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**C261 Crossrail Early East –Stepney Green (XRV10)**

**Building Material Assessment**

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## 5.1 Site archive: finds and environmental, quantification and description

Table 1 Finds and environmental archive general summary

Building material	A total of 347 fragments of building material were recovered (bulk of material discarded after assessment). Total 55.43kg 130 brick samples (not weighed) Seven shoe boxes of retained bulk building material
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### 5.1.1 The building material

Table 2 Building material

Material	Count	Count as % of total	Weight (kg)	Weight as % of total
Stone	6	1.73	7.70	13.89
Medieval ceramic*	106	30.55	19.95	35.98
Post-med ceramic**	209	60.23	24.42	44.06
Mortar	2	0.58	1.56	2.81
Wall plaster	24	6.92	1.80	3.25
<b>Total</b>	<b>347</b>		<b>55.43</b>	

\* includes some types which continue into the post-medieval period

\*\* not including weight of brick samples

#### 5.1.1.1 Introduction/methodology

All the building material has been recorded using the standard recording forms used by the Museum of London. This has involved fabric analysis undertaken with a x10 binocular microscope. The information on the recording forms has been added to an Oracle database.

#### 5.1.1.2 Roman building material

None.

#### 5.1.1.3 Saxon building material

None.

#### 5.1.1.4 Medieval building material

##### 5.1.1.4.1 FABRICS

2271, 2586, 2587, 2816

##### 5.1.1.4.2 FORMS

Roofing tile

Peg tile

Fabrics 2271, 2586, 2587

There are a number of glazed medieval peg tiles in the moat silt (subgroup 11), some associated with peg tile of post-medieval date. The medieval examples are of standard two round peg hole type, with peg holes between 13mm and 14mm diameter. There is also what could be either a paw or finger print. Probable medieval peg tiles were also found in brickearth deposits (subgroup 5), a clay deposit (subgroup 103) and an internal foundation deposit (subgroup 151).

All are in London area fabrics, indicating manufacture at tiliary in or close to London, possible at Stepney itself. As early as 1366 a licence was granted to John de Wendover to dig a piece of ground in Stepney to make tiles, almost certainly roofing tiles. A short time later a tiler Jon Clark at work in a field in Stepney was killed in a dispute.

#### Nib roofing tile Fabric 2816

A solitary nib tile was recovered from the fill of the ditch/moat (context [218], subgroup 6). This has knife trimmed sides, a distinguishing feature of many nib tiles used in London, and part of the nib surviving. Nib tiles, which are relatively rare in London, were probably used in the 13th and 14th centuries.

#### Ridge tile Fabric 2586

The top of peg and nib tiled roofs were normally covered by a line of curved ridge tiles. Two possible medieval examples were found on the site, one from a brickearth deposit (subgroup 5), the other from the backfill of the ditch/moat (subgroup 6).

### 5.1.1.5 *Post-medieval ceramic building material*

#### 5.1.1.5.1 FABRICS

##### *Tudor fabrics*

1678, 1977, 2191, 2194, 2309, 2497, 2504, 2850, 3063, 3080, 3246

##### *Later fabrics*

2275, 3032, 3035, 3090, 3094, 3202, 3259, 3498

##### *Undated fabrics*

2276, 2320, 2586, 2587, 2816, 3042, 3033, 3039, 3206, 3216

#### 5.1.1.5.2 FORMS

##### *Floor tile*

Low Countries 'Flemish' glazed

Fabrics 1678, 1977, 2191, 2194, 2309, 2497, 2504, 2850, 3063, 3080, 3246

A number of plain glazed Low Countries floor tiles were recovered from the backfill of the ditch/moat and from moat silt deposits (subgroups 6, 11). Other Low Countries floor tiles were recovered from a fill of a cesspit or trap (subgroup 14) and from the infill of a well (subgroup 30).

These have a plain brown, green or yellow glaze and would have been laid in a chequerboard pattern with the lighter yellow tiles alternating with the darker green and brown examples. These tiles all date to the late 15th to 16th century.

### *Stove tile*

Two small pieces of green glazed stove tile were recovered from moat silt (subgroup 11, context [219] (<39>, <40>). These are made with a distinctive hard white clay which is a characteristic of the products of the border ware potters (pot fabric BORDG) working around 1550–1700. The use of tiled stoves was restricted to the wealthiest members of society, so it must have come from a building of high social status.

### *Roofing tile*

#### *Peg tile*

2276, 2586, 2587, 2816, 3216

The majority of post-medieval peg roofing tiles came from brickearth deposits (subgroup 5), the backfill of the ditch/moat (subgroup 6), moat silt (subgroup 11) and from an internal foundation deposit (subgroup 151). Both two square nail hole and two diamond nail hole types are represented. One tile from the moat silt has an unusual top cutaway (context [258]) whilst another, from a cess pit fill (subgroup 26, context 262), has a burnt edge suggesting possible use in a hearth or oven structure.

Peg tiles rarely survive intact in London, but three complete examples were used in the brick drain (context [265], subgroup 18). These measure 261–265mm in length, 149–157mm in breadth by 13–16mm in thickness. All are of two round nail (or peg) hole type.

#### *Pantile*

Fabrics 2275, 3090, 3094, 3202, 3259

The majority of pantiles were recovered from the infill of a well (subgroup 30) and a cess pit (subgroup 32). Other pantiles came from industrial rubbish (subgroup 97) and an internal foundation deposit (subgroup 151). Pantiles began to appear in increasing numbers from the 1630, although they were used spasmodically before this date. The vast majority of London pantiles were from the Netherlands, until production started at Tilbury around in c 1694. It is not certain whether the examples from XRV10, which occur in a variety of fabrics, are of Dutch or English origin.

Pantiles rarely survive intact so the one complete and three virtually complete examples found in the infill of a cess pit (subgroup 32, context [190]) are worthy of note. These measure 341–363mm in length, 222–237mm in breadth by 13–16mm in thickness. Other finds in the cess pit fill date to 1850–1880, but the pantiles could be of earlier date.

#### *Hip tile*

Hip tiles were used where two roof lines set at different angles joined. These tiles are relatively rare in London, although it can be difficult to distinguish small fragments from ridge tile. One definite hip tile was recovered from backfill of the ditch/moat (subgroup 6, context [216]) where it was found with other finds dated to 1600–1610.

### *Chimney pot / garden furniture*

Found unstratified was a large piece of a decorated circular object with an internal diameter of approximately 230mm. This could be either a chimney pot or a piece of garden furniture. It would appear to be made of some kind of mortar. There are in fact two mortar layers. The initial object was made from a circular pinkish-white

mortar layer 14mm thick. On to this was attached a second pinkish mortar layer (up to 45mm thick) applied as decoration.

*Brick*

*Table 3 Post-medieval brick*

<b>Contexts</b>	<b>Fabric</b>	<b>Size (mm)</b>	<b>Date range</b>
[47]	3046	218–223 x 108–110 x 51–57	1500–1666
[50]	3033, 3046	226 x 106–109 x 56–61	1500–1666
[51]	3032, 3046	217 x 103–106 x 59–64	1750–1900
[52]	3033, 3046	208–232 x 97–113 x 55–63	1500–1666
[53]	3032, 3046	217–226 x 99–107 x 54–56	1666–1800/1900
[73]	3033	226–229 x 109–111 x 56–60	1500–1666
[78]	3046	229–231 x 111–117 x 49–56	1450/1470–1600
[153]	3046	221 x 105–106 x 54–60	1500–1666
[162]	3033	225 x 113 x 54–56	1500–1666
[165]	3046	? x 103–107 x 53	1500–1666
[166]	3046	221–222 x 108–110 x 54–55	1500–1666
[184]	3032	215–223 x 101–102 x 63–69	1800–1900
[194]	3032, 3035	218–229 x 98–106 x 58–67	1800–1900
[197]	3032, 3033, 3046	218–230 x 96–111 x 48–64	1800–1900
[204]	3032, 3035	224–x c 227 x 96–109 x 63–65	1750–1900
[206]	3042	228–230 x 107–109 x 54–63	1550–1666
[210]	3206	229–237 x 109–114 x 49–58	1450/1470–1550
[216]	3065	? x 106 x 48–60	1480–1600
[229]	3046, 3260	216–230 x 103–108 x 52–61	1480–1600
[233]	3046	220–226 x 106 x 50–57	1470–1555/1600
[235]	3033	216–226 x 104–105 x 49–56	1450/1470–1550
[238]	3046	217–222 x 106–114 x 51–63	1450/1470–1600
[241]	3032, 3036	211–218 x 98–106 x 55–62	1700–1900
[252]	3033, 3042	230–236 x 106–112 x 54–60	1500–1600
[254]	3033, 3039, 3042	201–224 x 99–106 x 50–62	1500–1666
[256]	3039?	c 210 x 90–92 x 51–56	1500–1600
[264]	3498	? x 100 x 55	1500–1700
[265]	3032, 3033	216 x 93–113 x 54–63	1666–1900
[267]	3032?, 3035	219–225 x 101–106 x 59–67	1800–1900
[269]	3033, 3046	225–226 x 105–109 x 53–67	1550–1666
[270]	3046	221–225 x 106–111 x 52–57	1500–1600
[271]	3033, 3046	218–233 x 105–111 x 54–60	1500–1600
[286]	3033, 3042	222–230 x 103–111 x 52–61	1500–1666
[293]	3032	219–222 x 97–104 x 59–63	1700–1900
[320]	3046 near 3033, 3206	213–227 x 103–107 x 51–59	1500–1600
[322]	3033, 3206	227 x 103–107 x 52–62	1500–1600/1666
[327]	3033	? x 106 x 53–60	1500–1600/1666
[329]	3206	224 x 105 x 50–59	1500–1600
[330]	3206	230–237 x 104–c 113 x 52–62	1500–1600
[332]	3033	c 223 x 106–107 x 52–56	1500–1600
[402]	3046	215 x 110 x 52–59	1500–1600

[404]	3032 near 3033, 3033	? x ? x 50–54	1500/1550–1700
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Brick samples make up the majority of the post-medieval building material collected. Many are very similar in fabric (3033, 3046), colour (red or orange) and size (218–236 x 99–113 x 49–63mm), suggesting they may be of similar date. Although dating brick on size needs to be treated with caution, many would appear to have been made around 1500–1666 which would suggest they formed part of Worcester House. Some bricks, such as those from a brick drain (see below) would appear to have been reuse in later structural features.

Many bricks have sunken margins, a feature more commonly associated with pre-1666 London-made bricks. Sixteenth–mid 17th century bricks were found associated with the following structural remains:

- The north wall of the south side of the moat (context [47], subgroup 68)
- The west side of Worcester House wall (context [50], subgroup 68)
- An internal wall (context [52], subgroup 69),
- A north-south wall of King John’s Tower (context [78], subgroup 49)
- The south-west corner of the outer moat wall context [153] (subgroup 78)
- East-west and north-south walls outside the moat (contexts [162], [165], subgroup 74)
- Western external moat wall (context [166], subgroup)
- Brick wall - latrine? (context [210], subgroup 7)
- Outer moat wall (context [233], subgroup 9)
- Internal House walls (contexts [235], [238], subgroup 10)
- Brick drain (context [252], subgroup 18)
- Brick cesspit or drain trap (context [254], subgroup 13)
- Internal return wall off 238 (context [269], subgroup 100)
- Brick drains (contexts [271], [286], subgroups 17, 18)
- Brick culvert (context [320], subgroup 132)
- North-south wall site centre (context [327], subgroup 138)
- Estate wall (contexts [329], [330], subgroup 119)
- North-South wall (context [332], subgroup 121)

A small number of bricks of pre-1666 date from a possible brick latrine (context [210], subgroup 7) and the fill of the ditch/moat (context 229, subgroup 6) have

fabrics characterised by a scatter of white calcium carbonate or crushed shell inclusions (fabrics 3206, 3260). It is not certain if these are London-made or were obtained from brickyards situated elsewhere. One, from the moat/ditch fill, has the impression of the full thickness of the wooden mould used to make the brick. The mould impression is 16mm wide, although this is a slight under-estimate as the impression would have shrunk slightly when the brick was fired.

Of particular importance are a number of shaped brick, which would have formed some kind of decorative architectural feature. Three bricks, found reused in a brick drain, (context [271], subgroup 18) are semi-circular in shape, whilst another, from the backfill of the ditch/moat, has the header end cut to a point (context [216], subgroup 6). Other bricks of interest include a grey 'glazed' header from a brick drain (context [286], subgroup 17) which may originally have been used in decorative brick diaper work, and a 'waster' from a construction backfill deposited dated to 1580–1700 (context [264], subgroup 18). This brick, and other overfired examples (contexts [50], [52], [82], [256]), represents evidence of brickmaking somewhere in the vicinity (this is discussed in more detail below). Despite being overfired some bricks were still used as walling, although probably not in a prominent location.

Sharp edged London-made dark red bricks (fabric 3032) measuring 212–223 x 93–104 x 59–69mm were recovered from contexts [51], [194], [197], [204], [241], [265], [265] and [267]. Many are frogged suggesting a 18th or 19th century date.

Later dark red brick (fabric 3032) was also found in context [53], although these have more rounded edges and so could be slightly earlier (1666–1800/1900). They were found reused with earlier red brick (fabric 3046) of probable 1550–1666 date. Evidence of reuse comes in the form of two different mortar types attached to the brick sides. The earliest mortar is cream in colour; this is overlain by a light grey mortar layer.

Yellow stock brick of probable Victorian date was recovered from contexts [194], [204] and [267]. One (context [194]) has been crudely cut to a wedge shape suggesting it comes from a brick arch. Another has a diagonal pressure mark on the stretcher face showing the stacking arrangement when the brick was laid out to dry prior to firing. A dark red brick (context [241]) has a similar feature.

### ***Evidence for brick production***

As discussed earlier, there are a number of warped and overfired bricks from the site, suggesting that some of the late 15th–mid 17th century brick may have been made in Stepney.

The bricks recovered from the outer brick wall of the moated house (context [233]) and the other brick features listed above are typical of many thousands of Tudor and Stuart bricks made in London during the late 15th–mid 17th centuries. Such bricks are normally orange to bright red in colour and are soft and fairly friable. There are also occasional stones and small pebbles where the clay was insufficiently prepared before brickmaking.

Tudor and Stuart London bricks were normally made in wooden moulds. Clay was thrown into the mould and the excess clay was then scrapped off, leaving striations on the brick surface. To stop the clay sticking to the sides of the wooden mould the mould was normally dipped in sand. Similarly the wooden bench or table on which the bricks were made was also covered with sand. Again this prevented the wet clay from sticking to the brick makers work bench. The remains of this sand can be seen on the bottom and edges of the most bricks, including the examples from XRV10.

Once the clay had been added to the mould the mould, with the clay still inside, was taken to the drying ground – or ‘place’ as it was normally called. This was done by an assistant – usually a woman or child – known as the ‘bearer-off’, whilst the brick maker was forming a further brick in a separate mould. The bearer-off removed each brick at the ‘place’ so that it lay flat on the ground. This ground was sometimes strewn with grass or straw to prevent sticking. Sometimes, as in the case of the bricks from XRV10 sand was used instead as glass and straw marks are not present.

After an initial period of drying the bricks were turned on edge and stacked in an open ‘honeycomb’ arrangement. Marks on the edges of certain bricks show how bricks were arranged diagonally to one another.

Most bricks in the Tudor and Stuart periods were fired not in permanent kilns but in temporary clamps. Clamps were large stacks of ‘green’ (unfired) bricks interspersed with fuel – which were set on fire and allowed to burn themselves out. The whole firing process, depending on the weather and an amount of fuel and bricks needed, could take several weeks. The firing of bricks could produce unexpected problems, during the 16th century in Islington there were complaints that the brickyards were a ‘chief nursery’ of many of the vagabonds then troubling the City, Westminster and Southwark. The warmth of the brick kilns made them a popular sleeping place for the poor seeking work in London.

During any brick firing, which would probably have achieved a maximum temperature of around 1000 to 1200 degrees, a certain percentage of bricks would be overfired and warped whilst others would be brown and underfired. Overfired bricks could be sold off cheaply as hard-core, whilst underfired brick could be re-fired again to the correct temperature provided they still remained intact. Overfired and vitrified bricks had another use – they could be set into walls to produce a decorative pattern. This decorative work can be seen on a number of Tudor brick buildings in London, notably Lambeth Palace gatehouse built by Cardinal John Morton around 1490.

In 1625 the size of bricks in ‘the Citie of London and Confines of [the] same’ was fixed by royal proclamation at 6 x 4 3/8 x 2 1/4 inches (229 x 111 x 57mm) although this was widely ignored. It is, however, of interest that the bricks from context [233], despite dating to the late 15th–mid 16th century, are close to the approved 1625 standard (220–226 x 106–110 x 50–57mm). This suggests the 1625 standard was recognising established practice regarding brick size, rather than introducing a new size of London brick.

It is difficult to say precisely where the bricks from XRV10 were made. London may not have any native building stones but it does process abundant supplies of raw materials for brickmaking. Areas to the east of the City, including Deptford, had long been established as brickmaking centres, and newer ones too were being opened up, for example in Hackney and north of St Giles in the Fields. They were sometimes the cause of complaint because of the noxious fumes they generated.

The bricks from XRV10 were almost certainly made close to where they were used. Brickmaking in Stepney has a long history. The account of the Episcopal manor of Stepney shows that in 1462/3 the Bishop received £12 2s. 10d. for the rents of the brickfields. According to McDonnell the existence of the Stepney brickfield was due to the ability of the brick manufacturers to outbid those who wanted the land for agriculture. The land had by that time become more valuable for industrial purposes.

Bricks were initially used for more minor structural work such as chimneys and as components in stone walls. Buildings largely or wholly of brick survive from the first half of the 15th century in the area around London, but nearer the city only from the 1480s. Notable brick buildings dating to the first four decades of the 16th century include Charterhouse Wash House Court (early 16th century), Bridewell Palace



(1515–22) and the Augmentations Office next to Westminster Hall (1536–7). The XRV10 bricks date to the period of expanding brick use, when brick were increasingly used for major structural work.

*Dutch paving brick*  
Fabric 3036

A small, hard, yellow Dutch paving brick measuring 153 x c 64 x 34mm was recovered from a rubbish pit fill (context [146], subgroup 82). Dutch paving bricks first arrived in substantial quantities in London around 1630 and were in widespread use during the mid-17th–18th centuries. They were set in a herringbone pattern in the floor to provide a tough hard wearing surface. The XRV10 example was clearly used in such a floor as there are wear marks on one stretcher face.

*Floor tile / brick*  
Fabric variant of 2320

Found with the Dutch paving brick (see above) was a flat red tile measuring 29mm in thickness. The fabric (a possible finer variant of 2320) is undiagnostic, so the function of this tile is uncertain. It may be an unglazed floor tile or a thin brick.

*Wall plaster*

Fragments of pale creamish-white wall plaster were recovered from the infill of a well (contexts [203], [204], subgroup 30). This plaster was found with other artefacts dating to 1807/1810–1900, suggesting a possible 19th century date.

*Mortar*

From the moat (context [288], subgroup 11) was a piece of mortar with a flattish surface.

*Stone*

The only stone collected was a large cobble stone from a well cut (context [197], subgroup 2) (stone type still to identify), dark grey roofing slate and a cut slab of what may be a variant of French Caen stone 52–56mm in thickness from a well infill (context [204], subgroup 30). The latter has a smooth upper surface suggests it may have been used as paving, or is part of some kind of monument or inscription. All the stone was found in 19th century contexts.

*5.1.1.6 Assessment work outstanding*

None.

## **6 Analysis of potential**

### **6.1 Building material**

The large number of brick samples collected has the potential to help with the identification and dating of the numerous brick walls from the site. Evidence for internal decorative features is provided by the floor and stove tiles. The roofing material used on the buildings was initially peg roofing tile, but pantiles were used in a later period.

## 7 Significance of the data / Text for Future Display Borders

There is evidence of brick production in the Stepney area dating back to at least the mid-15th century. A number of overfired bricks were recovered from the site including one definite 'waster', which would support the suggestion of local brick production. Evidence of exploitation of brick-clay deposits dates back even earlier, as round the mid-14th century roofing tiles were made in the Stepney area. This may be the source of a number of medieval glazed roofing tiles were found on the site, although occupation does not seem to have begun until the very end of the medieval period.

With ready supply of bricks on their doorstep it is not surprising that bricks were extensively utilized in the various brick structures found on the site. The earliest bricks are believed to be part of late medieval and Tudor manor house. This may be John Fennes Great Place dating to the mid-late 1400s. Many bricks were recovered from a brick lined moat and associated house and the gatehouse, the latter known as King John's Tower. A number of bricks have been cut to shape after firing. Decorative brickwork was a relatively common feature of high class Tudor buildings.

The Tudor house would have contained plain glazed floor tiles laid in a chequerboard pattern with lighter yellow coloured examples alternative with darker green and brown glazed examples. Huge numbers of plain glazed tiles were imported into London from the Low Counties during this period. London tilemakers seem to have abandoned floor tile manufacture by the late medieval period, hence the reliance on foreign imports.

The owners of the Tudor building must have had sufficient wealth to install a freestanding stove for heating in at least one room. Stove tiles were initially used in Royal buildings and the homes of the aristocracy, although there is evidence for their use at St Mary Grace Priory shortly before the Dissolution. After the Dissolution their use extended to London's growing merchant classes. Many stove tiles were imported from the Rhineland in Germany, but they were also made in England by potters based on the Surrey-Hampshire border (Gaimster et al 1990, 16). The fabric of the XRV10 stove tiles suggests they are the product of the Surrey-Hampshire potters who were working around 1550–1700.

Peg tiles were used to cover the buildings on the site at last until the mid-17th–18th century when pantiles first appear in the substantial numbers in the London area. It is probable, however, that at XRV10 the use of peg tiles for roofing still continued. The XRV10 pantiles could be either Dutch or English. Their importation coincides with the upturn in importation of hard wearing yellow paving bricks from the Netherlands from the mid-17th century. These bricks, which are present on XRV10, were often used to pave courtyards or stable blocks.

## **8 Method statements**

### **8.1 Building material**

Task 1: To examine further the likely use and position of the shaped bricks (consultation with brick expert Terry Smith) = 0.25 Day

Task 2: The building material assemblage should be compared with the stratigraphical sequence and all available dating evidence = 1.25 Day

Task 3: Write publication report = 3.5 Days

Task 4: Attend Finds Review = 0.25 (quarter) Day

Total time required = **5 DAYS**

#### *8.1.1.1 Work required for illustration/photography*

Shaped brick – context [216]

Shaped brick – context [271]

## 9 Bibliography

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