

**BRADWELL WIND FARM
HOCKLEY LANE
BRADWELL-ON-SEA
ESSEX**

ARCHAEOLOGICAL EXCAVATION



**Essex County Council
Field Archaeology Unit**

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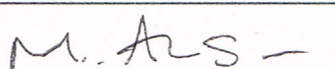

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ARCHAEOLOGICAL EXCAVATION

Prepared By: Trevor Ennis and Mark Atkinson	Signature: 
Position: Project Supervisor	Date: 20/05/13
Approved By: Adrian Scruby	Signature: 
Position: Project Manager	Date: 20/05/13

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As part of our desire to provide a quality service, we would welcome any comments you may have on the content or the presentation of this report. Please contact the Archaeological Fieldwork Manager, at the

Field Archaeology Unit,
Fairfield Court, Fairfield Road, Braintree, Essex CM7 3YQ.
fieldarch@essexcc.gov.uk
Tel: 01376 331470
Fax: 01376 331428

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BRADWELL WIND FARM
HOCKLEY LANE, BRADWELL-ON-SEA, ESSEX
ARCHAEOLOGICAL MONITORING & EXCAVATION

Client: RWE Npower Renewables Ltd.

NGR: TM 0221 0641

Site Code: BRHL 11

Oasis No: 150712

Dates of Fieldwork: 13th-28th August 2012

SUMMARY

Monitoring of groundworks associated with the construction of a ten-turbine windfarm site close to the marsh and coast south and east of the village of Bradwell-on-Sea on the Dengie Peninsular recorded the presence and exposure of significant archaeological remains at only two sites - the works being generally too shallow in most locations. In both instances, these remains relate to ancient salt production known to have been carried out at numerous marshland and estuarine locations along the Essex Coast, primarily in the Late Iron Age and Roman periods. These are commonly referred to as 'red hills', due to the characteristic presence of low mounds of heat-reddened earth at these sites.

The location of Turbine 106 had already been moved due to the detection of a large saltern or red hill site during preliminary geophysical survey work. However, the revised location also contained the remains of a less substantial saltern a short distance to the northeast, buried under thick deposits of marsh clay and topsoil. This c.20m diameter mound of burnt earth was found to both overlie and be cut by a number of distinctive hearth, tank and gully features that are indicative of salt production by means of salt water evaporation taking place at this location. Both the red earth deposits and cut features contained fragments of briquetage vessels and furniture associated with and generated by this activity. This saltern and red hill site is judged to be of late 1st century BC/early 1st century AD date and is one of the most extensively investigated sites of its type along the northeast Essex coast, providing some useful insights into their nature and operation to supplement the findings of other recent red hill investigations in the south of the county.

1.0 INTRODUCTION

This report describes the results of a programme of archaeological monitoring and excavation works undertaken in advance of the construction of wind turbines and the associated infrastructure at Bradwell Wind Farm, Bradwell-On-Sea, Essex. The fieldwork was carried out by the Essex County Council Field Archaeology Unit (ECC FAU) on behalf of RWE Npower Renewables Ltd.

A planning application (MAL/06/00291/FUL) for the construction of a wind farm at Hockley Lane, Bradwell-on-Sea was submitted to Maldon District Council in 2006. An initial desk-based assessment (Orr 2005) and geophysical and magnetic susceptibility survey (Johnson 2005) identified several possible salterns prior to the submission of the planning application. A subsequent trial-trench evaluation revealed an undisturbed saltern in the area of what was then identified as Turbine 9, now Turbine 106 (Foundations Archaeology 2006), which was subsequently moved to the west to allow the feature to be preserved *in situ*.

As a result of the perceived potential for the development to damage or destroy archaeological remains, condition 17 of the Planning Inspectorate's Appeal Decision to grant consent (APP/X1545/A/06/2023805) required investigation of the proposed turbine location prior to commencement of construction. The investigation was carried out in May 2011 and its results outlined in section 2.3 of this report. Archaeological monitoring of ground investigation works undertaken during the Unexploded Ordnance survey in July 2012, identified another saltern located immediately to the south of turbine 106, in the area of the proposed crane platform. As this saltern could not be preserved *in situ*, to mitigate the impact of the development, a decision was made to fully uncover, excavate and record these archaeological remains. In addition, the monitoring of construction of the other turbine sites, access roads and site compound was required.

This requirement for the archaeological works was based upon the advice provided to Maldon District Council by Essex County Council Historic Environment Management (ECC HEM), in line with guidance contained in the National Planning Policy Framework.

Copies of this report will be supplied to the clients, to ECC HEM, to the Essex Historic Environment Record. A summary of the project and a copy of the report will be uploaded to the OASIS online archaeological record and be accessible via the Archaeological Data Service website (<http://archaeologydataservice.ac.uk/>). The site archive will be held at Colchester Museum.

2.0 BACKGROUND

2.1 Location, Topography and Geology

The Wind Farm development site is located on the northeastern side of the Dengie Peninsula in the parish of Bradwell-on-Sea (Fig.1). The site is under arable cultivation and comprises a landscape of fields defined by drainage ditches, hedgerows and trees. The majority of development area lies within the coastal marshland, and so is generally flat.

The wind turbine 106 site (NGR TM 0221 0641) is located 1.8km south-east of Bradwell-on-Sea village on the Dengie Peninsula of the Blackwater Estuary. The site is situated approximately 1.5km inland of the coast, at a height of around 1.5m AOD.

The development is located on saltmarsh that has been reclaimed from the sea and converted to a farmland. The results of the desk-based assessment suggest that the reclamation took place during the medieval period (Orr 2005). The underlying geology comprises London Clay overlain by alluvial (tidal) clay deposits.

2.2 Archaeological and Historical Background

The wind farm site is located within a landscape dotted with probable Late Iron Age and Roman salterns (locally known as 'red hills') (EHER 2037, 2035, 2031, etc). The majority of these have been identified through aerial photograph analysis and none have been excavated (Orr 2005). Salt-making has been a significant industry around the Essex coast for millennia, utilising tidal waters. The earliest known examples in the county have been found in the intertidal zone of the River Crouch and date to the Bronze Age. More typical are salterns known locally as 'red-hills' - their remains characterised by low, often extensive, mounds or surface spreads of red burnt soils. Whilst in use they would have been situated on the edge of the high tide line and used to manufacture salt through the evaporation of sea water. They are generally considered to be Late Iron Age and Early Roman in date, although it should be noted that recent investigations at Stanford Wharf on the Thames Estuary have recorded Middle Iron Age and early, middle and late Roman salt production (Biddulph 2012).

As mentioned above, a trial-trench evaluation was undertaken in 2006 prior to the submission of a planning application for the development (Foundations Archaeology 2006). A total of 10 trenches were excavated across the site. Trench 9 was targeted upon an anomaly identified through geophysical and magnetic susceptibility survey (Johnson 2005). A large and clearly defined saltern was revealed at a depth of 0.53m below the surface at 1.42m AOD and cut into the natural grey brown mottled alluvial clay. Consequentially the location of turbine 106 was shifted to the north-west in order to preserve the saltern *in situ*.

Two ditches aligned north-west to south-east were found in trench 3, in the location of turbine 103. The ditches were sealed by the subsoil and though their projected courses ran through the planned route of the access road (Foundations Archaeology 2006).

The site is located some 2.5km south-west of the Roman 'Saxon Shore' fort of Othona (EHER 31; SM 24883), constructed to defend Britain from Saxon raiders, and 1.2km south of the Roman road leading to the fort, the modern East End Road. Recent archaeological investigations have revealed that the area surrounding the fort formed part of its hinterland and was seemingly used to hold and process cattle for use by the inhabitants of the fort (Medlycott 1994; Sparrow 2011).

A hiatus in activity followed the Roman period until St Cedd founded a religious community within the walls of the fort in AD 654 (EHER 32). The Saxon chapel of St Peter-on-the-Wall, built on the site of the west gate of the Roman fort, is one of the oldest places of Christian worship in the country.

2.3 Previous investigation

Turbine 106 (formerly turbine 9) lay beyond the north-western edge of the saltern discovered in evaluation trench 9. The excavation of its footprint revealed a 2m+ thick sequence of seven alluvial/tidal deposits (i.e. naturally deposited), all of silt clay apart from the second lowest which comprised sand and gravel (Germany 2011). The latest deposit had been cultivated and turned into topsoil post reclamation of this vicinity, while part of one side of a buried creek was possibly indicated by two of the deposits having sloping north sides. There were no archaeological features or finds in association to provide an indication of dating, though the recorded sequence presumably predates the medieval conversion of the area to farmland.

3.0 AIMS AND OBJECTIVES

The general aim of the archaeological works was to identify, investigate and record archaeological deposits and features within the development area and to establish their extent, character, location, date, quality and significance.

The specific objectives of the archaeological monitoring of the groundworks were to:

- Determine the presence or absence of archaeological deposits within the development area

- Provide the information on the necessity of any further archaeological work to mitigate the impact of the development
- Preserve by record any archaeological remains endangered by the development that could not be preserved *in situ*.

The specific objectives of the excavation were to:

- Preserve by record the saltern remains located within the crane platform footprint of turbine 106
- To establish the nature, date, extent and quality of the exposed remains
- To investigate the faunal and environmental evidence through an effective sampling strategy

Research objectives for both the fieldwork and post-excavation study were formulated with reference to *Research and Archaeology: a Framework for the Eastern Counties, 2. research agenda and strategy* (Brown and Glazebrook 2000; Medlycott 2011). These primarily focused upon the perceived need to understand the functioning of an entire saltern site and its possible subsequent use (Medlycott 2011, 30-1).

4.0 METHOD

ECC FAU monitored the topsoil stripping in advance of the construction of turbine foundations, crane platforms and access roads. The ground investigation during the Unexploded Ordnance survey was also a subject to archaeological monitoring. The contractor carrying out the survey had identified potential explosives using magnetometry, prior to digging test pits with a mechanical excavator targeting the anomalies and scanning ground with a metal detector. The test pit dug within the crane platform footprint, which was located immediately to the south of the turbine 106 footprint and comprised a rectangular area measuring 25m by 40m, revealed a saltern.

In order to reveal the extent of the discovered archaeological remains the topsoil was removed from almost the entire crane platform footprint and from the part of the proposed access road that would run adjacent to the west edge of the platform (Fig. 2).

The topsoil in the excavation area was removed using a mechanical excavator fitted with a toothless ditching bucket, working under the supervision of an archaeologist. Topsoil and any masking subsoil were removed down onto the red earth that constituted the saltern

mound and onto the surrounding natural clay. The excavation area was cleaned, planned and recorded. Discrete features were hand-excavated and the overall red earth deposit divided into quadrants, the opposing northeast and southwest of which were excavated both by hand and by machine. Further areas of the red hill were also investigated within smaller segments. The site was located by using a directional GPS and its features surveyed using a total station theodolite. Standard ECC FAU excavation, artefact collection and recording methodologies were employed throughout.

ECC FAU is a registered Archaeological Organisation with the Institute for Archaeologists (IfA). All archaeological fieldwork was carried out in accordance with the Institute for Archaeologists' *Standard and Guidance for Archaeological Excavation* (2008) and *watching Brief* (2008) and the Association of Local Government Officers' *Standards for Field Archaeology in the East of England* (Gurney 2003).

5.0 FIELDWORK RESULTS (Figs 1 - 5)

5.1 Turbine 106 excavation

A c.23m x 27m excavation area was established that fully exposed the saltern remains previously located within the planned crane platform footprint and access road to it. Approximately 0.2m of greyish-brown plastic silty clay topsoil and a 0.25m thickness of olive-brown plastic silty clay subsoil were removed to reveal the extents of a circular spread of red earth denoting the position of a red hill site (Fig. 3; Plate 1). A total of five layers and eleven cut features were investigated and recorded. These comprised burnt soil/clay deposits of the red hill, with various hearth, tank, pit and post-hole features cut into them or else sealed beneath them, for which a degree of stratigraphic and chronological sequence can be demonstrated. Recovered artefacts mainly comprised briquetage fragments deriving from tanks, furniture and hearth lining, though a small quantity of pottery and slag were also present.

Further context detail is presented in Appendix 1. Artefactual material is alluded to where pertinent to the description and interpretation of the site remains, and is discussed in detail in Section 6.

The red hill

The body of the red hill comprised a generally brownish-red burnt soil/clay deposit that is so distinctive of such sites - accorded the general identifier of layer 40. Some variation in colour

and texture was noted across its surface, thought at the time to denote either variable intensity of heating across the saltern or else deposition of different debris dumps, but on reflection more likely merely reflecting its variable thickness over, and proximity to the interface with, the underlying natural deposit (Plate 1). Distinct orange-red baked areas surrounded a few of the cut features, signifying direct heat contact. In overview, the red earth defined an apparent low mound some 20m in diameter. To a certain extent this mound was the product of the dumping of this material, to a variable thickness of up to 0.60m over the pre-existing, though evidently modified, land surface (see below). However, its placement is likely to have been deliberate and structured - both levelling off /countering a natural westward downslope and overlying a presumably redundant salt working site - perhaps to extend a working platform further out into the marsh. The red hill material was remarkably uniform and can reasonably be regarded as a single deposit episode. The long sections excavated across the red hill reveal no significant variation in composition (e.g. Plate 3), the changes in surface colour probably only being the result of thickness in relation to the underlying natural deposit. Where removed within slots and quadrants, and recorded as equating layers 22/23, 35, 38 and 43, the red earth was found to overlie and/or infill various undulations and cut features.

Features below the red hill

Hearth 28 was a sub-rectangular, almost oval, cut 2m long, 1.38m wide and c.032m deep located more-or-less at the centre of the red hill (Fig.5; Plate 4). It contained a relatively complex sequence of fills that suggests an episode of re-cutting and reuse of this feature (Fig. 6.6). Primary fill 29 was a dark greyish-black sandy silt judged to be the product of scorched soil and ash/charcoal, though only occasional distinct charcoal flecks could be discerned. Overlying fill 30 was a dark brownish-red sandy silt containing occasional pebbles. Mid orange-red sandy silt 31 and overlying greenish brown-red sandy silt 34 appear to have occupied an un-discerned (and so unnumbered) re-cut in the middle of the feature. Artefacts were absent from all of the fills of hearth 28, except for a few pieces of baked clay noted in 34, but not collected.

Immediately south of hearth 28 elongated tank 37 was a 6.0m-long cut, widest and more distinctly rectilinear across its eastern two thirds where it was c.2.0m wide. This feature narrowed toward the east, to a rounded end. Some 0.5m deep, it contained a primary fill of red-brown clay silt (36) with lenses of clay which included small fragments of briquetage and occasional charcoal flecks. This was overlain by a reddish-pink clay silt fill (35) that included fragments of briquetage and pottery and occasional charcoal flecks. This upper fill appeared to extend beyond the northern edge feature and over adjacent hearth 28 and its fill (Fig.6.7).

On the opposite side of hearth 28, tanks 24 and 25 form a linear arrangement. The smaller, sub-rectangular tank 24, was 2.2m long, 1.3m wide and c.0.36m deep (Fig.6.4; Plate 5). Its single fill (27) was a dark to brownish red clay silt with occasional lenses of soft brown clay and grey silt. No *in situ* burning of this fill was evident. Elongated tank 25 was 3.15m long and 1.2m wide (Plate 6). Its 0.35m depth contained a pinkish to red-brown clay silt (26) that included patches and lenses of pale grey-green clay (Fig.6.3). Both contained vessel briquetage fragments, but 26 also yielded probable hearth lining and a small quantity of pottery. These similar features are likely to be contemporary with one another, as indicated by a band of scorching which runs continuously along their north edges.

The placement of the tanks either side of hearth 28 was noticeably uneven, with a pronounced gap between it and tanks 24 and 25. Whether significant or not, this space appears to have been occupied by small rounded pits 32, 41 and 44 (Plates 7-9) - possibly in an arc around the hearth itself. All three are 0.4-0.5m wide and 0.13-0.2m deep. Their single fills ranged from mid orange-red (32) to dark greyish red (42 and 45) sandy silts. Four fragments of vessel briquetage were retrieved from the fill of pit 45, while small burnt clay lumps were noted in 32 but not collected.

It appears that this cluster of cut features described above occupied a distinct platform approximately 7.0m square that stood proud of the surrounding natural deposit by approximately 0.25m. Created by reducing the natural clay deposit at least on the north and east sides, if not all four, the edges of this platform were apparent as linear ridge of pale clay protruding up and exposed at the stripped/truncated surface of the red earth deposit (Plate 10). In the northeast excavated quadrant of the red hill further parts of this natural deposit were exposed and the break of slope of the platform recorded. This slightly brownish cream-coloured deposit graded into an underlying, more expansive, deposit of whiter clay (Plate 11) and it seems that it was the remnant of the upper, 'dirty', portion of the undisturbed natural deposit, or perhaps even traces of an overlying subsoil that had been removed elsewhere.

To the north and west, the modified terrain adjacent to the platform was flat and even and relatively high (Plate 12). Within the southwest excavated quadrant the slope down from the platform was more pronounced, with the cleaner white clay exposed immediately below the red earth deposit. The rough, undulating and pitted nature of its surface is noteworthy (Plate 13), being a clear indication of ground reduction and disturbance having taken place to the south of the platform - perhaps deliberately bringing the salt marsh closer to the production site? Within this part of the site, just south of tank 37, the bases of shallow pits or

depressions 46 and 47 were encountered (Plate 14). Larger cut 47 was perhaps least pit-like, containing a mid greyish-red clayey silt fill though overlying red earth deposit 40 occupied the upper portion of the feature and seemingly the whole of pit/depression 46 (Figs 6.1 and 6.2). The function of these is unclear, but they may have served to collect and retain salt water at high tide.

Clearly, prior to the deposition of the red earth mound, this whole location had been stripped of vegetation and topsoil and its land surface deliberately and concertedly remodelled to create the island platform for the hearth and tanks and other level areas of varying heights presumed to constitute working areas surrounding it.

Features above the red hill

The approximate centre of the red hill was occupied by a parallel arrangement of sub-rectangular features of varying size and elongation, cut into the exposed surface of the red earth deposit after the mound had been formed (Figs 3 and 5). All shared a WNW-ESE alignment.

The cut of hearth 10 truncated that of hearth 28, but was stratigraphically divorced from it, being separated by red hill debris layer 38. Clearly later, hearth 10 was however of similar proportion and positioning and so likely to be a replacement of the earlier feature. Some 2.1m long, by 1.4m wide and 0.42m deep, this tank had a similar alignment to the other hearth and tank remains, giving a further indication that it represented replacement and continuance of the functioning of the saltern. The clay sides of the cut had been baked hard due to the feature's use as a hearth, so producing a 0.3m-thick orange red 'lining' recorded as fill 39 (Fig. 6.5). However, the hearth pit base did not contain any such scorching - perhaps having been removed by its repeated cleaning-out? Its primary fill comprised a soft black sandy silt (11) containing occasional charcoal fragments, but no artefacts. This presumably constituted a final use deposit within the hearth. The two overlying fills, 12 and 13, were pebbly brown- to grey-red sandy silts, the upper of which contained a large quantity of briquetage, including fragments of trough and firebar.

On the southeast edge of the red hill, and extending eastwards from it, was irregular gully- or channel-like feature 20 (Plate 16). Broadest at its west end, this 7.2m long cut seemingly tapered and became increasingly irregular in shape to the east (possibly due to truncation?). Indication of its interrupted eastward continuation was noted at the eastern limit of excavation. Its mid orange-red to dark brown-red silt clay fill (19) contained a significant quantity of briquetage vessel and firebar fragments, along with the majority of the structural

briquetage (probable hearth lining) found on the site. Its positioning at the lowest part of the site running up to the edge of the red hill is likely to be of significance.

While the briquetage and the red hill itself are generally indicative of a Late Iron Age to Roman date for the site and its features, a number of deposits contained small quantities of more closely dateable pottery sherds. Red earth layer/fill 35/22 over tank 37 and adjacent hearth 28, and fill 26 in tank 25, yielded pottery of late 1st century BC to early 1st century AD date (section 6.1) in association with briquetage items. Additionally, cleaning layer 21 gathered further PRLIA sherds from across the surface of the red hill, though these could conceivably have come from the tops of the same deposits.

5.2 Monitoring

Monitoring of the various turbine sites and of the access track was generally unproductive, the majority of the topsoil strip either taking place at locations where previous evaluation had not identified sites or else being too shallow to expose any buried remains present.

However, to the north of the investigated red hill, within a separate area of monitored topsoil strip for the base of Turbine 106 itself, part of a shallow ditch or channel 15 was recorded (Fig. 4). Traced for c.9.5m along the southern edge of this area, only one side of the feature was exposed. In excess of 2.0m wide and 0.2m deep as excavated, this potential ditch was filled with a greyish-brown silty clay and sealed below 0.64m of clay underlying 0.25m of topsoil. Only a few oyster shells were observed to be present in the fill.

Further areas of monitored topsoil strip in the Turbine 106 vicinity were unproductive (Fig. 2), being only lightly stripped.

Lastly, groundworks at Turbine 104 were the only other operations to uncover archaeological remains. Here, little more than an irregular patch of red earth material was exposed along the western edge of the strip for the turbine base, its variable pinkish to dark red colouring recorded as deposits 16 and 18 (Plate 17, Fig. 4) within slight hollow 18 in the exposed natural clay. This feature was encountered c.0.7m below topsoil and clay.

6.0 FINDS & ENVIRONMENTAL MATERIAL

A relatively small assemblage of artefactual material was recovered from the site, dominated by briquetage fragments deriving from evaporation tanks, furniture and hearth linings as might be expected. The remainder of retrieved material comprises only small quantities of pottery, slag and baked clay, the absence of a wider range of 'domestic' items and foodstuffs being notable.

6.1 Late Iron Age Pottery by Stephen Benfield

A quantity of Late Iron Age 'Belgic' grog-tempered pottery was recovered from four contexts (22, 26, 35 & 36) and as unstratified finds (21). In total there are twenty sherds weighing 372g. The average sherd weight is 18.6 g and the estimated vessel equivalent (EVE) is 0.25.

The pottery was recorded using Essex Roman fabrics series (Going 1987) and the Camulodunum (Colchester) pottery form series (Hawkes & Hull 1947). These are supplemented by the National Roman fabric reference collection (Tomber & Dore 1998) and Thompson's corpus of 'Belgic' pottery types (Thompson 1982). The number of sherds, weight and the EVE are listed by fabric in the table below. The pottery is listed and described by context in Appendix 3.

<i>Fabric</i>	<i>Description</i>	<i>No</i>	<i>Wt(g)</i>	<i>EVE</i>
53	Grog-tempered fabrics	20	372	0.25

Late Iron Age pottery type

All of the pottery is Late Iron Age 'Belgic' grog-tempered ware (Going 1987, Fabric 53; Tomber & Dore Fabric SOB GT). Grog-tempered 'Belgic' pottery first appears in southern Britain the early-mid 1st century BC (c.75-50 BC), but probably did not become common on settlement sites until the late 1st century BC (c.50-25 BC) (Sealey 2007, 31). It is replaced by Romano-British wares from the early conquest period and is probably not current on some sites much beyond the Roman conquest in 43 AD, although it retains a significant presence among many assemblages dating to the Claudio-Neronian period (43-68 AD) (Biddulph 2007). The pottery here is essentially a pre-conquest assemblage with no later pottery. It can be broadly dated as late 1st century BC-early 1st century AD while one of the vessels probably dates to the early 1st century AD.

The stratified pottery was recovered from fill 26 of pit/tank 25, from fills 35 and 36 of pit/tank 37 and from layer 22. The largest quantity from any one context (22) is eleven sherds (157g), the other contexts producing between one and three sherds each including the unstratified

pottery (21). The sherds are generally moderately thick with burnished or smoothed surfaces which are a dark, brownish-grey colour. The condition of the pottery is good with medium-large sherds, some joining (22 and 26). The nature and condition of the pottery indicates that it probably represents an assemblage consisting of a small number of pots which are contemporary with the contexts.

Two vessel forms could be identified. One, from fill 22, is jar or bowl with a corrugated or rippled shoulder. The other, from fill 26, is a cordoned jar of form Cam 219 (Thompson 1982, B3-3), of which a single large sherd gives much of the vessel profile. This jar form is primarily a northeast Essex type (Thompson 149). It occurs from among the earliest occupation at Sheepen, Colchester, dated from c.5 AD (Niblett 1985, Table 1) and is dated by Thompson to the period of the early 1st century AD (1982, 149). There is some light abrasion to the lower internal part of this pot which probably represents use wear, possibly from stirring or scraping.

6.2 Briquetage by Mark Atkinson

Briquetage is a distinctive baked clay fabric exclusively associated with coastal salt-making sites of the Late Iron Age and Roman periods. It is the principal material manufactured and used to fabricate the principal functional components of the saltern installations. Briquetage debris constitutes the greater part of the orange/red burnt material that comprise Red Hills and gives this type of site its name.

A total of 315 pieces of briquetage, weighing 24,584g, was collected from eleven contexts. This assemblage is relatively restricted in its range of forms, comprising fragments of either containers such as evaporation tanks or else other associated items such as fire bars and supports. The material fabric of the hearths, though distinct from that of troughs and furniture, is included as briquetage and is described under the heading of 'structural' material. The briquetage assemblage has been recorded by fabric and by form type. Identification and quantification by context is presented in Appendix 4. Given the comparatively small size of the assemblage no attempt has been made to systematically record and analyse such aspects as rim form typology or fabric to form occurrence.

This report references the principal sources on Essex briquetage and red hill sites (Barford 2000; Biddulph *et al* 2012; Fawn *et al* 1990; Major, forthcoming).

Fabrics

While the fine, silty clay matrix of the retrieved fragments is more-or-less consistent, the amount of vegetable tempering added to the clay may be used to distinguish three broad fabrics used for vessel and furniture items. Their identification (Fabrics A-C) follows the scheme devised for Elms Farm, Heybridge (Major, forthcoming). A further fabric is defined for the distinctive structural briquetage present (Fabric D).

Fabric A: abundant vegetable temper, mostly burnt out, producing a vesicular appearance and hackly fracture. The vesicles often contain a white deposit and surfaces occasionally bear a cream coloured deposit. The material is light in weight, colour is variable - generally a reddish orange, often with a pinkish/mauve tinge, sometimes with a reduced core.

Fabric B: denser fabric than A, with less abundant vegetable inclusions, but otherwise similar.

Fabric C: little vegetable tempering, so producing a denser fabric. Often slightly browner colouring.

Fabric D: distinctive, very light-weight, fine and friable fabric, lacking vegetable tempering or other inclusions. Dessicated texture, with a powdery surface. Uniform orange-red colour.

Full fabric identification data is held in archive. Distinction between Fabrics A to C was often made difficult by considerable variation in surface survival, colour and intensity of firing. Consequently, fabric identifications should only be regarded as approximate. Fabric D exclusively describes the briquetage-like material deriving from the lining of hearths and flues and so accounts for 100% of the structural briquetage present. Despite some unreliability of fabric identifications, there appears to be clear trends within the data for Fabrics A-C; with Fabric C being predominant overall at over 60% of the vessel and furniture material. This is primarily due to Fabric C being the most commonly used for troughs - themselves comprising the most numerous and generally larger fragments in the assemblage. Fabric C accounts for 67% by count and 81% by weight of all vessel fragments. Fabric B is the next most common, with fabric A only a relatively rare occurrence. Contrary to this, Fabric B, at 75-80% of all the furniture fragments is clearly the preferred choice for items such as firebars on this particular site.

In the most general of terms therefore, Fabric C is most commonly used in the manufacture of troughs while Fabric B is mostly used for firebars.

Forms

Perhaps reflecting the relatively limited extent of excavation, seemingly lower intensity of use of the salt production site and restricted date range, the assemblage is noticeably constrained in terms of its range of forms. It comprises fragments deriving from vessels

(predominantly troughs) and from furniture (mostly fire bars), but lacks the array of mould vessels, wedges, pinch props, rods, plates, discs and plaques, luting and other miscellanea present at red hill sites elsewhere in Essex (e.g. Stanford Wharf, Biddulph *et al* 2012; Canvey Island, Fawn *et al* 1985). Those forms present are each considered below.

Vessels

Virtually all recovered and identified vessel fragments comprise trough. A few thinner-walled sherds may be speculated to be remains of smaller salt moulds or perhaps evaporation bowls.

Troughs:

These are north-eastern Essex 'type A' vessels as defined by Fawn *et al* (1990, 11). 195 fragments, weighing 18620g, were retrieved from 11 contexts. All of the identified trough fragments consist of pieces of slab-built rectangular containers with either vertical or splayed sides. Base, side and joint or corner fragments are present. Signs of hand shaping and smoothing are apparent on their surfaces. Edges or rims, where present, are generally square, plain and cut flat (e.g. context 40). However, context 013 includes a rim displaying a diagonal cut/sawn effect, one with a chamfered inner edge and a third with some gentle finger-pinched decoration. Even though plain, some rims show signs of compressing and/or pulling when cut, creating a slightly ragged outward lip. Wall thickness varies, being thickest where they merge into the base. Upper wall thickness is 14-20mm. Base thickness is as much as 25mm. Some of the thinnest could perhaps derive from non-trough vessels or even be plate pieces. Base/wall fragments suggest both slab-built and moulded construction of these troughs. Varying degrees of scorching/burning are apparent.

The context 019 assemblage is notable as it largely comprises material from substantial portions of two troughs. One of these is readily identified by its distinctive thick black reduced core of which a number of pieces can be refitted to give the full base width of the vessel. Its base is 16mm thick, splaying to 20mm to meet the walls. Its maximum measurable width is 345mm. Furthermore, there is a curious black band on the inside base surface, close to the end of the vessel, just before it curves up to the wall (Plate 18).

The remaining contexts 22, 23, 26, 27, 35, 36, 43 and 45 all comprise only small quantities of featureless fragments of trough base or wall.

Other vessels:

While no salt moulds or evaporation bowls - smaller-sized circular to oval vessels - are positively identified, a thinner (only 12mm) curving fragment in a brown coloured fabric from context 13 could be from a smaller vessel such as this. Two other adjoining wall fragments only 10mm thick in more regular briquetage fabric could also be. A fragment from 36 could also be vessel-like.

Furniture

Distinctive triangular firebars constitute the majority of the briquetage fragments deriving from items of recognisable hearth or kiln furniture. Oddly, no pedestals are present, nor are of the other items often found at red hill sites - such as wedges, pinch props, rods, etc. A few pieces of briquetage, currently identified as thin trough or other vessel wall from contexts 13 and could perhaps be plate.

Firebars:

A total of 16 firebar fragments, weighing 2290g, were retrieved (Plate 19). Some variation in fabric, colour and intensity of firing are all evident. None are complete, though all can be identified to be of the typical triangular type. Firebars are noticeably denser and harder fired than the troughs, and their surfaces are generally covered in white to pink residue. The bulk came from context 13, with one or two each from contexts 23, 36, 40 and possibly 22. Most fragments are from the central part of the firebars, where thickest and most robust. All are slightly thicker at their base and virtually all taper toward their ends. Having said this, there are relatively few ends present in the assemblage and breakage also tends to have occurred at the apex so it is often difficult to discern their sub-form. Pointed, flat and, possibly, rounded apexes are present. The most complete example is 190mm long by 65mm high and 25-30mm thick, representing approximately two thirds of a pointed apex firebar. Most firebars with measurable dimensions are of 55-90mm (c.70mm ave) height and consistent at 25-30mm thickness (though one example from 013 is 35mm and those from contexts 36 and 40 are only 20mm thick). Complete firebar lengths can only be estimated, at 220-260mm. One piece from 040 displays a white/pink coating or residue.

Structural

A total of 101 pieces of briquetage-like material, weighing 2854g and identified as structural briquetage, was recovered from contexts 19, 26 and 40. The majority, 84 relatively small fragments (2300g) were collected from context 19. It is all of Fabric D, an orange/red fine clay containing very few inclusions. It seems well fired, is particularly light-weight, crumbly and has a powdery surface. Some vague surfaces, both flat and curved are apparent, but

rarely more than one on each fragment. Only a few pieces show signs of briquetage-style pink/mauve colouring and one piece is near-vitrified. This material probably derives from the incidental heating of clay lining/sides of hearths and flues at the saltern site. There is nothing to suggest that any pieces are parts of minor items of furniture such as pinch props, wedges and luting, etc.

6.3 Fired Clay

Only one piece of fired clay, from 019, is distinctly different from the briquetage fabrics. Denser and solid, this light grey fragment presumably comes from some other source than the saltern structures themselves. It has suggestion of shaping and surface.

6.4 Slag

Four, mostly large, pieces of slag (960g) were recovered from context 040. All are light in weight, glassy and vesicular - presumably representing fuel ash slag deriving from the firing of the saltern.

6.5 Environmental material by Val Fryer

Bulk soil samples for the retrieval of the plant macrofossil assemblages were taken from three deposits; the red earth material exposed at Turbine 104 (sample 1, context 17), and at Turbine 106 a fill within saltern hearth 10 (sample 2, context 11) and from overlying fill/layer 12 (sample 3).

The soil samples were bulk floated by ECCFAU and the flots were collected in a 300 micron mesh sieve. The dried flots were scanned under a binocular microscope at magnifications up to x16, and the plant macrofossils and other remains noted are listed in Appendix 5. Nomenclature within the table follows Stace (1997). All plant remains were charred. Modern seeds and fibrous roots were also recorded.

Although cereal grains, chaff, seeds of common weeds and wetland plants and charcoal/charred wood fragments were moderately common within the hearth assemblage, plant remains were exceedingly scarce elsewhere. Preservation was generally good, although some seeds had lost their diagnostic testae or seed coats.

Both oat (*Avena* sp.) and wheat (*Triticum* sp.) grains were noted within the assemblage from sample 2, with oats occurring most frequently. A possible cultivated oat floret, with what appeared to be a straight basal abscission scar, was also recorded. The wheat was generally poorly preserved, with one grain in particular having deeply concave sides, probably

indicative of germination. This grain was of an elongated 'drop' form typical of spelt (*T. spelta*), and spelt glume bases were also recorded. In addition to the cereal remains, a range of seeds of common segetal weeds were also present within the assemblage, with taxa noted including brome (*Bromus* sp.), fat hen (*Chenopodium album*), black bindweed (*Fallopia convolvulus*), goosegrass (*Galium aparine*), grasses (Poaceae), buttercup (*Ranunculus acris/repens/bulbosus*) and dock (*Rumex* sp.). Fragments of charred root, rhizome or stem were abundant and pieces of charcoal/charred wood, some of which were quite large (>10mm) were also noted.

The assemblages from samples 1 and 3 were particularly sparse, although both contained numerous small fragments of burnt or fired clay. Sample 1 did include a single rush (*Juncus* sp.) fruit and sample 3 contained a very high density of mineral concretions (possibly derived from the heating and/or settling processes) along with siliceous and vitreous globules, both of which were probably derived from the high temperature combustion of organic materials including grass/straw.

In summary, although the assemblage from hearth fill [11] is small (<0.1 litres in volume), it is very similar in composition to material recovered from other contemporary saltern sites in both Essex (cf. Bowers Marsh (Fryer 2011) and the Hullbridge Survey (Wilkinson and Murphy 1995)) and the Fenlands (Lane and Morris 2001), where a range of plant materials were imported to the sites for use as temper or fuel. Given the context of the current material, it would appear most likely that fuel waste, including both dried herbage and cereal processing/storage waste, is represented. As this material was essentially sealed within the hearth by fill/layer 12, very few plant remains are recorded from the other sampled deposits.

Although sample 2 does contain a sufficient density of material for quantification (i.e. 100+ specimens), analysis of a single assemblage in isolation would add little to the data already included within this assessment. Therefore, no further work is recommended at this stage. However, a summary of this assessment should be included within any publication of data from the site.

6.6 Comments on the assemblage

This finds assemblage, comprising a modest and relatively restricted/specialised range of artefacts, is clearly indicative of a production site (as opposed to secondary working or consumption). Judging by the type of troughs used, predominance of firebars, and lack of other items such as pedestals, pinch-props, etc., this is a saltern in the northeast Essex

tradition, rather than Southeast and Thameside. Other than the small quantity of pottery, which could itself perhaps have been used in the salt-making process, the lack of domestic artefacts is presumably at least partly a product of the narrow focus of the excavation area upon the red hill itself. This may also suggest a relatively short working life for the site. All of the pottery is of Late Iron Age date and it is reasonable to assume that the saltern was in operation for only a short time in the late 1st century BC or early 1st century AD. This lack of prolonged activity, and consequent absence of significant reworking and disturbance of the site, has provided a 'snap-shot' briquetage assemblage for a pre-conquest Late Iron Age saltern and one that is noticeably unfragmented compared to material from other red hill sites. It is particularly notable that a substantial part of a trough can be reconstructed and its width determined. The paucity of fuel ash slag and apparent absence of significant quantities of charcoal suggests that such material was disposed of away from the red hill itself, beyond the limits of excavation. However, the preservation of charred plant remains within the later saltern hearth does provide some insights into the nature of the fuel used, as well as generally reflecting its surrounding saltmarsh environment in the weed taxa present.

7.0 DISCUSSION & ASSESSMENT OF RESULTS

The identification of only two occurrences of archaeologically-significant remains within the various groundworks for the turbine sites and their associated infrastructure is as much a function of their relatively deep burial as their low incidence in this saltmarsh fringe landscape - the majority of the topsoil and subsoil stripping being too shallow to expose further remains. However, the fact that both discoveries relate to salt production sites would appear to serve to reflect the perceived essential character of below-ground resource in this saltmarsh margin.

While the Turbine 104 deposits suggest the presence of a red hill saltern in their vicinity and amply evidence the generally deep nature of burial of such remains, it is the Turbine 106 site that is of particular significance. Apart from being the only extensively, and professionally, investigated red hill site on the north-east Essex coast for some decades, the exposure of the entirety of a single red hill mound has provided an important opportunity to further understanding of the nature, function and chronology of these salt production sites.

The Turbine 106 red hill is a relatively modest sized and uncomplicated example of north-east Essex type of saltern site. It is typical in terms of its mounded red earth deposit, its small complex of hearth and tanks, and the presence of larger briquetage tanks though otherwise restricted range of briquetage vessels and furniture.

The lack of complexity of its collective features is likely largely due to the short productive life of this saltern, with only two phases of use being reliably identified - separated from each other by the deliberate deposition of the scorched red earth debris material to form a mound over the original saltern site. Indeed, the deliberate modelling and remodelling of the site terrain is a significant aspect of the activity. The initial preparation of the site seems to have involved the removal of topsoil and much of the subsoil deposits to expose natural clay and the sculpting of a raised square working area or platform by removing further subsoil and natural clays from around it. This probably represented the exploitation and modification of an already elevated site on the edge of, and perhaps projecting into, the saltmarsh. The land surface inland (north and west) of the platform was levelled - perhaps to provide an ancillary working or storage area, while that to the south and east was seemingly reduced to create or enhance an existing scarp down to the saltmarsh or a natural channel leading off it - perhaps to bring tidal waters closer to the saltern. Once created, the platform was occupied by a single hearth, accompanied by a couple of storage tanks cut into the natural clay that held the brine prior to it undergoing evaporation in a briquetage tank over the hearth. While this would appear to have been a modest venture, it should be borne in mind that this was very probably just one of a number of salterns along this edge of saltmarsh location. Similar raised platforms, surrounded by gullies, are a feature of the saltern complex at Stanford Wharf (e.g. saltern 5808, Biddulph *et al* 2012,115) and also possibly Blackborough End at Middleton, Norfolk (Crowson2001, 167-73), albeit both are later Roman in date. One notable aspect of this earlier phase of production at Turbine 106 is the absence of fuel ash and briquetage debris, from which it must be presumed that such material was conscientiously removed and disposed of elsewhere in order to maintain a fairly clean working environment.

When the first phase of salt production came to an end, it appears that there followed an episode of concerted deposition of red earth debris over the obsolete saltern. This material was remarkably uniform considering that it must have been the product of a relatively protracted or concerted episode of accumulation given its volume - presumably deriving from production at a near-by saltern. It is conjectured that such material was deliberately dumped in an effort to remodel and rejuvenate obsolete salterns - ostensibly creating higher and larger platforms on which to work. The partially open hearth, tanks and water collection pits were infilled and the site re-profiled to create a reasonably circular and even mound. Whether or not this was in response to changing sea level is far from clear, but it does not seem to have been to facilitate a more expansive replacement saltern complex.

Once formed, the red hill was occupied by a second phase of saltern, clearly positioned over its precursor - hearth 10 being placed in a near identical position to hearth 28 - the original

square working platform perhaps still being visible and retained/incorporated into the remodelled saltern? The similarity of this simple arrangement of a small hearth and accompanying pair of tanks suggests that the interval between the two production phases was not protracted and that the nature and scale of the procedure remained unchanged. It seems likely that the entire saltern sequence is of Pre-Roman Late Iron Age date. The uniformity of the recovered finds assemblage also supports this. Its restricted range of material and evident consistency within the briquetage assemblage is construed to indicate the relatively short lifespan of this saltern site. The lack of a domestic component, other than a small quantity of pottery, is notable and suggests that any settlement or service activities were not located in close proximity to this particular saltern. However, the general low levels of processing debris and waste, such as fuel ash and burnt hearth lining is also of interest. Even in the final stages of use and abandonment, the red hill seems to have been kept clean with the only significant waste materials being found in the redundant hearth and tanks - the notably large pieces of briquetage tanks and firebars (compared to a long-lived and complex site such as Stanford Wharf) largely being discarded in the tops of these latest features. Indeed, the lack of significant amounts of carbonised deposits, other than from latest hearth 10, has constrained the potential to investigate the environmental setting of this saltern and its wider location.

In conclusion, the Turbine 106 investigated remains represent a chronologically-specific and well-preserved example of a saltern that is seemingly typical of such sites that proliferate the north-east Essex coast. Undisturbed and uncomplicated by subsequent use into the Roman period and re-use beyond, its creation and development is relatively clear. As such, the saltern illustrates the modest scale and simplicity of these earlier sites, but also their constant management and purposeful modification. As already noted, the investigation of an entire Essex red hill has been a rare occurrence in modern times and the information gained from Turbine 106 provides important insight into their nature and operation to supplement and compare to the findings of other very recent red hill investigations in the south of the county. It is therefore likely that the ECC HE officer will request the dissemination of these results by means of the production of a publication report, probably in the county journal *Essex Archaeology and History*.

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APPENDIX 1: CONTEXT DATA

(Contexts 01-09 relate to 2011 monitoring phase)

All contexts are for Turbine 106 site, unless indicated otherwise

All dimensions given in metres

Context	Fill of	Type	Description	Dating
10	-	Hearth	Hearth base. 2.1m x 1.4m x 0.42m deep	
11	10	Fill	Black sandy silt, inc. charcoal. 0.1m thick. Bottom fill of hearth	
12	10	Fill	Mid brownish red sandy silt, inc pebbles & charcoal. 0.12m thick. Middle fill of hearth	
13	10	Fill	Dark greyish red clayey silt, inc. freq briquetage. 0.24m thick. Top fill of hearth	
14	15	Fill	Mid greyish brown silty clay, inc. pebbles. 0.21m thick	
15	-	Natural hollow?	Large shallow depression, 9.5m+ x 2m+ x 0.21m deep. Possible creek or other natural feature?	
16	18	Fill	Red to pinkish red baked clay silt. 0.08m thick. Upper fill of ?natural hollow. Turbine 104	
17	18	Fill	Dark grey clay silt, inc. frags and lenses of pink & orange baked clay. 0.01m thick. Lower fill of ?natural hollow. Turbine 104	
18	-	Natural hollow?	Irregular & very shallow depression. 5m x 3.3m+ x 0.08m deep. Turbine 104	
19	20	Fill	Mottled orangey red & dark brownish red silt clay. 0.20m thick	
20	-	Tank/channel?	Irregular linear E-W cut, tapering. 7.20m x 1.45m x 0.20m deep	
21	-	U/S	Unstratified finds from surface cleaning	
22	-	Layer/fill	Mottled mid orange & dark reddish brown silt clay. 3.05m x 0.17m thick deposit in/over pit/tank 37. Over 23. Same as layer 35	LIA
23	-	Layer?	Dark brownish red clay silt, inc charcoal. 2.6m x 0.23m thick. Under 022. Same as layer 36	
24	-	Tank/pit	Oval, NW/SE aligned, flat base. 2.20m x 1.30m x 0.36m deep	
25	-	Tank/pit	Oval, NW/SE aligned, flatish base. 3.15m x 1.20m x 0.35m deep	LIA
26	25	Fill	Dark red brown to pinkish clay silt. Lenses of grey-green clay. 0.35m thick.	LIA
27	24	Fill	Dark red to brownish red clay silt. Lenses of brown clay. 0.36m thick.	
28	-	Hearth/pit	Oval, NW/SE aligned, steep sides, flatish base. 2.0m x 1.38m x 0.32m deep	

APPENDIX 2: FINDS DATA

All weights in grammes

Context	Feature	Count	Wgt (g)	Description	Date
013	10	94	9790	Briquetage: trough base, corner, wall & rim. Also firebar and misc frags	
019	20	85	2300	Structural briquetage: light, crumbly, hearth lining frags?	
		56	5990	Briquetage: trough frags, base, side, corner & rim present	
		1	2	Fired clay: grey, harder-fired small frag. Some shaping?	
021	u/s	3	27	Pottery: GROG bodysherds	Late Iron Age
022	-	11	157	Pottery: GROG bodysherds	Late Iron Age
		1	142	Briquetage: trough ?wall frag, 24mm thick, square rim (could be firebar?)	
023	-	2	200	Briquetage: vessel frag, small, rim. Also firebar frag, low apex?, though no end or apex present. 30mm wide.	
026	25	3	162	Pottery: GROG body & rim sherds of large carinated bowl	Late Iron Age
		18	490	Briquetage: small and featureless frags	
		13	400	Structural briquetage: light & crumbly hearth lining frags? Some pieces have one smoothed surface. One large piece has two surfaces	
027	24	4	230	Briquetage: vessel wall frags, featureless, 14mm thick	
035	37	1	3	Pottery: black surfaced ware bodysherd	
		2	94	Briquetage: vessel wall frags, featureless, 22mm thick	Late Iron Age
036		4	236	Briquetage: vessel frags, featureless. Also one firebar frag, 20mm thick, no apex or ends	
	2	23	Pottery; GROG bodysherds	Late Iron Age	
040	-	15	1260	Briquetage: trough fragments, probably all wall, 15-20mm thick. Some rims present. Also two firebar frags, 20mm thick, no apex or ends	
		4	154	Structural briquetage: light & crumbly, three have a smoothed surface, one has an edge. One very burnt	
		4	960	Slag: large pieces of light, glassy, vesicular slag - deriving from fuel ash?	
043	-	12	260	Briquetage: vessel, small & featureless frags	
045	44	4	218	Briquetage: vessel frags, featureless	
	Totals:	339	23098		

APPENDIX 3: POTTERY DATA

<i>Context</i>	<i>Ctxt type</i>	<i>Fabric</i>	<i>Type</i>	<i>Count</i>	<i>Wt(g)</i>	<i>Eve</i>	<i>Abr</i>	<i>Description/notes</i>	<i>Form</i>	<i>Period</i>	<i>Spot date</i>	<i>Illust?</i>
21	US	53	b	3	27							
22	Layer	53	b	1	21			Neck sherd from a corrugated or rippled shoulder jar or bowl	Jar/bowl	LIA	L1C BC-E1C AD	
22	Layer	53	b	10	136			Prob 2-3 pots, two groups of two sherds joining, one sherd with orange-brown surface			L1C BC-E1C AD	
26	Fill of 25	53	r	3	162	0.25		SV, one large sherd, bowl (part profile) with two small joining sherds, one a recent break (rim dia approx 190 mm), dark grey surfaces, grey core, traces of pinkish red soil adhering to surfaces, light abrasion to the lower internal part	Cam 219 (Thompson B3-3)	LIA	E1C AD	YES
35	Upper fill of 37	53	b	1	3					LIA	L1C BC-E1C AD	
36	Lower fill of 37	53	b	2	23					LIA	L1C BC-E1C AD	

APPENDIX 4: BRIQUETAGE DATA

Context	Briquetage Type	Description	Fabric A		Fabric B		Fabric C		Fabric D	
			Ct	Wgt	Ct	Wgt	Ct	Wgt	Ct	Wgt
013	Vessel	Trough: wall & rim; few corner & base frags			16	1670	46	6570		
	Furniture	Firebar: triangular, fragmentary	2	440	11	1890	1	280		
	Misc	Distorted/curving firebar end? Small vessel sherd					4	190		
019	Vessel	Trough: base, corner & wall frags, mostly two vessels	8	220	2	140	44	5600		
	Structural	Hearth lining?							85	2300
022	Vessel	Trough: wall & rim frag (or firebar?)					1	40		
023	Vessel	Trough: wall frag					1	110		
	Furniture	Firebar: triangular, fragmentary					1	90		
026	Vessel	?trough: very fragmentary, featureless	3	100	11	300	4	80		
	Structural	Hearth lining? Some surfaces/shaping present							13	400
027	Vessel	?trough: featureless fragments			4	230				
035	Vessel	?trough: featureless fragments			1	30	1	60		
036	Vessel	Trough: ?wall frags					4	100		
	Furniture	Firebar: triangular, fragmentary			1	120				
040	Vessel	Trough ?wall frags, some rim	3	200			7	740		
	Furniture	Firebar: triangular, fragmentary			4	450				
	Structural	Smoothed surfaces and one edge present							4	154
043	Vessel	?trough: featureless fragments			5	120	7	140		
045	Vessel	Trough: featureless fragments			4	210				
Totals:			16	960	59	5160	121	14000	102	2854

NB: 14 pieces / 1290g of vessel from 013 not identified to fabric due to intense heating/vitrification

Appendix 5: Environmental sample data

Sample No.	1	2	3
Context No.	17	11	12
Feature No.	18	10	10
Feature type	Dep.	Hearth	Hearth
Cereals			
<i>Avena</i> sp. (grains)		x	
(floret base)		x	
<i>A. sativa</i> L. (floret base)		xcf	
<i>Hordeum</i> sp. (rachis node)		xcf	
<i>Triticum</i> sp. (grains)		x	
(glume base)		x	
(rachis internode)		x	
<i>T. spelta</i> L. (glume bases)		xx	
Cereal indet. (grains)		x	
(basal rachis node)		x	
Herbs			
Apiaceae indet.	x		
Asteraceae indet.		x	
<i>Atriplex</i> sp.		xcf	
Brassicaceae indet.		xx	
<i>Bromus</i> sp.		xx	
<i>Chenopodium album</i> L.		x	
Chenopodiaceae indet.		xx	
<i>Fallopia convolvulus</i> (L.)A.Love		x	
<i>Galium</i> sp.		x	
<i>G. aparine</i> L.		x	
<i>Medicago/Trifolium/Lotus</i> sp.		x	
Small Poaceae indet.		x	
Large Poaceae indet.		x	
Primulaceae indet.	xcf		
<i>Ranunculus acris/repens/bulbosus</i>		x	
<i>Rumex</i> sp.		x	
<i>Stellaria media</i> (L.)Vill		x	
Wetland plants			
<i>Bolboschoenus/ Schoenoplectus</i> sp.		xcf	
<i>Juncus</i> sp.	x		

continued

Other plant macrofossils			
Charcoal <2mm	x	xx	x
Charcoal >2mm	x	xx	x
Charcoal >5mm		xx	
Charcoal >10mm		x	
Charred root/rhizome/stem	xx	xxxx	x
Mineralised root channel	x		
Indet.culm nodes		x	
Indet.seeds		xx	x
Other remains			
Bone	xb		
Burnt/fired clay	xxx	x	xx
Siliceous globules			xx
Small coal frag.	x		
Vitreous material			xx
White/buff/pink mineral concretions			xxxx
Sample volume (litres)			
Volume of flot (litres)	<0.1	<0.1	<0.1
% flot sorted	100%	100%	100%

Key to Table

x = 1 – 10 specimens

xx = 11 – 50 specimens

xxx = 51 – 100 specimens

xxxx = 100+ specimens

cf = compare b = burnt Dep. = depression

APPENDIX 6: CONTENTS OF ARCHIVE

SITE NAME: Bradwell Wind Farm, Hockley Lane, Bradwell-on-Sea, Essex

SITE CODE: BRHL 11

Index to Archive

1. Introduction

1.1 Risk assessment & Method statement

2. Research Archive

2.1 Monitoring & Excavation Report (1 bound, 1 unbound copy)

2.2 Finds catalogues & Reports

2.3 CD-Rom containing digital report, photos, drawings, etc)

3. Site Archive

3.1 Context Record Register

3.2 Context Records (ctxts 10-48)

3.3 Plan Register

3.4 Section Register

3.5 Trench location plan

3.6 Photographic Registers

3.7 Site Photographic Record (digital colour prints + images on disk)

3.8 Miscellaneous notes/plans, scheme drawings, background info

Not in File

13 large plan/section sheets, pencil on drawing film

4 large plan/section sheets, pencil on drawing film

Finds

4 cardboard boxes containing briquetage, pottery, slag, baked clay, enviro residues.

APPENDIX 7: HER SUMMARY SHEET

Site name/Address: Bradwell Wind Farm, Hockley Lane, Bradwell-on-Sea, Essex	
Parishes: Bradwell-on-Sea	District: Maldon
NGR: TM 0221 0641	Site Code: BRHL 11
Type of Work: Excavation & Monitoring	Site Director/Group: T. Ennis, ECC Field Archaeology Unit
Dates of Work: 13-28/08/2012	Size of Area Investigated: 580sq m
Location of Finds/Curating Museum: Colchester Museum	Funding source: client
Further Seasons Anticipated?: No	Related HER Nos:
Final Report: to be established	Oasis No: 150712
Periods Represented: Late Iron Age	
SUMMARY OF FIELDWORK RESULTS:	
<p>Monitoring of groundworks associated with the construction of a ten-turbine windfarm site close to the marsh and coast south and east of the village of Bradwell-on-Sea recorded the presence and exposure of significant archaeological remains at only two sites - the works being generally too shallow in most locations. In both instances, these remains relate to ancient salt production sites and include the presence of distinctive red hill deposits.</p>	
<p><u>Turbine 106</u> The location of Turbine 106 had previously been moved due to the detection of a large saltern or red hill site during preliminary geophysical survey work in 2005. However, the revised location also contained the remains of a less substantial saltern a short distance to its northeast, buried under thick deposits of marsh clay and topsoil. This c.20m-diameter mound of burnt earth was found to both overlie and be cut by a number of distinctive hearth, tank and gully features that are indicative of salt production by means of salt water evaporation taking place at this location. Both the red earth deposits and cut features contained fragments of briquetage vessels and furniture associated with and generated by this activity. A quantity of carbonised plant remains collected from one of the hearths indicates fuel material used. This saltern and red hill site is judged to be of late 1st century BC/early 1st century AD date on the basis of the small quantity of late Iron Age pottery retrieved.</p>	
<p><u>Turbine 104</u> An expanse of red hill material was exposed within the strip for the turbine base, seemingly contained within a shallow depression or cut, though no distinctive structures or artefacts were present.</p>	
Previous Summaries/Reports:	
<p>Foundations Archaeology 2006 <i>Bradwell Wind Farm, Essex: Archaeological Evaluation</i></p> <p>Germany, M. 2011 <i>Turbine 9 [6], Bradwell Wind Farm, Hockley Lane, Bradwell-On-Sea, Essex, Archaeological Excavation</i>, ECC FAU Rep. 2353</p> <p>Johnson, A.E. 2005 <i>Proposed Wind Farm, Bradwell-on-Sea, Essex: Topsoil Magnetic Susceptibility Survey</i>, Oxford Archaeotechnics Ref: 3010805/BRE/NPR</p> <p>Orr, K. 2005 <i>An archaeological desk-based assessment of land at Bradwell-on-Sea, Essex</i> , Colchester Archaeological Trust Report 04/5a</p>	
Author of Summary: M. Atkinson	Date of Summary: April 2012

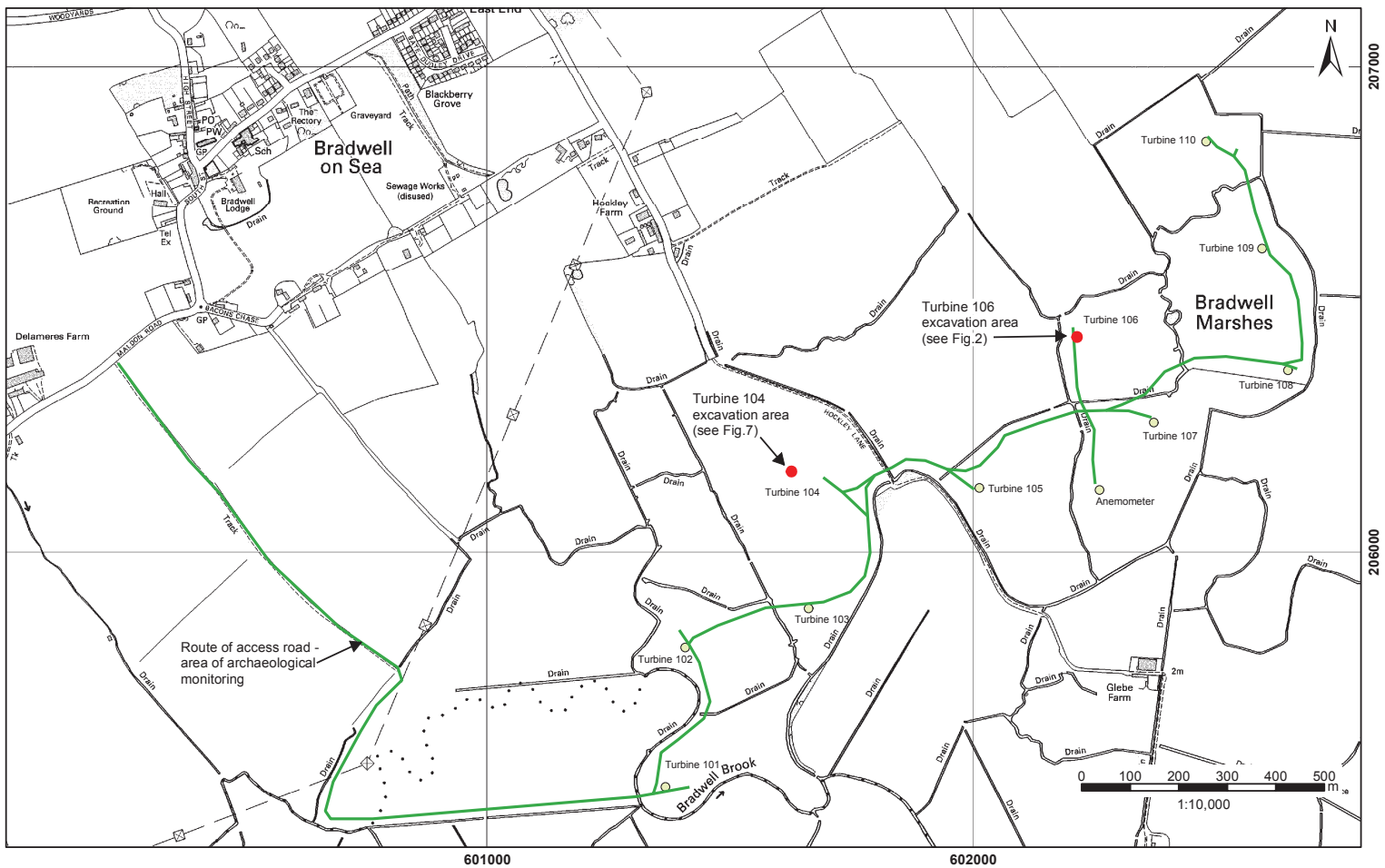


Fig.1. Location of archaeological works.

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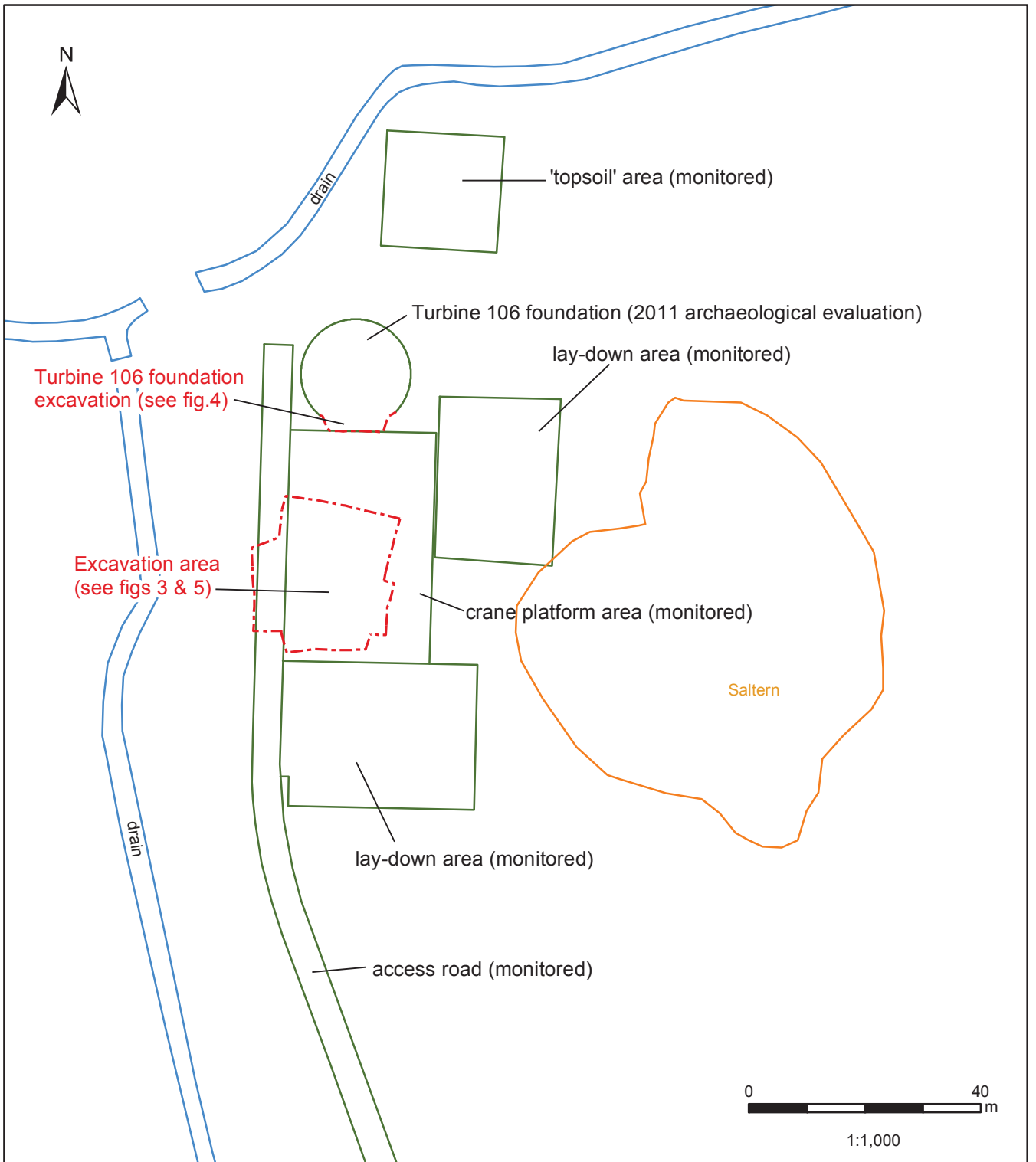


Fig.2. Location of turbine 106 wind farm groundworks, with excavation and monitored areas

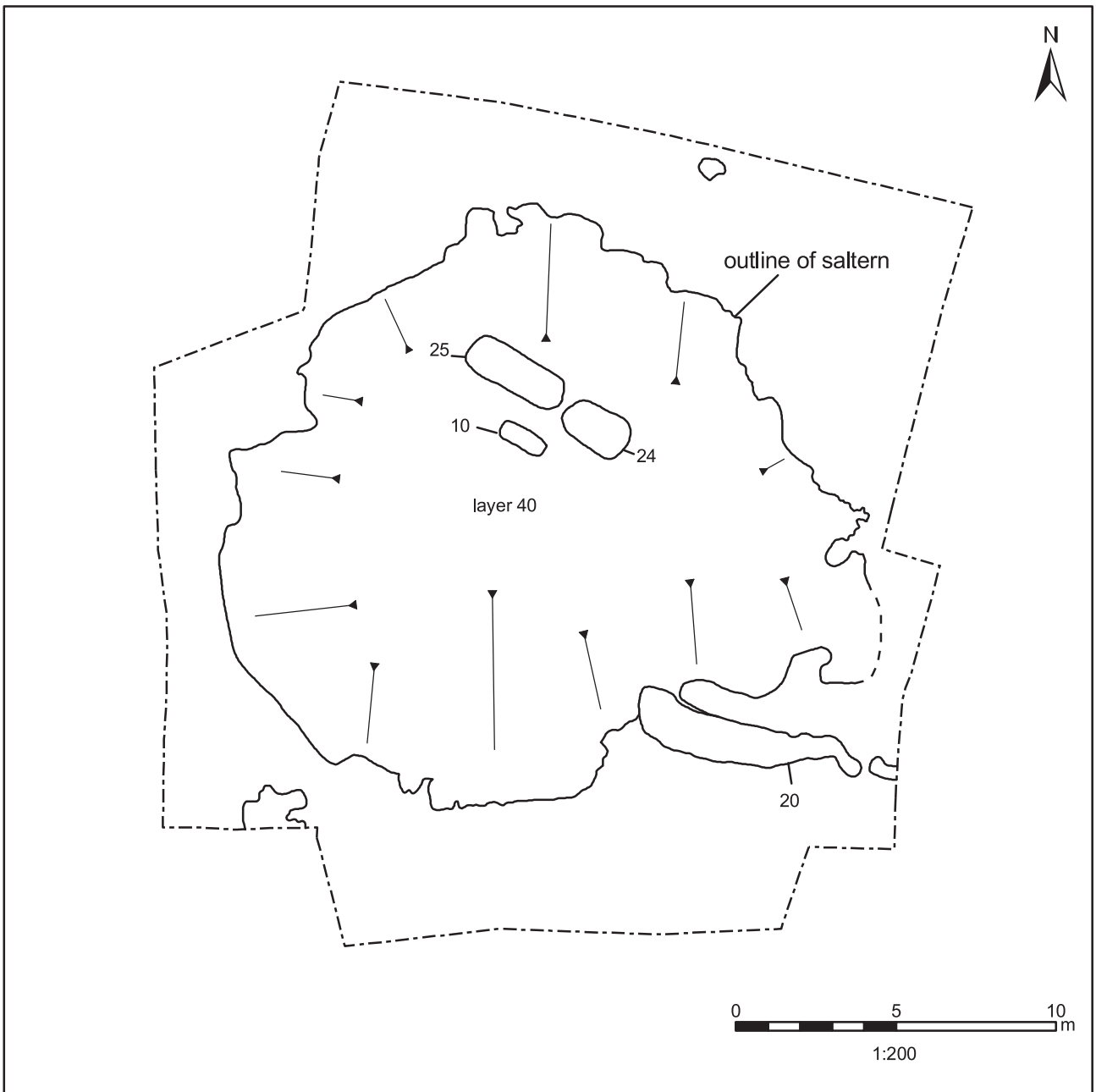


Fig.3. Turbine 106 saltern pre-excitation plan

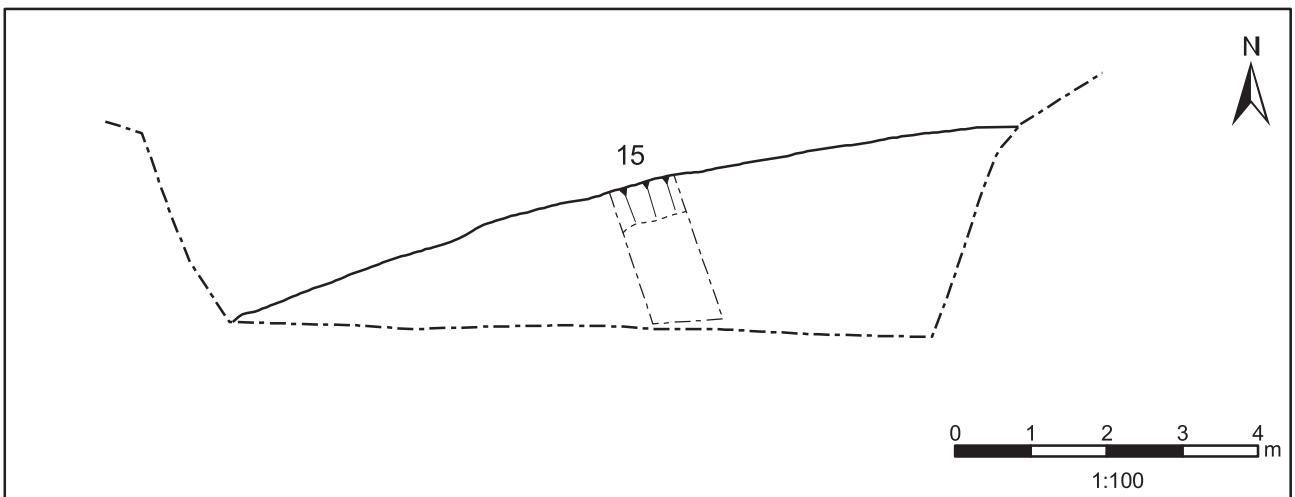


Fig.4. Turbine 106 foundation post-excitation plan

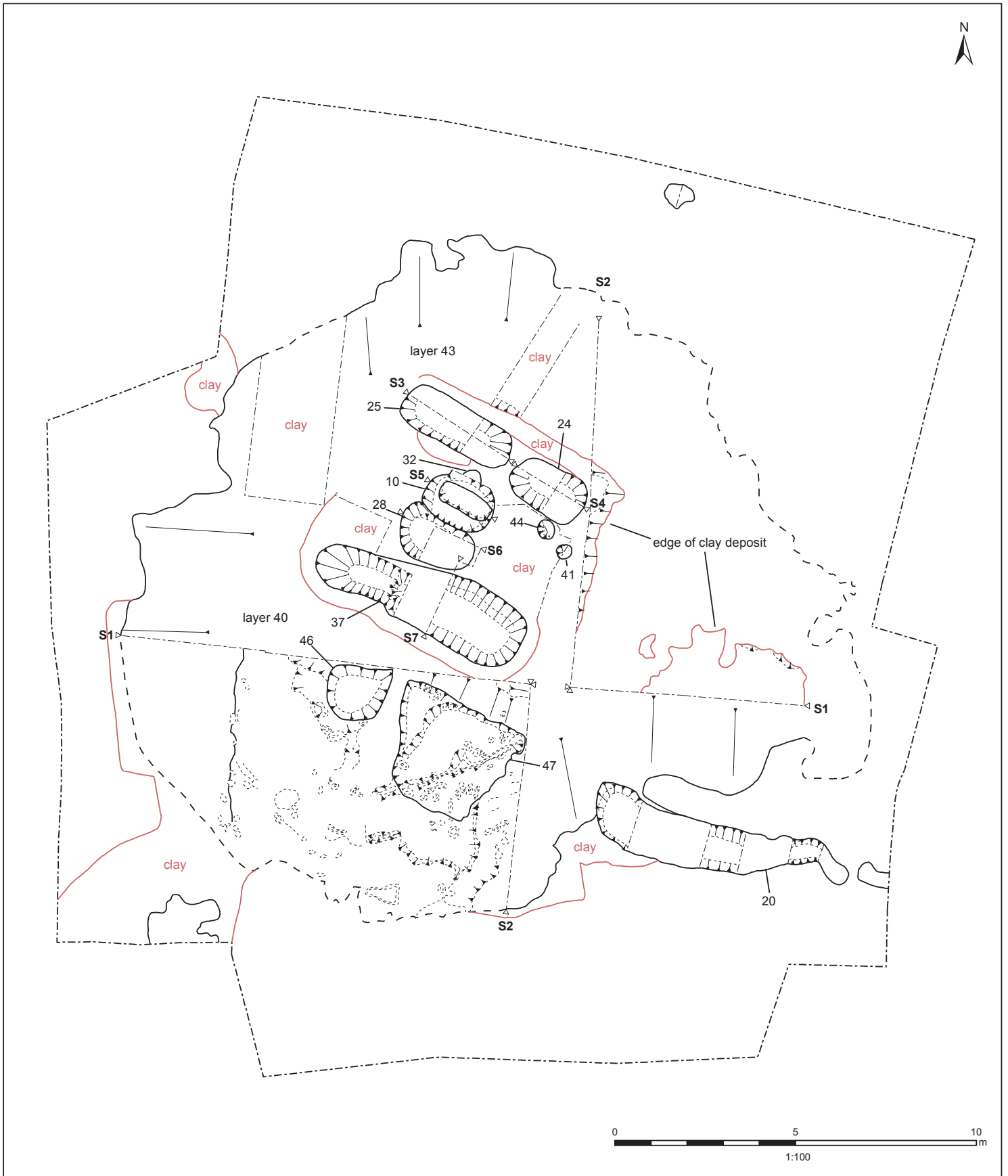


Fig.5. Turbine 106 saltern post-excavation plan

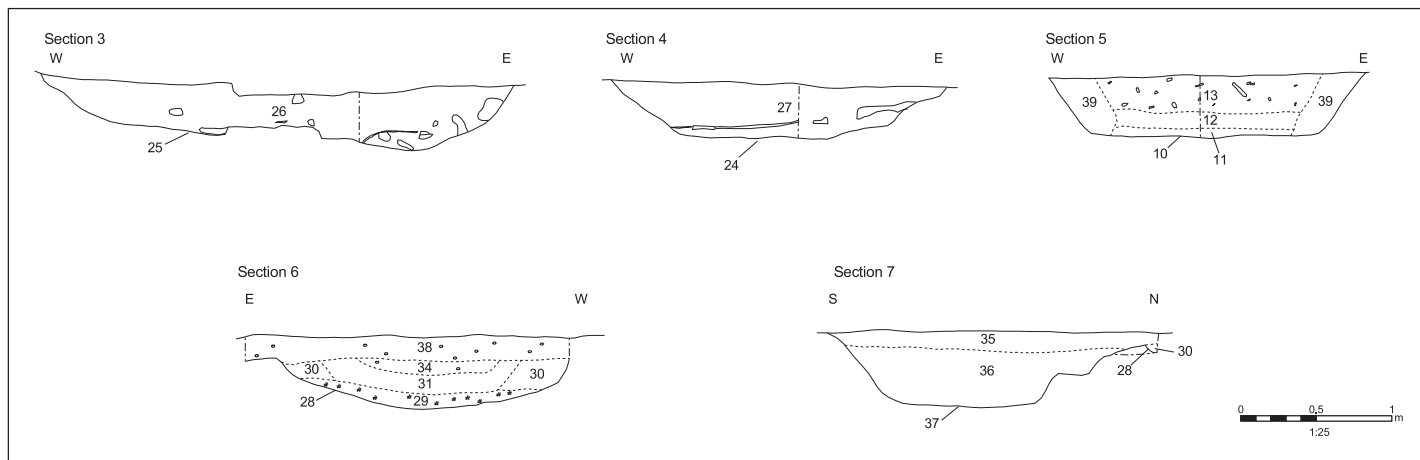
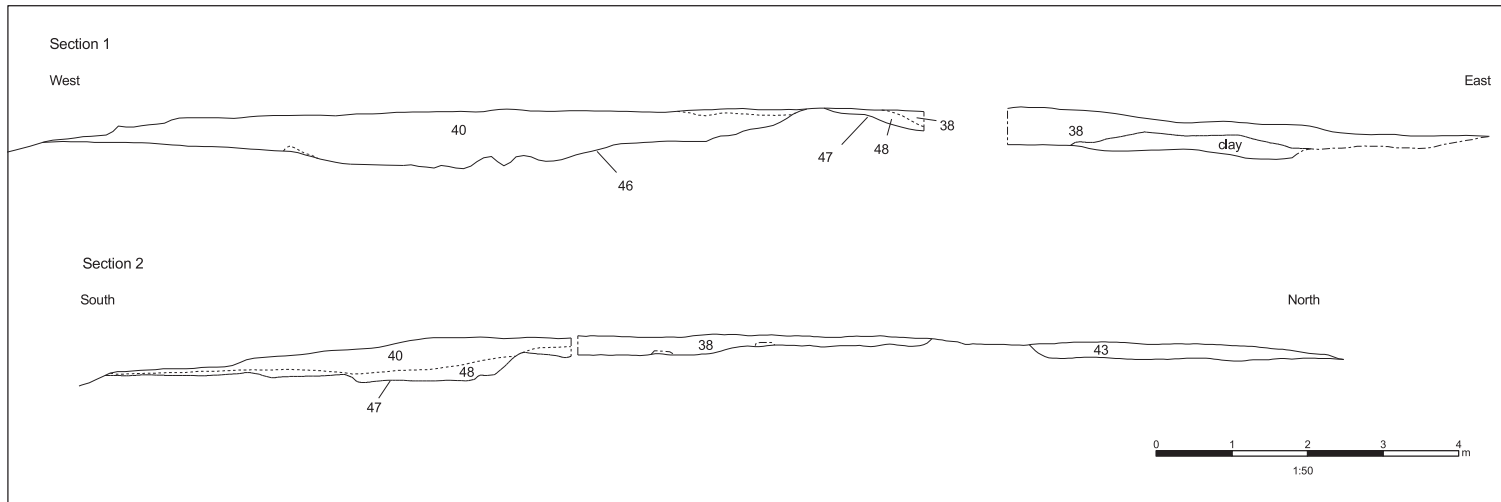


Fig.6. Sections 1 to 7

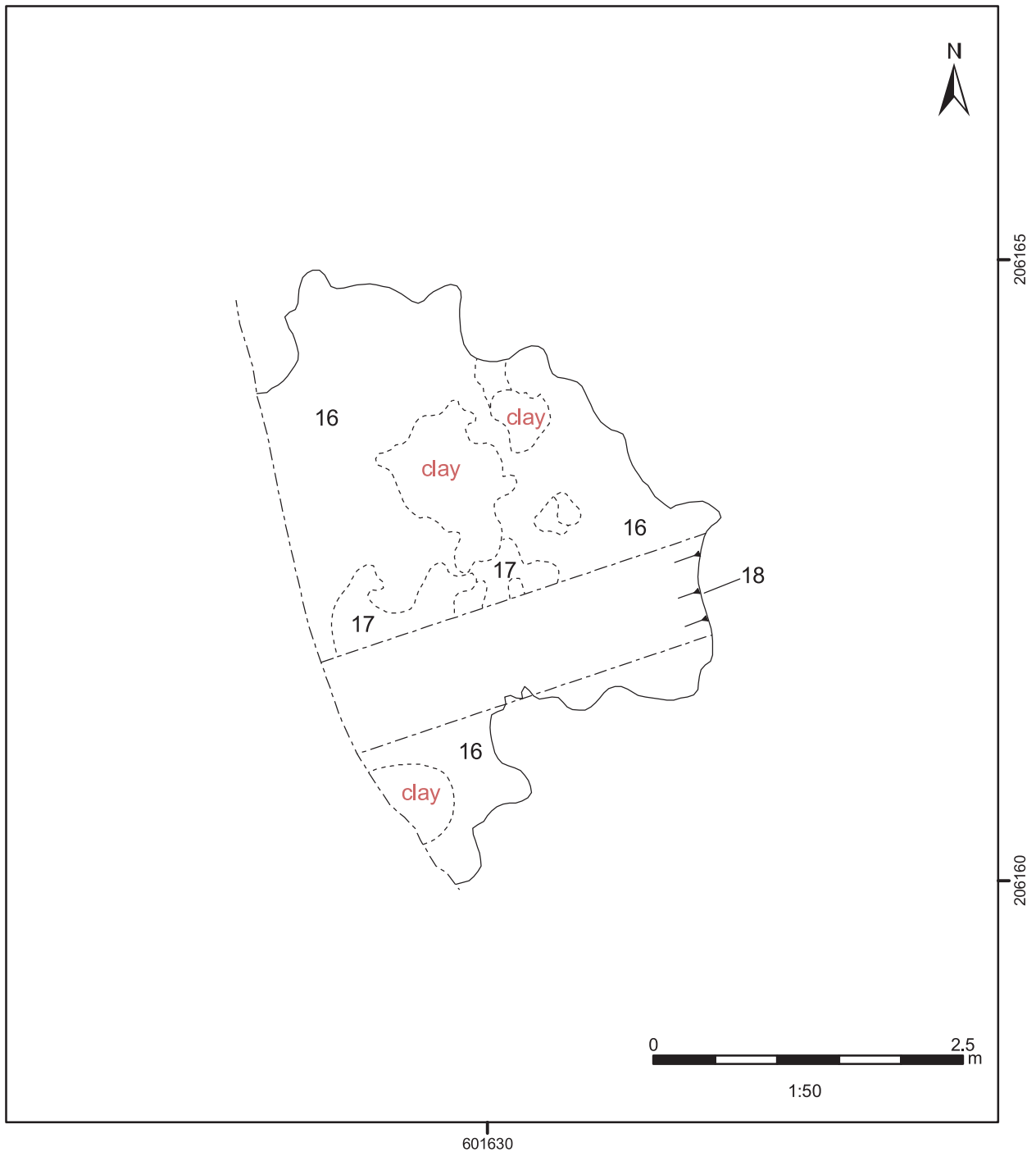


Fig.7. Turbine 104 red earth deposits



Plate 1. Turbine 106 site - general view prior to excavation, looking NW (2m scale)



Plate 2. Turbine 106 site - general view during excavation, looking NW



Plate 3. Red earth 040 in section 2.3, looking east (1m scale)



Plate 4. Hearth 28, looking SE (1m scale)



Plate 5. Hearth 24, looking SE (1m scale)



Plate 6. Hearth 25, looking east (1m scale)



Plate 7. Pit 32 looking NE (0.5m scale)



Plate 8. Pit 41, looking SE (0.5m scale)



Plate 9. Pit 44, looking NE (0.5m scale)



Plate 10. Square 'processing area' at centre of red hill, looking NW



Plate 11. Natural deposits under NE quadrant of red hill, looking west



Plate 12. Flat natural surface below NE quadrant of red hill



Plate 13. Rough and undulating natural surface under SW quadrant of red hill



Plate 14. Pit 46, with depression 47 beyond, looking east (1m scale)



Plate 15. Hearth 10, looking NE (0.5m scale)



Plate 16. Gully 20, looking east (1m scale)



Plate 17. Turbine 104 red earth deposits, looking north (1m scale)



Plate 18. Whole trough width, fill 19 of gully 20 (20cm scale)



Plate 19. Selected fire bar fragments, fill 13 of hearth 10 (20cm scale)