Excavations of Salterns at Fenland Way, Chatteris and Camel Road, Littleport, Cambridgeshire

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Two sites excavated by Cambridge Archaeological Unit have revised our knowledge of saltmaking in Cambridgeshire. At Littleport, a dump of industrial waste from a nearby saltern at the side of the Old Croft River contained briquetage from both the Iron Age and Roman periods. Meanwhile, at Chatteris, a saltern was located many kilometres from the nearest known zone of saltmaking and may have been used intermittently through the late Iron Age and into the beginnings of the Roman period.

Archaeological investigations were undertaken by the Cambridge Archaeological Unit (CAU) on two saltern sites located respectively at the edge of Chatteris and Littleport, Cambridgeshire (Fig.1). With both excavated within three years (2013–2016), the two sites present a good opportunity to compare and contrast the character of later prehistoric/Roman saltmaking at two fenland sites.

Both sites are located on the edge of what are essentially 'islands' within the Cambridgeshire Fens and more specifically close to the point at which 'dryland' gives way to peat fen. Fenland Way, Chatteris, lies at approximately 2–3m AOD on the western side of Chatteris where the underlying geology comprises Ampthill Clay. The setting of the site at Camel Road, Littleport is slightly different in that it sits on the roddon of the Old Croft River, a former channel, which extended northward from Littleport. Effectively a spine of dry land formed by water-lain sand and silt deposits, which rises above the surrounding peat at just 1m AOD, the Old Croft River roddon was first identified as a saltmaking site by survey undertaken as part of the Fenland Project (Hall 1992). Contemporary channels/creeks at Littleport appear highly likely to have held brackish water, and the Old Croft River roddon seems to have provided an ideal location from which to exploit this resource. In contrast, at Chatteris, no previous evidence of saltmaking has been recorded and there is also no palaeoenvironmental record of a nearby contemporary saltwater creek.

This paper is divided into two parts, each detailing and discussing the results of the respective archaeological excavations and analysis of the associated briquetage assemblages. This is followed by a discussion considering the character of the two sites and their contribution to our knowledge of Iron Age and Roman salt production in the East Anglian Fens.

PART I: Fenland Way, Chatteris

Excavations on land west of Fenland Way, Chatteris (centred on TL 3881 8649), took place during 2013 ahead of construction of a supermarket. Situated approximately 500m west of Chatteris town centre and immediately to the west of Fenland Way (the A141), the development area comprised a total of *c.* 8ha either side of Fenton Lode/Twenty Foot Drain.

Palaeoenvironmental investigations undertaken as part of the Fenland Project (Waller 1994) indicate that prior to the Bronze Age, the north, east and south-western edges of Chatteris island were bordered by marshland with channel networks stretching from the River Ouse on the west side of the parish. By the Iron Age and Roman periods, peat had formed over much of the landscape surrounding the island. During this period, the River Ouse occupied its prehistoric course, flowing north towards The Wash some 2km west of the development area, and any marine influence appears likely to have been largely confined to this channel. Iron Age activity is recorded in the east and northeast of the island and includes at least six occupation/settlement sites and two cropmark complexes (Hall 1992). Extensive remains of an 'open settlement' at Langwood, just over 3km to the east of Fenland Way, extend over *c.* 10ha and span the Early–Late Iron Age whilst the site also has a large Roman component (Crowson *et al*. 2000; Evans 2003). Significantly, however, no previous evidence of salterns had been found on Chatteris island.

Excavation Results

Following the discovery of evidence of saltmaking and a number of ditches during a trial trench evaluation (Tabor 2012), investigations in 2013 involved open-area excavation along with further trenching and an intermittent watching brief during groundworks (Hogan 2014). Having identified a high degree of truncation associated with the construction of

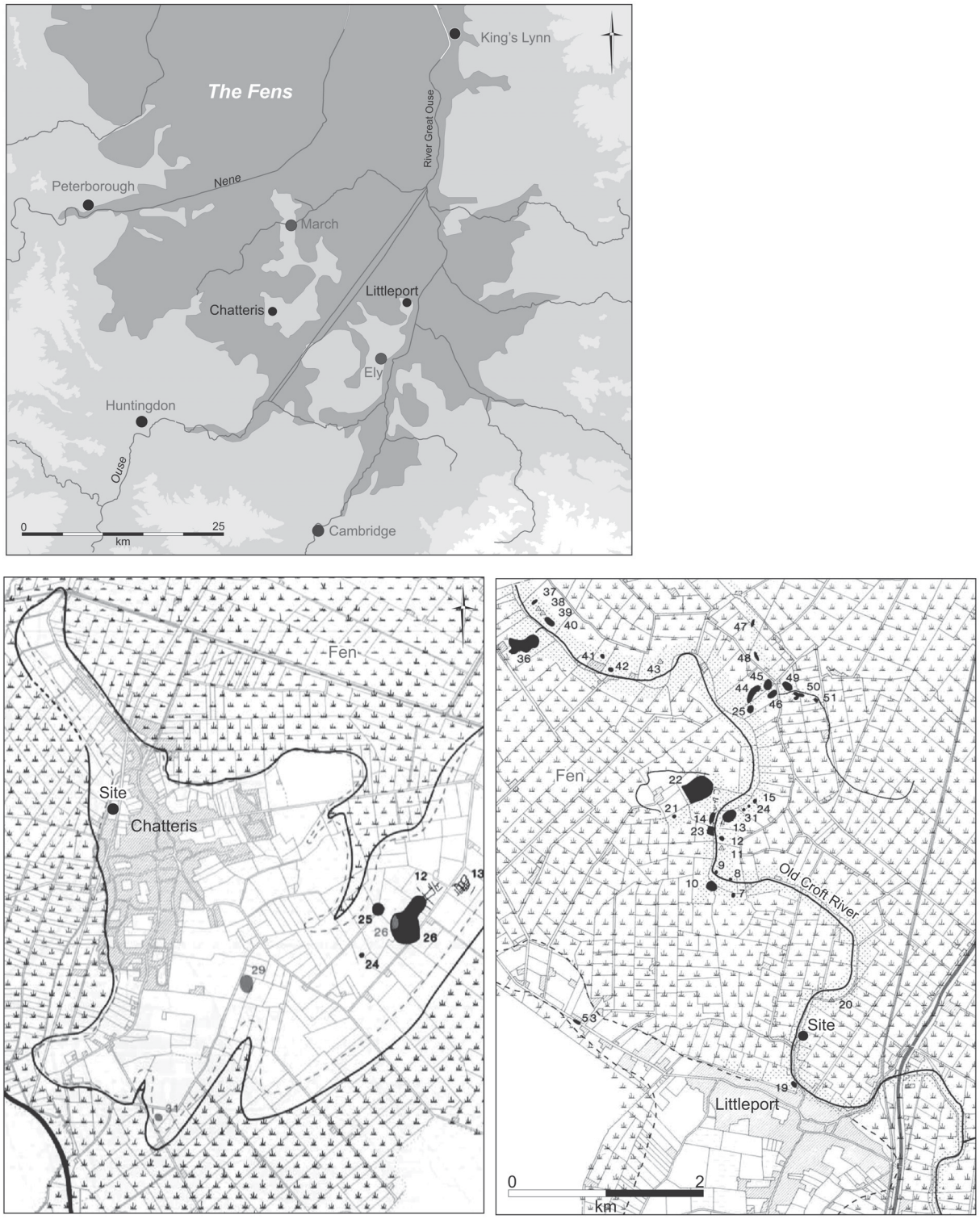

Figure 1. *Site locations. Plotted on the respective parish maps published by the Fenland Project (Hall 1992 and Hall 1996) the sites' fen edge locations are also highlighted. The numbered sites are those listed by the Fenland Project. At Chatteris they largely relate to the large Iron Age–Roman site at Langwood Farm whilst at Littleport all are saltern sites, sometimes coinciding with evidence of settlement and fields/enclosures, situated along the roddon of the Old Croft River and considered to date to the Roman period.*

Fenton Lode/Twenty Foot Drain in the west and north of the site, excavation focussed on a less-disturbed area (0.43ha) in the south of the Development Area.

At least four phases of archaeology were evident comprising a saltern – complete with hearth/oven, enclosure and 'settling' tanks/reservoir pits (Fig. 2) – alongside multiple phases of Late Iron Age/Early Roman period field system and evidence of nearby settlement.

The Saltern

The focal point of the excavation was the saltern, a term used herein to describe the group of features connected with saltmaking at the site (the heating structure, encircling/enclosing gullies and the various pits). The saltern enclosure consisted of a sub-rectangular arrangement of gullies, aligned broadly east-west and with the hearth/heating structure at its centre. Comprising multiple segments of gullies, the enclosure appears to have had multiple phases or at least multiple alterations during its lifetime. Finds from the enclosure fills were generally restricted to briquetage, which occurred in relatively large quantities, and just 89g of animal bone; no pottery was recovered.

The Saltern Enclosure

The enclosure measured some 15m by 9m and consisted of a series of discontinuous gullies. The northern arm comprised a shallow, truncated gully (F.57) which contained a re-deposited clay fill with virtually no briquetage; it was cut by later ditches F.86/101 and F.80 at its eastern end. The eastern arm was formed by gully F.51. Possibly a continuation of F.57, this was considerably narrower and completely infilled with briquetage fragments, which could represent former packing material, thus implying that the gully may have supported a small fence, shielding the heating structure from winds. To the west, the enclosure comprised two narrow gullies apparently representing successive phases of boundary which could be clearly differentiated by their fills; the earlier ditch (F.127) being relatively sterile whilst the later gullies (F.109) were charcoal- and briquetage-rich. Further evidence of a potential screen or fence were also found in this part of the enclosure with three associated postholes situated along its line (F.110, F.111, F.147 and F.114, F.115, F.131). To the south, the enclosure comprised two gullies and an elongated pit each separated by a gap of *c.* 1m (F.76, F.139 and F.104) which cut a series of earlier saltern pits (see below). Gully F.76 had a steep U-shaped profile (0.24–0.3m wide by 0.16–0.18m deep) whilst gully F.139 (0.4–0.78m wide by 0.14–0.28m deep) had a distinctive profile, with a slot in its base, again suggesting the potential presence of a fence. Both gullies contained concentrations of briquetage within their fills. Elongated pit F.104 measured just 1.6m in length and was 0.6m wide by 0.25m deep; the gully contained several almost complete briquetage evaporation containers and pedestals, seemingly 'dumped' in a heap at its base (Fig. 3); on no occasion elsewhere were such 'complete' portions of briquetage containers found. Finally, a gap in the southeast of the enclosure may represent an entrance.

The enclosure itself, therefore, appears likely to have been fenced on at least three sides – to the south, east and west – and although defined by a gully on its northern side was potentially 'open' to the north. The heating structure itself, located at the centre of the enclosure, was a large rectangular pit (F.106) in-filled with successive layers of burnt clay/briquetage fragments and charcoal- and ash-rich deposits.

The heating structure

This consisted of a large rectangular pit (F.106), which was aligned east to west and measured 2.5m by 1.4m. Within this larger pit, which was back-filled with silty clay and apparently formed some kind of substructure, a noticeable depression at its centre represented a fire pit fed by /feeding a short flue on its eastern side. The basal fill of this fire pit comprised a mixture of burnt clay 'lining' with briquetage fragments and a thick lens of charcoal and ash (context [359]). Immediately above these was a layer of re-deposited natural clay. The upper edges of the fire pit (context [360]) consisted of mid reddish brown burnt clay with embedded fragments of burnt briquetage. The remainder of the fire pit fills comprised successive layers of burnt clay and briquetage fragments and charcoal and ash-rich silt lenses. Six postholes located in the vicinity of the heating structure appear likely to be related to one or more of its various phases and may represent the remains of some sort of temporary structure or screen.

This sequence of fills suggests phases of use, build-up and collapse as well as episodic cleaning-out of the hearth and re-lining the fire pit. Within the uppermost exposed fills of the fire pit two concave imprints of evaporation trough bases (round-based) were recorded. These imprints were both aligned lengthways along the central fire pit with the earlier set slightly askew from the east-west alignment. Their position appears not to reflect how both they and the hearth were used in salt production; in use it seems more likely that several briquetage evaporation containers would have been placed adjacent to each other, widthways above the central fire pit and held in place by briquetage 'spacers/clips' and 'pedestals'. Indeed, evidence for spacers was found amongst the discarded briquetage material in adjacent pits and features. Furthermore, no evidence for pedestal imprints was found during excavation of the hearth to suggest that the trough imprints represented their intended positioning in the hearth.

In total 21 pits were excavated within the immediate vicinity of the saltern hearth, most evidently representing the remains of processes associated with salt production. Different phases were identified during excavation, although the precise function of each pit was not always evident. Most seem likely to have been reservoir pits and settling 'tanks' associated with the storage of brackish water and the settling-out of silts and heavy material prior to evaporation. Some of the early pits particularly also seem likely to have performed a two-fold function so that the clay extracted whilst digging the pit may have been used in the manufacture of briquetage (as suggested at March; Lane *et al.* 2008) or as feature lining.

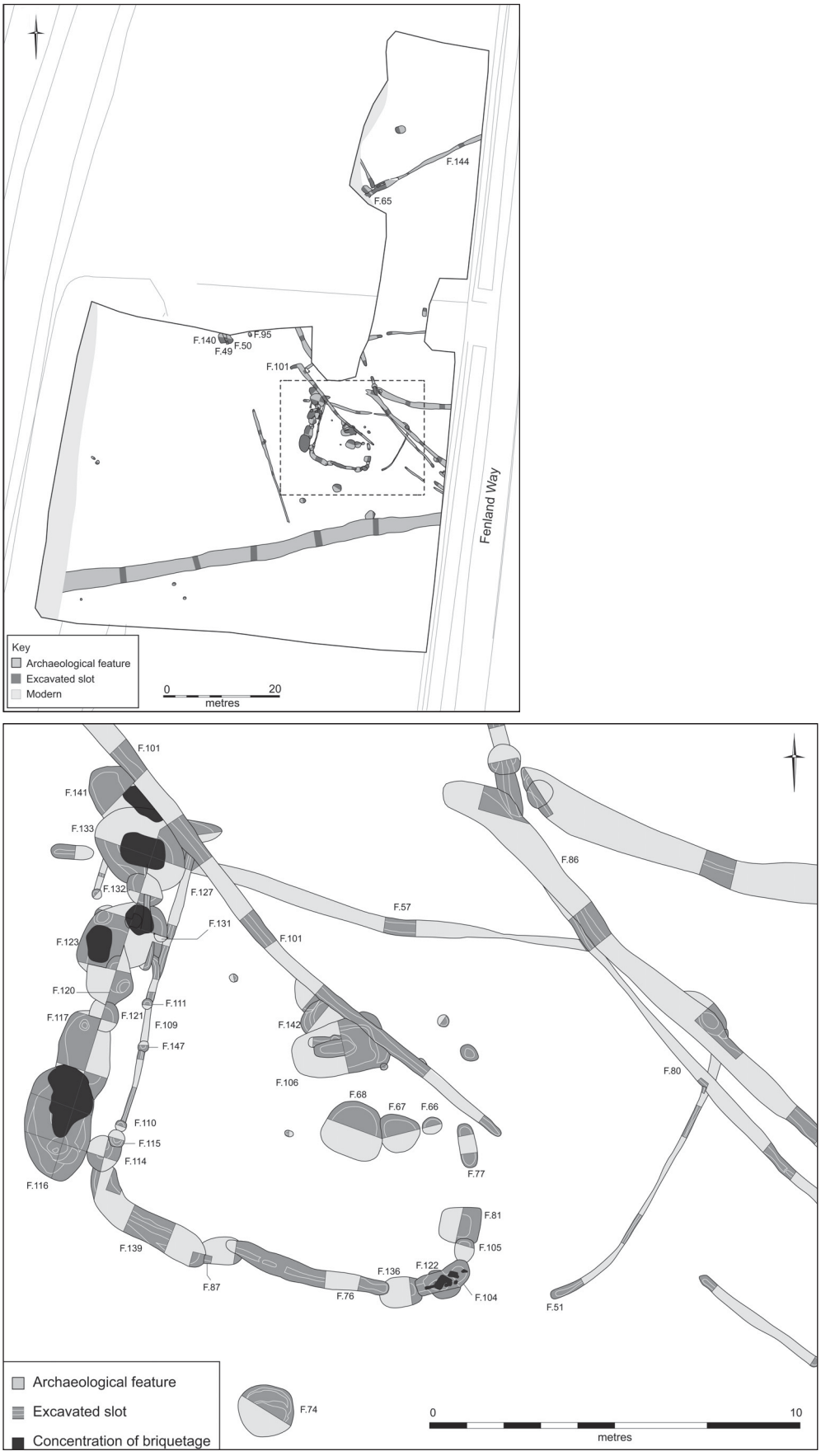

Figure 2. *The Fenland Way saltern, Chatteris.*

Pits F.66, 67, 68 and 77

Immediately adjacent to the hearth, three heavily truncated circular pits (F.66, F.67 and F.68) were excavated which contained only a few fragments of briquetage. Given their proximity to the hearth these shallow pits (0.5–1.6m in diameter by 0.07–0.1m deep) were likely to be the remains of settling tanks. One further pit in this area, an elongated oval feature (F.77; measuring 1.3m by 0.45m by 0.15m deep) was located immediately east and contained a large quantity of briquetage. It may also have been used as a small settling tank, although it was markedly different in form to Fs. 66–68.

Immediately to the west of the saltern enclosure, a linear arrangement of inter-cutting pits followed the line of the enclosure's edge. Two principal phases were identified, each containing pits, which yielded large quantities of briquetage and charcoal-rich deposits, along with occasional small quantities of animal bone. The earlier phase comprised three truncated pits (F.117, F.123 and F.141), similar in shape and plan, considered likely to have functioned as storage tanks.

Pits F.117, F.123 and F.141

Sub-oval in plan and measuring an estimated 2–3m across by 0.17–0.28m deep, the fills of these pits had a high silt component with frequent briquetage concentrated especially within the upper fills. This sequence suggests the pits had partially silted up prior to episodic briquetage disposal during a later phase of saltern use. It is presumed that these pits may have originally been used for water storage, however it is not clear if all three pits were in use simultaneously.

A second main phase of activity within the pit group was represented by pits F.116 and F.133, which were directly comparable in terms of shape in plan, depth and sequence of fills. The two pits were noticeably deeper than the earlier three and contained a series of distinct fills, including evidence for disturbed clay linings. Five further pits (F.114, F.115, F.120, F.121, F.131, F.132); were much smaller than F.116 and F.113; they also contained large concentrations of briquetage, however, their relationship with the two larger pits was unclear.

Pits F.116 and F.133

Both sub-oval/sub-rectangular features measuring up to 3m across up to 0.5m deep. Disturbed and re-deposited clay linings suggest that these two pits may have been repaired and re-used a number of times and may have had a settling tank function. Larger quantities of briquetage were again encountered in the upper region of the pits and similarly suggest that when the pits had gone into disuse, they were used for waste disposal.

Along the southern side of the enclosure a further five pits (F.81, F.87, F.122, F.136 and F.105) were located along its boundary; all were stratigraphically earlier than elements of the enclosure itself in this area, therefore representing a relatively early phase.

Pits F.81, F.87, F.122, F.136 and F.105

Pits F.87, 105 and F.136 (0.7–0.8m in diameter by 0.17–0.21m deep) all contained a large quantity of briquetage fragments along with layers of ash and hearth debris suggesting that they were used for disposal of spent fuel and waste from the heating structure. Pit F.122 (0.8m in diameter by 0.35m deep) was almost completely truncated by F.104, although its depth suggests it may have originally been used as a settling tank or water storage pit. Pit F.81 (0.9m in diameter by 0.35m deep), was also possibly a storage feature but was notable in that it contained the remains of what appeared to be a carefully placed briquetage container in an upright position (Fig. 3). The fill of Pit F.81 was almost sterile, and the container had been placed into the pit following a period of silt accumulation.

Just to the south of the enclosure a single discrete pit (F.74), which contained a complex series of fills including evidence of a clay lining, also appears to be associated with the saltern. Slightly further away, located some 18m to the northwest of the saltern enclosure, a further three pits (F.50, F.95 and F.140) contained saltmaking debris and could either be related to the recorded saltern or be associated with an undiscovered site to the north.

Pit F.74

Located *c.* 3m to the south of the saltern, this large, steep-sided circular pit (1.6m in diameter by 0.55m deep) contained a complex series of fills including evidence of clay lining, 'dumps' of charcoal-rich material, ashy deposits and waste briquetage. The fill sequence, although notably more complex than that of pits F.116, F.133 and F.140, for example, suggests it was also used repeatedly over a period of time, having undergone several phases of cleaning-out and re-lining with clay.

Pits F.50, F.95 and F.140

These three pits to the north-west of the main saltern site potentially represent a second, separate salt-making site, which was also suggested by a dense scatter of briquetage within the topsoil adjacent to the excavation area. Here, a shallow and truncated sub-rectangular pit (F.50) was cut by a larger pit containing disturbed clay lining material (F.140; 1.3m across by 0.35m deep). Adjacent to these pits, a small circular pit (F.95; 0.8m in diameter by 0.17m deep) contained a large quantity of briquetage suggestive of waste disposal.

The field system and settlement evidence

A total of 19 ditches, the majority occurring on a broadly north-west to south-east or north-east to south-west alignment, were recorded within the excavation area. A lack of dateable material culture across the site exacerbated by the paucity of junctions/inter-relationships renders precise dating and phasing of the ditches difficult. However, the ditches clearly represented multiple phases of field system, with at least three phases evident where ditches did intersect.

Apart from two ditches (F.86 and F101) in the south of the excavation area, possibly representing a drove-

way or trackway that cut and therefore post-dates the saltern, the only ditch of note was F.65. Located in the northeast of the excavated area F.65, a re-cut of ditch F.144, it contained an impressive assemblage of 1307 sherds (11267g) of early–mid 2nd century AD pottery.

Ditch F.144/F.65

Ditch F.144 was a steep-sided, flat-based, 'V' shaped ditch (0.65m wide by 0.15–0.5m deep) aligned north-east to south-west (Fig. 2). At its westernmost exposed limit the ditch had been evidently been re-cut by a shallow, concave ditch (F.65; 0.8m wide by 0.25m deep), which yielded 1,307 sherds of Roman pottery (predominantly dating to the early–mid 2nd century AD and representing 88% by count of the entire site pottery assemblage). The pottery assemblage was dominated by jars and larger storage jars, with very few fine wares or vessels. A small faunal assemblage of animal bone (although making up 67% by count of the overall site assemblage) was also recovered and comprised elements from cow and sheep/goat as well as one fragment of coot bone (Rajkovača in Hogan 2014).

The focus of this paper is the site's saltern so the pottery assemblage is only summarised below along with the results of bulk environmental sample processing. Detailed evidence can be found in the assessment report (Hogan 2014). The pottery clearly suggests the existence of a settlement site somewhere in the vicinity, most likely to the east, towards Chatteris itself and slightly away from the contemporary fen edge.

Pottery
Rob Perrin

Some 1485 sherds (16031g) were recovered from the site with 79 vessels identified. Most of the pottery (88%) and 55 of the vessels came from a four metre section of ditch F.65; significantly, no pottery was found in association with the saltern itself. Only a few sherds are of forms or fabrics which might date to the late Iron Age to early Roman period but other forms could belong to the later 1st century AD. Pottery dating to the 3rd and 4th centuries AD is noticeably absent. Ring-necked flagons and a central Gaulish samian ware dish along with Lower Nene Valley and roughcast ware beakers are of 2nd century date, and the assemblage as a whole would perhaps best fit a Hadrianic to Antonine date with an overall date range from the Late Iron Age to 3rd century AD. The small amounts of regional and continental imports and the lack of specialist vessels such as mortaria and amphora, together with the preponderance of jars, suggests fairly basic, utilitarian activity; a few flagons, beakers, bowls and dishes do, however, suggest a domestic element, albeit rather limited.

Bulk Environmental Samples
Val Fryer

Cereal grains/chaff and seeds of dry land herbs and wetland plants were recorded at a low to moderate density in all but three of the 14 samples processed. Of particular interest were the fruits of common wetland plants, namely sea club-rush/club-rush (*Bolboschoenus/Schoenoplectus* sp.), sedge (*Carex* sp.), saw-sedge (*Cladium mariscus*) and rush (*Juncus* sp.), which were present within many of the pit and gully fills. Charcoal/charred wood fragments were present throughout, although rarely at a high density, whilst fragments of charred root/stem and indeterminate culm nodes – a proportion of which were potentially from reed (*Phragmites australis*) type stems – were present or common within all of the pit assemblages.

Although specific sieving for molluscan remains was not undertaken, shells of terrestrial, fresh water and brackish water species were present within the pit and hearth assemblages. Overall, the mollusc assemblage was dominated by shells of freshwater obligate species, however, estuarine and salt marsh species (namely *Hydrobia ulvae* and *H. ventrosa*), including a number of burnt specimens, were also present in a small number of features (F.74, F.81, F.116 and F.106).

In some respects the results are different to those recorded at many other saltmaking sites; for example, seeds/remains of halophyte plants and seaweed are entirely absent. Furthermore the abundance of freshwater mollusc shells within many of the pit fills appears to suggest that some of the features very rarely, if ever, held brackish water. Therefore it seems likely that the site was only used sporadically and/or on a small scale. It appears that a mixture of fuels was being used including riverine plant materials (i.e. reeds), wood/charcoal and cereal processing waste, whilst abundant saw-sedge nutlets also suggests that peat was being utilised, as at Nordelph (Murphy 2001a, 2001b). The shells of the brackish water molluscs, which are abundant within pit F.74, were probably accidentally burnt along with imported estuarine plant materials to which they were attached.

Briquetage

Briquetage is the ceramic industrial material associated with the heating and crystallising of brine. All briquetage collected from the site was initially sorted through unwashed. From selected contexts individual characteristic identifiable pieces, or significant whole contexts, were submitted for processing. Amounting to around 200 pieces this processed material was then examined macroscopically and identified to briquetage type. For the container sherds the amount of chlorine bleaching, caused by the heated brine altering the colour and character of the fabric, was noted. Thicknesses of container sherds were also recorded. The range of briquetage types present consisted of container fragments, supports and structural material along with miscellaneous/unidentifiable fragments.

Items selected as special or key pieces were examined macroscopically and microscopically for fabric-type. A total of five fabric-types were recognised. Fabrics 1 and 3 have the same clay source – possibly the Late Jurassic Ampthill Clay/West Walton Formation – judged on the amount of light firing clay.

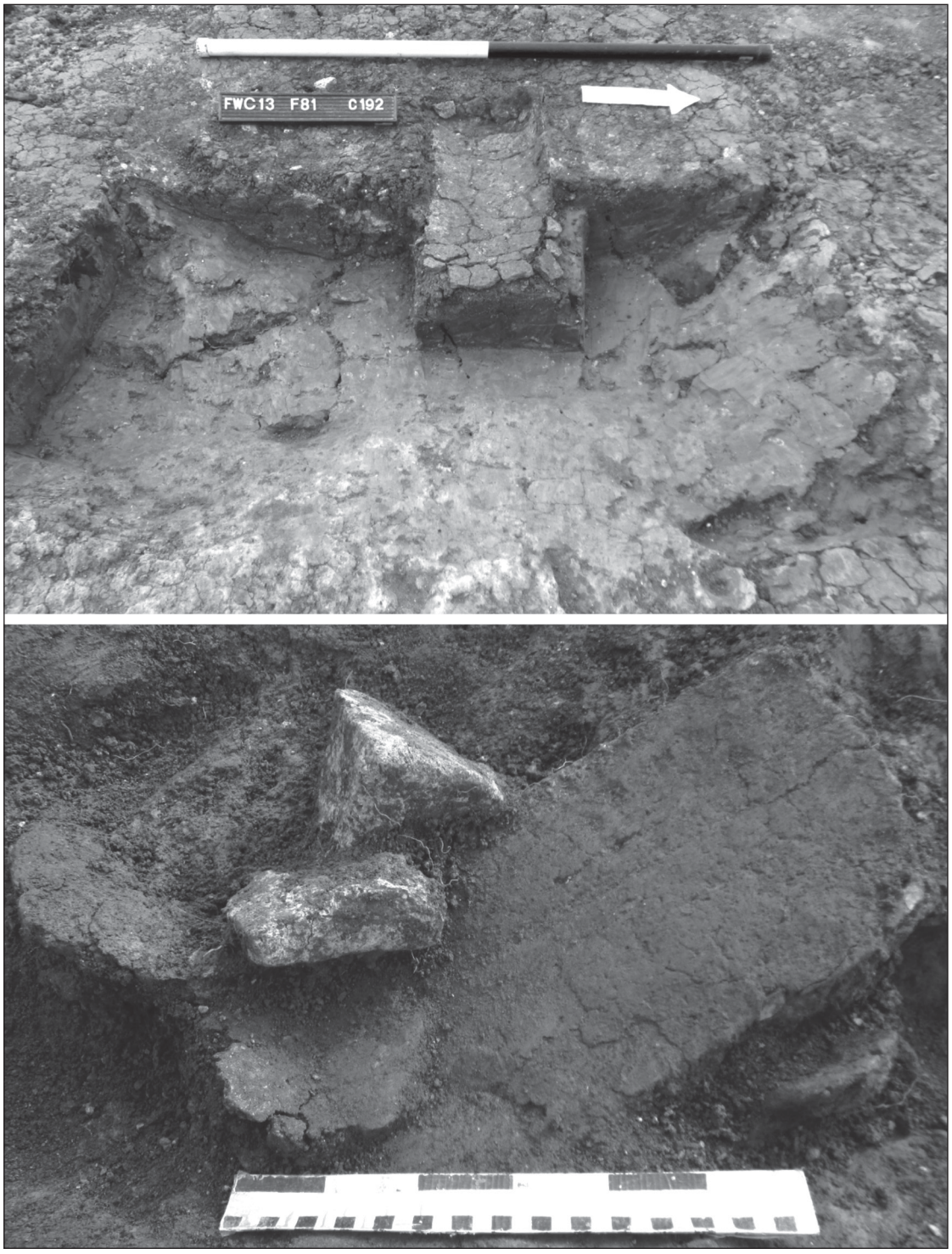

Figure 3. *Fenland Way, Chatteris: upright briquetage container in pit F.81 (top) and detail of briquetage in pit/settling tank F.104 (bottom). See also Plate 1.*

Fabric 4 is probably also from the same but had less organic matter added to the clay matrix. Fabrics 1, 3 and 4 were also characterised by common-to-frequent organic voids, but with rare inclusions of limestone, iron and oolite; all these inclusions probably reflect local production at the site on the side of the island. Fabrics 1, 3 and 5 were used in a wide range of objects including clips and containers, pedestals most often comprised Fabrics 3 or 4. Examples of fabric-types 2 and 5 – which contained flint chunks in excess of 10mm and rare organic voids – were much rarer with only five pieces amongst those examined. Selected briquetage fragments are illustrated in Figure 4.

Fabrics

Dr. Anne Irving

Fabric 1

Oxidised; very fine with common to frequent organic voids. Rare rounded smoky and red-tinged quartz >0.1 to 0.5mm. Sparse rounded oolitic granules and chalk matrix up to 5mm. Sparse to common rounded powdery iron granules up to 0.5mm. Rare sub-angular flint chunks >0.5mm. Rare sub-angular chunks of limestone up to >10mm. Probably an oxidised version of Fabric 3.

Fabric 2

Oxidised; very fine with frequent red and black iron specks. Rare organic voids with frequent rounded to sub-angular smoky and red-tinged 0.1 to 1mm with occasional quartz >3mm. Rare polished clear quartz (possible greensand?) >1mm. Sparse chunks of quartz pebble >5mm. Common chalk and rounded calcareous inclusions up to 7mm. Common powdery iron lumps >7mm and common very large ironstone fragments 10mm+. Sparse sub-angular flint chunks up to 10mm+. A clay/soil light fired in its natural state.

Fabric 3

Light firing, oxidised buff fabric; very fine with frequent organic voids. Rare rounded smoky and red-tinged 0.1 to 0.5mm; rare polished clear quartz (possible greensand?) up to 0.5mm; sparse chunks of quartz pebble >1mm. Sparse rounded oolitic granules and chalk matrix >5mm. Sparse rounded powdery iron granules >0.5mm. Sparse sub-angular flint chunks >10mm+. Rare sub-angular limestone chunks >10mm+. Light firing version of Fabric 1.

Fabric 4

Light firing; buff/oxidised fabric; very fine with frequent red and black iron specks with common to frequent organic voids. Rare polished quartz >0.3mm. Rare rounded oolitic granules up to 0.4mm. Rare rounded powdery iron granules up to 0.5mm. Rare sub-angular flint chunks up to 0.5mm. Cleaner version of Fabrics 1 and 3 with a denser and less vesicular fabric.

Fabric 5

Buff; very fine with frequent red and black iron specks and rare organic voids. Frequent rounded to sub-angular smoky and red-tinged quartz 0.1 to 1mm with occasional example >3mm. Rare polished clear quartz (possible greensand?) up to 1mm. Sparse chunks of quartz pebble >5mm. Rare chalk and rounded calcareous inclusions up to 7mm. Common powdery iron lumps up to 7mm and common very large ironstone fragments 10mm+. A clay/soil light fired in its natural state.

The range of briquetage confirms that salt was being manufactured on the site and briquetage was common in features across the site. In total, 11283 container sherds (73% of the total number of briquetage pieces) were recovered, along with 221 fragments from pedestals, 12 clips/spacers and a minimum of six each of possible hearth/oven wall and floor pieces. Some 3916 pieces were classified as miscellaneous. Of the latter, many are likely to be very small and unidentifiable pieces of container, although probable hearth debris was also present. There were few pieces to suggest or confirm that the heating unit had once had a superstructure, nevertheless, the few floor pieces suggest an oven structure had once been in use, possibly superseding the hearth.

Containers

Containers are the shallow vessels in which the strengthened brine was heated. These were predominantly rectangular in plan with rounded corners and flat bases. These flat-based pans included examples from Features 80, 87, 120 and 123. In one case, in Pit F.81, a rare near-complete base showed the minimum dimensions to be approximately 510mm long x 240mm wide (Fig. 3). By comparison the projected dimensions of the near-complete containers from Ingoldmells Beach, Lincolnshire, were *c.* 600mm long by 160–260mm wide (Crosby 2001a, fig. 131). The Fenland Way example appeared not to have the tapered form of the Ingoldmells containers, which narrowed and became shallower from one end to the other.

Less frequent were examples of sherds from 'gutter-shaped troughs' (F.86, F.106, F.116, F.131, F.136, F.137 and F.142), which are identified predominantly on Middle Iron Age salterns in Lincolnshire (eg. Market Deeping; Morris 2001d, fig. 92). Such vessels were also common in the F18 deposits at Littleport (see below).

Body sherds made up 92% (by number) of the container fragments (although this no doubt includes some flat-base sherds and some unfinished rim sherds, see below). The variety exhibited in the body sherds is mainly in the thicknesses of the pieces, generally tapering from the base/wall joins up to the rim, and in the intensity of their use, measured by the extent of 'salt-bleaching' (see below).

No full profile of a body sherd was identified to indicate the height of any of the containers, but many of the wall sherds tended to appear thicker and higher than examples from Lincolnshire. From F.51, part of the saltern enclosure, two joining pieces of base and wall sherd together measured 91mm high and the highest part, at 14mm thick, was probably still some distance from the upper rim. Elsewhere, the

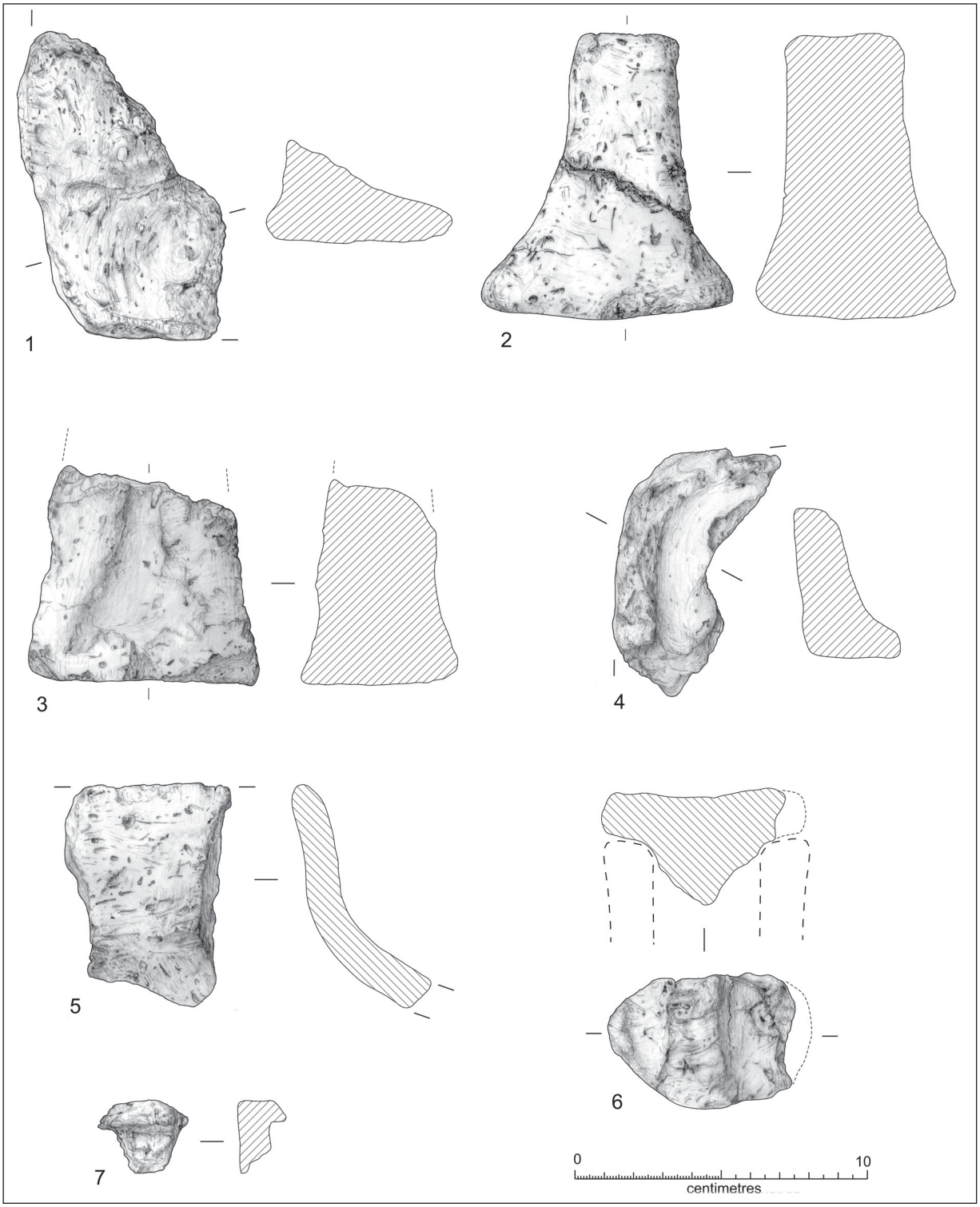

Figure 4. *Selected briquetage from Fenland Way, Chatteris.*
1. Corner piece, flat-based container (Fabric 2; F.80, [146]);
2. Pedestal (Fabric 3, F.74 [161]);
3. Pedestal (Fabric 3, F.123 [353];
4. Corner piece, flat-based container (Fabric 3, F.116 [327];
5. Rim sherd, gutter-shaped trough (Fabric 1, F.86 [225];
6. Spacer/clip (Fabric 4, F.104 [257];
7. Spacer/clip (Fabric 1, F.139 [292]).

maximum depth of the Ingoldmells containers was *c*. 80mm (Crosby 2001a, Table 99). A full container profile from fieldwalking site MOR 49 in Morton Fen, Lincolnshire, was only 40mm deep (Lane 1992, 224), whilst at Longhill Road, March, containers were 'likely to have ranged from about 50mm to 150mm tall (ie deep)' (Morris 2012). Containers there were also described as 'robust' and, like at Chatteris, appear to have been thicker than Lincolnshire examples.

Reporting on the excavated saltern in Morton Fen in Lincolnshire, Crosby (2001b, fig. 36) noted that flat-based vessels, also the most common form at Fenland Way, are known in both Iron Age and Roman sites nationally. Variations, however, were present and are unsurprising given that they form part of the corpus of industrial material, which were 'throw-away' items. The flat-based rounded-corner containers at Morton Fen were dated to the second century AD (Crosby 2001b, 133 and fig. 32, No 5) while the similar examples from Ingoldmells were thought to be Late Iron Age/ Early Roman (Crosby 2001a, 424).

Rim sherds proved extremely rare within the assemblage, with only 50 identifiable (0.4% of the container assemblage by number). By comparison, at the Iron Age site at Cowbit, Lincolnshire 2% of the container sherds were rims (Morris 2001b, Table 4), 10% at Iron Age Market Deeping (Morris 2001a, Table 61), 7.4% at Iron Age Langtoft (Morris 2001c, Table 55), 1.6% at Early Roman Morton Fen (Crosby 2001b, Table 27) and 1.6% at Roman Cedar Close, March (Lane *et al.* 2008, Table 2). Within the collection of rim sherds from Fenland Way, flat, pointed and rounded forms are present but also occasional in-turned and out-turned examples. One reason for the apparent paucity of the rim sherds at Fenland Way could be that a large proportion of the assemblage was unwashed at the time of examination, hampering their identification. Moreover, it appeared that some rim sherds were not particularly smoothed or pinched in the traditional way but just left unfinished. This need not necessarily be surprising as the manufactured container was a disposable industrial item, although leaving rims unfinished is not a common practice elsewhere. A few other rims have apparent erosion or damage on the inside of the rim, perhaps indicating where salt had been scraped out.

It is believed that the containers were mould-made, formed around one or more pre-existing objects and therefore likely to be of a regular size, although thicknesses vary considerably. No cut marks (incisions in the wet clay running parallel to and indicating the eventual line of the rims and common on Middle Iron Age examples from Lincolnshire) were present.

The majority of identified base sherds are from the junctions of the base and wall of the vessel, particularly from the corner of the vessel, where the fired vessel is strongest. Fragments of flat bases are difficult to distinguish from the vertical walls of the containers, particularly where there is variety of vessel thicknesses. Overall, many of the vessels are considerably thicker than those measured from Lincolnshire.

Pedestals

In a heating structure pedestals stand either on the base/floor of the structure or on ledges or on fired clay 'floor' slabs within the structure. In addition to a stabilizing role they enable the heat to circulate around the vessels they support and elevate. Often these items are idiosyncratic and made especially for the single purpose of levelling a particular container within the structure. Nevertheless, these one-off objects do often follow certain styles. At Fenland Way, the forms seem to be largely variations of two types. Two near-complete pedestals resemble in size those classified as PD4 pedestals on Fenland salterns by Morris (2001d, fig.114, No 19), but, significantly, styled to locate flat-based, rather than gutter-shaped, vessels. PD4 types are dated to the Early and Middle Iron Age in Lincolnshire (Morris 2001d, 371), but, as stated, the Fenland Way examples are of unique form at the top. A single perforated pedestal (from F.96, a gully north-east of the saltern) has a residue on the broken perforation and down the side of the pedestal. This also resembles a perforated PD4 pedestal, similar to those found at Middle Iron Age Langtoft, in Lincolnshire.

Many of the remaining Fenland Way pedestals are more 'brick'-like in form, resembling the PD8 pedestals from Nordelph and Downham West in Norfolk (Morris 2001d, fig. 115, No 22) and objects described as 'bricks' from Morton Saltern in Lincolnshire (Crosby 2001b, 120–1). At all three of these sites the date is likely to be Early Roman (1st and 2nd century AD). At Helpringham, Lincolnshire, however, similar pedestals to the PD8s came from the Later Iron Age saltern (Healey 1999, fig. 8, Nos 12–13). At Chatteris, a complete example of a broadly similar brick pedestal from F.74 (a pit south of the saltern) has a sub-square base measuring 85 x 70mm, tapering to square flat top measuring 37 x 40mm and is 98mm tall. A further complete example, from Pit F.116, in the row of pits to the west of the saltern, has a sub-square base measuring 75 x 65mm tapering to a flat top 53 x 48mm and 76mm high. None of the taller pedestals are circular in plan, all being square or rectangular, in contrast to many of the known Roman briquetage assemblages, where 'cylindrical'-types predominate. A single disc pedestal from Pit F74 measures 50mm diameter by 30mm tall and would have probably been used one time only as a levelling device.

Clips/spacers

In addition to the pedestals, which hold the bulk of the weight of the containers, a limited number of other stabilising devices, known as clips or spacers, would have been required. These originated as pieces of wet clay which were pushed down into the gaps between multiple containers in a hearth/oven or between a container and hearth/oven wall to stabilise the containers. The presence of clips in the Fenland Way assemblage, albeit few in number, is another suggestion of a Late Iron Age or Early Roman date

range for the saltern (Morris 2001d, fig 111).

Heating structure (hearth/oven)

As described above, the heating structure is thought to have been re-built several times. Its final form appears characteristic of a hearth, rather than an oven-type structure and yet there seems to be evidence for both types in the briquetage assemblage. Moreover, its setting, cut into the ground rather than resting on the surface, is more suggestive of an oven (see Lane *et al*. 2008). Relatively few sherds were identified as originating from floor pieces covering a flue. Such pieces, from F.140, an isolated pit some 25m northwest of the 'hearth', are between 20 and 30mm thick, smoothed more on the surface which is salt bleached (having been in contact with large amounts of salt water), but less smoothed on the under-side. While the presence of floor pieces suggests the use of an oven-type heating structure there is relatively little recognisable superstructure debris in the briquetage assemblage. Nevertheless, the presence of some floor pieces, albeit incomplete, indicates the presence at some point of an indirect heating structure (oven rather than simple hearth). Examples of indirect heating structures are found in Lincolnshire dating from the Late Iron Age onwards (eg. at Cowbit, Morris 2001b, 54).

A large number of the pieces, both containers and pedestals, have a creamy/pale yellow coating indicating regular contact with salt water. In many cases, this has penetrated the entire fabric indicating a high degree of salt water contact and a significant amount of use in the saltmaking process. In other cases, however, particularly container sherds, there is no evidence at all for contact with salt water and it may be that some of the items were either used only rarely or not at all. Alternatively, it may be that different phases of saltmaking took place, including an earlier, less intensive phase, followed by later phases which heralded an intensification of production indicated by the items with significant amounts of salt bleaching.

Given the lack of domestic pottery and other closely dateable artefacts associated directly with the saltern, or the application of scientific dating, a chronological fix for the site is reliant on briquetage. Given that briquetage is essentially discarded industrial debris, its use as a dating tool, by means of typology, is not an exact science. Nevertheless, previous work on briquetage assemblages, albeit chiefly from the Lincolnshire Fenland collections by Elaine Morris, has provided a set of broad date ranges for various classifications of briquetage. The presence of pits (settling tanks) adjacent to the heating structure and some use of ovens (as indicated in the briquetage assemblage) are both suggestive of a date in the later part of the Iron Age and into the earliest Roman period.

Discussion

As a saltmaking unit the Fenland Way site differs in many ways from the nearest known examples. Despite the possibility of a second heating structure to the northwest beyond the limit of excavation (F.49/50) the Fenland Way site appears to be largely isolated. Whether or not that was the case, the site certainly differs from the nearest known equivalents, those at Cedar Close (Lane *et al.* 2008) and Norwood (Potter 1981), March, *c.* 15km to the north. There, multiple heating structures were present as opposed to the single, or occasionally paired, examples common in the Lincolnshire Fenland and present at Fenland Way.

The general configuration of the saltern is also unlike its nearest known equivalents. With its 'encircling' features, gullies and pits it resembles more the Lincolnshire examples (Lane 2005, fig.4) than, for example, Cedar Close, but also appears less formal. Lincolnshire examples of Late Iron Age/Early Roman date commonly have square or rectangular pits, interpreted as 'settling tanks', in a location similar to those occupied by sub-circular pits F.67 and F.68 at Fenland Way. Settling tanks appear to become a feature of saltern sites during the later part of the Iron Age and into the Roman period and are usually clay-lined. Certainly they would be expected among the features present at Fenland Way; F.104 was clay-lined and may have originated as a settling tank while the locations of Pits F.67 and F.68 would make them likely candidates for a settling tank function. Pit F.104 was also significant in the sheer volume of dumped briquetage fragments it contained. These may have been dumped/placed there during regular maintenance and end of season clearing of the site.

Fenland Way represents the only saltern from Cambridgeshire with any suggestion of an encircling feature. The Lincolnshire 'encircling ditches' are usually of one construction and significantly deeper than that at Fenland Way (although the latter site was potentially more truncated). Neither do the Lincolnshire examples have posts inserted; usually, these encircling ditches are interpreted as serving a drainage and/or space delineation function. It is likely at Fenland Way that the posts within the encircling gully held in place a fence to shelter the saltern.

Not found on any of the Lincolnshire sites is the equivalent of the line of intercutting pits found to the west of F.109. One or more of these may have been clay-lined originally (and possibly a source of clay for use in making briquetage) and a local variation of the settling tank, but in terms of location their position outside the encircling gullies is previously unknown. It is possible that most of these pits were dug solely for clay extraction and subsequently served as dumps for broken briquetage and other waste thus keeping the saltern interior relatively clean.

Fuel was almost certainly peat, significant quantities of which were present around Chatteris. It was known to be cut in large quantities to the east of March and along the Fen Causeway (Palmer 2002)

where sediments from later 'marine' flooding filled the trenches left by peat extraction. Beyond the limits of those floods it is not possible to detect the presence or location of the trenches and they will have disappeared subsequently as drainage lowered the surface. Nevertheless, peat represents the most abundant contemporary fuel source.

Precise dating of the Fenland Way saltern is complicated by a number of factors, including the lack of scientific dating and the absence of associated dateable pottery found within the fills of saltern features. Furthermore, whilst the saltern was cut by elements of a later Roman field system, this merely provides an approximate *terminus ante quem*. Nevertheless the briquetage types present at Fenland Way, and the presence of an oven-type heating structure, certainly suggest a date in the Late Iron Age/Early Roman period although a number of Iron Age-type containers do hint at an earlier presence.

Various stratigraphic phases could be discerned from the excavation of the saltern-related features but from the individual briquetage assemblages there was no clear indication of clearly defined phases, with most of the collections being relatively homogeneous. This could be linked to the 'tidiness' of saltern sites – the way that at the end of a saltern's lifespan, or at the end of a season of saltmaking, the briquetage appears to have been backfilled into features (as noted previously by eg. Crowson 2001, 248).

It is difficult to speculate on the exact methods of salt production at Fenland Way although clips and 'spacers' amid the briquetage assemblage imply that multiple containers were heated at one time (as seen at Cowbit, Lincolnshire, for example; Lane and Morris 2001). It is also not possible to make accurate predictions as to the quantities of salt produced or the lifespan of the saltern. Indeed, the probable settling tanks identified at the north-west edge of the excavation area could have been associated with a separate saltern, now lost to modern ground disturbance. The re-use and re-making of settling tanks is common at saltern sites, however, and the several phases of pitting associated with the Fenland Way saltern could indicate a relatively long life-span. It is reasonable to assume that the large briquetage assemblage collected represents only a fraction of the waste produced during this time, and that briquetage dumps associated with the build-up of waste material may have been removed during hundreds of years of agricultural activity and modern ground levelling.

Turning finally to the site's setting and location, the saltern does not fit easily into the landscape as interpreted in the Fenland Survey, which whilst identifying Chatteris as an important and occupied location during the Iron Age and Roman periods, also considered it to be 'well away from the saltern industry' (Hall 1992, 94). Put simply, based on previous knowledge there were no obvious nearby sources of sufficiently saline water for saltmaking. The presence of the saltern at Fenland Way thus challenges our understanding of the geographical reach of the saltern industry during the Roman period and has implications for both the environmental sequencing of the River Ouse and the surrounding Fenland landscape.

The latest marine silts deposited in the north-west Cambridgeshire fens (around the Whittlesey and Thorney islands) occurred during the Late Iron Age, forming the *Terrington Beds* (French 2003, 150; Hall 1987) and it has been argued that they reach as far as the south-central Cambridgeshire fens (including the Chatteris area) but are confined to major channels (Waller 1994). A large north-south aligned tidal creek on the west side of the island did run within 2km of the site (*ibid*, fig. 54) and it is a tributary of this major creek that seems the most likely source of brine. Contemporary channels running off Chatteris island and connecting with the main tidal channel through the peat may once have been present with subsequent peat shrinkage (and/or ground reduction) having removed such evidence.

Surprisingly, as noted by Fryer above, no evidence was present to suggest that any of the sampled pits ever contained saltwater. This may imply that the saltern was not situated in a particularly brackish environment and that salt production may have been periodic and associated with intermittent (or even rare) episodes of marine inundation. The encroaching fen, thought to have reached the 2m contour by the later Iron Age and Early Roman period, may have seen phases of marine inundations which could have been exploited by the occupants of the Chatteris island. The Fenland Way site, occupying the 2.50m–3.00m contour would potentially have been ideally situated, especially if channels branching off the main Ouse channel brought salt water close to the site.

Overall, it is likely that the site saw intermittent use for saltmaking during the Late Iron Age and into the earliest Roman period as and when the environmental conditions were favourable. Most probably this was, whenever possible, to meet the immediate demands of a settlement close to the site (although the settlement evidence from Fenland Way itself appears to be slightly later, dating to the 2nd century AD). Whilst salt, as a significant commodity, did elevate the status of many contemporary sites, for example the settlement at Langwood Farm some 3km to the east of the site appears to have been associated with relative wealth (Evans 2003), the small scale of the saltern at Fenland Way and its apparently sporadic use suggest this was not the case here.

PART II: Camel Road, Littleport

Lying some 18km to the east of Chatteris and 4km to the northeast of Ely, the site at Camel Road, Littleport was identified following a trial trench evaluation in 2013 (Collins 2013). Excavations at the site, which comprised a 900m2 area immediately to the north of the village (TL 5672 8775; Fig. 1),were undertaken in 2016 prior to the establishment of a new cemetery and allotments.

In terms of the archaeological and palaeoenvironmental context of the site, the maximum extent of

marine inundation, which certainly reached nearby Welney, has been radiocarbon dated to 405–180 cal. BC, (95% probability; Waller 1994, Q-2819). Several archaeological investigations have recorded extensive Romano-British remains in close proximity to the Camel Road site. To the north, following the roddon of the Old Croft River, Romano-British activity included evidence for up to 12 salterns located *c.* 350m northwest of the Camel Road site (Young 1984). The Fenland Project also identified evidence for the extensive use of the Old Croft River for the production of salt, with channels evidently still providing brackish water and the raised level of the roddon forming a spine of dry land from which to exploit the surrounding fens (Hall 1996; Fig. 1). Further evidence for a Romano-British settlement and industry to the south has been found in excavations on Camel Road including a roundhouse, stock enclosures, pits, midden deposits, and tanks associated with salt-making located *c.* 700m southwest of the current excavation area (Roberts 1997). A maximum of eight phases were identified, spanning the 2nd to 4th centuries AD with periods of flooding in the late 2nd century AD possibly leading to a change in land-use towards more industrial processes, including salt-works (Macauley 2002). Also recorded, *c.* 900m to the southeast, was a quantity of dumped Romano-British briquetage, dated by means of *c.* 2nd–4th century pottery, although no contemporary features were associated with this material.

Initial machine-stripping of the excavation area exposed the roddon sediments and briquetage deposits originally recorded in the evaluation (Collins 2013); as part of this, evaluation Trench 5 was re-excavated revealing once more the section through these deposits (Fig. 5). A substantial deposit of saltmaking debris in the south of the site was identified, sample excavated and recorded, followed by additional machining in order to fully define its extent.

Excavation Results

The archaeology of the site effectively consisted of mounded dumps of saltmaking waste; no *in situ* salt-production features were discovered. Several sinuous linear and irregular discrete 'features' were recorded, but these are generally interpreted as created by erosion processes (see eg. F.11, Figs. 5, 6). Underlying the archaeological sequence, a deposit of peat is believed to date broadly to the Bronze Age and this was overlain by the roddon silts, which formed the raised linear ridge on which the archaeology was situated. The natural erosion processes at work had clearly resulted in a relatively complex 'natural' stratigraphy, with localised erosion of archaeological deposits along with deposition/redeposition of roddon silts in both small erosion channels and across wider areas.

The main area of saltmaking waste covered an area of over 100sqm extending beyond the edge of excavation to the south. Two transects through this area, oriented northeast–southwest, were aligned perpendicular to and contiguous with Trench 5 at a point at which deposits seemed most likely to contain *in situ* salt-production features, although in the event none were encountered. Nine one metre square test pits were excavated in Transect A which crossed the excavation area from Trench 5 to the edge of excavation and a further four test pits were excavated in Transect B, directly south of Trench A (Fig. 5, 6).

The saltern waste mound

Measuring a minimum of 23m north-south by 19m east-west, the saltern waste mound (F.18) extended beyond the limit of excavation to the east, west and south and only its northern edge was defined. The base of the mound was situated on patchy layers of eroded roddon sands and silts, which in turn overlay peat (Fig. 5). Over 100 contexts were recorded within the mound, which comprised eroded sands and silts, ash- and charcoal-rich deposits and dense deposits of fragmented briquetage surviving to a maximum depth of 0.7m. A minimum of 25 contexts/deposits were made up almost entirely of salt-production waste deposits either mounded *in situ* or slumped/eroded/trampled from the mound. No *in situ* or complete briquetage artefacts were found. Sherds of briquetage from F.18 indicate that the majority of brine containers dumped in the mound were gutter-shaped troughs which suggests a probable Middle Iron Age date (see below).

The majority of recorded features are interpreted as naturally created erosion gullies and hollows within the top of the roddon silts and saltern waste mound, only three possible archaeological features were recorded. Of these, irregular pit F.17, which extended beyond the edge of excavation to the east, was the most convincing and may represent a later phase of activity to the main saltern waste mound. Measuring at least 2.7m by 1.8m wide and 0.43m deep, pit F.17 yielded a relatively large finds assemblage dominated by large quantities of briquetage but also including two sherds of mid–late 1st century AD pottery. Perhaps significantly, the briquetage from F.17 suggests flat pans rather than gutter-shaped troughs indicating a Late Iron Age/Early Roman date, later than the main saltern waste mound. It follows that this feature may be the latest feature on site, possibly indicating a second phase of salt-working activity in the near vicinity.

The only other potential archaeological features comprised F.19 and F.20, both irregular hollows/pits recorded within the main section across the saltern waste mound and cut into its upper layers. Both contained what appeared to be redeposited material from the mound itself and could represent natural erosion hollows.

Palaeoenvironmental sampling

The character of the archaeological remains – apparently 'off-site' deposition of salt production waste – and the lack of *in situ* evidence, means that the deposits have extremely limited potential in terms of

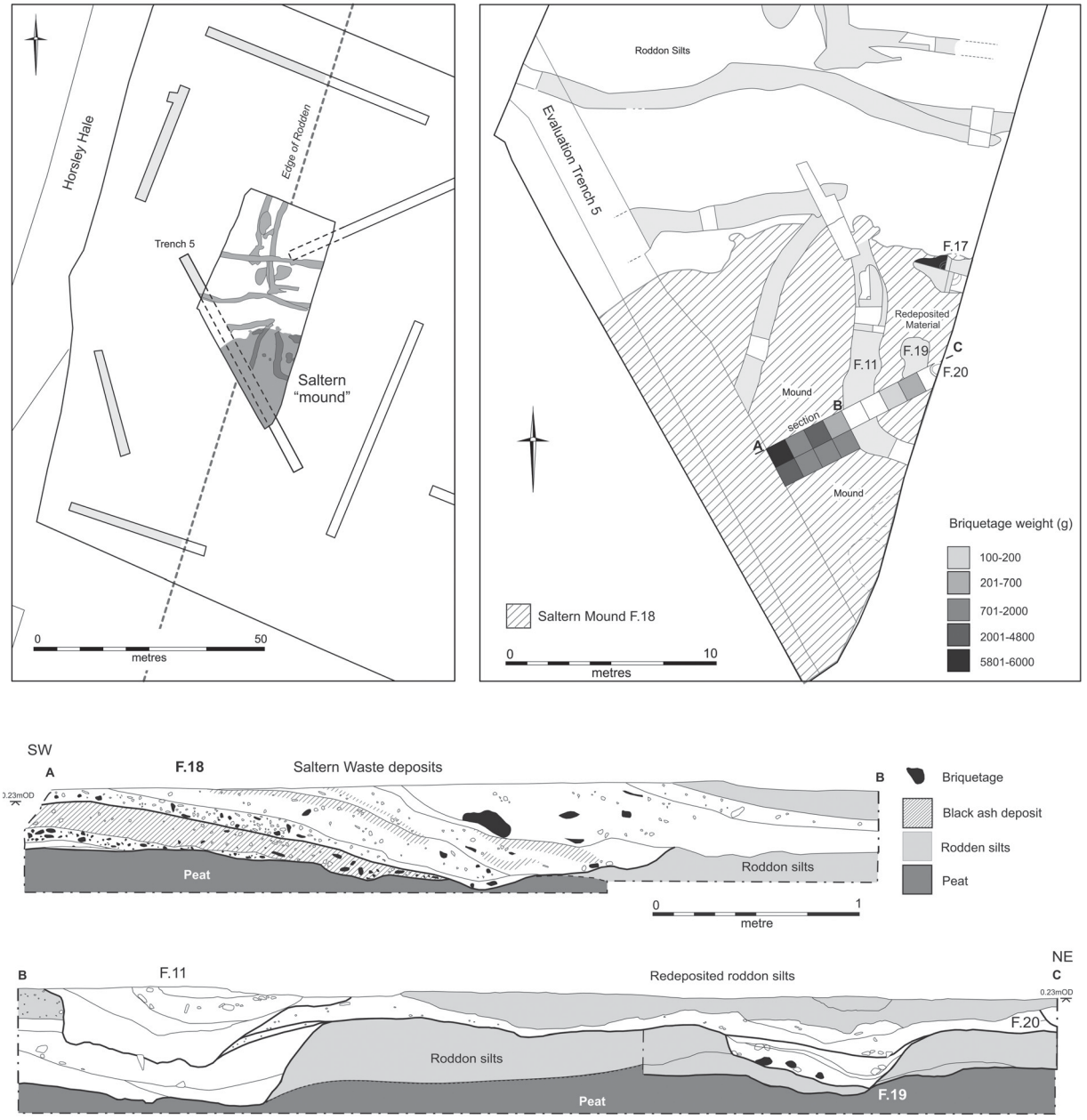

Figure 5. *The saltern waste mound at Camel Road, Littleport: excavation area plans (top) and section across the excavated transect (bottom).*

understanding the contemporary environment. The re-deposition and evident mixing of the saltmaking waste effectively rules out meaningful diatom analysis to determine whether the salt makers were utilising an 'on-site' source of brine, whilst also excluding the possibility of reliable radiocarbon dating of the activity. The results of initial assessment of bulk soil samples by Val Fryer (in Robinson Zeki 2017, 22–23), which produced plant macro remains at only low to moderate densities, also appear to reflect this situation. The presence of cereals, chaff and seeds of common weeds and wetland plants could reflect deliberate or accidental incorporation of midden waste into the deposit, or alternatively the use of cereal processing waste or grassland herbs, for example, as tinder/fuel; however, the density of remains is simply too low to comment further.

Briquetage

The overall assemblage comprised some 33.4kg of fragmented briquetage, the majority of which was recovered from the saltern waste mound, with a smaller quantity recovered from pits cut into the mound. The methodology followed that used for the Chatteris assemblage, with 698 pieces selected for further pro-

Figure 6. *Saltern waste mound deposits at Camel Road, Littleport: the re-excavated 2013 evaluation trench viewed from the north (top) and the excavated transect viewed from the south (bottom). See also Plate 2.*

cessing/cataloguing of which 74 pieces were chosen for more detailed analysis and description.

Three fabric-types were identified from the 74 pieces analysed. Calcareous Kimmeridge Clay is the probable source of the clay used for Fabric 1 whilst Fabrics 2 and 3 appear to be from a common source and share characteristics with the Lower Cretaceous Woburn Sands Formation (Lower Greensand), which stretches from Gamlingay to Ely. These are loosely cemented sandstones or unconsolidated pebbly sands containing variable quartz (Spencer 2003). From the selected briquetage pieces the 20 from F17 were all identified as Fabric 1 while, of the 49 pieces from F18, only 22% were Fabric 1 with 63% composed of Fabric 2. Selected briquetage fragments are illustrated in Figure 7.

Fabrics (Dr. Anne Irving)

Fabric 1 (Type specimen: [92] [432] Upper F19 A7)
Very fine sandy oxidised fabric with varying amounts of calcareous grains. Abundant fine background quartz <0.1mm and common mica; occasional rounded iron grains <0.1mm and sparse powdery iron inclusions >0.3mm. Sparse background calcareous inclusions >1.5mm and abundant fine background calcareous grains <0.1mm. Common voids which sometimes show organic impressions; proportion of quartz to calcareous grains does vary.

Fabric 2 (Type specimen: [56] [407] F18 B3)
Medium to coarse sandy fabric, usually oxidised, with varying amounts of iron. Background abundant fine quartz <0.1mm and very fine background calcareous grains <0.1mm; common rounded greensand >1mm and common, sub-angular quartz >1mm and occasionally up to 2mm; common sub angular iron >1.5mm with sparse rounded grains up to 3mm; common calcareous lenses and common voids which sometimes show organic impressions; sparse pebbles (include quartzite) up to 5mm; proportion of quartz to iron does vary.

Fabric 3 (Type specimen: [50] [462] F18 B4)
Intermediate fabric between Fabric 1 and Fabric 2; medium sandy fabric Very fine background quartz and calcareous grains both <0.1mm; common voids which sometimes show organic impressions; common round greensand >1.0mm; common sub angular quartz (some iron stained) >1mm; common sub angular iron grains >1.5mm; common lenses of calcareous material.

Much of the material was generally in poor condition. Even within the 698 selected pieces much was abraded and fragmentary with only a limited number, mainly pedestals and clip/spacers, being complete. No complete containers were present and few displayed complete profiles. Rim sherds were particularly uncommon (less than 2.8% of the total container sherds). Much material was fragmentary and unidentifiable, other than to confirm it as briquetage. This is in keeping with material coming from *in situ* dumps of waste from the salt-making process.

Containers

These appeared in two forms – gutter-shaped troughs and flat-based pans. Probably mould-made, the former are likely to have been formed as wet clay, possibly around a tree branch or similar, cut in half and with a half-moon shaped piece of clay added to the open end (Morris 2007, fig. 6). Gutter-shaped trough fragments were most common in F18 (mound) contexts. Generally, the trough fragments are thicker than those from the flat-based pans and are typically 10–15mm thick, whereas measurements of 8–10mm are more common on the latter. A second significant difference between the two container types is the enhanced level of bleaching on the flat-based pans, interpreted as a sign of greater use and a probable intensification of salt making. Material from pit F17 is generally heavily bleached and intensively used. Moreover, the container fabrics in the mound F18 are mostly Fabric 2 (66%) while Fabric 1, often with organic voids, is considerably more common in pieces from F17. Elsewhere in the Fenland, but mostly in Lincolnshire far to the north of Littleport, the associated dates of the two container types tend towards the middle part of the Iron Age for the gutter-shaped troughs and Later Iron Age/Early Roman for the pans, such as the F17 examples (Morris 2007, 435). Container fragments occasionally suggested the presence of circular vessels in briquetage fabric but these were not common. Again, in Lincolnshire, such vessels tend to date to the Iron Age or earlier.

Supports

These were generally hand-squeezed when wet and used to hold the containers firmly in position during the heating process. Each is a 'one-off', shaped to fit a particular gap between heating structure and container(s) to maintain the integrity of the container during the heating process. Nevertheless, certain broad forms of supports are recognisable and elsewhere have been categorised (Morris 2007). Given their idiosyncratic nature and the fact that almost all are fragmentary the Littleport pedestals are difficult to categorise precisely. Most are of cylindrical form, but with two notable exceptions, two pre-fired, square-sectioned tapering pieces, both from context (407), a layer within the F.18 mound. They measure *c.* 50 x 50mm at the base with the complete example 28 x 25mm at the top and 104mm tall. These are well-fashioned pieces compared to the roughly formed hand-squeezed cylindrical examples. The tapering pedestals are also pre-fired, whereas the cylindrical types are made on the spot, with firing occurring during the salt crystallisation. Other support pieces are clips/spacers, which were attached to the rims of either adjacent containers or between the container and the wall of the heating structure, again not pre-fired. Few examples are complete but intact clip/spacers show a distance between vessels during crystallisation of between 20mm and 50mm.

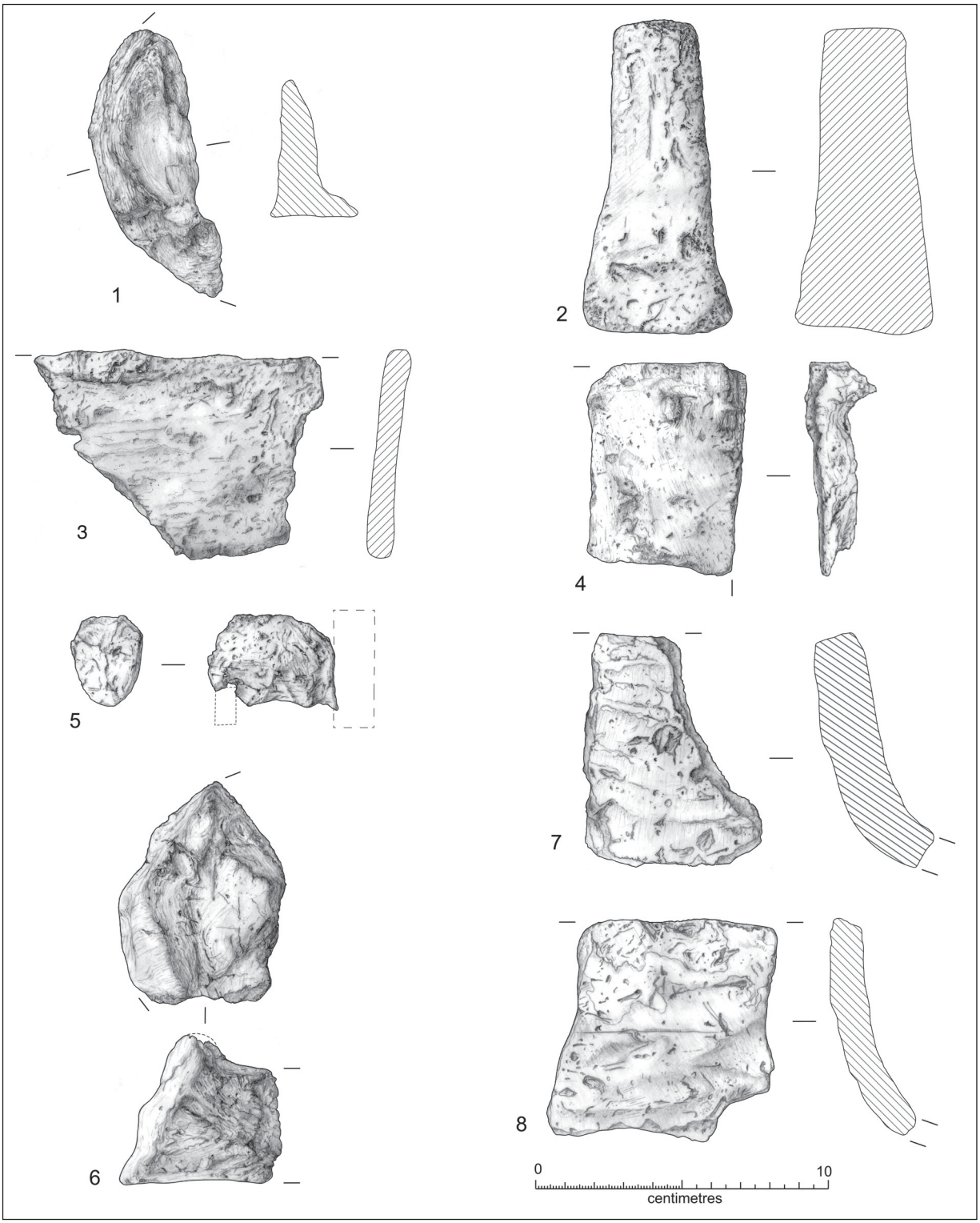

Figure 7. *Selected briquetage from Camel Road, Littleport.*
1. Corner of flat-based container (Fabric 2, F.18 [402]);
2. Pedestal (Fabric 2, F.18 [407];
3. Container rim, probably a flat-based pan (Fabric 2, F.18 [407];
4. Gutter-shaped trough, join of trough and end piece (Fabric F.18 [438];
5. Spacer/clip (Fabric 1 F.10 [330];
6. Pedestal (Fabric 3, F.17, [415]);
7. Gutter-shaped trough (Fabric 2, F.18 [437];
8. Gutter-shaped trough (Fabric 2 [438].

Structural

In Lincolnshire a major technological change in production occurred in the later Iron Age period (around the second century BC). This was the change from direct heating of containers on hearths to a system of indirect heating within an oven-type structure. In the latter, the containers were separated from the heating source by the presence of gradually more elaborate supports in the form of platforms, slabs and spacer/clips and with the heating source controlled by the use of flues (Morris 2001d, 373). While the direct heating hearth type of structure had been used from the later Bronze Age to the Middle Iron Age, briquetage studies suggest that the indirect heating oven and flue type of structure became the norm in the Fenland from the Later Iron Age onwards. In Littleport some oven-like material was present, including a perforated floor piece from *in situ* dump (402) F18. Other floor-like pieces included items from F17, which also included some large pieces of debris from an oven structure.

The Littleport site yielded all the forms of briquetage associated with the production of salt. No items of briquetage were located *in situ* and the material appears to be all dumped waste from one or more nearby salterns. At least two phases are strongly suggested by the assemblage, an earlier one associated with the mound F.18 and a later phase typified by the material from Pit F.17.

In terms of the containers present at the site the gutter-shaped troughs are, in Lincolnshire, almost always dateable to the early or middle part of the Iron Age and usually associated with a particular type of pedestal (PD4) (Morris 2007). Often gutter-shaped containers also have guide marks for cutting the cylinders of wet clay just beneath the rim. Neither of these characteristics, the cuts nor the PD4 pedestals, were present in the collections from Littleport. Moreover, the fabrics of such containers in Lincolnshire tend to be shelly, reflecting the local contemporary domestic vessels, again not seen at Littleport. The occasional presence of vessels which appear to have a vertical cut or sawn surface in F.18 at Littleport, again resembles some of the early examples from Lincolnshire (e.g. Billingborough; Cleal & Bacon 2001, 57). The purpose of these cuts and vessels has not been satisfactorily explained but they occur particularly in prehistoric assemblages.

Briquetage from F.17 shows a more intensive use of the vessels compared to those in F.18, as indicated by the extent of salt bleaching. This yellowy/white deposit adhering to and ingrained in the briquetage, indicating prolonged or repeated contact with salt water, is a useful indicator of intensity of use. This chlorine bleaching effect, caused by the heated brine altering the normally orange-red iron–rich colour of the fabric clay matrix, is rarely evident in substantial amounts on the pre–Late Iron Age briquetage in Lincolnshire. From the Late Iron Age onwards, however, many of the pieces are increasingly covered and the fabrics of the often-used containers are sometimes bleached to a creamy white/yellow colour throughout. Much of the briquetage from F.17 displays these characteristics. The container sherds from F.17 mostly derive from flat-based pans, again held in place with an array of pedestals and spacer/clips. This style of container and the intensity of use demonstrated are usually indicative of a Late Iron Age/Early Roman date.

Although mostly from dumped deposits the briquetage embraces all the types used in the saltmaking process and confirms that the activity was taking place on or adjacent to the site.

Discussion

Although there are only four confirmed archaeological features, the site indicates industrial scale salt-production in the immediate vicinity over two distinct periods. It is unlikely that such quantities of waste material would be transported any great distance, so a close location for the associated saltern(s) is probable; the site certainly had all the required raw material sources – brine, clay and peat – close at hand. In the absence of scientific dating, briquetage forms the main method for understanding the Littleport site's chronology. Briquetage forms recovered from the saltern waste mound suggest a date that, in Lincolnshire, would be during the Middle Iron Age, although without absolute dating it cannot be ruled out that at Littleport the feature was formed in the Late Iron Age. Subsequent to the formation of the mound the presence of only one clearly archaeological feature was recorded, a pit (F.17) that appears to have been deliberately dug to receive further dumps of salt-production waste. Briquetage evidence shows that F.17, in particular, contains material from the later Iron Age/Romano-British period. This suggests that the creek may well have continued to be 'active' into the Roman period and formed part of a long-lived history of salt-working in Littleport.

In a known zone of dense saltmaking along the Old Croft River the Littleport salterns were previously understood to be Roman, based largely on surface finds of domestic pottery alongside the briquetage, particularly on the sites in the north of the parish (Hall 1996, fig. 13). Nevertheless, Hall (*ibid*, 25) also noted that 'in some cases salt hearths occur without any signs of immediately adjacent habitation'. As in examples in the Lincolnshire fens (Lane, forthcoming), it is likely that the saltmaking was by its nature taking place within tidal range in a (risky) salt water environment, and pre-dates significant on-site settlement. The demise of each saltern would leave elevated dumps of waste ash and briquetage and, when occupation did occur, as these local environmental conditions improved, the settlers would be attracted to the higher areas with abundant waste briquetage for use as flooring or for post-packing (see eg. stuctures at Wygate Park, Spalding, Lane 2008, fig. 4). At the Camel Road site the briquetage suggests that dumped waste in F.18 was of Middle to late Iron Age date, but with briquetage from the later pit, F.17, of

Late Iron Age/Roman date. How many of the Old Croft River salterns actually are Roman is uncertain, but an Iron Age origin, as at Camel Road, is likely for many.

When the results of the current excavations are taken together with the evidence from other archaeological investigations in the area, a picture of the local industry emerges. Although there are no features which indicate salt-production on this particular site, it can be inferred from the large amounts of waste deposits that there would have been a saltern nearby during the Middle/Late Iron Age and into the Early Roman period. Several previously excavated sites to the south also produced evidence of salterns in the form of waste deposits and quantities of briquetage without on-site production features, although none have reported a Middle Iron Age date, and some authors have suggested a break in activity in Littleport during this period (Woolhouse 2012). While such a break would be likely for settlement in such conditions, the presence of 'marine' flooding would have proved advantageous for saltmaking.

Excavations elsewhere at Camel Road revealed brine tanks which demonstrate on-site salt-production during the 2nd–4th centuries AD (Macauley 2002) and to the north, further along the course of the Old Croft River, the fieldwalking along the route of the Ely bypass recorded approximately 12 saltern sites, which were dated to the Romano-British period (Young 1984). It would appear that salt-production was an important part of the economy of the area before the Romans arrived, and continued throughout most of the Roman period.

The landscape is, as others have commented (Hall 1996; Macauley 2002), well-suited for salt-production. The dry gravel 'islands' of higher ground would have provided land for occupation and food production. Raw materials required for salt-production were ready at hand: brackish water flowed up the river, the fen provided peat that fuelled the hearths to boil the brine pans, and the high banks of the roddon were a pathway through the fens to link areas of high ground and pockets of resources. Macauley (*ibid*.) also proposed that high status materials and artefacts at his excavation farther south along Camel Road intimate the possibility of a villa or mansio at Littleport with occupants controlling the local salt industry during the 2nd–4th centuries, although no evidence for this is known.

Finally, with regard to Littleport it is worth noting the potential significance of local place names. Brian Simmons (1975, Appendix V) speculated on the relationship between place names in the Lincolnshire Fenland and saltmaking, particularly of Iron Age date. Hel- and Hale- names along the western fen edge coincide with the densest areas of Iron Age saltmaking. These are, from north to south, the villages of Great Hale, Little Hale, Helpringham, Rippingale [R*epinga Hale*], and the area in Market Deeping parish known as Frognall (medieval *Froken Hale*).

In Littleport, two areas along the Old Croft River had *Hale* place names in the medieval period: *Camhale* (so-named in 1251), a kilometre north of the excavation and from where 'Camel' Road is derived, and *Halewere* (in 1221) (Hall 1996, 29), *c.* 3.5 north of the site and in the heart of the most concentrated area of salterns. Whether such places had names that lived on in folk-memory from the time of active saltmaking is unclear. It may be that they continued to be recognised as saltmaking areas from the waste dumps and dense briquetage that characterise these former industrial sites and acquired their 'hale' name later. The association of Hale names and particularly Iron Age salterns, as suggested by Simmons, would certainly appear to fit in the case of Littleport.

General Discussion

The sites at Littleport and Chatteris add to the limited, but growing, corpus of excavated Cambridgeshire salterns, and both sites challenge the previously understood knowledge of saltmaking in their respective areas as well as its chronology and extent. On the one hand the remains at Littleport appear to represent the dumping of industrial waste, ashes, briquetage etc, from salterns nearby, whilst the Chatteris example was clearly the manufacturing site itself. Not in doubt at Littleport was the source of brackish water which the Old Croft River provided over a long period, indeed, apparently from the Middle Iron Age up to the late Roman period. In contrast, there is uncertainty about the precise water source in Chatteris, with the minor creeks which must have served the site not surviving. The fact that a site is present at all at Chatteris is remarkable, given its distance from the heartland of Cambridgeshire salterns in Littleport and north and east from March. It serves to widen the known zone of salterns in the county and suggests that more could be present in areas previously considered beyond the tidal range.

Typically for salterns, the dating of the sites has to rely on the variations in briquetage styles, as devised by Elaine Morris for the Lincolnshire Fenland, many kilometres to the north. While regional variations may affect the briquetage assemblages in both areas, the absence of scientific dating, such as archaeomagnetism on the heating structures, or contemporary and datable pottery in direct association with most salterns, leaves briquetage as the only handle on the chronology of the sites. Given that this material is industrial in nature, is a throwaway commodity and is moved around the site during cleaning processes and therefore considerably mixed, it is unusual even to find stratigraphically sound collections. Briquetage remains, however, at this stage the only reasonable analytical tool.

At Chatteris, the briquetage assemblage displays some characteristics typical of both Iron Age and Roman material but on the whole it is considerably thicker than Lincolnshire examples and some other comparative regional material, although greater than average container thickness was also evident at Littleport and Longhill Road, March. Moreover,

while some of the briquetage exhibited salt bleach confirming its intensive contact with salt water, other pieces appeared little used; it is likely therefore that the saltern was active only intermittently. The variation within the briquetage material could also suggest that containers were made as and when salt water was available. Overall, the results from the environmental analysis and the variation of briquetage containers and pedestals seems to point toward occasional use of the saltern. Most saltern activity is seasonal, but the presence of both freshwater and brackish water molluscs and the plant remains from across the hearth suggests that saline water may have only been occasionally available at Fenland Way.

Site layout at Chatteris appears more akin to the Late Iron Age and Roman examples from Lincolnshire, but atypical of the few other excavated examples in Cambridgeshire. It displays some Lincolnshire characteristics, such as the enclosing ditch or, possibly in this case, an enclosing fence. The heating structure, central to the ditch, was most likely a partially enclosed oven, an indirect heating system in which multiple ceramic containers, supported on pedestals and fixed together by ceramic clips, held the crystallising salt.

The geographical location of the Fenland Way saltern, the uncertainty as to the source of the brackish water, the peculiarities of both the site layout and the style of briquetage, and the concerns regarding the exact date of the saltern, render the Fenland Way site both interesting and important to the understanding of the development of the salt industry in the Later Iron Age and Early Roman period.

At Littleport, the assemblage, is more characteristic of a slightly earlier Iron Age industry and is an important marker in terms of the chronology of saltmaking in Cambridgeshire. Despite the common presence of saltmaking sites in the Cambridgeshire Fenland few excavations have targeted salterns and firm dating is scant. Bronze Age examples are known on the north Cambridgeshire fen edge in the Peterborough region (eg, at Northey [Gurney 1980]; Fengate [Pryor 1980]; Pode Hole [Daniel 2009]; Northborough [Knight 1998]; Thorney [Pickstone and Mortimer 2011]). In the Roman period sites are known (but not excavated) on the silts around Elm (Hall 1981, fig. 2), in the area of March and at Littleport. There is, however, little of confirmed Iron Age date and until recently only one site had been dated to the period, at Estover in the north of March island (James and Potter 1996, 52). There, the northern ditch of an almost circular enclosure yielded pottery of Middle/Late Iron Age date together with an assemblage of briquetage. Little more detail is known but the dates are significant and confirm saltmaking during the Iron Age in the region. More recently, a second Late Iron Age example also came from the north of March island, at Longhill Road, where a saltern was most probably active in the latest Iron Age and quickly followed by first century AD settlement (Peachey 2012). Nearby, at Norwood (Potter 1981), was another example of salterns pre-dating settlement on the same site with 'second-century salterns and third to fourth century occupation' (Potter 1989, 170). Farther south, at Cedar Close on the east side of March island, Elaine Morris identified two phases of saltmaking from briquetage. The site, she suggested, operated from mid–late first-to-early second century and, after a period of flooding, was active again from mid–late third-to-fourth century (Lane *et al.* 2008, 107).

The early Fenland work of Sylvia Hallam (1960, 1970) suggested that the saltern sites in the western part of the Lincolnshire Fens were almost exclusively Roman in date, based on the discovery of briquetage, Roman domestic pottery and cropmarks of ditched enclosures, together on many sites. The results of the Fenland Survey and recent work on the Lincolnshire sites, however, have suggested that salterns and settlements are not contemporary, with the salterns preceding the settlements. The same applies at the Chatteris saltern, where the saltern pre-dates the field systems. Study of the briquetage from the Fenland Survey in the western Fens of Lincolnshire suggested that 27% of the sites were of Iron Age date (compared to 58% Roman and 15% undated) (Lane 1992, Table 8). While this indicates a growth in the industry during the Roman period there is significant Iron Age saltmaking preceding it. Moreover, of the 96 'groups of sites' visited by Hallam in her search specifically of cropmark sites, only 4% were solely industrial and contained no domestic pottery. In contrast, the Fenland Survey sites, where the fieldwalking strategy was blanket coverage and not targeted at cropmarks, some 35% of the Iron Age and Roman sites were industrial (saltern) only, with no contemporary domestic pottery or later settlement evidence present (Lane forthcoming).

Do the same circumstances prevail along the Old Croft River at Littleport? Given that much of the briquetage from the Camel Road excavation has strong Iron Age characteristics it can be suggested that, as in the Lincolnshire Fens, some of the sites to the north along the Old Croft River are likely to be of that date. David Hall (1996, 25) has questioned some of the interpretations of Gordon Fowler who identified 'hut sites' after initial ploughing in 1948, which may have been salterns. Indeed, it is possible that the salterns at *halewere* – which '…give the impression of being nearly continuous' (Hall 1996, 25) – could be predominantly features of Iron Age date, which due to their location on the high, firm roddon silts, further elevated by dumps of ashy residues and discarded briquetage, then provided an ideal site for later, Roman, settlement.

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