ROMAN RIVER BANK USE AND CHANGING WATER LEVELS AT 51–53 SOUTHWARK STREET, SOUTHWARK, LONDON

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SUMMARY

The excavation at 51–53 Southwark Street, Southwark revealed a previously uncharted watercourse leading northwards into the 'Southwark Street Channel' which divided the northern sand island on which Southwark was founded from the smaller island to the south. The natural stream was canalised using timber revetments and previously marginal land was reclaimed. The results showed the utilisation of land at levels assumed to have been regularly below Mean High Water. There was however nothing to suggest that the newly established ground surface was ever inundated. Analysis of the pottery assemblage provided evidence for the exploitation of the major watercourse to the north as a navigable channel used for the importation of goods directly into this part of Southwark during the late 1st and 2nd centuries AD. The volume of trade apparently fell away after AD 160 and by the middle of the 3rd century the site was probably abandoned. Homogeneous 'dark earth' type formations marked the end of the Roman sequence. This paper attempts to outline the results of the excavation and assess their contribution to our understanding of the development of Southwark and the exploitation of the Thames in the early Roman period.

INTRODUCTION

Archaeological evaluation and excavation were undertaken by Pre-Construct Archaeology at 51–53 Southwark Street, London Borough of Southwark in November and December 1996. The project was commissioned and funded by Lopex Engineering.

The site was situated approximately 420m to the south-west of London Bridge. The area of excavation was located to the south of No. 53 Southwark Street and to the west of No. 4 O'Meara Street, which delimited the site to the east (Fig 1). The southern limit of the trench was defined by the proximity of the neighbouring railway viaduct, which dictated that a distance of *c.*5m was maintained from the southern edge of the site to the edge of the excavation area. This area was not fully recorded archaeologically but was the subject of a watching brief following the area excavation.

The evaluation phase of the archaeological investigations had to be suspended due to the possibility of structural problems with the surrounding buildings. These required essential engineering works which involved the presence of heavy machinery on site and precluded the continuation of the evaluation. A watching brief was maintained on underpinning work to the north, south and east of the site and some archaeological information was recovered during these essential works. However, John Dillon, Senior Archaeology Officer for Southwark Council, noted that some stratigraphy had been removed without being recorded. The evaluation was recommenced, followed almost immediately by excavation. The area available for excavation measured *c.*13m east–west by 12m north–south, with the limit of excavation to the west being dictated by the proposed limits of the redevelopment and the presence of an access ramp for tracked vehicles. Following a Brief prepared by John Dillon the archaeological deposits

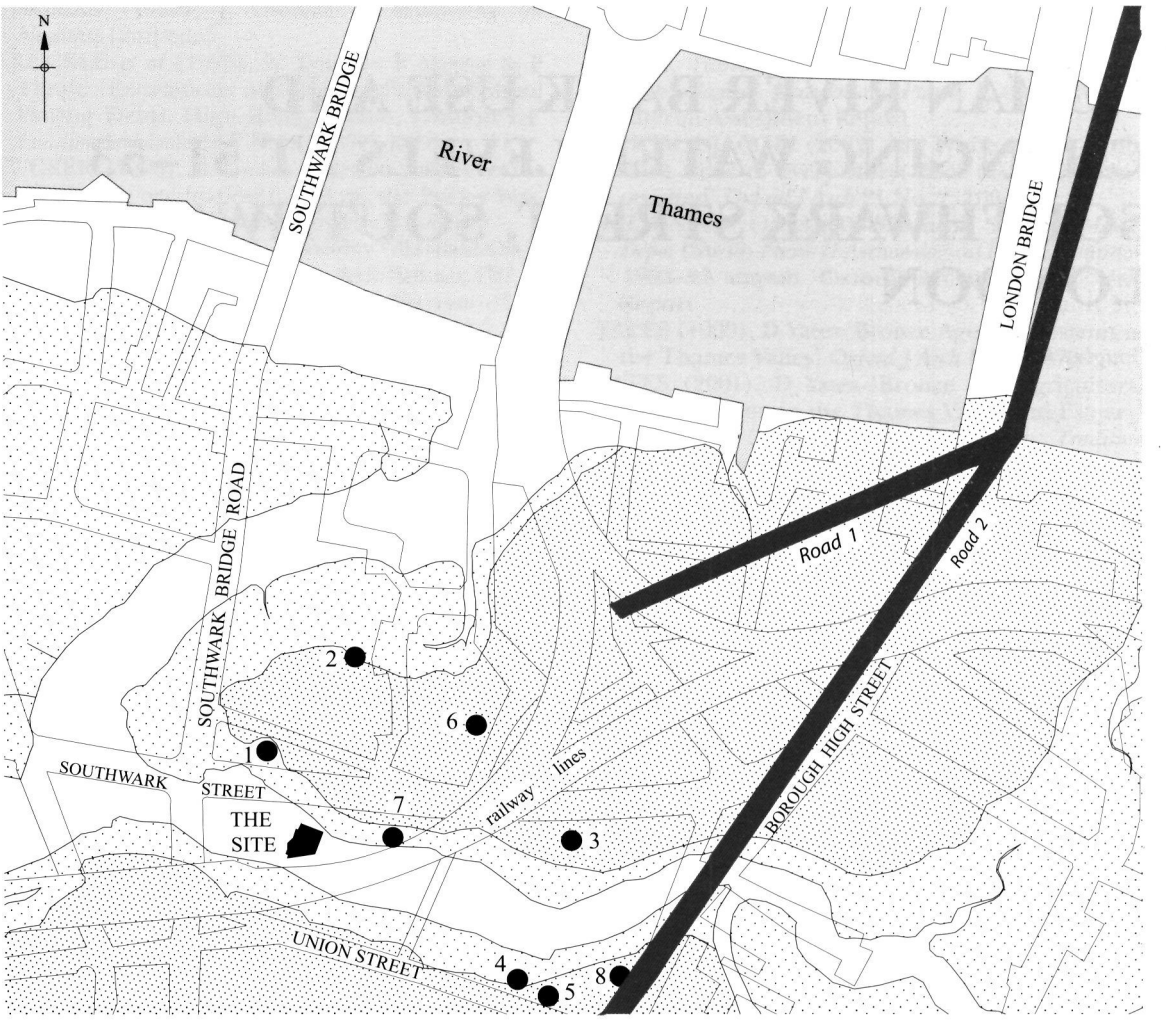

Fig 1. Site location and Roman background topography with the conjectured high water mark based on excavations completed before that at 51–52 Southwark Street

were reduced by a mechanical excavator utilising a toothless bucket until the top of the Roman levels was reached. Thereafter deposits were removed and recorded by hand.

ARCHAEOLOGICAL BACKGROUND

The area in which the site was located formed part of the Thames floodplain in Roman times. It was characterised by multiple channels, small islands, mudflats and marshland, with the river

being subject to tidal influences. The main channel of the Thames had its north bank some 100m north of the current embankment, the southern margin of the channel being close to the modern south bank. To the south of the main body of water was a series of braided channels and islands (Yule 1988, 13–15).

Two major Roman roads were constructed in Southwark in the early 50s AD (Sheldon 1978a, 15). These converged at the southern end of the Roman bridgehead leading to the principal settlement *Londinium*. Road 1 is relatively well documented and ran southward linking the city with the south coast via Stane Street and Watling Street. Road 2 may have linked *Londinium* with a Thames crossing further west at Westminster (Graham 1978, 252–4). The course taken by this road has, however, been the subject of debate; some projected road lines pass very close to the east of 51–53 Southwark Street (Dillon *et al* 1991, 258). Its course has proved difficult to establish away from the bridgehead and it is possible that Road 2 may not have extended beyond the northern island on which much of Roman Southwark was built (Heard *et al* 1990, 610–11).

Much of the early building work required for creating the infrastructure has been attributed to the Roman army and a strong military presence has been suggested for the early Roman period (Hammerson 1978). However, it is clear that a substantial civilian settlement grew up around the southern bridgehead (Sheldon 1978a, 11–48). Much of the expansion dates to the 2nd century but there is little doubt that this had been preceded and facilitated by extensive management of the watercourses which traversed the area. The interpretation of coin loss evidence has led to suggestions that Southwark was the focus of activity in the decades immediately post-dating the conquest (Rhodes 1991, 187). The settlement contracted in the late Roman period and previously occupied areas were abandoned and used as cemeteries. These developments have been demonstrated at 15–23 Southwark Street and the Courage Brewery site (Cowan 1992, 3–191; Dillon *et al* 1991, 262), although there appears to have been a revival of Roman activity in Southwark during the late 3rd and 4th centuries AD.

Apart from the two sites mentioned above, the excavations of note carried out nearest to the site took place at 3 Redcross Way and 52–54 Southwark Street; the latter lies immediately to the north-west, on the north side of Southwark Street. This excavation uncovered the north bank of the Southwark Street Channel, which had been the subject of two phases of timber revetting. The first phase is believed to have been replaced by the early 2nd century. The process of land reclamation continued with new ground being established to the south and reclaimed areas being consolidated by the dumping of sand (Heard 1989a).

A building with stone foundations was subsequently constructed in an area partially overlying the earlier stream bank. Evidence for the structure survived in the form of robber trenches. A large rectangular pit filled with building material, specifically tile and wall plaster, was found nearby and this material may have derived from the demolition of the building. A construction date in the 2nd century is thought likely, but the demolition date is unknown (Heard 1989a).

The site at 3 Redcross Way showed extensive evidence of Roman occupation. Apart from early ditches, a section of road was uncovered. This was associated with clay and timber buildings, possibly shops, dating from the late 1st or early 2nd centuries. Successive building phases sealed these earlier deposits. The later history of the site was not closely dated but one late pit produced a mid-4th-century coin. No evidence of late Roman burials was uncovered, though these are known from the adjacent Courage Brewery site (Dillon *et al* 1991, 262).

The excavations at 15–23 Southwark Street also produced extensive Roman remains. The earliest phase of Roman building dated to AD 60–70. The clay and timber buildings which comprised the first phase were succeeded by a large masonry structure, which is thought to have had a public or official function. Two later phases of clay and timber buildings post-dated this structure. These were relatively high status buildings as they were furnished with mosaic floors, hypocaust systems, and painted plaster walls. Further masonry building works are recorded for the mid-2nd and 3rd centuries. The site was used as an inhumation cemetery in the late Roman period. The inhumations were sealed by dark grey silt deposits (Cowan 1992, 3–191).

SYNTHESIS OF THE EXCAVATION RESULTS

Sand bar, channels and jetty

The most notable topographic feature was a

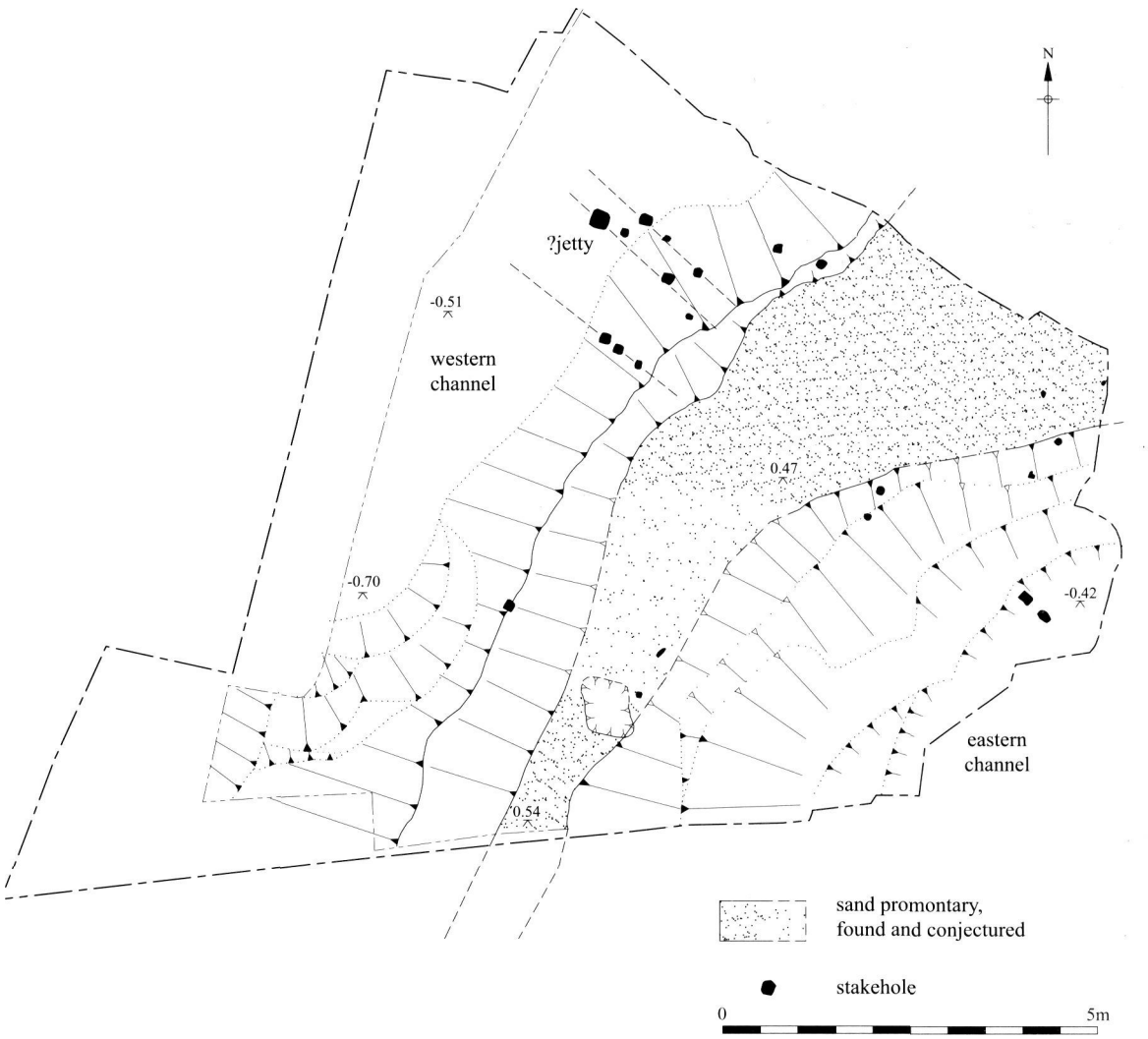

Fig 2. Early Roman sandbar, jetty and channels

small island or sand promontory which extended roughly north–south through the central and eastern parts of the excavation (Fig 2). The earliest deposit within this formation consisted of fine orange gravels which occurred at a height of *c.*-0.30m OD. These were overlain by an alternating sequence composed of clays and silts, indicating slow water movement, and sand layers, indicating periods of faster moving water. The regularity of these bands was notable and a seasonal cycle of deposition might be inferred. These deposits survived to a maximum height of 0.55m OD.

The original extent of this formation is unknown as it continued beyond the limits of the trench and had undoubtedly been eroded by the north–south-aligned channels which lay to either side. These were slow-moving waterways in the immediate pre-Roman and early Roman periods but had clearly shaped the sand bar which divided them. It is possible that they were once branches of the same stream. Clearly the site and its developments were affected by the active floodplain environment in which it was situated.

The two streams were active contemporaneously

but the eastern channel was the first to become silted up. Pottery dates suggest that this occurred in the mid to late 1st century AD. Large scale alluvial deposition also took place along the bank of the western channel and the course of the stream migrated westward. During the early part of this depositional sequence a few sherds of Roman pottery found their way into the lower fills of the stream. These included part of a Dressel 20 amphora and a stamped samian base, which has been dated to AD 50–65 (Precious 1997). No man-made structures were present on the site at that time.

The early fills of the western channel, along with those of the eastern channel, have been analysed for diatoms and pollen. The results suggest that all fills were deposited under similar environmental conditions, possibly relatively rapidly. Although freshwater conditions predominated, both channels presented evidence that they were connected with the main Thames waterway and that they were, at least periodically, tidal (Cameron & Dobinson 1997).

Pollen analysis suggested an environment in which local woodland was sparse. Limited evidence of arable crops and associated weeds was evident. The dominant elements were herb communities with associated elements deriving from waste ground, aquatic/marsh, wetland, and salt marsh environments. Note has been made of the presence of spruce, not a native to these shores, whilst other exotic tree species known to have been introduced in the Roman period, such as walnut, were absent (Scaife 1997).

The sequence of alluvial deposition continued in the western channel. The earliest tangible human intervention on the site took the form of a series of driven wooden posts which occurred around the periphery of both the eastern and western channels (Fig 2). One cluster of posts was noted in the north-west quadrant of the site. Although interpretation is difficult, this cluster may have represented a small jetty or landing stage which facilitated access from the bankside to boats moored in the channel. The majority of the posts were too small or badly decayed to produce dendrochronology dates but one timber has a provisional felling date of AD 72 (Nayling 1998). No attempt seems to have been made to canalise or control the stream by constructing timber revetments.

It appeared that the site was not frequently exploited in this period. The posts show that it was at least visited but the paucity of finds within the channel fills demonstrates the absence of occupation. Analysis of the sediments suggested some human activity nearby but cess could have entered upstream and been washed down to the site (Keeley 1997). The timber structure mentioned above was not maintained and successive alluvially deposited layers covered its decaying elements.

The final event in this alluvial sequence was the deposition of an homogeneous clay layer which sealed the fills of both channels and capped the sand promontory which divided them. The topography of the site was radically altered during this early phase of development. The eastern channel ceased to be active. The course of the western channel migrated westward and alluvial clays and silts covered the entire area. The highest points of the new land surface lay at *c.*0.75m OD. Pottery recovered from the site-wide alluvial layer has been dated to AD 70–100. Among the material were fragments of SLOW ware, a very early local product from the City previously seen in Southwark only at the Park Street excavation (Precious 1997). When found in the City this pottery has been seen as indicative of very early Roman settlement even when it occurs in residual contexts (Milne 1995, 46).

Large scale alluvial deposition was limited to the revetted channel in later periods. The central and eastern areas of the site were therefore no longer subject to transgressions from the surrounding channels. This may imply not only the management of the stream situated to the west of the site but also of the Southwark Street channel to the north (Heard *et al* 1990, 613, fig 4; Cowan 1992, 21, fig 8).

Sand dumping and revetments

Although some of the events described above occurred within the early Roman period, the deposition formed part of a natural sequence and the human impact was very limited. More active Roman intervention is indicated by the dumping of sand, at times mixed with brickearth, especially across the western half of the site, and the construction of a post and plank revetment along the bank of the western channel (Fig 3). Land reclamation using dumped sand or gravel was apparently common practice in Roman Southwark. Parallels from the immediate vicinity of the site can be found at 10–18 Union Street (Heard 1989b, 126–31) and 8 Union

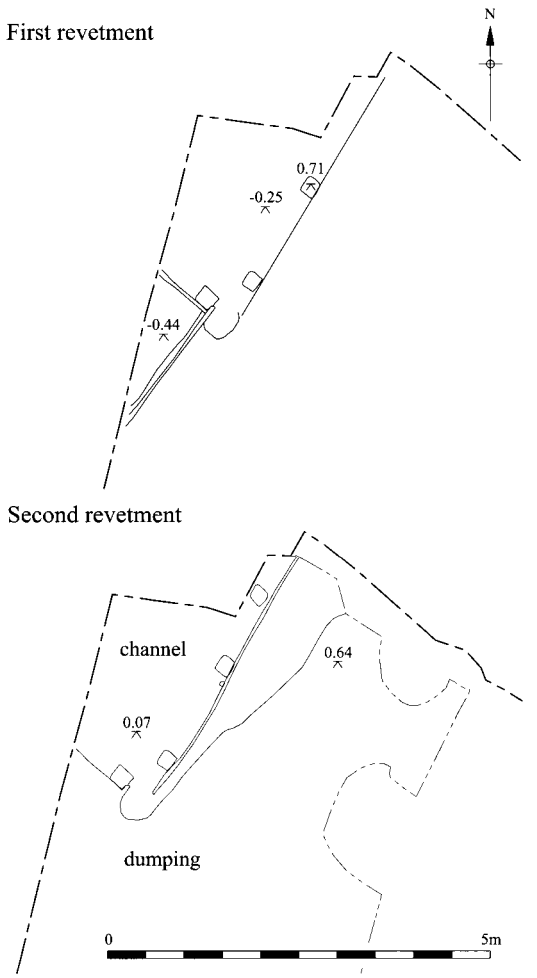

Fig 3. The first and second phases of Roman revetting

Street (Marsh 1978, 223), where dumping and levelling using these materials preceded the earliest occupation phases. This intervention raised ground level by 10–20cm across the area concerned to a maximum height of 0.80m OD. Some postholes were cut into the new surface. Although they formed no discernible pattern, their presence demonstrated that this horizon represents at least a temporary ground surface. The sand deposits had no direct stratigraphic relationship with the first phase of revetting but they may have been associated with it and were undoubtedly *in situ* prior to the construction of the second phase.

Interpretation of the revetment structures was hampered as they extended beyond the limits of the excavation, but it appeared that the remains uncovered represented two distinct phases of construction. Both phases were built using the same method, which consisted of upright squared posts supporting horizontal planks. This construction method seems very similar to that employed at 52–54 Southwark Street (Heard 1989a) and, with circular rather than squared posts, at 175–177 Borough High Street (Schaaf 1976, 6, fig 4). Dendrochronological evidence for the earlier phase of revetting is not precise, two of the timbers being dated to AD 41+ and AD 58–103 (Nayling 1998).

The second phase of revetting consisted of an open box-type structure with two sets of planking set at roughly 90 degrees to each other (Fig 3). This survived to a height of *c.*90cm, with the decayed top of the planking lying at *c.*0.60 m OD. The posts employed in the revetment were quite substantial, measuring over 20cm square and *c.*2m in length. These would have been capable of supporting a superstructure above the revetment (Damian Goodburn pers comm) and quayside facilities for landing cargo may have been part of this construction project. One of the posts from the revetment produced a dendrochronology date of AD 39+ whilst a post inserted as a later repair has been dated to AD 78–123 (Nayling 1998). Pottery recovered from the construction cut for the second phase of revetting has been dated to AD 70–100 and that from the primary silting of the structure to AD 70–120. The construction cut itself was buried below the dumps which raised and levelled the ground surface.

The dumps consisted of large quantities of sand; these layers were up to 40cm thick in places and a new ground surface was established with the highest points lying at *c.*0.90–1.00m OD. Although a reasonably horizontal surface had been established over most of the site by this time, the original topography was still reflected by a slope from the central area to the west (above the buried periphery of the western channel) — most noticeable in the south-west quadrant of the site. This dumping was almost certainly contemporary with the second phase of revetting, some material later collapsing above the alluvial fills of the silted-up channel as the revetment decayed. Pottery recovered from these layers covers a wide date range but the latest layer produced material dated to AD 120–160, suggesting that the revetment was still in use during this period.

The earliest fills of the revetted channel were

clearly waterlain and represented natural silting. Pottery dating indicates that the revetment continued in use through the mid-2nd century. The upper fills of the revetment were interpreted as deliberate backfilling, or a combination of backfilling and natural silting. The redeposited nature of the backfilled materials was reflected in the pottery dates, which indicated a range clearly pre-dating the earlier fills and at times the construction of the revetment. This material was obviously residual and demolition debris from earlier structures was probably incorporated in these deposits. If so, the material must have been imported as no buildings pre-dating the revetment were present. The revetment appears to have gone out of use in the mid to late 2nd century, although establishing a precise date is difficult due to the residuality of the finds.

The revetment may have served not only to canalise the stream but also as part of a landing facility. Although no 2nd-century structures associated with the revetment were discovered, the pottery analysis suggested that goods were being imported in amphorae and decanted on site, or very nearby. The pottery as a whole presented 'characteristics typical of a waterfront assemblage' and the suggested comparisons comprise City of London waterfront sites (Precious 1997). This would strongly suggest that the Southwark Street Channel to the north of the site was navigable in the early Roman period. Sand and gravel fills of this channel containing large quantities of Roman pottery, especially amphora, were found during the watching brief which monitored underpinning works on the site. These sand and gravel layers suggested fills of a relatively fast moving stream. They were found below the lowest excavated levels, indicating that the bank must have fallen away very sharply toward the north. Observations made by the site agent suggested that an east–west orientated timber structure had existed in the area where unmonitored ground reduction had taken place immediately to the north side of the excavation area. This could not be verified as the area had been concreted over prior to the resumption of the archaeological investigation. However flimsy this evidence may seem, the need for management of the south bank of the Southwark Street Channel is self evident. Indeed this would suggest a much narrower channel than has previously been conjectured (Fig 7).

Although the revetment found was in no way comparable in size and construction method with an early City waterfront (Brigham 1990, 99–183), the management and exploitation of the Southwark Street Channel is at present a largely unknown quantity. Later revetments along the banks of the north–south channel may lie beyond the western limit of the excavation and it is possible that the later post-built structures within the area of excavation were associated with these. The most obvious alignments of posts respected the orientation of the revetment, suggesting that it had been perpetuated by a later structure or structures.

Mortar floor bedding

Attempts to establish a more permanent presence on the site may be represented by a mortar preparation recorded in the south-east corner of the site. This had been designed as bedding to fix brick or tile elements, the impressions of which were clearly visible (Fig 4). The preparation had been severely truncated by later intrusions and no associated walls were uncovered. A possible robber cut, which may have represented a wall connected with the floor, was seen in section beyond the southern limit of the excavated area. Pottery from its fill has been dated to AD 120–200 and that from a nearby pit (which had been cut from the same ground surface) to AD 140–200. The structure surviving as the mortar preparation may therefore have been demolished in the late 2nd century. If so the lifespan of the building was very limited. Given the marginal nature of the ground, any structure could have quickly developed structural faults, which may explain its limited period of existence.

Demolition rubble dumping

Large scale dumping, especially of building materials, characterised the next phase of development. The origin of the demolition rubble is unknown but it undoubtedly derived from a high status structure with *opus signinum* and mosaic floors and painted plaster walls. The building material was almost certainly imported to the site but the size of the fragments, especially the wall plaster, suggest a source very close by. The most obvious high status buildings known from the area were uncovered at 15–23 Southwark Street (Cowan 1992, 3–191) but analysis of the mosaic fragments found no direct links between the two (Sheehan 1997).

The dumps covered two almost overlapping

Fig 4. Mortar bedding for tile floor

areas in the north-west and south-west of the site. To the north the dumps were horizontal whilst to the south they were mainly confined to a large pit which measured 5.20m north–south and exceeded 2.90m east–west. The fill of the pit was composed almost exclusively of building material, including fragments of mosaic and large quantities of wall plaster. Although the area covered by the pit was later built upon, it does not seem that the dumping of demolition debris formed part of this building project. The slope down to the west was maintained, and if building in this area had been planned, a more level surface would probably have been sought. The new ground surface lay between *c.*1.00m and 1.20m OD.

The pottery recovered from these dumps ranges in date from AD 50 to 170. Many of the finds are likely to be residual, a bone-handled knife recovered from one of the dumps being a perfect example (Fig 5). The knife is of intrinsic interest as it is almost certainly the product of a London cutler working in the late 1st century, possibly in the Walbrook area of the City (Crummy & Weinstein 1998). However, the pottery sequence established for earlier events

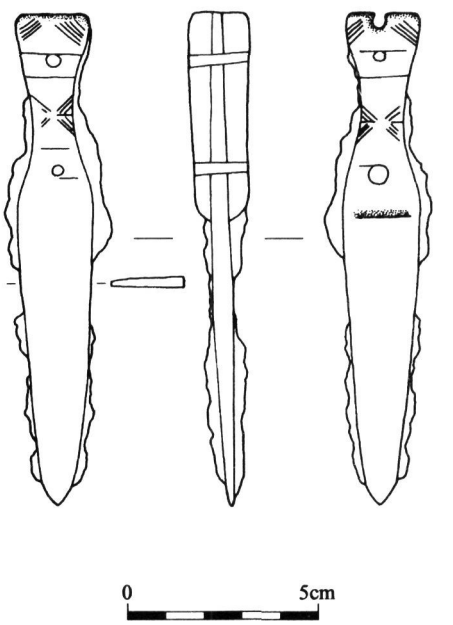

Fig 5. Roman bone-handled knife dating to the later 1st century. The style of decoration on its handle appears to be matched only by other knives from London, and therefore it is almost certainly the product of a London cutler

on the site suggests a deposition date in the second half of the 2nd century.

Second mortar floor

A second mortar base or floor was laid down in the north-west quadrant of the site, directly above the area occupied by the silted-up and backfilled revetted channel. The 'floor' was divided by an irregular linear trench which may have been a robber cut, but this is far from certain as the features extended beyond the limits of the trench. No associated walls were discovered and the purpose of this substantial mortar preparation therefore remains unproven. The position of this structure did however demonstrate that the channel had definitely gone out of use, or that its course had migrated westward beyond the excavated area.

Postholes and well

A large complex of postholes, of a variety of shapes and sizes, completely covered the western part of excavation (Fig 6). These had been cut from the ground surface formed by the dumped building materials mentioned above. Diameters as large as 0.50m were not uncommon and posts of this size could have supported substantial structures. Many of the smaller postholes, at times grouped in pairs, apparently represented partitions and divisions of the complex around these buildings. They may have supported wattle hurdling. More than one phase of building was represented, although clear patterns and building plans were hard to establish. Some lines of single small postholes were almost certainly external fence lines. Other elements were possibly supported by short beams or post-

Fig 6. Roman posthole configurations

pads. No associated floor layers were discovered. Timber floors lying on sill beams are a distinct possibility and have been found *in situ* in the area (Dillon 1989; Dillon *et al* 1991, 261).

A timber-lined well located in the extreme south-west of the site may have been contemporary with these buildings. Most of this structure lay outside the limits of the trench but was recovered in a watching brief which followed the excavation. The well lining was constructed of jointed planks *c.*1.00m long by 0.45m high. An earlier sub-rectangular pit was found close to the timber-lined well. The fills of this pit had been cut through by later postholes and it is possible that the cut represented an earlier well that had been dismantled before being backfilled.

The dating of these structures is problematic. A very high degree of residuality is probable in the fills of the postholes. A late 2nd- or early 3rd-century date would, however, be consistent both with dates established for earlier phases and with the dumping which sealed the remains of the post-built structures.

The presence of late 2nd-century timber structures is of intrinsic interest. This does not conform to the general trend in Southwark where earlier timber structures were being replaced by stone buildings after the late 2nd century (Sheldon 1975, 278–84; Sheldon 1978a, 39–42; Cowan 1992, 3–191; Heard 1989a). It is possible that the timber buildings erected at the site had a lower status. This may be a domestic complex or the remains may represent ancillary buildings associated with a small port facility.

'Dark earth' dumps

The buildings were demolished or decayed and homogeneous site-wide dumping covered their remains. The phases of dumping were clearly divided as the later deposits took the form of a 'dark earth' type formation. Pottery from the earlier dumps has been dated to the period AD 200–300, although small finds such as bone needles dating to the 1st or 2nd centuries and a coin of Hadrian (Crummy & Weinstein 1998) indicate that much of the material was residual and may have been imported to the site. The later 'dark earth' deposits produced pottery from the period AD 250–400 and two barbarous radiates dated to AD 270–290; no evidence exists for wares which definitely post-date AD 350 (Crummy & Weinstein 1998; Precious 1997). The timber buildings therefore represented the last phase of permanent occupation prior to the abandonment of the site in the late Roman period.

COMPARISON WITH NEARBY SITES

Comparisons with nearby sites produce notable similarities. A large pit containing demolition debris, possibly of similar date, was found at 52–54 Southwark Street (Heard 1989a). Rubbish pits filled with fragments of painted wall plaster, *opus signinum*, and ceramic building materials are also documented from 10–18 Union Street. Pottery from these pits dated to the 2nd century (Heard 1989b, 126–31).

The early sequence recorded at 51–53 mirrors almost exactly that of 52–54 Southwark Street, where a revetment was constructed on the bank of the Southwark Street Channel, which later became silted up (possibly with an element of backfilling). The alluvial deposits, possibly representing mud-flats, were covered with dumped sand in order to reclaim the land for construction. The resulting building partially covered the area of the earlier revetment. The stone building was subsequently demolished and a large rectangular pit was excavated and backfilled with building material (Heard 1989a). Although the Southwark Street Channel separated the sites, their early histories seem remarkably similar.

DISCUSSION AND CONCLUSIONS

The results of the excavation have an important contribution to make to our understanding of the topographical development and utilisation of this area of Southwark in the Roman period. As the location plans (Figs 1 and 7) show, the excavation area was until recently presumed to lie within the Southwark Street Channel which separated the two major islands upon which the Roman suburb developed (Heard *et al* 1990, 609, fig 2; Cowan 1992, 21, fig 8). The earlier topographical models were developed from archaeological investigations combined with the collation of geophysical data (Graham 1978, 501–16; Yule 1988, 13–17) and attempts to determine the level of the tidal Thames in the early Roman period (Devoy 1979; Devoy 1980; Milne *et al* 1983; Brigham 1990). The case for a mid-1st-century Mean High Water level between 1m and 1.5m OD, as constructed from the archaeological evidence by Milne and Brigham, is a compelling one. It is not the

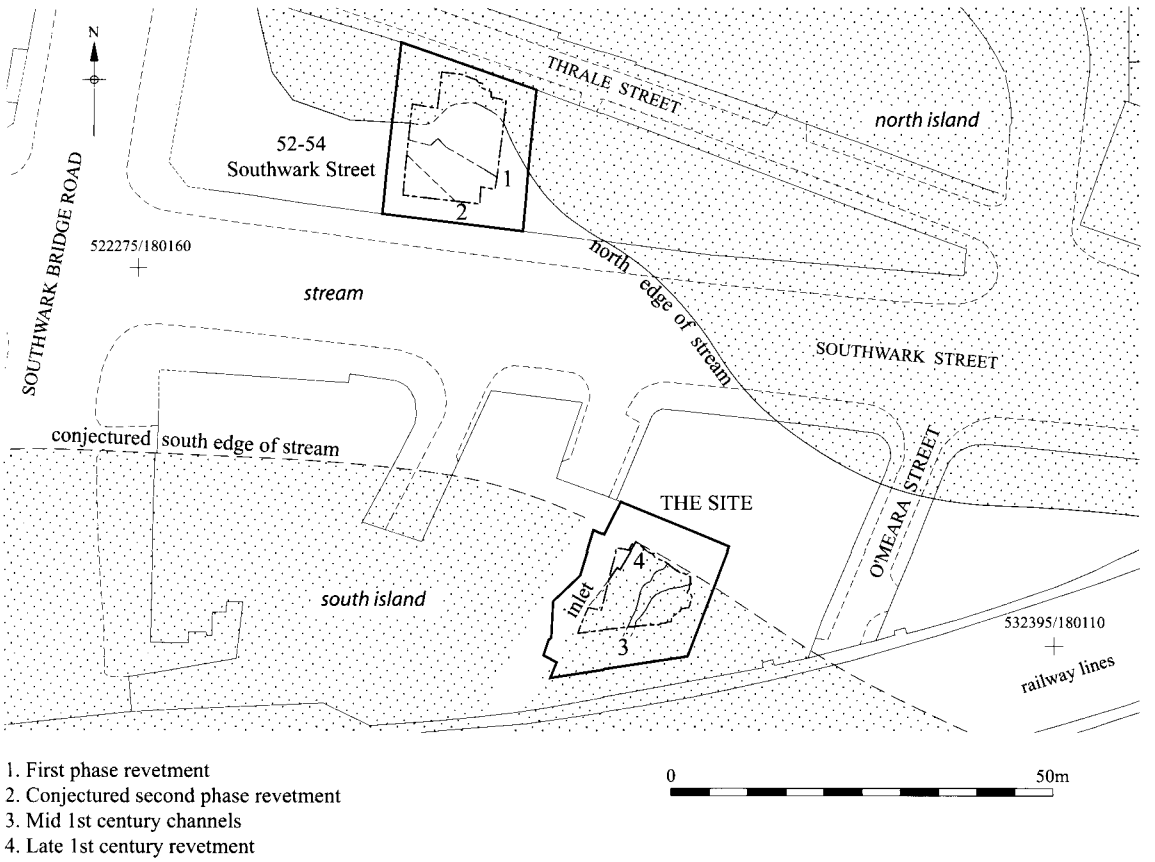

Fig 7. Conjectured southern channel with revised north bank position at projected high water mark

purpose of this paper to disprove the currently accepted orthodoxy in this matter. However, the increasing evidence of the adoption of low-lying areas below the proposed MHW level does beg an answer to the question 'how were these marginal areas reclaimed and sustained?' The construction of extensive embankments and or timber waterfronts on the Thames bank of the northern Southwark island is probable. However this alone would have been of little use if the water level of the major watercourse separating the two largest islands, presumably equal to that of the Thames, was left uncontrolled. Unfortunately a simple answer to this question is not available, but the contradictions in some of the available data are notable. It should be stated that some of the observed problems might be related to an insufficiently precise resolution of the dating of changes in the MHW level. This would be particularly pertinent for periods of relatively rapid change, as the accepted model suggests, from the mid-1st century onwards (Brigham 1990, 144).

The subject of sea level change in the Thames has been extensively documented and discussed, notably by Devoy whose study of deposits at Tilbury created a model which successive authors have used as a basis for their interpretations of archaeological sequences, particularly those where peat formations were present (Devoy 1979, 355–407). Attempts to establish a precise correlation between the fluctuating sea levels recorded at Tilbury and that of the inner Thames estuary are perhaps misleading. However, the accepted archaeological model suggests that the sea level rose throughout the late Iron Age and peaked in the Thames at London by the mid-1st century before falling dramatically in the following 50 years (Milne *et al* 1983, 22–3; Brigham 1990, 143–5). Establishing exact OD levels for the height of the 1st-century river is vital to our interpretation of early Roman

Southwark. Falling tidal levels may have been more influential than man-made drainage schemes when access to marginal ground was in question. The low-lying south bank must have been more susceptible to changes in sea level than the steeply shelving northern foreshore. The results of investigations from both sides of the river should clearly be considered when discussing the overall tidal regime.

The precise status of the site in the early Roman period is difficult to demonstrate. It is possible that it was only accessible at low tide. This was obviously directly dependent on the height of the Thames to which the main watercourse to the north was connected. There is little doubt that the earliest ground surface, lying at a maximum of 0.55m OD, could have been intermittently used at low tide. The Thames is known to have receded well below this level. First-century pits dug into the foreshore on the north bank at Miles Lane and Pudding Lane were cut from *c.*0m and -1.28m OD respectively (Milne *et al* 1983, 25), which clearly suggests that considerable areas of marginal ground were exposed at low tide. The tidal nature of the channels recorded at 51–53 Southwark Street has been confirmed by diatom analysis of the sediments (Cameron & Dobinson 1997) which demonstrated the presence of Cyclotella striata, a diagnostic brackish water species also found within foreshore deposits at Pudding Lane (Bateman & Milne 1983, 209) and other City sites (Milne *et al* 1983, 25).

The early topography at Southwark Street was characterised by a low-lying area of sand which formed a narrow promontory, protruding northward into the main channel, flanked by small streams to either side. Although this ground surface would undoubtedly have been prone to flooding, discrete fills accumulated in the channels which lay on either side, suggesting that alluvial deposition was limited in the early Roman period to a level below +0.40m OD. Pottery recovered from an early channel fill has been dated AD 50–65 and a group of timber posts and stakes driven into the sands and channel silts provides firm evidence that the site was frequented and utilised by AD 72, although it is not clear to what end. The deposition of a thick homogeneous layer of clay and silt, which covered the earlier fills of both channels and capped the higher sand, marked the end of this early period of development. The highest point of the ground surface formed by alluvial deposition lay at *c.*0.75m OD; pottery dating suggests that this event occurred between AD 70 and 100. A preliminary sequence of sandy dumps that covered the clay, presumably an attempt to create a workable ground surface, did not raise ground level above 0.80m OD. No evidence for consequent alluvial deposition could be seen outside of the revetted channel that was then established.

A Mean High Water level of 1–1.5m OD for the Thames in the mid-1st century was proposed following the excavation of the Pudding Lane/Peninsular House site in the City (Bateman & Milne 1983, 226). Here the earliest river defences, consisting of a gravel bank with vertical timber piles and plank and upright revetments, survived to heights of *c.*1.6–1.8m OD (Bateman & Milne 1983, 209). Evidence from later 1st-century structures on the north bank strongly supports the proposed Mean High Water level. Quays constructed in this period stood to a height of 1.7m OD at Billingsgate Buildings, 2m at Pudding Lane/Peninsular House, and as high as 2.5m at Miles Lane (Brigham 1990, 133, fig 12). This clearly made the understanding of the earliest phases of development at Southwark Street problematic, as the proposed level of the river was much higher than the surface of the alluvial deposits and first phase of dumping.

Evidence from the south bank is both more fragmentary and more difficult to interpret than that from the north. Imposing quayside structures such as those found in the City have not been identified in Southwark. Much of the Thames bank of the northern sand island may have been heavily eroded and consequently any riverside structures would have been destroyed (Heard *et al* 1990, 616). Traces of the early Thames waterfront are known from Winchester Palace, where close-set piles may have supported a bank similar to that found at Pudding Lane/Peninsular House. The waterfront is known to have advanced northward from this early structure in the period AD 80–120 (Yule 1989, 32). The semi-interred base of a well-preserved timber building, assumed to have been a warehouse used in connection with the Thames waterfront, was found at the Courage Brewery site (Dillon 1989, 229–31). The external metalled surface associated with this building lay at 0.75m OD, which has led to suggestions that embankments would have been necessary to protect such low-lying areas (Heard *et al* 1990, 617). This would clearly have

been a requirement if the proposed Mean High Water level is correct. Flooding pre-dating the Roman period is thought to have deposited clays and silts on the south bank up to a level of 1.30 m OD (Yule 1988, 13). The two major Roman roads known from Southwark, constructed *c.*AD 50–55, were at least in part laid across this newly formed surface (Sheldon 1978a, 15, 20–7). Even the land on which the roads were laid has been presumed to be 'very marginal' (Milne *et al* 1983, 21). How quickly the effects of falling tidal levels and or drainage systems rendered marginal ground usable is the vital question for sites such as Southwark Street.

However, recent work at nearby O'Meara Street may suggest that Southwark Street was not only accessible at low tide. This site lay close to the southern limit of the north island. Excavations there demonstrated the presence of early Roman surfaces at *c.*0.65m OD, and part of a clay and timber building was also discovered (Woodger 1994, 18). The establishment of a building at such a low level must suggest that at the time it was constructed the site was not regularly covered at high tide. Although subsequently damaged by flooding this event may be seen as exceptional. Either the river did not normally flood above the level at which the earliest building was established or the site was protected by river defences.

The channel bank at 51–53 Southwark Street was canalised and new ground reclaimed in the later 1st or early 2nd centuries. The exact form and function of the earliest timber revetment was unclear but the early phase of associated sandy dumps formed a ground surface rising to *c.*0.80m OD to the east of this structure. The revetment established in the second construction phase, although badly decayed, retained the bank of the western stream and probably joined with a revetment defining the southern margin of the Southwark Street Channel to the north. A second sequence of sandy dumps raised the ground level to the east and south of this new structure, with the maximum height of this new surface between 0.90m and 1.00m OD. Pottery recovered from the backfilling of the revetment construction cut dates to AD 70–100, suggesting a construction date in the late 1st or early 2nd centuries. Although not precise, the dendrochronological dates support this date range; a post inserted as a repair was dated to after AD 78.

Once again the levels of the working surfaces established in this period appear to be low compared to those in the City, although the difference between the two had at least diminished. The early 2nd-century waterfront at Billingsgate Buildings survived to a height of 1.5m OD (Brigham 1990, 133, fig 12). It is likely that the effects of falling water levels were already being felt in the late 1st century. The height of the quay at Billingsgate itself had been reduced, if only by 20cm, suggesting that regular flooding had not been a problem associated with the original waterfront. Mid-2nd-century waterfronts show further signs of this effect. The new quay at Swan Lane was built to a height of 1.10m OD, and the post and plank revetments at New Fresh Wharf and Old Custom House to 1.30m and 0.70m OD respectively (Brigham 1990, 133–6).

The development of 51–53 Southwark Street, with the construction of a substantial post and plank revetment and associated ground surfaces, presumably for handling waterborne cargo, should be viewed with these and other developments in mind. The southward expansion of the City waterfront, where the quay at Swan Lane was advanced some 20m (Brigham 1990, 135), clearly suggests that the water level had already fallen sufficiently by the mid-2nd century for corrective measures to be required. The effects of the beginning of falling water levels might initially have been insignificant for the City but even a small drop would have had a wide-ranging effect on Southwark. At present it is impossible to demonstrate exactly when the effects of lower water levels began to be felt. It appears that at the time of the construction of the Southwark Street revetment the water had receded far enough to allow the exploitation of marginal ground below *c.*1m OD.

It would be foolhardy to suggest that falling water levels can be inferred from the remains found at Southwark Street alone. However, the site needs to be seen in its context and decades of archaeological work is gradually piecing together both the limits and development of the major channel which separated Southwark's two largest islands. The site at 64–70 Borough High Street, situated slightly to the east of 51–53 Southwark Street, showed some similar developments. This is also true of 52–54 Southwark Street, a little to the north and west, where the site lay on the southern extremity of the northern sand island. Much further to the east, an extensive development of the bankside

has been found in the Guys Hospital area. The results of excavations at 93–95, 175–177, 201–211 and 213 Borough High Street should also be considered.

At 64–70 Borough High Street two phases of revetting were documented. The earliest of these was constructed from wattle hurdling with sandy make-up layers dumped behind it raising the ground level to *c.*1.20m OD. This intervention has been dated to AD 45–80 (Graham 1988, 57) but as it may be associated with the construction of Road 1 it probably does not pre-date AD 50. Not surprisingly this early revetment collapsed into the channel, indeed the rather flimsy nature of its construction suggests that it was a temporary measure. It was replaced with a more substantial post and plank and upright revetment after AD 75. This structure stood to a height of at least 1.10m OD and sandy dumps to its landward side respected the earlier ground level at 1.20m OD. The uppermost fills of the revetted stream did not exceed 0.80m OD. Second-century dumping sealed both the revetment and the alluvial fills of the channel, indicating that the channel must have become narrower (Graham 1988, 57–65).

The excavation at 201–211 Borough High Street covered an area where Road 1 crossed the north bank of the Borough Channel, a subsidiary of the Thames that separated the southern sand island from the higher gravels to the south. Ditches and posts pre-dating the construction of the road indicate that the site was frequented very early in the Roman period. The road itself was partially built on the alluvial fills of the channel, which did not exceed 0.90m OD (Ferretti & Graham 1978, 59–62). The excavations carried out at 5–7 Long Lane and Tabard Square, situated on either side of the Borough Channel, both demonstrated that there was no sign of alluvial deposition above 0.90m OD (Douglas forthcoming; D Killock pers comm). Excavations at 213 Borough High Street showed the uppermost channel fill at 0.80–1.05m OD (Graham & Hinton 1988, 22).

A deep, north–south aligned revetted channel was discovered at 93–95 Borough High Street. The bottom of the channel was not found but lay below -1m OD. The top of the revetment was decayed and survived to +0.60m OD. The channel was revetted in the late 1st century and sandy fills, presumably deposited by fast moving water, continued to be deposited at least into the Hadrianic period. Later organic fills show that the channel was probably becoming clogged by vegetation and had silted up to a level of 0.60m by *c.*AD 150. The uppermost waterlain fill reached 0.70m OD (Sheldon 1978b, 423–30).

The revetted western bank of the same channel may have been found further south at 175–177 Borough High Street where it formed the last in a sequence of three channels. The fills of the earliest unrevetted channel, dated to AD 50–75, were deposited below +0.80m OD (Schaaf 1976, 4). A revetment was then constructed. Alluvial fills of the channel were deposited below +0.40m OD in the late 1st century before it was deliberately filled and levelled, the new ground surface being formed at *c.*1m OD. Finally a revetment was established on a new alignment similar to that found at 93–95 Borough High Street. The waterlain fills did not exceed 0.50m OD and dated to AD 100–150 (Schaaf 1976, 4–5).

These sequences of events have more than a passing relevance to 51–53 Southwark Street. Those at both 64–70 and 201–11 Borough High Street show a primary intervention in the mid-1st century followed by later 1st-century consolidation. The level of the upper fills of the channels is also of note: mid-1st-century alluvial deposition occurred below 1.05m OD at 213 Borough High Street and possibly at 15–23 Southwark Street (Cowan 1992, 10), mid to late 1st-century alluvial deposition took place below 0.80m OD at 64–70 and 175–177 Borough High Street and 0.75m OD at 51–53 Southwark Street. Early to mid-2nd-century alluvial deposition reached 0.70m and 0.50m OD at 93–95 and at 175–177 Borough High Street respectively. If this evidence can be taken as indicative of the normal late 1st-century Mean High Water level within the channels as a whole, the exploitation of large areas of previously inaccessible ground becomes a possibility. Even if it is not accepted that the highest alluvial deposits within the channels represent the Mean High Water level, the evidence available indicates that the river level and therefore the level of alluvial deposition was falling from the mid-1st to the mid-2nd century.

Far to the east of Southwark Street, excavations at Guy's Hospital in 1989 revealed an extensive waterfront structure along the western bank of the 'Guy's Channel'. A post and plank revetment had been erected in the late 1st or early 2nd century. The original structure was repaired *c.*AD 160 and possibly reinforced *c.*AD 240 (Heard *et al* 1990, 616). This site lay 130m

north of that where the remains of a late 2nd-century vessel were discovered in 1958 (Marsden 1965a). A further section of the Guy's Channel embankment, to the south-west of the 1989 site, was excavated in 1998. This produced further evidence of post and plank revetments and associated bankside timber structures (Taylor-Wilson 2002). A collapsed timber jetty and revetment associated with the same channel is known from 179 Borough High Street (Heard *et al* 1990, 616).

The feasibility of adopting Southwark's watercourses for trade has in the past been called into question. It has been stated that 'Apart perhaps from the northern edge of Southwark's island ... the inter-tidal marshland on the southern shore was unsuitable for unloading of goods' (Milne *et al* 1983, 28). However, an increasing body of evidence is coming to light showing that the larger channels between the islands were being exploited for the importation of goods in the late 1st and early 2nd centuries. Although the mass of this evidence comes from the eastern part of the settlement, there seems no reason why the Southwark Street Channel could not have been used in the same way further to the west; the two were after all connected. It is thought that the channel was eventually backfilled where it met Road 1, although it has yet to be shown exactly how and when this took place (Graham & Hinton 1988). The precise area where the road crossed the deepest point of the channel has yet to be excavated but it was probably originally spanned by a bridge and an open channel is thought to have survived into the 2nd century (J Drummond Murray pers comm).

The exploitation of Southwark's waterways for trade in the late 1st and 2nd centuries seems entirely logical when viewed against the known archaeological background. Land reclamation projects, possibly in conjunction with the onset of falling water levels within the inner Thames estuary, allowed access to and exploitation of hitherto marginal areas within Southwark. It is also assumed that Roman London was expanding and booming in the late 1st and early 2nd centuries when its status was upgraded to that of a provincial capital (Milne 1995, 48–70). There can be no doubt that a large market existed for imported goods within both the city itself and its increasingly Romanised hinterland (Merrifield 1983, 135–40). The southerly extension of the mid-2nd-century quay at Swan Lane demonstrated that the effects of receding water levels had already begun to be felt. It is therefore possible that the harbour on the north bank was suffering from decreasing functionality at a time when the volume of goods was reaching a peak. Therefore the circumstances seem to have favoured the establishment or extension of port facilities and the expansion of waterborne trade on the south bank.

If it is accepted that the overall economic situation favoured developments such as that proposed for 51–53 Southwark Street, the practicalities of handling cargo must be examined. The results of excavations at Guy's Hospital clearly demonstrate that post and plank revetments were being used for unloading vessels from the banks of Southwark's navigable channels in the late 1st and 2nd centuries. Massive infilled quays similar to those excavated in the City, for example those found at Miles Lane and Pudding Lane (Brigham 1990, 152–3, fig 15), were not required along the channel banks and were costly to construct. As the 2nd century progressed and the waters receded, the early quays may also have been becoming isolated from the river. Although lighter structures could not be expected to have the longevity of the massive quays, 'the adoption of post-and-plank revetments throughout the second century, with one or two exceptions, can be seen as a means of maintaining a working port facility at a time when investment in more extensive types of structure was considered imprudent due to their short life expectancy' (Brigham 1990, 147). The landing facilities established in Southwark may not be comparable with the massive quays on the north bank but this may also reflect the expansion of smaller private ventures as opposed to larger planned civic projects.

The vessels most suitable for unloading at small low quaysides should have been readily available. These would have been lighters which served larger sea-going ships which presumably moored in the river (Milne 1985). The wreck discovered at New Guys House, a flat-bottomed boat around 16m long and 4m wide (Marsden 1965a, 118–31), would seem ideal for use in these conditions. Other examples of flat-bottomed river-going vessels are also known from the North-West of the Empire, notably from Zwammerdam in Holland (Weerd 1978, 15–21). Larger sea-going craft have also been found in London at County Hall (Marsden 1965b, 109–17) and Blackfriars (Marsden 1967).

The interpretation of the 51–53 Southwark Street site as a commercial waterfront is based both on the nature of the sequence excavated and the analysis of the pottery. The latter suggested that a typical waterfront assemblage had been found, comparable to those of City sites such as Pudding Lane (PDN81) and Fish Street Hill/ Monument Street (FMO85). Amphorae made up around 25% of the pottery recovered, a wide range of types being represented, and flagons a further 13%. This combination, along with the elevated sherd sizes, led to the conclusion that amphorae were probably being unloaded and decanted on site (Precious 1997). This would mark the first phase of redistribution within Britain.

South Gaulish amphorae carrying wine from the Rhône valley and Provence were the most common type. Southern Spanish olive oil vessels were almost as numerous, and fish sauce and grape syrup were imported from the same area. Amphorae were also imported carrying wine from Campania, fish sauce, wine or fruit from Catalonia, figs and wine from Crete, Rhodes and the Aegean and fermented fish sauce from Cadiz. Small quantities of later Roman North African olive oil amphorae were also present. Continental imports that were not used for transporting goods comprised samian vessels from South, Central and Eastern Gaul, beakers from the Cologne and Moselle regions, and flagons from Northern France. There is also a colour-coated, slip-moulded cup produced in South Gaul. A mere 13 examples of these vessels are known from Roman Britain, including the one from Southwark Street (Precious 1997).

The bulk of the pottery recovered dates from the period AD 120–160 and the heyday of the commercial waterfront probably corresponded with this. A sudden decline in trading can be inferred from the quantities of Dressel 20 amphorae recovered. These were used almost exclusively for carrying South Spanish olive oil, which maintained a predominance in the British market until around the middle of the 3rd century when it was superseded by North African production (Williams & Carreras 1995, 232–5). Only 4 sherds from a total of 108 are of the later type which post-dates AD 170 (Precious 1997). This may be explained by a massive reduction in direct importation.

The Southwark Street site was not abandoned in the late 2nd century, but the timber buildings that were established may have been a small domestic complex rather than a trading post. Whatever form this occupation took, it was probably very short lived as 3rd-century pottery was relatively uncommon and the majority of it was found within later dumps. The late 2nd-century decline in trading and a contraction of the settled area is a phenomenon widely recognised throughout the Roman city. This has long been demonstrated in Southwark, where clay and timber buildings established alongside the road were falling into disrepair in the period AD 160–170 (Sheldon 1975, 278–84). Apart from the evidence of a decline in imported pottery, the native British industries which supplied London, such as those at Brockley Hill and Highgate, also went into decline and ceased production in the late 2nd century, perhaps as the result of a failing market (Merrifield 1983, 144). A marked decline in the population of the city following AD 150 has been demonstrated by statistical analysis of the quantities of domestic rubbish, food debris, and available water supply (Marsden & West 1992, 138). Southwark Street conforms to the patterns outlined above and the site was abandoned in the early 3rd century and thereafter only used for dumping rubbish.

The results of this small excavation have hopefully cast new light on many aspects of Roman Southwark. The area covered lies outside that which had previously been shown to support Roman settlement. The utilisation of the area for trade is also of great interest and although the excavation is far from alone among recent archaeological investigations in demonstrating the extent to which Southwark acted as port, it is unique in that it lies on the western side of what is known further to the east as the Guy's Channel. The level at which ground surfaces were established also contributes to our attempts to establish a precise record of the development of the river regime in the early Roman period.

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