle Saxon period (Walton Rogers 2007; Blackmore 2008, 196) and traditionally Late Saxon bun-shaped or biconical forms appear to have been in use as early as the late 7th and 8th centuries AD (Goffin 2003, 218; Walton Rogers 2007, 30; Blackmore 2012, 222). This may indicate a long-lived process of transition between the distinctly annular and biconical/bun-shaped forms.

The weights would have been used to keep the warp threads of an upright loom taut (Malcolm & Bowsher 2003, 85). Three of the weights are redeposited within made ground and dump layers of medieval date (Period 3), but the remaining six were recovered from the fills of pit [93], providing convincing evidence for weaving activity in the immediate vicinity. Loomweights are ubiquitous on sites across Lundenwic, indicating that weaving was taking place

across the settlement within households, as observed at Hamwic (Leary 2004, 11; Keily & Blackmore 2012, 156; Andrews 1997). Excavations at the Royal Opera House to the north-west, however, have also revealed that textile manufacture appears to have developed from a craft into an industry during the early 8th century AD (Malcolm & Bowsher 2003, 169–70; Cowie & Blackmore 2008, 149–50). This appears to coincide with the arrival of Ipswich ware in Lundenwic with both developments potentially stimulated by the Frisian traders (*ibid*). The small size of the current assemblage can add little information, but the picture emerging is of a ‘cottage’ industry with textile manufacture undertaken in designated weaving huts and in domestic houses (Keily & Blackmore 2012, 156).

*The Roman Ceramic Building Material*

Kevin Hayward

A brief description of a small group (5.8kg) of intermixed, broken up and abraded Roman brick, roofing and box flue tile recovered from the Saxon and medieval levelling layers [71], [72], [79] and [100] and pit fills [85], [87] and [94] from Room B45 follows.

Most of the common fabric groups for London are present (Table 3), with the common London early sandy groups 2452, 2459a and 3006 dominant with proportions (66% by weight) in keeping with Roman London as a whole. Other early fabric groups account for a further 28%, together with later 2nd- to 4th-century AD non-local grey calcareous 3013 and Reigate 3014 fabrics (6%) emphasise the intermixed nature of the assemblage.

In terms of its form, the assemblage is largely unexceptional, with proportions of brick and roofing tile typical for Roman London. Of note, however, is a heavily abraded roller stamp from [100] comparable with Betts billet design group [100] (Betts *et al* 1997, 104–5).

In the absence of any known Roman structure in the vicinity, it is probable that this mixed group may have been salvaged from the city and either brought along the adjacent London–Cirencester road or brought upstream for use as revetment/consolidation dumps to build up the land for Saxon and medieval occupation, rather like that at Thorney Island (Thomas *et al* 2006; Hayward 2013a).

*The Medieval and Early Post-Medieval Ceramic Building Material*

Kevin Hayward

*Medieval*

Rather like the Roman tile and brick the medieval building material recovered from Somerset House is unremarkable in terms of its preservation, size (6kg) and range of fabrics. Instead it is limited to small groups of reused glazed and unglazed peg tile in fabrics 2271 (*c.*1180–1450) and 2587 (*c.*1240–1450), intermixed with the Roman material from pits and dumps beneath Room B45 ([71], [72], [79], [85], [87], [91], [94]). There is no evidence for high-status plain or decorated floor tile that would be expected given the documented location of the bishops’ inns, for example Chester Inn and St Mary of Strand, in the immediate

Table 3. Roman ceramic building material by fabric types, source, date of manufacture and weight (all periods) from Somerset House

Fabric	Kiln source	Date range ( <i>c.</i> AD)	Weight (g)	Weight %
Early Sandy Group 2452; 2459a; 3006	tileries between London and St Albans, Hertfordshire, along Watling Street	50–160	3819	66
Radlett Group 3023/3060	Radlett, Hertfordshire	50–120	1181	20
Eccles Group 3022	north-west Kent–River Medway	50–80	168	4
Weald Silt Group 3238	Weald area south of London	71–100	149	4
Reigate Group 3014	Reigate, Surrey	140–230	156	4
Calcareous Group 3013	coastal southern or south-east England	180–350	67	2



vicinity (Croot 2009, 9–11); this feature was seen in the nearby Phase III watching brief of the Great Court area (Smith 2005, 44) where just one solitary decorated Penn tile fragment was observed.

### *Tudor Bricks*

Because of the homogeneity of the assemblage, only brief comment is necessary on the form, fabric and mortar type of the few Tudor brick walls. Occasional *in situ* examples of red, poorly made shallow (50–60mm) and wide (110–116mm) Tudor bricks in fabric 3033 (*c.*1450–*c.*1700) turn up in Corridor 2 brick walls [187] and [188] and masonry foundations [186] as well as early brick culvert [49] from Room B52. These are pointed in a brown sandy or gravel sandy mortar, and are likely to represent fabric from the 1547–53 construction of Somerset House. There are also two brick walls, [192]/[193], in this fabric together with Kent ragstone from Lightwell 1. In addition, the walling also from the area of the Lower Court in Room B52, [50] and [51], is likely to be Tudor and repointed in a later mortar.

These same types of brick were identified lining the floor and sides of the nearby Strand Lane Bathhouse (Hayward 2011), which despite its name contained no square Roman bricks. Instead the structure corresponds to that mentioned in Somerset House Works Accounts between 1611 and 1612 that state that it originally functioned as a cistern for the Mount Parnassus grotto-fountain in the privy garden of Denmark (Somerset) House in 1612 (Trapp 2013). Comparable bricks in fabrics 3033 and 3039 were also identified in large quantity in the Phase III watching brief of the Great Court area of Somerset House (Smith 2005, 42) which was identified as belonging to either the mid-16th-century palace or Inigo Jones's work in the 1630s.

### *The Medieval and Tudor Architectural Stonework*

*Kevin Hayward with additional comments on the mouldings by Neil Rushton*

#### *Introduction*

A sizeable group (63 examples) (577kg) of reused architectural stonework, including

some exquisitely carved items were retained mainly from three Period 6, 17th–18th-century brick and stone garden walls, [26], [171] and [173], from Somerset House. Two aspects of stone study are considered in this review. First, a comparative petrological review of the stone types (see also Table 4) will be used to establish not only the materials used for these carvings, but also to determine where the stone was being quarried. Secondly, an art historical review of the more intricately carved items will not only establish their period of manufacture, but also ascertain their original use.

In the discussion, both datasets are considered together to ascertain whether or not the assemblage represents fresh stonework from a single building campaign, in this case to embellish the 1549 Lord Protector's House. There is documented reuse of stone at Somerset House from a number of ecclesiastical buildings and bishops' houses in the capital (Thurley 2009, 16–17), following the 1540 Dissolution of the monasteries, as well as the recycling of stone at the nearby riverside Whitehall Palace from the 1512 fire at Westminster Palace and from Wolsey's buildings after 1530 (Thurley 1999, 38). It was also possible that some of the stone from Somerset House could have been salvaged from earlier medieval or very early post-medieval constructions.

With no building records from Somerset House relating to the procurement and source of fresh consignments of stone for the palace, a key objective will be to use geological techniques to establish what stone types were being used in its construction and from where they were being quarried. Comparison will be made with other assemblages recorded from excavations at Somerset House including excavations of the South Wing and River Terrace (SRD97; SMH97; CTI98; Wood & Munby 2003) and Great Court (SRA99; Samuel 2005) in order to get an overall picture of stone type and use in its construction. Stylistically comparable late medieval–early post-medieval stone from the Priory of St John of Jerusalem (JON89; Sloane & Malcolm 2004) will also be examined, as documentary evidence for the removal of stone here after 1540 is attested to in building records from accounts at Whitehall Palace (Thurley 1999, 52) and Somerset House (Thurley 2009, 16–17).

Table 4. Rock types identified from the Somerset House excavations (EAF10)

MoL fabric code	Description	Geological type and source	Use at EAF10
3105	fine hard dark grey sandy limestone	Kent ragstone, Lower Cretaceous, Lower Greensand Maidstone District, Kent	19 examples reused in L1/L2 foundation rubble [26] as rubble stone and large ashlar blocks, but also as rubble in B53 brick and stone wall [40] and [41], B45 brick and stone drain [67] and [68] and wall [69] as ashlar and rubble and C2 masonry foundations [186] with red brick; whetstone [79] B45 dump layer
3106	yellow-green glauconitic sandstone	Hassock stone, Lower Cretaceous, Lower Greensand Maidstone District, Kent	3 examples B47 masonry foundations [125], in B53 brick and stone wall [40] as walling rubble, C2 masonry foundations [186] with reused Tudor brick
3107	fine grained low-density glauconitic limestone	Reigate stone, Upper Greensand, Lower Cretaceous Reigate-Mertsham, Surrey	5 examples reused in L1/L2 foundation rubble [26] once a possible window jamb, and foundation rubble for B47 [125]
3109	cream-yellow oolitic limestone, oolitic grainstone (Dunham 1962)	Corsham/Monks Park stone, Bathonian, Middle Jurassic, Wiltshire-Avon	3 examples, 2 in L1/L2 foundation rubble [26] as ashlar and a classiscising window jamb, as foundation rubble in B60 [173] guttering reused in T1 mortar; WSN17; thin section sample SOM 1 and 7
3110	hard light-grey, fine grained oolitic grainstone (Dunham 1962)	Portland whitbed (Portland stone), Portlandian, Upper Jurassic, Isle of Portland, Dorset	1 example [544] ashlar fragment reused in 19th-century T6 gravel mortar
3116	fine white powdery limestone	Chalk, Upper Cretaceous (Upper Chalk), London Basin	exclusive use of ashlar blocks and rubble in <i>in situ</i> stone foundation of B52 [73] [74] [75] and probably B45 T4 mortar
3117	hard dark-grey siliceous cryptocrystalline sandstone	Flint, Upper Cretaceous (Upper Chalk), London Basin	2 examples nodules late medieval/early post-medieval B45 pit fill [85] possibly natural gravel fragments
3118	white nodular low-density calcareous stone	Calcareous Tufa, Holocene nearest outcrops chalk outcrops Thames Estuary or Medway	1 example fragment late medieval/early post-medieval B45 made ground [71] possibly Roman or medieval vault

3119	fine yellow to orange-yellow limestone Yellow Packstone (Dunham 1962)	Caen stone, Calcaire de Caen, Bathonian, Middle Jurassic, Département Calvados, Normandy	24 examples including 18 mouldings and 1 ashlar in L1/L2 foundation rubble [26] as reused tramline mullion mouldings, classicising cornices or window sills and 1 other ornate piece; second group from B60 as ornate moulds in foundation rubble [173] and walling [171] as ashlar, classicising window jamb all repointed in T1 mortar; WSN1–15, WSN18, WSN20, WSN22–23; thin section sample SOM 6
3120	very fine powdery white limestone with small laths of calcite spar White Packstone (Dunham 1962)	Beer stone, (Upper Cretaceous) Chalk, Exeter, Devon	4 examples B60 masonry wall [171] and L1/L2 foundation rubble [26]; examples of reused ashlar, cornice and jamb moulds in T1 mortar; WSN 17; WSN21, WSN24; thin section samples SOM 4 and 6
3123	hard, coarse, dark-grey vesicular basalt lava with white (leucite) and black inclusions	Neidermending lavastone Tertiary-Andernach region, NW Germany	1 example fragment B45 [85] Saxon pit fill probable rotary quern fragment
3126	hard light grey limestone, bi with numerous black oyster shells bioclastic grainstone (Dunham 1962)	Purbeck limestone, 'Thornback', Upper Jurassic (Purbeckian), Isle of Purbeck, Dorset	2 examples large pavers examples B45 drain (drain cover material?) [67] [68]
3143	very hard yellow-brown shelly-oolitic grainstone (Dunham 1962) with high spired nerinoid gastropods and complete oyster	Barnack stone, Bajocian (Middle Jurassic), Barnack Village, Cambridgeshire	1 example L1/L2 foundation rubble [26] funerary fragment broken up reused T1 mortar; thin-section sample SOM 2
3153	weathered brown-yellow skeletal porous grainstone (Dunham 1962) with coral fragments	Headington stone, Oxfordian (Upper Jurassic) Headington Quarry, Oxfordshire	2 examples L1/L2 foundation rubble [26], reused corroded possible ashlar or degraded mouldings; thin-section sample SOM 3

*Architectural Stonework: The Petrology*

## Regional Geological Setting

Materials suitable for fine carving are termed by quarrymen and masons as freestone. These consist of fine, even-grained limestones and sandstones characterised by a soft, open porous texture that enable the rock to be worked or carved in any direction, take inscription and yet be hard enough to withstand external weathering. Most of these rocks are of Middle Jurassic age, exposed along a 322km long north-east to south-west trending limestone scarp face that runs from Humberside down to the Dorset coast, before reappearing on the north French coast in Normandy.

London lies in an area of the British Isles where the underlying bedrock consists of poorly consolidated geologically recent Tertiary sands and clays that are too soft to be suitable for fine carving or ashlar. Although some harder examples of Upper Cretaceous chalk exposed immediately to the south-east of the medieval capital have Holocene river deposited Tufa, proven to be suitable ashlar materials in the construction of, for example, the 12th-century refectory wall at Westminster Abbey and the Pyx Chamber (Hayward 2009a), they are too soft to be worked into intricately carved mouldings. Slightly further afield, the calcareous and glauconitic sandstones, such as the Kentish ragstone and Hassock stone from the Lower Greensand of the Medway, are in the main too hard, restricting tooling to just superficial carving and dressing.

Fortunately, the Thames provided London with excellent riverine and maritime access to continental and native coastal freestone exposures, as well as its upstream links with the Cotswold escarpment and the North Downs (Reigate stone) via Battersea (Tatton-Brown 2000) providing a whole range of suitable material types for internal and external decoration.

## Existing Studies

It is surprising given the size and grandeur of Tudor palaces in Greater London that so little attention has been put towards understanding the geological character and style of their moulded stonework. Where specialist work has been

undertaken, it has instead focused upon the decorative plasterwork (Gapper 2009), brick (Richardson 2010) and terracotta (Smith & Watson 2014). A detailed study of these ceramic materials is fully justified, as they define Tudor palaces, and a great deal of innovation in their manufacture was occurring at this time. Nevertheless, the tradition of building in high-quality freestone continued unabated into the Tudor period and, if anything, the demand increased for these materials to embellish these enormous structures. Furthermore, this period is defined by the adoption of the Renaissance style of architecture and with it changes in the design and approach to stone carving, including the procurement of skilled craftsmen from the Continent.

Little research has been undertaken on the geological source of late medieval/early post-medieval building stone using earth science methods (petrological and geochemical). Instead, the geological source of stone used in Tudor and for that matter medieval buildings has largely been based on contemporary documentary evidence, especially building contracts (Salzman 1952, 119–39). Although these accounts are extremely useful in determining when and which types of rock were being quarried for a particular project, very few *in situ* examples have actually survived the ravages of time, meaning that there are large gaps in our understanding. Another problem is the absence of building records for some major sites, such as the 1520s development of Hampton Court (Thurley 2003).

A few petrological (thin-section) studies of medieval mouldings from London have at least begun to redress the balance. Ecclesiastical excavations at St Mary Spital (Samuel & de Domingo 1997), Holywell Priory (Hayward 2009b; Samuel 2011, 142), St Paul's Cathedral (Blows & Worssam 2011) and the civic London Guildhall (Donovan 2007; Hayward 2007) have included short petrological sections. Although the thin sections used in these reports have been used to answer specific questions relating to a particular aspect of that building's construction, as a group they also provide an increasingly large comparative temporal database of petrological types (Reigate stone, Caen stone, Taynton stone, Kentish

ragstone and Magnesian limestone) for the medieval capital.

Somerset House provides the ideal opportunity to redress this balance. The Duke of Somerset embraced ideas of Renaissance architecture and the import of continental craftsmen, including stonemasons, as well as pioneering the 'Somerset Circle'. This was a group of influential courtiers whose West Country homes at Lacock and Longleat (Wiltshire), where built out of and straddled the Middle Jurassic belt of limestone, where many of the high-quality freestones of the British Isles outcrop.

### Methodology

Each of the 63 examples of architectural stonework was examined using the London system of classification with a fabric number allocated to each one. The application of a 1kg mason's hammer and sharp chisel to each example ensured that a small fresh fabric surface was exposed. The fabric was examined at x20 magnification using a long arm stereomicroscope or hand lens (Gowland x10). Comparison was then made with the PCA moulded stone reference collection and petrological samples of medieval and post-medieval stone obtained from various sites in London to determine the fabric type, source and period of use.<sup>2</sup>

Thin-section preparation and analysis was undertaken on seven worked stone samples, including WSN16, WSN17 and WSN21 where either conventional hand specimen discrimination was not successful in determining its source or where representative examples of the key rock types could be illustrated as a series of photomicrographs (Fig 19). Photomicrographs (using a Leica DFC 320 digital camera) were taken from this section and other petrological samples compiled from earlier research (Hayward 2007; 2009b) of medieval stone from monastic sites in London in order to illustrate the diversity of fabric types.

Hand specimen descriptions of limestone used Dunham's (1962) classification of texture, whilst thin-section analysis employed Folk's (1959; 1962) classification based on grain type and cement.

### Results

In all, six major rock types were identified

in architectural stonework and ashlar from Somerset House. Most, for example Caen stone and Reigate stone, are common construction materials that form part of the medieval and early post-medieval package for London (Hayward in prep). However, some had not previously been identified from architectural mouldings in the capital before.

#### TYPE 1 CAEN STONE

Fine condensed cream, yellow or yellow brown limestone (packstone). Geological source: Middle Jurassic (Bathonian) Caen, Department Calvados, France. (Fig 19d) Examples: WSN1–15, WSN18, WSN20, WSN22–23

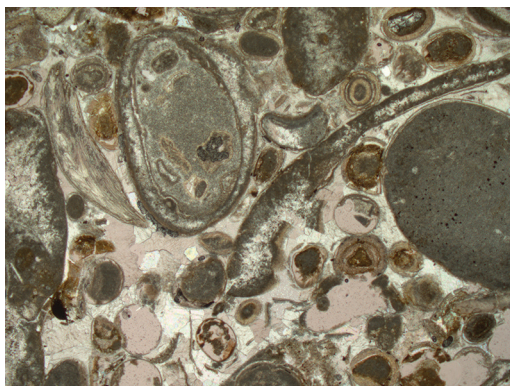
In the hand specimen this fine, yellow packstone, Caen stone *sensu stricto*, is the most common material type to be used in the mouldings and ashlar from these excavations. All of the tramline mullions are carved from it (WSN1–2, WSN9–15) as well as much larger Renaissance scrolled bracket moulds (WSN6–7) used to support the oriel window base and jamb (WSN8).

This Caen stone has the same fine, bright yellow (Munsell 2.5YR 8/1) compact limestone (yellow pelletal packstone) (sub-type 1a) (Hayward in prep) seen in medieval ecclesiastical mouldings and ashlar throughout London. This includes Westminster Abbey (Hayward 2009a), St Paul's Cathedral (Hayward 2008; Blows & Worssam 2011) and Bermondsey Abbey, but also in post-medieval mouldings belonging to Whitehall Palace (Hayward 2013b).

Its low porosity and homogeneous character has made it an ideal robust structural material for pier bases and ashlar blocks throughout medieval London, so its use in large bracket moulds (WSN6–8) should not be seen as surprising. Yet it is soft enough to permit deep finer carving as seen from the crisp intricate moulds of the larger cornices and the delicate lines of the tramline mullions.

The thin-sectioned example taken from a large tramline mullion (WSN1) chevron fragment, [26], as well as an outcrop sample (KH254) obtained from the La Maladiere quarry 2km west of Caen share the same characteristics. These include small, grey-brown (<0.5mm) ovoid carbonate pellets

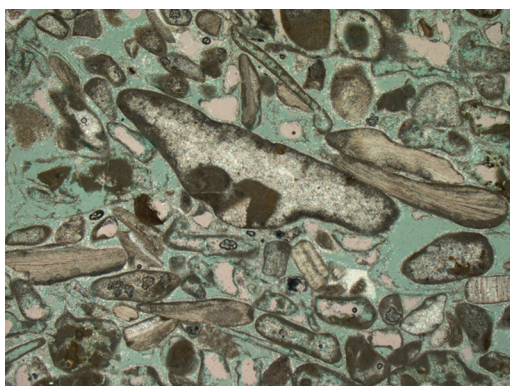




a



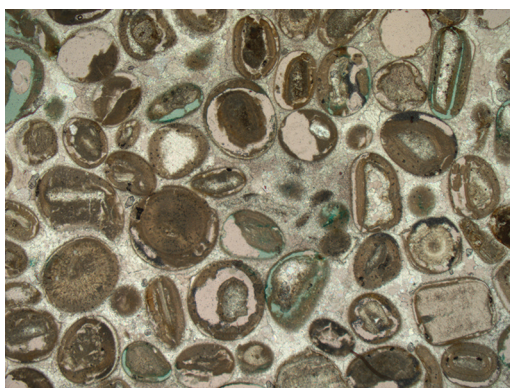
b



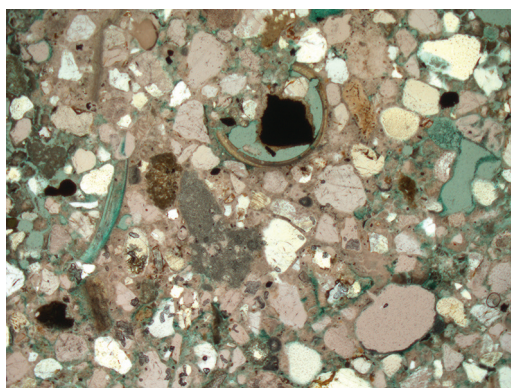
c



d



e



f

Fig 19. Photomicrographs of rock types and mortar identified in the reused late medieval to early post-medieval mouldings recovered from the Period 6 garden walls of Somerset House (original field of view = 4.8mm; plane polarised light). Key: a. Barnack stone (Cambridgeshire), medieval grave cover EAF10 [26]; b. Beer stone (Devon), late medieval cusped chamfer mullion mould WSN17 [26]; c. Headington Freestone (Oxfordshire), early post-medieval degraded ashlar fragment EAF10 [26]; d. Caen stone (Normandy), early post-medieval tramline mullion WSN1 [26]; e. Corsham/Monks Park stone (west Wiltshire), early post-medieval window jamb WSN16 [26]; f. hard mortar, bonding the masonry in the 17th-/18th-century garden walls EAF10 [26], [171], [173].

(x40) and fine (silt-sized) dispersed quartz. They both have narrow bioclastic siliceous rods (sponge spicules) as well as valvulinidae foraminifera along with small ostracod fragments.

TYPE 2 CORSHAM/MONKS PARK STONE/COMBE DOWN OOLITE

Fine, pale cream oolitic limestone (oolitic grainstone). Geological source: Middle Jurassic (Bathonian) Bath-Box-Corsham, Avon and Wiltshire. (Fig 19e) Examples: [26] WSN16 with ashlar [26] and guttering [173]

Three examples of this soft, pale cream-white (2.5Y 8/1) oolitic limestone (oolitic grainstone) are comparable with Cotswold Middle Jurassic (Bathonian) limestones from the Bath and Corsham area. They are quite unlike the poorer quality Taynton stone, the most common worked native medieval Jurassic freestone type for London, which has a distinct orange hue (10Y 7/6–10Y 8/4) and hollowed out 5–10mm bands of ooids and white oyster shell. In order to identify which type of Bath-stone the material from Somerset House came from, two thin sections (SOM 1, 7) were prepared and compared to a group of thin sections obtained from the Bath-Box-Corsham quarries of west Wiltshire and Avon (KH95–98; KH121–123; KH128).<sup>3</sup> Thin sections of Bath-stone used in medieval statuary (HEN1–2)<sup>4</sup> and early post-medieval moulds (BERM14)<sup>5</sup> in London provided an additional body of comparative data.

In thin section both samples (SOM 1, 7) had an identical petrological character, with thickly coated grains or ooids dominant, small quantities of skeletal debris and Biosparite set within a microcrystalline, iron-rich cement. These are comparable features characteristic of outcrop samples of Bath-stone.

Closer thin-section matches were possible with individual units of freestone, including Corsham Blue (KH128), Monks Park stone (KH97) from west Wiltshire and Combe Down oolite (KH98).

TYPE 3 BEER STONE

A very fine pale cream-white wackestone; Biomicrite. Geological source: Upper Cretaceous Chalk (Cenomanian), Beer, Seaton, south-east Devon. (Fig 19b) Examples: WSN17, WSN21, WSN24

In the hand specimen this very fine cream-

white slightly granular limestone resembled a chalk. However, most chalk and chalk-like rocks are too soft and perishable for fine working. An exception is the Beer stone from Dorset. It was also comparable with worked examples of fine Magnesian limestone from the Permian of Yorkshire. Because of this similarity, two samples (WSN17, WSN21) underwent thin-section preparation and analysis.

In thin section the fine-grained limestone is dominated by numerous small porous echinoid plates and thin-shelled molluscan debris, miliolid and globigerina foraminifera set within a fine calcite mud (micrite). This provided an exact petrological match with thin-section outcrop samples of Beer stone (Beer Caves)<sup>6</sup> (KH251), a local chalk-rock from the south-east Devon coast.

Although building contracts documenting the quarrying and supply of Beer stone are recorded for a number of prestigious buildings in the medieval capital (Salzman 1952, 132), and thin-sectioned samples of *in situ* rubble are recorded from the south wall of the White Tower (Sanderson 1998a, pls A7 and A8; 1998b, 5), this is the first time that this material has been observed in a stone moulding from an archaeological excavation. The building contracts record a peak period of production and supply to London during the 14th and 15th centuries. These include a document from 1347 'William Hamele of Weymouth' supplying '68 great stones of Bere for the King's Chapel, Westminster for £11', and from 1349, the Tower of London accounts include '£4 6s 8d for 100 great stones of Bere, whereof 50 were worked as voussiors for the heads of doors and windows and 50 in the rough' and, finally, in 1350 there were '18 great stones of Bere' weighing 18 tons, valued at 6s 8d a ton used at London Bridge (Salzman 1952, 132).

Given that the three slightly weathered mouldings, a cornice and two double embayed moulds from the foundations of the 17th-/18th-century garden walls, [26] and [171], have a distinct late medieval appearance, on petrological, documentary and stylistic grounds at least these mouldings were not quarried specifically for the Tudor palace; instead, they appear to represent late medieval material probably derived from a demolished ecclesiastical building.



## TYPE 4 HEADINGTON STONE

Coral-rich shelly grainstone; Biosparite. Geological source: Wheatley Limestone Member Upper Jurassic (Oxfordian), Headington Quarry, Oxfordshire. (Fig 19c)

Part of an ashlar fragment, [26], made from a highly weathered, openly porous cream-yellow (2.5YR 8/1) limestone was present in just one example from Somerset House. More detailed binocular microscope analysis revealed this to be a granular banded shelly texture full of coral and not particularly suitable for fine carving. A number of skeletal-rich candidate rocks fitted this description (Calcaire Grossier, Calne Freestone Dundry stone, Headington Freestone, Calcaires a Polypiers).

In thin section the rock has a fossil fraction (90%) consisting almost entirely of corroded coral polyps, occasional echinoids and bivalve fragments set within an open texture. There was a good match with a thin-section example of Headington Freestone from Oxfordshire obtained from outcrop (KH77). Headington stone is not an ideal freestone as it blisters easily (Arkell 1947), and after prolonged exposure it becomes friable contributing to its high overall porosity (BRE E5236; 34.7%).

Headington stone is the closest available Jurassic freestone outcrop to London and directly accessible via the River Thames, but very little of it has been identified in medieval and post-medieval structures in the capital, no doubt due in part to its susceptibility to prolonged exposure. An exception is its presence in a neo-classical ionic capital from Prices Candle Factory (YPE02), which was also thin sectioned (KMH3). Documentary sources, however, do identify a freestone from the same outcrop (Wheatley limestone) being used as ashlar in the 1515–22 Courtyard at Hampton Court (Thurley 2003, 17), Headington stone as facing stone from the later 1535 Great Stone Bridge (Thurley 2003, 54) and, slightly further afield, as early as 1363 at Windsor Castle (Salzman 1952, 121).

## TYPE 5 BARNACK STONE

Banded shelly oolitic grainstone; Oobiosparite. Geological source: Clipsham Member Upper Jurassic (Bajocian) Barnack village, Cambridgeshire. (Fig 19a)

Part of a worked slab made from a hard, banded, crystalline, pale yellow (2.5YR 9/2) shelly oolitic limestone was incorporated into the 17th-/18th-century wall, [26], of Somerset House. The banded fabric consists of numerous fossil fragments which alternate on a centimetre scale with oolitic grains. The shells include complete dark grey oyster fragments up to 5cm across and high-spined marine snails (nerineid gastropods). A thin section was produced (SOM 2) because the rock in the hand specimen shared affinities with two Middle Jurassic limestones: Taynton stone from Oxfordshire and Barnack stone from Cambridgeshire. Both have a coarse texture making it an unsuitable medium for accurate stylised carving or polishing. Given that the dimensions of this robust slab are proportional in size to a coffin lid, it would seem likely that it formed part of a stone covered inhumation. Both of these limestones have been identified nearby in Roman sarcophagi from St Martin-in-the-Fields (Hayward 2007) and at Westminster Abbey (Hayward 2015). The second example was used again as a Saxon stone interment. Barnack stone was used to make grave covers during the medieval period at Merton Priory (Surrey) and other locations across Greater London (pers obs).

The thin section is dominated by large fossils (bioclasts) including broken up echinoids, high-spined nerineid gastropod, bivalves and miliolid foraminifera which are consistent with Middle Jurassic limestones. Other grains include coated (ooids) and broken and aggregated limestone fragments (intraclasts and grapestones) which are enclosed by a coarse ferroan calcite cement. All these features were seen in thin-sectioned outcrop samples of Barnack stone (KH11).

## TYPE 6 REIGATE STONE

Fine-grained lime-green (glauconitic) limestone. Geological source: Upper Greensand, Upper Cretaceous, Reigate-Mertsham, east Surrey.

An example of a weathered, low density glauconitic limestone moulding, that was once a possible window jamb, [26] <19>, is identical to Reigate stone quarried from the Upper Greensand firestone and hearthstone mines and quarries of east Surrey Reigate-Mertsham (Sowan 1975).

When exposed to rain, the margins of the glauconitic Reigate stone mould oxidise brown, whilst frost and ice shatter the margins of the rock into narrow curvilinear slithers, effectively negating any profile or tool mark that may have been present. Although a diagnostic freestone type of medieval mouldings from ecclesiastical buildings in London, fresh consignments of this stone continued to be supplied into the capital to meet the demand for Tudor building of influential personages in windows, doors, fireplaces and newel stones (stairways) (Tatton-Brown 2001, 200). One example is its use in the embellishment of Thomas Pope's mansion, which was built on the ruins of Bermondsey Abbey in the 1540s (Samuel in prep). Its use in other Tudor royal palaces in London is attested to with its identification in the entrance doors of the 1529–39 Great Hall at Whitehall Palace (Thurley 1999, 29–30) and the 1515–22 Courtyard at Hampton Court (Thurley 2003, 17), with a building yard set up specifically for these palaces by Wolsey (Tatton-Brown 2001, 200–1). Stockpiles of Reigate stone may still have been used from this yard 20 years later for Somerset House.

#### Stone Walling Rubble

Only a brief comment is necessary on the geological character of the stone walling associated with the Tudor palace, mainly because many of these structures were built from fresh consignments of red Tudor brick. The wall foundations of Room B53, the Dressing Room [40] and [41], were constructed of large (7kg) ashlar blocks of both Kentish ragstone, a very hard dark grey sandy limestone, in conjunction with Hassock sandstone, a yellow to green-brown coarse-grained glauconitic sandstone. Both rock types outcrop together in the same Lower Greensand (Hythe Bed) quarries along the Medway at Maidstone (Kent). The widespread use of these robust materials along this stretch of the River Thames during the 16th century is attested to at Whitehall Palace in ashlar walling (Thurley 1999, 52) and bastions (*ibid.*, 58) to shore the waterfront, due to the extension of these properties into the Thames. The identification of Portland stone from the Tudor riverfront wall at Somerset House

(Wood & Munby 2003, 84) should be called into question, as the Dorset material only begins to be used in any large scale after 1630. This wall was probably constructed of Kentish ragstone.

The stone used in the masonry walling rubble foundation in Room B47 ([73], [74], [75]) was chalk and probably represents the extant blocks of a pre-existing medieval building incorporated into the fabric of the Tudor palace.

#### Mortar

The mortar type (T1) identified on the broken fresh faces of these mouldings reused for the construction of the three Period 6 garden walls ([26], [171], [173]) was particularly hard and quite unlike other softer contemporary mortar types from this period. In the hand specimen, this is a fine cream-grey lime mortar with large (25mm) angular lumps of chalk with small gastropod shells, occasional specks of black charcoal and flecks of red brick and sand-sized quartz. This recipe seems well suited to strengthening disparate elements of large broken up examples of angular moulding stone, rubble and brick and may even have been waterproof, necessary perhaps due to the proximity of the River Thames to these garden walls. In thin section it has a very low porosity which, together with this interlocking mosaic of shell, quartz and lime, merely enforces the binding strength of this recipe (Fig 19f).

#### Art-Historical Review

*Kevin Hayward with Neil Rushton*

An art-stylistic review of the 24 mouldings (WSN1–24) (Table 5) recovered from the Somerset House excavations was enhanced by their exceptional preservation revealing crisply executed examples of Elizabethan and possibly one or two earlier Roman, medieval and Tudor mouldings. Indeed, the quality of carving is comparable with examples recovered from the earlier fieldwork at Somerset House (Samuel 2005), ranking amongst the finest Renaissance examples from excavations in the 16th-century capital. Furthermore, the moulded stone assemblages that relate to the initial

*Table 5. Twenty-four moulds recorded at Somerset House*

WSN	Context	Weight (kg)	Dimensions (L x W x Hmm)	Stone type	Form	Comments	Fig no.
1	[26]	29	850 x 159 x 137	Caen stone	tramline mullion paint and plaster	T1 mortar; chisel marks; red paint and plaster traces; 2 nail holes	20
2	[26]	8	225 x 160 x 135	Caen stone	small tramline mullion	T1 mortar; plaster flecks, no paint; 1 nail hole	20
3	[26]	17	262 x 245 x 260	Caen stone	stepped moulding	chisel marks; T1 mortar and some plaster broken off other end	-
4	[26]	7.1	281 x 192 x 180	Caen stone	high angled cornice	mason's mark 'R'; narrow awl marks; T1 mortar	20
5	[26]	14.1	220 x 218 x 190	Caen stone	decorated end ashlar	roughed out chisel marks; T1 mortar	20
6	[26]	50	550 x 352 x 187	Caen stone	large low angled rounded cornice profile window sill	awl marks; T1 mortar	20
7	[26]	31.7	495 x 270 x 205	Caen stone	large straight cornice very smooth surface window sill	T1 mortar; chisel marks on upper surface	20
8	[173]	60	360 x 285 x 480	Caen stone	complex high moulding window jamb	T1 mortar; masons mark 'X' underside; French drag tool marks	21
9	[26]	9.5	277 x 160 x 140	Caen stone	end part tramline mullion	T1 mortar	-
10	[26]	14.4	395 x 160 x 135	Caen stone	tramline mullion long section	T1 mortar	-
11	[26]	4.4	125 x 140 x 180	Caen stone	possible truncated section of small tramline mullion	T1 mortar	-
12	[26]	2.6	175 x 150 x 140	Caen stone	slither of tramline mullion	-	-
13	[26]	4.3	145 x 160 x 145	Caen stone	fragment of tramline mullion	-	-
14	[26]	8.2	290 x 160 x 111	Caen stone	fragment/slice of tramline mullion	T1 mortar; brick fragments attached post-Great Fire	-
15	[26]	11.3	290 x 160 x 140	Caen stone	end part of tramline mullion	T1 mortar; nail hole plaster flecks underside	-



16	[26]	23.3	-	Combe Down Oolite/ Corsham stone	complex high moulding window jamb	T1 mortar like WSN8	-
17	[26]	11.7	360 x 150 x 120	Beer stone	voussoir-type material	Lewis hole; low angled wedge moulding worn	-
18	[26]	15.1	280 x 140 x 230	Caen stone	high moulding double embayment	possible window element worn; could relate to WSN18	-
19	[26]	40	490 x 335 x 200	Reigate stone	large curved jamb or win- dow moulding	traces of red paint; no T1 mortar	-
20	[171]	7	190 x 173 x 112	Caen stone	ornate curved mould diag- onal tool marks on side	lots of T1 mortar on sides; could relate to WSN18	-
21	[171]	8.5	190 x 203 x 288	Beer stone	high 45 degree angled cornice	T1 mortar; a little like WSN4	-
22	[26]	12.3	223 x 220 x 191	Caen stone	cornice fragment	T1 mortar	-
23	[26]	10.8	270 x 210 x 230	Caen stone	cornice fragment	T1 mortar; continuation of WSN22	-
24	[171]	5.1	210 x 150 x 100	Beer stone	double embayment	somewhat similar to WSN18	-

construction of Somerset House (discussed earlier) may also help bridge a major gap in our understanding between the stylistic development of windows in Tudor country houses and palaces in southern England (Morris 1989, 132) during the mid-16th century.

Illustrations (Figs 20 and 21) of the principal moulds, or type stones, are accompanied by a review of their function and probable placement within the Tudor palace (Thurley 2009).

### Window Elements

The assemblage is dominated by Tudor window elements, including nine 'tramline' (Morris 1989, 131) mullions and transoms (WSN1–2; WSN9–15), two large plain scrolled brackets (consoles) (WSN6–7) and a square-headed stepped roll moulding (WSN5). The petrological results (see above) have shown that all are finely executed in yellow Caen stone, supporting the evidence from other sources (quality of execution, style and standardisation) that much of the assemblage probably was derived from one, maybe two very large oriel bay windows from the Tudor palace, permitting at least a partial reconstruction.

Less clear perhaps is the origin of a smaller group of window moulds (WSN18; WSN20; WSN24) whose poorer preservation, variability difference in rock type (Beer stone, Caen stone) and art-historical style (cusped archlets) (Morris 1989, 131) indicate that these may have derived from an earlier Tudor or even late medieval structure.

### TRAMLINE MULLIONS

The tramline mullion, so called because the front surface is flat and square and edged with parallel fillets either side (Morris 1989, 131), is represented in nine examples (WSN1–2; WSN9–15) of comparable proportions in Caen stone. The largest (850mm long x 159mm wide x 137mm deep; [26] WSN1) is considered here (Fig 20).

This piece of Caen stone (WSN1) has tramline mouldings typical of late medieval and 16th-century window mullions. Although primarily decorative, tramline mouldings also had the practical effect of wicking water away from the stonework and thereby away from the window. There is an

attachment hole in the bottom face of the piece and chisel marks where the stone has been worked into a flat surface. The mullion would have been attached to an iron fixing on the horizontal sill at the bottom of a window, but the top of the mullion has been dissected and so it is not possible to gauge the size of the window of which it was once a part. The mortar accretions have been applied after the mullion ceased its original function.

Unlike the other mouldings, [26] WSN1 also has remnant traces of red paint backed with white plaster on the flat, square surface.

### SQUARE-HEADED STEPPED ROLL MOULDING

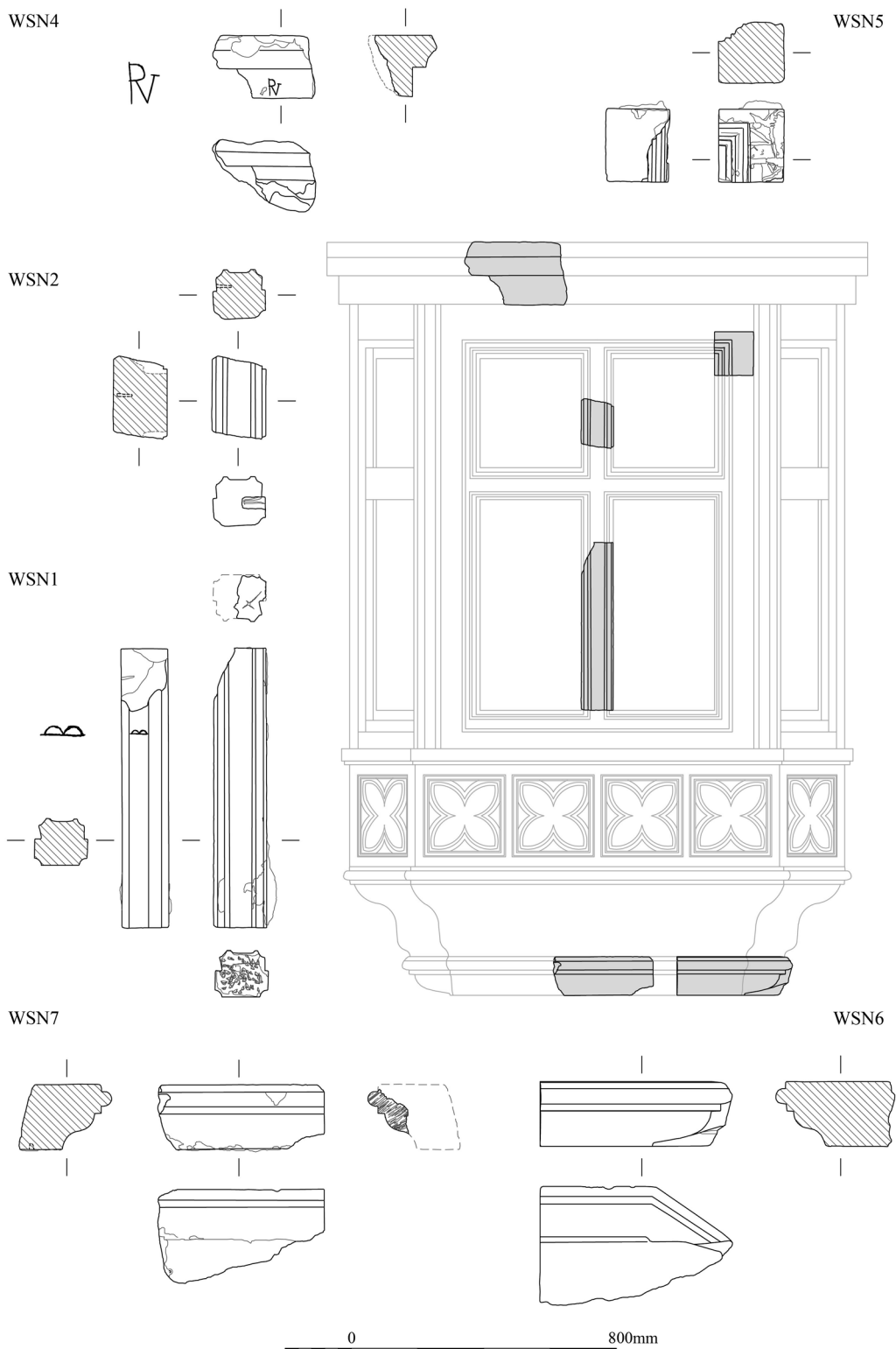
This fragment of moulded Caen stone, [26] WSN5, is the corner section of a window known as a square-headed stepped roll moulding (Fig 20). It is typical of 16th-century moulded designs, especially in secular buildings, and suggests a high-status origination. It would have originally been a corner portion of a square or rectangular window and bonded to the vertical and horizontal elements with mortar. The mouldings appear to be weathered suggesting it was in its original window location for at least a century.

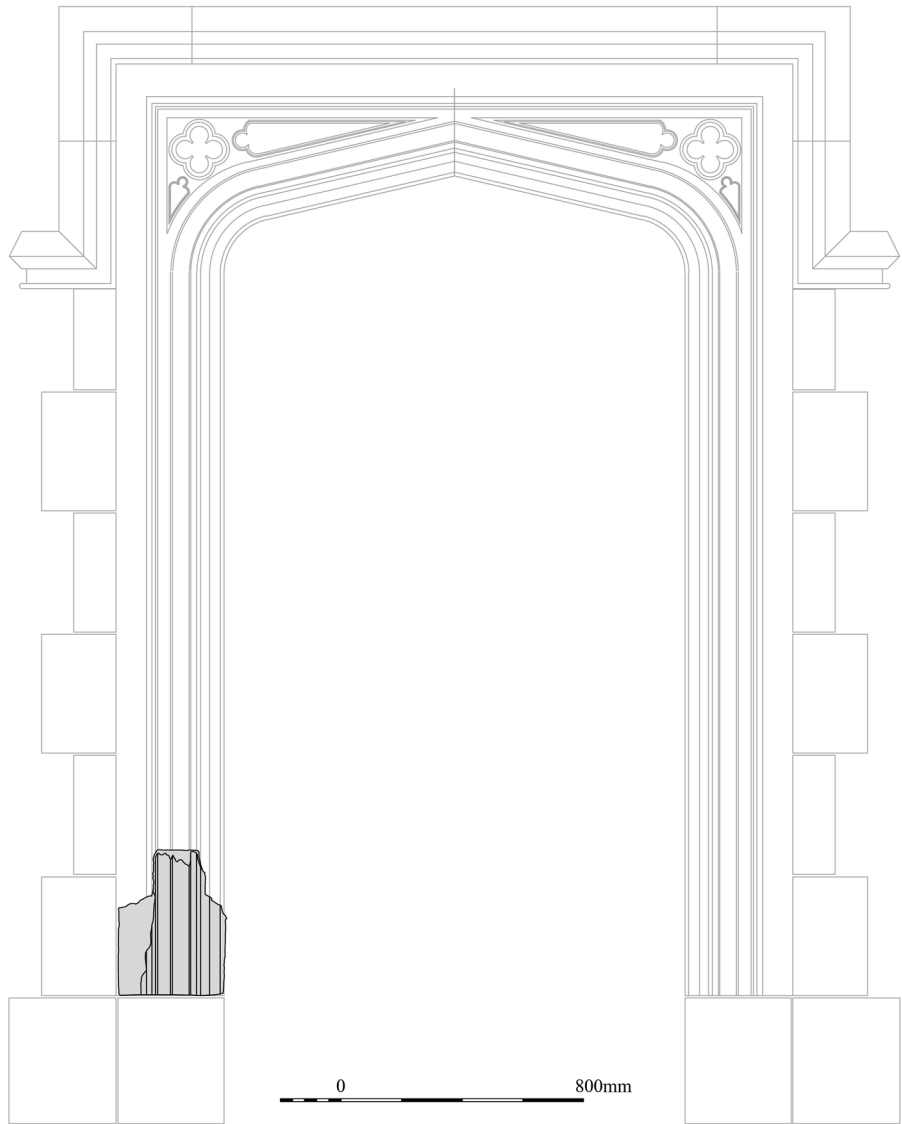
### PLAIN SCROLLED BRACKETS

Two very large ogee mouldings, [26] WSN6 and WSN7 (Fig 20), are of a size and simplistic linear style typical of a Tudor Renaissance scrolled bracket mould. Their function was to support a window head or window cornice, most likely in a projecting or oriel window. This was a common feature of contemporary Tudor country houses, most notably at the 1540 Lacock House (Morris 1989, 131), but there are also earlier examples from the capital, especially the extant 1517 inward-facing Great Window of the church of St Bartholomew the Great in West Smithfield.

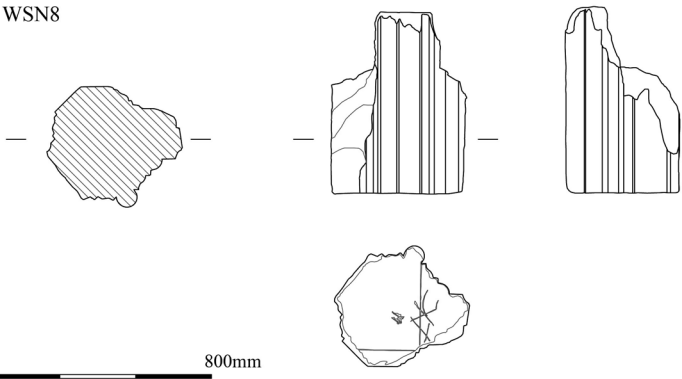
These individual S-shaped moulds would project out to one half its height or less to support the large overhanging bay window. Given the height (220mm) and breadth

*Fig 20. (facing) Principal types of window mouldings from excavations at Somerset House (EAF10) and schematic plan of a Tudor bay window (scale 1:20)*





WSN8





(270mm) of the straight bracket WSN7 and the corner bracket WSN6 (190mm and 352mm), this would indicate that it supported a projecting oriel window of some considerable size, which might have been expected in a palatial residence.

These exquisitely carved moulds in Caen stone are of outstanding workmanship with a consistently smooth, regular ogee face with very fine linear chisel tooling in WSN7 and awl marks on the hidden side of WSN6.

#### ROUNDED CUSPED CHAMFER MULLION MOULDS

Three examples of cusped chamfer mullion mould, one in Beer Stone (WSN24) the other two in Caen stone (WSN18, WSN20), are quite unlike the rest of the assemblage in terms of their art-historical style. Other degraded mouldings, also in Beer stone (WSN17, WSN21), may also be from this period.

#### Door Elements

Supplementing the assemblage are a number of mouldings, which may relate to cornices and jambs to window moulds, but given their size they are more likely to have been used to embellish door surrounds (WSN3–4; WSN8; WSN16; WSN19; WSN22–23) (not illustrated). With the exception of WSN16 (Corsham stone) and WSN19 (Reigate stone) they are all crisply dressed in the same fine Caen stone as the window elements and possess a form which is indicative of a 16th-century date.

#### WINDOW/DOOR CORNICE

This piece of Caen stone, [26] WSN4, is part of a cornice from above a window or door. It has been broken on both sides, but the definition of the visible profile is a sharp right angle, whilst the moulded hood is curvilinear (Fig 20). On what would have been the vertical outer-facing surface of the cornice is a monogrammed mason's mark 'RT', which has a majuscule 'R' with a majuscule 'T' appended to its tail. This almost certainly represents what is known as a 'Banker Mark' made by the skilled mason

who was carving the piece of Caen stone into its cornice form. Alexander describes these marks:

Since there is no direct documentary evidence for the way that medieval marks were allocated we can only speculate, and look at later evidence. Masons may have chosen their own mark, or been given one when they joined the site, later masons sometimes based their mark on that of the master who trained them. ... Marks do sometimes form groups and this may indicate that they belong to a team of masons working together. An example of this is a mark like a capital letter 'W' which can be found in that form or with extra strokes across the ends of one, or more, lines. The marks are mostly drawn free-hand, although compasses are sometime used for marks based on circles, and consist of lines that meet or cross in a pattern. The marks are made with a chisel or a punch and a point is sometimes used to drill the ends of the lines. Although it was important that marks were not easy to confuse it is clear that masons did not spend a long time cutting elaborate marks made up of a large number of lines. (Alexander 2008, 29–30)

Unfortunately, an extensive search of the available resources has failed to identify a corresponding mason's mark and so all that can be said of this monogram/cypher is that it is a late medieval or 16th-century Banker Mark.

#### DOOR JAMB

A large (480mm long) moulding in Caen stone, [173] WSN8, has tramlines and appears to be part of a window or, more likely, a door jamb (Fig 21). The profile is suggestive of a vertical upright section mortared to a corresponding wall and joined to another section of the jamb on its flat surface. The other surface has been broken. The flat surface has been worked to a high standard so as to fit on to its corresponding jamb section with a fine seamline, thereby giving the effect of a continuous piece of moulded stone. Tool marks are present on this surface produced by French drag, a type of plane tool consisting of a series of blades

*Fig 21. (facing) Principal types of door mouldings from excavations at Somerset House (EAF10) (scale 1:20) and schematic plan of a Tudor door (scale 1:25)*

set at alternating angles, for final preparation on soft limestone materials.

A second, smaller (262mm long x 260mm wide x 205mm deep) example, [26] WSN3, again in Caen stone, has a profile also suggestive of a vertical door jamb. One surface has diagonal tooling marks made by scratch stocks or moulding planes and would have been mortared on to a corresponding piece of moulded ashlar.

### *Discussion*

#### The Embellishment of Somerset House

Bringing together the two lines of evidence (petrological and art-stylistic) it is possible to assign nearly all of this large group of moulded stones and ashlar blocks reused as part of the foundations for three 17th-/18th-century walls ([26], [171], [173]) to a single building campaign. They all display moulded profiles and decorative insets suggestive of a high-status provenance. Stylistically the fragments are datable to the 16th century and the square-headed stepped roll moulding ([26] WSN5) strongly suggests a secular origin. Furthermore, the high quality of the craftsmanship, the level of weathering and the use of Caen stone infers that these pieces originated from the Tudor palace.

The dominance of numerous tramline mullion segments and fragments of very large plain scrolled brackets would indicate that they once belonged to one (or more) very large projecting or oriel bay windows, a feature typical of large Tudor mansions belonging to the 1540s such as Lacock House (Morris 1989, 131). These windows may have either fronted on to the Strand, as depicted in presentation plans along the Strand (Thurley 2009, 98), or were facing on to either the Great or Inner Courts. The scale of the large door jamb mouldings would tend to support the idea that these once belonged to a Tudor building.

Petrologically, this suite of freestones (Caen stone, Headington Freestone, Corsham-Bath stone, Beer stone, Reigate stone) have a distinctive late medieval/Tudor flavour. Headington stone and soft finer cream Corsham-Bath type stones, with few exceptions, do not appear to have been used much in London before the 16th

century. Both are documented as being key construction materials in Tudor palaces and country house construction.

The coral-rich Headington (Wheatley) stone, identified from ashlar, was recorded in both the Wolsey 1515–22 Great Courtyard (Thurley 2003, 17) and the 1535 Henrician Great Bridge (*ibid*, 54) at Hampton Court, and was also identified in a thin section taken from a large classical mould from the archbishop of York's 15th- to 17th-century Battersea Palace on the site of Price's Candle Factory (YPE02).

Comparable source material to the fine Corsham/Monks Park stone door jamb (WSN16) includes Minchinhampton stone, in the stairs, and a Jurassic stone with a source near Gloucester, in the south wall, recorded from Wolsey's 1528–9 Great Hall at Whitehall (Thurley 1999). The Corsham and Monks Park stone quarries which form the easternmost outcrop of the Jurassic freestone belt in west Wiltshire also lie very close (just 3km south) to Lacock Abbey. The exposures are also the closest freestone outcrop to the abandoned Lord Protector's 1549 country residence at Bedwyn Broil and within reach of the 1567 construction of Longleat House (both also in Wiltshire). This group of western Tudor country houses were also residences belonging to the highly influential 'Somerset Circle' of courtiers, a group of English patrons who embraced the Renaissance style of architecture during the mid-16th century.

A preference for using imported fine hard yellow Caen stone for the embellishment of Somerset House is shown by its identification in 19 of the 24 Tudor-style mouldings from these excavations. After its peak period of use during the 12th and 13th century in London's ecclesiastical buildings, Caen stone appears to have remained the most suitable quality freestone for crisply executed decoration into the early post-medieval period. Its dense, fine, even texture was not only conducive to intricate carving, but when finely dressed and smoothed by the best stonemasons it also provided a suitable base for the application of pigment, as shown by the presence of red paint applied to the flat surface of one tramline mullion (WSN1). The identification of a continental style stone material is also in keeping with

the documented use for foreign craftsmen and imported materials by the influential 'Somerset Circle' of courtiers to embellish their Renaissance-style palatial and country residences. The documented use, for example, of French craftsmen by the Lord Protector at Somerset House (Thurley 2009) and Bedwyn Broil (Morris 1989) not only to work in a style they were familiar with but with the same local Normandy stone that they would have always used makes sense. Taking this argument one step further, a petrological link with accessible coastal Normandy quarries also supports Morris's (1989, 133) statement that continental masons at projects such as Bedwyn Broil were on short-term contracts and would have come from accessible workshops in northern France, presumably linked in with the stone obtained from these quarries.

Some contextual examples of high-status houses built between c.1530 and 1600 using similar architectural motifs as those found at Somerset House (EAF10) are East Barsham Manor, Norfolk (1530), Lacock House, Wiltshire (1540), Burghley House (1564) and Kirby Hall (1575), Northamptonshire, Wollaton Hall, Nottinghamshire (1580) and Wimbledon House, Surrey (1588).

#### The Medieval Moulded Stonework

Art-stylistic and petrological evidence have already shown that a small proportion of the reused stonework (Beer and Caen stone cusped moulding and a possible Barnack stone grave slab) could only have come from earlier funerary and ecclesiastical projects. As to their origin, it would seem that the most likely scenario was that the material derived from the dismantled exterior or interior of a local church or priory (eg St Mary of Strand) and/or graveyard as spolia following the Reformation, especially given the documented clearance of this part of the Thameside frontage soon after to make way for the construction of Somerset House.

This possibility is, however, rather simplistic as it ignores two important factors. First, there is the close proximity to the Thames and its role in the transport of reused stone from monasteries from much further afield for use as spolia and foundation material in new Tudor construction projects. Second, there are the contemporary building

accounts of Somerset House which mention the wholesale clearance and supply of stone from priories all over London including material dismantled from 'the steeple and most part of the church of St John of Jerusalem neere Smithfield' for use in the 1547 palace (Thurley 2009, 16–17). None of the stone from the excavations at St John Clerkenwell (Sloane & Malcolm 2004) was identified as Beer stone, although further investigation into the geological character and source of the moulded stone assemblage may prove otherwise.

Given the site's excellent riverine links, one can only speculate as to the origin of these fragments. However, in light of the documented recycling of stone from medieval ecclesiastical buildings throughout London and their identification as foundation material in Tudor construction projects, such as at Pope's mansion constructed on the ruins of Bermondsey Abbey (Hayward in prep), one must not downplay the 'hidden' role that medieval moulded stone had as a valuable commodity for Tudor construction projects.

#### *The Animal Bones*

*Kevin Rielly with Philip Armitage*

#### *Introduction and Methodology*

The majority of the animal bones were discovered within the Saxon and medieval deposits. Most of the bones were collected by hand. However, a small number of bulk samples were collected from the Saxon pits, which contained some fish bones (identified by Philip Armitage). Preservation was moderate to good with some examples of poorly preserved bones in all phases, usually composed of well-worn cattle or cattle-size limb bone shaft pieces. The variety of preservation states within individual contexts is clearly indicative of some redeposition. There was a moderate level of fragmentation.

The bones were recorded to species/taxonomic category where possible and to size class in the case of unidentifiable material such as ribs, fragments of long bone shaft and the majority of vertebra fragments. Recording follows the established techniques whereby details of the element, species, bone portion, state of fusion, wear

of the dentition, anatomical measurements and taphonomic, including natural and anthropogenic, modifications to the bone were registered. The sample collections were washed through a modified Siraf tank using a 1mm mesh and the subsequent residues were air dried and sorted.

#### *Description of Faunal Assemblage*

The site provided a grand total of 533 hand-collected animal bones and a further 127 from two samples. In total, 512 of the hand-recovered and all the sieved bones were from phased deposits. The earlier two phases (Periods 2 and 3) were entirely derived from Room B45 and the later (Periods 5 and 7) from Rooms B45, B47 and B51/52. The entire collection is relatively well preserved.

#### *Saxon (Period 2)*

This collection was retrieved from layer [100] and from two overlying cut features, pit [93] and stakehole [110], with most of the bones recovered from the layer and the pit (31 and 24 fragments respectively). These deposits provided minor quantities of cattle, sheep/goat and pig, as well as a few chicken bones and fish from the sieved collections (see Table 6). All of the sheep/goat and most of the cattle bones were from adult individuals, with the exception of a young calf skull fragment and lower leg bone (metacarpus), each from different deposits. These may represent food waste or infant mortalities, the latter indicative of cattle being kept within the vicinity of this site.

#### *Medieval (Period 3)*

The bones in this phase were recovered from pit [84] (193 bones) sandwiched between layer [79] (96 bones), directly overlying the Saxon features, and layers [71] and [72] (62 and 71 bones respectively). The assemblage largely consisted of cattle and sheep/goat, in approximately equal numbers, with some pig, hare and chicken. The abundance of cattle-size bones may suggest cattle is under represented. However, these are principally composed of fragmented limb bone and rib pieces. Both cattle and sheep/goat remains were almost entirely represented by adult individuals, complemented by a small proportion of first year animals and,

*Table 6. Distribution of animal bones by period within the hand-collected and sieved (in brackets) assemblages using total fragment counts*

Period	2	3	5	7
<b>Species</b>				
Cattle	14(7)	100	5	2
Cattle-size	19(27)	131	2	1
Sheep/Goat	6(2)	96	6	7
Sheep-size	17(79)	55	4	
Pig	1(4)	38	2	
Dog			1	
Hare		1		
House mouse	(1)			
Chicken	(2)	1	2	
Goose			1	
Freshwater eel	(1)			
Cyprinid <i>cf</i> roach	(1)			
Salmon	(1)			
Unident Fish	(2)			
Total	57(127)	422	23	10

in the case of cattle, by an upper hindlimb bone (femur) from a probable foetal/neonate calf. As in the previous phase, this is likely to suggest local production. Notably, the majority of the older portion are young adults, that is third and fourth year animals, indicative of a bias towards good-quality meat, essentially prime beef and mutton. This contrasts with the skeletal representation, at least from the sheep. While the cattle feature a diverse spread of skeletal parts, it is notable that the sheep/goat collection is mainly composed of lower limb (radius, ulna and tibia) and foot parts (carpals/tarsals, metapodials and phalanges), 32.3% and 44.8% of the total number of sheep/goat bones respectively. This could be indicative of status, the evidence suggesting the preferential usage of lesser quality meat cuts. However, the absence of a similar bias within the cattle collection contradicts this argument, here supposing that the cattle and sheep/goat waste were derived from the same households. The main two domesticates were represented by typically small medieval stock, a single cattle metacarpal providing a shoulder height of 1100.8mm and the equivalent from seven sheep metapodials



giving a range of 571.1mm to 622.5mm with an average height of 590.9mm (shoulder height calculations after Boessneck and von den Driesch 1974).

#### Post-Medieval (Periods 5 and 7)

The various contexts include the following: Period 5 – brick drain [49] (6 bones), construction cut [96] (3 bones) and a dumped deposit [91] (14 bones); and Period 7 – pit [150] (3 bones) and another dumped deposit [66] (7 bones). Table 6 shows that the majority of these bones were derived from the Period 5 assemblage, mainly from the dumping. This period produced the widest array of species found in any one period at this site, including all species present during Period 3, plus dog and goose, although with the absence of hare.

#### Conclusions

The Middle Saxon evidence is rather limited; however, it does follow some general trends noticed amongst the various contemporary sites to the north and west (after Rielly 2012), here including the nearby excavations at Church Court and Hare Court (Bendrey 2005). All of these sites provided a dominance of cattle bones, which in turn were mainly represented by adult individuals. There is a minor home production element as indicated by the recovery of very young cattle, sheep and pig. The range of food species is rather small, with the major domesticates, some poultry and a minimal proportion of game. In addition, the fish bones invariably comprise a predominance of freshwater species, with freshwater eel and Cyprinid in particular.

The somewhat larger medieval collection, in contrast to the Saxon evidence, exhibits unusual traits in comparison to contemporary London assemblages. Where the general pattern is for a wealth of cattle bones (see *eg* 37 and 40–43 Fleet Street and also Carroone House on Farringdon Street: Fairman 2015; Rielly in prep), this site has provided equal proportions of cattle and sheep/goat. There is a similar dominance of adult cattle and sheep, but there is usually a good proportion of older as well as younger animals in this age group, signifying surplus dairy, work or wool producing animals as

well as those providing good-quality meat (prime beef and mutton). There is, however, the stated contradiction concerning the possible admixture of poorer quality cuts of mutton, as defined by the concentration of lower limb parts and foot bones. Rather than a status orientation, it is conceivable that the sheep bones were principally derived from a local butcher.

## DISCUSSION AND CONCLUSIONS

### *Saxon (Period 2)*

The earliest occupation recorded on the site was of Middle Saxon date. This activity was only recorded within one of the basement rooms, B45, probably because it was excavated to a deeper level than the majority of the other rooms (Fig 4). Despite its limited nature, however, this Saxon activity was of interest in the wider context of the Middle Saxon settlement of Lundenwic. The site is located in the south-eastern corner of Lundenwic in close proximity to the Middle Saxon waterfront. No foreshore deposits were recorded, with only pitting and levelling layers being encountered. Evidence for Saxon foreshore activity has been recorded nearby at Arundel House to the east of Somerset House, where an alignment of oak stakes was interpreted as a possible Middle Saxon waterfront (Proctor 2000, 52). Saxon pitting has also been recorded directly to the north during archaeologically monitored test pits in the central and eastern parts of the North Wing of Somerset House (Fig 1, nos 2 and 7) and to the east at King's College (Fig 1, nos 3 and 9). This fieldwork revealed natural brickearth along the Strand frontage at 9.98m OD (probably truncated from c.11.22m OD). These levels indicate that the natural ground surface fell immediately to the south of the Strand with a slope of between 1:15 and 1:30 (Cowie & Blackmore 2012, 91–2). The Saxon deposits in Room B45, located halfway through the East Wing of Somerset House, appear to confirm this slope, being located at 5.25m OD. In contrast, the Saxon foreshore features at Arundel House were recorded between -1.49m OD and -0.89m OD (Proctor 2000, 51–2). This clearly illustrates the considerable slope from the Strand down

to the Middle Saxon waterfront. It has been suggested that the Middle Saxon waterfront was located c.80m north of the modern river wall (Cowie & Blackmore 2012, 117, fig 102). Room B45 was situated roughly midway down this slope, meaning that it was at least 30m north of the contemporary waterfront, where the land was high enough to be flood-free and therefore suitable for settlement. The material culture recovered from these Saxon deposits provides some insight to the activity being undertaken within the vicinity. The small assemblage of pottery recovered from the pit consisted of imported North French/East Belgium hard greyware (NFEBB) and North French greyware (NFGW) vessels (see Suds above). Such imports are commonplace finds within the settlement of Lundenwic, typically occurring as tablewares for serving liquids (Blackmore 1988a, 89). Residually recovered Saxon pottery includes locally produced chaff-tempered ware (CHFS) and regionally traded Ipswich ware (IPSC, IPSM) vessels, all of which are common in Lundenwic.

The Saxon loomweights represent direct evidence for spinning and weaving and, therefore, the manufacture of textiles (see Suds above). Virtually all sites in Lundenwic have produced evidence for textile production (Cowie & Blackmore 2012, 156). The widespread and frequent nature of finds associated with this activity has led to the interpretation of a home-based 'cottage' industry. Interestingly, the loomweights recovered from Somerset House represent the three main forms: annular, intermediate and bun-shaped. The discovery of all three types of loomweight within a single Middle Saxon feature is not unusual as it appears that all these forms were in use at the same time in Lundenwic (Blackmore 1988b, 112; 2008, 196; Goffin 2003, 220; Riddler 2004, 19 and 22).

The animal and fish bone assemblages, despite being small are also ubiquitous to Lundenwic. The small assemblage of animal bones also represents the commonly encountered range of species from Lundenwic, cattle, sheep/goat and pig and a few chicken bones (see Rielly above). These major domesticates provided the majority of the meat consumed in the settlement, the remainder consisted of poultry and fish

(Cowie & Blackmore 2012, 146–7). Fish bones from two of the commonest found species, eel and Cyprinidae (carp family), were recovered (Table 6). The presence of a single salmon bone is interesting as this species is also present in small numbers on other Lundenwic sites.

Also recorded in Room B45 were two stakehole alignments of probable Saxon date. It may be that these two alignments represent two phases of wattle fencing. Elsewhere in Lundenwic similar alignments have been interpreted as fence-lines, walls and animal pens (Cowie & Blackmore 2012; Malcolm & Bowsher 2003).

### *Medieval (Period 3)*

The tradition of housing Crown ministers near Westminster began when the Treasury was moved to London in the late 12th century (Croot 2009, 9). During this time many bishops served the king as his principal officers and spent considerable time in London utilising their inns in Westminster. These inns were also often let out by the bishops to others who held public office. During this period the area of Somerset House was occupied by inns of the bishops of Exeter, Bath and Wells, Llandaff, Chester, Worcester, Norwich and Durham, together with the precursor to the present church of St Mary le Strand. This occupation was continued until Edward Seymour began purchasing these properties to begin the construction of his palace in 1547 (see below).

Medieval activity at Somerset House was confined to just two of the basement rooms and is represented by levelling deposits and pitting (Fig 6), interpreted as external activity, implying that this area which was some distance from the Strand street frontage had not yet been built over. The associated ceramics and building materials suggest a late 12th- to mid-13th-century date for the activity, a period when the area south of the Strand was known to be settled (Croot 2009, 10). This small pottery assemblage, consisting of London-type ware (LOND), with white slip decoration (LOND WSD) and green glaze, south Hertfordshire-type grey ware (SHER) and Kingston-type ware (KING), is typical of this period.

### ***Late Medieval/ Early Post-Medieval (Period 4)***

A number of chalk rubble cellar wall foundations were recorded within the basement of the East Wing, which appear to pre-date the Tudor palace of Somerset House (Fig 7). These foundations were of quite different construction to the brick and stone Tudor foundations. The gravelly mortar bonding some of these foundations is of a similar type to that used in some of the Tudor palace foundations. However, the identification of late medieval and early post-medieval mortar types is problematic and therefore their stylistic dating is not precise.

The presence of these wall foundations confirms that this area was now being developed, presumably reflecting an increasing density of buildings along the south side of the Strand during this period. Based on reconstruction drawings of the area during the medieval period it appears that the East Wing of Somerset House lay within the area of Chester Inn and the church of St Mary of Strand (Croot 2009, 12). It has also been documented that various structural alterations and additions were undertaken on the buildings that occupied the site during the 15th and early 16th centuries (Croot 2009, 11–13). It therefore seems likely that the foundations found on site relate to Chester Inn and its associated buildings. The limited area of these foundations examined and the lack of accompanying artefactual evidence means that their precise plan and date cannot be determined. Although the dating evidence suggests a slightly earlier date than the Tudor palace, it cannot be entirely ruled out that some may relate to the palace. An enrolled account by John Pickarell covering the period of 1 April 1548 to 7 October 1551 which covers £10,091 9s 2d expenditure has detailed within it ‘Chalk, lime, sand, etc.’ at a cost of £266 17s 8d (Thurley 2009, 17). This clearly documents that chalk was being used as a building material on the palace. However, these foundations appear to bear no relation to the 1775 plan of the palace (Fig 3).

Of particular note are the large chalk foundations located in Room B45 and Lightwell 1, which were reused as part of the

Tudor palace. An extensive Tudor masonry wall was built directly upon these chalk foundations and it seems highly likely that the palace incorporated elements of the previous medieval bishops’ inns located on the site (S Thurley, pers comm). It has also been argued that the relatively low cost for certain materials as listed on John Pickarell’s account of expenditure, such as the stone, brick and tile, suggest that the majority of the stonework and some of the bricks used were salvaged from various former ecclesiastical buildings including St Paul’s Cathedral and the Priory of St John Clerkenwell (Thurley 2009, 19). Excavation of Norfolk House in Lambeth revealed that the 16th-century house foundations incorporated masonry and architectural stonework salvaged from its medieval predecessor (Webber 1991, 345).

### ***The Tudor Palace (Period 5)***

Arguably the most important features recorded during the fieldwork were the remains of the Duke of Somerset’s palace, which was largely constructed during 1547–53 (Fig 9). An extensive corpus of the cartographic material relating to the Tudor palace has been published (Thurley 2009). Needham and Webster’s 1706 plan of Somerset House has previously been used to interpret Tudor structural elements recorded during the 1997–9 archaeological investigations (Fig 1, no. 6; Wood & Munby 2003, fig 2). However, Couse’s plan of Somerset House, 1775, particularly his plan of the basement storey, is the most accurate (Thurley 2009, 126, 128). This plan confirms that the foundations recorded in the East Wing relate to the cellars under the southern range of the Lower Court, in particular the Drawing Room, Dressing Room and State Bed Chamber as illustrated on the Couse plan of the principal floor of Somerset House (Fig 3). This area of the palace does not appear to have altered much from its original construction. Research by Thurley would suggest that the rooms from west to east were originally laid out as Presence Chamber, Privy Chamber and Bed Chamber (*ibid*, fig 5).

Elements of the Tudor palace and associated features have been recorded during

previous archaeological investigations at Somerset House. Tudor foundations were recorded in the North Wing (Fig 1, no. 5; MoLAS 1997a) and a number of Tudor features were found during investigations in the South Wing and an adjoining light well, including the masonry Tudor river wall and its two trapezoidal bastions. Also recorded in the South Wing was a north–south aligned rubble wall, interpreted as part of the chapel garden wall (Fig 1, no. 6; Wood & Munby 2003, 83–5). A similar feature was also identified previously by MoLAS to the east (Fig 1, no. 4; MoLAS 1997b) as a wall of the same garden.

An archaeological watching brief in the area of the Great Court also recorded remains relating to the Tudor palace. Six lengths of masonry walling are interpreted as part of the Tudor palace. Cartographic evidence suggests that they belonged to the Presence Chamber, Guard Chamber and Kitchen (Fig 1, no. 8; Gifford & Partners 2005, 18). A set of steps also identified as dating to the Tudor period has been suggested to equate to steps highlighted on Needham and Webster's 1706 plan of Somerset House, which led up to the first floor (Wood & Munby 2003, fig 2). This had led to the hypothesis that the walls of the Tudor palace may have survived to first floor level below the area of the Great Court possibly to retain the ground raising deposits involved in the new construction. Three more sections of walling predominantly of brick construction are interpreted as part of the chapel designed by Inigo Jones for Henrietta Maria in 1632 (Gifford & Partners 2005).

The majority of the Tudor walls examined in the East Wing were of red brick faced with Kentish ragstone ashlar and mouldings. The basal portion of these foundations were not examined, but they would presumably have been constructed of rubble like the remains recorded in Corridor 2. Evidence for the appearance of the Tudor palace was provided by an important assemblage of moulded stone which was reused as the foundations of later garden walls in the palace (see Hayward above). This stonework provided evidence for the appearance of both windows and doors (Figs 20 and 21). The Duke of Somerset's palace was at the forefront of contemporary architectural design incorp-

orating fashionable Renaissance style with features such as large bay windows with tramline mullions (see Hayward above). Other *ex situ* fragments of Tudor moulded stonework, including tramline mullions and decorative plasterwork possibly derived from Somerset's phase of the palace, have been recovered from previous archaeological investigations within Somerset House (Fig 1, nos 6 and 8; Samuel 2005; Gapper 2009).

### *The Stuart Palace (Period 6)*

The presence of the reused Tudor masonry in the garden walls would suggest that elements of the original palace were demolished during later alterations (Fig 9). In fact the palace was subject to several campaigns of rebuilding and enlargement as it expanded, and parts of the older building were renovated and remodelled to bring them up to date with new architectural fashions. Queen Anne of Denmark initiated a major reconstruction of the palace from 1609. The original Lower Court was substantially remodelled and buildings forming a new three-sided courtyard were erected. Further reconstruction around the Upper Court saw the introduction of an open arcade of nine arches to the entrance and the rebuilding of the ranges on the east and west sides, in a style to match the Strand front constructed 60 years earlier (Thurley 2009).

It is difficult to determine the date of the garden walls with any accuracy. However, it seems highly likely that they represent part of the Stuart expansion and reconstruction of the palace. Cartographic evidence clearly indicates that they are part of the garden walls to the south of the Lower Court and Arcade (Fig 3).

### *Government Offices (Period 7)*

A number of features were recorded throughout the basement of the East Wing of Somerset House which relate directly to the extant building. These included a series of levelling deposits associated with the construction of Somerset House and the remnants of an original brick-paved basement floor surface and hearth. Principal amongst these features, however, was an extensive network of drainage culverts



below the basement floor (Fig 15). Indeed a similar network of culverts of the same date was recorded during archaeological investigations in the South Wing of Somerset House. Here the culverts ran into larger ones which then extended into the river terrace and discharged into the main sewage system beneath the Victoria Embankment (Fig 1, no. 6; Wood & Munby 2003, 90–1). Brick culverts of this type and date were also recorded during the watching brief in the area of the Great Court (Fig 1, no. 8; Gifford & Partners 2005, 20). This clearly illustrates that this extensive network of brick culverts was the principal drainage system not only in the East Wing of Somerset House but across the whole complex. A small pottery assemblage dating to the mid-19th century provides a terminus post quem for the disuse of this network of culverts.

### *Late 19th-Century Activity (Period 8)*

A series of alterations were undertaken in the basement of the East Wing of Somerset House during the late 19th century to reflect its changing usage. This was evidenced by the presence of hearths and remnants of brick-paved floor surfaces located in some of the rooms. The most prominent feature, however, was the remains of an extensive network of brick and tile-lined flues (Fig 15). This network cut through the earlier culverts. Similar flue structures of the same date were recorded during the archaeological investigation of the South Wing and River Terrace of Somerset House. However, these flues were part of a large industrial complex in the area of the River Terrace directly next to the remains of the 19th-century barge house. Here a brick-lined flue ran out from the fire box of a brick-built furnace into a vertical flue (Fig 1, no. 6; Wood & Munby 2003, 95). Much like the flue structures found in the East Wing they contained burnt coal and ashes. Despite the similarities between the flues recorded on the River Terrace and those in the East Wing, it seems unlikely that they are part of the same network. However, as demonstrated in the basement of the East Wing, these flues were certainly part of an extensive network. During the mid-19th century this area of the basement was predominantly used for the

storage of archival material, plus supplies of coal and wood. No record of any such system of flues or associated structures could be found in the records associated with the East Wing basement during this period. Although this flue system is very reminiscent of underfloor heating ducts it seems unlikely that the basement would have required any heating based on its documented usage. Perhaps its planned usage was different hence the installation of the ducts.

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### NOTES

<sup>1</sup> MOLA Resource Library, [www.mola.org.uk/resource-library](http://www.mola.org.uk/resource-library) (accessed 9 January 2017).

<sup>2</sup> Obtained from examples of moulded stone that formed part of the LAA moulded stone collection formerly kept in temporary storage at Convoys Wharf.

<sup>3</sup> KH20 Westwood Groundstone (Corsham); KH95 Box Groundstone (Box); KH96 Box Corngrit (Box); KH97.

<sup>4</sup> HEN 1 Henry III statue, Westminster (Monks Park stone); HEN 2 Queen Eleanor statue, Westminster (Monks Park stone).

<sup>5</sup> BERM 14 late 17th-century/early 18th-century cornice moulding, Bermondsey Abbey.

<sup>6</sup> Also termed echinoidal limestone (Sander-son 1998b, 17)

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