LIVING BY THE CREEK

Excavations at Kemsley, Sittingbourne, Kent

Giles Dawkes

LIVING BY THE CREEK: EXCAVATIONS AT KEMSLEY, SITTINGBOURNE, KENT

by

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Front cover: Photograph of Middle Bronze Age Ring-Ditch 1 under excavation with Kemsley Marsh visible in the background

Back cover: (clockwise from the left) Photograph of Roman salt-evaporation hearth [196] under excavation with the high ground of Kemsley Down visible in the background; Accessory vessels from Roman cremation burial pit [238], showing a samian dish, a samian cup and a lattice-decorated beaker ; Plan of the Roman salt-evaporating hearth showing areas of fired clay floor and salt pans.

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SUMMARY

A series of archaeological investigations, carried out in 2009 and 2010 along the route of the Sittingbourne Northern Relief Road, identified a multi-period site dating from the earlier prehistoric to the Roman periods.

A small assemblage of residual Palaeolithic and Mesolithic/Early Neolithic flint artefacts represented the oldest activity, but the earliest archaeological features were Neolithic/Early Bronze Age pits, waterlogged alluvial deposits and an occupation horizon. A Middle Bronze Age ring-ditch with central cremation burial was found on Kemsley Down and was probably contemporary with the Bronze Age settlement previously identified at the nearby Kemsley Fields site. The ring-ditch seems to have remained a landscape feature for some considerable time, with Late Iron Age field boundary ditches respecting its location and finds of Roman pottery from the upper fills.

The Late Bronze Age/Early Iron Age period was poorly represented although recovery of pyramidal loom weights suggest that there was probably a domestic building in the near vicinity. The upper alluvial deposits in Kemsley Marsh were broadly dated to the Iron Age. In the Late Iron Age/Early Roman period a field system and possible enclosed settlement were established on Kemsley Down and the majority of finds and features are dated to this period. The enclosure was recut and expanded northwards on at least two occasions. The settlement was ideally located on the higher and drier land overlooking Milton Creek with the opportunity of exploiting the resources of both the marsh and the surrounding fields.

By the 2nd century AD, the settlement was abandoned and the area by the ring-ditch used as a small cremation cemetery. In addition, a salt-evaporation hearth or saltern was identified on the edge of the marsh. Considering the importance of the Roman salt-production industry in the Thames estuary, surprisingly few sites have been subject to modern archaeological excavation techniques, and this saltern is a rare find in the region. In a wider context, the possibility that exploitation of the natural resources of the foreshore was controlled by the local villa estates is explored.

ACKNOWLEDGEMENTS

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CHAPTER 1 INTRODUCTION

1.1 PROJECT SETTING

This volume presents the results of the archaeological investigations undertaken in advance of and during the construction of the Milton Creek crossing section of the Sittingbourne Northern Relief Road (Fig 1.1). The investigations, commissioned by Kent County Council and carried out by Archaeology South-East (UCL Institute of Archaeology) (ASE), comprised evaluation trenches, an excavation area and a subsequent watching brief (Fig 1.2). The evaluation and excavation were undertaken during the summer of 2009 under ideal weather conditions. By contrast, the watching brief was conducted in the winter of 2009/10 in challenging weather and site conditions (Fig 1.3).

The Milton Creek crossing section is located in the north-western half of Milton Creek and links Ridham Avenue, Kemsley (NGR 591457 16077) with Castle Road, Eurolink, Sittingbourne (NGR 592283 165070). Ridham Avenue runs along a high ridge of land which is flanked by Ridham Marsh to the north and Kemsley Marsh to the south. The road was designed so that the lower ground of Kemsley Marsh was crossed by a raised embankment and cut into the higher land of Kemsley Down. The scheme required the removal of the existing watercourses in Kemsley Marsh and the construction of compensatory watercourses.

The geology at the top of Kemsley Down is an outcrop of uncapped London Clay, at *c* 13m OD; to the south in the lower part of Kemsley Down is an area of head brickearth. Further south still, in Kemsley Marsh, the underlying geology is alluvium (Fig 1.4; BGS 1977).

Kemsley Down is a south-facing spur of land projecting from a broad ridge running from Bobbing in the west to Kemsley in the east (Fig 1.5). The down directly overlooks Kemsley Marsh with wide views over Milton Creek and, more distantly, the Swale to the north-east. The top of the down is relatively flat with a steep slope to Kemsley Marsh to the south, and a gentler slope to Kemsley Fields to the west. These two distinct areas, the down and the marsh, have been used where appropriate to organise the archaeological results.

1.2 ARCHAEOLOGICAL BACKGROUND

Three archaeological excavations took place previously in close vicinity to the Sittingbourne Northern Relief Road investigations: one at Kemsley Fields to the west and two at Kemsley distributor road to the north.

The first was an archaeological excavation undertaken by the Canterbury Archaeological Trust (CAT) between 1998 and 2003 in advance of a housing development in an area earlier known as Kemsley Fields (Diack 2006; Fig 1.1). It identified a Middle/Late Bronze Age settlement, including two possible roundhouses and associated rubbish pits and enclosure ditches (ibid, 9–22). Residual Mesolithic, Neolithic and Early Bronze Age finds were also recovered and medieval ditches were recorded (ibid, 22, 53–60).

To the north of Kemsley Fields, Museum of London Archaeology (MOLA) undertook two sets of archaeological investigations in advance of the construction of the Kemsley distributor road (KT-MIL03) and an additional housing development (KT-RID04; Mackinder & Blackmore 2014; Fig 1.1). The principal findings of these investigations were a Late Bronze Age field system and possible associated settlement and, after a hiatus in activity, a Middle Iron Age unenclosed farmstead with four roundhouses. There was some limited Late Iron Age activity and the site was eventually abandoned during the 1st century AD. The final occupation identified was a medieval farmstead (ibid).

Further away, *c* 2km to the north-west, another important multi-period archaeological site was excavated at Iwade by Pre-Construct Archaeology (PCA; Bishop & Bagwell 2005). While there was some evidence for sporadic visits to the site in the early prehistoric period, the main occupation began in the Middle Bronze Age and developed into the Late Bronze Age with the laying out of a field system and trackway. After a long hiatus a Late Iron Age enclosed farmstead was established, and was abandoned in its turn around the time of the Roman Conquest. The final occupation was in the medieval period with the establishment of a trackway and some limited evidence for settlement (ibid).

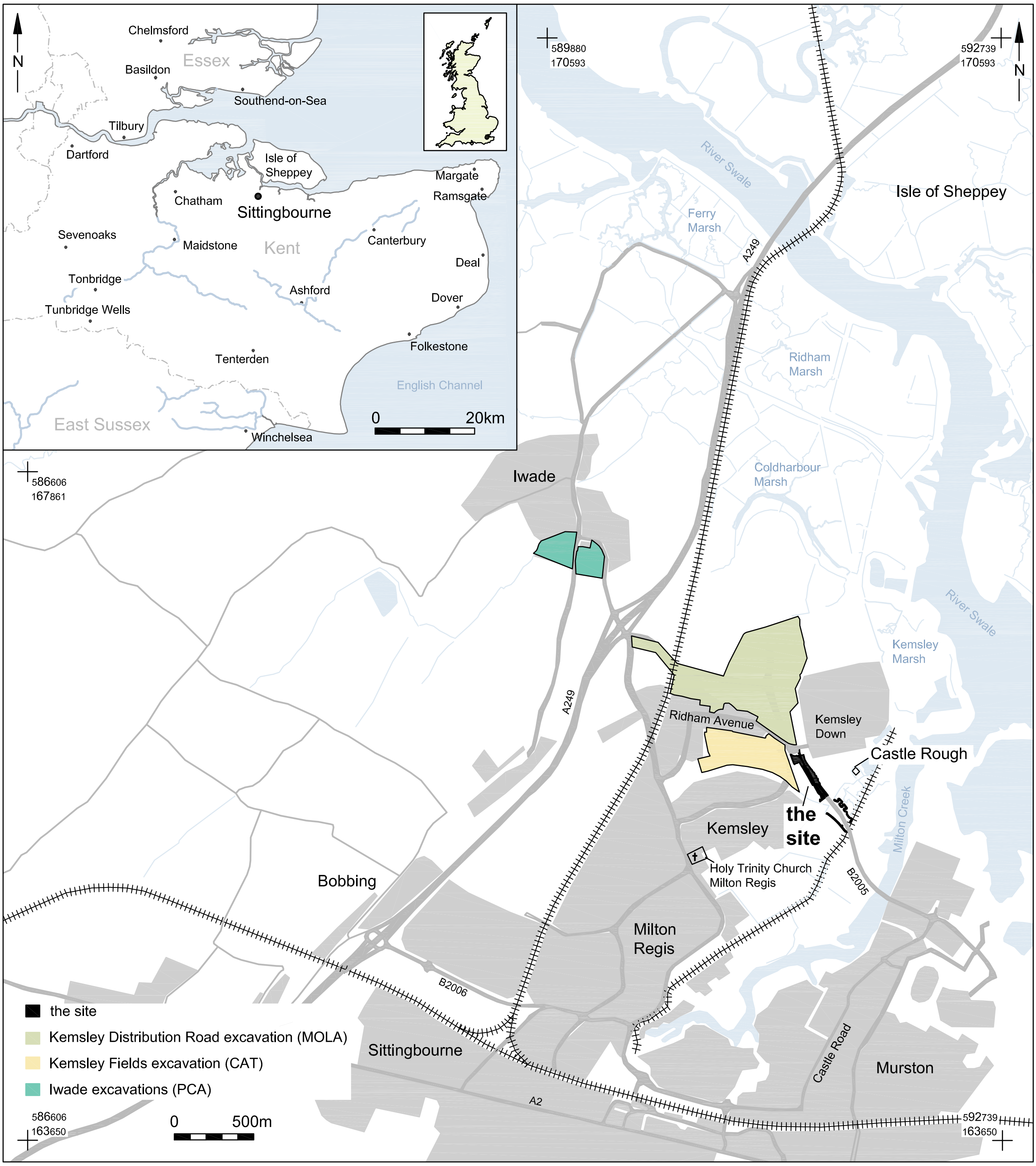

Fig 1.1 Location of the site and of previous excavations in the vicinity

1.3 STRUCTURE OF ANALYSIS AND REPORT

A hierarchical context, group, and land-use framework was used to structure the data. This framework is summarised below.

CONTEXT

A unique number was assigned to each archaeological context in the field. Context numbers are shown in square brackets, thus: [000].

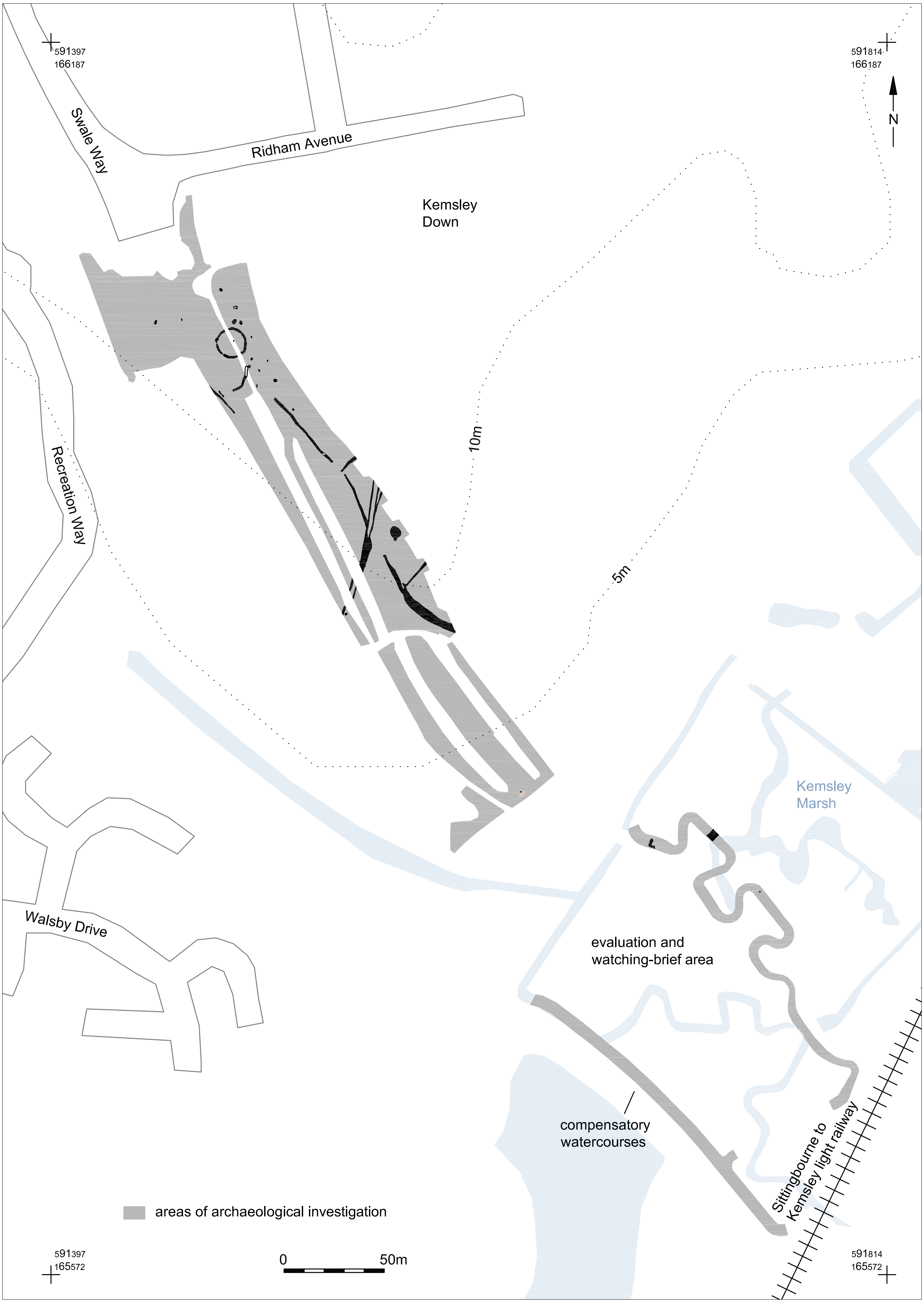

Fig 1.2 Plan of archaeological features excavated across all areas of investigation

Fig 1.3 Photograph showing the challenging site conditions of the watching brief on the new compensatory watercourses in Kemsley Marsh

GROUP

Groups (G) are an interpretative structuring of the context data and comprise a number (sometimes many) of interrelated contexts. For example, all the individual context numbers associated with a single phase of a ditch may be grouped together under a single group number. Similarly, a cluster of associated pits or postholes may be assigned a single group number.

LAND USE

Each group has been assigned to a land use, which encompasses many separate features. These numbers are used broadly to characterise the function of the land for a given period. The following land-use classifications are used in this report:

B	Building
CC	Cremation Cemetery
ENC	Enclosure
FS	Field System
OA	Open Area (open fields, yards etc)
RD	Ring-Ditch
ST	Structures (yard surfaces, post-built structures etc).

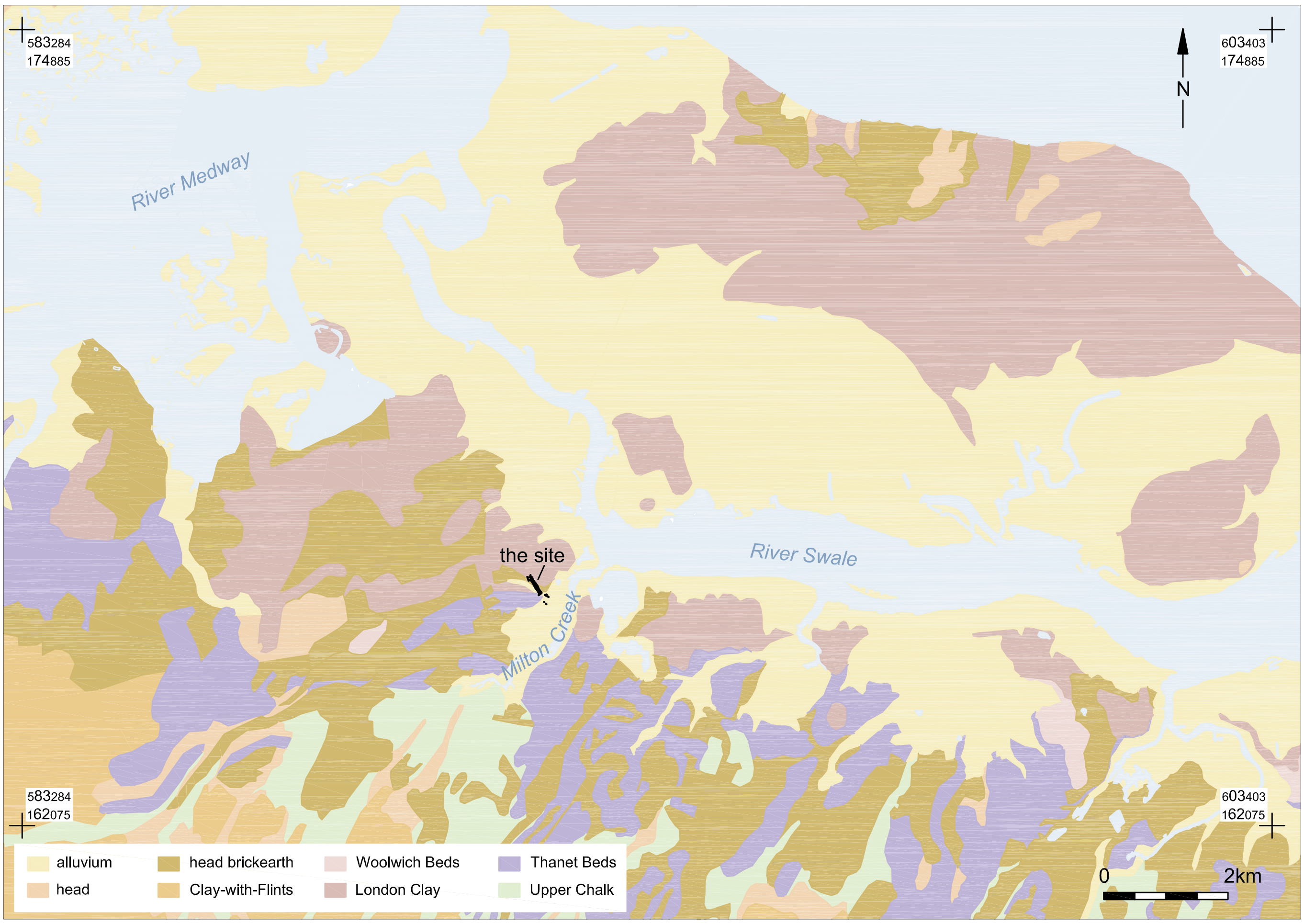

Fig 1.4 Map of the geology of the Sittingbourne region

Fig 1.5 Map of the topography of Milton Creek

Chapter 2 presents the archaeological results from the site within a chronological narrative that considers the archaeological discoveries by period. As far as possible, an integrated approach has been followed, with relevant finds and environmental information (RF<0> = Registered Find number; <0> = sample number) included as part of the narrative. Chapter 3 contains the stand-alone specialist reports.

CHAPTER 2 ARCHAEOLOGICAL RESULTS

2.1 RESIDUAL PALAEOLITHIC–EARLY NEOLITHIC FLINTWORK (*c*500,000–4000 BC)

A small assemblage of residual early prehistoric flintwork, including a single possible Palaeolithic flake, was recovered from Middle Bronze Age Ring-Ditch 1 (RD1). This small broken flake is tentatively dated to the Palaeolithic as it is heavily rolled, corticated and iron-stained and unlike any other lithic in the assemblage. The flake has four flake removal scars and is likely to have originated from the terrace gravels of the River Thames (Chapter 3.1).

The remainder of the early prehistoric assemblage consists of 12 artefacts of broadly Mesolithic/Early Neolithic date, including a Mesolithic unicrested blade. Although the artefacts form only a light background scatter, they indicate an early presence in the landscape. No other finds and no features of this date were identified.

2.2 PERIOD 1: NEOLITHIC/EARLY BRONZE AGE (*c*4000–2000 BC/2000–1700 BC)

The earliest archaeological features identified were a single pit on Kemsley Down and occupation and alluvial layers in Kemsley Marsh.

KEMSLEY DOWN

OPEN AREA 1 (OA1)

On the flat top of Kemsley Down was a single, subcircular pit, [168], 1.6m long by 1.0m wide and 0.33m deep (Fig 2.1), containing two sherds of Early Neolithic open bowl pottery. In addition to these finds, 22 further sherds of likely Neolithic/Early Bronze Age date were recovered from later features as residual finds (Chapter 3.2).

A small assemblage of residual worked flint broadly dating to this period was also recovered, mainly from Middle Bronze Age RD1. This consisted mostly of un-retouched flakes. Artefacts in the assemblage included a flake from a ground flint implement, a serrated flake with a silica gloss and a fine end-and-side scraper (Chapter 3.1).

KEMSLEY MARSH

OPEN AREA 2 (OA2)

At Kemsley Marsh two phases of Neolithic/Early Bronze Age evidence were recorded: lower alluvium of Neolithic/Early Bronze Age date; and Late Neolithic/Early Bronze Age cut features and occupation horizon.

PERIOD 1, PHASE 1: LOWER ALLUVIAL LAYERS (3200–1700 BC)

A sequence of alluvial deposits and archaeological features was recorded in the archaeological evaluation and subsequent watching brief on the new compensatory drainage course in Kemsley Marsh (Fig 2.2). The lower alluvial layers were seen throughout the investigated areas between 0m OD and 1.4m OD. The most illustrative sequence of deposits was seen in Trench 1 (T1): brown clay [1/005] was overlain by orange-brown clay [1/004] and mottled grey and brown clay [1/003] (Fig 2.2, section 4). A single Late Neolithic/Early Bronze Age flint flake and a small amount of fire-cracked flint were recovered from uppermost layer [1/003]. A similar sequence of alluvial deposits was seen in Trenches 2–6 and the watching-brief area to the south.

The [1/004]/[1/005] contact was assessed (Chapter 3.10–3.13) and the results confirmed this was a land surface on the margins of a brackish water channel which was flooded and inundated during a period of apparent sea-level rise. The dry land surface gave way during this period to salt marsh. Micromorphology confirmed it to be an occupation horizon, based on the presence of abundant burnt material. These *c* 1m-thick layers probably represented a prolonged sequence of overbank fluvial depositions along the foreshore of Milton Creek at the base of Kemsley Down. These can be broadly dated to the Neolithic/Early Bronze Age by the struck flint from [1/003] and by the fact that the layers were sealed by well-dated Late Neolithic/Early Bronze Age features and deposits (period 1, phase 2).

PERIOD 1, PHASE 2: LATE NEOLITHIC/EARLY BRONZE AGE FEATURES (3200–1700 BC)

In evaluation Trenches 2 and 4, and in the subsequent watching brief, four pits and two possible ditches or palaeochannels were identified in the northern area of the foreshore (Figs 2.2–2.4).

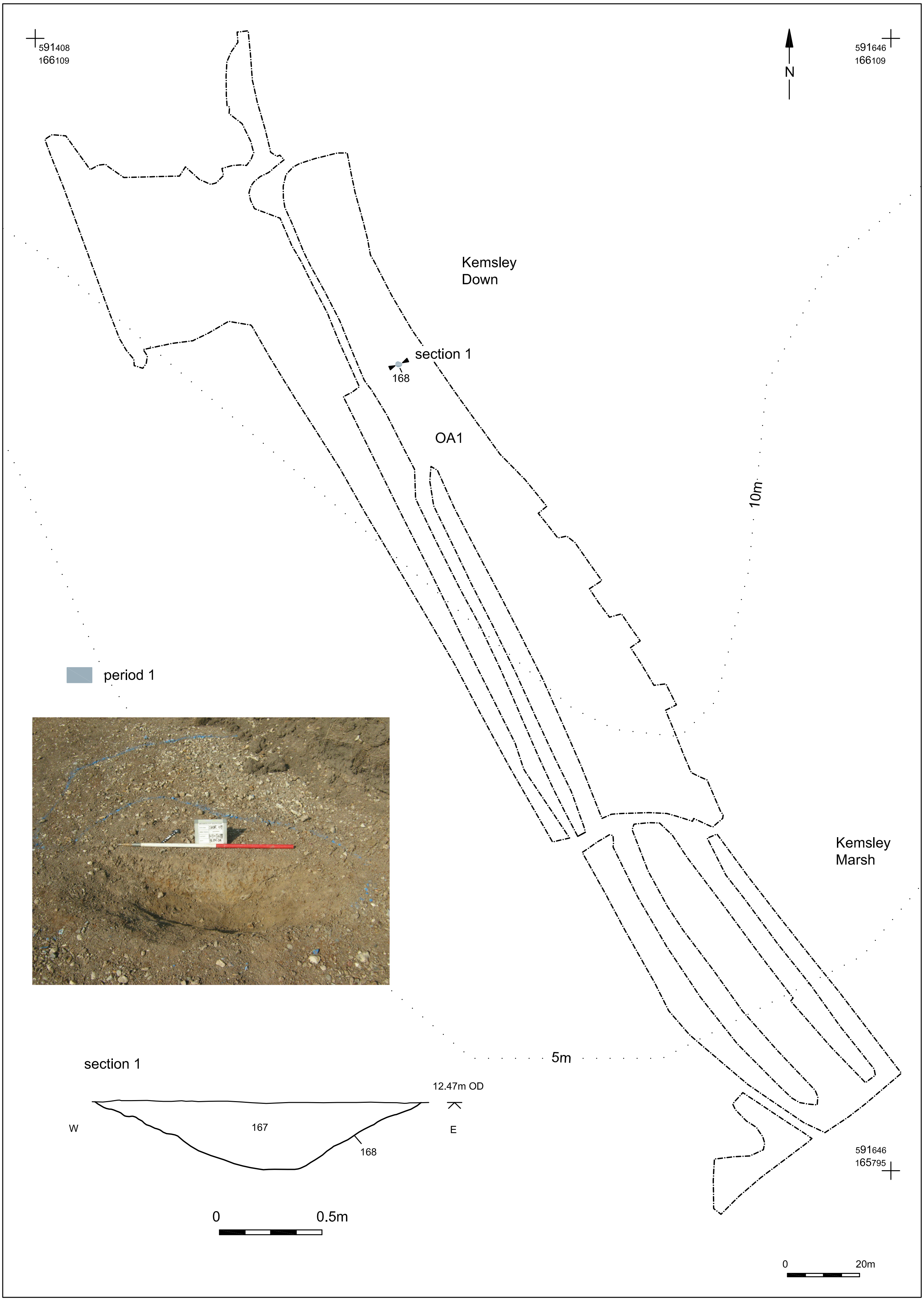

Fig 2.1 Plan, photograph and section of pit [168]

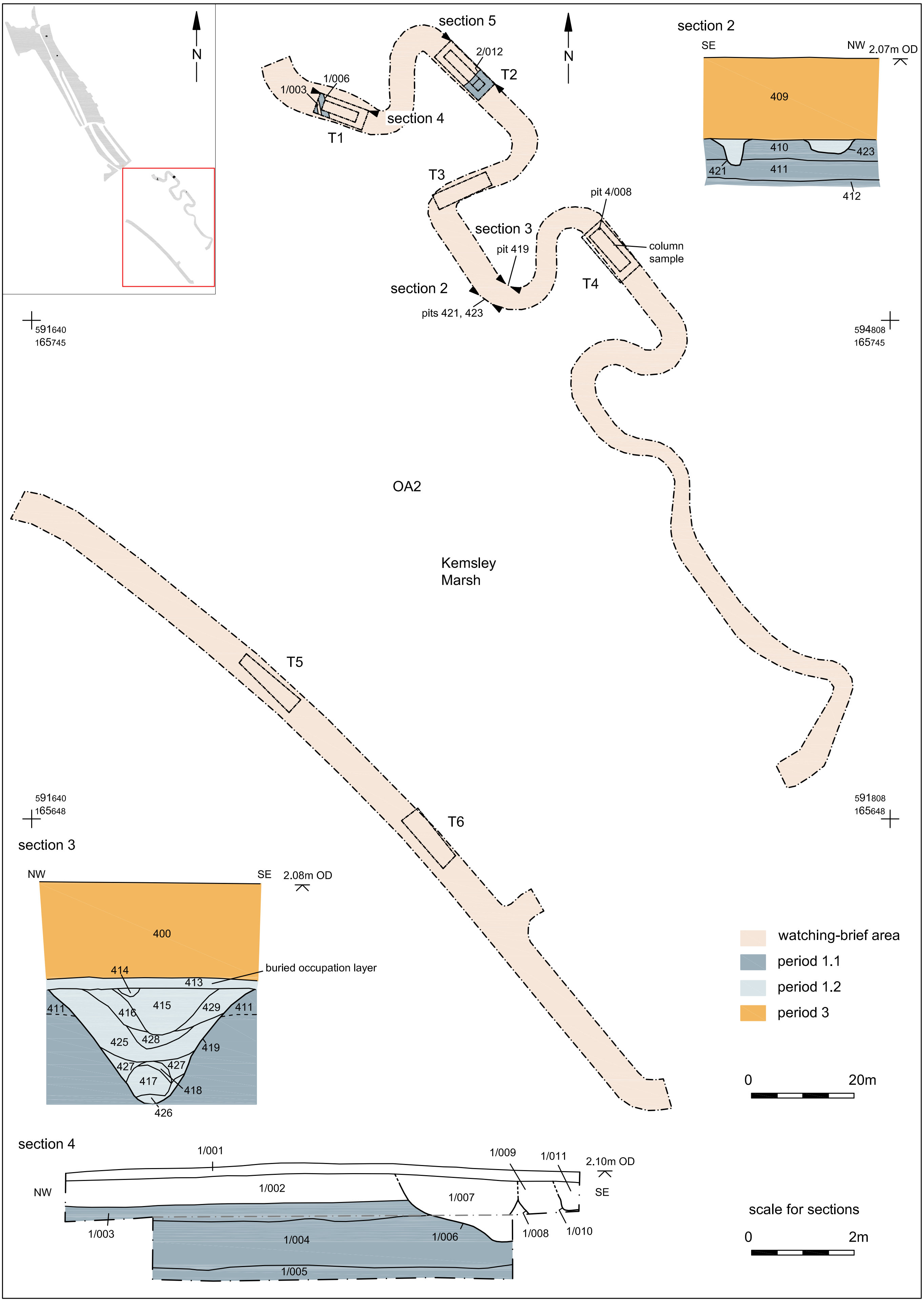

Fig 2.2 Plan and sections of periods 1 and 3 features in Kemsley Marsh

No features were found in the southern area, but there were fewer archaeological interventions in this part of the site. All the features were cut into the lower alluvium (period 1, phase 1) and were probably of broadly contemporary date.

A pair of small pits, [421] and [423], were recorded in the watching brief during construction of the new compensatory watercourses (Figs 2.2 and 2.3). Pit [421] was filled with mottled grey and red-brown silt-clay, [422], containing finds of fired clay, two fragments of burnt daub with wattle impressions, a lower valve of an oyster shell and fire-cracked flint. The fragments of burnt daub suggest that some sort of structure of Late Neolithic/Early Bronze Age date may have been located in the vicinity near to the former marsh foreshore.

Pit [423], nearby to the north-east, produced waterlogged wood fragments and finds of fired clay, burnt non-human bone fragments, the upper valve of an oyster shell and irregular flint waste (Fig 2.2, section 2, and Fig 2.3). A radiocarbon measurement on a sample of cremated bone yielded a date to 3790±30 BP (2340–2130 cal BC; SUERC-32613). Oak (*Quercus* sp) and yew (*Taxus baccata*) were the only identifiable species in the small charcoal assemblage from the fill, [424].

Adjacent, on the opposite side of the new compensatory drainage channel, was a much larger pit, [419] (Fig 2.2, section, and Fig 2.4). Some time after the feature was dug, the sides begun to slump, [426], before the pit was partially filled with dumps of burnt waste material consisting of mottled red and black charcoal-enriched silt-clay [417] and black burnt clay [418].

During a hiatus in the dumping, the pit was filled by the inundations of waterborne clays and silts, [427], and by further gradual slumping of the sides, [425]. Finally, the pit was filled with another episode of dumped burnt material: mottled red and black silt-clay [428]; grey-brown silt [429]; red and brown burnt clay [416]; dark brown silt-clay [415]; and black charcoal-rich clay [414].

Pit [419] was sealed by a buried occupation layer, [413], of mottled red and brown silt-clay, *c* 0.1m thick and extending for at least 5.5m with frequent charcoal and crushed shell inclusions. The finds from this layer were a Late Neolithic/Early Bronze Age end scraper in very fresh condition, a single platform core and fire-cracked flint. This deposit was in turn sealed by *c* 1m of later prehistoric alluvium [400].

Some 20m to the north-east of pit [419] another pit, [4/008], was recorded in Trench 4 (Fig 2.2). The pit contained no finds and yew was the only identifiable species in the small charcoal assemblage from the fill, [4/009]. To the north-west

Fig 2.3 Photograph of section showing pits [421] and [423], facing south-east

Fig 2.4 Photograph of section showing pit [419], facing north-east

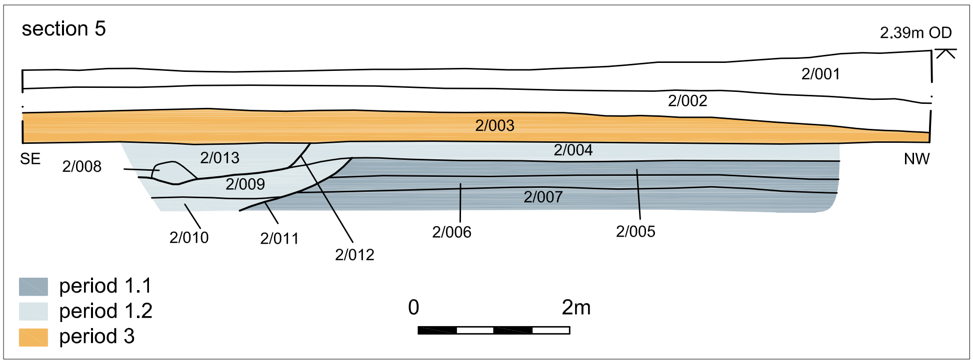

Fig 2.5 Section of Trench 2

were two possible ditches or palaeochannels, [2/011] and [2/012], in Trench 2 (Figs 2.2 and 2.5). These ditches were only partially seen but appeared to be aligned east to west and were filled with grey and brown clays containing no finds. The two ditches were stratigraphically separated by an alluvial deposit of grey clay sand [2/004].

DISCUSSION

The presence of these features and the occupation deposit indicates that the foreshore was exploited from as early as the Late Neolithic/Early Bronze Age. The function of the pits is not certain, but the abundance of burnt material in the fills and the close vicinity of brackish water suggest a possible salt-making function. The recovery of burnt daub suggests the presence of structures of some description in the vicinity, although the finds were too fragmentary to give any clear indication of form.

There was also some evidence that this foreshore occupation was extensive: *in situ* burnt foraminiferal shells were identified in Borehole 4 in the geoarchaeological investigations, *c* 100m to the south-east (Chapter 3.12). In addition, the geoarchaeological and palaeoenvironmental evidence (including micromorphology, microfaunal and pollen analysis) indicates a stable, relatively long-lived land surface on the edge of brackish estuarine marsh, which eventually succumbed to burial by a muddy inundation as a result of a rise in sea level, resulting in the formation of salt marsh (Chapter 3.10–3.13).

While there have been sporadic finds of Neolithic worked flint and pottery from both sides of Milton Creek, as well as an antiquarian find of a log boat, this is the first archaeologically attested evidence of a more permanent presence on the foreshore. This presence can be interpreted as a semi-permanent or seasonal foreshore camp, perhaps established to undertake salt-making, as well as to exploit the fish and fowling resources of the creek. It must be borne in mind that the marsh today differs significantly from the prehistoric landscape, as the sea level was 4–5m lower in the Neolithic period, which profoundly affected the nature of the land along the coastline margin. This was a 'dry grassland subject to periodic, although not necessarily seasonal, flooding', providing a 'wide, open, diverse habitat for grazing cattle and for open woodland, with salt marshes at the coastal fringes' (Allen et al 2008, 277–8).

The Milton Creek camp is likely to have been one of several located on this resource-rich liminal zone between land and water, outlying from the larger settlement located at Grovehurst, lying *c* 1km to the north-west on the east–west ridge of higher ground (Fig 2.6). This important Neolithic settlement, excavated in the late 19th century by George Payne, produced an abundance of polished axes, as well as burnt daub and Peterborough Ware pottery sherds, from large, shallow, circular hollows (Payne 1880). Originally interpreted as sunken huts, these hollows have since been reinterpreted as a pit complex, with the artefact deposition associated with ritual demarcation of the landscape (Clarke 1982; Bishop & Bagwell 2005). Although both this site and Grovehurst have no *in situ* structural evidence, they are perhaps the best evidence for a more permanent occupation of the local landscape.

While there are few Neolithic sites in the immediate vicinity of Kemsley Down, some 7 km to the north, on the Isle of Sheppey at Kingsborough, two adjacent Neolithic causewayed enclosures produced evidence both of large-scale public gatherings with conspicuous consumption (enclosure K1) and of private ceremonies (enclosure K2; Allen et al 2008). It is highly likely that this hilltop location would have dominated the social and religious lives of the Kemsley inhabitants and those further afield.

2.3 PERIOD 2: MIDDLE BRONZE AGE (*c*1700–1150 BC)

RING-DITCH 1 (RD1)

During the excavation on top of Kemsley Down, a ring-ditch (RD1) was recorded. Measuring 16m in diameter, its ditch was between 1m and 1.5m wide and up 0.42m deep with regular, straight to concave sides and a concave to flat base (Figs 2.7 and 2.8). The site was level before the topsoil was stripped by machine and there was no evidence of a surviving central mound. On the west side however, were two 0.5m-wide gaps in the ring-ditch, causeways set *c* 6m apart and facing towards the location of the known Bronze Age settlement at Kemsley Fields (Diack 2006, 9–22).

RD1 was fully excavated, although initially a 2m-wide strip was left around the high-voltage cable passing through the centre of the feature (Figs 2.7 and 2.8). This strip was later investigated during the watching brief on removal of the cable and a cremation, found roughly central to RD1, was excavated.

The cremation, [407], was interred in small subcircular pit [406]. A sample of cremated human bone was radiocarbon-dated to 3155±30 BP (1505–1315 cal BC; SUERC-32612). Oak charcoal was recovered from the environmental sample; fire-cracked flints were also present, but no charred macrobotanical remains were present.

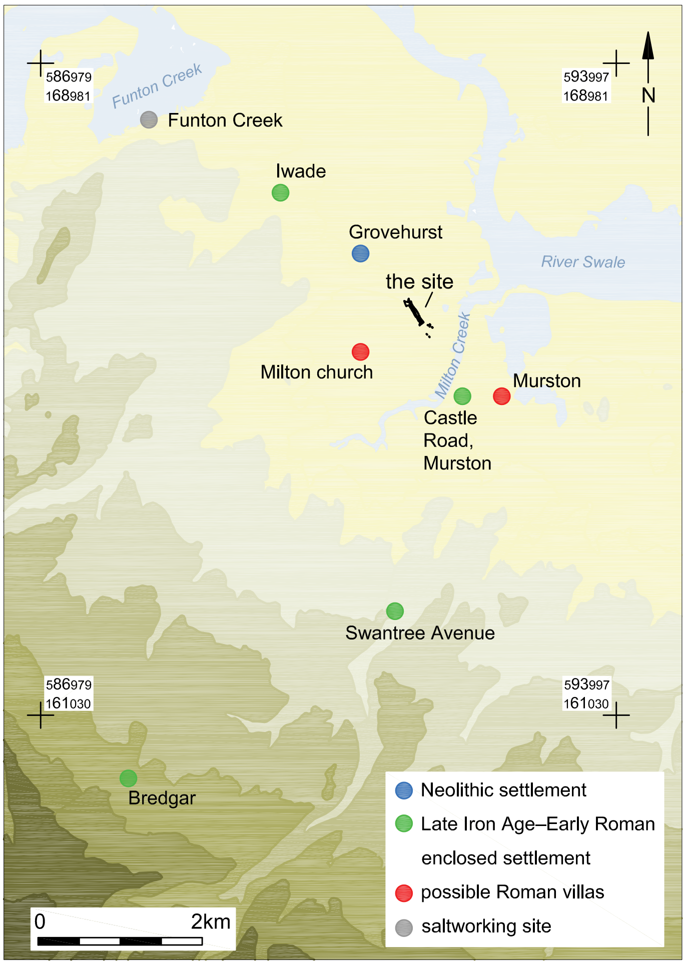

Fig 2.6 Map of archaeological sites in the Swale area referenced in the text

The location of the cremation burial in the centre of RD1 suggests that the interment of the burial and the digging of the surrounding ditch were contemporary Middle Bronze Age events, and that the ring-ditch was constructed as a funerary monument, possibly a barrow. Generally, RD1 had a single fill of grey-brown silty clay with flint gravels although occasionally in places two fills were present. No deliberate infilling was apparent.

The finds recovered from RD1 were informative: the 122 pieces of worked flint suggest the feature was a focus for flintworking (Figs 2.9 and 2.10) and the pottery suggests that it was open for a considerable period (Figs 2.9 and 2.11; Chapter 3.1–3.2). The majority of the flint was fresh, broad, hard-hammer-struck flakes of Bronze Age date, with also residual flints of Palaeolithic, Mesolithic and Neolithic origin (Fig 2.10). In contrast, the only diagnostic Middle Bronze Age pottery was a single sherd with finger-impressed cordon from a thick-walled vessel, the majority of the assemblage being composed of thin-walled sherds, more typical of the Late Bronze Age, as well as three intrusive sherds of Late Iron Age/ Roman date (Fig 2.11).

A small amount of cremated human bone was found within the fill of RD1. It is unclear whether this was disturbed from the central burial or from a separate cremation inserted into the ditch. A small amount of animal bone was also recovered. Flotation residues from the environmental samples were dominated by uncharred vegetation and included seeds and rootlets, indicating some contamination by recent root activity.

DISCUSSION

There is good reason to think that the surviving ring-ditch (RD1) represents a funerary monument or barrow contemporary with, and related to, the Middle Bronze Age settlement excavated to the immediate west at Kemsley Fields (Diack 2006; Fig 1.1). The monument was located directly overlooking the settlement (no more than 200m to the west), and the causewayed entrance faced straight towards it. The amount of worked flint clearly demonstrates that this prominent landmark was a focus for flintworking and that other activities, including hide-scraping, were being undertaken in the close vicinity.

Unlike most Middle Bronze Age sites, little burial evidence has been so far recovered at Kemsley, with only unstratified disarticulated human remains (Diack 2006, 61) and a single cremation found to the north (Bishop & Bagwell 2006, 123), and this ring-ditch is the first funerary monument to be found associated with the settlement.

The relative lack of Middle Bronze Age pottery sherds from the fills, in comparison with the amount recovered from the nearby settlement, suggests the ring-ditch was kept clean whilst the monument was in use. There is also no evidence that the cremation burials were interred in urns. Although the ring-ditch was allowed to silt up during the Late Bronze Age it seems to have remained an extant landscape feature for some considerable time, since its location was apparently respected by period 4 Late Iron Age/Early Roman enclosure ditches and the Roman cremation cemetery (CC1).

It has become increasingly evident that the siting of barrows was not haphazard, but owed much to careful consideration of topography. Field has shown that barrows were positioned to be viewed from a certain direction, often at a considerable distance, and that they usually deliberately avoided the prominent high points (Field 1998, 309–20). Thus RD1 was set back from the exposed edge of Kemsley Down and would not have been visible from Milton Creek, but rather would have been seen from the approaches along the ridge

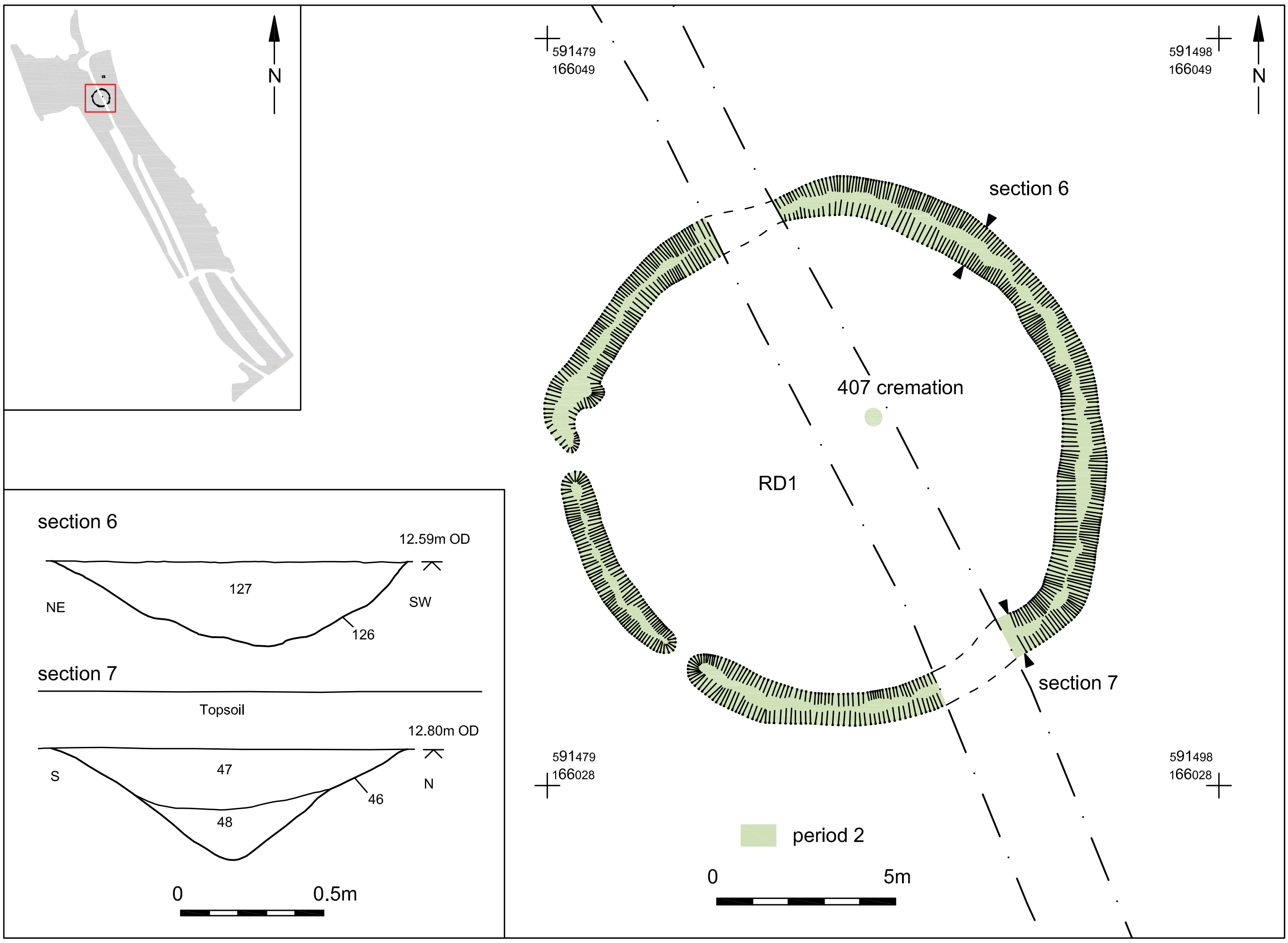

Fig 2.7 Plan and sections of period 2 Middle Bronze Age Ring-Ditch 1 (RD1) on Kemsley Down

Fig 2.8 Photograph of Ring-Ditch 1 (RD1) under excavation facing south-east; Kemsley Marsh is visible in the distance

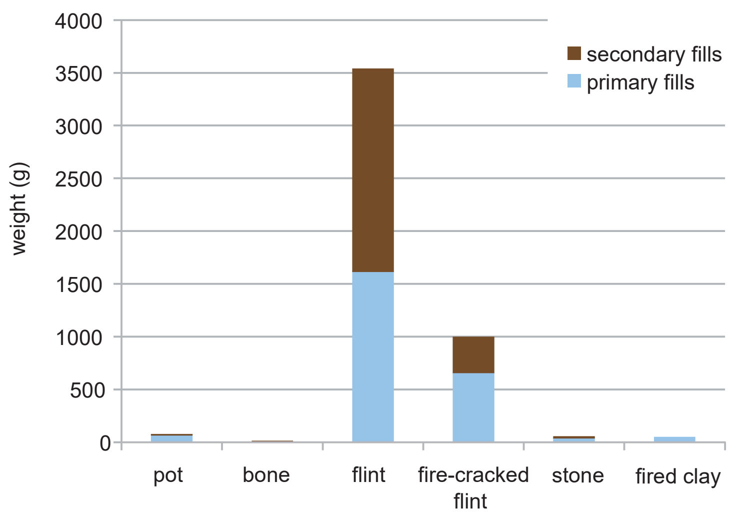

Fig 2.9 Graph showing quantification of finds from Ring-Ditch 1 (RD1) by weight

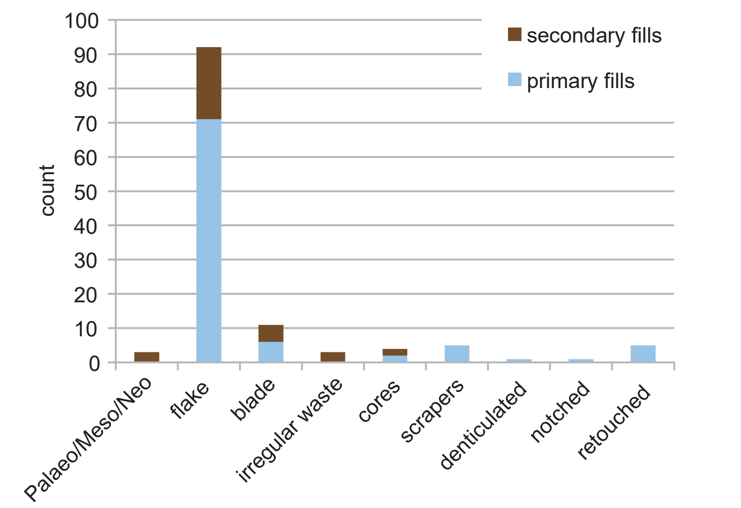

Fig 2.10 Graph showing quantification of worked flint from Ring-Ditch 1 (RD1) by count

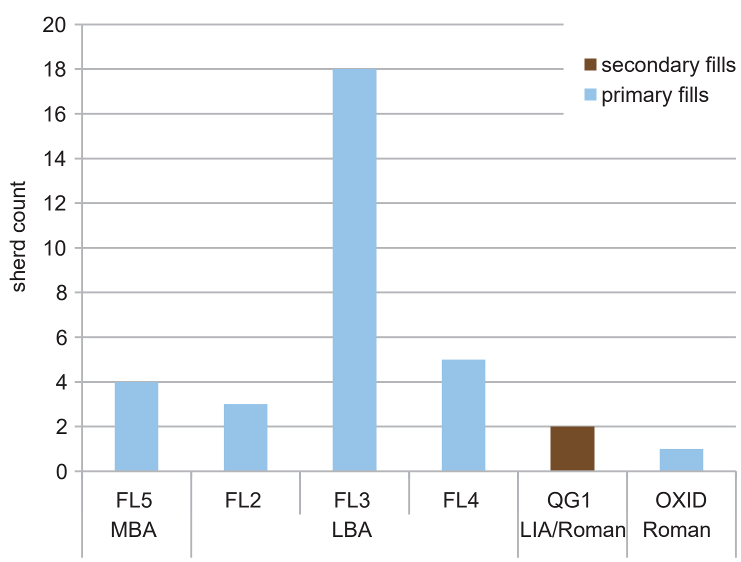

Fig 2.11 Graph showing quantification of pottery fabrics from Ring-Ditch 1 (RD1) by sherd count

to the north and from the settlement to the west. It has also been noted that barrows are often located on marginal land and near social boundaries. RD1 may well have marked the eastern limit of the Kemsley settlement (Field 1998).

Barrows are rare in north-west Kent, particularly when contrasted with Thanet and the South Downs, and the reason for this disparity is not well understood. Moreover, although barrows have been frequently excavated their significance is still widely debated, especially concerning issues such as identity of the self, social stratification/fragmentation and tenurial rights (Barrett 1990; Brück 2000). Bradley and Fraser (2010) have pointed out the difference between 'permeable' and 'impermeable' barrows, the former being characterised by a causewayed entrance (as in the case of RD1). They suggest that the Middle Bronze Age witnessed a change in the relationship between the living and the dead. The Early Bronze Age 'impermeable' barrows, with one or more complete earthwork circuits, were built to keep the dead at a distance, whereas the Middle Bronze Age 'permeable' barrows were open and accessible, and placed a new emphasis on continuity between generations (Bradley & Fraser 2010, 23–8). Indeed, there is tangible evidence for the 'permeability' of RD1 in its use as a focus for flintworking and other associated activities.

2.4 PERIOD 3: LATE BRONZE AGE (*c* 1150–800 BC)

KEMSLEY DOWN

OPEN AREA 1 (OA1)

On the top of Kemsley Down a few small pits were located, containing pottery broadly attributable to the Late Bronze Age, most of it in the post-Deverel-Rimbury tradition (Fig 2.12). Seven small subcircular pits (G20: [54], [80], [81], [87], [89], [97] and [100]) were identified. The fills were mostly brown silt-clays and contained small amounts of fire-cracked flint, hard-hammer-struck flint flakes and a few pottery sherds. The largest finds assemblage derived from pit [100] (Fig 2.13) and included two pyramidal clay loom weights (RF<1> and RF<9>) and sherds from a post-Deverel-Rimbury jar, as well as other bowl and jar fragments.

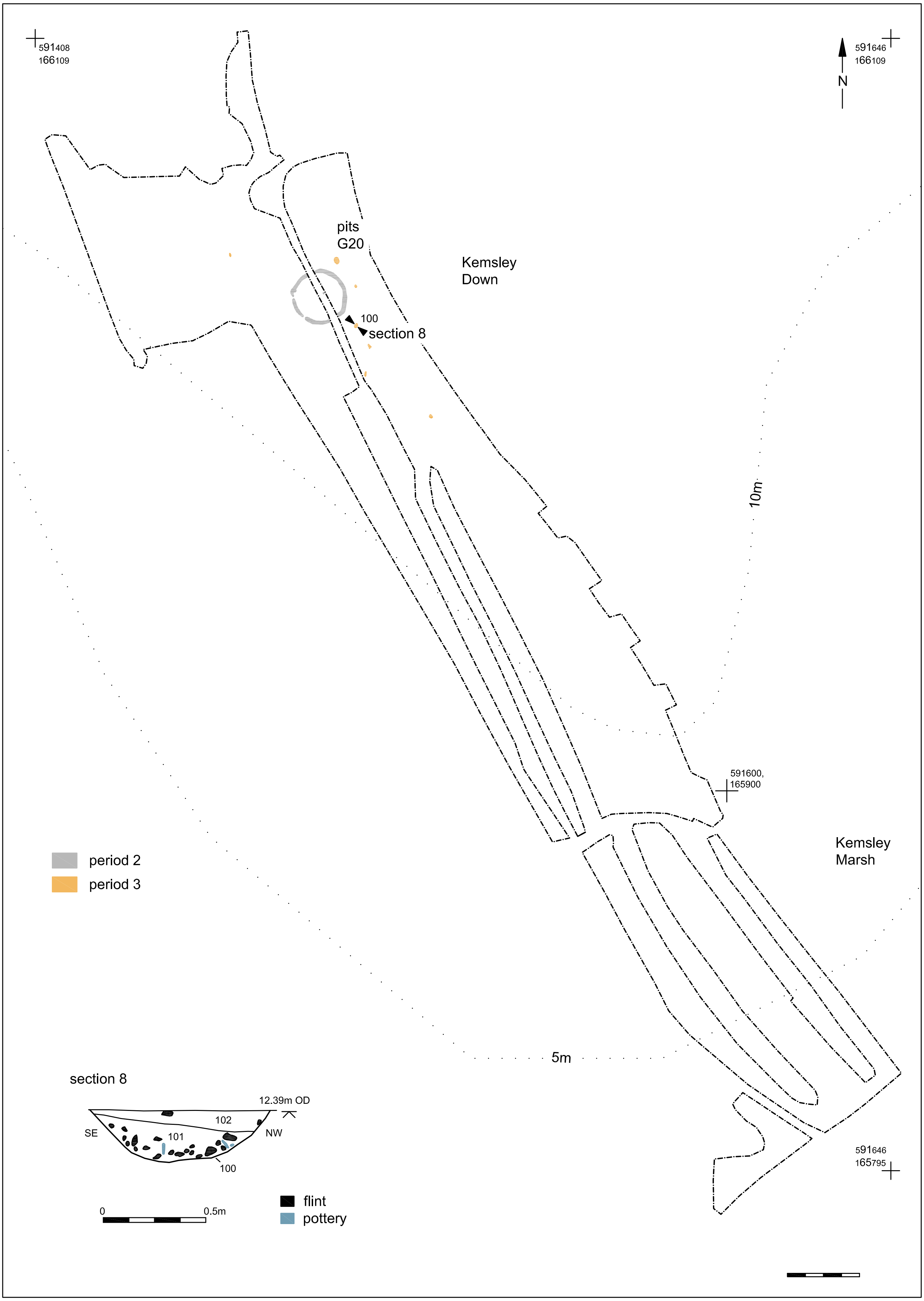

Fig 2.12 Plan and section of period 3 Late Bronze Age pits on Kemsley Down

Fig 2.13 Photograph of pit [100] (G20, OA1), facing south-west (1.0m scale)

KEMSLEY MARSH

OPEN AREA 2 (OA2)

Above the Late Neolithic/Early Bronze Age features and alluvium was a later alluvial sequence, *c* 1m thick and most likely of Bronze Age date (Fig 2.2, sections 2 and 3). The dating framework for these deposits was poor, being based solely on a single find of Late Bronze Age pottery that was recovered from the lowest layer, [3/003], in this upper sequence and on the stratigraphic position above the Late Neolithic/Early Bronze Age occupation layer [413]. Unlike the earlier period, no cut features were recorded within these layers.

The later Bronze Age alluvium was not observed in Trench 1 but was recorded in the other five evaluation trenches to the south and during the subsequent watching brief. The Late Bronze Age alluvium was thinnest to the north near the higher ground (Trenches 2 and 3), increasing in thickness further south to around 0.9m (Trenches 5 and 6). This suggests that later Bronze Age episodes of inundation were not as extensive as those of the earlier periods.

DISCUSSION

This period was poorly represented by features and finds, which may reflect a reduction or relocation of settlement in the area. The adjacent Middle Bronze Age settlement at Kemsley Field was abandoned, and the next archaeologically attested occupation in the area was evidenced by four Middle Iron Age roundhouses found *c* 300m to the north, on the Kemsley distribution road and housing site (Fig 1.1; Diack 2006; MacKinder & Blackmore 2014). Nevertheless, the large and somewhat fragile pyramidal loom weights from pit [100] are clearly associated with domestic activity, and it is probable that some form of settlement was located close to the site, albeit perhaps in a reduced form.

2.5 PERIOD 4: LATE IRON AGE/ EARLY ROMAN (*c* 100 BC – AD 70)

The Late Iron Age/Early Roman period saw the establishment of a settlement, probably a farmstead, on the cusp of the slope of Kemsley Down overlooking the marsh and creek. The settlement was enclosed by a ditch and had an associated field system to the immediate north. The majority of the farmstead lay to the east beyond the site boundary with only the westernmost portion of an enclosure ditch identified. The enclosure ditch was recut and expanded on at least two occasions, including a northern addition to the field system. The last of these phases is likely to have dated to the Early Roman period.

PERIOD 4, PHASE 1: ENCLOSURE 1 (ENC1)

The western portion of the enclosure (ENC1), as exposed within the limits of the excavation area and defined by ditches (G2), was L-shaped and enclosed an area of at least 32m north to south by 15m east to west (Fig 2.14). The ditch was up to 2.1m wide and 1m deep, with steep, occasionally stepped, sides and a flat base. Fewer than 100 sherds of pottery were recovered from the fills. Although these were mostly of an undiagnostic nature and included significant amounts of residual material, the entire absence of Roman fabric types suggests that the assemblage probably dates to the 1st century BC (as opposed to the 1st century AD for the later phases 2 and 3).

PERIOD 4, PHASE 2: ENCLOSURE 1 (ENC1) RECUT

ENC1 was maintained, with the recut (G8) following the line of the original ditch (G2) and having a terminus in the north, possibly forming an entrance. The ditch was up to 3.8m wide and 1.05m deep, with irregular sides and a concave base. The small assemblage of pottery sherds contained the first Early Roman fabric types (less than 5% of the sherds) and generally dated to the 1st century AD.

A posthole, [280], was found in the southernmost sondage excavated through the ditch. The undercut sides of the hole suggest the post had been deliberately removed. The function of this posthole is not clear, but it could have been one of a series of posts in the base of the open ditch which may have formed a fence line or a revetment to support the ditch sides.

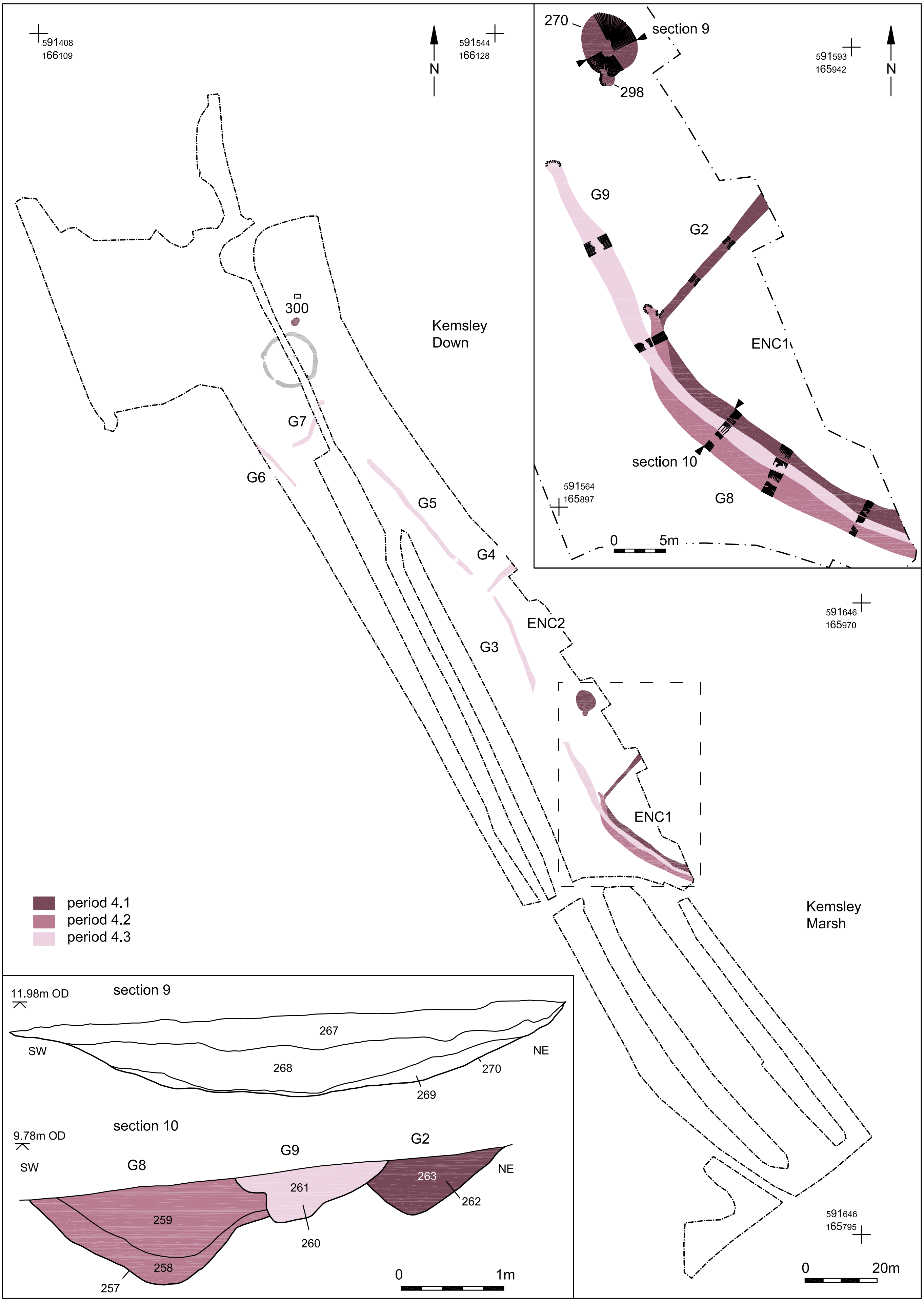

Fig 2.14 Plans and sections of period 4 Late Iron Age/Early Roman enclosed settlement, Enclosures 1 and 2 (ENC1, ENC2)

Two small subcircular pits, [300] and [298], both produced Late Iron Age/Early Roman pottery. Pit [298] was later cut through by a larger subcircular pit, [270], *c* 6m in diameter and 0.8m deep (Figs 2.14 and 2.15). This pit seems to have been used for the disposal of refuse as large quantities of pottery sherds and three triangular loom weight/oven brick fragments (RF<3>, RF<6> and RF<7>) were recovered from the three fills. The uppermost fill, [267]/[251], alone contained over 8.5kg of Late Iron Age/Early Roman pottery sherds. Although the pottery assemblage was large, it produced very few near-complete vessels, implying that this was a secondary dump containing material initially deposited elsewhere.

Fig 2.15 Photograph of refuse pit [270], facing south (scales 1.0m), and also showing views from the site across Kemsley Marsh

PERIOD 4, PHASE 3: ENLARGED ENCLOSURE 2 (ENC2)

After perhaps a couple of decades the recut ENC1 was abandoned and a new larger enclosure, ENC2, established. The southern edge of ENC2 (G9) maintained exactly the same alignment as ENC1, indicating that the earlier enclosure was to some degree still visible (Figs 2.14 and 2.16). Although only the western edges of these enclosures were seen, ENC2 appeared to be around three times the size of its predecessor, with two entrances on the south-west side.

To the north of ENC2 were three further ditches (G5, G6 and G7) forming a possible annexe or adjacent paddocks, although only fragmentary lengths were seen (Fig 2.14). All the ditches were generally shallow (less than 0.65m deep) and contained small assemblages of fired clay lumps, briquetage, Roman brick, fire-cracked flint and a fired clay perforated slab (RF<8>). The small pottery assemblage was indistinguishable in date from the phase 2 assemblage.

Environmental sample <31> produced moderate assemblages of barley and wheat caryopses as well as legumes including broad/celtic beans; glume bases typical of spelt wheat (*Triticum spelta*) and a broad array of arable and ruderal weed plants were also indicated in the charred assemblage (Chapter 3.8).

Fig 2.16 Photograph of intercutting enclosure ditches G2, G8 and G9 (section 10), facing north (scales 1.0m)

DISCUSSION

The majority of the excavated finds and features from the site were dated to this period and provided evidence for the western edge of a small enclosed farmstead. The occupation began in the 1st century BC and was modified and expanded on at least two occasions before the enclosed farmstead was abandoned before the end of the 1st century AD. According to a recent national survey, enclosed farmsteads were the most common settlement type during this period on the north Kent plain, as opposed to 'open' and 'complex' settlement forms (Smith et al 2016, 84).

The function of the enclosure is puzzling: the ditches were too small, even allowing for some horizontal truncation, to be considered in anyway defensive. They may have been largely for drainage or stock control, with the inner face of the ditch possibly fenced (suggested by posthole [280]), but they may also have been dug for a symbolic definition of space, as much or as well as for any functional considerations.

Other than refuse pit [270] nothing of the internal features and structures of the farmstead was uncovered, with the vast majority of the enclosure lying to the east. However, the settlement was clearly ideally located on the higher and drier land overlooking the creek, with the opportunity of exploiting the resources both of the marsh and of the surrounding fields.

The presence of charred chaff and charred weed seeds is evidence of nearby crop processing and the smaller amounts of charred pulses suggest a mixed arable economy.

The absence of any evidence for the consumption of the nearby marine resources, such as wild fowl and shellfish, is surprising, although these remains can often be elusive and other excavated settlements sites in the Swale have been equally devoid, for example at Iwade (Bishop & Bagwell 2005) and Bredgar (Boden 2006).

Without doubt, the best local parallel for the Kemsley site is at Iwade, *c* 2km to the north-west, where a contemporary Late Iron Age/Early Roman enclosed farmstead was excavated (Bishop & Bagwell 2005; see Figs 1.1 and 2.6). In contrast to the Kemsley site, virtually the entire extent of the Iwade settlement was exposed by the open-area excavations, and four roundhouse-type structures, as well as numerous four-post structures, usually interpreted as raised granaries, were identified. Like Kemsley, the Iwade enclosure ditches were reconfigured at least once and the ditches were again not sufficiently large to be considered defensive (ibid, 55–6).

Other contemporary Late Iron Age/Early Roman enclosed farmsteads have been found on land overlooking the Swale and its inlets – at Castle Road, Murston on the opposite side of Milton Creek (CAT 2002, 357) and further inland at Bredgar (Boden 2006, 354–74) (Fig 2.6). More recently, an archaeological evaluation at Swantree Avenue identified an enclosed settlement which had its origins in the Late Iron Age and its apogee in the 1st century AD, possibly with an associated cemetery, while the 2nd century saw quarrying and the apparent abandonment of the settlement (ASE 2015).

At all five of these farmsteads (Murston, Bredgar, Iwade, Swantree Avenue and Kemsley Down) there was no convincing evidence for any sustained occupation extending much beyond the first half of the 2nd century AD, and there was clearly a marked change in the nature and pattern of landownership along the coast of the Swale in the 50 or so years following the Roman Conquest.

2.6 PERIOD 5: ROMAN (*c* AD 70–200)

By the late 1st century AD a small cremation cemetery had been established immediately to the north of the Middle Bronze Age RD1 (Figs 2.17 and 2.18). The Late Iron Age/Early Roman settlement had been abandoned by, or shortly after, this time and the only archaeologically identifiable activity on Kemsley Down was the occasional digging of pits. On the edge of the Kemsley Marsh foreshore at the bottom of the slope a salt-evaporation hearth was identified. The dating of the hearth was considerably less precise than that of the cemetery, with only a small artefact assemblage recovered, and the saltworking could be dated to any point within the Roman period.

CREMATION CEMETERY 1 (CC1)

Cremation Cemetery 1 (CC1) consisted of four small, shallow, subcircular cremation burial pits, [11], [136], [225] and [238], closely grouped within 5m of each other; the lack of intercutting suggests they may have been marked (Fig 2.18). The best-dated accessory vessels suggest the cemetery was used for over a generation: cremation burials [11] and [136] dated to before *c* AD 80 and burials [225] and [238] to the early–mid 2nd century AD.

CREMATION BURIAL PIT [11]

Cremated bone representing a single adult, [12]/[16], was interred in pit [11] with four accessory vessels: a ring-necked flagon, a globular beaker (not illustrated), a necked beaker and a platter (Fig 2.19, P43–P45). The platter was the first vessel placed into the pit, followed by the cremated bone itself, which was placed within and over-spilling the sides of the vessel. The two beakers were then placed upright and the flagon rested on its side above the cremation. The vessels were probably all locally produced and date to AD 40–80. The environmental samples (<2>–<7>, <41> and <55>–<57>) produced limited evidence for oak, privet/honeysuckle (*Ligustrum*/*Lonicera* sp) and possible hazel/alder (*Corylus*/*Alnus* sp).

P43 Ring-necked flagon. Fabric OXID (probably a coarser north Kent white-slipped ware although no trace of the slip remains), [13]
Heavily truncated and fragmented globular beaker. Fabric SAND (local coarse grey ware), [14] (not illustrated)
P44 Necked, cordoned beaker. Fabric SAND (local coarse grey ware), [15]
P45 Camulodunum 14-style platter. Fabric SAND (local coarse grey ware), [16]

CREMATION BURIAL PIT [136]

Cremated bone representing a single adult, [145], was interred in pit [136] with a platter and beaker as accessory vessels, both dated *c* AD 40–80 (Fig 2.20, P46–P47; Fig 2.21). The cremated bone was placed on one side of the pit with the vessels on the other, although some cremated bone was recovered from the fill of beaker P46.

P46 Globular bead-rimmed beaker. Fabric SAND (local coarse dark-surfaced sandy ware), [137]
P47 Camulodunum 14-style platter. Fabric SAND (local coarse grey ware), [137]

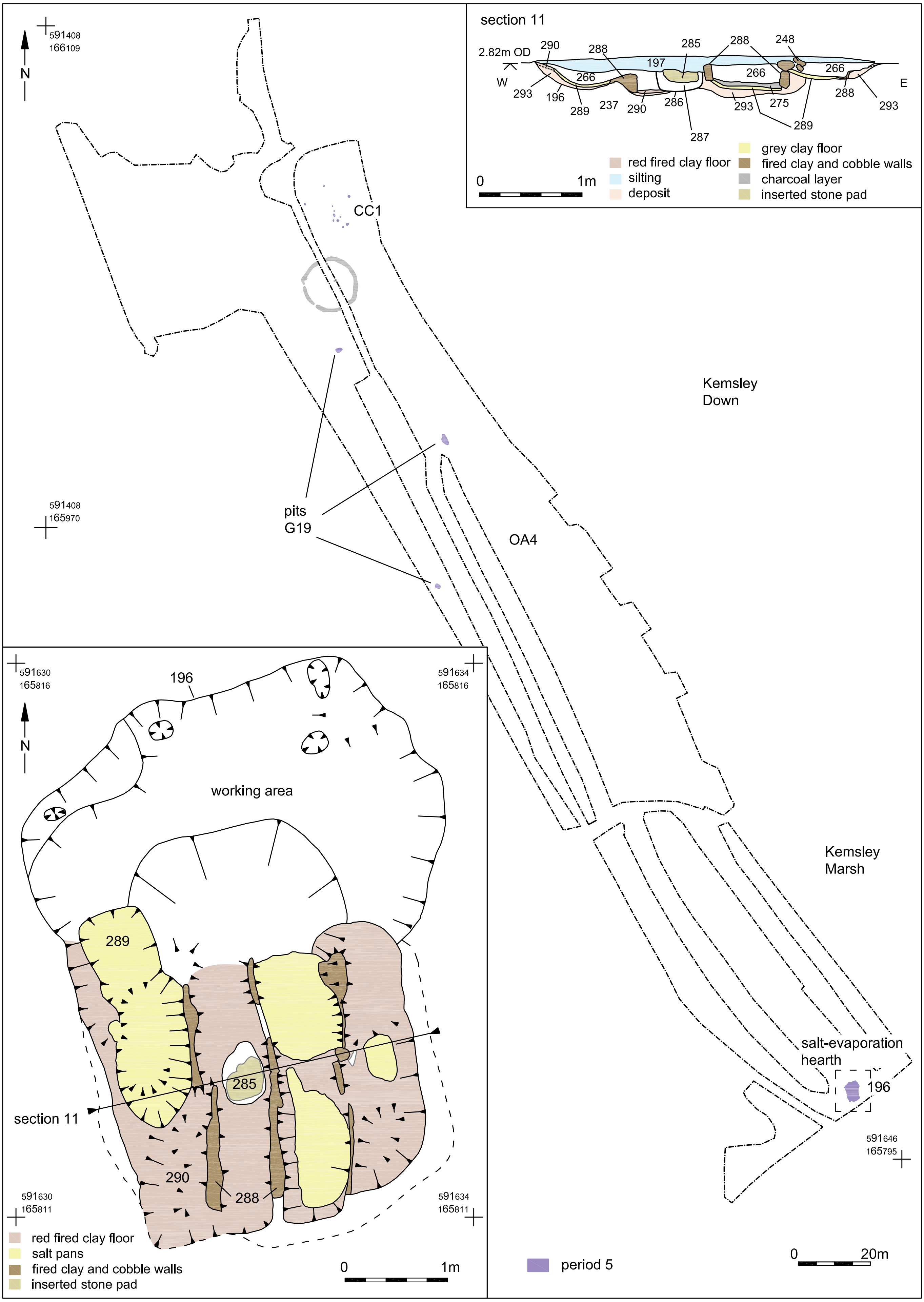

Fig 2.17 Plan and section of period 5 Roman features

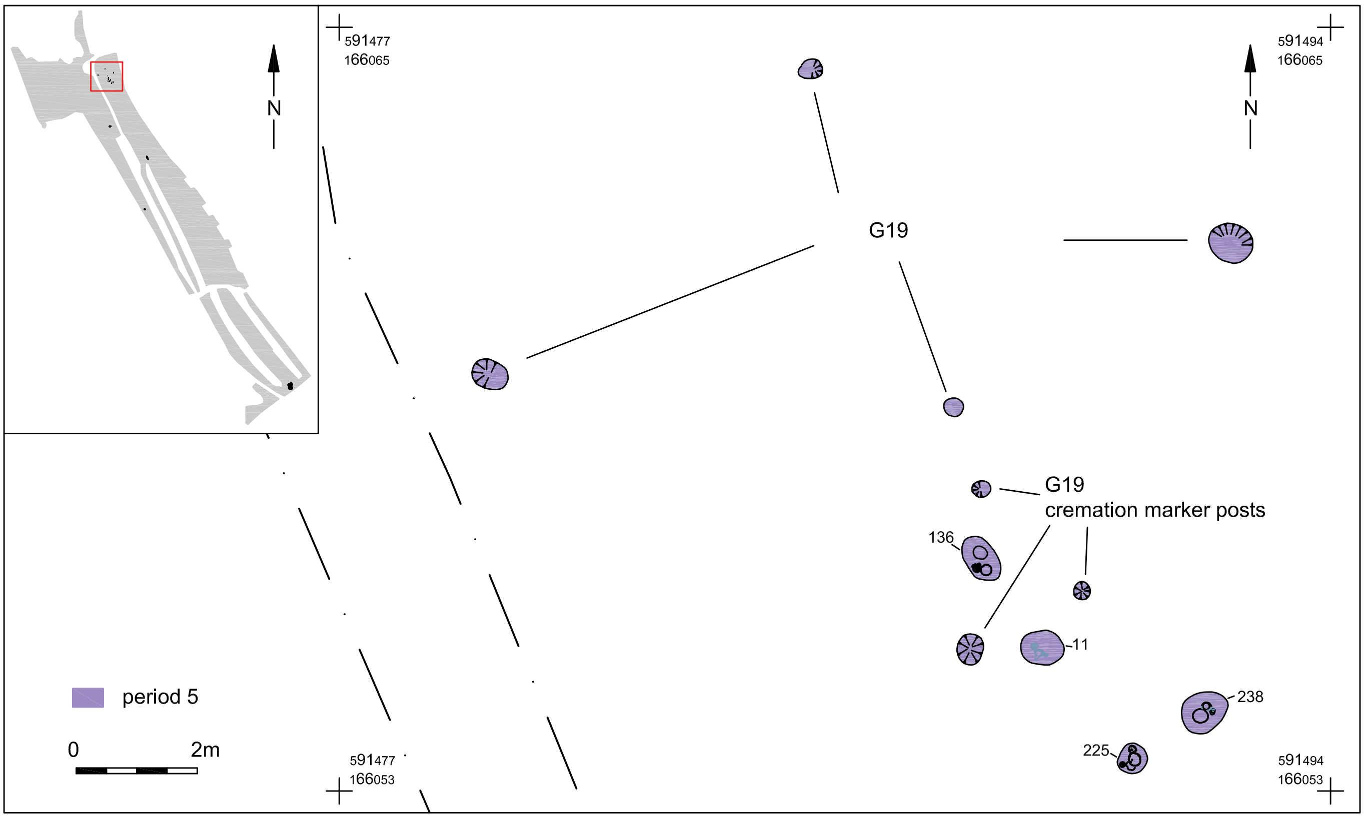

Fig 2.18 Detailed plan of period 5 Early Roman Cremation Cemetery 1 (CC1)

CREMATION BURIAL PIT [225]

Cremated bone representing a single adult, [230], was interred inside a grey ware jar (not illustrated) in pit [225], with three accessory vessels: a samian dish and two locally produced vessels (Fig 2.22, P48–P49). The dish was placed first in the pit, followed by the cremation urn, and finally the flagon and globular beaker. Of the four, the samian dish is the most closely dated, to *c* AD 100–40.

Heavily truncated jar base containing the cremated remains. Fabric SAND (local coarse ware of similar composition to Kent BB2 but unburnished and grey in colour), [229] (not illustrated)

Heavily truncated flagon base. Fabric NKWS (coarser north Kent white-slipped ware), [227] (not illustrated)

P48 Heavily truncated globular beaker. Fabric FINE (slightly oxidised local fine ware fabric), [233]

P49 Dragendorff 42 platter. Fabric SAMMV (Les Martres-de-Veyre samian ware), [231]

CREMATION BURIAL PIT [238]

Cremated bone representing a single adult, [241], was interred inside a wide-mouthed jar in pit [238] (Fig 2.23, P50). Three accessory vessels, a lattice-decorated beaker, a samian cup and a samian dish, were also placed in the pit (P51–P53). The date range of the vessels is *c* AD 90–130. Small amounts of cremated bone were also recovered from pit fill [239] and vessel fill [243].

P50 Cordoned jar containing the cremated remains. Fabric SAND (local coarse grey ware), [240]

P51 Everted-rimmed beaker with acute lattice decoration. Fabric SAND (local coarse grey ware), [246]

P52 Dragendorff 18/31 platter. Fabric ?SAMSG (possible south Gaulish samian fabric), [242]

P53 Dragendorff 46 cup. Fabric SAMLG (La Graufesenque samian ware), [249]

Cremation burial pits [11] and [136] contained apparently unurned cremations, accompanied by very similar suites of accessory vessels. Both were buried with Camulodunum 14-style platters and globular beakers in local coarse sandy fabrics, but only one, [11], was accompanied by a flagon. The choice of near-identical vessels in these earlier cremations may have been deliberate and could represent familial ties between the deceased individuals (Chapter 3.2). The later cremations, [225] and [238], were of a slightly different burial rite with the cremated bone now deliberately interred within pottery vessels. Although the beakers and flagons are broadly similar to types from [11] and [136], the two groups can be distinguished by the use of grey ware jars as cremation urns and of samian accessory vessels. It is notable that the latter group contained vessels of a more mixed date and some may be curated items, perhaps possessions of the deceased.

This small cemetery most likely represented the plot of a family group, occupying a nearby farmstead, although there was little evidence of any domestic occupation on the site, with only three small pits located to the south of the cremations (Fig 2.17).

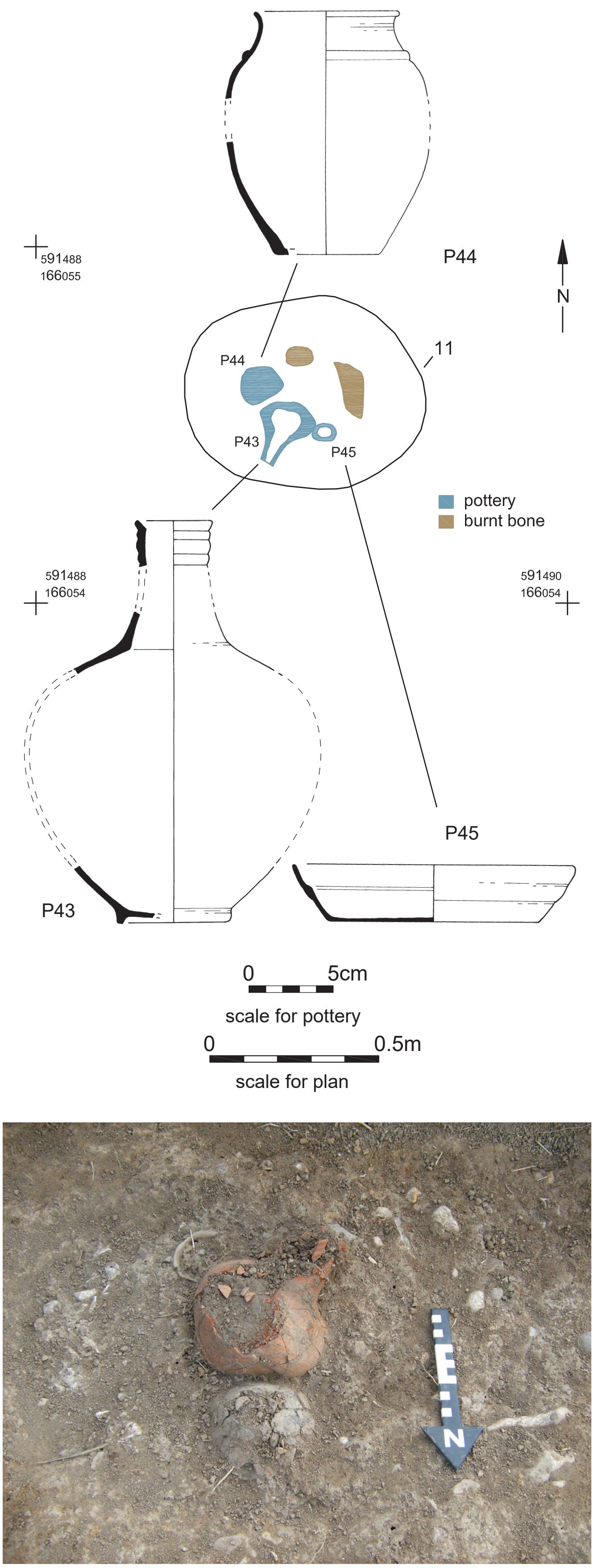

Fig 2.19 Plan and photograph of cremation burial pit [11] with illustrated pottery vessels P43 and P45

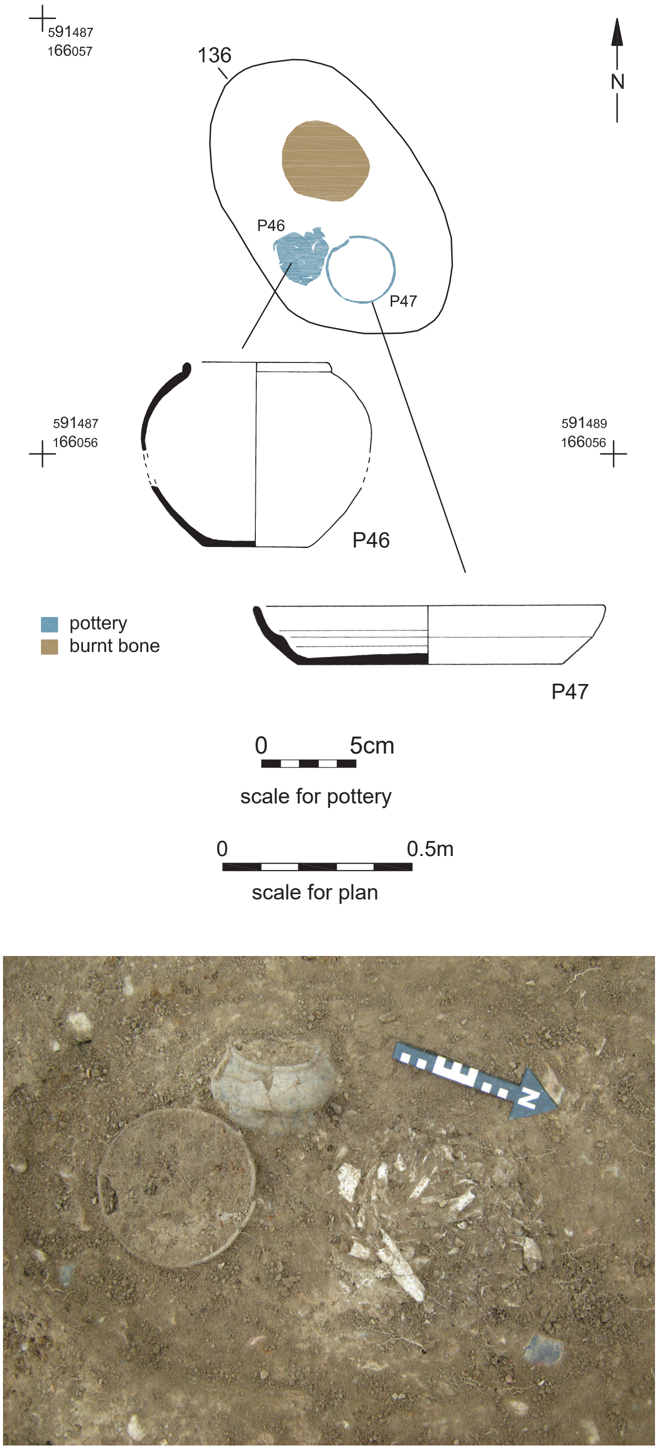

Fig 2.20 Plan and photograph of cremation burial pit [136] with illustrated pottery vessels P46 and P47

PITS/POSTHOLES (G19)

Close to the cremations were seven pits/postholes (G19), with those closest to the cremation burials pits possibly representing marker posts (Fig 2.18). Finds from these postholes included residual prehistoric pottery, Roman pottery and Roman brick. Environmental samples <17> and <25> produced further cremated bone fragments and charcoal of oak, cherry/blackthorn (*Prunus* sp), Maloideae taxa, a possible vetch/tare/bean (*Vicia* sp/*Lathyrus* sp) and a single sedge (Cyperaceae)

Fig 2.21 Photograph of cremation burial pit [136] during excavation

family seed. It is therefore possible that some of these may actually have represented simple unurned cremations, 'tokens' or offerings.

SALT-EVAPORATION HEARTH

At the far south of the excavation area, located on the edge of the Kemsley Marsh foreshore at the bottom of the slope, a salt-evaporation hearth was identified (Fig 2.24). The hearth was constructed within a subrectangular cut, [196], *c* 5.4m long by 4.2m wide by 0.4m deep, with shallow concave sides and a flat base (Fig 2.17). It was situated in the southern half of pit [196] with the northern half left open as an apparent working area for stoking the fire. Inside the northern edge of the pit were four postholes, which may have been part of a shelter.

The primary fill of the pit, [293], in the southern half, was of mottled red and black charcoal-enriched silt with burnt clay fragments, occasional burnt cobbles and a Roman brick. This layer is likely to have been the remains of an earlier phase of hearth use.

Above [293] was the clay floor of the hearth, red clay [290] and buff clay [289]. Constructed above the clay floors was the hearth superstructure. This consisted of three vertical fired clay and cobble walls, [288], which formed four parallel 'gullies', each about 2.5m long by 0.6m wide (Fig 2.25). The walls survived up to a height of 0.17m, and the original height is likely to have been *c* 0.3m. They were slightly staggered rather than straight in plan, forming two 'cells' in each gully. The centre-left gully was set slightly lower than its counterparts on either side, and the easternmost gully was slightly higher again (Fig 2.17, section 11). These height differences may reflect

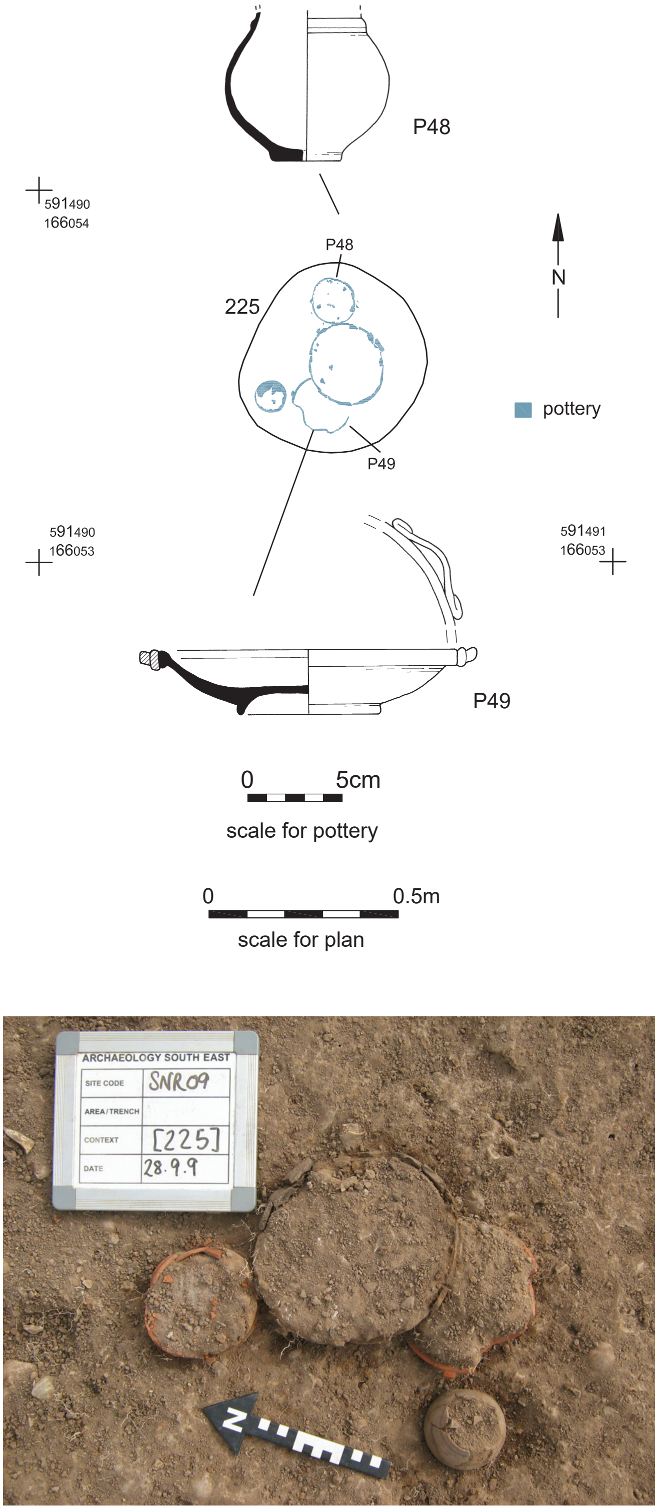

Fig 2.22 Plan and photograph of cremation burial pit [225] with illustrated pottery vessels P48 and P49

some unknown practical attribute, although they could equally be an accident of the construction and functionally irrelevant.

While there was no evidence of containers, there were finds of briquetage pedestals and other structural supports associated with the raised container method of evaporation. These came from the overlying deposits representing the collapse and abandonment of the hearth, [266] and [271]. Filling the

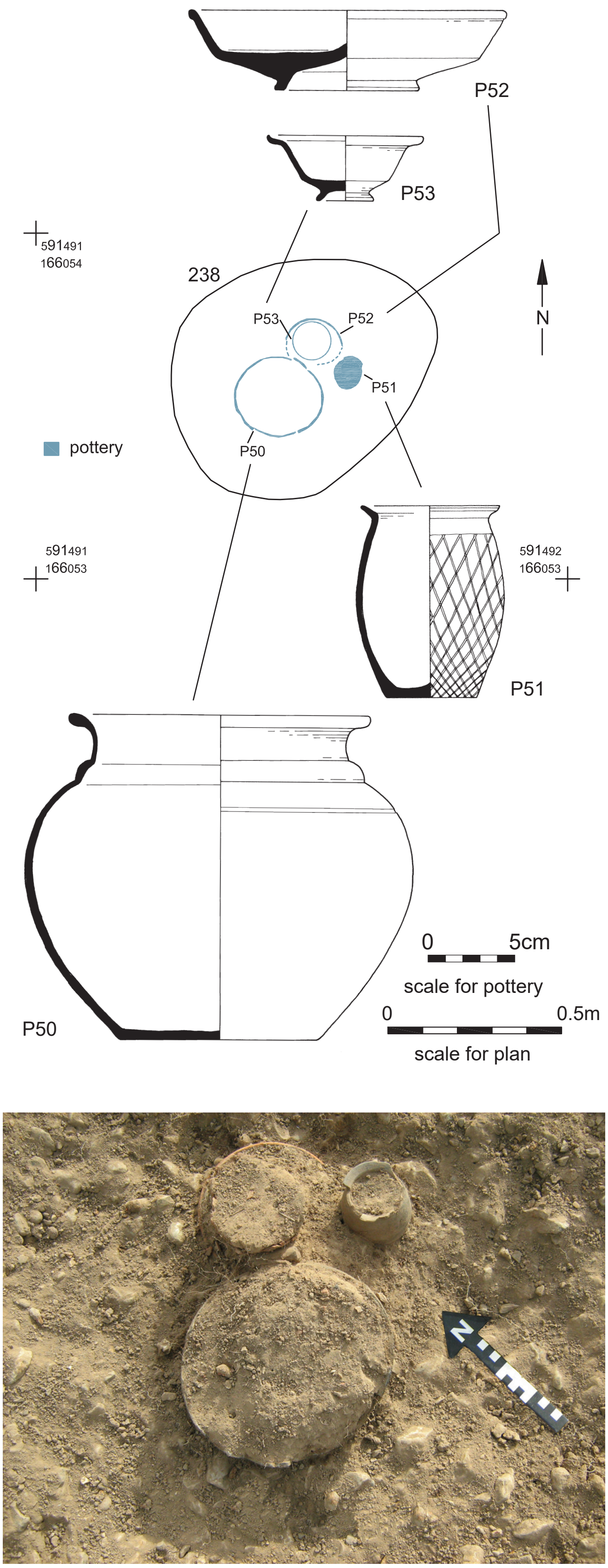

Fig 2.23 Plan and photograph of cremation burial pit [238] with illustrated pottery vessels P50–P53

hearth gullies were deposits of cobbles, burnt clay fragments, ceramic building material (CBM) fragments; deposits [266] and [248] represented a collapse and disuse of the hearth. The CBM fragments from [266] included roller-stamped flue tile from a high-status building, tegula and imbrex roof tile. It has been suggested elsewhere that these finds may have been misidentified and that they actually represent the remains of a trough vessel (Hathaway 2013, 326), but the tiles in question are all in the same fabric as the vast majority of building material from the site, and one fragment bore a typical tilemaker's signature mark (Chapter 3.3).

At some point, pit [287] was dug through the partially collapsed hearth and stone pad [285] was laid flat on backfill [286]. The function of this stone pad is not clear although it may have represented some form of final use. Finally, the remaining depression of the hearth gradually silted up, [197].

Fig 2.24 Photograph of the Roman salt-evaporation hearth [196] under excavation, facing north; the high ground of Kemsley Down is visible in the background

DISCUSSION

Roman settlement and burial

The small family CC1, in use between the mid/late 1st and mid 2nd centuries AD, probably served a nearby farmstead, although it is not certain whether it was that of the occupants of

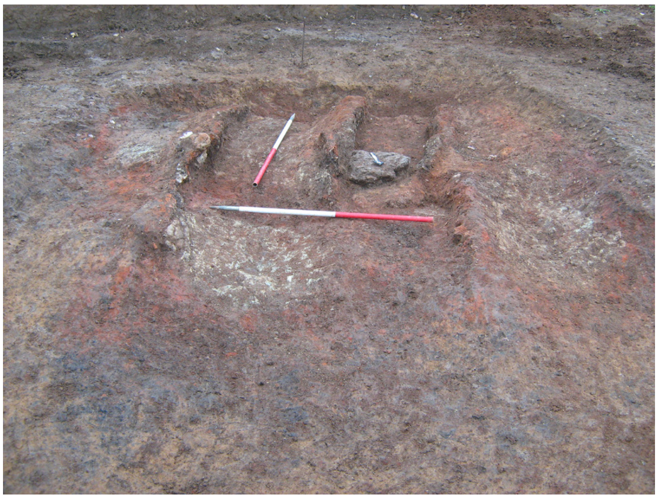

Fig 2.25 Photograph of Roman salt-evaporation hearth [196] after excavation, facing south (1.0m scales)

ENC2 or some other farm. The choice of funerary vessels was of interest, for they consisted of tablewares in highly Romanised fabrics, in contrast to the pottery recovered from the adjacent ENC2. This might suggest that, despite the potential for chronological overlap between these two elements, they were in reality events separated chronologically by a couple of decades. The dating of the pottery is not sufficiently refined to elucidate the relationship. Equally, understanding the relationship between cemetery and settlement may be affected by differences in vessel procurement, with burial vessels being procured especially for interment, rather than being selected from the possessions of the dead or of their family (Chapter 3.2).

While the people buried in this cemetery may have been those that occupied ENC2, the cemetery itself continued to be used into the mid 2nd century, after ENC2 was abandoned. The 2nd-century settlement focus may well have been close to the pits and ditches identified to the north of Ridham Avenue, *c* 300m to the north-west (Fig 1.1; Mackinder & Blackmore 2014, 24–8).

Fragments of CBM associated with high-status buildings, such as the roller-stamped flue tile, were found reused in the salt-evaporation hearth. There are two known candidates for the origins of this tile: the possible villas at Milton church and at Murston on the other side of Milton Creek (Fig 2.6). At Milton, the church itself contains reused Roman CBM and in the 19th century substantial masonry foundations were found during a graveyard extension (Payne 1874, 172). At Murston, the foundations of a large building were partially exposed in the sewerage works near the edge of the marsh. Finds included wall plaster and numerous roof tiles, and in the 1989 trial excavations an occupation layer was found with 2nd- to 4th-century AD pottery, glass, tesserae and a piece of tegula (KARU 1989).

Salt production

Two alternative interpretations can be offered on how the salt-evaporation hearth could have operated, and we are fortunate in that this has already been considered in an unpublished work (Hathaway 2013, 322–6, 478). According to the first interpretation, all four gullies were hearths, and the clay and cobble walls, [288], were used to support evaporation vessels, possibly lead containers, which were heated by fires from below (Fig 2.26a; ibid). The two central gullies, [289], certainly appear to have been utilised as hearths, as evidenced by the presence of charcoal layer [275] in the base of both, representing the last firing (in the section this is visible in only one gully). The charcoal assemblage recovered from bulk samples taken from [275] was dominated by mature oak (Chapter 3.9).

The alternative interpretation is that two of the gullies were hearths and the others were adjacent brine-evaporation tanks (Fig 2.26b and c). Evidence for this could be indicated by the differences in the colour of the clay floor: the buff clays, [289], were possibly salt-affected and indicate the locations of brine-evaporation tanks (Fig 2.25).

There would almost certainly have been other associated salt-production features, such as brine tanks and feeder channels, in the vicinity of saltern [196]. The reason these were not found is almost certainly due to the limited extent of the excavation area. Interestingly, another potential hearth was identified in the geoarchaeological geophysical survey, represented by an oval anomaly of a similar size to saltern [196] and located further into Kemsley Marsh *c* 200m south-east (see Fig 3.10).

One of the best examples of a Roman saltern with associated features from the Thames estuary was excavated at Stanford Wharf, Essex (Biddulph et al 2012). Located within a small ditched enclosure were three settling tanks and an adjacent hearth. The seawater was taken from horseshoe-shaped ditches after they were filled at high tide, and transferred into the tanks. In the tanks, the silt was allowed to settle and on warm days the salinity of the water could be increased naturally by solar evaporation. The three tanks are likely to have represented different parts of the settling process, and perhaps held increasingly saline brine. The brine was then boiled in the hearth in briquetage vessels supported by clay pedestals. The resulting salt crystals were skimmed off the top and decanted into storage vessels, ready for transportation (ibid, 115).

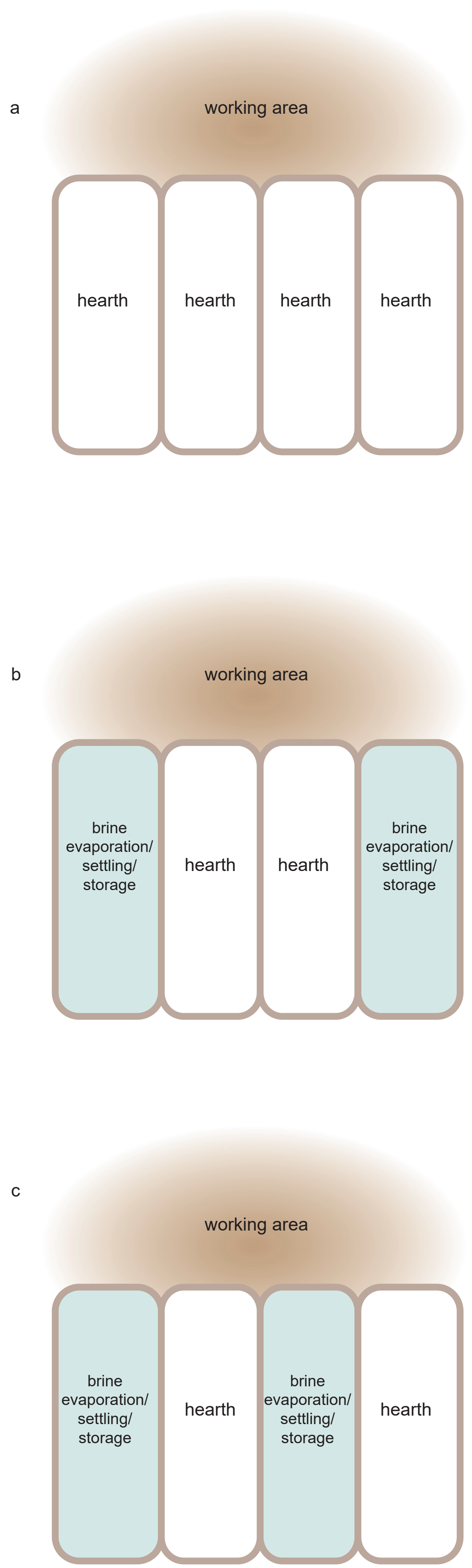

Fig 2.26 Alternative interpretations of the use of salt-evaporation hearth [196] (after Hathaway 2013)

At Kemsley Marsh, only the saltern itself was found and the form of any other associated features remains unknown. However, similarities between the Kemsley Marsh and Stanford Wharf examples suggest a possible comparability of use. Saltern [196] was of a broadly similar size and form to the Stanford Wharf hearth ([1722]), and both had adjacent stokehole areas (ibid). The major difference between the two was how the briquetage vessels were supported: the Stanford Wharf hearth used pedestals, while saltern [196] used both walls and pedestals (ibid). Hathaway, in her review of salt-production sites in Kent, notes that the form of this hearth was unique in the area, but is comparable to Late Iron Age and Roman examples from Lincolnshire and the Seine valley, France (Hathaway 2013, 325, 478). It demonstrates a high level of investment and technological choice, and represents salt production on a large scale (ibid, 325–6).

The wood species used for fuel that have been identified in salt-production hearths are varied, and include salt-marsh plants and a variety of wood charcoals. The former had the extra advantage of leaving salt-enriched burnt ashes, which could be added to the brine solution to make it even stronger (ibid, 163–4). This has also been demonstrated by archaeological experiments using samphire, showing that salt-marsh plants were not only important as a fuel but also in the production of salt itself (Biddulph 2016).

However, oak charcoal was the dominant fuel used in hearth [196], and to select such a valuable timber suggests this resource was abundant in the locality. On numerous salt-production sites in Essex, too, the dominant fuel was oak, probably from coppiced woodland (Rippon 2000, 104–5). Interestingly, at Stanford Wharf, the use of wood-based fuel was associated with the adoption of using lead evaporating vessels (ibid, 194). Although there was no conclusive evidence for vessels of any type from Kemsley Marsh, Hathaway believes this type of hearth very probably utilised lead containers (Hathaway 2013, 478).

2.7 POST-ROMAN PERIOD

Despite a small medieval earthwork, Castle Rough, lying only *c* 300m to the east, there was no evidence that the site was anything other than open land from the post-Roman period until recently. The focus of Anglo-Saxon and later settlement moved further south to the site of Sittingbourne.

CHAPTER 3 SPECIALIST REPORTS

3.1 WORKED FLINT

Hugo Anderson-Whymark

Archaeological investigations along the route of the Sittingbourne Northern Relief Road yielded 340 struck flints (Table 3.1). The assemblage includes one flake of probable Palaeolithic date and a small number of Mesolithic and Neolithic to Early Bronze Age flints, but the greater part of the assemblage dates from the Middle to Late Bronze Age. Contemporary lithic assemblages were recovered from the fills of Middle Bronze Age Ring-Ditch 1 (RD1) and seven Late Bronze Age/Early Iron Age pits; the rest of the assemblage was residual in later archaeological features.

METHODOLOGY

The flints were catalogued according to broad artefact/debitage type and retouched pieces were classified following standard morphological descriptions (Bamford 1985; Healy 1988; Bradley 1999; Butler 2005). Evidence of burning, breakage, edge damage and cortication was also recorded.

RAW MATERIAL

The flint exhibits considerable variation in colour with various shades of mid and dark brown, grey, black, orange-brown and orange-red represented. The cortex is typically thin and abraded or worn and pitted, indicating the raw material was collected in the form of small cobbles from fluvial deposits, such as river gravels. A small number of flints exhibit shattered cortical surfaces; this wear is characteristic of nodules from beach deposits. Bullhead Bed flint from the base of the Reading Beds, which exhibits a distinctive olive-green cortex with an underlying orange band, formed a minor component of the raw materials. Overall, the flint was of poor quality for knapping.

THE ASSEMBLAGE

PALAEOLITHIC FLINTWORK

A small, broken flake from secondary fill [155] of RD1 has been tentatively dated to the Palaeolithic. This artefact is heavily rolled and exhibits a corticated and iron-stained surface that is unlike any of the other lithics on site, but it is comparable to many Lower Palaeolithic artefacts from the terrace gravels of the River Thames.

MESOLITHIC TO EARLY BRONZE AGE FLINTWORK

A small number of artefacts (*c* 12) date from the Mesolithic or Early Neolithic, but all were recovered from later archaeological contexts. A unifacial crested blade, resulting from the initiation of blade production and a fine parallel-sided blade, both from secondary fill [155] of RD1, are technologically comparable to debitage dating from Mesolithic. The remaining ten flints – seven narrow flakes and blades, a single platform blade core, a platform rejuvenation tablet and a truncated blade forming a piercing point – are the product of a blade-orientated industry broadly dating from the Mesolithic or Early Neolithic.

In addition to the potentially Early Neolithic artefacts considered above, a small number of flakes and tools are considered to date broadly from the Neolithic or Early Bronze Age. These artefacts comprise a flake struck from a ground flint implement, a serrated flake with silica gloss, a fine end-and-side scraper and several flakes exhibiting platform-edge preparation. These artefacts are all residual with the exception of two flakes from Late Neolithic/Early Bronze Age alluvial layer [413] on the foreshore.

MIDDLE BRONZE AGE: RING-DITCH 1 (RD1)

In total, 122 flints were recovered from RD1. This includes one possible Palaeolithic flake and a small number of Mesolithic, Neolithic and Early Bronze Age flints, considered above, but the majority of the assemblage comprises fresh, broad, hard-hammer-struck flakes that are contemporary with the monument. Five scrapers, a denticulate, a notched flake and an edge-retouched flake with a distinctive 'nose' on one edge also probably date from the Middle–Late Bronze Age, although these forms are not chronologically distinctive (Fig 3.1, nos 1–4).

LATE BRONZE AGE

The seven Late Bronze Age pits ([54], [80], [81], [87], [89], [97] and [100]) yielded ten squat hard-hammer-struck flint flakes in fresh condition that may be broadly contemporary with the features. The simple reduction techniques and broad proportions of the flakes are typical of this period (Humphrey 2003).

DISCUSSION

The presence of a one probable Palaeolithic flake and small numbers of Mesolithic to Early Bronze Age flints provides evidence for limited activity in the local landscape before the cutting of identifiable archaeological features. The limited size of the assemblage, however, precludes accurate dating and characterisation of this activity.

RD1 provided a focus for flintworking in the Middle and Late Bronze Age and the presence of a few tools indicates that various activities, including hide scraping, were being undertaken around this area. The limited range of artefacts, however, again precludes detailed characterisation of the activities undertaken.

ILLUSTRATION CATALOGUE (Fig 3.1)

1 End scraper manufactured on a hard-hammer-struck flake; RD1, [85]; Middle Bronze Age
2 Side scraper exhibiting minimal retouch manufactured on a hard-hammer-struck flake; RD1, [85]; Middle Bronze Age
3 Denticulate manufactured on a frost-shattered chunk; RD1, [127]; Middle Bronze Age
4 Retouched flake with a distinctive notched nose manufactured on a broken flake; RD1, [127]; Middle Bronze Age

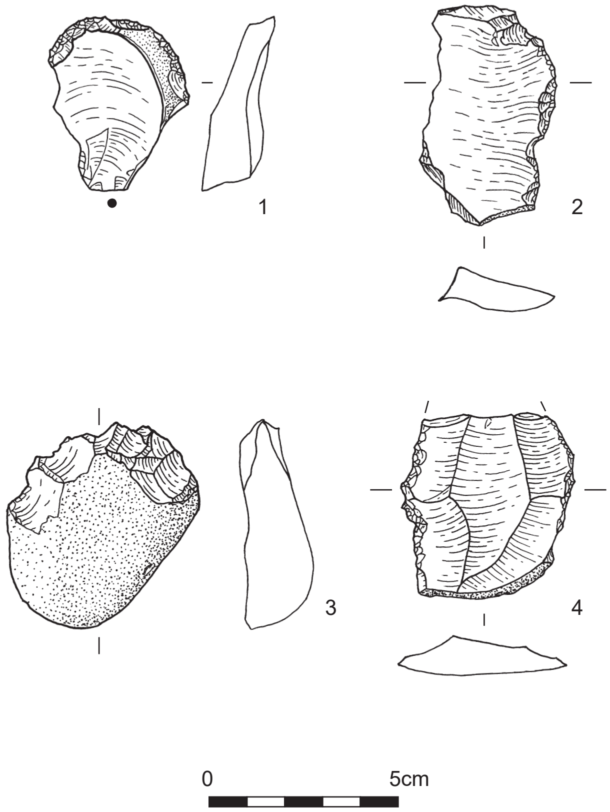

Fig 3.1 Worked flint nos 1–4

	From the excavation, by period			From the evaluation trenches	Total
Type	MBA (RD1)	LBA/EIA (pits G20)	Post-EIA periods and undated		
Flake	92	10	133	16	**251**
Blade	4		4		**8**
Bladelet	2		5		**7**
Blade-like	4		7	1	**12**
Irregular waste	3		13	2	**18**
Rejuvenation flake core face/edge				1	**1**
Rejuvenation flake tablet			1		**1**
Crested blade	1				**1**
Flake from ground implement			1		**1**
Single-platform blade core			1		**1**
Tested nodule/ bashed lump			2	2	**4**
Single-platform flake core	1		2	1	**4**
Multi-platform flake core	3		2	1	**6**
Discoidal flake core				1	**1**
Core on a flake				1	**1**
End scraper	3		2		**5**
Side scraper	1				**1**
End-and-side scraper			2		**2**
Other scraper	1				**1**
Spurred piece			1		**1**
Serrated flake			1		**1**
Denticulate	1				**1**
Notch	1		1		**2**
Retouched flake	3		1		**4**
Miscellaneous retouch	1				**1**
'Nosed' retouched flake	1				**1**
Piercer?			1		**1**
Burin			1		**1**
Total	**122**	**10**	**181**	**27**	**340**

Table 3.1 Flint from the excavation and the evaluation trenches by period and category type

3.2 PREHISTORIC AND ROMAN POTTERY

Anna Doherty

The prehistoric and Roman pottery assemblage from the site totals 2297 sherds, weighing 21.8kg; it amounts to 1463 estimated number of vessels (ENV) and 14.42 estimated vessel equivalents (EVE). Small assemblages dating to the Neolithic and Bronze Age were recorded but the majority of the pottery is associated with Late Iron Age/Early Roman settlement activity and the Roman cremation cemetery.

The pottery was examined using a ×20 binocular microscope and quantified by sherd count, weight, ENV and EVE. Prehistoric fabrics were recorded according to a site-specific fabric type-series which was formulated in accordance with the guidelines of the Prehistoric Ceramics Research Group (PCRG 2010). In the absence of a universal type-series for Kent, Late Iron Age and Roman fabrics and forms have been recorded using the Museum of London's standard system of codes (Marsh & Tyers 1978; Davies et al 1994), with further cross-referencing in the text to Thompson (1982) and the Camulodunum series (Hawkes & Hull 1947).

FABRIC TYPE-SERIES

FL1
Sparse to moderate (occasionally common), moderately to ill-sorted flint, ranging from 0.5mm to 4mm and occasionally up to 6mm. The matrix may be silty or contain moderate visible fine quartz of *c* 0.1mm. Many examples contain rare or sparse linear voids from burnt-out organic matter.

FL2
Sparse to moderate, moderately or well-sorted flint, ranging from 0.5mm to 2mm with occasional larger examples. The matrix is comparable to FL1.

FL3
Moderate to common flint, mostly in 0.5–2.5mm range, often with rare examples up to 5mm. May have a sand-free or silty matrix.

FL4
Sparse to moderate flint, generally of 0.5–1.5mm but usually with some rare larger examples up to 2.5mm, often with well-burnished surfaces. May have a sand-free or silty matrix.

FL5
Common, very ill-sorted flint, mostly in the *c* 0.5–4mm range, often with very coarse examples up to 8mm in size, usually in a sand-free matrix.

FL6
Moderate to common, very well-sorted flint, mostly in the 0.5–1mm range.

FL7
Encompassing some variability but characterised by sparse and very ill-sorted flint usually in the 2–4mm range but sometimes including very variable size ranges from 0.5mm to 10mm. The matrix usually contains very common silt-sized quartz although one example with a sand-free laminar matrix was also lumped with this group.

FLQG1
Rare or sparse flint which is frequently very coarse (up to 5mm) in a silty/fine sandy matrix. The fabric often has a slightly hackly fracture and soapy texture, indicating the possible presence of rare/sparse grog. However, it is usually difficult to distinguish possible grog-inclusions from their surrounding matrix. Rare or sparse organic inclusions or related voids may be present.

QG1
Similar to FLQG1, although usually not containing flint; where it is present, inclusions are usually rare and/or very fine. Fine grog inclusions (usually <1mm) are slightly more frequent (sparse to moderate) but, again, are often of a similar texture and colour to the background matrix. Fairly uniformly unoxidised and black-surfaced.

GR1
Moderate to common grog of 0.5–2mm in a matrix with few other visible inclusions, although rare flint may feature. This fabric tended to be higher-fired and frequently oxidised or grey in colour.

GR2
Sparse, ill-sorted grog of 1–3mm in a silty background matrix with rare large quartz grains up to 0.5mm.

SH1
A rare fabric type encompassing some variability. Generally moderate or common shell, usually in the size range 1–3mm. Rare flint may occur.

Q1
Common well-sorted quartz of around 0.1mm. Rare iron-rich and organic inclusions are often present, and rare flint may occur.

Q2
Moderate coarse quartz usually of around 0.3–0.5mm, occasionally accompanied by rare flint in range of different sizes.

GL1
Common well-sorted glauconite, usually in the *c* 0.2–0.3mm range. Rare larger quartz grains and/or flint inclusions may occur.

PERIOD 1: NEOLITHIC/EARLY BRONZE AGE

Twenty-four sherds, weighing 114g, are in possible Neolithic/Early Bronze Age fabric types. All but one are in the broadly defined flint-tempered fabric grouping FL7, most likely to be associated with Early and Middle Neolithic pottery styles.

Only two of these sherds are thought to have been securely stratified in a contemporary feature, pit [168]. This contained an open bowl in fabric FL7 featuring a shoulder carination very high on the vessel wall (Fig 3.2, P1). Carinations are associated with the earliest Carinated Bowl style (*c* 4000–3650 BC) but survive as a minor element in Plain Bowl assemblages (*c* 3650–3300 BC). Several very small rims in fabric FL7 could be from Plain Bowl forms although all are partial profiles and were found as residual elements in later features. Two flint-tempered body sherds respectively feature fingernail impressions and finger indents and perhaps belong to the Middle Neolithic Peterborough Ware tradition (*c* 3500–2500 BC). A single body sherd in grog-tempered fabric GR2 is thought to be part of a

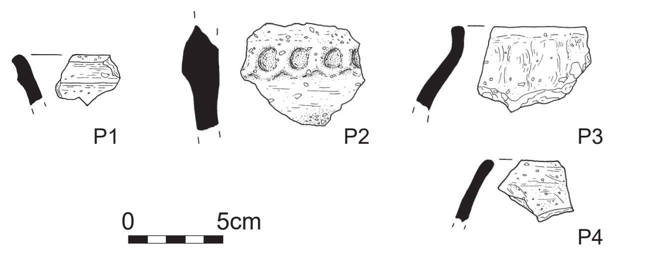

Fig 3.2 Prehistoric pottery vessels P1–P4

Collared Urn (*c* 2000–1500 BC). It probably comes from the join of the body and collar and features traces of diagonally aligned twisted cord impressions (not illustrated).

PERIOD 2: MIDDLE BRONZE AGE

Given the fairly large and diagnostic Middle Bronze Age assemblage found during adjacent excavations at Kemsley Fields (McNee 2006), surprisingly little pottery in the current assemblage could be assigned to the Middle Bronze Age. The fills of RD1, a funerary monument whose use is dated to this period by a radiocarbon determination on human remains, produced the only diagnostic Middle Bronze Age sherd, part of a finger-impressed cordon in the coarsest flint-tempered ware FL5 (Fig 3.2, P2). However, the rest of the very small assemblage from this feature is rather mixed in character. It is generally composed of relatively thin-walled sherds in finer flint-tempered wares which are more characteristic of the Late Bronze Age (Table 3.2). This could suggest that the ditch remained open for a long period after the burials were interred but these fills also included three sherds in later Iron Age and Roman fabrics (OXID and QG1), indicating that some of the pottery is likely to be intrusive.

Fabric	Sherd count	Weight (g)	ENV	Sherd count (%)	Weight (%)	ENV (%)
FL2	3	26	3	9.1	11.1	9.1
FL3	18	88	18	54.5	37.6	54.5
FL4	5	12	5	15.2	5.1	15.2
FL5	4	76	4	12.1	32.5	12.1
OXID	1	16	1	3.0	6.8	3.0
QG1	2	16	2	6.1	6.8	6.1
Total	**33**	**234**	**33**	**100.0**	**100.0**	**100.0**

Table 3.2 Quantification of pottery fabrics in Ring-Ditch 1 (RD1) (ENV = estimated number of vessels)

PERIOD 3: LATE BRONZE AGE

Six pits in OA1 produced pottery but these are generally small groups of undiagnostic body sherds, mostly in flint-tempered fabrics FL3 and FL4. One of the pits, [100], produced a reasonably large assemblage, including diagnostic Late Bronze Age elements (quantified by fabric type in Table 3.3). Aside from fabrics GR1 and QG1, which are almost certainly intrusive later Iron Age/Early Roman elements, the entire group is flint-tempered, although sherds in fabric FL7 may be residual Neolithic wares. Several rims are present in this group; most appear to be simple profiles but are from very small sherds which are difficult to assign to a form type with certainty. The largest profiles include a coarse shouldered jar (Fig 3.2, P3) and a simple ovoid form which is relatively thin-walled and well-finished (Fig 3.2, P4).

Fabric	Sherd count	Weight (g)	ENV	Sherd count (%)	Weight (%)	ENV (%)
FL3	66	318	66	57.4	51.8	57.4
FL4	32	160	32	27.8	26.1	27.8
FL5	8	98	8	7.0	16.0	7.0
FL7	6	20	6	5.2	3.3	5.2
GR1	1	12	1	0.9	2.0	0.9
QG1	2	6	2	1.7	1.0	1.7
Total	**115**	**614**	**115**	**100.0**	**100.0**	**100.0**

Table 3.3 Quantification of pottery fabrics in period 3 pit [100] (ENV = estimated number of vessels)

RESIDUAL POST-DEVEREL-RIMBURY POTTERY

Several of the ditches assigned to the subsequent period (period 4) contained fairly high proportions of probable post Deverel-Rimbury (PDR) fabrics FL3, FL4, FL5 and FL6. This was particularly the case in interventions through the northern half of ditch G5, which is located in the same area as the six Late Bronze Age pits, perhaps suggesting that the ditch truncated Late Bronze Age features. A large number of these fabrics were also recorded in the earliest period 4 assemblage (ENC1, discussed in detail below). Although it is possible that some of these are of Middle/Late Iron Age date, the single feature sherd associated with such fabrics (Fig 3.3, P5) looks more characteristic of weakly shouldered PDR jar forms. It also features rustication, a surface treatment which is fairly typical of early/mid first millennium BC pottery styles.

PERIOD 4: LATER IRON AGE/EARLY ROMAN

The period 4 assemblage is quantified by fabric type in Table 3.4. A small group assigned to period 4, phase 1 is probably of earlier date than the rest of the assemblage and is considered separately below. This material derives entirely from the original fills, G2, of enclosure ditch ENC1. The remainder of the pottery comes from three elements of the site: the recut G8 of ENC1, ENC2 and the large refuse pit [270]. ENC2 is stratigraphically later than the recut of ENC1 and these two features have been assigned to separate phases (ENC2 to period 4, phase 3 and G8 to period 4, phase 2). However, no pronounced differences in assemblage composition could be detected.

Fabric	Sherd count	Weight (g)	ENV	Sherd count (%)	Weight (%)	ENV (%)
AHSU (Alice Holt/ Surrey ware)	1	8	1	0.1	0.0	0.1
FL1	266	2930	247	19.6	18.0	20.8
FL2	181	1570	169	13.3	9.7	14.2
FL3	90	688	90	6.6	4.2	7.6
FL4	8	44	6	0.6	0.3	0.5
FL5	17	316	16	1.3	1.9	1.3
FL6	6	44	6	0.4	0.3	0.5
FL7	7	50	7	0.5	0.3	0.6
FLQG1	159	4346	132	11.7	26.7	11.1
GL1	55	324	27	4.0	2.0	2.3
GR1	108	1837	98	7.9	11.3	8.3
HOO (Hoo ware)	10	74	2	0.7	0.5	0.2
NGWH (north Gaulish white ware)	11	50	3	0.8	0.3	0.3
NKGW (north Kent grey ware)	2	2	2	0.1	0.0	0.2
OXID (unsourced oxidised ware)	17	98	10	1.3	0.6	0.8
OXIDF (unsourced fine oxidised ware)	16	32	8	1.2	0.2	0.7
Q1	75	602	70	5.5	3.7	5.9
Q2	16	166	14	1.2	1.0	1.2
QG1	282	2792	252	20.7	17.2	21.2
SAND (unsourced sandy grey ware)	13	110	13	1.0	0.7	1.1
SH1	20	182	14	1.5	1.1	1.2
Total	**1360**	**16265**	**1187**	**100.0**	**100.0**	**100.0**

Table 3.4 Quantification of pottery fabrics from period 4

PERIOD 4, PHASE 1

Fewer than 100 sherds were recovered from the original fills of ENC1. Roman fabric types are absent from this group and fabrics FL3 and FL4 make up a larger proportion (*c* 30%) than in most other period 4 features. These two fabric types are most closely identified with later Bronze Age pottery from the site and might be entirely residual. However, it is not easy to determine the date of undiagnostic flint-tempered body sherds, and some Late Iron Age/Early Roman feature sherds were associated with unusually coarse and ill-sorted fabrics. As already noted, the only diagnostic sherd associated with one of these wares (Fig 3.3, P5) seems more characteristic of PDR shouldered jar forms. Other flint-tempered wares, in fabrics FL1 and FL2, are more certainly attributed to this period and make up a further *c* 18% of the group. There appears to be a slightly larger proportion of glauconitic wares compared with the subsequent phases, but a number of these sherds are probably from the same vessel and this fabric group makes up only *c* 6% of ENV. Grog-tempered wares make up a significantly smaller proportion (*c* 15%) than in the stratigraphically later assemblages. Other fabric types, including shelly, glauconitic and quartz-rich wares are present, but are represented by only a few sherds each.

Apart from the single, probably residual, flint-tempered jar, the only feature sherds associated with this group are an S-profile jar in glauconitic fabric GL1 (Fig 3.3, P6) and a similar, sinuous, round-shouldered jar with a slightly more defined neck in sparsely grog-tempered fabric QG1 (Fig 3.3, P7).

PERIOD 4, PHASES 2 AND 3

Key groups from ENC2 and refuse pit [270] have been selected for illustration (Fig 3.3). Relatively few vessel profiles worthy of illustration were found in the phase 2 group but fragmentary rim sherds suggest that form types were similar to those presented below. As already noted fabric composition appears to have altered over time, although possible problems of residuality in the phase 1 group make comparisons difficult. Overall, flint-tempered wares are slightly less common in the later assemblages but the difference lies almost entirely in fabrics FL3 and FL4, which may include a strong component of residual PDR pottery. The more certainly contemporary flint-tempered wares FL1 and FL2 are actually more common than in the phase 1 assemblage, together making up about one-third of the pottery from phases 2 and 3. There is also a fairly dramatic increase in grog-tempered wares. These make up over 40% of later assemblages, although most are the sparsely grog-tempered fabrics QG1 and FLQG1. Other fabric categories including glauconitic, shelly and quartz-rich fabrics make up only a minor component of the assemblage. A small number of sherds in Roman fabric types were identified, making up about 5% of the total sherd count. Almost all are coarse wares probably attributable to the earliest activity of the local north Kent/Thameside industry. Only a few examples of more widely traded north Kent table wares, such Hoo white-slipped flagons or north Kent fine grey wares, were identified. From further afield, a single example of an early Alice Holt Surrey sherd was recorded. A few sherds of north Gaulish white ware, mostly from a single butt-beaker, represent the only imported material in the assemblage.

Although probably residual, examples of S-profile jars were found within the latest Roman enclosure ditch (P8). In general the pottery from phases 2 and 3 is characterised by a narrow range of forms with an emphasis on hand-formed techniques

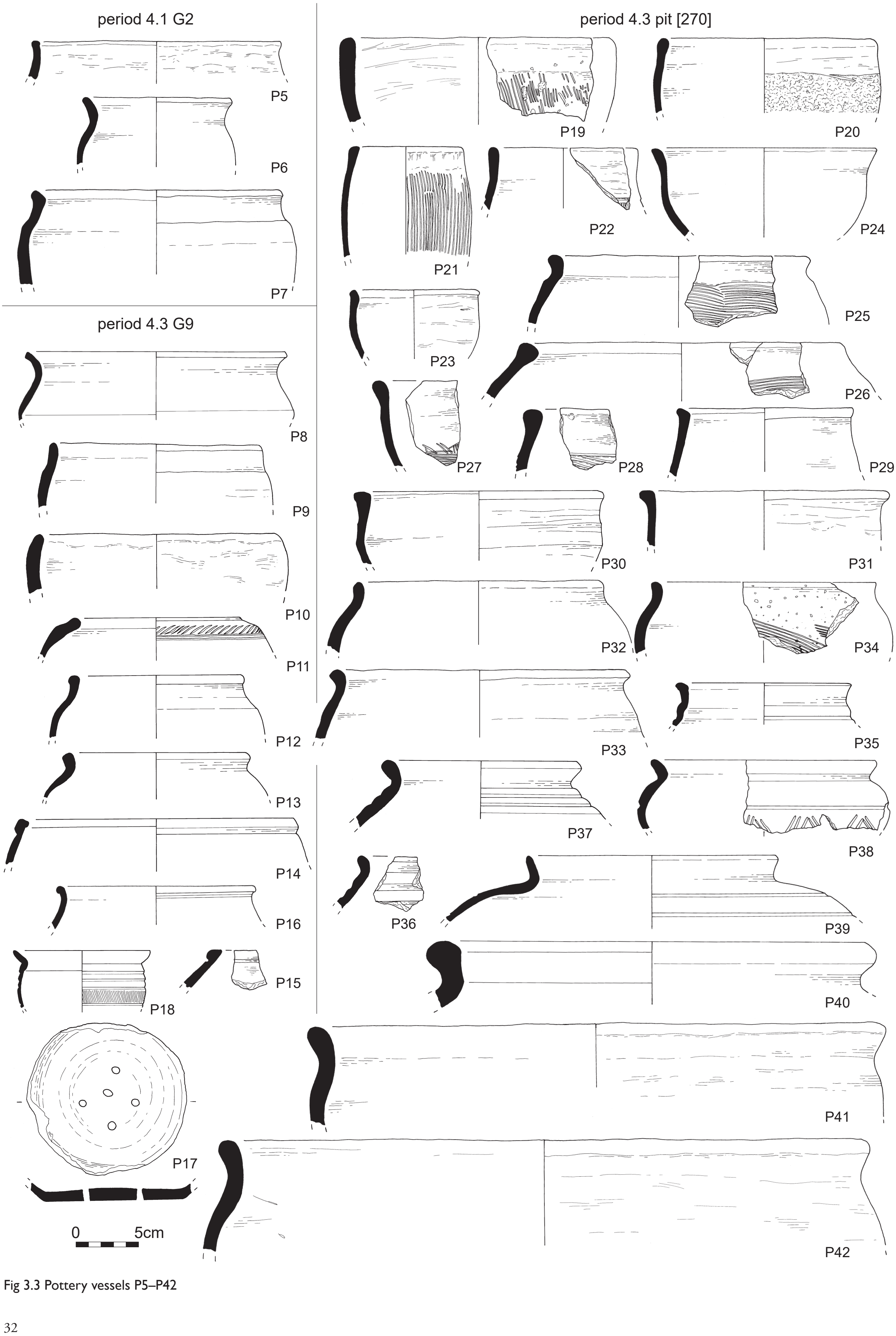

Fig 3.3 Pottery vessels P5–P42

(Table 3.5). Plain-rimmed jars (Thompson C3) may be plain or decorated with rough combing or furrowing (P9–P10 and P19–P23) and occasionally with stabbing or slashes on the shoulder (eg, P11). Some of the plain-rimmed forms have a very slight neck/shoulder (eg, P24), and there is a continuum between these forms and bead-rimmed/short-necked jars, which are by far the most common forms (P12–P15 and P25–P34); again, these forms are often combed or furrowed. Overtly Gallo-Belgic stylistic traits are a rarer component of the assemblage although a few examples of ripple-shouldered jars were recorded (P35–P37). In all but one case, these were associated with wheel-thrown manufacturing techniques. Other plainer wheel-thrown jars with well-defined necks are represented by a few examples (P16) as are some jars with everted rims (P32–P39). Several storage jars were recorded, ususally large, thicker-walled, versions of the most common bead-rimmed/short-neckedar form (P40–P42). Non-jar forms are fairly poorly represented. These include strainers made from jars (P17) as well as fragmentary examples of flagons, lids and platters (not illustrated). A single finely rouletted butt-beaker in an imported north Gaulish white ware fabric was also recorded (P18).

Form	ENV	EVE	ENV (%)	EVE (%)
Flagon: undifferentiated	3		2.8	0.0
Jar: undifferentiated	12	0.41	11.0	5.8
Jar: S-profile	2	0.17	1.8	2.4
Jar: plain profile (Thompson C3)	16	1.85	14.7	26.3
Jar: bead-rimmed (Thompson C1)	11	0.56	10.1	8.0
Jar: bead-rimmed/short-necked (Thompson C2)	27	1.86	24.8	26.4
Jar: pedestal (Thompson A)	1		0.9	0.0
Jar: necked	14	0.93	12.8	13.2
Jar: necked, ripple-shouldered (Thompson B2)	3	0.18	2.8	2.6
Jar: storage (Thompson C6)	7	0.28	6.4	4.0
Jar: strongly everted-rimmed	2	0.2	1.8	2.8
Jar/beaker: undifferentiated	1	0.09	0.9	1.3
Beaker: butt-beaker	2	0.33	1.8	4.7
Platter: undifferentiated	1		0.9	0.0
Lid	5	0.18	4.6	2.6
Strainer	2		1.8	0.0
Total	**109**	**7.04**	**100.0**	**100.0**

Table 3.5 Quantification by form of pottery from period 4, phases 2 and 3 (ENC1, ENC2 and refuse pit [270]) (ENV = estimated number of vessels; EVE = estimated vessel equivalent)

CATALOGUE OF ILLUSTRATED NON-FUNERARY POTTERY

PERIOD 1

P1 Open carinated bowl. Fabric FL4; pit [168]; OA1 (Fig 3.2).

PERIOD 2

P2 Finger-impressed cordon. Fabric FL5; ditch [123]; RD1 (Fig 3.2).

PERIOD 3: FROM THE FILLS OF PIT [100]; G20; OPEN AREA 1 (OA1)

P3 Necked jar. Fabric FL5 (Fig 3.2).
P4 Plain ovoid jar/cup. Fabric FL3 (Fig 3.2).

PERIOD 4

Phase 1: from the fills of ditch G2, Enclosure 1 (ENC1)

P5 Necked jar with surface rustication, possibly a residual Period 3 form. Fabric FL3; ditch [262] (Fig 3.3).
P6 S-profile jar. Fabric GL1; ditch [212] (Fig 3.3).
P7 Sinuous profile jar with a defined neck. Fabric QG1; ditch [223] (Fig 3.3).

Phase 3: from the fills of ditch G9, Enclosure 2 (ENC2)

P8 S-profile jar. Fabric Q2; ditch [219] (Fig 3.3).
P9 Plain-rimmed to slightly necked jar. Fabric GR1; ditch [209] (Fig 3.3).
P10 Plain-rimmed (Thompson C3) jar. Fabric QG1; ditch [209] (Fig 3.3).
P11 Plain- to slightly bead-rimmed jar with slash decoration on shoulder. Fabric QG1; ditch [219] (Fig 3.3).
P12 Bead-rimmed/short-necked jar. Fabric FL2; ditch [219] (Fig 3.3).
P13 Bead-rimmed jar. Fabric Q1; ditch [209] (Fig 3.3).
P14 Bead-rimmed jar. Fabric FL1; ditch [209] (Fig 3.3).
P15 Bead-rimmed jar. Fabric FL2; ditch [209] (Fig 3.3).
P16 Wheel-thrown necked jar. Fabric FL2; ditch [209] (Fig 3.3).
P17 Strainer base with large post-firing perforations. Fabric QG1; ditch [204] (Fig 3.3).
P18 Imported north Gaulish butt-beaker. Fabric NGWH; ditch [209] (Fig 3.3).

Phase 3: from the fills of refuse pit [270]; G15; Open Area 4 (OA4)

P19 Thick-walled plain-rimmed (Thompson C3) jar with furrowed decoration. Fabric FLQG1. (Fig 3.3).
P20 Plain-rimmed (Thompson C3) jar with furrowed decoration. Fabric FLQG1 (Fig 3.3).
P21 Plain-rimmed (Thompson C3) jar with vertical furrowed decoration. Fabric QG1 (Fig 3.3).
P22 Plain-rimmed to slightly necked jar. Fabric QG1 (Fig 3.3).
P23 Plain-rimmed jar with fine furrowed decoration. Fabric QG1 (Fig 3.3).
P24 Plain-rimmed jar with slight shoulder. Fabric FL2 (Fig 3.3).
P25 Bead-rimmed/short-necked jar with furrowed decoration. Fabric FL1 (Fig 3.3).
P26 Bead-rimmed/short-necked jar with furrowed decoration. Fabric FL1 (Fig 3.3).
P27 Bead-rimmed/short-necked jar with fine furrowed decoration. Fabric QG1 (Fig 3.3).
P28 Bead-rimmed/short-necked jar with furrowed decoration. Fabric QG1 (Fig 3.3).
P29 Bead-rimmed/short-necked jar. Fabric Q1 (Fig 3.3).
P30 Bead-rimmed/short-necked jar. Fabric FLQG1 (Fig 3.3).
P31 Bead-rimmed/short-necked jar with furrowed decoration. Fabric FLQG1 (Fig 3.3).
P32 Bead-rimmed/short-necked jar. Fabric FLQG1 (Fig 3.3).
P33 Bead-rimmed jar. Fabric FLQG1 (Fig 3.3).
P34 Bead-rimmed/short-necked jar with furrowed decoration. Fabric FLQG1 (Fig 3.3).
P35 Hand-made ripple-shouldered necked jar. Fabric Q1 (Fig 3.3).
P36 Ripple-shouldered necked jar. Fabric QG1 (Fig 3.3).
P37 Ripple-shouldered necked jar. Fabric GR1 (Fig 3.3).
P38 Everted-rimmed jar with diagonal tooled lines on shoulder. Fabric FLQG1 (Fig 3.3).
P39 Everted-rimmed jar. Fabric FL2 (Fig 3.3).
P40 Necked storage jar. Fabric FL1 (Fig 3.3).
P41 Necked storage jar. Fabric FLQG1 (Fig 3.3).
P42 Necked storage jar. Fabric FLQG1 (Fig 3.3).

PERIOD 5

Apart from a few undiagnostic Roman body sherds, the period 5 assemblage consists entirely of the 14 vessels from four cremation burials within CC1 (see Chapter 2.6). The four cremations appear to have fallen within two distinct episodes of interment: cremation burial pits [11] and [136] in the late 1st century AD; and cremation burials [225] and [238] in the first half of the 2nd century AD.

Cremation burial pits [11] and [136] contained apparently unurned cremations, both accompanied by similar suites of accessory vessels. Both were buried with Camulodunum 14 platters and globular beakers in local coarse sandy fabrics; only one of the burials, [11], was accompanied by a flagon. The two later cremation burials, [225] and [238], were of different character. Although the beakers and flagons are broadly similar to types from [11] and [136], the two groups can be distinguished by the use of grey ware jars as cremation urns, and of samian accessory vessels.

The variation between the two groups appears to be partly chronologically determined. All the vessels in [11] and [136] are of post-Conquest 1st-century AD date, the platters in particular probably pre-dating *c* AD 80. In contrast, all the vessels in [225] and [238] are in keeping with an early/mid 2nd-century date of deposition. The possible similarity of the cremation urn in [225] to north Kent black-burnished ware 2 (BB2) fabrics and the acute lattice decoration on one of the accessory beakers from [238] may suggest that both burials post-date *c* AD 120.

DISCUSSION

NEOLITHIC

Only two sherds of Early Neolithic pottery were found in a contemporary feature. This pattern of rather sporadic activity with single or very small groups of pits is characteristic of the Early Neolithic. Many such pits contain larger volumes of pottery and although vessels tend to be fragmented there is some evidence that pits were dug with the express purpose of depositing cultural material (Thomas 1999, 64–74). Such deposits are therefore often interpreted as highly meaningful acts, perhaps marking the end of a phase of domestic occupation. It is debatable, however, given the tiny size of the sherds, whether the current assemblage can be viewed in such a way. It is worth noting, though, that residual Early/Middle Neolithic sherds are distributed sparsely across the site. The lack of stratigraphic associations and the fragmentary nature of this pottery make it difficult to draw any firm conclusions about date, but the presence of both carinated forms and possible Peterborough Ware might suggest repeated phases of occupation that made little impact on the surviving archaeological record. Nearby excavations at Kemsley distributor road (Mackinder & Blackmore 2014, 6–7) also uncovered evidence of Neolithic pits, suggesting wider exploitation of the landscape during this period.

LATER BRONZE AGE

The high incidence of intrusive material in stratified deposits of Middle and Late Bronze Age date makes it difficult to assess the composition of the pottery groups. It is clear, however, that diagnostic Deverel-Rimbury pottery and very coarse flint-tempered fabrics are lacking, which might suggest that the funerary monument was located some distance from domestic activity during the Middle Bronze Age.

Although the stratified Late Bronze Age assemblage is relatively small and fragmentary, it is perhaps indicative of increased settlement activity in the general vicinity of the site. The pit group appears to consist purely of flint-tempered sherds (discounting probable intrusive Late Iron Age/Early Roman sherds). The few feature sherds are relatively simple and generally seem characteristic of plain ware PDR assemblages, dated to *c* 1150–800 cal BC (Needham 1996). Although a tiny component of decorated PDR pottery was noted in the much larger assemblage from the adjacent site at Kemsley Fields, the general impression from the pottery assemblage was of a decline in activity over the course of the Late Bronze Age (McNee 2006, 42). This also seems to fit the pattern of many of the sites from the central part of the High Speed 1 route, where decorated assemblages, dating after *c* 800 cal BC, were absent (Morris 2006, fig 3.2, 71).

LATE IRON AGE/EARLY ROMAN SETTLEMENT ACTIVITY

Chronology and assemblage composition

The very small group of pottery from the original cut of ENC1 is of slightly different character from the rest of the assemblage. However, apart from a much larger number of flint-tempered sherds, which appear to be at least partly residual, proportions of other tempered wares are not too dissimilar to the assemblages from later phases, the principal differences being a lower proportion of grog-tempered wares and slightly higher numbers of glauconitic vessels. Crucially, though, the material from this earliest phase of the enclosure completely lacks recognisably Roman fabrics and the only diagnostic feature sherds are sinuous jars. There has been some debate as to the date range of glauconitic S-profile jars, which are a feature of Middle/Late Iron Age assemblages in the Thames estuary region, including Stone Castle Quarry, Farningham Hill and Keston (Detsicas 1966; Couldrey 1984; 1991). Generally speaking, these forms are thought to have originated before the Aylesford–Swarling tradition and there is now growing evidence to show that they first occurred reasonably early in the Middle Iron Age (Morris 2006, 68–9; Champion 2007, 297; Brown & Couldrey 2012, 212–15).

In the period 4, phase 1 assemblage an S-profile jar form in a glauconitic fabric (Fig 3.3, P6) was stratified alongside quite a number of grog-tempered sherds, and another well-burnished jar with a sinuous profile was in fact made in a grog-tempered fabric (Fig 3.3, P7). There is comparatively little solid evidence for the date of the emergence of grog-tempering in Kent and there are some instances where it was used in the Middle Iron Age, particularly in southern Kent (Morris 2006, 70). However, more generally, it tends to be associated with the Late Iron Age Aylesford–Swarling tradition. During recent road development work in north-west Kent a group containing both grog-tempered wares and glauconitic S-profile jars was associated with a class J potin and with radiocarbon dates that were interpreted as implying an earlier 1st-century BC date of deposition (Brown & Couldrey 2012, 223). In the current assemblage, the continuity in land use between phases 1 and 3 should also be noted when considering the dating of the respective pottery groups. The fact that the enclosure was recut twice on a similar alignment suggests continuous activity stretching into the Early Roman period and perhaps argues in favour of a Late Iron Age date of inception.

There were no significant differences in fabric composition or in the range of forms from the recut of ENC1, ENC2 and the refuse pit [270]. Significantly, the assemblages assigned to phases 2 and 3 both contained similar proportions of Roman fabrics. As every intervention through ENC1 also had an intercutting relationship with later ditch ENC2, it is possible that the Roman material in the earlier ditch was introduced intrusively. However, small numbers of Roman sherds were assigned to ENC1 quite consistently along the length of the ditch and there are actually a slightly greater number of Roman sherds assigned to phase 2 than to phase 3. Although ENC1 may originally have been recut in the pre-Conquest period, the similarity of the pottery assemblages suggests that it was filled in the Early Roman period and that ENC2 was cut and then filled within a few decades at most. There is no evidence of any diagnostic Flavian pottery from the settlement features, indicating that the enclosed settlement phase had ended by *c* AD 70.

Deposition

Fairly large volumes of pottery were recovered from the enclosure ditches and refuse pit. Given that few other contemporary features were identified within the excavation area, the assemblage provides important evidence that these enclosures were probably associated with domestic activity in the vicinity. Table 3.6 shows that the pottery from the refuse pit, [270], was more abundant than that from the ditches and had a much larger average sherd weight. This probably implies that the pottery from the pit arrived through much more direct processes of deposition. However, it is also worth noting that the pit, like the enclosure ditches, generally produced individual broken sherds rather than complete or partially complete vessels, suggesting that it was secondary dump containing material transferred from its original context of deposition.

	Sherd count	Weight (g)	ENV
Refuse pit [270]	561	9747	506
Enclosure 1	289	2316	237
Enclosure 2	493	3996	434

Table 3.6 Comparison of assemblage size from the three main pottery-producing features (ENV = estimated number of vessels)

Fabric choices

Thompson recognised that tempering traditions in Kent were usually local in their distributions, and plotted some basic distributions of fabric types (Thompson 1982, map 2, 7). The quantity of pottery data from Kent has vastly increased since this research was published, although the evidence continues to suggest quite dramatic differences in tempering choices across relatively small areas of territory (eg, Booth 2011, 298).

In the current assemblage the most important ware groups are flint-tempered and sparsely grog-tempered fabrics (often containing some flint and quartz). In this respect the assemblage seems to reflect a greater affinity with sites to the east than with those to the west. Flint-tempering is, for example, very characteristic of assemblages east of the Medway. At Highstead, flint-tempered and grog-tempered wares were the only important fabric types. There was a clear trend for decreasing amounts of flint and increasing quantities of grog across the subphases of Late Iron Age and Roman activity (Couldrey & Thompson 2007, table 14, 182). The current site seems to be fairly close to the western limit of distribution for flint-tempered wares, however, as they were hardly observed at all on the route of the West Malling to Leybourne bypass *c* 20km to the south-west (Jones 2009, 18). The rather low levels of glauconitic and shelly wares are also of some note. There is evidence that glauconitic wares were produced in some quantity in the Medway valley and specifically probably in the Maidstone area, whilst shelly wares are typical of sites in the western Thames estuary and in south Essex (Pollard 1988, 31; Booth 2006, 173). Some of these tempering choices were undoubtedly the result of geology and local availability of different resources but they may also point to different cultural traditions and trading relationships.

Vessel form in settlement and cremation groups

Whilst two of the cremations almost certainly post-date the enclosures, the other two ([11] and [136]) probably overlap with the latest settlement activity. It is therefore interesting to note how the funerary pottery has been selected from the wider repertoire of available vessels. In common with most lower-status rural assemblages, the settlement groups are dominated by jar forms. On the whole these are not the classic, cordoned, wheel-thrown jars associated with the Aylesford–Swarling tradition of cremation burial. Instead they tend to be simpler handmade forms which developed from indigenous Middle Iron Age potting traditions, albeit incorporating some 'Belgic' influences. The fact that the two earliest cremations are apparently unurned is of some interest and could reflect a localised belief that domestic handmade pots were inherently unsuitable for interring human remains.

As is generally the case, the accessory vessels associated with the burials were forms used for drinking and dining, reflecting beliefs about providing nourishment for the deceased in the afterlife. Although individual examples of beakers and platters are present in the settlement assemblage, they are very rare. This seems to suggest that Gallo-Roman styles of drinking and dining may have been adopted much more fully for conspicuous public events such as funerals than in day-to-day life. Severe post-depositional abrasion makes it impossible to determine whether any of the vessels were worn through use, but the rarity of these forms in the general assemblage suggests that vessels are more likely to have been procured specially for funerals rather than being drawn from the possessions of the dead or their families. It was suggested that this was also the case in assemblages from cemeteries at Pepper Hill and the A2 excavations (Booth 2009, 23; Biddulph 2012, 444). Recent correspondence analysis of pottery data drawn from sites in south-east England, France and Belgium indicates that this is a widespread pattern, lower-status sites having far higher frequencies of fine or tableware forms in their cemetery groups than in nearby settlement assemblages (Biddulph 2018).

The cremations were all associated with two to four accessory vessels but the majority of these are in local coarse ware fabrics. In general, higher-status burials tend to be defined by traits such as a very high proportion of samian ware or accompanying metalwork or glass vessels, rather than by sheer numbers of ancillary vessels (Biddulph 2005, 34). The settlement assemblage appears to suggest an ordinary rural community, although it is not necessarily the case that the deceased lived in the immediate vicinity. It has been suggested that a high proportion of platters is a high-status characteristic (Biddulph 2012, 441–6). Although each of the burials from Sittingbourne includes a platter, overall locally produced beakers are the most common vessel type and these are, conversely, associated with lower-status burial groups (ibid). This highlights the fact that it is difficult to draw conclusions about status from individual data sets of vessels drawn from very small cemeteries.

3.3 CERAMIC BUILDING MATERIAL

Sarah Porteus

A total of 294 fragments of ceramic building material (CBM), weighing *c* 29kg, were examined from 21 contexts together with a small amount of unstratified material. The material is predominantly of Roman date with a single fragment of possible late medieval or early post-medieval peg tile. The majority of the contexts yielded small quantities of CBM, with only two producing more than 5kg in weight: [197] (12.5kg) and [266] (8.2kg). All the material is fragmentary. Brick, imbrex, tegula and flue tile are all represented, while 28% (by count) of the assemblage is of unidentifiable form (Tables 3.7–3.9).

The majority of material is in a similar fabric (fabric 1), suggesting a possible local source. The small quantities of other fabrics that are present are more likely to have been brought to the site from sources further away. Percentages of fabric types are given in Table 3.7. Close to 80% of the material by weight was identified as fabric 1 – a clean orange fabric with sparse coarse quartz inclusions containing variable quantities of fine sand with some examples containing very little sand. Fabric 3 is a poorly mixed fine orange fabric with pale cream silt streaking. The basic clay types for fabrics 1 and 3 are similar and may have the same origin. A small quantity of abraded material is represented by MOL fabric 2454, a fine pale creamy yellow fabric, possibly produced at Eccles and found also in London and Colchester.

Flue tiles are represented by fabric F1, broadly similar to fabric 1 though a fine micaceous scatter is visible in fabric F1 that is not observed in fabric 1. Approximately 13% of the assemblage is vitrified, meaning identification of fabric is not possible. The greatest quantity of vitrified and heat-affected material was recovered from saltern fills [197] and [266]. Some material from these contexts was heat-affected on broken surfaces, which suggests that the material has been reused. Dates for fabric 1 have not been established beyond the broad Roman bracket. The MOL fabric 2454 and buff fabrics are believed to have a pre-Boudican (before AD 60) origin (Betts 1992). All the material from site is believed to have been reused and so relates to use at a later date.

Fabric	Count	Count (%)	Weight (g)	Weight (%)
1	222	76	23296	79
3	11	4	962	3.5
MOL 2454	13	4.5	692	2.5
Buff?	4	1	406	1.5
Vitrified	38	13	3768	13
F1	5	1.5	142	0.5
Total	**291**	**100.0**	**28626**	**100.0**

Table 3.7 Roman ceramic building material fabrics by count and weight

Form	Count	Count (%)	Weight (g)	Weight (%)
Brick	101	34.5	18436	62
Imbrex	18	6	902	3
Tegula	86	30	8064	28
Roller-stamped flue tile	2	0.5	108	1
Combed flue tile	3	1	34	<0.5
Fragments	83	28	1722	6
Total	**291**	**100.0**	**28626**	**100.0**

Table 3.8 Summary of Roman ceramic building material by form

BRICK

Brick accounts for approximately 35% (by count) of the assemblage. All the bricks are abraded and fragmented, so that brick sizes could not be identified. There are only three fragments in MOL fabric 2454 and three fragments in the possible buff fabric. Partial signature marks were observed on four brick fragments – two bricks from [266] and two from [248] – consisting of arcs drawn into the upper surface on one edge. Mostly only a single arc is visible. A single brick from [293] had a pierced nail hole in one corner; the hole was unabraded and may have served no function.

ROOFING TILE

Tegula is represented only in fabric 1, with some vitrified fragments. All tegula fragments are fragmentary and abraded.

Context no	Fabrics present	Forms present	Count	Weight (g)
[19]	1	tile	1	70
[27]	1	tile	1	8
[56]	1	brick	1	76
[117]	1	flake	1	6
[171]	1	flake	3	8
[176]	1	tile	1	20
[189]	2	peg tile (medieval?)	1	44
[197]	1, MOL 2454, F1, buff?, V	combed flue tile, brick, imbrex, tegula, flakes	150	12548
[199]	1, V	tile, imbrex, brick	3	344
[215]	1	tile	1	62
[218]	1	tile, brick	2	216
[236]	1	tile	1	6
[248]	1, V	tegula, brick, tile	35	4688
[254]	1, buff?, V	tegula, brick, tile	3	520
[263]	1, 3	brick, flake	2	224
[266]	MOL 2454, 1, F1, 3, V	brick, roller-stamped flue tile, tegula, imbrex, tile	63	8290
[267]	1	tile	1	16
[274]	1	brick	1	276
[275]	1	imbrex, tile	2	186
[293]	1	brick	2	778
Unstratified	1, V	brick, tegula, imbrex, tile	19	924

Table 3.9 Summary count and weight of ceramic building material by context with form and fabric types

A few square flanges have been identified. It is most likely that the fragments were reused as part of the hearth structure in [197] and [266]. A single arc signature mark was identified on one small fragment from [266].

IMBREX

Imbrex is represented only by abraded small fragments.

FLUE TILE

Roller-stamped flue tile from [266] is in die 12 (Betts et al 1994) and is known from Eccles, Orpington (Crofton Road) and Lullingstone in Kent, various sites in London as well as sites in Buckinghamshire and Gloucestershire (I Betts, pers comm). A very small, abraded fragment of combed flue tile comprising three conjoining fragments was recovered from [197].

SUMMARY

The majority of the CBM is of Roman date though no close date can be given. Where the CBM formed part of saltern [196] it appears to have been reused, probably taken from another structure in the area. The presence of fragments of flue tile and a range of fabrics suggests the material had originally been used in a heated, high-status, Roman structure.

3.4 FIRED CLAY

Trista Clifford

A small assemblage of 419 fired clay fragments weighing just less than 11.5kg was recovered from 39 separate contexts. It is characterised in Tables 3.10 and 3.11. The aim of the analysis was to identify the form and function of the burnt clay assemblage, in order to illuminate the possible range of activities taking place on the site.

The fragments were examined with the naked eye for diagnostic characteristics indicating form and/or function, and recorded on pro forma archive sheets. The primary characteristics indicating function used in the analysis include wattle impressions, smoothed surfaces, diagnostic piercings or being part of a known object form, with the presence of at least two diagnostic features informing identification.

Ten fabric groups were devised, described below. Table 3.10 gives an overview of the entire assemblage by fabric type.

F1 Sparse fine sand with no visible inclusions.
F2 Medium to fine sand with occasional iron-rich inclusions of less than 4mm, occasional organic voids.
F3 Fine sand with very frequent longitudinal organic voids.
F4 Sparse, fairly coarse sand with frequent organic voids and occasional iron-rich veins.
F5 Abundant medium sand.
F6 Medium to coarse sand with occasional iron-rich inclusions of less than 4mm, occasional organic voids and sparse flint inclusions of *c* 3mm.
F7 Sparse, fine sand with grog inclusions up to 9mm, poorly mixed.
F8 Medium to fine sand with sparse iron-rich inclusions of less than 4mm, occasional organic voids and occasional grog of *c* 4mm.
F9 Fine sand temper with calcined flint inclusions of less than 2mm.
F10 Sparse fine sand tempered with moderate organic temper (voids) and occasional calcareous sedimentary stone inclusions up to 2mm.

The mean fragment weight (MFW) is 27.4g, with moderate to high abrasion apparent on a high proportion of the assemblage. Although the overall MFW is quite high, it ranges from 4g for period 2 contexts up to 109.3g for period 3 contexts. However, the most significant groups in terms of percentage derive from features of periods 4 and 5, most notably from those contexts associated with the period 5 saltern, [196]. Analysis of the assemblage is arranged by chronological period, with the most diagnostic groups discussed individually thereafter.

PERIOD 1

OPEN AREA 2 (OA2): PIT FILLS [422] AND [424]

Only 1% of the assemblage came from pit fills of this date. The fragments are largely undiagnostic although one exhibits two parallel wattle marks of 12.5mm and 16.1mm diameter with two conjoining flat surfaces, indicating they were part of a structure. These may be intrusive, but it is worth noting that the fabrics 4 and 5 from which they are made are also solely confined to these period 1 features.

PERIOD 2

RING-DITCH 1 (RD1): DITCH FILLS [47], [85], [127] AND [170]

Period 2 features produced only a very small amount of material (7 fragments weighing 28g) which was highly abraded and undiagnostic of form or function. It is likely to have been redeposited from other features.

PERIOD 3

OPEN AREA 1 (OA1): UPPER PIT FILL [102]

This feature produced two separate loom weights of pyramidal form, RF<1> and RF<9> (Fig 3.4, no 3). This form is characteristic of the Late Bronze Age and occurs fairly frequently across south-east England. Neither loom weight is complete, although both display lateral perforations of 22mm and 14mm respectively. A similar weight was recovered from

	Period										
Fabric	**1**	**2**	**3**	**4**	**4.1**	**4.2**	**4.3**	**5**	**6**	**Unstratified**	**Total**
F1				1216	22	238	114	5810			**7400**
F2		14	48	574	8	366	260	1728	30		**3028**
F3										16	**16**
F4	78										**78**
F5	40										**40**
F6		14									**14**
F7									104		**104**
F8			506					150			**656**
F9						30					**30**
F10			102								**102**
Vitrified								18			**18**
Total	**118**	**28**	**656**	**1790**	**30**	**634**	**374**	**7706**	**134**	**16**	**11486**

Table 3.10 Overview of fired clay assemblage by period and fabric type, quantified by weight (g)

	Period										
Type	**1**	**2**	**3**	**4**	**4.1**	**4.2**	**4.3**	**5**	**6**	**Unstratified**	**Total**
Briquetage, container										16	**16**
Briquetage, supports								1832			**1832**
Briquetage, structural								1442			**1442**
Briquetage, miscellaneous							4	2458			**2462**
Weight, pyramidal			608					142			**750**
Weight, triangular				812							**812**
'Brick' or slab				394							**394**
Wattle impression	40						106	70			**216**
Perforated slab						30					**30**
Utilised				50		36			104		**190**
Undiagnostic	78	28	48	534	30	568	264	1762	30		**3342**
Total	**118**	**28**	**656**	**1790**	**30**	**634**	**374**	**7706**	**134**	**16**	**11486**

Table 3.11 Fired clay by period and form, quantified by weight (g)

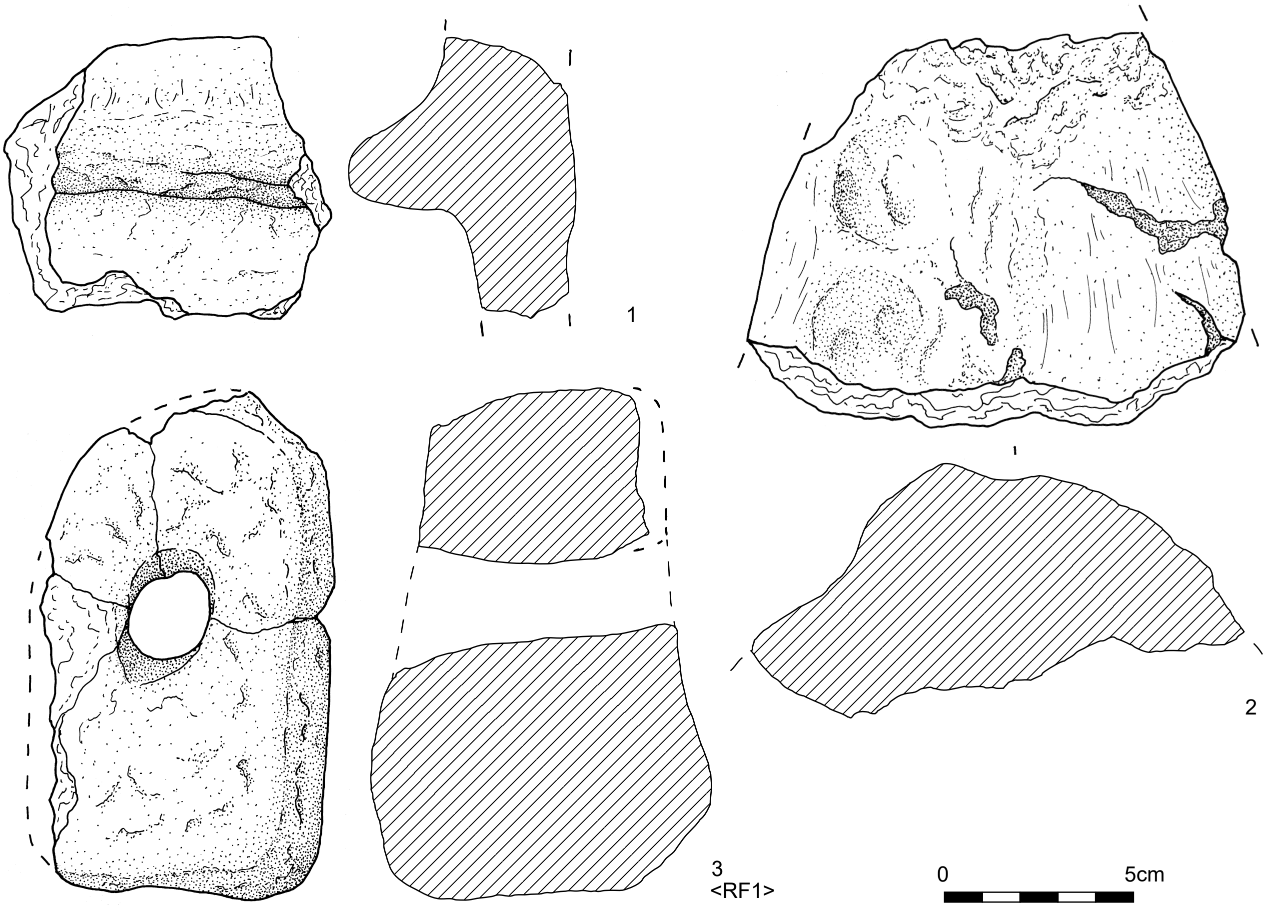

Fig 3.4 Briquetage and fired clay loom weight, nos 1–3

Dartford (Poole 2011a, 264). It is generally accepted that these objects were used as weights (Barford & Major 1992, 117) although it has been suggested that they could also have been utilised as oven bricks or in saltworking; Poole (2011a) notes the resemblance of such weights to pedestals from kilns and salt-evaporation hearths. RF<1> exhibits an area of buff to pale pink bleaching on the bottom surface which may indicate contact with brine, although whether this occurred during primary use or subsequently is not necessarily apparent.

PERIOD 4

OPEN AREA 4 (OA4): PIT FILLS [251], [267], [268] AND [269]

The most notable finds from these pit fills are three triangular loomweight/oven brick fragments, RF<3>, RF<6> and RF<7>, and several fragments of possible oven brick or firebar. The triangular form is typical of Iron Age weights and is widespread in south-east England. The current examples are comparable to those from Danebury (Poole 1984, 404–5) and Ashford (Sudds 2006, 69). None survives to a sufficiently large extent to be confident of assigning a type but RF<6> is probably a Danebury Type 1 (Poole 1984, 403), having a probable perforation evident where each apex has broken off. This, the most complete example, would have had a weight of *c* 1050g, which falls within the lower range of complete Type 1 examples.

This form of weight is associated with textile production, although this interpretation has been subject to some debate. Poole (1995), for example, cites use as oven bricks or other structural use as possible alternatives. It is worth noting that while the other two weight fragments appear more typical, RF<6> exhibits an area of white scale and pinkish-buff coloration more usually associated with exposure to salt water. It may be that the object was utilised in the salt-production process although, as in the case of the pyramidal weight previously described, this could have been either its primary or its secondary function.

Well-made 'oven brick' fragments consisting of the corner of one object and fragments from at least one other came from pit fill [251]. No complete dimensions are measurable from the object and it is probably a portable oven brick or firebar.

ENCLOSURE 1 (ENC1): DITCH FILL [274]

This group contained a small fragment of a perforated clay plate with two partially remaining perforations of 16.6mm and 13.8mm diameter. A recent extensive review of these somewhat enigmatic Late Bronze Age objects concluded that they were not related to salt production, but rather with cooking and boiling (Champion 2014). Unfortunately, this small residual fragmentary assemblage adds little to the discussion.

PERIOD 5

OPEN AREA 5 (OA5): SALTERN [197], [248] AND [266]

The largest proportion of fired clay material was derived from various contexts associated with the salt-working hearth. These produced over 7.3kg of material with a MFW of 39.4g. Only a small amount, *c* 0.5kg, was recovered from other features of this date. Table 3.12 provides an overview of the period 5 fired clay in its entirety. Classification of the briquetage assemblage follows Lane & Morris (2001, 374) in grouping material into four classes: containers, supports, structural material and miscellaneous material. Morris proposes a chronological explanation for differing proportions of each class, reflecting a change in salt-making technology (ibid, 376). The presence of large quantities of both supports and structural material is indicative of the use of oven technology (indirect heat source) rather than open hearth salt-production, which would involve a direct heat source, and therefore less structural material. The large miscellaneous category potentially hides many less diagnostic fragments of support and structural material.

Containers

The almost complete absence of container briquetage from the site as a whole and from the oven feature in particular (Table 3.12) is somewhat difficult to interpret. Evidence from elsewhere in north Kent suggests that the two separate stages of salt production, the initial evaporation of brine over heat and the subsequent drying and packing of crystallised salt, may well have occurred in geographically distinct areas (Poole 2011b, 139).

While the oven features can be interpreted as performing the former function, in both Kent and other areas of the south-east containers are differentiated by function: evaporation troughs and specific transport/refining vessels are clearly identifiable. It is reasonable to assume that had ceramic evaporation pans or troughs been in use some evidence of this would remain. The lack of container vessels on salt-working sites is not without precedent. Excavations of Roman salt pans at Funton Creek, to the north of Sittingbourne (Fig 2.6), also failed to produce container briquetage. Here the absence was interpreted as a result of the saltern technology in use, which involved the salt water being contained in large open pans built directly from the ground surface and heated with a fire surrounding the perimeter walls (Detsicas 1984). While this method was possibly used initially at Kemsley, a noticeably different technology was employed later; no other briquetage classes were recorded at Funton Creek, whereas several support objects used to stabilise troughs were recovered from Kemsley.

The lack of any such vessel fragments elsewhere has led to the suggestion that containers made of other materials, such as lead, may have been in use instead, particularly in the later Roman period (Lane & Morris 2001; Bradley 1992, 44). It is interesting to note that a second saltern at Funton Creek is described as having globules of lead embedded in the ash floor, as well as vessels interpreted as 'salt moulds' (Miles 1965, 261). These globules may have been evidence for the use of lead containers for evaporation. From the short description given, it is probable that both evaporation and refining vessels were in use here; likewise at Chidham, where two distinct vessel types were concentrated around different areas of the hearth (Bradley 1992).

An equally possible explanation is that the saltern was in use for a short period of time and the salt produced was transported from the site within intact evaporation pans rather than specific transport vessels, most probably to an inland site nearby, for further refining.

Type	% of period 5 assemblage
Briquetage, container	0
Briquetage, supports	23
Briquetage, structural	19
Briquetage, miscellaneous	32
Weight, pyramidal	2
Wattle impression	1
Undiagnostic	23
Total	**100.0**

Table 3.12 Characterisation of the period 5 fired clay assemblage (percentage of assemblage by weight)

Supports

Stabilisers in the form of clips made from wet clay were used as supports, being wedged between troughs to prevent movement during evaporation. Two different types are apparent at Kemsley, with parallels at Morton Fen in Lincolnshire (Lane & Morris 2001, fig 133, 13, 14). Both types exhibit angled indentations where they rested against either the rim or base of the container. Two examples of type 1 (Fig 3.4, no 1, [266]) have T-shaped sections and a flat, smoothed outer surface indicating they were squeezed between the base of a container and the top of a support, whilst the other type (type 2; not illustrated) are simple bridging clips which would have stabilised two adjacent rims. The form of type 1 suggests that the containers would have had slightly curved, rather than sharply right-angled, bases.

One definite and one probable pedestal fragment were also recovered. The most diagnostic fragment comes from a large, conical pedestal with a smoothed outer surface exhibiting two thumb impressions (Fig 3.4, no 2, [266]). The fragment makes up approximately one-third of the diameter of the original, which would have had a diameter at the base of *c* 195mm. Both the original base and the apex are now missing, so an estimate of height is not possible. This substantial example is fairly similar in form to Morris's PD16 (Lane & Morris 2001, fig 115), if potentially a little larger.

Structural briquetage

Fragments from at least three separate clay slabs came from [266]. Thickness ranges from 37mm up to 63mm. Two examples in F1 are well made with smoothed parallel surfaces. One has a right-angled corner and may possibly be a 'brick' support. The other is much more roughly made in F2 with a finger-smoothed surface which exhibits a typical white 'salt skin' characteristic of contact with brine. The difference in manufacture suggests this may have been part of the wall or floor of the oven rather than a pre-formed slab on to which the pedestal was placed to raise the container above the heat source. The presence of small fragments of salt-affected daub with one or more wattle impressions is tentative evidence of a superstructure of some description.

It is also worth noting here that the large quantity of CBM excavated from the feature, a great proportion of which had been directly in contact with heat causing vitrification, clearly also had a structural function alongside the briquetage objects, the larger tiles perhaps used as slabs to hold troughs above the heat source.

Miscellaneous briquetage

Miscellaneous material constitutes 32% of the utilised fired clay. Almost all the material placed within this category exhibits some evidence of utilisation during salt production, most commonly one or more flat surfaces and/or salt skin, which probably derives from the structure of the salt oven. Small amounts of greenish vitrified material are also present. It is likely that a number of smaller or fragmentary objects, particularly support props or clips, are also hidden unidentified within this catch-all class.

Interpretation of the salt-working features

Despite the isolated nature of the excavated features it is possible to provide some brief observations on the nature of salt working at Kemsley. The pale buff clay patches observed in the base of the depressions most probably indicate an initial phase of salt working similar in nature to that at Funton Creek, the salt water having created the characteristic salt colours evident in these discrete areas.

The presence of a charcoal layer overlying the buff clay in the central depressions indicates this was where the fire/source of heat for evaporation was located during a second phase of use. Above this an arrangement of slabs and pedestals, probably including reused tile and stone, would have supported the evaporation troughs in a similar manner to the postulated oven at Cowbit, Lincolnshire (Lane & Morris 2001, fig 22). Walls either side of the oven, formed from fired clay, reused tile and cobbles, would have created a partial enclosure which served to regulate the internal temperature whilst allowing evaporated water to escape from the open top of the oven. Briquetage evidence in the form of both structural slabs and pedestal/clip supports strongly suggests that troughs of some description were used despite the lack of ceramic vessels. This, together with the arrangement of paired and walled parallel rectangular depressions is indicative of a saltern structure rather than of a simple hearth (ibid).

3.5 GEOLOGICAL MATERIAL

Luke Barber

The excavations recovered 21 pieces of stone, weighing 12.34kg, from six contexts.

The fills of RD1 produced the earliest dated stone, yielding unworked pieces of weathered Lower Greensand chert, a stone type likely to have been naturally transported to the area from its outcrops to the south. The only other prehistoric context from which stone was recovered was Late Bronze Age posthole [152], which contained a flattened cobble fragment of fine-grained, grey, non-calcareous sandstone/quartzite (RF<2>) that may have been utilised as a polishing stone.

Roman deposits associated with the saltern, [196], produced the bulk of the assemblage. Fill [197] contained small pieces of Lower Greensand carstone (42g) and a calcareous concretion (98g), none of which appear to be modified by man in any way. Wall [248] of the hearth contained ten large unshaped and weathered pieces of glauconitic Lower Greensand (9.9kg) and two pieces of weathered Lower Greensand carstone (2.1kg).

3.6 ANIMAL BONE

Gemma Ayton

The small animal bone assemblage contains just 272 fragments from eight contexts, the majority of which are assigned to period 4 (Late Iron Age/Early Roman). The assemblage is in a poor state of preservation and includes many small, unidentifiable fragments. The bone was recovered by hand collection only from pit and ditch fills, with 241 fragments deriving from Late Iron Age/Early Roman refuse pit [270]. The majority of the bone is identified as cattle and sheep/goat; pig, horse and red/fallow deer are present in small numbers. The identifiable assemblage contains both meat-bearing and non-meat-bearing bones, which are likely to have derived from domestic waste.

3.7 CREMATED BONE

Lucy Sibun

Burnt human bone was recovered from nine contexts. One was dated to the Middle Bronze Age (period 2; [407]) and the remaining eight to the early–mid Roman period (period 5; [12]/[16], [137], [145], [230], [239] and [241]/[243]). Recording and analysis of the bone followed the procedures outlined by McKinley (2004a). Age estimations were carried out with reference to Bass (1987) and Buikstra & Ubelaker (1994). Age estimations were possible only as 'adult' (A). Sex was estimated from the sexually dimorphic traits of the skeleton (Buikstra & Ubelaker 1994). The results of analysis are tabulated in Tables 3.13 and 3.14 and are summarised below by phase.

PERIOD 2: MIDDLE BRONZE AGE

A single unurned cremation burial, [407], was dated to this period. It was recovered from subcircular pit [406], located in the centre of RD1. The cremation deposit was excavated in spits in the field and then processed as an environmental sample, with sieve fractions of <4mm, 5–8mm, 9–20mm and 21–30mm presented for analysis.

DEMOGRAPHIC AND PATHOLOGICAL DATA

This burial appears to contain the remains of single adult based upon fragment size alone. Unfortunately, it was not possible to estimate age more precisely. The assemblage does not contain any sexually dimorphic fragments and no pathological lesions were noted.

Context no	Fragment size (mm)	Weight per skeletal element (g)					% of whole assemblage	Total weight (g)
		Skull	Axial	Upper limb	Lower limb	Unidentified		
[407]	0–4					26.1	7.6	**342.5**
	5–8	12.7	6.2	28.0	37.5	55.6	40.8	
	9–20	56.9	9.9	34.4	23.6	14.8	40.8	
	21–30	12.4	0.9	17.1	6.4		10.7	
% of identifiable material		33.3	6.9	32.3	27.4			

Table 3.13 Summary of results from the analysis of the Middle Bronze Age cremation burial

Context no	Fragment size (mm)	Weight per skeletal element (g)					% of whole assemblage	Total weight (g)
		Skull	Axial	Upper limb	Lower limb	Unidentified		
Cremation [12]/[16] (pit [11])	0–4					62.8	7.90	789.8
	5–8	21.9	14.6	13.6	14.8	122.8	23.8	
	9–20	58.6	73.5	106	87.3	50.3	47.6	
	21–30	18.7		50.0	94.9		20.7	
% of identifiable material		17.9	15.9	30.6	35.6			
Pit fill [137] (pit [136])	0–4					8.9	7.3	121.9
	5–8	12.9	4.6	8.2	7.8	36.2	57.2	
	9–20	3.5	4.3	6.4	13.6	15.5	35.5	
% of identifiable material		26.8	14.5	23.8	34.9			
Cremation [145] (pit [136])	0–4	4.2				43.2	5.6	848.3
	5–8	22.8	10.1	18.3	29	90.4	20.1	
	9–20	101	67.0	173.3	173.1	52.4	66.8	
	21–30			63.5			7.5	
% of identifiable material		19.3	11.6	38.5	30.5			
Cremation [230] (pit [225])	0–4	1.2			18.6		17.5	113.1
	5–8	4.6	4.2	6.3	7.8	37.7	53.6	
	9–20	0.4	8.7	2.7	5.6	13.9	27.7	
	21–30				1.4		1.2	
% of identifiable material		10.1	21.0	14.6	54.3			
Pit fill [239] (pit [238])	0–4					9.1	31.6	28.8
	5–8	1.2	2.0		1.9	6.0	38.5	
	9–20	2.4	1.5	1.3	3.0	0.4	29.9	
% of identifiable material		27.1	26.3	9.8	36.8			
Cremation [241] (pit [238])	0–4					24.0	39.5	60.7
	5–8	2.8	2.6			22.7	46.3	
	9–20	1.4	2.2	0.9	0.4	3.7	14.2	
% of identifiable material		40.8	46.6	8.7	3.9			

Table 3.14 Summary of results from the analysis of the Roman cremation burials

PYRE TECHNOLOGY AND CREMATION RITUAL

The assemblage is 95% calcined and the resultant off-white colour is associated with an efficient cremation process (Holden et al 1995a; 1995b). The weight of fragments recovered (342.5g) represents approximately 21% of the expected weight of cremated bone produced by an adult. This comparatively small assemblage is less than the average of between 500g and 800g (McKinley 2006, 26) but significantly larger than quantities recovered in contemporary unurned cremations from Manston Road, Ramsgate (Sibun in prep). However, other contemporary assemblages from the south-east, such as those from Clay Pit Lane, Westhampnett, Sussex, range in size between 28% and 61% of the expected weight produced by an adult (McKinley 2006, 35).

The recovery of a relatively small assemblage may suggest that it has suffered from some degree of post-depositional disturbance, as cremation pit [406] was somewhat shallow at only 200mm deep; this was also thought to be the case at

Manston Road. However, the high level of fragmentation normally associated with heavily disturbed deposits is not strongly evident. Unurned cremation burials without the protection of a vessel are usually greatly fragmented, with high percentages of the bone assemblage being recovered from the smaller fractions. In this assemblage the majority comes from the 4–8mm and 9–20mm fractions, each producing approximately 40% of the assemblage. The smallest fraction produced only 7.6% of the assemblage.

Fragments from all skeletal areas are present. The less robust axial skeleton is unsurprisingly the least well represented, forming only 6.9% of the assemblage. Although skull fragments make up the largest proportion at 33.3%, the upper and lower limbs are similar, at 27.4% and 32.3% respectively. There is a notable absence, however, of the smaller elements of the skeleton from the assemblage, for example, tooth roots and phalanges, which was noted also in the Manston Road assemblages. The presence or absence of these elements is thought to be a reflection of the bone-collection ritual after the cremation and in this case may result from hand-selection rather than an en masse approach (McKinley 2004b, 18). However, this is at odds with the contemporaneous Clay Pit Lane assemblages, where small bones such as phalanges, tooth roots and enamel were all recovered (McKinley 2006, 35). No animal bone or other pyre debris was present in the assemblages.

Bronze Age cremations are not uncommon in the south-east of England but few appear to be associated with barrows (Garwood 2003, 50). However, at Clay Pit, Westhampnett, cremation burials were also recovered from the area enclosed within a ring-ditch. Several differences have been highlighted between this example and other contemporary burials from the area but perhaps the most obvious is the absence of an urn, which is uncharacteristic of the burial traditions during this period (Chadwick 2006, 43).

PERIOD 5: ROMAN

Four cremation burials were recovered from this period. Cremations [12]/[16] and [145] were both unurned and interred directly into pits with accessory vessels of mid–late 1st-century AD date. Cremations [230] and [241]/[243] were slightly later, dating to the early–mid 2nd century AD, and were interred in vessels within pits, also with accessory vessels. The results of analysis are shown in Table 3.14, with the exception of [243], which produced only 2g of bone.

DEMOGRAPHIC AND PATHOLOGICAL DATA

In the cases of [12] and [241] the age of the individuals represented is based upon fragment size alone; both appear to contain an adult. Cremation burials [145] and [230] also contain adults but in both cases the estimate is more confident and based upon evidence from epiphyseal fusion. None of the burials contain fragments that enable sex to be estimated and no fragments displayed pathological lesions.

SPATIAL DISTRIBUTION

The vessels containing cremated bone, [230] and [241], were removed from the field and subjected to careful recording and excavation in spits. Bone fragments were collected per spit and accurate plans drawn at each stage of the excavation. The excavated fill underwent flotation and all additional bone fragments recovered were included in the analysis.

The cremated bone from burial [230] was distributed throughout the vessel, increasing in density towards the base, with the larger fragments present only in the lowest spits. Only small quantities of bone were recovered from spits 1 and 2, suggesting that the quantity lost to truncation may be minimal. The bone from burial [241] was also distributed throughout the vessel but, unlike [230], the greatest density was located in the upper and lower spits, with smaller quantities recovered from the middle of the vessel. Larger fragments were present also in the upper and lower spits rather than being restricted to the lower spits only, as found in [230]. In both cases, the distribution of elements from the different skeletal areas seems random, with no obvious patterns. The bone from [243] was recovered from all three spits but as such small quantities were recovered no patterns were apparent.

PYRE TECHNOLOGY AND CREMATION RITUAL

Bone from approximately 99% of the assemblages was calcined, indicating an effective cremation process (Holden et al 1995a; 1995b). The weight of bone recovered was far greater in the unurned deposits than those recovered from vessels. The 789.8g recovered from burial deposit [12] equates to approximately 49% of the expected weight of cremated bone produced by an adult (McKinley 1993, 285). The quantity recovered from [137] and [145] equates to approximately 8% and 52% of the respective expected weight, or 60% if they are considered together. In contrast, the quantities of bone recovered from vessels represent only approximately 7% from [230] and less than 2%, 4% and less than 1% from [239], [241] and [243] respectively. This figure only rises to 5.7% if bone from all three vessels with cremation burial [241] is considered together. These figures suggest that the apparent change in burial rite between the late 1st-century AD unurned deposits and the 2nd-century AD urned deposits also involved a difference in the ritual associated with the bone-collection process. Contemporary urned cremation deposits from Manston Road (Sibun in prep) also produced small quantities of bone, the largest representing only 17% of the expected weight of an adult, but a possible cause in that case was significant truncation to the vessels.

With the exception of unurned deposits [12]/[16] and [145], the majority of the bone (between 38.5% and 57.2%) was recovered from the 5–8mm fraction. In [12]/[16] and [145] the 9–20mm fraction produced the largest proportion of the assemblage (47.6% and 66.8% respectively). A greater degree of fragmentation is usually associated with unurned burial deposits without the protection of a vessel. Consequently, this highlights another difference between the two groups within the cemetery, with the greater fragmentation evident in the later, small, urned deposits. Other 1st-century AD Kentish cremation burials have been recorded with between 37.6% and 63.5% bone in the 10mm fraction, with an average of 50% (McKinley 2004b, 18), so the Sittingbourne assemblage compares well.

All skeletal areas are represented in the assemblages. In all but two of them, [230] and [239], the axial skeleton is the least well-represented skeletal area. Relatively low proportions of fragments from the axial skeleton are to be expected since a high percentage of it consists of the less dense trabecular bone, which is more susceptible to poor preservation conditions. However, in [241] fragments from the axial skeleton form the majority of the assemblage at 46.6%. The majority of the remainder of this assemblage comprises skull fragments (40.8%), leaving only 12% identifiable as limb fragments. The other vessel from [241] contains a larger percentage of limb fragments so perhaps there is evidence of deliberate selective deposition within the vessels. Limb fragments form the majority in all other assemblages, comprising between 34.9% and 54.3%. The assemblage from [230] contains only 10.1% of skull fragments, which seems abnormally low, considering that the more readily identifiable skull fragments are often disproportionately represented. It has been suggested that skull fragments may have been deliberately omitted from some 1st-century AD burials in order that they could be deposited separately (McKinley 2004b, 18), and this may be another such example.

With the exception of [239], which contains a single fragment of an intermediate phalange, smaller elements of the skeleton – for example, tooth roots or small bones of the hands and feet – are absent, as was noted also in the contemporary cremations at Manston Road (Sibun in prep). This may reflect the method of bone collection and this scarcity of smaller elements has been noted in assemblages from 1st-century AD burials in Kent by McKinley, who suggests that it results from hand-recovery of fragments rather than any form of en masse collection (McKinley 2004b, 18).

3.8 CHARRED MACROBOTANICAL REMAINS

Karine Le Hégarat

Forty-five bulk soil samples were collected during excavations for the recovery of environmental remains. All the samples were processed in a flotation tank with the flots and residues retained on 250mm and 1mm meshes respectively. On the basis of the assessment three samples were selected for more detailed analysis of their charred macroplant remains (Allott & Le Hégarat 2011). All three samples derived from the Late Iron Age/ Early Roman ENC2. They were extracted from the southern enclosure ditch, G9; two samples came from slot [209], excavated through the ditch (from basal fill [208] and upper fill [207]), and one sample came from recut [219], fill [220].

METHODOLOGY

Flots were weighed and measured before being sieved through 4mm, 2mm, 1mm, 500μm and 250μm geological sieves. The flots were sorted in their entirety for macrobotanical remains under a stereozoom microscope at ×7–×45 magnifications. The term ‘seed’ is used in the text to encompass a range of fruiting bodies such as nutlets and achenes as well as true seeds. The term ‘cf’ (‘compares with’) is used to precede identifications that are considered most similar to a specific taxon but that do not display sufficient anatomical features for secure identification. Taxa have been identified through comparison with modern reference material and reference manuals (NIAB 2004; Cappers et al 2006; Jacomet 2006; Neef et al 2012). Habitat information and nomenclature used follows Stace (1997) for native species and Zohary & Hopf (2000) for macrobotanical remains of cultivated taxa.

RESULTS

The plant taxa identified from each sample are presented in Table 3.15. Although charred macroplant remains were commonly found in the samples, the item density was small, ranging from 1.22 to 5.25 items per litre of processed soil. The upper fill, [207], and recut fill, [220], produced more concentrated densities of macroplant remains than the primary fill, [208]. The charred macroplant assemblage consisted of a large proportion of weed seeds (52.96% of the total macroplant remains) with cereal grains representing 13.86%, chaff 29.09% and pulses accounting for 4.09% of the total macroplants. Preservation varied from fair to poor and, while the charred grains and charred leguminous seeds were mostly poorly preserved, possibly owing to charring at high temperatures, the preservation of the chaff and weed seeds was generally better.

The chaff assemblage was dominated by hulled wheat (either emmer or spelt) glume bases, spikelet forks and spikelet bases, a third of which provided evidence for spelt wheat (*Triticum spelta*). These chaff elements were positively identified based on their rounded appearance, their strong veins and the absence of a secondary keel. Although a large proportion of the grains could not be identified, caryopses typical of hulled wheat were also recorded amongst the assemblage of identifiable grains. There was also limited evidence for hulled barley (*Hordeum vulgare*) in the form of grains and rachis fragments and possibly free-threshing-type wheat (cf *Triticum aestivum*-type) although the latter was represented by a unique caryopsis. Cultivated pulses, which were recorded for the most part in upper fill [207], consisted of Celtic/broad beans (*Vicia faba*), garden peas (*Pisum sativum*) and some indeterminate large, round, seeded pulses, which may have represented vetches, beans or garden peas (*Vicia/Pisum* sp).

Charred weed seeds were well represented in the samples. The most common taxa represented were vetch/vetchling/tare (*Vicia* spp/*Lathyrus* spp), fat hen (*Chenopodium* sp), sheep sorrel (*Rumex acetosella*), black bindweed (*Fallopia convolvulus*), various grasses (Poaceae) and scentless mayweed (*Tripleurospermum inodorum*). Some of the seeds may have originated from disturbed grounds in the vicinity of the site. However, these taxa are commonly associated with the cultivation of crops. They would have grown as impurities with wheat, barley and pulses and would have been gathered with the crops at harvest. Only a few seeds are characteristic of specific soil types. While the presence of the small leguminous weed seeds could indicate cultivation of impoverished soils, fat hen is indicative of nitrogen-rich soils. Sheep's sorrel is characteristic of light acidic soils. The presence of sedge could indicate that low-lying wetter grounds were also occasionally under cultivation. The plant could also have been collected from the nearby marshes to serve a variety of household uses. The site lies on Gault clay and it seems that the crops reaching the settlement were cultivated in the surrounding fields.

The presence of charred chaff and charred weed seeds is highly indicative of domestic activities relating to crop processing being carried out close by. For hulled wheat species, chaff adheres tightly to the grains. To release the grains, various stages of threshing, winnowing, pounding and sieving are undertaken (Hillman 1981; 1984). In damp climates, in order to protect the grains, hulled wheat was often stored relatively unprocessed, and some of these operations were only carried out on a regular basis once the crops were taken out of storage. The overall large quantities of weed seeds and glumes and spikelet fragments of hulled wheat represented in the samples are characteristic of waste generated by routine processing activities, and are regularly recorded in Iron Age and Roman deposits (Stevens 2003). A small quantity of charred grains and pulses was also present, and overall the remains appeared to represent the disposal of domestic waste, consisting mainly of crop-processing waste together with some cereals and pulses that may have been accidentally burnt while being prepared for consumption. It is likely that the plant material related to several distinct deposition events. Some of the remains may also have represented redeposited material that had worked its way into the open ditch.

The overall assemblage indicates a mixed arable economy based on both pulses and cereals, which is characteristic of Late Iron Age/Early Roman sites. Based on the secure identification of chaff, spelt appears to be the dominant wheat species. However, given the large quantity of crop remains which could not be identified beyond the genus level, it is possible that emmer (*Triticum dicoccum*) may have been present in the assemblage of carbonised crops. Overall, the apparent dominance of spelt at Kemsley reflects results from other contemporary sites. During this period, in southern England, spelt is often the principal cereal found followed by smaller amount of hulled barley and free-threshing wheat (Greig 1991). Nonetheless, numerous recent excavations in Kent have revealed that although spelt was the dominant hulled wheat cultivated, emmer was also an important crop locally during the Late Iron Age and Roman period (Stevens 2006; 2009). Approximately 2km north-west of Kemsley, excavation at Iwade produced a small assemblage of charred crop remains, including chaff tentatively identified as emmer, from deposits associated with a Late Iron Age enclosed settlement (Keen et al 2005). Pelling (2008) has suggested that in the south-east both hulled wheat species could have been cultivated side by side or even together.

DISCUSSION

The botanical remains from Kemsley are typical of a settlement with an agricultural economy based on subsistence. The remains have also shed light on specific domestic activities. The charred macroplant remains have confirmed the cultivation of hulled wheat, apparently mainly spelt, and they have showed the minor role played by barley, free-threshing wheat and pulses.

3.9 WOOD CHARCOAL

Dawn Elise Mooney

Small to moderate quantities of charcoal were recovered from bulk soil samples taken from Neolithic, Bronze Age, Iron Age and Roman deposits at Kemsley, and were analysed according to standardised procedures (Gale & Cutler 2000; Hather 2000) in order to assess the range of woody taxa present at the site (Allott & Le Hégarat 2011). The fragments were often poorly preserved, showing evidence of sediment infiltration resulting from fluctuations in groundwater level. Despite this, sufficient quantities of identifiable fragments were recovered to gain insights into local woodland composition and the procurement and use of fuel for domestic, industrial and ritual purposes. The results of this analysis are recorded in Table 3.16.

Throughout the occupation of the site, wood for use as fuel was collected from oak-dominated deciduous woodland. Oak (*Quercus* sp) is known to be an excellent fuel wood (Taylor 1981) and appears to have been specifically selected for use as fuel for all purposes at the site. This was supplemented by smaller quantities of other taxa such as yew (*Taxus baccata*), ash (*Fraxinus excelsior*), hazel (*Corylus avellana*), alder (*Alnus* sp), beech (*Fagus sylvatica*), elm (*Ulmus* sp), hornbeam (*Carpinus betulus*) and woods from the Maloideae subfamily (including hawthorn (*Crataegus monogyna*), rowan (*Sorbus aucuparia*), apple (*Malus* sp) and pear (*Pyrus* sp) species). This pattern showed little change over time, suggesting that the woodland resources available to the inhabitants of the site were fairly constant throughout the period in question.

While most of the charcoal analysed originated from contexts such as pit and ditch fills, which are likely to contain the remains of numerous different burning events, there were several exceptions to this. A single Middle Bronze Age cremation pit produced a charcoal assemblage composed entirely of oak. Contemporary cremations from White Horse Stone (Alldritt 2006a) and Saltwood Tunnel (Alldritt 2006b) also produced charcoal assemblages dominated by oak charcoal, although Maloideae taxa are also common as fuel in Bronze Age cremation deposits from the region (cf Challinor 2009). It has been suggested that oak was the preferred material for cremation pyres throughout the prehistoric period because of its ability to burn at a high temperature over a long period of time (Gale & Cutler 2000), and the evidence from Kemsley supports this hypothesis.

Oak also made up the majority of charcoal remains from the Roman cremations at Kemsley, which again is consistent with other contemporary cremations at Northfleet (Challinor 2006), Hothfield (Alldritt 2006c) and Thanet (Challinor 2009). Charcoal remains from a Roman salt-extraction hearth also proved to consist entirely of mature oak. This pattern has been seen too at the Roman salt-production site at Stanford Wharf in Essex, although here, along with other contemporary salt-production sites, roundwood resulting from brushwood or coppice was dominant in the assemblage, which has been interpreted as being indicative of the heavy demands placed by salt production on the local wooded environment (Druce 2012). As oak is known archaeologically as a valuable resource for construction as well as for fuel (Taylor 1981), its widespread occurrence in the charcoal assemblage at Kemsley suggests that oak trees were plentiful in the local environment.

Overall, there is very little evidence for substantial changes in woodland composition or in fuel-procurement strategies over time at Kemsley. The continued dominance of oak in the charcoal assemblage from the Neolithic to Roman periods suggests that this taxon in particular was abundant in the landscape, and was specifically selected as a fuel resource for domestic, industrial and ritual purposes, with other taxa providing supplementary fuel.

		Period	4.3	4.3	4.3
		Sample no	<28>	<27>	<31>
		Feature type	ditch	ditch	ditch
		Context no	[209], fill [208]	[209], fill [207]	[219], fill [220]
		Flot volume (ml)	48	250	300
		Flot weight (g)	8	28	36
Taxonomic identification	**English name**	**Habitat/soil conditions**			
Crop cereals					
Hordeum vulgare L	barley	C*	1		
cf *Hordeum vulgare* L	possible barley	C*	2	1	
Triticum dicoccum Schübl/*spelta* L	emmer/spelt wheat	C*		5	3
Triticum cf *dicoccum* Schübl/*spelta* L	possible emmer/spelt wheat	C*			2
cf *Triticum aestivum*-type	possible bread – free-threshing-type wheat	C*			1
Triticum sp	wheat	C*	1	6	2
Cerealia indeterminate	indeterminate cereal – whole grain	C*	1	2	3
Cerealia indeterminate	indeterminate cereal – fragment	C*	1	1	5
Cerealia indeterminate/Poaceae	indeterminate cereal/grass – large-seeded	C*G	6	5	13
Chaff					
Hordeum sp	barley rachis fragment	C*			2
Triticum spelta L	spelt wheat – glume base	C*	2	15	16
T spelta L	spelt wheat – spikelet fork	C*			1
T dicoccum Schübl/*spelta* L	emmer/spelt – glume base	C*	2	18	25
T dicoccum Schübl/*spelta* L	emmer/spelt – spikelet fork	C*		1	2
Triticum sp	wheat – spikelet base	C*	3	14	9
Cerealia indeterminate/Poaceae	indeterminate cereal/grass – indeterminate chaff	C*G	5	9	4
Non-cereal crops					
Pisum sativum L	common pea	C*		1	
cf *Pisum sativum* L	possible common pea	C*		2	
Vicia faba L	broad bean/celtic bean – whole	C*		4	
V faba L	broad bean/celtic bean – halves or less	C*		2	
Vicia/Pisum sp	vetch/bean/pea	C*	1	2	
cf *Vicia/Pisum* sp	possible vetch/bean/pea	C*		2	
Fabaceae	pea family – most likely cultivated	C*		4	
Weed seeds					
Chenopodium album L	fat hen	DAn		11	26
Chenopodium sp	goosefoot	AArDn	1	1	1
Chenopodium sp	goosefoot – ancient/modern?	AArDn	5	5	1
Silene sp	campion		2	4	4
Fallopia convolvulus (L) Á Löve	black bindweed	DAr	1	25	1
Polygonum spp/*Rumex* spp	knotgrass/dock	DGEAoa		2	
Rumex acetosella L	sheep's sorrel	EoGAa	3	25	2
Malva sp	mallow	GDY		1	
Vicia spp/*Lathyrus* spp	vetch/vetchling/tare – 2–3mm	AArDGY	3	7	2
Vicia spp/*Lathyrus* spp	vetch/vetchling/tare – <2mm	AArDGY		13	8

Habitats: A = weeds of cultivated ground; Ar = arable weeds; C = cultivated plants; D = ruderals, weeds of waste and disturbed places; E = heath; G = grassland; H = hedgerows; M = marsh/bog; R = plants of running waters; O = plants of open water; S = scrub; W = woods; Y = waysides; * = plants of economic value

Soils/ground conditions: a = acidic; c = calcareous; d = dry; b = base-rich; n = nutrient-rich; o = open ground; s = shaded; w = wet/damp soils; h = heavy soils

Table 3.15 Charred macrobotanical remains

cf *Vicia* spp/*Lathyrus* spp	possible vetch/vetchling/tare – <2mm	AArDGY		2	2
Medicago sp/*Trifolium* sp	medicks/clovers	GD		1	
Plantago media L	hoary plantain	G		1	
Tripleurospermum inodorum (L) Sch Bip	scentless mayweed	DA		9	11
Asteraceae	daisy family				1
Carex sp	sedge triangular/round	GwMWwHSGah			2
cf *Avena* sp	possible oat – indeterminate cultivated/wild oat	C* or AArDG	2		1
cf *Festuca* sp/*Lolium* sp	possible fescue/rye-grass	DG		3	2
Poaceae	grass – large-seeded	ADG	4		5
Poaceae	grass – medium-seeded	ADG		2	
Poaceae	grass – small-seeded	ADG	2	7	3
cf Poaceae	possible grass – stem fragment	AGC		1	2
Indeterminate or unidentified plant parts					
Indeterminate – seed	indeterminate – seed		1	5	10
Total count (fragment or item)			49	219	172
Sample size (litres)			40	40	40
Processed soil (litres)			40	40	40
Count density (items per litre of processed soil)			1.22	5.25	4.3

Table 3.15 *continued*

Date	**Period**	**Feature type**	**Parent context**	***Quercus* sp**	***Prunus* sp**	***Fraxinus excelsior***	***Ligustrum/ Lonicera***	**Leguminosae**	***Corylus/Alnus* sp**	***Fagus sylvatica***	**Maloideae**	***Ulmus* sp**	***Carpinus betulus***	***Taxus baccata***
Neolithic/Early Bronze Age	2	pit	[423]	15										10
Middle Bronze Age	3	ring-ditch	[46]	4	10	1	3							
	3	ring-ditch	[45]	4							6			
	3	cremation	[406]	20r										
Late Iron Age/Early Roman	4	pit	[270]	6r					1			1		
	4.1	ditch	[223]	3	2							2	3	
	4.2	posthole	[280]	9							1			
	4.3	ditch	[204]	4r				1			2			
	4.3	ditch	[149]	6		1					1			
	4.3	ditch	[172]	7r	1									
	4.3	ditch	[173]	10										
	4.3	ditch	[209]	5										
Roman	5	cremation	[11]		4	1								
	5	cremation	[136]	3			2		1					
	5	posthole	[152]	5r	2						3			
	5	cremation	[238]	26										
	5	cremation	[225]	10		1								
	5	salt-extraction hearth	[196]	20										

Table 3.16 Quantification of the wood charcoal assemblage (r = roundwood)

3.10 GEOARCHAEOLOGICAL AND PALAEOENVIRONMENTAL CHARACTERISATION

Martin Bates and Matt Pope

In order to characterise the sedimentary, palaeogeographic and palaeoenvironmental context of the Sittingbourne Northern Relief Road, a geoarchaeological ground investigation and follow-up palaeoenvironmental assessment were undertaken, with particular reference to:

- defining the presence of the former marshland edge against dry rising ground to the west
- clarifying the depth to the submerged land surface of late prehistoric date known to exist within the area
- clarifying the position and extent of peat deposits
- clarifying the nature of the sedimentary sequences present in the site
- recovering pollen, micromorphology and microfaunal samples to characterise sedimentary environment and palaeoenvironmental conditions at the site.

BACKGROUND TO THE AREA

Much of the road route crosses sediments that the British Geological Survey have mapped as alluvium of Milton Creek (BGS 1977; TQ 914 657). Today Milton Creek is a tidal inlet surrounded by low-lying estuarine environments extending from Sittingbourne to the River Swale. The north-western end of the route consists of the higher ground of Kemsley Down (more than *c* 14m OD) sloping down towards Milton Creek, with a bedrock of Tertiary sediments lying beneath Pleistocene head deposits and probable Holocene colluvium. To the south-east, flood-plain alluvium is mapped overlying Thanet Sands. Previous investigation of the area was undertaken by the Museum of London (Ruddy 2009) as well as extensive geotechnical ground investigations undertaken as part of route construction design.

SITE INVESTIGATION METHODOLOGY

Three approaches were used to investigate the site: a limited geophysical survey using an EM 31 ground conductivity meter; test pitting (augmented by sample in four locations); and the recovery of two sealed borehole samples. This approach enables rapid interpretation of the buried topography and landscape and the techniques applied were selected to complement each other (Bates et al 2007) in supplying information to address the key site objectives.

GEOPHYSICAL SURVEY

The Geonics EM 31 ground conductivity (Figs 3.5 and 3.6) meter was chosen for the geoelectrical survey because at low electrical induction numbers the terrain conductivity is directly proportional to instrument reading (of secondary to primary magnetic field). The ground conductivity is a function of the electrical conductivity of the material (soil or rock), the fluid content and the thickness or depth of individual layers within the ground. Because the instrument uses an electromagnetic field, maps of geologic variations and subsurface features associated with the changes in ground conductivity can be produced without recourse to placing electrodes directly into the ground. The survey methodology is ideally suited to mapping changes in the nature of the alluvium, where changes in thickness or sediment type will modify the geoelectrical properties of the subsurface.

The survey was conducted by walking lines across the study site with line spacing between of 10–20m. In the field ground conductivity measurements were directly recorded together with a DGPS location for real-time spatial positioning. Data were downloaded and processed after fieldwork during the day and additional survey was determined after consideration of the results. The results of the survey are shown in Fig 3.7.

Fig 3.5 Photograph of EM 31 geophysical survey in progress

TEST PITTING

Test pitting was undertaken using a JCB to excavate sedimentary sequences in a controlled fashion. Test pits were excavated to a maximum depth of 4m across a 2 × 2.5m footprint. The location of the trenches was established using a survey grade Global Navigation Satellite System (GNSS).

Beneath the modern horizons, the pits were dug down in 0.20m spits to a maximum depth of 4m. A photographic record was made and key sections in each test pit drawn. All pits excavated are listed in Table 3.17 and shown on Fig 3.7.

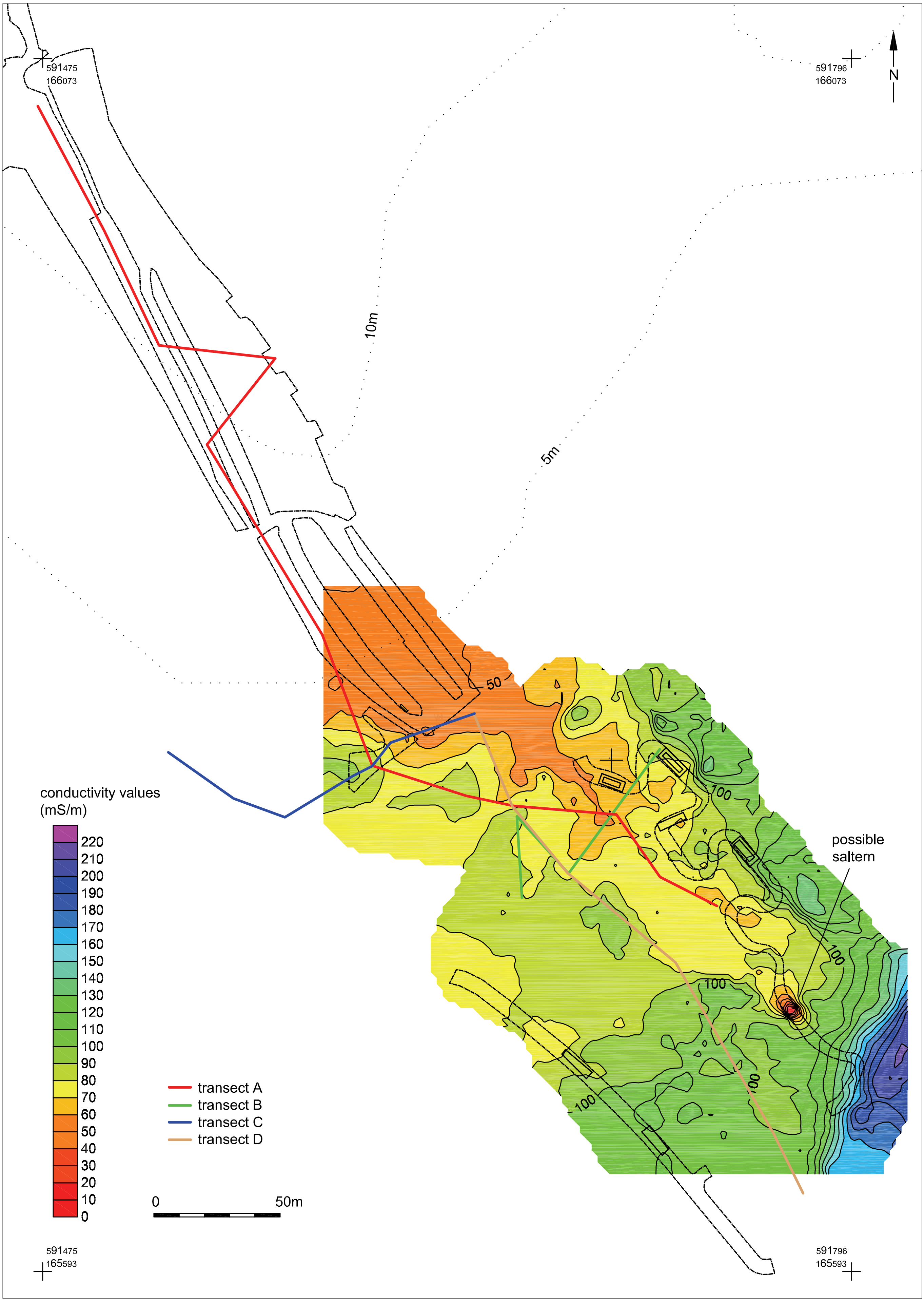

Fig 3.6 EM 31 geophysical results with lines of transects A–D

Detailed sediment logs were made and all units and unit boundaries were fully described following the methodology of Jones et al (1999). When depth precluded entry to the pit further recording was made from the trench side. The arisings were placed in stratigraphical order to enable description and recording.

		Location		m OD
GTP	1	591473	166056	12.94
	2	591612	165801	2.097
	3	591566	165880	6.603
	4	591598	165790	1.84
	5	591605	165793	1.86
	6	591585	165845	4.253
	7	591540	165920	9.301
	8	591520	165961	10.664
	9	591497	166007	12.186
	12	591718	165801	2.424
	13	591702	165773	2.305
	14	591683	165750	2.172
	15	591667	165733	2.102
	16	591642	165781	2.118
	17	591661	165777	2.499
	18	591720	165749	2.078
	19	591742	165737	2.103
	20	591766	165719	2.139
	21	591781	165711	2.018
	22	591717	165772	2.157
	23	591717	165723	2.241
SI	BH1	591601	165787	1.178
	BH2	591663	165774	2.369
	BH3	591720	165725	2.102
	BH4	591763	165722	2.22
	BH175	591567	165954	12.43
	BH220	591593	165916	11.57
	BH350	591646	165813	3.53
	BH400	591665	165741	2.64
	BH470	591725	165714	2.27
	BC3	591718	165719	2.1
	BH535	591764	165644	2.09
	BH570	591776	165623	2.16
	BC5	591755	165637	2.04
	TP150N	591482	165947	6.49
	TP250N	591514	165853	2.04
	TP330N	591550	165779	2.19
	BH400N	591570	165773	1.96
	BH470N	591561	165841	2.61
	BH300N	591525	165798	2.09

Table 3.17 Data used in geoarchaeological study
(GTP = geoarchaeological test pits, dug for archaeological purposes;
SI = data derived from site investigation)

RESULTS

GEOPHYSICS

The results of the geophysical survey are shown in Fig 3.9. The map illustrates the results as a contoured plot of conductivity values ranging from 0mS/m to 230mS/m. Typically, higher conductivity values are associated with units able to conduct electrical currents and these tend to be the finer-grained sediments (often associated with alluvium, or thicker sequences of alluvium). However, conductivity is influenced by porosity and permeability of sediment as well as grain size and consequently it is possible for coarse-grained sediments to exhibit high conductivity values, especially if saturated with salt water. thus in low topographic situations, close to modern coastlines, the interpretation of the results of conductivity survey has to be made with caution.

The conductivity values allow the surveyed area to be subdivided into four discrete zones (Fig 3.8):

- Zone A – conductivity values in the range 0–80mS/m, lying along the central part of the site trending from north-west to south-east
- Zone B – conductivity values in the range 80–90mS/m, lying on the western side of the site
- Zone C – conductivity values in the range 90–140mS/m, a discrete unit within the central part of the site, wrapped around the central ridge of zone A
- Zone D – conductivity values above 140mS/m, a very well-defined zone in the south-east part of the site.

TEST PITS

Detailed examination of the test pit logs identified the presence of six groups of sediments (excluding topsoil) across the site. These are identified in Fig 3.9, where individual bodies of sediment are colour-coded.

Group I

Sands containing Tertiary shells as well as silt-clay units. All are interpreted as bedrock of Tertiary age.

Group II

Flint gravels with variable matrix of clay/silt or sand (Fig 3.10). The sediments are interpreted as having been deposited by high-energy fluvial activity under cold-climate periglacial conditions in a braided river environment.

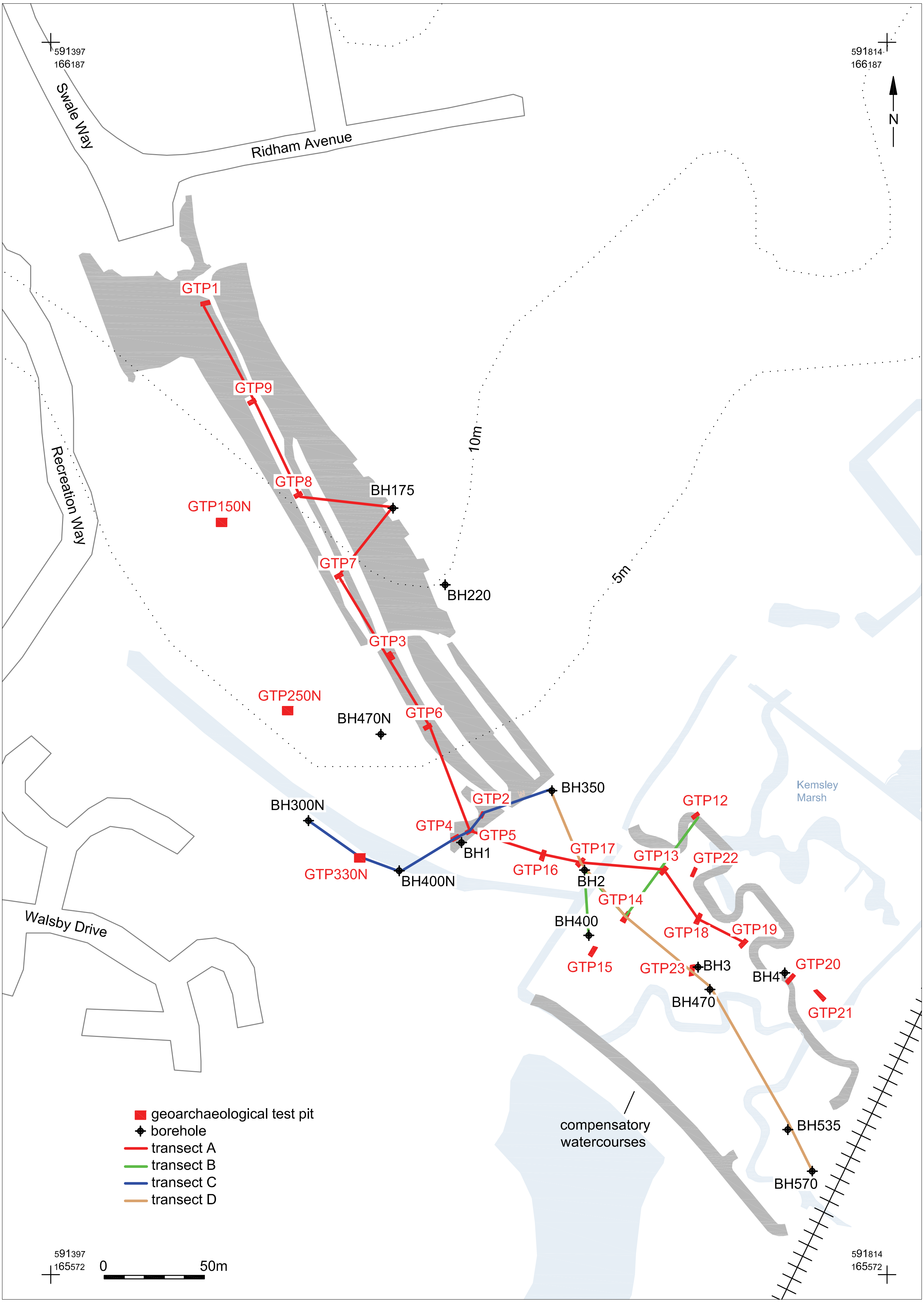

Fig 3.7 Distribution of geoarchaeological test pits (GTP) and ground investigation data used in this study, including location of transects A–D

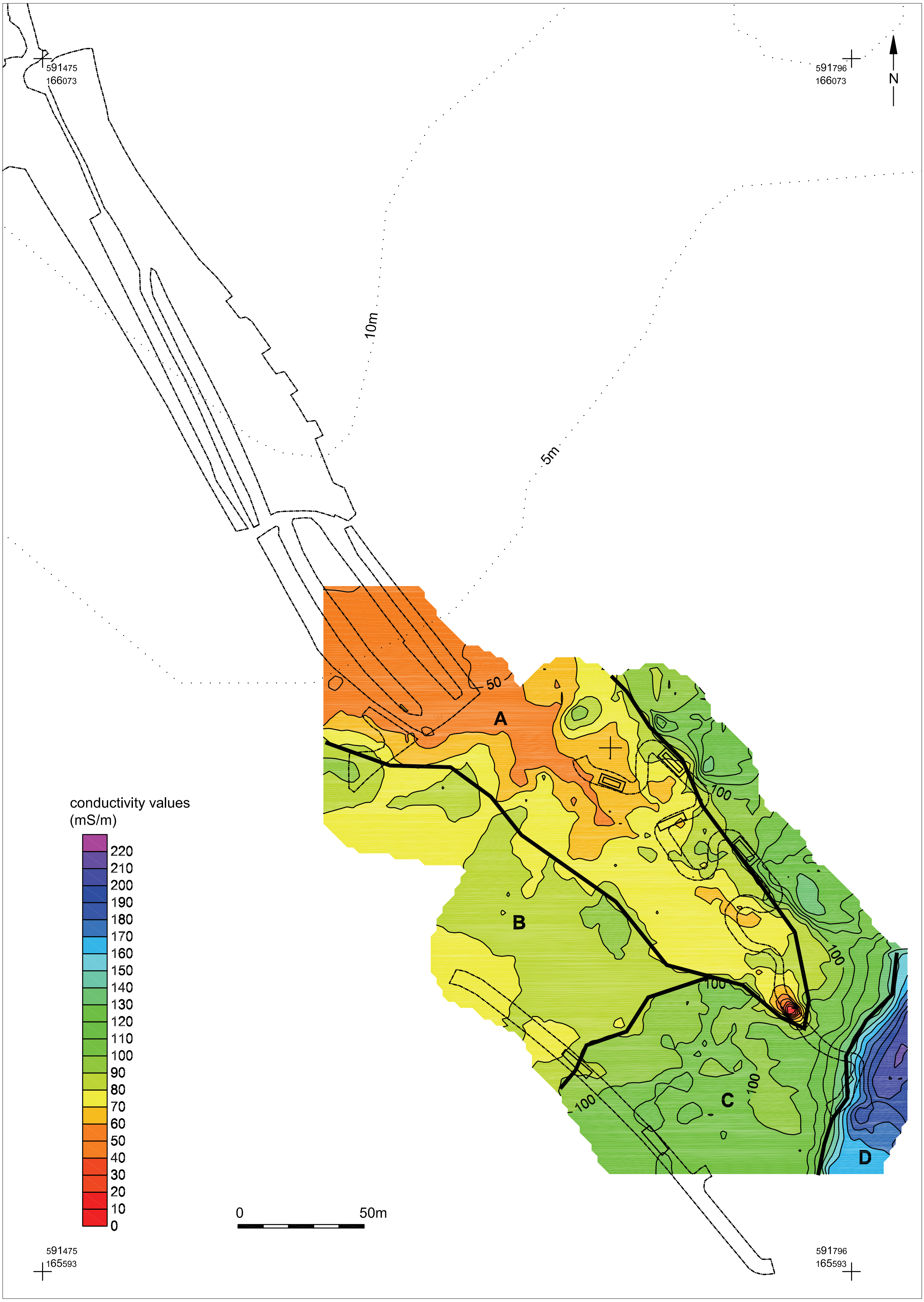

Fig 3.8 EM 31 geophysical results and identified zones

Group III
Variable mixtures of gravels with sands/silts/clays (Figs 3.11 and 3.12). Often the sediments exhibit blocky structure and are carbonate-rich in places. Dense networks of fine root canals may be present. They are interpreted as solifluted sediments resulting from reworking of older fluvial and colluvial sediments downslope under cold-climate conditions during the Pleistocene.

Group IV
Organic-rich silts and clays; sometimes peats are present. The sediments contain shell as well as bone fragments in places, for example, GTP4 and GTP5 (Figs 3.13 and 3.14) These deposits are thought to have been deposited under aquatic or semi-aquatic conditions in freshwater or brackish channels, tidal channels or swamps.

Group V
Silt-clays with occasional organic fractions (Fig 3.14). Typically the sediments are structureless and plastic. These deposits wedge out against the underlying Group III sediments in some places. They are thought to be of brackish-water origin, being deposited in tidal mudflats or tidal marshes during the Holocene. Within this group a palaeo-land surface, recovered within the [1/004]/[1/005] contact by borehole survey was identified. This contact is discussed in terms of micromorphology and palaeoenvironmental conditions below.

Group VI
Silt-clays appearing intermittently along the slopes, thought to be of Holocene colluvial (slopewash) origin (Fig 3.11).

DISCUSSION
The evidence from both the geophysics and the test pits provides a robust stratigraphic framework for the site and its landscape setting. The geophysical survey identified four discrete zones at the site (Fig 3.8). If it is assumed that the conductivity values are in part a reflection of grain size within the top 3–4m beneath the ground, then it is likely that zone D contains a thick sequence of alluvial sediments, while zones B and C have intermediate thickness of alluvial sediments, and zone A only a thin accumulation of alluvial sediments. Consequently the ridge-like feature described by zone A appears to be a zone in which alluvial cover is thin and reaches out into the marshland surrounded by zones of thicker alluvium. Such a feature would clearly have significant attraction to human activity until submerged by encroaching marshland conditions.

The lithological data supplied by the test pits (Fig 3.9) and their position on the ground relative to the geophysical data (Fig 3.6) very clearly support the results. For example, along transects A and D (along the axis of the ridge of zone A) the alluvial wedge of sediments (Group IV and Group V) clearly thickens towards the south-east (Fig 3.9). Similar wedge-shaped appearances of Group IV and Group V sediments are shown in transects B and C, which cut across this ridge (Fig 3.9). Thus the zone mapped by the EM 31 survey (zone A) represents a ridge of drier ground extending into the marshland and consists primarily of the Group III sediments associated with the solifluction deposits. This interpretation differs from that previously proposed where no such feature was identified (Ruddy 2009, fig 19).

3.11 SOIL MICROMORPHOLOGY
Richard I Macphail

INTRODUCTION
One thin section from BH4 from across Units 4 and 5 (-1.61–1.70m depth below ground level) confirmed the observations of the archaeological investigation in identifying a land surface/soil with possible traces of occupation. This 'soil' probably became iron-depleted because of a rise in base level, which was followed by muddy alluviation (Unit 4) and the formation of a vegetated wetland. Given the location of the site, and the presence of much pyrite within relict root channels, the inundation could have been marine in character.

METHODS
A ~80mm-long Kubiena box from BH4 was received for soil micromorphology analysis (Courty et al 1989; Goldberg & Macphail 2006).

The undisturbed monolith sample was impregnated with a clear polyester resin-acetone mixture; the sample was then topped up with resin, ahead of curing and slabbing for 75 × 50mm-size thin-section manufacture by Spectrum Petrographics, Vancouver, Washington, USA (Murphy 1986, fig 16; Goldberg & Macphail 2006). The thin section was further polished with 1000 grit papers and analysed using a petrological microscope under plane polarised light (PPL), crossed polarised light (XPL), oblique incident light (OIL) and using fluorescence microscopy (blue light – BL), at magnifications ranging from × 1 to × 200/400. Thin sections were described, ascribed soil microfabric types (SMT) and microfacies types (MFT) (Tables 3.18 and 3.19), and counted according to established methods (Bullock

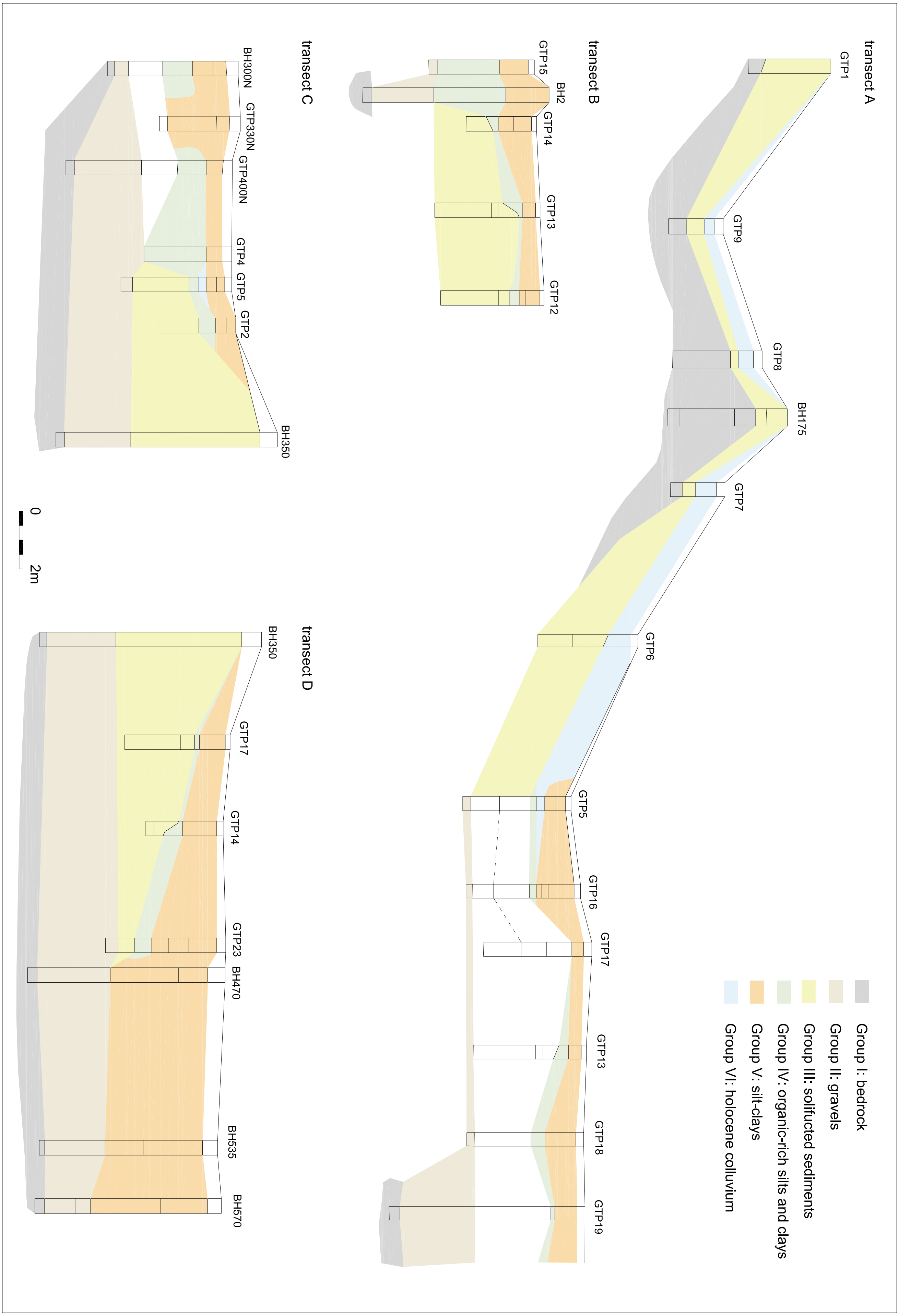

Fig 3.9 Test pit logs for transects A–D

Fig 3.10 Photograph of gravels of Group II beneath finer-grained Group III sediments in GTP15

Fig 3.12 Photograph of sediments of Group III in GTP12

Fig 3.11 Photograph of sedimentary structures at the top of Group III sediments lying below Group VI sediments in GTP7

Fig 3.13 Photograph of sediments of Group IV abutting Group III sediments in GTP5

Fig 3.14 Photograph of sediments of Group IV and Group V in GTP4

et al 1985; Courty et al 1989; Courty 2001; Macphail & Cruise 2001; Stoops 2003; Stoops et al 2010).

RESULTS

Results are presented in Tables 3.18 and 3.19. Ten characteristics were identified and counted from the two units within the one thin section analysed.

UNIT 5

This is a compact, iron-depleted coarse silt-fine sand with very few medium sand grains and weathered glauconite. This layer includes an example of 2mm-size burned flint, and a rare trace of wood charcoal, one 3mm example of which is apparently vertically oriented. There are occasional root traces, often showing occasional iron staining/replacement and channel hypocoatings. Rare pyrite spheroid concentrations occur in relict root channels. A trace amount of dusty clay forms very thin infills, associated with rare collapsed thin burrows. Dusty matrix intercalations and infills characterise the uppermost 15mm of this unit.

This is possibly a truncated soil-sediment surface composed of brickearth coarse silt and fine sand with very few medium sand with possible traces of occupation. The original structure and burrows, which allowed the inclusion of burned flint and vertically oriented wood charcoal, appear to have collapsed and become elutriated through water saturation – associated with inundation. Ensuing wetland development led to rooting and waterlogging, hence ferruginisation and pyrite formation.

UNIT 4

This is a compact, partly laminated silty clay and silt, with very fine sand, containing little weathered glauconite. Layers include rare blackened and brown detrital organic matter fragments (monocotyledonous organic matter), 6mm long and horizontally oriented, as detrital inclusions. There are also occasional root traces, both blackened and browned, often with pyrite in channels. This unit is characterised by very abundant matrix pans and laminae (300–600μm), fine material from which affects the uppermost 15mm of Unit 5 below. Muddy and silty low-energy alluviation is probably associated with raised base levels and iron depletion of Unit 5, below. Wetland developed waterlogged conditions and the area became vegetated.

DISCUSSION

The single thin section records an old land surface formed in a fine sandy silt loam brickearth-like geology, with small indications of human occupation, which may have developed soil features. A rise in base level, possibly associated with the site's juxtaposition to the Thames and Isle of Sheppey to the north, led to iron depletion and, when flooded, to possible elutriation. This is a similar situation to that described from

Monolith (site)	Thin section	Unit	Relative depth	Microfacies type	Soil microfabric type	Voids	Root traces	Charcoal	Burnt flint	Dusty clay	Matrix infill	Matrix intercalation	Matrix pans	Secondary iron	Pyrite
M1	M1	Unit 4	0–15 mm	B	1b	10%	aa	a*				aaaaa	aaaaa	a	a
M1	M1	Unit 5	15–75 mm (15–30mm)	A	1a	15%	aa	a	a-1	a*	a*(a)	(aaaa)		a	a

* - very few 0-5%, f - few 5-15%, ff - frequent 15-30%, fff - common 30-50%, ffff - dominant 50-70%, fffff - very dominant >70%; a - rare <2% (a*1%; a-1, single occurrence), aa - occasional 2-5%, aaa - many 5-10%, aaaa - abundant 10-20%, aaaaa - very abundant >20%

Table 3.18 Soil micromorphology counts in Borehole 4 (BH4)

Microfacies type (MFT)/Soil microfabric type (SMT)	Sample	Depth (relative depth) Soil micromorphology (SM)	Preliminary interpretation and comments
MFT B/SMT 1b MFT A/SMT 1a	B4, M1	0–75 mm SM: heterogeneous with layers 0–15mm (SMT 1b), inwash into 15–30mm and layer 15–75mm (SMT 1a). *Microstructure*: massive, diffuse layered, compact 15% voids, very fine to medium channels (200 μm to 2mm) 0–15mm SM: heterogeneous/layered and mixed SMT 1b and silty SMT 1b. *Microstructure*: massive, diffuse wavy laminated, 10% voids, fine channels; *Coarse Mineral*: C:F (Coarse:Fine limit at 10μm), 85:15 and laminae of 35:65, well-sorted coarse silt and fine sand (as below, examples of little weathered glauconite); *Coarse Organic and Anthropogenic*: occasional root traces, both blackened and browned, with pyrite often; rare blackened and brown detrital OM fragments (monocotyledonous organic matter), 6mm long and horizontally oriented; *Fine Fabric*: SMT 1b: dusty and fine speckled grey (PPL), moderately low interference colours (open porphyric, stipple speckled (also oriented as intercalations/pans), XPL), very pale yellow brown (OIL), weakly humic stained, rare very fine amorphous/blackened detrital organic matter and trace of very fine charcoal; *Pedofeatures*: *Textural*: very abundant matrix pans and laminae (300–600μm); *Amorphous*: rare ferruginised root traces and pyrite channel infills associated with plant decay 15–30 mm and 30–75 mm SM: heterogeneous. *Microstructure*: *Coarse Mineral*: C:F, SMT 1a 85:15; moderately well-sorted coarse silt, fine sand, with very few medium subrounded subangular sand (quartz, quartzite, feldspar, mica, flint, with very few weathered glauconite); *Coarse Organic and Anthropogenic*: example of 2mm burned flint, rare trace of wood charcoal – one 3mm example vertically oriented; occasional root traces; *Fine Fabric*: SMT 1a: pale dusty grey (PPL), very low interference colours (very close porphyric, stipple speckled b-fabric, XPL), grey, very pale greyish-yellow (OIL), trace amounts of very fine amorphous OM; *Pedofeatures*: *Textural*: rare trace of very thin (~50μm) dusty clay infills associated with burrows and silty matrix infills in channels; 15–30mm – abundant silty intercalations and matrix infills; *Amorphous*: many very weakly iron-stained textural intercalations, rare ferruginised roots and channel hypocoatings; rare pyrite associated with root traces; *Fabric*: rare thin burrows (collapsed)	Unit 4 Compact, partly laminated silty clay and silty very fine sands, containing little weathered glauconite. Layers include rare blackened and brown detrital organic matter fragments (monocotyledonous organic matter), 6mm long and horizontally oriented, as detrital inclusions. There are also occasional root traces, both blackened and browned, often with pyrite in channels. This unit is characterised by very abundant matrix pans and laminae (300–600μm), fine material from which affects the uppermost 15mm of Unit 5 *Muddy and silty low-energy alluviation associated with raised base levels and iron depletion of Unit 5 below. Wetland developed waterlogged conditions and the area became vegetated – as at Unit 5a, Boxgrove* Unit 5 Compact, iron-depleted coarse silt-fine sand with very few medium sand grains and weathered glauconite. Layer includes example of 2mm burned flint, and a rare trace of wood charcoal, one 3mm example of which is apparently vertically oriented. There are occasional root traces, often showing occasional iron staining/replacement and channel hypocoatings. Rare pyrite spheroid concentrations occur in relict root channels. A trace amount of dusty clay forms very thin infills, associated with rare collapsed thin burrows. Dusty matrix intercalations and infills characterise uppermost 15mm of this unit *Possibly truncated occupation soil-sediment surface composed of brickearth, coarse silt and fine sand with very few medium sand grains. Original structure and burrows which allowed the inclusion of burned flint and vertically oriented wood charcoal appear to have collapsed and become elutriated through water saturation – inundation. Wetland development led to rooting and waterlogging, hence ferruginisation and pyrite formation (as in uppermost unit 4c and lowermost unit 5a at Boxgrove)*

Table 3.19 Soil micromorphology description and preliminary interpretation of Borehole 4 (BH4)

the decalcified Lower Loam at Swanscombe, Kent (Kemp 1985). In the case of BH4, however, this 'soil' was buried by clayey silty sediments, which are the result of gentle muddy alluviation. Wetland then developed and became vegetated as evidenced by vertical root traces. The situation here could be broadly compared to the Unit 4c and Unit 5a sequence at Boxgrove (Macphail 1999), especially as the fine rooting from wetland Unit 5a affected underlying Unit 4c. At Sittingbourne, however, the muddy alluvium more obviously washed down-profile into Unit 5, with the iron staining and pyrite formation in relict root channels perhaps also testifying to the possibility that this is marine alluvium. Several other Thames sites with early Holocene marine inundation of terrestrial soils have been investigated, namely, Fords Park Road, Canning Town, London (Mesolithic to Bronze Age on brickearth); Stanford Wharf Nature Reserve, Essex (Neolithic to Bronze Age on brickearth); and at The Stumble and other River Crouch and Blackwater sites, Essex (Neolithic and Bronze Age on head; Macphail 1994; 2010; Macphail et al 2010; 2012; Wilkinson et al 2012).

3.12 MICROFAUNA

John Whittaker

Twenty samples from two boreholes were collected. BH1 (7 samples) and BH4 (13 samples) were sited to either side of the new road. The two boreholes, samples from which are listed below, cover intervals of 1.65m (BH1) and 2.45m (BH4). From the initial sedimentological and archaeological analysis on site, the samples from Unit 4 and Unit 5 in BH1 were described as organic clays. In BH4, the same organic clays (Unit 4) passed down in weathered alluvium or palaeosol (Unit 5) with silts (Unit 6) and possible (Pleistocene) loess (Unit 7) below. The purpose of the microfaunal assessment was to ascertain whether there were any foraminifera and ostracods present, and if so, what evidence they might provide for palaeoenvironmental reconstruction.

METHODOLOGY

The sediment samples, in each case, were broken up by hand into very small pieces and placed in ceramic bowls. They were then dried thoroughly in an oven. A little sodium carbonate was added (to help remove the clay fraction) and boiling water was poured over the sample. After soaking overnight each sample was then washed through a 75µ sieve with hand-hot water and the resulting residue decanted back into the bowl for drying in the oven. In all cases a single washing produced a satisfactory breakdown. After final drying the samples were placed in labelled plastic bags. Picking was undertaken by first dry-sieving each sample into fractions of >500µ, >250µ, >150µ and >75µ, then sprinkling a little of each fraction at a time on to a picking tray. A representative fauna of foraminifera and ostracods, where present, was then picked out into a 3" by 1" faunal slide and a semi-quantitative estimate of each species made by experience and by eye (on a several specimens/common/abundant basis). These data were then logged on spreadsheets. Notes were also made of other important organic remains in each of the samples and logged on the same figure, this time merely on a presence/absence basis.

RESULTS

BOREHOLE 1 (BH1)

The results of the microfaunal assessment of the seven samples from Units 4 and 5 (depth, 1.20–2.85m) are given in Table 3.20. All seven samples contained plant debris and brackish foraminifera, while two samples contained insect remains and large (>75µ) diatoms. The lowermost sample from Unit 5 contained brackish and freshwater ostracods, earthworm granules and rhizoliths. Unit 4 is characterised environmentally as 'mid–high salt marsh with patchy and limited mudflat development'. The foraminifera are colour-coded to show their ecological preferences: there are four species of agglutinating foraminifera (colour-coded blue-green), often common or abundant/superabundant, all of which are herbivores and detrivores on high salt-marsh plants. The calcareous foraminifera, colour-coded grey, are much less common and indicate, as mentioned above, that the associated mudflats were somewhat limited in development. The lowest sample from Unit 5 is the only one to contain ostracods and this is dominated by the (protected) creek-living *Cyprideis torosa* (colour-coded green). The presence of freshwater ostracods, albeit rare, and earthworm granules indicate that at this moment in time there was a small creek at this site. This was fed by a stream which introduced earthworm granules at times of heavy rain (or overbank flooding) and at other times completely dried out – hence the rhizoliths (for the significance of which, see BH4, Unit 7).

BOREHOLE 4 (BH4)

The results of the microfaunal analysis of the 13 samples from Units 4–7 (interval 1.15–3.60m) are given in Table 3.21. Units 4 and 5 contained only agglutinating foraminifera of two species, typical of mid–high salt marsh (colour-coded blue-green), and the ecology of this interval has been characterised as such. Some of the samples also contained charcoal, that from 1.55m – 1.60m being of particular interest in other ways. This contained abundant specimens of *Trochammina inflata*, in two types of preservation. A good many were well preserved and 'natural' but significantly many more were red, burnt and recrystallised.

This species has an agglutinating shell made of mineral grains cemented on to an organic template. Moreover the shell is very robust and thick and the grains are arranged like a Roman mosaic, covered in addition with an outer organic layer. These foraminiferal shells are therefore either coming from salt marsh that has been periodically burnt, naturally or through the agency of man, or they may be coming from clay that has been used for the evaporation of salt.

A similar situation was describe by Whittaker (2010) at the London Gateway site, where Roman salt extraction was proven to be quite sophisticated, using clay excavated from a nearby salt marsh as part of the process. The only difference here is that the tell-tale pinkish-red burnt clay (giving the famous 'red hills') was absent. Perhaps the foraminifera had been burnt through natural fire, as was the charcoal. Iron tubes and precipitates are also indicated under 'organic remains', where found in this

Organic remains							
	Unit 4						**Unit 5**
Depth (m)	**1.20–1.25**	**1.50–1.55**	**1.80–1.85**	**2.00–2.05**	**2.40–2.45**	**2.70–2.75**	**2.80–2.85**
Plant debris and seeds	x	x	x	x	x	x	x
Insect remains	x	x					
Diatoms (>75 microns)	x	x					
Brackish foraminifera	x	x	x	x	x	x	x
Brackish ostracods							x
Rhizoliths							x
Earthworm granules							x
Freshwater ostracods							x
Ecology	mid–high salt marsh with patchy and limited mudflat development						small creek; evidence of drying out
	tidal access – brackish						
Brackish foraminifera							
	Unit 4						**Unit 5**
Depth (m)	**1.20–1.25**	**1.50–1.55**	**1.80–1.85**	**2.00–2.05**	**2.40–2.45**	**2.70–2.75**	**2.80–2.85**
Haynesina germanica	x	x			xx	xx	xx
Ammonia sp (brackish)					x	xx	x
Elphidium williamsoni						x	x
Elphidium waddense							x
Trochammina inflata	xx	xx	xx	xxx	xx	xx	x
Jadammina macrescens	xx	xx	xxx	xxx	xx	x	
Arenoparrella mexicana	x	x	x		x		x
Miliammina fusca					x		
Brackish ostracods							
Depth (m)	**1.20–1.25**	**1.50–1.55m**	**1.80–1.85m**	**2.00–2.05m**	**2.40–2.45m**	**2.70 2.75m**	**2.80–2.85m**
Cyprideis torosa							xx
Loxoconcha elliptica							x
Freshwater ostracods							
Depth (m)	**1.20–1.25**	**1.50–1.55**	**1.80–1.85**	**2.00–2.05**	**2.40–2.45m**	**2.70–2.75**	**2.80–2.85**
Candona neglecta (juvs)							x

Organic remains are listed on a presence (x)/absence basis only

Foraminifera and ostracods are listed as follows: x = several specimens; xx = common; xxx = abundant/superabundant

- Brackish
- Calcareous foraminifera of low–mid salt marsh and tidal flats
- Agglutinating foraminifera of mid–high salt marsh
- Brackish ostracods of tidal flats and creeks
- Freshwater

Table 3.20 Borehole 1 (BH1) microfauna

interval, and these seem to be associated with weathering or near-surface groundwaters, formed before the onset of fully terrestrial conditions, or pedogenic activity (Candy 2005).

All the samples from Units 6 and 7 were unfortunately completely barren of any calcareous fossil material. The absence of any agglutinating foraminifera suggests that the site was freshwater (with tidal access therefore only beginning at 1.75m). Unit 7 (samples from interval 2.75–3.60m) contained calcareous tubes or rhizoliths in great abundance (externally with sand/silt grains, but internally with impressions of stems

Organic remains													
	Unit 4		**Unit 5**		**Unit 6**				**Unit 7**				
Depth (m)	**1.15–1.20**	**1.35–1.40**	**1.55–1.60**	**1.70–1.75**	**1.90–1.95**	**2.15–2.20**	**2.35–2.40**	**2.55–2.60**	**2.75–2.80**	**2.95–3.00**	**3.15–3.20**	**3.35–3.40**	**3.55–3.60**
Plant debris and seeds	×	×	×	×	×	×	×	×	×	×	×	×	×
Charcoal	×		×	×									
Iron/iron tubes	×	×	×		×		×						×
Brackish foraminifera	×	×	×	×									
Insect remains					×								
Rhizoliths									×	×	×	×	×
Fish bone										×			
Ecology	mid–high saltmarsh; some weathering and evidence of burning				riverine; some weathering/waterlogging				riverine; drying out				
	tidal access – brackish				freshwater								
Brackish foraminifera													
	Unit 4		**Unit 5**		**Unit 6**				**Unit 7**				
Depth (m)	**1.15–1.20**	**1.35–1.40**	**1.55–1.60**	**1.70–1.75**	**1.90–1.95**	**2.15–2.20**	**2.35–2.40**	**2.55–2.60**	**2.75–2.80**	**2.95–3.00**	**3.15–3.20**	**3.35–3.40**	**3.55–3.60**
Trochammina inflata	×	×	×××	×									
Jadammina macrescens		×	××										

Organic remains are listed on a presence (x)/absence basis only

Foraminifera and ostracods are listed as follows: x = several specimens; xx = common; xxx = abundant/superabundant

Brackish

Calcareous foraminifera of low–mid salt marsh and tidal flats

Agglutinating foraminifera of mid–high salt marsh

Table 3.21 Borehole 4 (BH4) microfauna

and rootlets) and concretionary masses. These are what Candy calls, respectively, rhizoliths and rhizoconcretions and they reflect, when associated with a freshwater environment, 'the drying out of the environment and the formation of fully terrestrial conditions either as a result of the initiation of a drier climate or because of sediment infilling/lateral migrations of the channel system. Rhizoliths, along with other calcrete types, are typically used to indicate the existence of a dry climate, either a semi-arid climate or a humid climate with pronounced dry months' (Candy 2005).

As rhizoliths may form over relatively short periods of time – the lifetime of the root, for example – these features may not represent a long-lived period of land-surface stability and soil development but could reflect a relatively short-lived land surface. At the moment there is no way of knowing the age of any of this pre-tidal sequence in BH4.

3.13 POLLEN

Rob Scaife

Sediments sampled (column <102>) in Trench 4 (see Fig 2.2) were perceived as having potential for pollen preservation and, with analysis, providing the possibility of ascertaining the local vegetation and environment (Fig 3.15). A pollen study has been undertaken which shows this to be the case.

METHODOLOGY

Subsamples of 2ml volume were processed using standard techniques for the extraction of the subfossil pollen and spores (Moore & Webb 1978; Moore et al 1991). The subfossil pollen and spores were identified and counted using an Olympus biological research microscope fitted with Leitz optics. Total pollen counts of up to 500 grains of dry land taxa per level were counted. All spores and pollen of freshwater marsh taxa (largely Cyperaceae), fern spores and miscellaneous (predominantly pre-Quaternary pollen and spores) were counted for each of the samples analysed. Pollen diagrams (Fig 3.16) were plotted using TILIA and TILIA-GRAPH (Grimm 1991). Percentages were calculated in as follows:

Sum = % total dry land pollen (tdlp) including halophytes

Marsh/aquatic = % tdlp + sum of freshwater marsh/aquatics

Spores =% tdlp + sum of spores

Miscellaneous = % tdlp + sum of miscellaneous (largely pre-Quaternary).

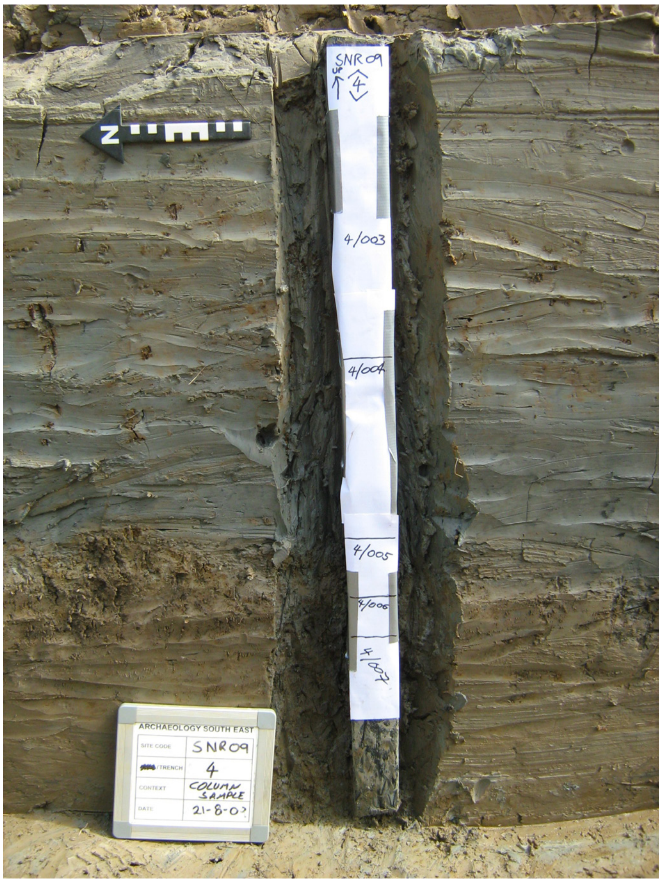

Fig 3.15 Photograph of column sample <102> in Trench 4

DATA

Pollen was obtained from the upper and lower parts of the profile, with poor preservation found between 1.40m and 0.65m. Overall, the pollen record is broadly homogeneous throughout with only minor changes in some taxa. As such, local pollen assemblage zones have not been designated. Where changes occur, these are described in text. The palynological characteristics of the sequence are as follows.

TREES AND SHRUBS

Overall, tree and shrub pollen numbers are subordinate to herbs. However, Chenopodiaceae (one of the herb group) was probably growing on or near to the site. This will have suppressed the represented values of other taxa within the pollen sum.

Quercus (oak; to 19%) and *Corylus avellana*-type (hazel; to 18%) are most important. There are also small numbers of *Betula* (birch), *Pinus* (pine) *Picea* (spruce), *Ulmus* (elm), *Fagus* (beech), *Tilia* (lime) and *Alnus* (alder). Thus a diverse but generally poorly represented arboreal flora is indicated. It is noted that *Pinus*, along with *Picea*, has slightly higher values in the lower part of the profile below 1.60m.

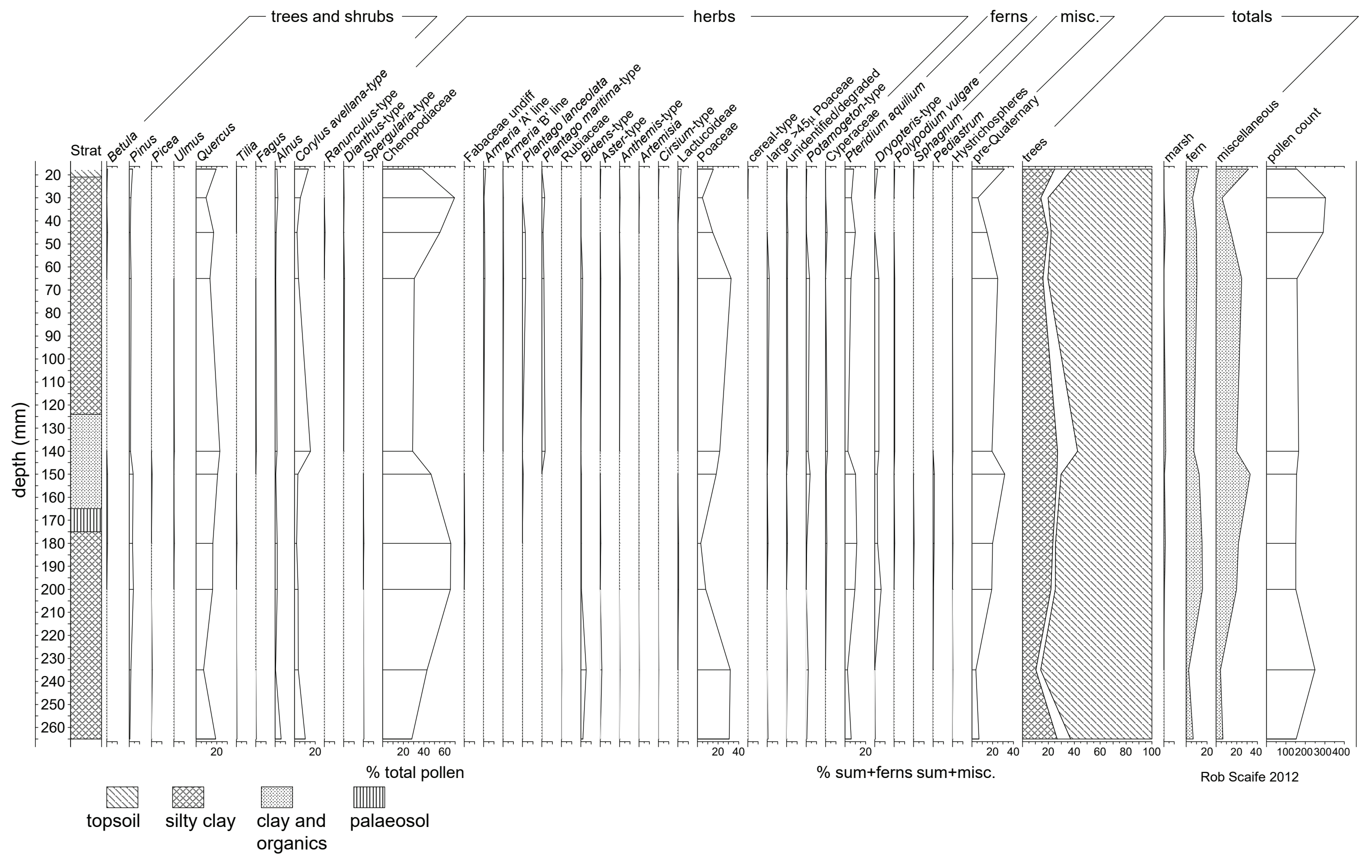

Fig 3.16 Pollen diagram from Trench 4 column sample

HERBS

Overall, herb diversity is low. However, halophytes are important and this group is dominated by Chenopodiaceae (goosefoots, oraches and samphire; to 70% of the pollen sum). Other halophytes include *Plantago maritima* (sea plantain), especially in the upper half of the sequence, with *Armeria* 'A' and 'B' line (thrift and sea lavender) and *Spergularia*-type (sea spurrey) and possibly *Aster*-type (sea aster?). Poaceae (grasses) are also important (to 35%) and may include halophytic types as well as from other plant habitats/ecotypes. Other non-halophytes include *Plantago lanceolata* (ribwort plantain) and Asteraceae (daisy and dandelion family).

FRESHWATER ELEMENTS

There are few freshwater/wetland aquatic taxa. They include a small but continuous representation of Cyperaceae (sedges) and occasional *Potamogeton*-type (pondweed). The latter taxon, however, may also derive from *Triglochin* (sea or freshwater arrow grass).

FERNS

Pteridium aquilinum (bracken) is most important (to 17%) and is more important from *c* 2.0m and 1.50m. Also present are monolete (*Dryopteris*-type; typical ferns) and occasional *Polypodium* (polypody fern).

MISCELLANEOUS ELEMENTS

These comprise very substantial numbers of pre-Quaternary, geological palynomorphs derived from reworked sediment and bedrock. Values are greater in the lower part of the sequence between 2.0m and 1.40m. Occasional cyst of algal Pediastrum and Sphagnum moss are also present in this unit (4).

INTERPRETATION AND DISCUSSION

The data can be viewed in terms of pollen derived from the on- and near-site vegetation (the autochthonous component) and that from off site (allochthonous).

THE ON-SITE (AUTOCHTHONOUS) COMPONENT

This pollen profile is very clearly dominated by halophytes (salt-loving or salt-tolerant plants). These consist largely of goosefoots, oraches and samphire with diagnostic taxa such as thrift and/or sea lavender, sea plantain and possibly sea aster and sea arrow grass. The former have higher values in the lower part of the profile expanding to a maximum at *c* 1.90m to 1.80m. Conversely, the latter elements appear to be of more importance in the upper part of the profile and it can be noted that thrift and sea lavender (*Armeria* and *Limonium*) are very under-represented in pollen spectra compared with Chenopodiaceae, and were probably of much greater importance than their small numbers suggest. This sequence may have been a change from mudflat created through regionally rising post-glacial sea level (for example, relative sea level; RSL). This is in the lower part of the profile (2.64m to *c* 1.50m. Samphire (*Salicornia*) may have been growing in this lowest salt-marsh habitat. Large numbers of reworked geological palynomorphs are also typical of such sediments from reworking of older sediments and from geological sediment. Higher pine pollen numbers are also diagnostic of such marine sediments because of the saccate pollen grains, which may float for substantial distances. This also explains the small numbers of spruce pollen, which is non-native. The latter were well preserved and not derived Pleistocene or earlier forms.

There is a gap in sedimentation and poor pollen preservation from 1.40m to 0.70m. In or above this zone, there is a clear increase in pollen diversity with the incoming/expansion of middle salt-marsh taxa noted above (thrift, sea lavender, sea plantain). This represents the stabilisation of the mudflat through sediment accretion allowing formation of typical salt marsh. A tentative palaeo-land surface was recognised at 0.39m to 0.28m and this would be in accord with the pollen data showing stabilised salt marsh. This habitat remained until the top of the sampled profile.

THE OFF-SITE (ALLOCHTHONOUS) DRY-LAND VEGETATION

As noted, the substantial numbers of halophytes (largely Chenopodiaceae) have depressed the percentages of the extra-site taxa because of their on-site and very local importance and for the purposes of this study have been included in the overall pollen sum. Overall, there are few changes in the arboreal and shrub taxa throughout the profile. Oak and hazel are the most important taxa represented. These are anemophilous trees and are likely to have been transported from the broader region.

This also applies to birch, pine (see above) and alder, none of which may be regarded as of significance here. Lime and beech are by comparison less well represented and small numbers of their pollen may imply some growth (Andersen 1970). However, numbers here are small and with the possibility of fluvial, marine transport from farther afield, they are probably also of significance. It is concluded that the local and regional vegetation consisted largely of oak and hazel. This has implications for the dating of the site (see below).

In addition to the arboreal/shrub flora, herbs are present. These include the halophytic elements noted above and also taxa of drier ground. These are, however, limited with only relatively small occurrences of, especially, grasses (of which part is undoubtedly from salt marsh) and ribwort plantain, which are indicative of grassland, possibly pasture. A single cereal pollen grain was observed at the top of the profile. Grains recorded as 'large Poaceae' may include pollen of cereals but are more probably from specific, wild grass types with large but less robust pollen grains (eg, *Elymus* and *Glyceria*). Terrestrial herb taxa noted are more abundant in the upper part of the profile and are associated with the phase of stabilisation of salt marsh after mudflat. It is probable that taphonomy has played a role in the representation of such taxa.

CHANGING VEGETATION

Overall, the pollen flora demonstrates a strong brackish marine habitat. Initially, mudflat with perhaps samphire (*Salicornia*) existed. This developed into salt marsh with typical halophytic elements (sea plantain, thrift and/or sea lavender, oraches and other taxa).

The terrestrial woodland flora was made up largely of oak and hazel, although it is probable that less well-represented taxa (eg, lime, beech, ash) may have been present away from the sample site. However, it does appear that the sediment sequence probably post-dates the periods of lime dominance in the landscape.

There is poor representation of herb communities, including agriculture, with only minimal representation of cereal pollen and some possible grassland.

It is stressed that the taphonomy may be complex with pollen input from typically less well-represented taxa possibly not reaching out on to a possibly large mudflat or salt-marsh habitat. Furthermore, fluvial (freshwater, brackish and marine) transport may also have contributed to the pollen record.

3.14 GEOARCHAEOLOGICAL AND PALAEOENVIRONMENTAL SUMMARY

The stratigraphic evidence indicates that the following key factors can be identified.

Clear evidence of fluvial gravel deposition (Group II sediments) beneath the floor of Milton Creek has been obtained on all transects examined (Fig 3.9). This observation confirms that made in Ruddy 2009. The age of these deposits is unknown but given their location beneath the Holocene sediments the simplest interpretation would be that they are of latest Pleistocene age, perhaps immediately post-dating the last glacial maximum (but see below).

Other Pleistocene sediments consist of the Group III sediments that were previously identified beneath the slope but not the marsh (Ruddy 2009). In our study it is clear that these deposits are of a variety of origins and include reworked river gravels as well as slope wash and probable loess. The age of these deposits is not clear in all cases but the ridge of soliflucted sediments mapped by the EM 31 survey clearly lies on top of the fluvial gravels in places and so may be younger than the last glacial maximum. However, elsewhere in the Medway catchment around Kingsnorth Power Station similar stratigraphies, at similar elevations in the landscape, have been shown to be considerably older and date to at least 150,000 BP (Bates et al 2017) and therefore these deposits may belong to marine isotope stage 6 or older.

The surface of the Group III sediments describes the surface in the early to middle Holocene – for example, this is the land surface on which human activity from the Mesolithic through the later prehistoric period occurred. The surface was identified and studied in detail through micromorphology and microfauna assessment as the Unit 4/Unit 5 contact described above. The presence of a ridge of higher ground extending south-east into a lower-lying area of probably wetter ground may have formed a focus for human activity. This land surface has been investigated through micromorphology, microfaunal and pollen analysis. It represents a stable, relatively long-lived land surface on the edge of brackish estuarine marsh. The land surface shows evidence of local truncation and extensive burning. Rise in sea level seems to have led to a muddy inundation of the site and formation of salt marsh, sealing this land surface at depth. The land surface is undated but appears to be late prehistoric in age given the presence of struck flint.

Holocene sedimentation on this land surface began with the accumulation of the Group IV sediments. In some places, this consisted of peat or organic-rich silt, in others of silt-clays. Accumulation may have begun under freshwater conditions or with the presence of brackish water. Through time brackish creek/mudflat situations developed, leading to the deposition of the Group V sediments.

Localised Holocene slopewash occurred on the slope, leading to the deposition of the colluvial sediments of Group VI. The age of this event remains difficult to place but was at least partially contemporary with the accumulation of Group IV/Group V sediments as is shown by the intercalation of sediments in GTP5.

The evidence from the boreholes and the geophysics provides a picture of landscape development over both the Pleistocene and Holocene periods. The topographic setting is of significance in terms of exploitation of wetland situations and may explain the abundance of archaeological remains at the site.

3.15 RADIOCARBON DATING

Two samples of cremated bone were submitted for AMS radiocarbon dating at the Scottish Universities Environmental Research Centre (SUERC). The purpose of submitting the samples was to refine the dating of the associated features, which were cremation burial [406] and pit [423].

Details of the radiocarbon date are given in Table 3.22, quoted in accordance with the international standard known as the Trondheim convention (Stuiver & Kra 1986), and are given as conventional radiocarbon ages (Stuiver & Polach 1977). Calibrated dates at the 95% confidence level, obtained using Oxcal v4.3 with calibration curve IntCal13 (Reimer et al 2013), are also given.

Laboratory code	Context no	Material	Analysis method	Conventional radiocarbon age (BP)	δ13C (‰)	2-sigma calibrated date (95% confidence)
SUERC-32612	[406]	cremated bone	AMS	3155 ± 30	-22.6	1505–1315 cal BC
SUERC- 32613	[424]	cremated bone	AMS	3790 ± 30	-24.2	2340–2130 cal BC

Table 3.22 Radiocarbon results

CHAPTER 4 DISCUSSION

4.1 THE EARLIER PREHISTORIC EXPLOITATION OF THE FORESHORE

Kemsley Down, located at the end of an elevated ridge of land protruding into Kemsley Marsh, attracted settlement from the Neolithic period onwards. While the focus of the settlement shifted around the ridge top, the easily ploughed brickearth and gravel geology to the south and west and the resource-rich marshes and rivers to the north and east acted as a constant attraction (see Fig 1.4).

Although only Neolithic and Roman *in situ* archaeological deposits were found on the foreshore of Kemsley Marsh, we cannot dismiss its exploitation during other periods. Many foreshore activities, such as fishing and fowling, leave little archaeological trace and only a tiny area (less than 100 square metres) was fully investigated. Moreover, much of the former foreshore has been lost to erosion or buried by alluvial deposits. However, as this investigation has amply demonstrated, important prehistoric stratified deposits still survive in Swale Marsh, and evidence of other seasonal foreshore camps should be anticipated by future fieldwork.

4.2 THE MIDDLE BRONZE AGE BARROW AND SETTLEMENT AT KEMSLEY

Ring-Ditch 1 (RD1) on Kemsley Down overlooked the adjacent Middle Bronze Age settlement at Kemsley Fields and is the first funerary monument associated with the site to have been found. However, although barrows are generally rare in north Kent, more barrows associated with the settlement probably lie on the prominent high ground to the north, possibly marking off the edge of the settlement from the outside world. Further afield, the spurs of high ground extending into Swale Marsh are other likely locations for these monuments.

The lack of identified Late Bronze Age to Late Iron Age activity echoes the findings of other excavations both in the near vicinity and in much of north Kent. While this appears to indicate a genuine absence in occupation during this period, the reasons for this hiatus are still unknown, and it remains an important research question to be addressed.

4.3 THE LATE IRON AGE/EARLY ROMAN SETTLEMENT AND ITS ABANDONMENT

The most extensive archaeological features found during the investigations related to the edge of a Late Iron Age/Early Roman enclosed farmstead (ENC1/ENC2), lying mostly beyond the site to the east. Although similar settlements are frequently found on the north Kent plain, and are also famously alluded to in Caesar's *de bello Gallico* (v.12), this is the first time one has been identified on Kemsley Down.

As Bishop and Bagwell commented, many excavations in north Kent, including this one, produce a strikingly similar late prehistoric chronology: Bronze Age fields and settlement abandoned by the Early Iron Age, followed by a lacuna until settlement is re-established in the Late Iron Age, only to be abandoned again just after the Roman Conquest (Bishop & Bagwell 2005, 128). These sites are also topographically similar: elevated positions overlooking the coast, often by navigable inlets with ready access to the Thames estuary and beyond. This abundance of waterside locations appears to demonstrate the importance of communications and travel in the late prehistoric period (ibid).

It is difficult to view the widespread abandonment of these settlements just after the Roman Conquest as anything other than a hostile land-seizure causing a traumatic displacement of the indigenous people. Although the details of the land tenure restructuring is difficult to elucidate from the archaeological record, the villas at Murston and Milton seem to have been a planned insertion into the landscape. This is more likely to have been at the direction of some form of central authority, taking over the lands and their production, than a series of localised responses by native landowners to the new political regime (Bishop & Bagwell 2005, 130–1).

Elsewhere in the south-east, evidence of abandonment is not prevalent, with continuity and expansion of settlement between the Late Iron Age and the 2nd century AD being more common (Smith et al 2016, 83–4). Nevertheless, some areas such as the Middle Thames Valley and the Sussex Coastal Plain do have good evidence for a similar settlement abandonment, and this serves to illustrate the diversity of post-Conquest experiences in the region (ibid, 89).

4.4 ROMAN SALT PRODUCTION

Saltern [196], identified at the edge of Kemsley Marsh, is unique in the region and offers some important insights. An overview of Iron Age and Roman salt production in Kent identified four main areas (Hoo peninsula, Medway estuary, Romney Marsh mainland and Romney Marsh coastline; Hathaway 2013). The Medway estuary has by far the densest concentration of sites and can be further divided into three subgroups (two in the Medway estuary and one on the Upchurch mainland; Fig 4.1). The salt-production site at Kemsley Marsh falls broadly within the Medway estuary sites (Hathaway's group 2) although it is outside the subgroups, the closest of which, the Upchurch mainland (Hathaway's group 2c), lies some 4km to the north-west. Kemsley Marsh can thus be considered a new, separate subgroup centred on the middle reach of the Swale (extending Hathaway's groups to 2d; Fig 4.1). A further possible area is located on the Isle of Harty to the east but, owing to the lack of investigation, this is mostly undated (Fig 4.2).

Kent's long coastline has many low-lying areas ideal for salt production, and it is no surprise that the county has more prehistoric and Roman salt-production sites than any other with a coastline in the south (Hathaway 2013, 269). Within Kent itself, by far the greatest concentration of salt-production sites is located along the Thames estuary around the Isle of Sheppey, Swale and Hoo peninsula (ibid). While the efforts of local archaeological groups active in these areas have definitely added to the abundance of identified sites, this concentration is also a reflection of the industrial development of the Thames estuary during the Roman period. Salt is just one of a number of industries that have been archaeologically attested along the estuary, including oyster beds, tile and pottery manufacture, brewing and abundant agricultural production (Biddulph et al 2012, 174). From the Roman city of London eastwards along the estuary the coastline has been described as 'a corridor of economic and social opportunity' (ibid, 173) and can be described as a major mercantile zone.

A QUESTION OF OWNERSHIP: IMPERIAL VS PRIVATE

Hathaway's geographical grouping of salt-production areas in north Kent (2013; Fig 4.1) is particularly useful when trying to understand the relationship between these areas and the wider Roman landscape. Who owned the major areas of salt production in Roman Britain and how they were organised are questions that have been considered by many authors (Drury & Rodwell 1980, 63; Salway 1981, 189, 224; Rippon 2000, 96–116; Hurst 2006; Mattingly 2007, 362–3; Biddulph et al 2012, 174–5; Dawkes 2017, 286–8; Allen et al 2017, 212–16). One recurrent idea is that Britain's major salt-production areas were under some form of Imperial control, either directly as Imperial estates or indirectly through a franchise system that involved local elites centred on local villas. This is largely based on evidence from elsewhere in the Empire as explicit evidence of control is lacking in Britain (Mattingly 2007, 362–3). While this view has had its detractors, primarily Millet (1990, 120), in the most exhaustive review of the subject to date, and after reviewing each coastal area in its local context, Rippon concluded that if the industry was not under Imperial ownership then at the very least the state authorities took a close interest (2000, 116).

Compared to the other major Thames estuary salt-producing areas, such as the Hoo peninsula (Hathaway's group 1) and south Essex, the Medway estuary and Swale sites (Hathaway's group 2) are in close proximity to numerous villas (Fig 4.2; Table 4.1). The absence of villas from the Hoo peninsula and south Essex has been previously noted, and it is largely this that has led to the interpretation that these areas were Imperial estates (Drury & Rodwell 1980; Dawkes 2017, 286–8).

However, the Medway and Swale salt-production sites appear, at least superficially, to have been located in a landscape more typical of the rest of north Kent, with numerous forms of settlements and an abundance of villas. This clearly raises the question: are the Medway estuary/Swale salt-production sites controlled by the adjacent villa estates, either as private enterprises or as Imperial franchises?

Several villas lay immediately south of the Hathaway's group 2 salt-production sites, and two potential villa sites were located very close to the Kemsley/Milton Creek salt-production sites and mounds (proposed group 2d). Boxsted villa was only *c* 1km from the edge of the Medway marshland and the salt-production sites in Hathaway's group 2c (Figs 4.1 and 4.2; Table 4.1). Hartlip villa may also have been involved in the production, possibly with Hathaway's group 2a, but was slightly further away (*c* 3.5km) from the edge of marshland.

Around Milton Creek were two likely villas, at Milton Regis and at Murston. Neither has been subject to large-scale archaeological excavation, but large stone buildings have recorded at both locations (Kent HER nos TQ96 NW8; TQ96 SW9). Roman masonry remains were identified during the building of an extension to Milton Regis church in the 1870s and work in the 1970s by amateur groups recovered box-flue tiles but few features (TQ96 NW8). At Murston, foundations

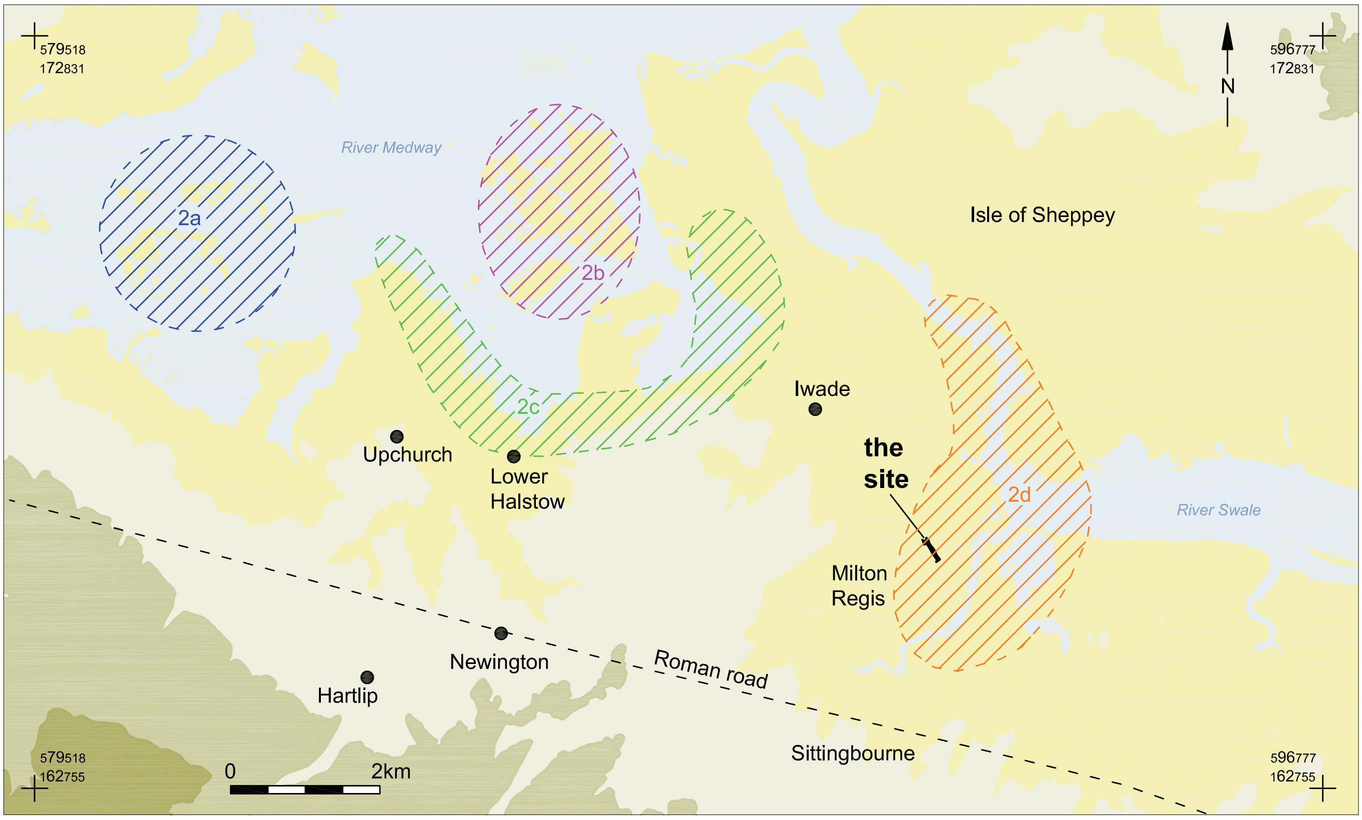

Fig 4.1 Location of Roman salt-production areas in the Medway estuary (after Hathaway 2013)

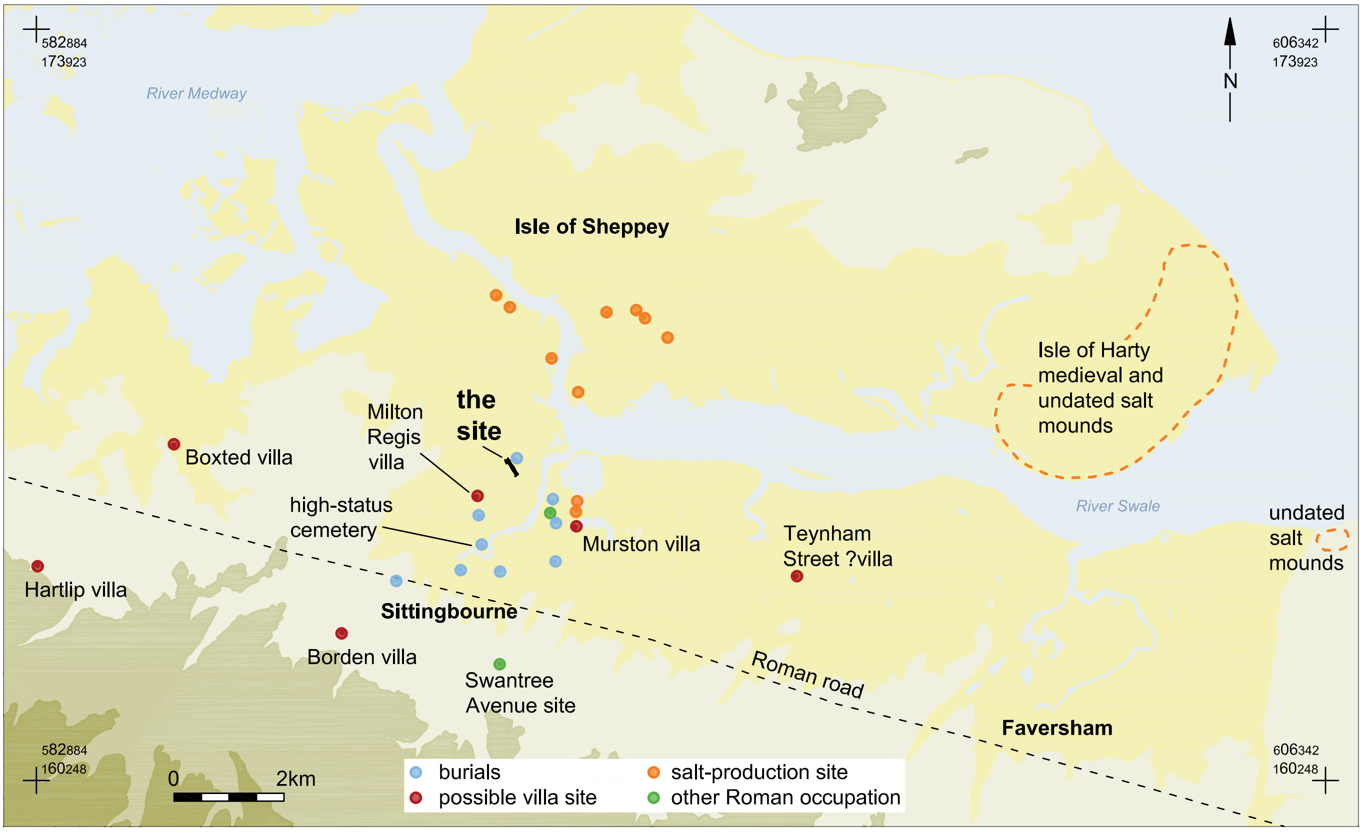

Fig 4.2 Location of Roman occupation in the Medway estuary

of a big stone building were found in the 1930s. Finds included wall plaster and an abundance of roof tile (TQ96 SW9). While neither of these buildings is even remotely well understood, they do clearly contain elements characteristic of villa buildings, such as stone foundations and box-flue tile.

Moreover, there is the evidence from nearby burial grounds, among them an exceptionally high-status inhumation cemetery about 1km south of the Milton Regis church site (TQ96 SW6). This cemetery was dug in the later 19th century and contained at least six lead coffins, some of which were highly decorated and were accompanied by notable grave goods, including gold wire rings and exceptional glassware (Payne 1874, 164–73). Many other Roman burial sites, including Cremation Cemetery 1 on Kemsley Down, are known from both sides of Milton Creek, and it seems clear that this was an area of sustained settlement including at least two high-status residences.

Precise chronologies of the villas and salt-production sites in the region are not yet possible, as both suffer from a lack of large well-dated pottery assemblages and few radiocarbon-dated samples. Much of the work done on the villas was by antiquarians in the 19th century and few have been formally excavated. Similarly, our knowledge of salt production is greatly hampered by few of these sites having been subjected to modern archaeological excavation techniques. However, from the dating evidence that is available both the villas and the salt-production sites seem to have had relatively long lives, and it is therefore quite feasible that at least some of the six villas in the Medway estuary and Swale were in existence during the heyday of the adjacent salt-production industry. A possible relationship between villas and salt production in central Essex has also been postulated (Biddulph 2012, 174–5).

While at present there is no conclusive evidence to link villas with nearby salt production the relationship cannot be entirely ruled out, and this is part of a wider problem of linking the ownership of peripheral activities to villa cores. Thirty years ago Todd (1989, 14) complained that ‘it is remarkable how ill-informed we are on the whole about the units in which land was owned’ and the problem is still as pertinent today.

Nevertheless, it seems highly unlikely that these marsh-edge villas were not somehow engaged with the extensive tracts of open marshland on their doorstep, with the opportunities they provided for salt and pottery production as well as seasonal grazing. Rippon has described these as ‘federative estates’, in the sense that they were straddling a number of ecological zones with specialist resources to exploit (2000, 125).

On a countrywide level, after an initial post-Conquest boom in salt production the industry in the south-east declined during the 2nd and 3rd centuries, and was replaced in the Late Roman period by expansions in the west, particularly around the Severn estuary and at inland sites such as Droitwich and Chester (Rippon 2000, 110–16).

Rippon considers that the salt industry was always an Imperial monopoly, subject to the same control as other minerals, such as iron in the Weald and lead mines in the Mendip Hills (2000, 115). He believes that the change in focus of the salt industry in the later Roman period was largely due to the role of the state and the presence of the army and its demands for goods. Inland springs had higher concentrations of brine and were more efficient producers, while western salt-production areas enjoyed the additional advantage of being much closer to the major market of the army in the north and west in the later Roman period. Rather than the sprawling estuary sites along the Thames, these western areas were more centralised and easier to control (ibid, 116). The organisation of the salt industry in Roman Britain remains ill-understood, however, and a recent national survey concludes there is ‘as yet, only limited and indirect evidence for state or military control’ (Allen et al 2017, 215).

Nevertheless, despite the absence of the army, the decline of urban centres and the regional economic malaise there persisted a market for salt in the south-east. Recently a substantial Late Roman salt-production centre was identified at Stanford Wharf, Essex (Biddulph et al 2012), though this site does appear exceptional and some limited evidence points to an association with a low-level military presence (ibid, 175).

Pottery is another industry in the Thames estuary region that is likely to have been intimately connected both with villas and with salt. Indeed, pottery and salt production may both have been under the same mechanism of control. The overlap between the production areas of the two industries is striking: the Hoo peninsula and Medway estuary/Swale coast in Kent; south Essex; Rowlands Castle and Solent in Hampshire; and around Poole harbour in Dorset (Monaghan 1987; E Biddulph, pers comm). The pottery kilns may have supplied the containers for the salt to be transported, although identifying this in the archaeological record is difficult. However, one possible instance where this link has been demonstrated is Springhead, where there was both evidence for secondary salt processing and an abundance of north Kent shelly ware (Seager Smith et al 2011, 55; Poole 2011c, 323).

Site name	Type	Comment	Date (AD)	Reference
Boxted	villa	winged corridor stone building; tessellated floors	100–300?	Payne 1883
Hartlip	villa	complex of at least six stone buildings; hypocaust; bathhouse; tessellated floors	80–350?	Roach Smith 1852, 1–24
Teynham Street	villa?	antiquarian note of a stone Roman building	ended by 400?	Payne 1900, liv
Borden	villa	three stone buildings; hypocaust	100–300?	Page 1974, 105
Milton Regis	villa?	antiquarian record of Roman walls under medieval church	uncertain Roman date	Kent HER no TQ96 NW8
Murston	villa?	large stone building; wall plaster, roof tiles	uncertain Roman date	Kent HER no TQ96 SW9

Table 4.1 Villas and possible villas near the Medway estuary and River Swale

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Journal title abbreviations generally follow those of the Council for British Archaeology.

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A series of archaeological investigations carried out along the route of the Sittingbourne Northern Relief Road identified a multi-period site dating from the earlier prehistoric to the Roman periods.

A small assemblage of residual Palaeolithic and Mesolithic/Early Neolithic flint represented the oldest activity, but the earliest features were Neolithic/Early Bronze Age pits, waterlogged alluvial deposits and an occupation horizon. A Middle Bronze Age ring-ditch with central cremation burial was found on Kemsley Down and was probably contemporary with the Bronze Age settlement previously identified at the nearby Kemsley Fields site. The Late Bronze Age period was poorly represented although recovery of pyramidal loom-weights suggest that there was probably a domestic building in the near vicinity.

In the Late Iron Age/Early Roman period a field system and possible enclosed settlement were established on Kemsley Down and the majority of finds and features are dated to this period. The settlement was ideally located on the higher and drier land overlooking Milton Creek with the opportunity of exploiting the resources of both the marsh and the surrounding fields.

By the 2nd century AD, the settlement was abandoned and the area by the ring-ditch used as a small cremation cemetery. In addition, a salt-evaporation hearth or saltern was identified on the edge of the marsh. Considering the importance of the Roman salt-production industry in the Thames estuary, surprisingly few sites have been subject to modern archaeological excavation techniques, and this saltern is a rare find in the region. In a wider context, the possibility that exploitation of the natural resources of the foreshore was controlled by the local villa estates is explored.