

# ROSE COTTAGE, TYLERS GREEN: EXCAVATION OF A 15<sup>th</sup> TO 17<sup>th</sup> CENTURY TILERY

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*Archaeological evaluation and excavation were undertaken at Rose Cottage, Tylers Green, in advance of housing development. The site was found to contain three tile kilns, with associated stoke-pits and workshops or drying sheds. Two of the kilns contained evidence of rebuilding, and appeared to have been in use for relatively long periods. Archaeomagnetic dating revealed that the earliest kiln had last been fired between 1445 and 1485, and the latest between 1535 and 1670. The structures on this site provide the first physical evidence, apart from its products, for the Penn tile industry, known to have been in operation between the 14th and 18th centuries.*

*Analysis of pottery, brick and tile samples from the site confirmed that the kilns and associated structures were in use between the 15<sup>th</sup> and 17<sup>th</sup> centuries and produced roof tile. The finds include four examples of decorated medieval floor tile not previously attributed to the Penn tileries.*

## INTRODUCTION

In July and August 2003, Archaeological Services & Consultancy (ASC) carried out excavations on a site at Elm Road, Tylers Green. The work was commissioned by Meryl Construction in advance of housing development.

The site is located in the Chilterns, in the civil parish of Penn, about 4km east of the centre of High Wycombe, centred on SU 9070 9394 (Fig. 1). It comprised a rectangular plot of land measuring approximately 28 × 24m, fronting onto Elm Road, in the centre of the village (Fig. 2). Prior to redevelopment, 'Rose Cottage' (1, Elm Road), its gardens and garage, occupied the south half of this plot. Another small cottage (2, Elm Road) and a shop (3, Elm Road) formerly occupied the northern part of the plot. On the south side of the site is a lane leading to a sports ground to the rear of the property.

The site lies at an elevation of c.161m OD, and slopes by about one metre from south to north, reflecting the topography of the surrounding land. The soils in the immediate area have not been mapped, but are likely to comprise the Combe 1 Association, namely well-drained fine silty soils over chalk (Soil Survey 1983, 511f). There is little surface run-off in the area, but Tylers Green is above the valley of the Wye, which flows from northwest to southeast, c.2km southwest of the site, joining the Thames at Bourne End.

The project archive will be deposited with Buckinghamshire County Museum. The accession number for both evaluation and excavation is 2001.58.

## ARCHAEOLOGICAL BACKGROUND

During the 14<sup>th</sup> century, the Penn/Tylers Green area

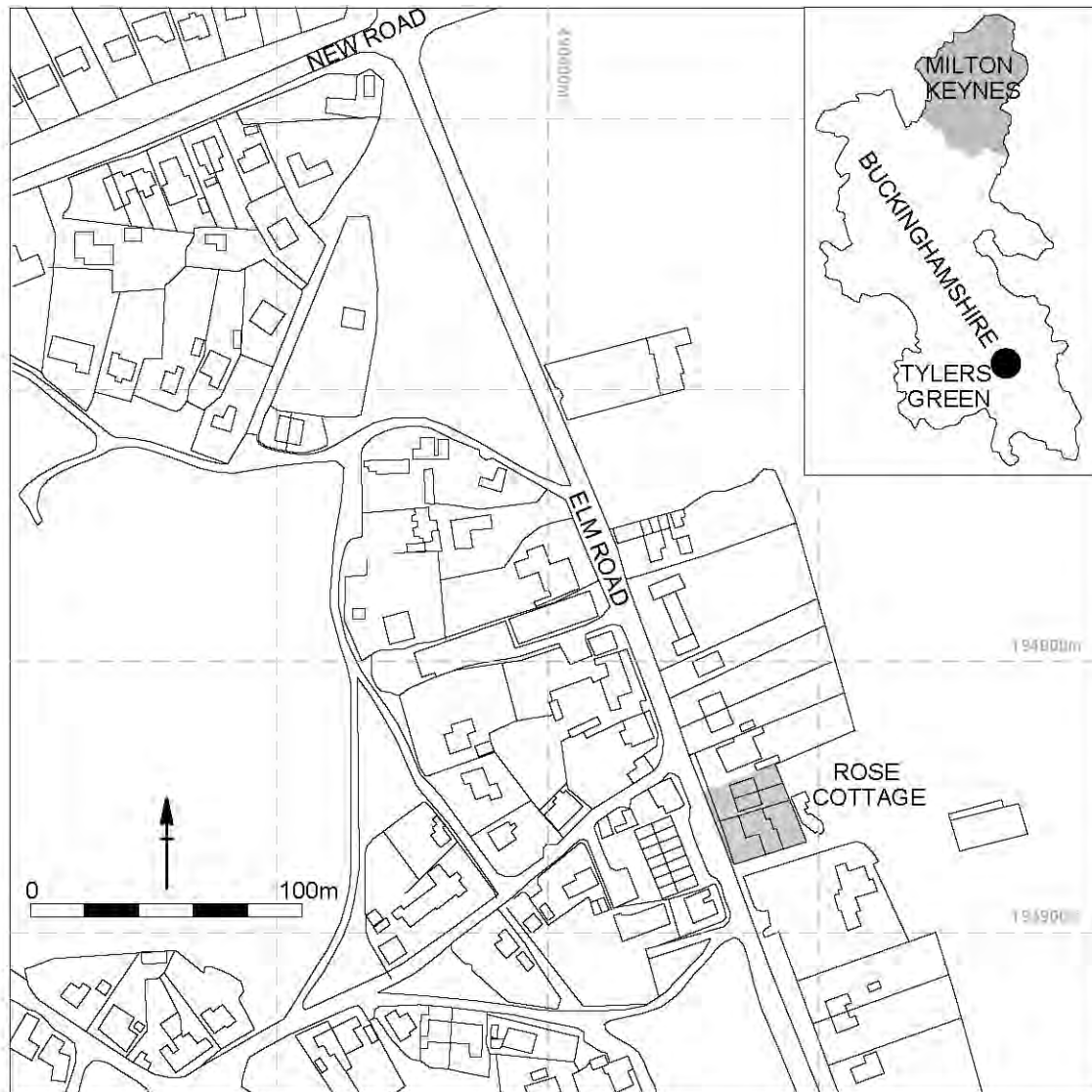


FIGURE 1 Rose Cottage, Tylers Green, site location.

became an important centre for the production of pottery and tiles, both for roofing and floors (Hohler 1941). The latter comprised both unglazed and patterned glazed tiles, typically used in churches and other high-status buildings, notably the royal palaces at Windsor and Westminster. Although tiles of this period have been found in the vicinity of the site, they have been either stray finds, or have been associated with dumps of tile

and pottery wasters. These seem to indicate that the focus of the medieval tile industry lay at the junction of Beacon Hill, Stumpwell Lane and Church Road, c.0.5km south of the site. However, to date no kilns of this period have been positively identified in the area. A comprehensive summary of finds relating to the Penn tile industry has recently been published in *Records* (Green 2005).

In the post-medieval period the settlement at

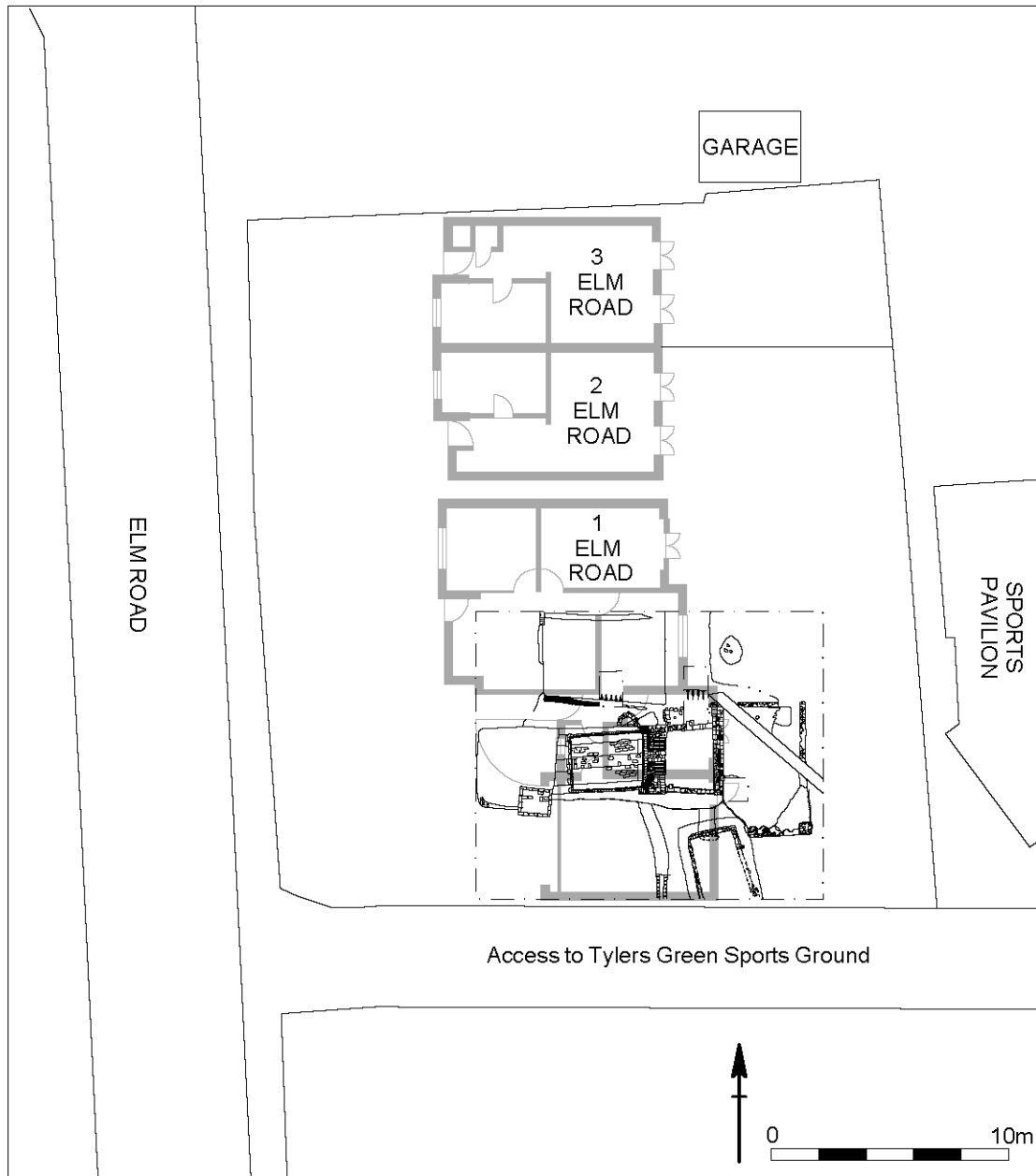


FIGURE 2 Tile kilns in relation to subsequent development.

Tylers Green developed considerably. The tile industry remained important, though only one possible kiln site, of 16<sup>th</sup> to 17<sup>th</sup>-century date, has been found to the north of the site near Potters

Cross (*ibid.*). The industry declined during the 18<sup>th</sup> century. In contrast, the settlement appears to have undergone a renaissance, in the 18<sup>th</sup> and 19<sup>th</sup> centuries, when it developed as a residential area.



FIGURE 3 Kilns 2 & 3 under excavation, from east.

Many of the houses along Elm Road were built during this period – as summer residences for Londoners (Robinson 1929). Rose Cottage itself was brick-built, apparently of 19<sup>th</sup> century date.

In 2001 an archaeological evaluation of the site was commissioned to inform proposals for redevelopment. The work comprised a desk-based assessment followed by trial trenching (Fell 2001: ASC site code 312/TGR). This revealed a well-preserved, substantial brick-built tile kiln and stoke-pit of post-medieval date in the garden of Rose Cottage, the

only part of the site accessible for trenching. East of the kiln were two walls, probably belonging to an adjacent structure. As well as quantities of roof tile, the evaluation recovered several glazed, decorated medieval floor tiles, including designs not previously recorded from Penn.

Development of the site commenced in the summer of 2003. No provision had been made for archaeological excavation – in contravention of the planning condition imposed on the development following the evaluation. By the time a stop order

had been issued and construction halted, the buildings on the site had been cleared, and overburden and subsoil stripped from the kiln area to a depth of c.0.6m below the original ground surface. This resulted in damage to the kiln structure, which had been covered with a protective polythene sheet after the evaluation. It was only at this stage that ASC was commissioned to undertake the excavation, which was commenced at extremely short notice (ASC site code 494/PTG). The work was carried out in accordance with a brief prepared by the County Archaeology Service (Radford 2003). Sampling of the kilns for archaeomagnetic dating was undertaken by the Museum of London Archaeology Service, and analysis of the samples carried out by the Centre for Archaeology, English Heritage. The four-year delay in bringing this report to publication has been largely due to funding problems associated with the voluntary liquidation of Meryl Construction.

## RESULTS

The excavation (Figs 3, 4) revealed three tile-kilns, two of which had been rebuilt during their working lives. Adjacent to the kilns were the remains of two structures, either drying sheds or workshops. A small number of later features, mostly associated with drainage, were also identified. To simplify description, the results of the excavation have been divided into three broad periods: 'Medieval', 'Post-medieval' and 'Victorian & Modern'. These periods are illustrated in Fig. 5.

Following the excavation, a process of assessment and analysis was carried out, leading to the preparation of a detailed report (Abrams & Zeepvat 2007), on which this article is based. Features, along with layers and fills, retain their original 3-digit context numbers. Evaluation context numbers are in the range 101–199: excavation context numbers commence at 201. Finds and samples are numbered in a sequence beginning at 1000.

### Period 1: Late Medieval

This period was represented by Ditch 322, Wall 305 and Oven 292, Kiln 1, Kiln 2 and Workshop 1.

#### *Ditch 322*

This feature (Fig. 4) was in the south part of the site. It followed a slightly curving north-south

alignment, truncated by Kiln 2/3 to the north, and extending beyond the excavation area to the south. Its maximum width was 0.47m and c.0.42m deep, with a rounded, V-shaped profile. Its single fill of dark-brown fine sandy soil (321) contained a single sherd of late medieval to early post-medieval pottery. It appears to be the earliest feature on the site, predating Kiln 1.

#### *Kiln 1, phase 1 (Figs 4–10)*

Kiln 1 is the earliest of the five kilns recorded. Approximately half of the kiln was excavated, the remainder lying beyond the southern limit of the excavation. The furnace chamber and part of the two parallel flues were recorded, but the stokehole and remainder of the flues were not revealed.

The kiln was constructed in 359, a large rectangular pit. It was aligned roughly NW-SE, and was 3.0m wide, 1.7m deep and at least 3.4m in length. The void between the pit edge and the kiln wall was filled with Deposits 319 and 358. Deposit 319 comprised mid-orange gravel, from which two sherds of late medieval to early post-medieval pottery were recovered. Sealing 319 was 358, a red to mid-orange firm clay containing frequent tile fragments.

As originally built, the kiln structure (Figs 6–8, 9–11) comprised two parallel flues, aligned north-south, with a firing chamber above. Overall internal dimensions were 1.65m by at least 3.5m: the flues measured c.0.62m in depth. The floor of the flues (383) was constructed from edge-set, mortar-bonded rectangular roof tiles, laid on 382, a foundation deposit of light brown firm coarse sand. The tiles measured 275 × 175 × 15mm. The exterior walls (353, 355 and 357), and the spine wall separating the flues (380) were constructed from stretcher coursed, clay bonded roof tiles. Some appeared to have been seconds, broken prior to their use in the kiln, though this could have been caused by frost or fire. Complete tiles in the walls measured 290 × 170 × 15mm. The inward-facing edges of the tiles had all been vitrified, showing that the kiln had seen frequent use. The floor of the firing chamber was carried above each flue by a row of at least eight parallel arches (364, 366, 368, 370, 372, 374, 376, 378), constructed of peg tile at 100–150mm intervals. Some of the arches had been contorted due to the effects of firing, and subsidence of the kiln following abandonment.

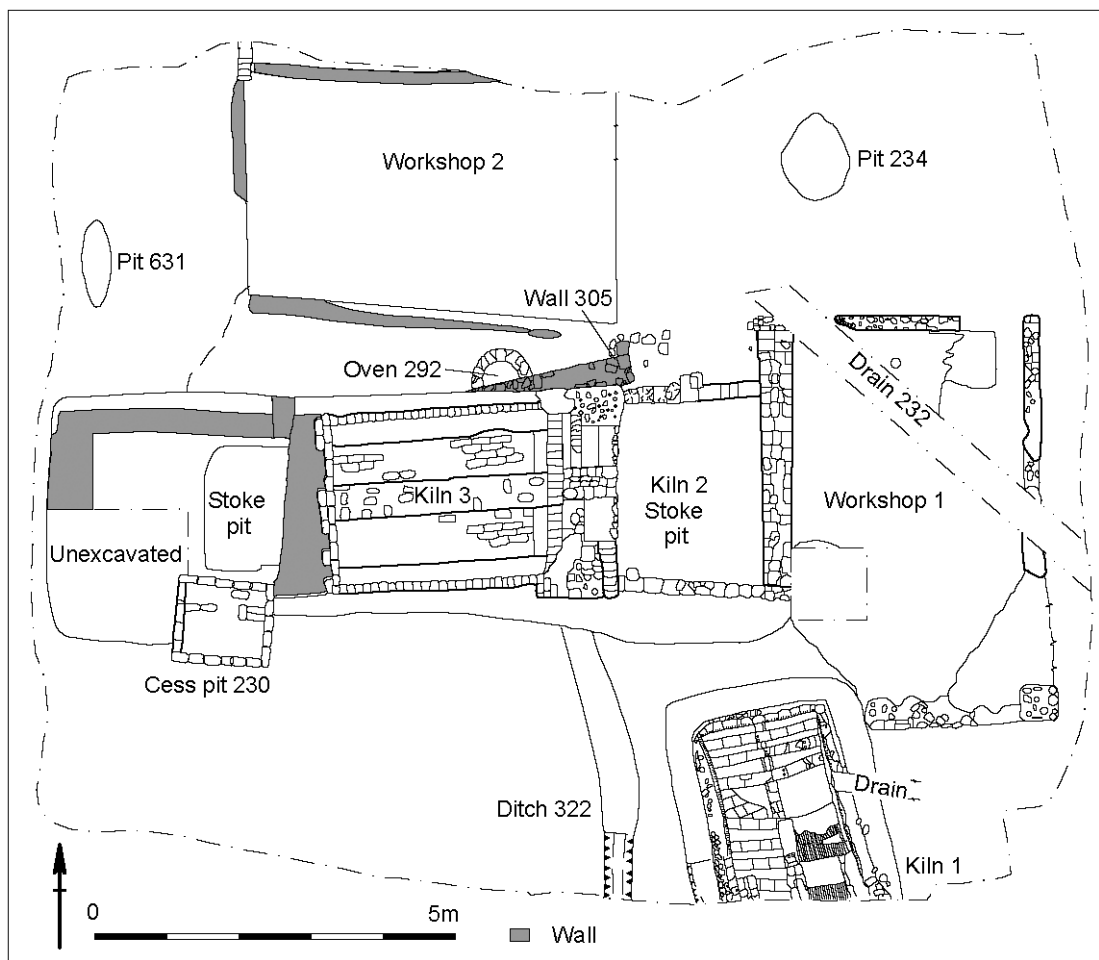


FIGURE 4 Rose Cottage, overall site plan.

#### *Kiln 1, phase 2 (Figs 4–10)*

After a period of use it is evident that the fabric of Kiln 1 had deteriorated to the point where reconstruction became necessary. This was apparently achieved by reducing the original kiln structure to the level of the firing chamber floor, infilling the flues and constructing a new kiln above, within the same pit. Two deposits appeared to relate to this episode. A layer of mid brown coarse sand (385), containing moderate quantities of degraded chalk and fragments of tile, covered the flue floors of the phase 1 kiln. This may have been deposited during the destruction of the kiln. The voids above this were filled by mid brown silty clay 362 containing

frequent fragments of red tile and occasional rounded flint nodules.

The structure of the rebuilt kiln (Figs 6 and 10) was very similar to its predecessor. Its base (351) comprised a layer of edge-set, clay-bonded roof-tiles. The flues were c.0.4m high, separated by a spine wall (349), similarly constructed to the external walls. The floor of the firing chamber was carried above the flues by at least six parallel tile-built flue arches (337, 339, 341, 343, 345 and 347), at c.200mm intervals, some of which had been distorted due either to repeated firing or subsidence. The peg tiles used in this later phase kiln measured 290 × 170 × 15mm.

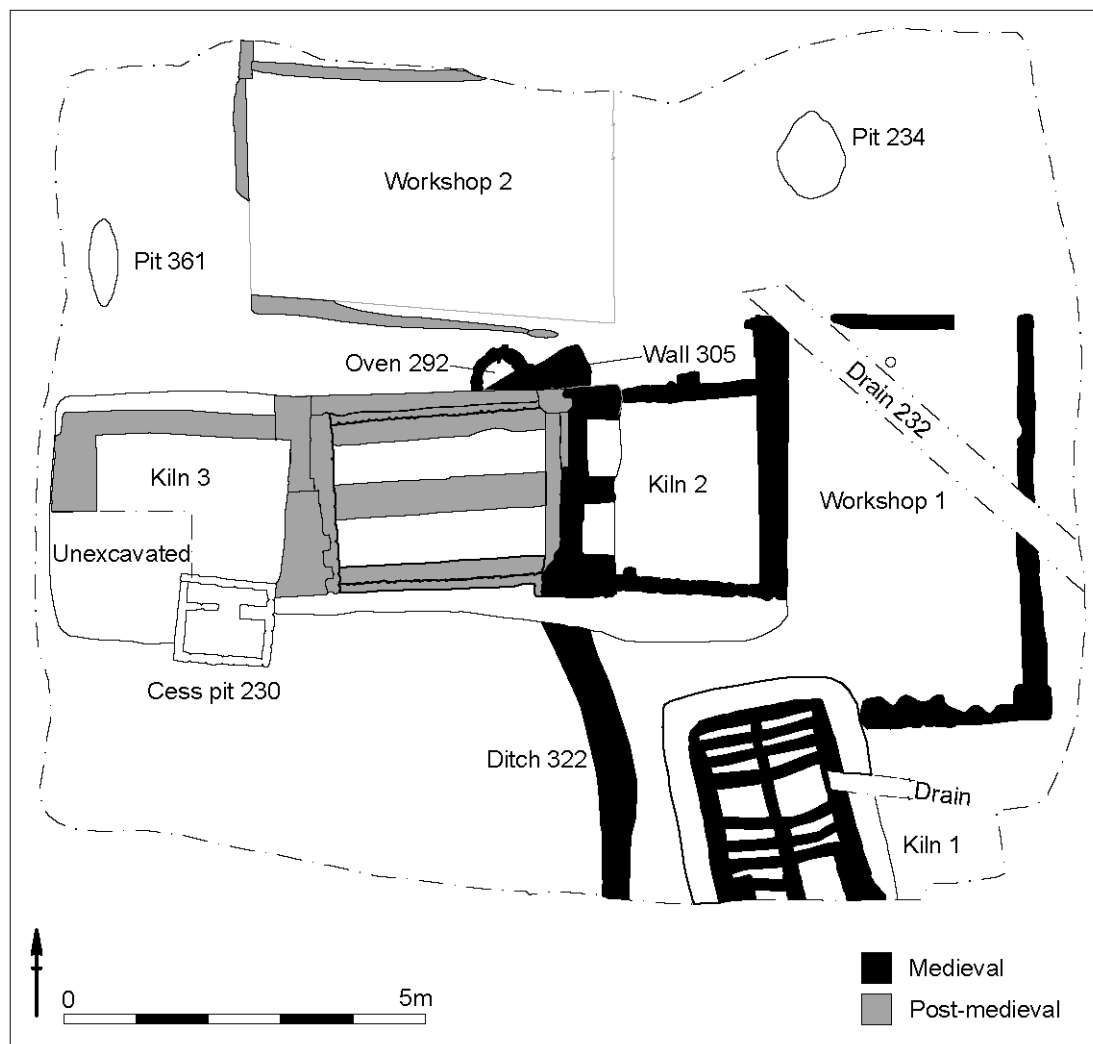


FIGURE 5 Rose Cottage, phase plan.

Against the inner face of the west wall of the rebuilt kiln was a tile-built stretcher-coursed structure 300mm wide (331), extending beyond the southern limit of excavation. It was mirrored by 333, built against the east wall. These structures appear to have formed the outer cheeks to the stokeholes of the kiln. The absence of similar structures in the earlier phase kiln suggests the rebuilt kiln may have been shorter than its predecessor, with fewer flue arches.

Archaeomagnetic dating analysis indicated that

the second phase of Kiln 1 was last fired between 1445–1485. The earlier phase of the kiln was not subjected to this dating process, because of the heavily fractured state of the tile comprising its surviving structure.

#### *Destruction of Kiln 1*

Two deposits, probably relating to the abandonment and demolition of the rebuilt Kiln 1, filled its flues and firing chamber. A thin mid brown, firm silty clay layer containing frequent lenses of chalk

(328: not on Fig. 7) covered the kiln floor. Above this, the structure was filled with 318, a firm red/brown clay deposit containing frequent tile fragments, including peg tile, unglazed floor tile and a single, complete, glazed floor tile of 14<sup>th</sup> century date. Twenty-one pottery sherds were also recovered from this deposit. Eleven were undiagnostic: the remainder were dated to the late medieval to early post-medieval period.

#### Wall 305

Wall 305 was in the centre of the site and followed a NE-SW alignment (Figs 4 and 12). It was constructed with roof tiles laid in regular courses and bonded with mortar, and was truncated to the south by the north wall of Kiln 3. Oven 292 was butted to its north-west side. The surviving section of wall was 1.8m long and 0.4m wide. It is not known whether it formed part of a structure or was a freestanding boundary wall. It was at right angles to Kiln 1, and could therefore be contemporary with it. A single sherd of late medieval to early post-medieval green-glazed pottery was recovered from the fabric of this wall.

#### Oven 292

This was a semicircular structure, constructed with

roof tiles bonded with clay against the north-west side of Wall 305 (Figs 4 and 12). Its internal diameter was *c.*0.4m, and the roof tiles used in its construction measured *c.*290 × 180 × 15mm. The oven's interior was filled with 290, a white chalk layer up to 0.1m deep. This structure could have been a beehive oven related to tile production, possibly for the production of glaze used with decorated tiles.

#### Kiln 2

Kiln 2 was north-west of Kiln 1, aligned on a WSW-ENE axis. Like the earlier kiln it comprised a twin-flue structure, which appeared to have been built at least partly within a pit (224). Only the southern edge of this feature was defined in the excavation. The space between the walls of the kiln and the edge of the pit was backfilled with mid brown silty sand (223). The surviving remains of the kiln consisted of twin arched stokeholes, with a rectangular stoke-pit to the east (Figs 13–15). The body of Kiln 2 had been largely destroyed during the construction of Kiln 3 to the west.

Like the later phase of Kiln 1, the floor of Kiln 2 (316) comprised a layer of edge-set, clay bonded peg tiles. The north and south walls of the kiln (281, 285) and the spine wall (283) were

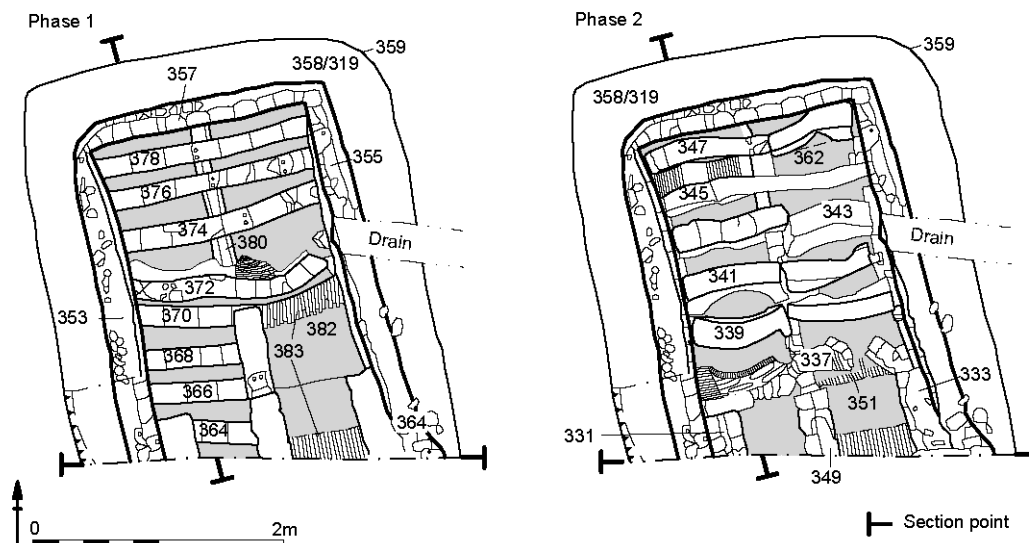


FIGURE 6 Kiln 1, phases 1 & 2.

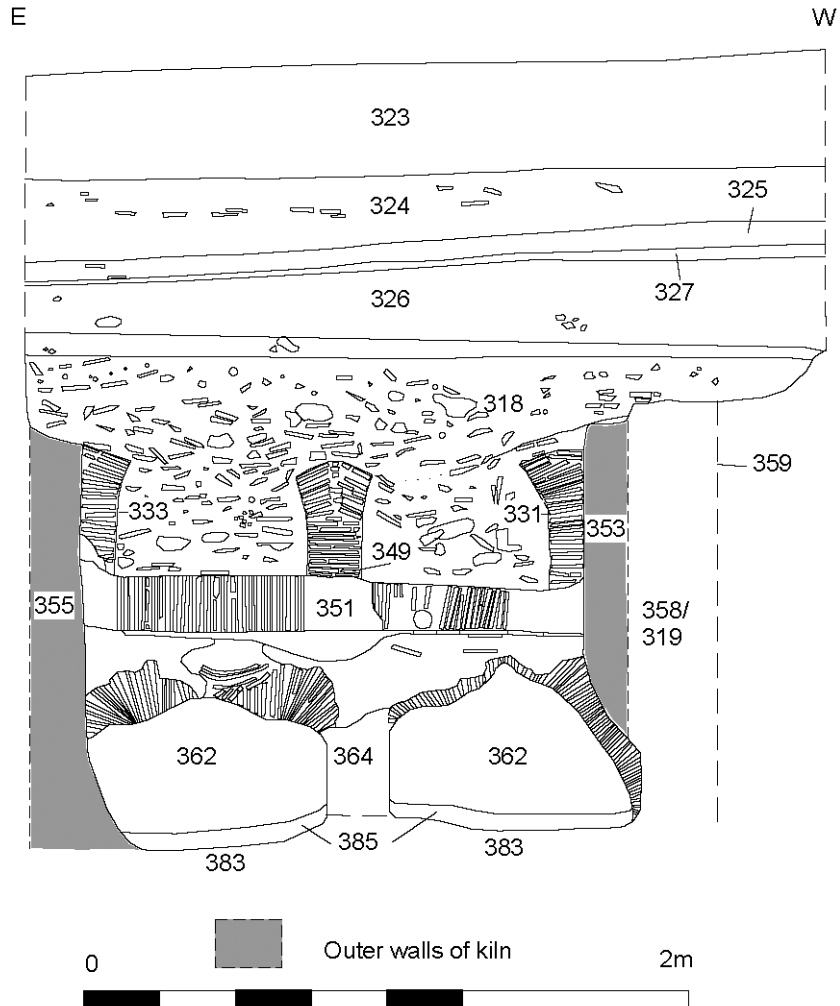


FIGURE 7 Kiln 1, west-east section, looking south.

constructed from header-coursed, clay bonded peg tiles set on the kiln floor. These walls survived to a height of 0.6m: springing for the flue arches commenced at a height of 0.32m (Fig. 13). On this basis, it is estimated that the flues were c.0.75m in height. Examples of whole tiles from the structure measured 290 × 180 × 18mm. The edges facing into the flue had been scorched black. The west end of the structure was truncated by the east wall of Kiln 3. The overall width of the kiln was 2.15m.

The stoke-pit, at the east end of the kiln, measured 2.0 × 2.4m internally. Its walls were

constructed with roof tiles, bonded with lime mortar. The east wall (249) was 3.7m long and 0.4m wide. It extended to the north of the stoke-pit, also forming the west wall of the adjoining structure (Workshop 1). The northern and southern walls (247, 251) were both 0.2m wide, and were butted to Wall 249 to the east, and to the kiln structure to the west. The tiles used in the construction of the walls measured 270 × 170 × 17mm. A metal staple recovered from within the mortar bonding of Wall 251 was probably included by accident in the mortar mix during construction. The floor of the

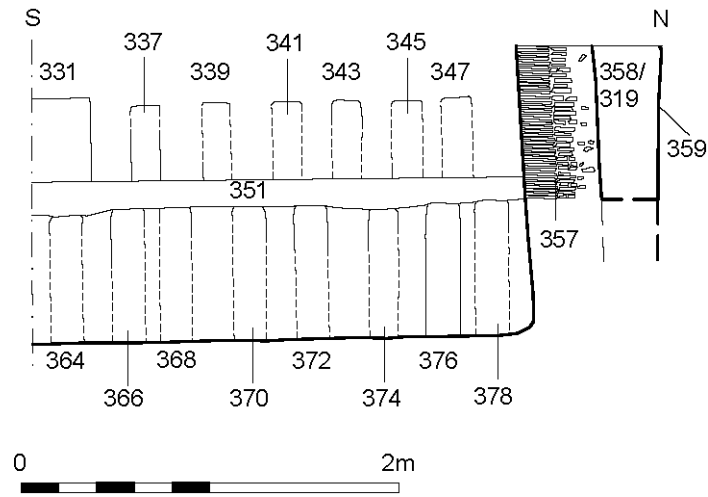


FIGURE 8 Kiln 1, north-south section, looking west.



FIGURE 9 Kiln 1, phase 1, looking north.



FIGURE 10 Kiln 1, phase 2, looking north.

stoke-pit was scorched natural clay.

Because of the partial survival of Kiln 2, and its close association with the later Kiln 3, it was decided that archaeomagnetic dating of Kiln 2 was unlikely to provide meaningful results. It has been assigned a late medieval date on the basis of its structural similarities with Kiln 1, and its physical relationship to Kiln 3.

#### *Destruction of Kiln 2*

The body of Kiln 2 was largely destroyed during the construction of Kiln 3, though some deposits found in association with Kiln 2 may relate to its abandonment and demolition. A layer of mid-brown silty clay (274), containing occasional lenses of orange clay, covered the floor of the stoke-pit. It is possible that this deposit formed after the kiln fell out of use, prior to its demolition. Overlying this, and filling the surviving stoke-pit

structure, was 273, a deposit of mid brown, loose fine sand, containing frequent red tile fragments. This may have accumulated during its demolition. A layer of compacted clay (240) sealed the fill of the stoke-pit.

#### *Workshop 1*

To the immediate east of the Kiln 2 stoke-pit was a rectangular structure (Figs 16 and 17), probably a workshop or a drying shed. It was aligned north-south, and measured 5.3 × 3.2m internally. This structure was first revealed during the evaluation, and had been subsequently truncated by ground reduction for the site development.

Wall 249, the west wall of the building, was also the east side of the adjoining stoke-pit of Kiln 2, and is described above. The north wall (215) was marked by a shallow footing trench, 0.22m wide and filled with mortar containing peg-tile frag-



FIGURE 11 Kiln 1, looking east.



FIGURE 12 Oven 292 and Wall 305, looking south.

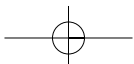




FIGURE 13 Kiln 2, stokepit and blocked flues, looking west.

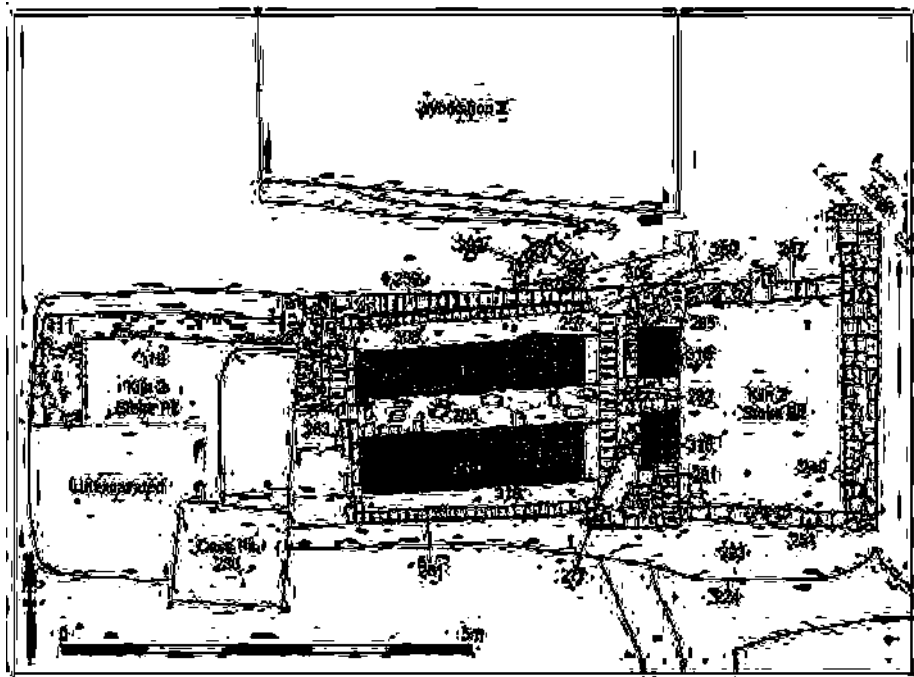


FIGURE 14 Kilns 2 and 3, plan.

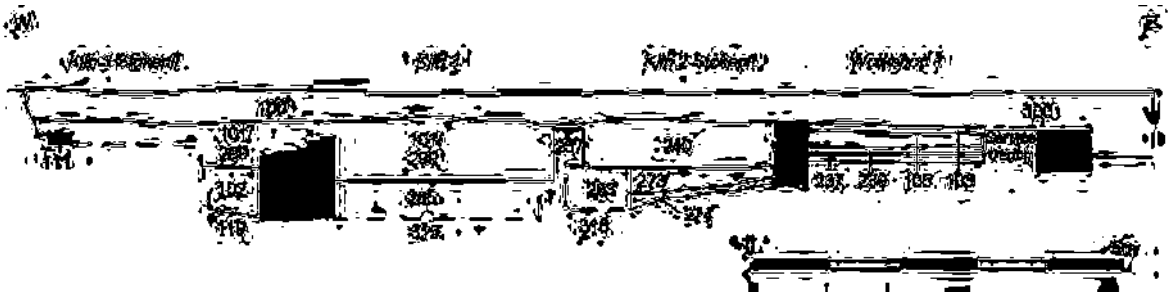


FIGURE 15 Kilns 2 and 3, west-east section, looking south.

ments. Its west end was butted by 249, and its east end terminated short of the north-east corner of the building, leaving a gap of *c.*0.9m. It is not certain whether this represented a doorway, or truncation by recent groundworks. The east wall (107) had been severely truncated: in the evaluation report it was described as 0.75m wide, constructed of courses of plain floor tile fragments, bonded with a cream-coloured sandy mortar (Fig. 18). The south wall survived only as a footing trench (201) 0.45m wide, containing deposits of sand and clay with chalk pebbles and tile fragments. The floor consisted of two layers: 237, a compacted chalk layer 50mm thick, above which was 239, a layer of compacted mid orange clay, 80mm thick.

In the evaluation, it was noted that a layer of crushed chalk and clay (103) sealed the walls and floor of the workshop. Owing to the limitations of the evaluation, and the initial ground reduction for the development, the full extent of this layer was never determined. It is possible that it represented levelling-up of the site, possibly for the construction of a building on the street frontage.

### Post-Medieval

This period covers the construction, use and abandonment of Kiln 3 and Workshop 2.

#### *Kiln 3 (Figs 14, 15, 19 and 20)*

Kiln 2 was demolished after it had ceased operation and a new twin-flue kiln (Kiln 3) was constructed in the same location and on the same WSW-ENE axis, but facing in the opposite direction, with its stoke-pit to the west. This kiln was initially revealed during the evaluation, when its stoke-pit and firing chamber were partly excavated.

In contrast to the earlier kilns, Kiln 3 was

constructed of mortared brick, laid mainly in header bond. The west end of the firing chamber was formed by Wall 263, and was 1m wide. Through it ran two brick-vaulted flue arches, each 0.60m tall and 0.58m wide (Fig. 19). A layer of dark grey ash and charcoal (115: not on figs), interpreted as spent fuel from the last firing of the kiln, covered the floor of the stoke holes.

The north side of the chamber was formed by Wall 259, 0.4m wide. Wall 261, also 0.4m wide, formed the south wall of the kiln. The east wall of the chamber comprised two distinct elements. Wall 257 formed the face of the chamber, and was laid in mortared header coursing, 0.22m wide. Behind it was 277, which was constructed from irregular, uncoursed tiles and bricks bonded with mortar, and which filled the truncated flues of Kiln 2.

The firing chamber of Kiln 3 (Fig. 20) measured  $3.03 \times 2.21$ m internally. The two flues, each *c.*0.6m wide, ran across it from west to east, separated by a spine wall (265), a mortar-bonded structure 0.5m wide and 0.4m high. Wall 308 formed the north side of the north flue. This was constructed from stretcher-coursed bricks, 0.35m deep. The south side of the south flue was formed by Wall 310, which was of identical construction to 308, and was also 0.35m deep. The bases of the flues (315) were constructed with un-bonded edge-set purple/black bricks measuring  $230 \times 110 \times 40$ mm. The floor of each flue was concave, rising at either side. In contrast to Kiln 1 there were no flue arches: presumably the flues in Kiln 3 were bridged with kiln bars when in use.

The stoke-pit, which was half-sectioned during the evaluation, measured *c.* $3.0 \times 2.3$ m internally. Its west and north retaining walls (111) were constructed of mortared flint and brick fragments, and

survived to a height of 0.9m. The floor consisted of compacted grey clay (119). This structure was not examined further during the excavation.

As one of the aims of the excavation (Radford 2003) was to preserve the structure of Kiln 3 as far as possible, investigation of its fabric was limited to removal of the floors of the flues. In the south flue this revealed the remains of an earlier brick floor (304: not on figs), constructed of edge-set bricks measuring  $230 \times 110 \times 40\text{mm}$ , set on a black, coarse sandy layer containing frequent rounded pebbles (303: not on figs). In the north flue was the remains of a floor of un-bonded bricks,  $220 \times 120 \times 55\text{mm}$  laid directly on the underlying natural clay (312: not on figs). These fragments could represent either an earlier phase of Kiln 3, or part of the earlier Kiln 2.

All the internal structural elements of Kiln 3 had been vitrified by the very high temperatures to which the inside was subjected. This had left a white, glassy, chalky deposit (255) over many of the structural elements. This was at its thickest on the flue floors (315), from which samples were taken for archaeomagnetic dating. The results suggest that Kiln 3 was last fired between 1535–1670.

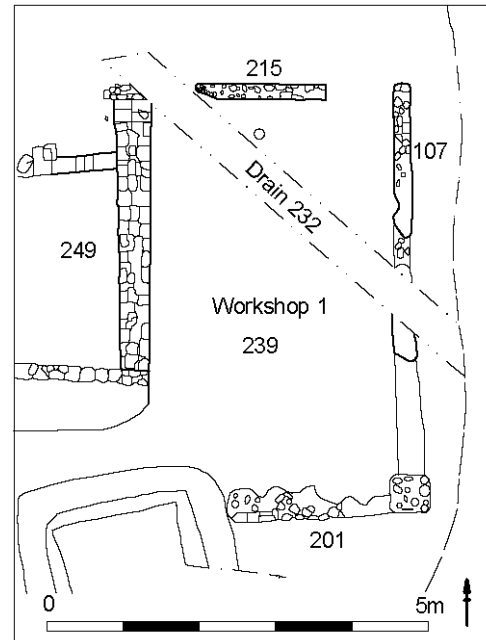


FIGURE 16 Workshop 1, plan.



FIGURE 17 Workshop 1, looking south-west.

*Workshop 2 (Fig. 21)*

The remains of a possible drying shed or workshop were revealed immediately to the north of Kilns 2 and 3. This structure, not encountered in the evaluation, had been severely truncated by ground reduction for the development: as a result, only the bases of three of its walls and the remains of a clay floor were visible. It measured  $5.1 \times 3.5\text{m}$  internally. From its alignment and proximity to these kilns, it is likely to relate to either or both of them.

Wall 298 formed the west side of the structure. It was 0.18m wide, made up of header coursed tile and brick, bonded with mortar. The north side was delineated by a footing trench (388), 0.3m wide, filled with coarse white/yellow sand. The mortar base (287) for a wall, also 0.3m wide, formed the south side. The floor (289) consisted of compacted mid orange clay, extending across the interior of the building. A single piece of clay pipe was recovered from this layer.

*Demolition of Kiln 3 – Deposit 253*

The floor of the southern flue of Kiln 3 was covered with a thin layer of firm dark-brown silty clay (301: not on figs). Above this was a thin layer of light brownish white clay (300: not on figs). The floor of the north flue was covered by a grey, loose fine sand containing frequent ash inclusions (306: not on figs). It is suggested that these deposits may have formed once the kiln had fallen into disuse. Subsequently, the kiln appears to have been demolished, as the flues and stoke-pit were filled with brick and tile rubble (Fig. 15: 101/299, 102), much of it vitrified and therefore originating from this kiln or another. Seven medieval floor tiles and a fragment of a 17<sup>th</sup>-century wine glass were found in this deposit, suggesting that the site of the former kiln formed a convenient rubbish dump.

**Victorian & Modern (Figs 4 and 5)**

During this period, *Rose Cottage* was constructed and cartographic evidence indicates that the site was in residential use by 1840 (Fell 2001, 13, fig. 10).

A rectangular brick-built cesspit (230) of 19<sup>th</sup>-century date,  $1.4 \times 1.2\text{m}$ , was found cutting through the south part of the Kiln 3 stoke-pit. Several pieces of 19<sup>th</sup>-century glass and pottery were recovered from the black coarse sand fill of the cesspit.

Three modern features were encountered: Drain 232 was a service trench 0.4m wide containing a ceramic drain pipe, crossing the site on a west-east



FIGURE 18 Wall 107 (209), from north.

alignment, cutting through Workshop 1; a land drain aligned WSW-ENE cut across Kiln 1; and near the north corner of the site Pit 234, a sub-circular feature *c.*1.2m across, was filled with coarse grey sand containing lumps of modern brick and concrete. In the west corner of the site Pit 361, a discrete oval feature  $1.7 \times 0.6 \times 0.12\text{m}$ , filled with mid brown firm silty clay, contained a single abraded sherd of late 15<sup>th</sup> to 16<sup>th</sup>-century pottery but is presumed to be of recent origin.

**Ceramic Building Materials***Introduction*

The evaluation and excavation at *Rose Cottage* resulted in the collection of 129 fragments of ceramic building material weighing just over 66kg. A wide range of types was collected, including floor tiles, peg tiles, bricks, ridge tiles, hip tiles, pantiles and fragments of clay lining. A large quantity of brick and tile, often in a fragmentary condition, was encountered and it was decided that retrieval of all the ceramic building material was not possible. The resultant small assemblage is the product of a



FIGURE 19 Kiln 3, flue arches, looking east.

sampling strategy in which only fragments with diagnostic features and measurable dimensions were collected. In addition, samples were collected for analysis from the kiln structures and fills.

#### *Methodology*

The medieval floor tiles have been recorded using the guidelines described by Stopford (1990) and other types of building material have been recorded using a system based closely on that used for the floor tiles. The fabric of every fragment has been identified in accordance to the guidelines described by Peacock (1977), and a site-specific fabric type series has been constructed. The fabric analysis was carried out using a binocular microscope at  $\times 10$  and  $\times 20$  magnifications.

#### *Fabrics*

Seven fabrics were identified and are described below. The range of inclusion types is restricted, comprising quartz, iron, mica, clay pellets, with occasional flint fragments and pebbles. The overall impression is that the fabrics are very similar.

**Fabric 1** is hard to very hard, fine textured with

hackly fractures. It contains abundant, sub-rounded, moderately sorted white quartz ( $< 0.16\text{--}0.80\text{mm}$ ), with an average grain size of  $0.16\text{mm}$ . Other inclusions are abundant red and black sub-rounded, poorly, sorted iron ( $< 0.16\text{--}1.66\text{mm}$ ), with an average grain size of  $0.83\text{mm}$ ; moderate, very small flecks of mica ( $< 0.16\text{mm}$ ), and rare rounded pink to buff clay pellets ( $1.0\text{--}5.0\text{mm}$ ).

**Fabric 2** is hard to very hard, coarse textured with hackly fractures. It contains moderate to abundant sub-rounded clear and white quartz ( $0.16\text{--}2.00\text{mm}$ ), with an average grain size of  $0.5\text{mm}$ . The smaller quartz grains are less numerous and the clay matrix is quite clean. Other inclusions present are rare, rounded black iron grains ( $0.16\text{--}0.50\text{mm}$ ), with an average size of  $0.5\text{mm}$ ; rare, rounded pink clay pellets, ( $1.0\text{--}2.0\text{mm}$ ) and rare, very small flecks of mica ( $< 0.16\text{mm}$ ).

**Fabric 3** is hard, fine textured and has a fine fracture. The clay matrix is clean with fair amounts of moderately well sorted, sub-rounded, white and clear quartz, ( $0.16\text{--}0.5\text{mm}$ ), with an average size of  $0.3\text{mm}$ . Also present are rare, poorly sorted red and black iron, ( $0.16\text{--}1.00\text{mm}$ ), with an average grain



FIGURE 20 Kiln 3, interior, looking east.

size of 0.5mm and rare flecks of mica (<0.16mm).

**Fabric 4** is hard and has a fine texture and fracture. It contains abundant, well sorted, sub-rounded white and clear quartz (0.16–1.00mm) average size 0.5mm; rare, well sorted, sub-rounded red and black iron (0.16–1.00mm), average size 0.16mm; rare flecks of mica (<0.16mm). There are also occasional white and grey flint fragments, poorly sorted (5.0–8.0mm).

**Fabric 5** is hard, fine textured with hackly fractures. It contains abundant, moderately well sorted, sub-rounded clear and white quartz (<0.16–0.33mm), with an average size of <0.16mm. Also present are abundant, moderately well sorted, rounded red and black iron, (0.16–0.83mm) with an average size of 0.16mm, moderate, small flecks of mica (<0.16mm), and moderate pellets and streaks of pink and buff coloured clay (1.0–2.0mm).

**Fabric 6** is soft and friable, fine textured with fine fractures. It contains abundant, well-sorted, white and clear sub-rounded quartz, (0.16–

0.83mm), with an average size of 0.3mm. Other inclusions present include moderate, poorly sorted, rounded red iron (0.33–9.30mm), with an average size of 0.6mm; also moderate to rare, poorly sorted, rounded white clay pellets and streaks (0.33–3.30mm), with an average size of 0.83mm, and occasional flint pebbles (10–30mm).

**Fabric 7** is soft and friable, fine textured with fine fractures. It contains abundant, moderately well sorted, sub-rounded, clear and white quartz (<0.16–3.50mm), with an average size of 0.16mm. Other inclusions present are moderate, rounded, red iron (0.5–3.5mm), with an average size of 1.0mm; moderate flecks of mica (<0.16mm), and rare, white and grey fragments of flint (1.6–5.0mm).

Fabric 1 is the most common type, accounting for 64% of the assemblage. Most of the plain and two-colour floor tiles (41 out of 58) are in Fabric 1. The rest are in Fabrics 2, 3 and 4. Fabrics 1–4 are very similar to the fabrics of other floor tiles found

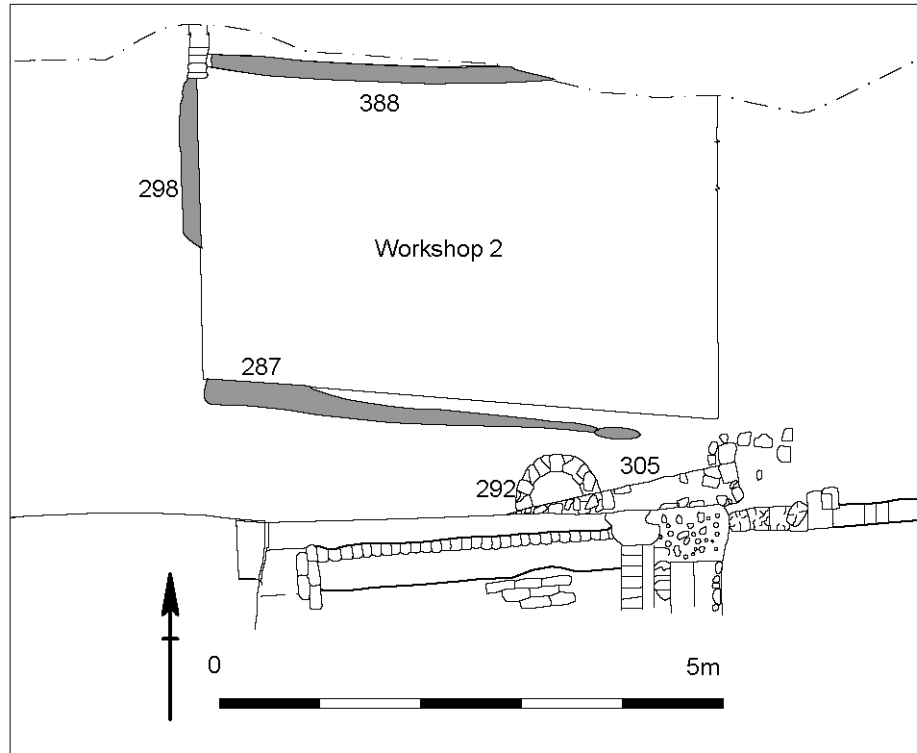


FIGURE 21 Workshop 2, plan.

in Penn (Cauvain & Cauvain 2002), in having small quartz inclusions under 1mm with some pieces of ironstone and flint.

Virtually all the roofing tile fragments (peg tiles, hip tiles, ridge tiles and pantiles) are also in Fabric 1. Only one fragment of peg tile is Fabric 4 and a single peg-tile fragment is the only occurrence of Fabric 5 in the assemblage. Fabrics 6 and 7 are exclusively found in bricks.

The use of Fabric 1 both for medieval floor tiles and later for a variety of roofing tiles may indicate that either the same clay source was utilised in a fairly unaltered state, or that the same fabric recipe was used over a long time span.

Though Penn is not well known for its brick production, there is a reference to a “brick kiln” c.1.5km from the site on Jeffreys’ 1770 map of Buckinghamshire (Fell 2001, 13). Given the presence of suitable raw materials – together with a tradition of tile making – it seems highly likely that bricks were also made locally.

#### *Medieval Floor Tiles*

Fifty-eight fragments of medieval floor tiles are present in the assemblage. While most are from unstratified contexts, some were recovered from either the kiln structures or their fills.

Though the floor tiles occur in Fabrics 1–4, twenty-four of the two-colour tiles are made in Fabric 1 and two in Fabric 4. Seventeen plain tiles are also in Fabric 1, and six in Fabric 4. The remaining nine fragments are in Fabrics 2 and 3.

The manufacturing characteristics for both two-colour and plain tiles are consistent throughout the assemblage. All tiles have been made in a mould; their bases are sanded and the edges knife trimmed, with a slight bevel of about seven degrees. No evidence of template holes can be seen on the top surface, and none of the bases are keyed. The plain tiles can either be glazed (the glazes are usually black or dark green) or slipped and glazed. The white slip is very thin (0.5mm) brushed all over the surface, and is then covered in a clear or copper

glaze. Most of the tiles are rectangular, but three triangular scored and split tiles and one tile that has been scored but not split are also present.

The white slip designs found on many of the two-colour floor tiles show several of the characteristics associated with tiles attributed to the Penn workshops. The white slip design is very thin, usually only 0.5–0.3mm, and the image is often blurred (Eames 1980).

The overall condition of many of the floor tiles is poor and many show a range of manufacturing defects. Some are badly formed and thickness can often vary. One extreme example varies from 30–21mm. Others have not been formed square and so do not have a regular shape. Other defects have occurred during the decoration stage. Several two-colour and plain tiles have not been glazed at all, while others are only partially glazed. The designs on some of the two-colour tiles are blurred and indistinct while, on others, the design has been so heavily stamped that it is quite deeply depressed into the surface.

Many tiles show defects caused during firing. Quite a few show signs overfiring, where the glaze has either bubbled, or fallen off or run into cracks on the surface. More extreme examples are vitrified, and the tiles have become warped and distorted. Many have stacking scars, such as bands of glaze on the base and lumps of clay sticking to their surface – where they touched other tiles in the kiln. A number have split horizontally. This is thought to be due to poor mixing of the clay prior to being thrown into the mould. It appears that pockets of air and sand present in the green tile cause it to split during firing.

Many tiles have patches of a white deposit on their surfaces and sometimes over their fractures. One type of deposit is mortar, where grains of sand can clearly be seen incorporated into the matrix. The other is a very thin white deposit that looks like limescale. This deposit and the mortar patches react vigorously when tested with 10% hydrochloric acid. It is likely that this deposit is results from the tile being in close proximity to either lime or mortar at some time. The presence of mortar on the tiles is clear evidence of their use in structures on the site. Therefore, though most of these tiles show signs of being wasters and were obviously not sold or taken off the site, the tile makers could still find use for such material. Not all broken tiles and wasters were used in kiln construction or left in

dumps at the production site. Records show that such material had a financial value, and was regularly purchased for building works, such as at Windsor Castle in 1354 (Green 2005).

Given the largely residual nature of the assemblage, it is not surprising that only seven plain tiles and eight two-colour tiles are complete. The range of dimensions (length, breadth and thickness) is large. Plain tile thicknesses range from 18–34mm, though most (17 out of 28) are 23–25mm thick. The range for the two-colour tiles is similar (19–30mm), with most (9 out of 22) measuring 23–25mm in thickness. Eames (1980) records a comparable range of thickness measurements for Penn floor tiles.

The designs on the more complete two-colour tiles have been compared to those catalogued in Eames (1980) and Hohler (1941 & 1942). Nineteen tiles match those illustrated in both catalogues. Most of the designs are attributed to the Penn workshop and Eames dates them to the 14<sup>th</sup> century by Eames (*ibid.*). These are listed in Table 1.

Four designs were not found in either catalogue, so it is assumed they are new additions to the Penn workshop repertoire. These are illustrated (Fig. 22) and discussed below.

- 1 The tile is made from Fabric 2. It is 110mm long and has a breadth of 107mm. The tile has split during firing so it is not possible to measure its thickness. The surface is only partially glazed and lumps of clay are stuck to the surface. A thin white deposit of limescale is present on the glazed surface and one edge. The surface is complete and the motifs are made from a white slip covered by a clear glaze. The design is composed of the faces of a lion or a devil in each corner: between them is a curved band enclosing two similar faces and a fleur-de-lis motif. Each of the faces in the corners makes up into a four-tile design with either the four faces in a roundel or a rectangle.  
*SF1003, Context 102*
- 2 This tile is hard and has red margins with a dark grey core. It is overfired, and though the fabric is slightly vitrified, it is probably Fabric 1. It is 22mm thick, 116mm long and has a breadth of 114mm. Most of the lower surface has broken off and has become covered in glaze. Lumps of clay can be seen sticking to the surface under and over the glaze.

The tile surface is about three-quarters

complete and is part of a four-tile design. The design is composed of a series of pellets and curved bands made in white slip and covered by a clear glaze. The motifs are a single large white pellet in one corner with a band of six smaller, even sized white pellets in an arch across the middle of the tile. The other corner is missing so the complete design is unknown.

The surviving design for this tile closely matches design 2114 in Eames. The type tile for this design was found at St Albans Abbey, and Eames attributed it to a workshop in Hertfordshire dated to the 14<sup>th</sup> century. On the evidence of this tile it is possible that this design can now be attributed to the Penn workshops.

*SF1023, Context 317*

- 3 This incomplete tile is made from Fabric 2 and measures 28mm thick and 108mm across its complete side. Parts of the thinly-stamped design are blurred and the glaze is patchy: some areas are unglazed. The tile also has split horizontally during firing. A thin white deposit resembling limescale is present on the edges and over the fracture.

The design, made from white slip covered in a clear glaze, consists of three circles enclosed in a white band. Each of the circles has a different inner design. One has a flower motif (eight rounded petals), another has a wheel motif (six curved spokes) and the third also has a flower motif, with six pointed petals. One corner of the tile is missing, but it is likely that it forms part of

a four-tile design.

This tile closely matches two design type tiles, 2836 and 2805 in Eames, who attributes both to the Penn workshops operating in the 14<sup>th</sup> century. This combination of motifs on the one tile appears to be a new variant for the Penn workshop.

*SF1063, Unstratified*

- 4 The tile is made from Fabric 1. It is 74mm square: its thickness cannot be measured because it has split during firing. The condition of the upper surface is poor, the glaze thin and patchy and where it has been applied it is bubbled. The glaze is opaque with green specks and it is rough to feel.

The design is very similar to type tile 2287 in Eames and P70 in Hohler. However, the tiles in Eames range from 120 × 118mm, 118 × 118mm and 120 × 117mm, while that from Hohler is 116 × 104mm. It seems probable that this tile is a new variant for the Penn workshop. The tile may be a smaller type or it may be from a larger tile that has been scored and split.

*SF1020, Demolition layer 318*

*Roof Tiles*

Peg tiles are the most numerous type of roofing tile in the assemblage. Other forms recorded are three bonnet-type hip tiles, one ridge tile, two hip or ridge tile fragments and a single fragment of pantile. Though most of the peg tiles are fragmentary, substantial evidence for their method of manufacture remains. Most show a consistent range of

TABLE 1 Catalogue of recognised decorated floor tile types present

<i>No of examples</i>	<i>Eames (1980) ref</i>	<i>Hohler (1941 &amp; 1942) ref</i>
1	2232	P44
1	1360	—
2	2534–8	P88 and P89
1	1847	P152
3	2028 and 2029	—
2	2337	P68
1	2328	P59
2	2821	P142
1	1717	P8
1	2836 and 2805	—
1	1845–7	P151
1	2287	P79
1	2114	—
1	2282–8	—

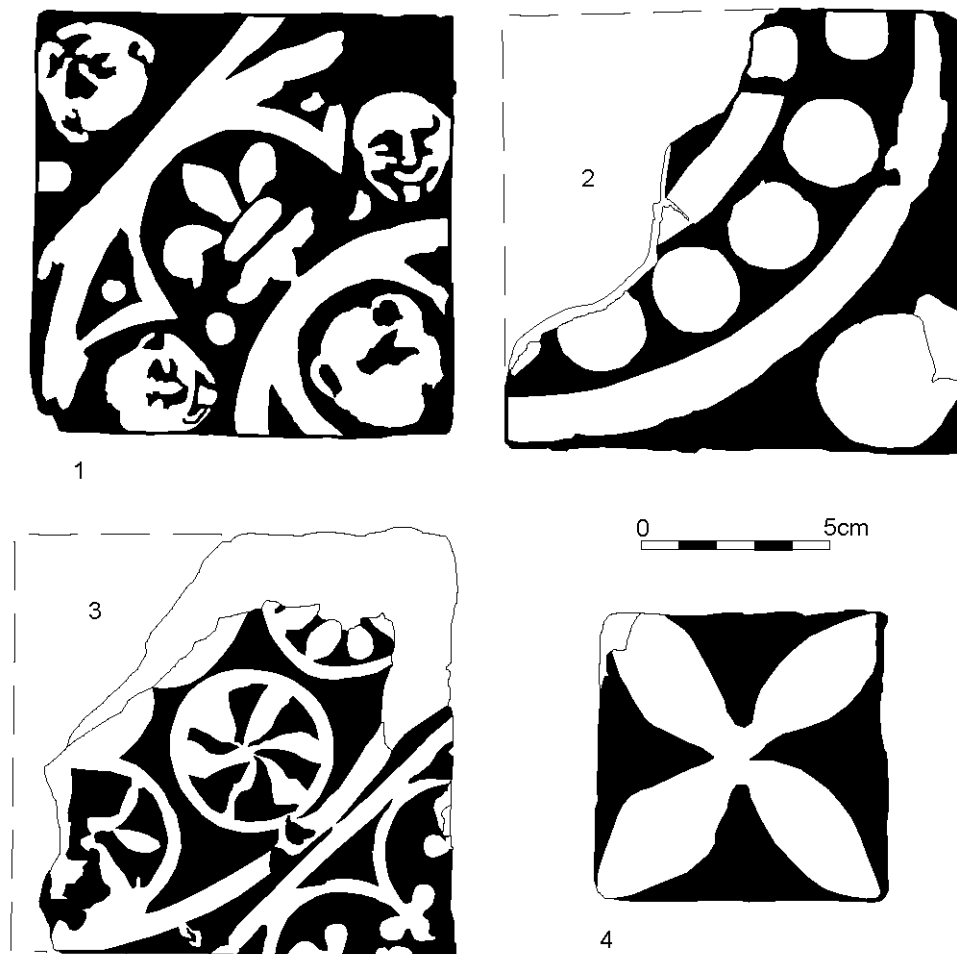


FIGURE 22 Decorated floor tiles (scale 1:2).

attributes: sanded bases and edges show that they have been made in a mould and the top surface of all the tiles have drag lines running from top to bottom where the excess clay has been struck off the mould. Several have bands of smoothing down the struck edge, presumably to clean off excess clay after being struck. All have holes for fixing them to the roof: no evidence for any nibs or glaze was found. The peg holes are all round, except for a single square example. All were formed while the tile was wet, using a sharp tool pushed through the tile from the struck surface to the sanded base. The holes are irregularly placed, not only in relation to each other but also along the top edge of the tile. The size of the peg holes varies from 10–15mm.

The fragmentary condition of the tiles means that the only dimension that can be consistently measured is thickness. The range is 12–17mm, but most (18 out of 27) have a thickness of 13–15mm. Only five length measurements, ranging from 271–285mm, and fifteen breadths, ranging from 151–179mm, were possible.

Many of the peg tile samples had been subjected to extreme heating. They are typically dark red or dark grey, their surfaces are often cracked, and they are either brittle or vitrified and warped. Many have mortar or clay bonding on their surfaces, and it is likely that most are wasters subsequently used in the kiln structures. Two samples of peg tiles bonded with mortar were taken from the flue

arches in Kiln 1, and three samples of peg tiles bonded with clay from the flue arches in Kiln 2.

Two peg tiles provide an insight into the drying stage of production. One has two impressions of a small cloven hoof on the sanded surface. Another has a set of small cloven hoof prints and a set of dog paw prints, with both sets of prints present on both surfaces of the tile. This suggests that the tiles were laid outside on the ground surface to dry. The sequence of prints also suggests that the tiles were turned over at least once during the drying process.

Other types of roof tile also show evidence of being mould-made. They all have sanded bases and edges and struck upper surfaces. A bonnet-type hip tile is the only complete form present. It has maximum dimensions of 296 × 382 mm, is 21mm thick and weighs 2285g.

### Bricks

Twenty-four brick fragments weighing 22.18kg were retrieved from both stratified and unstratified contexts, and from Kiln 3. All show evidence of being mould made. One face and all four edges on each brick are sanded and have creases from the mould: the top surface has drag-lines from being struck. Many of the bricks have sunken margins – a feature noted by other researchers – and probably caused when the brick maker tried to flatten down a ridge of clay formed as he lifted the mould off the brick (Betts 1996).

The size range of the bricks is quite varied. Once again thickness is the only consistently available measurement, followed by breadth. Thicknesses range from 41–59mm, though one-third of the assemblage is 53–54mm thick. Breadth ranges from 104–125mm, though about one quarter are between 104–106mm. Only four complete lengths can be recorded, ranging from 213–233mm. Virtually all the bricks have characteristics resulting from extreme heat. Their colour is either red or very dark grey and their texture is often dusty and brittle. Some fragments have been so overheated that they have become dark grey in colour and their fabric is vitrified and bubbled. All bricks are either Fabric 6 or Fabric 7.

### Dating of the Brick and Tile

Dating the medieval floor tiles from this assemblage is not particularly relevant due to their residual nature. However it is interesting that Eames (1980) dates the tile designs found at this site

broadly to the 14<sup>th</sup> century. Recent research (Keen 2002) has shown that four of these designs, found in a pavement in the Aerary, St George's Chapel, Windsor Castle, can be dated from documentary sources to 1355.

The precise dating of brick and tile can be fairly difficult and often it is only possible to ascribe broad date ranges. In part, this is because their method of manufacture remains largely unaltered over a long time and also because sizes are also fairly long lived. Therefore, the archaeomagnetic dates from two of the kilns are invaluable in providing independent dates for the kiln structures, as well as helping to date the bricks and tiles recovered from them.

Kilns 1 and 2 were constructed from peg tiles. Five peg tiles were measured *in situ* from the Phase 2 flue arches in Kiln 1. All measured 290 × 170 × 15mm, while a retrieved sample (1013) measures 272 × 170 × 15mm. The archaeomagnetic date for the last firing of the kiln is 1445–1485. Eight tiles were measured from Phase 1 structures in Kiln 1. Two of the peg tiles have the same dimensions as those in Phase 2: a further five measure 275 × 175 × 15mm, and a single tile measures 275 × 175 × 13mm. Of the five tiles measured from Kiln 2, one is the same as Sample 1013 (above), while the other four have dimensions of 290 × 180 × 18mm. It is interesting that though there is some variation in the size of the tiles, two broad sizes emerge. The larger measures 290 × 170–180 × 15–18mm, and the smaller 270–275 × 170–175 × 13–15mm. Both sizes occur in the structures for all three kilns. Contemporary documentary evidence for peg tile sizes is given in the tile statute of 1477 (Brunskill 1976), stipulating that tiles should be 10½ × 6¼ × ⅝" (266 × 158 × 16mm). All the tiles from Kilns 1 and 2 are longer and wider than those set out in the statute. This may be because they were manufactured prior to 1477 or, for some reason, the tilers were making non-regulation tiles.

Kiln 3 was constructed from brick. A complete brick (1061) was recovered, and measurements were taken from complete examples in the kiln structures during excavation. Six bricks from the floor of Kiln 3 were measured: two were 220 × 120 × 55mm, two were 220 × 110 × 55mm and two were 220 × 110 × 60mm. The recovered brick (1061) measures 233 × 104 × 56mm. Two of the measured bricks from the early floor (304) beneath the flue of Kiln 3 are the same as examples from

TABLE 2 Pottery Catalogue

No.	Context	Fabric	Vessel	Date
1	101	3	Shallow dish, dia 180mm, int. yellow and brown banded slip decoration, ext band dark brown glaze, sherd joins 5	17th/18th
2	101	3	Teapot? Sherd. Fine red earthenware, high brown gloss finish	18th
3	102	–	Bowl/plate rim. Staffordshire blue printed ware.	Modern
4	102	–	Jar base, English Grey stoneware. Dia. 110mm, int. dull brown pink	18th
5	102	3	Dish, yellow slip trail decoration, sherd joins 1	17th/18th
6	102	3	Heavy jar rim dia. 300mm, cordon on ext 15mm below rim, ext unglazed slip, trace under rim fold some glaze	17th/18th
7	102	3	Large jar, three sherds, two join and show glaze run on section. This may have occurred if vessel had cracked whilst firing. (Kiln waster?)	17th/18th
8	102	3	Three thick jar sherds, two int/ext dark brown glossy glaze and one int 17th/18th glazed	
9	102	3	Large sherd unid, int worn patchy thick light brown glaze, ext intended to have slip banded decoration, shows a trace of dark slip between glaze. (Kiln waster?)	17th/18th
10	102	3	Jar, flat-topped rim, dia 160mm. Int well glossed dark brown glaze, ext hard fired showing dark sheen	17th/18th
11	102	3	Bowl, rounded rim, dia 240 mm, ext strong grooves, int some clear glaze with thin patch of slip badly fired. (Kiln waster?)	17th/18th
12	102	3	Bowl (2 rims, 1 base, 1 sherd no joins) rim dia 200mm. Ext/int good light glossy brown glaze, the rim has remains of debris on top showing stacking marks from within the kiln. (Kiln waster?)	17th/18th
13	102	3	Bowl, rim dia 250 mm, rounded rim top is slightly worn with remains of kiln stacking mark, int brown glaze, ext grooved	17th/18th
14	229	–	Moulded plate rim, marked 'BEST ENGLISH CHINA'	modern
15	233	–	Plate/dish rim, pale blue transfer, underside crazed	18th
16	245	1	Everted rim jar, dia 200mm	Late med / early postmed
17	252	1	13 unid sherds, Oxidised bowl rim dia 300mm, Oxidised sherd ext worn brown glaze, bowl base worn green glaze int; bowl base spots brown glaze int oxidised surface ext brown/grey; one other base worn glaze int	Late med / early postmed
18	288	3	unid form, glossy dark brown-glaze int	Early 17th
19	294	2	unid form, apple green-glaze int/ext	Late med / early postmed
20	317	1	eleven unid sherds; three jar bases; four sherd frags jug includes two joining thumbed base pieces, speckled green glaze ext; frag jar everted rim diam? int patch oxidised; one sherd oxidised ext grooved; one sherd spot glaze ext.	Late med / early postmed
21	318	1	jar rim diam? brown surfaces oxidised core; four unid sherds includes one abraded/burnt? One sherd oxidised ext shattered; one jug sherd misfired glaze similar to jug sherds in 317; one sherd frag ext worn dark greenish glaze. Four sherds one oxidised int worn glaze, two other sherds one with oxidised core, one unid base	Late med / early postmed
22	319	1	three unid sherds, one has spots glaze ext	Late med / early postmed
23	321	1	single sherd unid vessel	Later med.
24	327	1	single base sherd	Late med / early postmed
25	327	2	unid form, ext apple green glaze	Late med / early postmed
26	360	1	two unidentified sherds one has abraded/burnt? surfaces; two oxidised jar sherds with ext grooves join; one oval strap jug handle, signs of slashing on break, distinct reduced firing except for int being oxidised.	Late med / early postmed
27	unstrat	1	jar rim diam 200m, as [245] no join; single jar base with a few spots of glaze on the int/ext	Late med / early postmed

elsewhere in Kiln 3 (220 × 120 × 55mm), and the other two are 230 × 110 × 40mm. These sizes fall into two broad groups: eight are 220 × 110–120 × 55–60mm and three are slightly larger at 230–233 × 104–110 × 40–56mm. Bricks with similar dimensions have been recorded from buildings dated between the 15<sup>th</sup> and 17<sup>th</sup> centuries (Harley 1974). The archaeomagnetic date given for the last firing of Kiln 3, 1535–1670, also spans a wide period. This confirms the date range obtained from the use of bricks of these dimensions in buildings, but does not provide any greater precision.

#### *Brick and Tile Discussion*

Though the brick and tile assemblage from the site is small, it is still of some importance. The archaeomagnetic date for the last firing for Kiln 1 is important in not only dating the kiln, but also the tiles used in its construction. Peg tiles are difficult to date solely by their dimensions, and their association here with an independent scientific date will help in establishing a dating framework for peg tiles of this period. The date obtained for Kiln 1 (1445–1485) is similar to that for the last firing of the tile and pottery kiln excavated at Ley Hill, Bucks, and dated to 1460–1510 (Farley & Lawson 1990, 43).

The analysis has also provided an insight into several aspects of the organisation of tile making in Penn, both in the medieval period and later. The methods of manufacture for the medieval floor tiles are very uniform and the tiles fairly standardised. A similar uniformity in the manufacturing techniques is seen in peg tile production of the later period.

The presence of animal footprints on several peg tiles, especially the double set of animal prints on both sides of one example, shows that tiles were dried in open conditions and turned at least once while they were still green. It also shows that even fairly major blemishes on green peg tiles did not necessarily prevent them from being fully processed and fired. A similar characteristic is seen in the two-colour floor tiles, where unglazed examples were put through the firing process. It would have been fairly obvious, visually, that certain tiles were imperfect or blemished prior to firing. That such tiles were fired implies that quality control was only exercised at the end of the production process.

It is interesting that most of the medieval floor tiles and the later peg tiles are made from the same fabric (Fabric 1). The use of this fabric for floor tiles dated to the mid 14<sup>th</sup> century and peg tiles of

the 15<sup>th</sup>/16<sup>th</sup> centuries implies that either the same clay source was used in a fairly unaltered state, or that the same fabric recipe was used for a very long period of time. Not only is this fabric long-lived, but it has also been used successfully to make two different sorts of tile with very different functions.

Though Penn is well known for the production of floor tiles, its roof tiles were of equal importance. Records show that Salden Manor, in north Buckinghamshire, purchased 111,500 Penn roof tiles in 1357, and it has been estimated that sales of roof tiles up to 1357 were twice that of floor tiles (Green 2005). The presence of kilns postdating this period indicates that the production of roofing tiles substantially outlived that of the better-known floor tiles.

## Pottery

### *Introduction*

A small assemblage of ninety pottery sherds was recovered from the site: twenty-three sherds (1.118kg) from two contexts of the evaluation, and sixty-seven (780g) from twelve contexts of the excavation (Table 2).

Abbreviations used in report: Fab = fabric, unid = unidentified, ext = exterior, int = interior, dia = diameter. None of the assemblage is sufficiently significant to be illustrated.

### *Fabrics*

Three fabrics were present:

**Fabric 1:** Later Medieval Sandy ware. Wheel thrown, hard with abundant quartz, often visible on the surface, occasional iron oxides. The surfaces and core colour can be buff pinkish/brown/grey or orange/red oxidised throughout. This ware was predominant in all but two contexts (288, 305). Source probably local. 1 sherd unstratified (eval): 62 sherds plus 2 unstratified, (exc).

**Fabric 2:** 'Tudor Green' ware. Wheel thrown, fine sandy fabric, off-white pinkish core, apple-green to dark green glaze. From Wall 305 and Layer 327. Produced in the Hampshire and Surrey border areas (Pearce & Vince 1988). 2 sherds (exc).

**Fabric 3:** Red Earthenware. Wheel thrown, fine quartz occasional iron oxides and fine mica; oxidised firing, orange-red in colour, light and dark brown glaze, sometimes with faint iron streaking. Layers 101, 102 and Floor 289. Source probably local. 23 sherds (eval): 1 sherd (exc).

### Catalogue

Twenty-three post-medieval sherds were collected from the evaluation. The heavy rims and sherds were larger and more substantial than the earlier sherds from the excavation, and represented a typical selection of 17<sup>th</sup>/18<sup>th</sup> century red earthenware vessels: one dish, four jars and three bowls.

The sixty-seven sherds from the excavation, though small, were mainly in good condition, except for two with abraded/burnt surfaces, from Layer 318 and Pit 361. The approximate number of vessels estimated from the rims and identifiable sherds is five jars, four bowls and two jugs. Precise dating of the pottery is limited by the small quantity and the lack of vessel profiles and diagnostic sherds.

### Dating of the Pottery

The later medieval/early post-medieval pottery from the assemblage represents a transitional group dating from the later 15<sup>th</sup> to early 16<sup>th</sup> century. The early post-medieval is represented by a single early 17<sup>th</sup>-century glazed redware sherd which was found in association with a clay pipe stem. Pit 361 and Ditch 322 contained only single sherds of Fabric 1, dated to the later 15<sup>th</sup> or possibly 16<sup>th</sup> century.

The pottery evidence indicates activity on the site for the period from 1450–1600, with further activity in the period c. 1600–1700.

It is perhaps relevant here to make comparisons between the dating of the pottery assemblage and the archaeomagnetic dates for Kilns 1 and 3. The last firing of Kiln 1 has been dated to 1445–1485. Pottery from the backfill around the kiln (Table 2, 22), and from the demolition layers within and above it (Table 2, 21 & 22) has a *terminus post quem* around 1450. Kiln 3 has been dated archaeomagnetically to 1535–1670. Associated pottery from the buried soil layer over Kilns 2 and 3 (Table 2, 17 & 25) is later 15<sup>th</sup> to early 16<sup>th</sup>-century, and includes a sherd of 'Tudor Green' ware, which was made in the later 15<sup>th</sup> century and probably reached its peak in the early 16<sup>th</sup> century.

### Pottery Discussion

With such a small assemblage, and in the absence of a local type series, the fabric type dates recorded in north Buckinghamshire (Mynard 1992) have mainly been relied upon. From the Fabric 1 pottery assemblage it can be seen that, while the late

medieval sandy wares continued to be available, fully oxidised, early post-medieval red wares were beginning to appear. Therefore, it is not surprising to find the two 'Tudor Green' sherds, which can be produced side-by-side with these oxidised wares. The production centres for redware and whiteware, including 'Tudor Green', are the on the Surrey-Hampshire border (Pearce & Vince 1992). Two possible locations for similar production centres in Buckinghamshire have been identified: one at Brill (Farley 1979) and the other at Potters Row, Great Missenden (CMAG 1978).

This small assemblage of the later 15<sup>th</sup> to later 16<sup>th</sup> century was retrieved mainly from destruction layers related to the kilns. Elsewhere, it is known that medieval pottery was produced in tile kilns, such as those at Brill (Yeoman 1988) and Leyhill (Farley & Lawson 1990), though in the latter a circular pottery kiln had been constructed within an existing rectangular twin parallel updraught flue tile kiln. Although sherds were found in association with the Rose Cottage kilns, there is no evidence to suggest that pottery was being produced in them at this period.

However, some sherds from the evaluation, tentatively identified as kiln wasters, could indicate a production site in the vicinity during the 17<sup>th</sup>/18<sup>th</sup> century. For example, a large unidentified sherd and a bowl rim show misfired slip (Table 2, 9 & 11), and two sherds of a large jar show a thick glaze-run down the broken section (Table 2, 7), though this may only be the result of the vessel cracking during firing and the glaze trickling into the crack. There is also part of a glazed red earthenware jar rim (Table 2, 12) with remains of kiln-stacking debris on the rim – making the pot far from perfect. It might have been abandoned at the kiln site, although it has been recognised that 'seconds' were sold in the medieval period.

## DISCUSSION AND CONCLUSIONS

In his recent study, Green (2005, 115) notes that Penn had 'the most extensive, successful and well-organised commercial tile workshops in medieval England', and was famous for the production of glazed, decorated floor tiles. Roof tiles continued to be produced at Penn into the 16<sup>th</sup> and 17<sup>th</sup> centuries, eventually declining in the 18<sup>th</sup> century. Although there have been abundant finds of the industry's products from the area, mostly wasters,

and the name 'Tylers Green' attests to tile manufacturing, the discovery of the Rose Cottage kilns and their associated structures represents the first real evidence of the tile industry in the Penn area.

Taken together, the evaluation and subsequent excavation revealed three kilns, two with adjacent drying sheds or workshops. Kilns 1 & 3 both showed evidence of rebuilding or at least refurbishment during their lifetime. Few other features were associated with the kilns and workshops, though the fragment of a wall, and an adjoining hearth or oven, suggest that a wider range of structures and activities were present. It is also apparent that tile making extended beyond the relatively small area available for excavation, as the stoke-pit of Kiln 1 lay beyond the south boundary of the site.

The extent to which the Rose Cottage site represents a discrete tillery is debateable. The site could form part of a much larger industrial complex, possibly including the manufacture of pottery products, extending all along the Elm Road frontage with only occasional breaks. The area to the north was not properly investigated before the present housing development commenced. It has been suggested that there were about fifteen tile kilns in Penn and Tylers Green in the mid 14<sup>th</sup> century (Green 2005, 142). However, this figure is by no means certain, and estimates that individual kilns had the capacity to produce 12,000 roof tiles or 30,000 floor tiles per annum should be treated with caution (*ibid.*).

Green (2005, 140) comments that the shape of a kiln could have been decided by the shape and type of its wares. The three kilns excavated at Rose Cottage were all of the 'twin parallel updraught flue' type. This type has been found on a wide range of sites in Britain, including Meaux Abbey, Yorkshire (Eames 1961), Lyvedon, Northants (Webster & Cherry 1973), Little Brickhill, Bucks (Mynard 1975), Leyhill, Bucks (Farley & Lawson 1990), Danbury, Essex (Drury 1975), Lacock, Wiltshire (McCarthy 1976), Norton Priory, Cheshire (Greene 1989), Radwinter, Essex (Webster & Cherry 1980), Beverley, Yorkshire (Youngs *et al* 1987), Havering, Essex (Meddens 2000) and Tyttenhanger, Herts (Hunn 2004). The principal elements of this kiln type comprise a rectangular firing-chamber above a furnace area normally consisting of two parallel flues, and a rectangular stoke-pit. Construction may be of tile, brick or occasionally stone: the furnace area is

normally below ground level, with arched stoke-holes leading to the flues. Firing-chamber sizes can vary, from the Norton Priory kiln at  $1.2 \times 0.85\text{m}$  to Kiln 1 at Danbury, which measured  $5.0 \times 2.25\text{m}$ . At about 3.8 sq. m, Rose Cottage Kiln 1 is close to the average size for a firing chamber (*c.* 4 sq. m), while Kiln 3 is larger, at 6.6 sq. m. Firing-chamber floors may be supported above the flues by either rows of arches, or by kiln bars: Kiln 1 falls into the former category, and Kiln 3 into the latter.

It is interesting that the alignment of the kilns and the location of their stoke-pits at Rose Cottage changed over time. It might be assumed that the stoke-pit would always be situated to take account of the prevailing wind. However, the stoke-pit for Kiln 1 faced south, the Kiln 2 stoke-pit faced east, and that of Kiln 3 faced west. If the stoke-pits were under cover, as suggested at Danbury (Drury & Pratt 1975, 108, 137), then orientation might be of less significance. On the basis of the surviving structural evidence at Rose Cottage, this is possible for Kilns 2 and 3 at least. Other sites such as Lacock and Danbury also show changes in the orientation of their respective stoke-pits. A cursory examination of the location of stoke-pits reveals a wide variety of orientation on different sites. There is a slight preference for a west-facing orientation and only Shouldham, Norfolk (Smallwood 1978), Tyttenhanger and Leyhill have their stoke-pit facing eastwards.

Kilns 2 and 3 at Rose Cottage appear to have had associated structures, possibly workshops for tile manufacture, or drying sheds for hardening off 'green' tiles prior to firing. Both structures are fragmentary, and in the absence of more detailed evidence it is not possible to be more precise about their function. Their association with the kilns is also tenuous: less so for Kiln 2 and Workshop 1, where the structures share a wall, but more so for Kiln 3 and Workshop 2, where their interpretation as related buildings rests on proximity and a shared alignment. At Beverley two of the kilns were associated with drying sheds each *c.*  $20 \times 4\text{m}$  wide internally and aligned on the same axis as the kiln, immediately adjacent to their respective stokepits. At Danbury the sheds were located at the opposite end of the kilns, furthest away from the stoke-pits. Internal measurements were *c.*  $7.4 \times 4.5\text{m}$  and  $16.0 \times 7.5\text{m}$ . At these sites few structural relationships survived, though the six kilns at Beverley were on a site 1.75ha in extent, and those at Danbury in area

of 2310 sq. m, in comparison with the Rose Cottage structures, which were concentrated in a far smaller area.

At Rose Cottage, other medieval and post-medieval features were few and far between. Ditch 322 contained no dateable finds, but as it was truncated by the pit containing Kilns 2 and 3, and followed a broadly similar alignment to Kiln 1; it can be interpreted as being broadly contemporary with the latter. Wall 305 may also be contemporary with Kiln 1 on the grounds of alignment, and is also truncated by Kiln 2. Its function is uncertain, though it is just possible it could be part of a workshop or similar structure. The semicircular oven (292) set against its north side is enigmatic. It might have been used for reducing lead to manufacture glaze, but there is no direct evidence to support this theory.

Date ranges for the final firing of Kilns 1 and 3, 1440–1480 and 1535–1670 respectively, were obtained by archaeomagnetic dating, and can be viewed with some confidence. Beyond this, dating of the site is more problematic. Securely dateable finds are almost non-existent: the small pottery assemblage consists mostly of fabrics and forms with broad date ranges, and with the exception of the few decorated floor tiles, all of which are residual, the ceramic building materials have even broader date ranges. Furthermore, comparison of the evidence from the evaluation and excavation shows that initial ground reduction for the development truncated the surviving structures, removing stratigraphic evidence that could have assisted with dating. An instance of this is the relative dating of Kilns 1 and 2. This report assumes that Kiln 1 is earlier, on the basis that features possibly associated with it (Ditch 322, Wall 305) are stratigraphically earlier than Kiln 2. In the initial report, the excavator argued on equally tenuous grounds that Kiln 2 was the earliest kiln on site.

All three kilns at Rose Cottage showed signs of heavy use over time. Kiln 1 had been rebuilt at least once, and Kiln 3 had been refurbished, if not rebuilt. It is just possible that Kiln 3 was a rebuild of Kiln 2, incorporating a change of orientation. This evidence of use and repair, in conjunction with the archaeomagnetic dates, may provide some indication of the life span of the kilns. It has been argued that on some sites kilns remained in commission, but were used on an irregular basis (Stopford 1993, 99). If this was so then the life

span of Kiln 1 could, in theory, be much greater than previously supposed. Whether intermittent production could put the date for the use of Kiln 1 back into the late 14<sup>th</sup> century cannot be established. Estimates for the life span of tile kilns vary from as little as four years at Lacock (McCarthy 1976) to 40–60 years at Danbury (Drury & Pratt 1975, 137–8). At Great Chart, Kent, tile production began in 1310/11, but by 1316 a new furnace was required (Adams 1996, 43). This should not necessarily be interpreted as requiring an entirely new kiln on a new site, but possibly as a complete rebuild. The first kiln at Great Chart cost 13s 4d, but the replacement furnace cost 6s 8d, suggesting an extensive repair rather than a replacement kiln *de novo*. The first kiln at Rose Cottage may have not been replaced because of the damage it had suffered during the course of its life, but because there was a need to reduce its size. Accordingly, it is not possible to arrive at precise date for the construction of the kilns.

The excavation did not reveal any definite evidence as to the product of the Rose Cottage kilns. However, from the abundance of roof tile, both as debris and as a major element of the construction of the kilns and associated structures, it is likely that the kilns produced peg tile, and possibly associated items such as ridge and hip tiles. The earliest archaeomagnetic date for Kiln 1 suggests it is just too late to have been used for firing decorated floor tiles. Although brick is used in the construction of the later Kiln 3, there is no evidence to suggest that bricks were made on the site, and it is probable that this kiln was also used to make roof tile.

This report adds to the growing body of evidence for an industry that has been so assiduously collected by others (Hohler 1941; Rouse & Broadbent 1952; Hutchings & Farley 1989; Cauvain & Cauvain 1991; Keen 2002; Green 2005). Its importance is that it provides the first physical evidence of a significant local industry hitherto recognised by its products alone. In addition, it highlights the future potential for the study of the Tylers Green area and its contribution to our understanding of the artistic and cultural context of the nationally renowned Penn tile industry.

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