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AN ARCHAEOLOGICAL EVALUATION OF THE MEDIÉVAL SHIPYARD FACILITIES AT SMALL HYPHE

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In June 1998 a brief programme of archaeological works was undertaken at Small Hythe, near Tenterden, as part of the Channel 4 television series *Time Team*. Documentary sources indicate that there was a substantial shipyard at Small Hythe in the later medieval period, but its location on the ground had never been precisely located. The aim of the *Time Team* investigations was to try to locate the likely area of the shipyard and determine the nature and extent of the surviving evidence. These investigations were prompted by the interest of Peter Luckett of the Probus Club, Tenterden and of Brian Philp and the Kent Archaeological Rescue Unit, who brought the site to the attention of the television programme's researchers (Philp 2002). The site itself was under no direct immediate threat and the work carried out can be considered as a research evaluation, albeit one that had to be undertaken within the constraints of the making of a television programme. All the fieldwork was carried out within the three-day time limit imposed by the *Time Team* television programme structure.

The field investigations comprised a number of different survey and excavation elements. Geophysical survey and seismic survey was carried out by GSB Prospection. Earthwork survey was undertaken by Stewart Ainsworth and Bernard Thomason of English Heritage. Auger survey by Jane Sidell (UCL). The excavations were undertaken by a team of regular *Time Team* archaeologists together with the Kent Archaeological Rescue Unit, directed by Brian Philp. The post-excavation analyses have been undertaken by Wessex Archaeology and the Institute of Archaeology, University College, London.

This report is an interim statement on the work at Small Hythe. It contains full details of the fieldwork but the analyses of the shipyard finds is still in progress. Therefore, much of the detail of the shipyard is, of necessity, a summary statement. Full publication of the shipyard evidence will follow in due course.

HISTORICAL BACKGROUND

Small Hythe is one of the few places in England where a shipbuilding industry is known to have existed in the medieval period (Friel 1995). Documentary evidence indicates that there was shipbuilding here from the early fifteenth to the mid sixteenth century (Clarke and Milne 2002). Most of the ships known to have been built at Small Hythe were royal warships. However, there are likely to have been many merchant ships built or repaired also, but these are rather less well documented. Among the ships known to have been constructed or repaired at Small Hythe are: the New Romney town ship built in 1401; the barge *Marie* built between 1409-11; the *St Gabriel* (40 tons) rebuilt in 1415; the balinger *George* (120 tons) built in 1416; the balinger *Gabriel Harfleur* (40 tons) rebuilt between 1416-20; and the bark *Mary Fortune* built in 1497 (Friel 1995, 52-4; Oppenheim 1926). The most famous (and the largest) vessel constructed at Small Hythe was the great ship *Jesus* (1,000 tons) built in 1416. King Henry V visited Small Hythe in August 1416 to inspect the ships being built for him – the *Jesus*, the balinger *George* and perhaps also the *Gabriel Harfleur* (Taylor and Roskell 1975, 150-1).

There was a rapid decline in the shipyards in the sixteenth century, related to the silting of the Rother. This effectively cut Small Hythe off from the sea as it became impossible to navigate large ships that far upstream. The last mention of a ship built at Small Hythe is in 1545.

THE SITE

Small Hythe lies on the north-western fringes of Romney Marsh, about 3.5 km to the south of Tenterden (Fig. 1). The B2082 road from Tenterden runs through the village and the sites investigated lie at its southern end on both sides of this road, continuing for a distance of about 800 m from west to east (centred on NGR TQ 892 300) (Fig. 2). The area investigated ranged across five fields on ground sloping down to the south from about 16m OD in the north to about 3.5m OD in the south. The land to the south is flat, the relict floodplain of the River Rother between Small Hythe and the Isle of Oxney (Fig. 1). The floodplain is extensively drained, with a major drainage channel, the Reading Sewer, running along the northern side, immediately to the south of Small Hythe. The site itself lies just above the edge of the floodplain.

The underlying geology of the site is mapped as Wadhurst Clay with Tunbridge Wells Sand higher upslope to the north and sandy marine

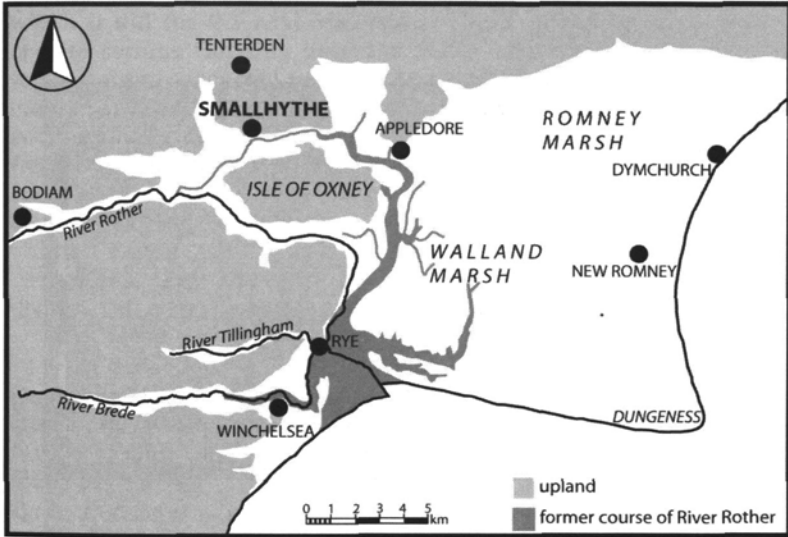


Fig. 1 Location of Small Hythe in relation to the changing course of the River Rother.

alluvium in the low ground to the south. The soils are of the Whickham 1 association and are slowly permeable, seasonally-waterlogged fine silty over clayey, fine loamy over clayey type.

At the present day Small Hythe lies about 12.5 km from the sea and is completely land-locked. Evidently this was not always the case. Much work has been done on the palaeoenvironment of Romney Marsh (Eddison 2000) but this is not the place to go into the details of the changing nature of this marginal area. However, a brief description of the medieval landscape is necessary in order to place the Small Hythe shipbuilding evidence into its larger context. In the early medieval period, it is not clear whether the Rother flowed to the north or the south of the Isle of Oxney. However, the disintegration of the Rye Bay barrier after the great storm of 1287, caused widespread flooding and destroyed the earlier well-maintained system of drains, exposing the area to tidal waters and to uncontrolled flooding. The seaward end of the river channel was then up to 90m wide (Fig. 1). In the 1330s, the Knelle dam was built at the western end of the Isle of Oxney in order to try to control the flooding. This forced the River Rother to flow round the northern side of the Isle of Oxney, past Small Hythe,

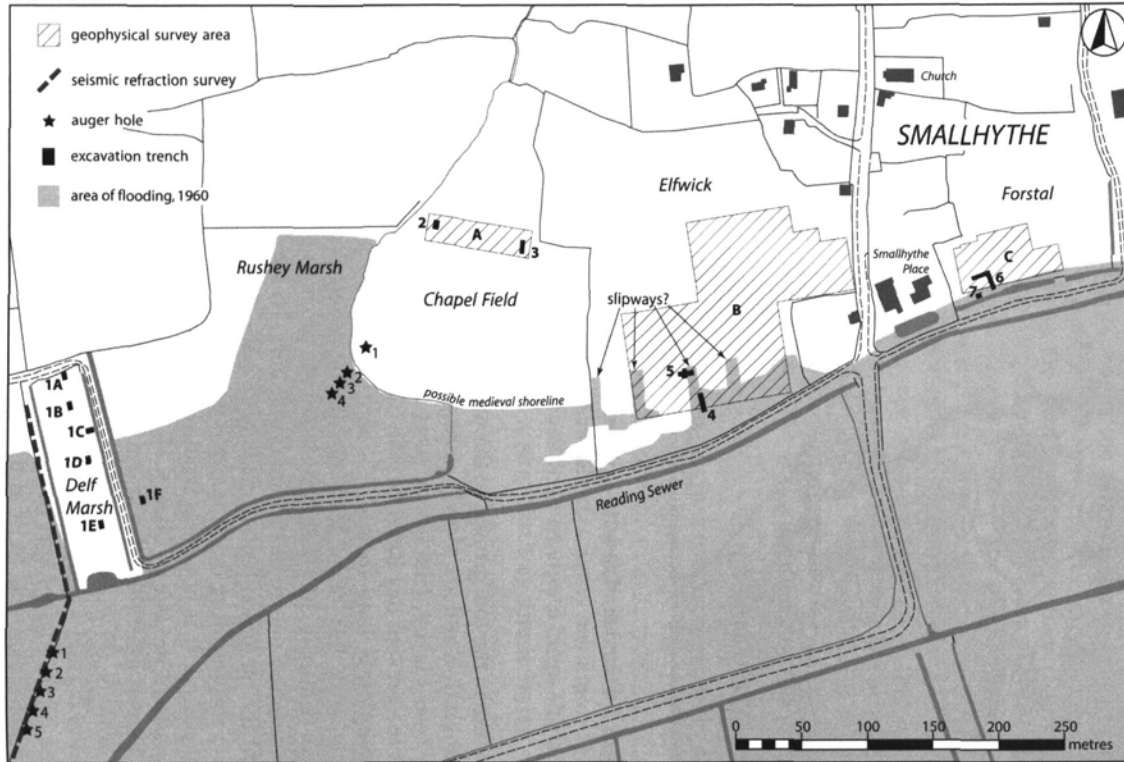


Fig. 2 The areas investigated at Small Hythe.

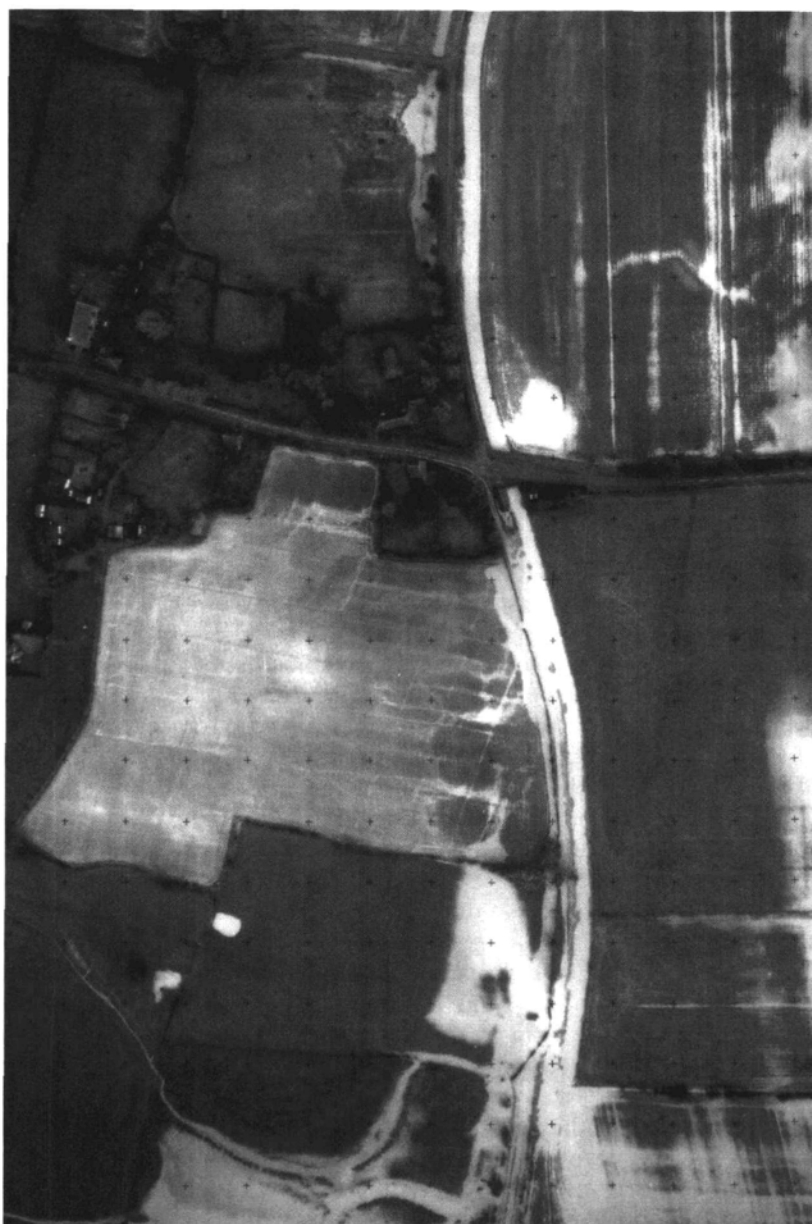
which it did for the next 300 years. The river remained navigable despite serious flooding until the end of the fifteenth century but serious silting occurred reducing the depth of the river channel. By the mid sixteenth century it was no longer possible to get a vessel of any size as far as Small Hythe. The land instead became flooded by freshwater, which could no longer drain away along the silted up channels. In 1635 the Rother was diverted to flow south of the Isle of Oxney (Eddison 2000, 109).

INVESTIGATION OF THE RIVER CHANNEL AND MEDIEVAL SHORELINE

One component part of the *Time Team* investigations was the examination of the floodplain in order to locate the former course of the river Rother leading into the estuary which is thought to have covered much of Romney and Walland Marsh for several millennia. A substantial channel would have been necessary for navigating boats out to sea. Therefore, mapping the channel would aid the identification of likely areas of shipbuilding activity. Investigation of its size and nature would help locate the focus of the shipbuilding activity and of the conditions of its eventual decline.

The location of the channel was approached using auger survey and seismic refraction survey. Unfortunately, due to access problems, it was not possible to investigate more than a single transect across part of the floodplain (Fig. 2), thus hampering the detailed investigation of the channel and the medieval shoreline.

The medieval shoreline was reconstructed from a number of sources. Most useful were the aerial photographs taken during the flooding of the Rother valley in 1960 (**Plate I**), which highlighted subtle landscape features at the edge of the valley including medieval slipways (Fig. 2). The northern limit of flooding may approximate to the medieval shoreline as this was coincident with the possible shoreline identified by geophysical survey in areas B and C (Fig. 2). This shoreline was about 50m to the north of the course of the Reading Sewer, then curved round to form an inlet in Rushey Marsh. The possible shoreline was examined by a single excavation trench (Trench 4). The Rushey Marsh inlet was investigated by auger survey to examine the nature of the sediments; to establish whether they were waterlain or not, and to characterise points such depth and angle of slope, in order to determine whether this would be an area suitable for shipbuilding or repair.



Aerial photograph of the flooded area around Small Hythe (1960)
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Seismic Refraction Survey by GSB Prospection

In order to investigate the size and depth of the palaeochannels, a seismic refraction survey was carried out along a 180m transect, made up of three spreads with geophones at 5m intervals. Survey was undertaken as a conventional four shot refraction survey. Although a 24-channel seismograph was used, only 12 channels were available for data collection at the time. A hammer and plate were used as a source.

The data indicate the presence of two possible palaeochannels. One is approximately 45m wide and 10m deep and the other approximately 120m wide with a dipping base that reaches a maximum depth of 30m, shallowing to 20m in the south. The nature of the profile and its correlation with known borehole data suggests that the bedrock interface has been defined.

No information regarding the nature of the stratification within the channels is available from this data. This is primarily due to the limitations of the technique. Seismic refraction relies on two basic assumptions: that velocity increases with depth and boundaries between different materials form a distinct interface. Borehole data along the seismic traverse confirmed that the deposits comprise alternating layers of material which is likely to result in some layers having a slower velocity than the one above. In such situations this layer becomes 'hidden'. Aside from reducing the resolution of the technique, it also introduces errors into the depth calculation because layers with differing velocities are grouped together resulting in an overestimation of the depth to the interface. Given the nature of a floodplain, one would expect there to be gradual lateral and vertical variations within the sediments. Again, if these do not form distinct boundaries this finer detail is lost. While this finer detail could normally be obtained using a GPR survey, the saturated nature of the deposits made that technique unfeasible.

Auger Survey by Jane Sidell (UCL)

Drilling was undertaken using a Cobra power auger with open probes in order to describe the sample as it was recovered directly, rather than collecting each sample in tubes, extruding and then recording. This method was picked for speed, which was a constraining factor in this project. Power augering rather than hand augering was selected mainly owing to the potential depth of sediment; up to, if not in excess of, 10m was envisaged in the centre of the floodplain. This would be impractical with a hand auger, particularly with well-consolidated sediments. The core was cleaned using a trowel and the sediments described using the Troels-Smith system for sedimentary

classification (Troels-Smith 1955). This system was selected for its general applicability and because it is a preferred method amongst other researchers engaged in projects on Romney and Walland Marsh. All cores were discarded after they had been described.

The floodplain channel

An auger survey was undertaken to establish, firstly, whether there was a channel in the floodplain adjacent to the site and to characterize any such channel. Access to fields within the floodplain was restricted owing to several of the landowners refusing permission to drill in their land. However, a substantial transect was available, roughly central to the valley bottom. A central location was selected for the first auger point, to establish the nature of sediments present and approximate depth to be drilled. Below the topsoil, a series of minerogenic units were encountered to a depth of 130cm below surface, comprising the modern soil horizons and the beginnings of waterlain units. These sealed a sand horizon which overlay the first traces of organic material in the still predominantly minerogenic sediments. Fragments of wood were preserved and also highly degraded and humified indeterminate organic fragments. These units continued to 434cm below surface where they overlay a substantial peat dominated by highly degraded and humified indeterminate organic fragments and possible *Phragmites* remains. This continued to 600cm below surface where the core was terminated.

The blanket peat identified here may well be that recorded as covering much of Walland and Romney Marsh, persisting up the river valleys, such as the Rother. This peat has been dated in a number of locations and is thought to have begun formation *c.* 6000 years BP and ceased formation asynchronously across the region. The date recorded nearest to this location is 3600 cal BP (Long *et al.* 1998). Thus, this peat was identified as pre-dating the medieval channel under investigation. The organic muds sealing the true peat horizon suggest that the site was gradually inundated, probably in the late prehistoric period, leading to minerogenic input into an environment such as marginal swamp. The detrital wood fragments would suggest that the energy of deposition was sufficient to move organic fragments periodically. The sand, which overlay the organic muds, is very likely to be an in- (or marginal to) channel deposit, reflecting a much higher energy of flow. Although the contact between the organic muds and the sand appeared to be a gradual one, it is possible that there was a hiatus and that a period of erosion rather than accretion took place. In the absence of dating evidence it is impossible to

confirm this, but the considerable change in sedimentation might support this suggestion. Alternatively, if the channel was gradually migrating towards the sampling site, then the sands might represent overbank flooding from the channel. The presence of iron staining within the sands would suggest a degree of sub-aerial weathering, supporting that suggestion. The sands are sealed by silt clays indicating that the energy of flow dropped. This could be as a result of several factors. Perhaps the channel was migrating away from the sampling location, or it could even have been abandoned, leading to gradual accretion through intermittent flooding. The presence of iron staining, indicative of exposure and weathering, supports either of these suggestions. The formation of a stable soil at the top of the sequence indicates that the floodplain was finally reclaimed.

Following the successful identification that the first auger point was probably located beside a substantial channel, a further four points were drilled along the transect around it. This was to refine the location of the channel and to establish its approximate depth and width. Boreholes 4 and 5 appear to have been closest to the course of the channel; sands were recovered to a depth of c. 330cm, overlying sand and clay laminae. This is suggestive of fluctuations in energy flow, possibly resulting from periodic/seasonal accretion or a meandering channel getting nearer to the sampling site through time. It is likely that BH4 and BH5 were situated within the channel. This is suggested on the basis of grain size dominance, i.e. in BH5 sand forms all 4 components of the Troels-Smith classification between 322 and 180cm below surface, whilst in BH4, the same can be said for the facies 236-172cm. Unfortunately, it was not possible to bottom BH4 and BH5 owing to time constraints. If this had been achieved, then the full depth of the channel could have been identified, by establishing where the channel cut into the peat at what is likely to have been the centre of the water body.

In conclusion, the auger survey did locate a channel in the centre of the floodplain. Initially, it appears to have been wholly freshwater and likely to have been the former course of the Rother. The evidence from all the boreholes taken together suggests that the channel is unlikely to have contained more than three or four metres of water at any given time. The channel subsequently became tidal, as indicated by the rapid scan of diatoms recovered from the clays at c. 200cm in BH3 and therefore the tides would obviously affect the depth of water in the channel twice daily. The obvious migration of the channel across the floodplain through time hampers any consideration of how wide it was, but it is likely to have been within the region of ten or so metres. This could probably be resolved through further work.

Rushey Marsh inlet

Following examination of the aerial photographs which showed how the area had been inundated in the 1960s, an area of flooding a considerable distance from the area of the channel was tentatively identified as an inlet or embayment (Plate I). This had important repercussions for the interpretation of Small Hythe as a shipbuilding centre – i.e. if a deep inlet was present, this could have facilitated berthing, repair and launching of vessels. Therefore an auger transect across the proposed inlet was suggested to establish its form. There was insufficient time to undertake an entire auger survey, so one edge was examined through drilling four cores. The first of these was at the edge of the inlet, on an obvious break in slope of the modern topography. It was hoped that the modern topography was influenced by the underlying topographic features. This first auger point (BH1) indicated a relatively shallow series of Holocene deposits overlying the local geology of Wealden Clay which was encountered at 150cm below surface. The Wealden Clay was sealed by a sand-dominated unit which lay under the modern soil. The second auger point (BH4) was forty metres away from the first point across the embayment. The core was drilled to a depth of four metres. The surface of the field was fairly constant for the three cores off the embayment edge at *c.* 3.3m OD. Peat was encountered at 245cm below surface and appeared to be similar to the mid-Holocene peat found on the floodplain. The peat was sealed by a silt clay with a non-erosive contact suggesting that the peat had been gently inundated rather than eroded. The clay persisted to 170cm below surface (i.e. *c.* +1.60m OD) where it was sealed by a sand showing an upwards fining tendency in itself sealed by the modern soil horizons. The clays and sands were obviously waterlain and suggest the presence of a large waterbody. The clays may have been deposited in a marginal situation. However, the sands would suggest that the waterbody ran over the site and indeed was depositing sediment in a moderate energy environment. It has been suggested that the sand may have been derived from a recorded barrier breaching event at Rye in AD 1289. If so, this would be consistent with the development of a shallow inlet in the later medieval period. The depth of water here may have been less than 0.5m, even at high tide in the fourteenth century.

Similar sequences were recovered in the two holes (BH3 and BH2) drilled between BH1 and BH4. The surface of the peat remained fairly constant at *c.* +0.80m OD. Peat was consistently overlain by waterlain clays and sands which indicate the presence of a large water body. The edges of the topographic feature suggest that the water

would have been confined within the embayment, except for exceptional storm events. It seems likely that the waterbody was subject to tidal movement in the later medieval period, but would seem to have been too shallow to have allowed the inlet to act as a major focus of the contemporary shipbuilding activities.

Excavation

Trench 4

A rectangular trench, 9.4 x 1.5m, was excavated in Elfwick Field, in order to investigate the presumed shoreline identified by the geophysical survey (Fig. 3). This trench was excavated by machine down to a depth of 0.9m below present ground surface, except at the northern end, where it was taken down to a depth of 1.8m. The sides and base were cleaned by hand, followed by a very limited amount of hand excavation in the northern edge of the trench. After recording, a further sondage was excavated by machine down to a depth of over 3m.

This trench revealed a thick deposit of laminated grey, yellowish-grey and pale grey sand [408] across most of the trench except at its northern end. It lay directly below the topsoil [401] and was exposed to a depth of 0.9m. Its full thickness is not known, however, a machine sondage at the southern end of the trench revealed that this was part of a sequence of sand deposits over 3m thick. Due to the unstable nature of the sands, it was not possible to record them in any detail. It is unclear whether it represents a single deposit or a sequence of sand deposits. A single animal bone was recovered from a sand layer [410] at a depth of about 2.5m below the surface. Otherwise no finds were recovered from this sand deposit. The laminar nature of the sand layer [409] indicates that it is a fluvial deposit, rather than of anthropogenic origin and is likely to be part of a sandbank on the edge of the river channel.

The northern side of the sandbank was cut by a channel running roughly E-W. The full profile of this channel was not exposed and its total length, width and depth are not known. This channel appears to have been recut on at least one occasion. Cutting through the northern edge of sand layer [408] was a steep sided cut [411] at least 1.3m deep. The upper part of this cut is much less steeply sloping and is likely to be a result of erosion of the sides of the channel. The lowest layer exposed within this channel was a grey brown silty sand [409], at least 0.35m thick. The upper surface of this layer had frequent iron panning. This layer was sealed by a 0.2m thick layer of greyish brown sandy silt with reddish mottling [407] which contained some iron



Fig. 3 Small Hythe: Resistance and Gradiometer data.

nails and a brick fragment. This layer was sealed by a 0.5m thick layer of brownish yellow silty sand with reddish iron staining and occasional charcoal flecks [406]. This layer also filled the eroded upper part of the channel.

Channel [411] was cut by another steep-sided channel [412], at least 2.8m wide and 1.5m deep. The lowest exposed part of this channel was filled by a layer of brownish grey clay with frequent reddish mottling [405], over 0.45m thick. No finds were recovered from this context. Overlying it was a 0.3m thick layer of grey clay with occasional charcoal flecks [404], which contained a number of nails, one piece of slag and some brick fragments. This layer was sealed by a 0.6m thick mid yellowish brown silty sand with reddish brown mottling and with lenses of pale yellowish sand and occasional charcoal flecks [403]. A single brick fragment was recovered from this context. It was sealed by a 0.2m thick layer of compact dark yellowish brown silty sand [402].

All of the contexts described above were sealed beneath a layer of grey brown silty clay loam topsoil [401], 0.4m thick.

The results from Trench 4 indicate that there was a sandbank adjacent to the shoreline. The full extent of this sandbank is not known at present. It is unclear whether the geophysical results marked as 'approximate edge of shoreline' on Fig. 3 reflect the location of the sandbank rather than the shoreline proper. In any case, the geophysical survey area clearly does not include the full extent of the sandbank as the results from Trench 4 clearly show that it continues southwards beyond the limit of the survey area. Interestingly, the 1960 aerial photographs show an area of higher ground approximately 130 x 20m with a channel running along the northern side immediately to the west of the location of Trench 4. This may possibly indicate the area of the sandbank.

The date of the formation of this sandbank is not known. However, the inclusion of ship's nails in the filling of the channel along the northern side provides circumstantial evidence that it was in existence during the working life of the shipyards, perhaps building up progressively during this time. Nails and brick fragments were found in both the earlier channel and its recut. It is unclear whether the channel is a natural or a deliberately cut feature. If it is an artificial channel, it may have been dug for drainage or perhaps to aid the passage of boats and ships from the slipways. This latter interpretation seems less likely, considering that the channel runs parallel to the shoreline and the projected width of 3.2m for the later recut seems too narrow for this purpose.

SEARCHING FOR THE SHIPYARDS

The primary task of the *Time Team* investigations was to identify the possible location of the shipyards. This would be no mean feat given the imposed time constraints as there was a considerable area along the edge of the floodplain on both sides of the village, which could conceivably house the shipyards and no traces had been discovered on the ground previously. Firstly, two areas – Delf Marsh and Chapel Field – were examined.

Delf Marsh

Local lore has it that a field known as Delf Marsh, which lay on the edge of the floodplain about 500m west of Small Hythe village was a dock, on the basis of its shape, topographic location and place-name evidence (Fig. 2). This field is distinctive as it has a long narrow rectangular shape running perpendicular to the floodplain unlike any of the other fields in the area. The name of the field is also suggestive; 'delf' is from the Old English 'a digging, a trench, a pit' (Smith 1987, 128) and, therefore, just might refer to the digging out of a dock. So this was the area where the initial investigations were focussed and Delf Marsh was investigated by machine sondages, in order to test the dock hypothesis.

A series of six machine-dug test pits (Trenches 1A-F) were excavated (Fig. 2). Four of these were along the line of the long axis of the field, one (1C) was offset to the east and the last (1F) was excavated outside the field to the east, in order to have a comparative section through the deposits in the area adjacent to Delf Marsh. These test pits were about 4 x 1.3m and ranged between 1.85m and 3.6m deep. The results from the test-pits were similar. A layer of dark brown to black peat with detrital wood fragments and reed stems was encountered at the bottom of Trenches 1B-E at a depth of between 1.75 m and 2.5 m, with the depth increasing to the south. In Trench 1D, there was also another 0.3 m thick layer of peat above, separated by a 0.2 m thick layer of grey clay. Above the peat, there was a series of layers of dark grey or brown clays, greyish brown to yellowish brown silty clays and yellowish brown silty sands. No peat was encountered in Trench 1A, but the natural clay was reached at a depth of 1.4m below ground surface. No finds were recovered from any of the sondages in Delf Marsh and the deposits appeared to be natural in origin. Trench 1F was excavated to test whether the layers of peat, clays and silts continued beyond the limits of the field or were only present within its boundaries. If these deposits were only within the

field, then it could be argued they represent the silting up of a large deep dock. However, the deposits in Trench 1F were very similar to the others, with a series of layers of brown and grey clay with peat layers at 1.8m and 3.2m below ground level. A single piece of tile was recovered from the clay about 0.75 m below the surface in this trench.

The results of the investigation of Delf Marsh clearly showed that it was not a dock and not part of the shipyard. The sheer scale of this field (160 x 40m) seemed to argue against this hypothesis from the start. No archaeological evidence for a dock was revealed, indeed the investigations have shown quite clearly that the deposits are natural in origin and also extend beyond the bounds of the field. If further proof were needed to dismiss the dock hypothesis, the 1960 flood photographs show Delf Marsh as a promontory jutting out into the flooded valley, which suggests, far from being a depression in the landscape, as might be expected, the field stands slightly higher than the immediately surrounding area. Delf Marsh was not part of the medieval shipbuilding site and the complete absence of finds indicates that the shipyard is likely to have been located at some distance from it.

Chapel Field

Chapel Field lies about 200m west of Small Hythe and was under grass at the time of the investigations. The ground slopes off towards the floodplain to the south and also down to Rushey Marsh to the west (Fig. 2). A number of low earthworks could be seen in this field. However, the majority appeared to be the result of cultivation and drainage, rather than possibly associated with shipbuilding. The investigation of this field consisted of geophysical survey (Area A), followed by the excavation of two small trenches (2 and 3) to evaluate specific geophysical anomalies. These investigations found only modern disturbance.

THE MEDIEVAL SHIPYARD LOCATED

The site of the medieval shipyard was finally located on both sides of the main road stretching along the edge of the floodplain for a distance of over 350m (see areas B and C on Fig. 2). The evidence for the shipyards was recovered from earthwork survey, geophysical survey and limited excavation. Initially the investigations were concentrated to the west where earthwork evidence first indicated the location of potential shipyard activity. The area immediately to the

east of the road was investigated following Friel's hypothesis that the pond in the garden of *Smallhythe Place* was originally a dock (Friel 1995, 53).

Earthwork Survey

Only a very limited earthwork survey was carried out for reasons outside the control of *Time Team*. A walkover of the site revealed three, or perhaps four, earthwork features of interest along the edge of the floodplain. These corresponded with a series of slight embayments visible on the 1960 aerial photographs. The earthworks consisted of linear depressions, about 25m long by 12m across and 0.5m deep, oriented perpendicular to the floodplain and cut back into the edge of the slope. They were found spaced 25-30 m apart, about 100m to the west of Small Hythe village (Fig. 2). Their location and form suggests they may be slipways. Their positions were noted but they were not surveyed in detail. This area was subsequently subjected to geophysical survey and one of these proposed slipway features was investigated by excavation (Trench 5).

Geophysical Survey by *GSB Prospection*

Area B

Limited magnetic and resistance survey was initially undertaken over a 40 x 40m block in the area where potential slipway earthworks had been identified. Excavation (Trenches 4 and 5) confirmed that the responses obtained by the geophysical survey were indeed related to the shipyards and consequently the gradiometer survey was expanded to place the findings in a wider context.

The resistance survey data shows a clear area of high resistance approximately parallel with the modern field (Fig. 3). This was interpreted as an edge to the river, possibly either indicating dry river silts or sand. It was not possible to be precise about the exact position of the edge, as the high resistance anomaly changed gradually into the lower background. There are also a number of anomalies within the northern part of the survey block. However, most of them do not appear to correlate very well with the visible earthworks. A single high resistance anomaly was noted on the edge of one of the earthworks and this also produced a significant magnetic response (see below). This anomaly was investigated by excavation (Trench 5).

The most significant response in the gradiometer survey data within the initial survey block is a very strong, broad magnetic anomaly that coincides with the isolated high resistance response. It was

believed that fired or heavily burnt material would be present at this point. Near to the 'burnt' feature are a few other anomalies that appear to correlate with the 'slipway' earthworks. There is also a perceptible decrease in the background response at the southern edge and this covers the same area as the supposed river edge found in the resistance data.

The extended gradiometer survey, largely to the north and east of the original survey block, has provided conclusive evidence for archaeological activity (Fig. 3). The anomalies are very strong and are likely to relate to both industrial processes and settlement. However, despite the wealth of evidence for archaeological-type responses, a detailed interpretation is still difficult. This is a result of the nature of the archaeology and the combination of magnetic responses from interacting anomalies. In some instances it has only been possible to identify 'zones of increased response' rather than individual anomalies. In such an area, archaeology is likely to be relatively complex, possibly suggesting dense, or multi-phase, settlement. While no further fired responses have definitely been identified, some of the individual anomalies, especially at the northern end of the survey, may have some archaeological potential. Some ditch-type anomalies have been located and it is assumed that they indicate land divisions associated with the settlement and presumed industrial activity.

Area C

This area was immediately east of *Smallhythe Place*, on the edge of the floodplain (Figs. 2 and 3). An initial scan suggested a number of possible anomalies in the western part of the field. Both gradiometry and resistance survey were carried out. Detailed gradiometer survey revealed that the majority of the anomalies lay in the western part of the survey area. A large ferrous-type anomaly was believed to be of some interest, especially as it appeared to be associated with a magnetic positive to the east and a high resistance anomaly. In the near vicinity of these anomalies are a number of pit and ditch type responses.

As with the magnetic data, the major anomalies in the resistance survey data are within the western part of the survey. The high resistance itself is part of elevated values which spreads across 10-15m. The impression given is that potentially burnt deposits lie on an area of drier, perhaps higher, land. Other high resistance anomalies trend in the same orientation as those noted on the gradiometer and may represent ploughed-out land divisions.

Excavation (Trench 6) over the massive ferrous response and the

associated high magnetic anomaly revealed that the ferrous response was mostly the product of recently buried metal debris, including a kettle, and the high magnetic anomaly appeared to be a scoop containing many iron nails.

Excavation

Trench 5 in Area B was dug to investigate both a strong geophysical anomaly and one of the possible 'slipway' earthworks. This trench measured up to 12.25m by 5.5m across and was positioned over the western edge of the third slipway from the west, about 15m north of Trench 4. The turf was removed by hand and the overburden removed down to the top of the *in situ* archaeological deposits by machine. The top surface of these deposits was cleaned by hand and a small number of sondages were dug to investigate the features exposed. A test-pit was dug by machine, at the eastern end of the trench, down into the natural clay.

The stratigraphically earliest archaeological context was a kiln-like feature [507] cut into the natural clay at the western end of the trench (Fig. 4). Although it was not completely exposed, the basic plan shape was relatively clear. It was roughly rectangular, measuring 3.25 x 2.70m across, with an extension to the east at an angle of roughly 35°. The eastern end was divided into two parts by a central pedestal of natural clay [502/503], though the complete arrangement of this end is not known as it had been partially destroyed by later activity. The feature had vertical sides surviving 0.30m deep and, where exposed, the base was flat. In the eastern half, there were two projections, one on each side, adjacent to the pedestal (Fig. 4). Feature [507] exhibited signs of severe burning, with extensive traces of vitrification on the sides and base and the surrounding natural soil exhibited traces of burning for a distance of about 0.25m. It was filled with a grey-brown silty clay [506], which contained a very large quantity of burnt clay fragments and occasional chalk flecks and a number of patches of burnt chalk. There was a large quantity of broken vitrified bricks near the base of this layer. No structure was apparent in these bricks. However, they were only exposed in a very small area on the southern side. At the eastern end there was a concentration of brick rubble around pedestal [502/503]. These bricks were all handmade with both yellow and red fabrics present and occasional vitrified fragments. The bricks were almost all broken and again no structure was apparent.

The precise dating of this feature is not known at present but it is probably late medieval. The only artefacts recovered were bricks,

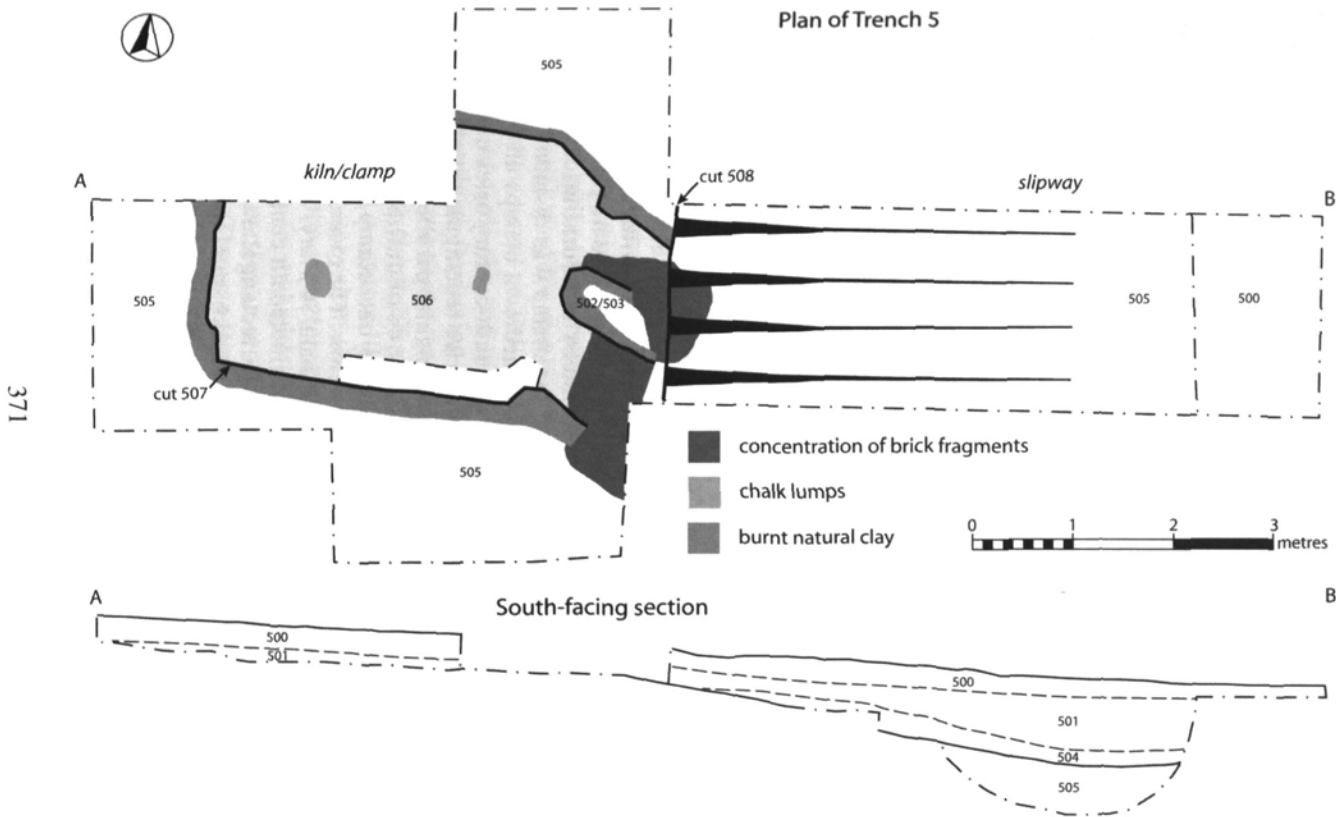


Fig. 4 Plan of Trench 5.

which, though not closely datable, are likely to be late medieval. Also, as it is stratigraphically earlier than the slipway [508], it must predate the end of the shipbuilding activities at Small Hythe.

The interpretation of this feature is hampered by the destruction of the eastern end and also by the lack of excavation of its interior. Nevertheless, the morphology of the surviving structure, together with the evidence for intensive burning indicate that it is likely to be a kiln or clamp with its floor cut into the natural clay and two angled flues to the east. No trace of a stoke hole was exposed within the excavation, nor were there any significant quantities of ash or charcoal. This may be a result of the later truncation of the eastern end of the structure removing the firing floor. The large number of burnt clay pieces within the structure was probably the remnants of the kiln superstructure. The apparent concentration of bricks at the eastern end may indicate that the flues were constructed in brick. What is not so clear is what was being produced in this clamp.

The large quantity of brick fragments may suggest that it is the remains of a brick clamp and this was the interpretation favoured in the field. However, the details of the Small Hythe clamp do not appear to be paralleled elsewhere, though excavated examples of medieval and post-medieval brick clamps are rare. Traditionally a brick clamp comprises a slightly dished rectangular area of minimum dimensions approximately 6 x 6m, with a series of parallel linear channels or flues across the floor. The base of the clamp was formed from discarded bricks. The flues in the floor were filled with fuel then the green bricks to be fired were stacked on top together with further fuel. The outer part of the stack was protected by old burnt bricks (Brunskill 1990, Dobson 1850). After firing the clamp was dismantled.

The excavated medieval and post-medieval clamps all conform to this general layout. The probable fifteenth-century brick clamps from *Wijk bij Duurstede* in Holland comprise rectangular slightly dished areas up to about 7m across with rectangular parallel flues filled with charcoal and ash (Hollestelle 1974). Rows of unfired and partly fired bricks survived between the flues in one clamp. Some traces of burning were visible in the subsoil below. The examples excavated in Britain are of a later date. At *Shotesham St Mary*, Norfolk, a clamp probably dating to the eighteenth or nineteenth century was partially excavated (Wade 1980). This was a rectangular area of charcoal about 10 by 12m across with five parallel channels or flues filled with charcoal dust and surrounded by slightly burnt natural clay. This clamp was bounded by an irregular line of crushed brick, which was thought to mark the position of temporary 'walls' surrounding the clamp during firing. Similar types of brick clamp dating to the late

seventeenth to late eighteenth century have been excavated in New Cross, London (Proctor *et al.* 1999). Here the base comprised a layer containing brick fragments and organic material covered in a layer of straw, to aid drainage and keep the base of the clamp dry, then a layer of sandy silt to form a level base. The heat generated by the clamp had fired the clamp floor.

The main problem with this interpretation is that the structure in Trench 5 would represent a very small clamp. These have to be of a certain minimum size in order to be able to accommodate sufficient fuel to fire the bricks. It is not clear what this minimum size would have to be but this clamp appears to have been about quarter the size of other known examples. The vitrification of the natural clay in the structure indicates that it had been successfully fired.

An alternative hypothesis is that it was a limekiln. The size and layout of the Small Hythe kiln can be paralleled in medieval and later limekilns elsewhere in Britain. Typically, the most prominent part of a lime kiln is its firing pit, which was often 1.2-5m across and between 1-3m deep, though there are some instances where the firing chamber is built above ground level, for example at North Elmham, Norfolk, where the firing pit was only 0.3 m deep (Wade-Martins 1980). Circular firing pits are most common but square and rectangular ones also exist. There are up to four flues leading off the firing chamber. The bricks found associated with this clamp may all derive from the superstructure of the kiln. The bricks were all broken and many were vitrified, which may explain why they were discarded rather than being reused elsewhere. The large lumps of 'chalk' noted within the backfill of the firing chamber may have been remnants of the raw material used for making the lime.

During the medieval period, lime was used to for the production of mortar and towards the end of the medieval period quicklime was used in agriculture for liming fields and to break down heavy clay soils. This kiln is not near a ready supply of raw material – the nearest chalk outcrops are about 20km distant and limestone does not occur within 25km – so it is more likely that it is sited close to the point of use of the lime rather than the source of raw material. While it is possible that the lime was for agricultural purposes, it is more likely that the kiln is associated with the shipyards. Most probably the lime was for the construction or repair of an oven or hearth in the kitchen of a large vessel. Thousands of bricks would have been used in the fitting of a kitchen in a large ship (Friel 1995, 116-9).

A third possibility is that this feature is the remains of a forge, part of a smithy complex making such items as nails, roves, anchors, etc. The difficulty with this interpretation is the lack of metalworking

evidence. No hammerscale was present in this trench, for example. Neither was any slag recovered, though evidence from other medieval sites suggests that slag was cleared from working areas and reused elsewhere as hardcore (Astill 1993, 272-91).

On balance, it is thought that it is more likely that the clamp or kiln was used for lime rather than brick construction or ironworking, but a definitive interpretation will have to wait for a more complete investigation of this feature.

The eastern end of the kiln or clamp was truncated by a feature [508] with gently sloping sides, which cut through context [506] and into the natural clay below (Fig. 4). Only a small part of the western side of this cut was exposed by the excavation but the rest was visible as an earthwork. It was a linear hollow with a level bottom cut into the slope just above the former shoreline. The lowest layer filling cut [508] was a 0.16m thick layer of grey-brown silty clay loam with red mottling [504], containing occasional rounded flint pebbles and some flecks of charcoal. This layer produced a number of iron objects including clenched nails and roves. There was a large number of brick fragments and a number of chalk flecks in the western part of this context, probably derived from context [506]. Above context [504] was a layer of grey-brown silty clay loam [501] with moderate chalk flecks, occasional charcoal flecks and occasional rounded flint gravel and pebbles. This context was traced over the whole of the trench and was up to 0.55m thick at the eastern end, within cut [508]. It contained a fairly large number of iron nails and brick fragments. This context was covered by a 0.25 m thick layer of grey-brown silty clay loam topsoil [500].

The topographical position of this feature just above the level of the former shoreline suggests that it may have been a slipway to enable ships and boats to be dragged out of the water for repair or for the construction of vessels. Analysis of the ship's fastenings found in the slipway showed that there was both new and used nails and unused roves present suggesting repair of vessels. There was a wide range of nail sizes present implying a range of different parent vessels.

After the abandonment of the slipway, it silted up naturally. Later agricultural activity has truncated the kiln remnants and has removed any surfaces contemporary with either the kiln or the shipyards.

The date of the two events is not clear nor is the chronological gap between them. This may be resolved when the finds analysis is complete. At the present time, there is no conclusive evidence that there is any connection between the kiln and the shipyard activity, but it is considered highly likely that this is the case. If the sandbank feature investigated in Trench 4 built up during the working life of the

shipyard, it may have had the effect of forcing the slipways to move progressively eastwards, thus giving a sequence of slipways. This might explain why the kiln feature, perhaps associated with one of the slipways to the west, was cut by slipway [508].

Trench 6

An L-shaped trench, 13.5m by 14m long and 1.3m wide, was opened up in Forstal field over a geophysical anomaly and down towards the drain at the southern edge of the field (Fig. 2). This trench was dug in order to investigate the anomaly and to search for further shipyard evidence that may be present in this area, according to local reports. Due to time constraints, this trench was not fully investigated and recorded and the exact form of the archaeology is poorly understood.

The trench was excavated by machine down to a depth of about 0.55m, into the top of a layer of reddish brown clay [602]. An area of dark greyish brown sandy silt [603], which appeared to fill an irregular cut [604] into clay [602], was exposed about 3.25m from the western end of the trench. The edges of this potential feature were not properly defined as the grey sandy silt 'fill' continued beneath the clay to the west and to the north. As excavated it measured 4.2m long and over 0.9 m wide. The western edge of the 'cut' [604] was apparently straight and vertical in the upper part of the clay but then dived further westwards underneath the clay. The apparent base was about 0.5m deep and sloped down to the north. The eastern edge of the feature was very confused and not satisfactorily defined. It continued beyond the edge of the trench to the north and south.

The fill [603] contained large quantities of iron nails and roves as well as some smithing debris, in the form of hammerscale, strongly indicating that it derives from the medieval shipyard. However, this context also produced six sherds of post-medieval pottery as well as some clay-pipe fragments and post-medieval brick and tile pieces, thus casting doubt on the medieval origin for this context. The locations of the post-medieval finds were not recorded, so it is unclear whether they are the result of later intrusive disturbance or truly provide a post-medieval date for the whole of this context. The clay layer [602] also contained post-medieval pottery and brick.

Below the base of disturbance [604] was a layer of grey clay [605], at an unrecorded depth. Within the upper part of this layer, two large fragments of ship's timber were discovered. Unfortunately this was after the end of the excavation, during backfilling operations and their location and position was not fully recorded. Overlying clay layer [602] was the topsoil [601]. A large quantity of modern rubbish,

including a number of metal objects, was found at the base of the topsoil in the western end of the trench. This was partially the cause of the strong geophysical anomaly in this area.

The results from this trench are very difficult to interpret given the cursory nature of the investigation and recording. The discovery of the ship's timbers at the base of the trench suggests that there is intact stratigraphy related to the medieval shipyard activity in this area. Despite the large quantities of shipyard finds in the context above, it is not clear whether any of the overlying excavated contexts relate directly to the shipyards as they apparently all contain late post-medieval material. It is possible that they are disturbed contexts, perhaps representing material dumped on the site after the digging or cleaning of the adjacent pond in *Smallhythe Place* and/or the adjacent drain. Some medieval shipyard finds have been recovered from this pond in the past (Friel 1995, 53).

Despite the lack of clear undisturbed stratigraphy investigated in Trench 6, some interesting details on the shipyard activity were recovered. This is the only trench where clear evidence for iron smithing was discovered. Also, it is interesting to note that the iron fastenings recovered comprised many more large nails, including the largest and heaviest spikes, compared to Trench 5, which may imply larger parent vessels being worked here. The assemblage of fastenings included both new and used clenched nails and all the roves appeared to be unused, indicating that vessel repair or building had taken place here.

Trench 7

The oval pond in the grounds of *Smallhythe Place* has previously been suggested as the remains of a medieval shipbuilding dock (Friel 1995). As permission to investigate this pond was not granted, it was decided to look at part of the drain that leads away from it to the east, to see if this may also have been part of a dock or slipway. A small sondage on the northern edge of this pond was excavated by machine. A small quantity of modern finds together with occasional ships nails and roves were recovered. The finds were of low density and there was no indication of anything other than a natural edge to the pond, so that excavation was quickly halted. It seems likely that this does not represent anything other than a drain and is not connected with the shipyards.

The Finds – Iron Fastenings

A large group of at least 164 iron fastenings were recovered from Trenches 4 to 7. The assemblage comprises 24 single roves and 140

tacks, nails or spikes. Of these many were fragmentary, badly deformed or corroded, but some 92 were examined, measured and recorded by Kim Ayodeji for the project, using the conventions adopted by Jan Bill from the Centre of Maritime Archaeology at Roskilde in Denmark (Bill 1994). The presence of clenched nails and single roves provides clear evidence for the presence of vessels constructed in the clinker-built style using over-lapping hull planking held together with such iron fastenings. The fact that so many of them had clearly been used represents vessel breaking and repair activities, while the unused roves probably represent vessel building or repair.

The range of sizes in the roves and in the cross-section of the nails recovered shows that a range of vessel-types is represented in this assemblage, some of which were of a size which could be interpreted as that of a small ship, rather than a boat.

The Finds – Timber frame element from a medieval ship

A badly-damaged timber fragment some 0.68m in length and up to 0.12m in width was recovered from Trench 6. There was evidence of at least four 'joggles' cut into one face of the timber, a feature which unambiguously-identifies the fragment as part of a frame from a clinker-built vessel, the rebates (joggles) representing the rebates which would have housed the overlapping runs of horizontally-set planking forming the hull of the ship (**Plate II**). Both ends were broken, showing that the element was initially longer. One edge was clearly badly damaged, showing that it was once also rather wider: examination of the split along the length of the frame revealed evidence of part of two bored peg holes set some 0.15m apart. Since it seems reasonable to assume that these holes mark the position of wooden pegs which held the planking to the frame, and since such fastenings are usually cut halfway across the face of the frame, then the element was probably once some 0.20m in width. This robust frame element therefore seems to have been derived not from a boat but probably from a small ship which had floors and futtocks some 0.20m wide and clinker planking, some 20 mm thick and 150 mm wide.

Other Finds *L. Mephram* (Wessex Archaeology)

A total of 27 sherds of *pottery* were found in the trenches associated with shipyard activity. Of these, only one sherd, part of a medieval glazed jug handle (thirteenth/fourteenth century) from context [501], is potentially contemporaneous with the shipyard. This sherd has a coarse, oxidised sandy fabric with a patchy olive green/brown glaze and the handle is decorated with pin-prick stabbing. One potential



Part of the frame of a clinker-built vessel

source for this pottery vessel is the production centre at Rye in East Sussex (Barton 1979). The majority of sherds were post-medieval in date and comprise glazed and unglazed coarse redwares, stonewares, and industrial white/buff wares. While the redwares could be earlier, their association in most contexts with the industrial wares would suggest a date range of nineteenth/twentieth century for the whole assemblage. The possible exception is Trench 5, where the only pottery came from the base of the topsoil [context 501], where glazed redwares were unassociated with obviously modern material and could, therefore, be dated earlier (?seventeenth/eighteenth century). The only other sherd recovered is a rim sherd of an ovoid vessel of indeterminate later prehistoric date in a coarse shelly fabric, recovered from context [501].

Ceramic building material was recovered from several contexts within Trenches 4, 5, 6, and 7. The majority of the material came from the kiln [contexts 503 and 506] and the overlying topsoil [context 501] in Trench 5. This consists mainly of irregular, handmade brick fragments in a variety of fabrics, some poorly-wedged and some pale-firing. There are no complete examples, but those with surviving

complete dimensions suggest that they are of a standard size, with a width between 3 7/8 inches and 4 1/4 in. with most being 4 1/4 inches wide and a thickness between 1 3/4 inches and 2 1/4 in., with the vast majority being 1 7/8 and 2 in. thick. The dimensions of the bricks falls within the range of late medieval bricks found elsewhere in Britain (Lloyd 1925). Some flat roof tile fragments are also present among this group.

The other *miscellaneous* finds do not include any that are significant to the shipyard. They include a small quantity of domestic refuse (animal bone, oyster shell) and a piece of slag. A small quantity of material that post-dates the shipyard activity (clay-pipe, bottle glass) was recovered from the upper excavated levels. The presence of a prehistoric flint flake [from context 501] should be noted.

DISCUSSION

It has long been known from documentary sources that Small Hythe was one of the most important shipbuilding centres of medieval England. The *Time Team* investigations have now produced evidence on the ground to complement the historical data, enabling a reconstruction of medieval shipbuilding practices. The character of the investigations and the very small proportion of the site examined mean that any conclusions are of a preliminary nature.

The survey evidence indicates that the shipbuilding was not carried out in enclosed docks or inlets, but was aligned along the open bank of the estuary just above high tide level. The series of linear depressions dug at right angles to the waterway, along the presumed medieval shoreline, are probably slipways to provide a more or less level base upon which keels could be laid. Unfortunately it is unclear from the record of the present investigations what was the precise relationship of these slipways with contemporary high tide levels. The limited nature of the investigations has meant that only a very restricted part of the shipyard area has been examined and the geophysical survey evidence has indicated that the activity spread well beyond the area of the slipways. Nevertheless, the earthwork evidence from this site is sufficient to define a new class of monument, the Deserted Medieval Shipyard.

The vast bulk of the evidence from this site comes from the finds, in particular the ironwork. There is no independent dating evidence for the shipbuilding activity but as most vessels of any size were built in the carvel style from the sixteenth century onwards, it follows that the ship timber and at least the larger roves and clenck nails from

Small Hythe must have come from vessels built in or earlier than the fifteenth century.

The collection of disarticulated medieval fastenings from this site, together with the frame element, form a unique grouping, the largest assemblage of its type found hitherto in Britain. It should be stressed that reused nails were often systematically collected and routinely recycled in the medieval period: thus the Small Hythe assemblage represents a tiny proportion of the nail scatter, which would once have littered the site. Such a concentration of ironwork all from four discrete trenches close to the ancient shoreline provides clear unequivocal archaeological evidence for vessel breaking, building and repair on a substantial scale.

As such, the material remains may be set alongside that from the first medieval boatyard to be identified and excavated under modern conditions, which was at Poole, in Dorset in 1986-7 (Watkins 1994). There were no major installations found, no dry docks or slipways, just sixty timbers arranged in groups laid out over an area that had once been the open foreshore, dating to the early fifteenth century. The elements represented included keels, floor frames, futtocks and stem posts. Some timbers had clearly been removed from a working vessel, while others were partially-worked new timbers in the process of being cut to shape, perhaps using the old elements as templates. The type of vessel represented by the timbers has been identified as a clinker-built boat up to 8m long with a beam (width) of some 2.5m, incorporating a hull up to 11 strakes (runs of planking). Gillian Hutchinson suggests that such vessel would have been suitable for coastal work, perhaps as fishing boats. Interestingly, some of the Small Hythe fastenings and timber came from proportionally larger vessels.

The collection and reuse of timbers stripped out of an older vessel to repair and facilitate the construction of a new vessel at Poole is significant, since it highlights the close relationship between breaking (the systematic but careful deconstruction of a vessel at the end of its operative life), vessel repair (the patching-up of a working vessel) and vessel building (the construction of a brand-new boat or ship). Today, such activities might well be conducted on different sites by different groups of workers, but in the earlier medieval period in particular, that distinction seems not to have been as well defined. Indeed, following on from that work at Poole, it has proved possible to suggest the location of other shipyards in Britain, not through the excavation of major shipyard facilities, but simply through the discovery of concentrations of vessel timbers representing a variety of broken-up ships. Such concentrations have been

found on a number urban waterfront sites including Dublin (McGrail 1993) and London (Milne 1999). Thus archaeological evidence for shipbuilding can now be set alongside the historical data, so admirably discussed by Friel (1995).

In sum the material evidence recovered from Small Hythe lends substantial support to the suggestion that the area of open foreshore and riverbank between Trenches 4 and 7 was used as part of the major late medieval shipyard, rather than that activity being enclosed within docks or inlets. This opens up the possibility that other sites in similar locations may now be suggested and identified, a major archaeological advance in the otherwise rather neglected study of England's medieval maritime industry (Hutchinson 1994, 23-6).

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