Land north of Greenpark Avenue, King's Lynn, Norfolk

Archaeological Evaluation Report

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Land north of Greenpark Avenue, King's Lynn, Norfolk

Archaeological Evaluation Report

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Summary

Oxford Archaeology (OA) carried out an archaeological evaluation between 15th and 23rd February 2018 at Land north of Greenpark Avenue, King's Lynn, Norfolk. This work was commissioned by NPS Property Consultants Ltd. The site comprised 3.8ha of undeveloped land, within the urban reach of King's Lynn, proposed for redevelopment as a primary school and associated grounds.

These works lie in a significant area of industrial archaeological remains relating to salt-making, during the later Saxon and medieval periods. This industrial landscape is currently being investigated by OA as part of a wider scope of works for the adjacent Lynnsport residential development by Lovell Partnerships Ltd.

Topographical survey of the site along with NHER data indicated that the remains of six saltern mounds, resulting from salt-making activities (including NHER 27907 and 27909), partially or wholly lie within the bounds of the proposed development. The evaluation confirmed the presence of the salterns. Two of these (Salterns 1 and 4) extended beyond the southern boundary of the site where they were previously excavated by OA in 2017 as part of the Lynnsport 4 and 5 developments. The remains of a further saltern (Saltern 7) were located wholly within the development. However, the remaining salterns (Salterns 5, 6 and 8) lay on the periphery of the site, where they extended beyond the proposed development area into neighbouring plots of land. As well as revealing waste deposits from the salt-making process constituting the mounds, the evaluation also revealed the remains of broken-up brine boiling hearths and *in-situ* remains of clay-lined tanks. These remains are typical of the known later Saxon and medieval salt-making evidence previously excavated in the area by OA East.

The evaluation also revealed a network of ditches across the lower lying areas of the site, probably representing drainage channels of either later medieval or post-medieval origin when the site would have comprised part of a landscape predominantly utilised for pasture. The later date for these drainage features was reinforced with the recovery from the fills of artefacts spanning both these periods. However, the possibility remains the larger extant (unexcavated) channel observed to extend broadly north to south across the site (skirting Salterns 5 and 7) may delineate the path of a historical creek.

In addition to these remains, there was evidence for recent truncation of the deposits comprising Saltern 1 in the southern part of the site, with associated dumps of saltern mound material found to overly the topsoil intermittently across the southern part of the site.

Acknowledgements

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The project was managed for Oxford Archaeology by Matthew Brudenell. The fieldwork was directed by Graeme Clarke, who was supported by Frances Wildmun and Francis Pitcher. Survey and digitizing was carried out by Sarita Louzolo. The illustrations were produced by Séverine Bézie with Figures 3 and 4 prepared by Gareth Rees. Thank you to the teams of OA staff that cleaned and packaged the finds under the management of Natasha Dodwell, processed the environmental remains under the management of Rachel Fosberry, and prepared the archive under the management of Katherine Hamilton.

1 INTRODUCTION

1.1 Scope of work

1.1.1 Oxford Archaeology (OA) was commissioned by NPS Partnerships Ltd to undertake a trial trench evaluation at the site of Land north of Greenpark Avenue, King's Lynn, Norfolk (TF 6278 2124; Fig. 1). The site lies within a known area of later Saxon and medieval saltworking sites.

1.1.2 The work was undertaken to inform the Planning Authority in advance of a submission of a Planning Application. A brief was set by James Albone, Planning Archaeologist of Norfolk County Council Historic Environment Service (NCC HES), outlining the Local Authority's requirements for work necessary to inform the planning process (Albone 2017). A written scheme of investigation was produced by OA detailing the methods by which OA proposed to meet the requirements of the brief (Brudenell *et al.* 2018).

1.2 Location, topography and geology

1.2.1 The site is located within the urban reach of King's Lynn, *c*. 1.5km east of the River Great Ouse (Fig. 1). The site covers 3.8ha on a flat area of ground at approximately 4-5m OD. The site is bounded by land adjacent to Greenpark Road (formerly Salter's Road) to the south (currently under redevelopment for housing), allotment gardens to the north, recreation fields to the east, and residential development along Columbia Way to the west. The central part of the site comprises a children's playpark, with the periphery of the site, until recently, covered by scrub and copses of woodland that have since been cleared.

1.2.2 The underlying geology of the site comprises Jurassic Kimmeridge Clay Formation mudstone overlain by layers of clay and silt, which were deposited by tidal action during the Quaternary period. British Geological Survey borehole data from site (TF 62900 20900 and TF 63060 20890) revealed a typical Flandrian sequence of deposits, with an amorphous peat horizon (1.60/1.88m-3.10/3.35m below the ground surface) overlain by saltmarsh deposits of brown fine-grained silts and sands of the Terrington Beds.

1.2.3 The investigations carried out by Oxford Archaeology in 2017 on the adjacent Lynnsport 4 and 5 developments (to the south; Fig. 1) revealed natural saltmarsh deposits at a height of approximately 2m OD (Clarke 2017a-b).

1.3 Archaeological and historical background

1.3.1 The site has been subject to an Archaeological Desk-based Assessment (DBA) in 2016 (Copsey and Hobbs 2016; NPS Report 2016/1108). The following sections summarise the findings from the DBA report, data obtained from the Norfolk Historic Environmental Record (NHER; Fig. 2), and the results of recent archaeological investigations immediately south of the site (Clarke 2017a and b; OA East Reports 2059 and 2078; ENF 139746 and ENF141949).

1.3.2 Although the surrounding landscape provides evidence of prehistoric and Roman activity in the vicinity of the site (with stray finds of a Roman coin, c.350m to the north-

east (NHER 11990), and a Late Neolithic/Early Bronze Age arrow head c.380m to the south-west (NHER 5494)), much of this area was unsuitable for occupation during later prehistory and the Romano-British period, with any earlier traces of activity sealed beneath thick marine and freshwater Flandrian deposits (the arrowhead was recovered from a drain cutting these deposits). Whilst not discounting the importance of these deposits, and the potential buried prehistoric land surfaces/shore-lines they protect, the immediate archaeological significance of the area falls largely within the Anglo-Saxon, medieval and post-medieval periods when the area was a saltmarsh environment.

1.3.3 Of particular significance are the traces of a former salt-making industry that flourished between the Anglo-Saxon and post-medieval periods around the Wash coastline. The remains of this industry are primarily revealed in the form of saltern mounds, some of which still survive as earthworks, or are visible as pale oval or floriform soilmarks. The mounds, which can be up to 200m across, were formed by the piling up of waste sand from salt filtration in the 'sand washing' or 'sleeching' process of salt extraction.

1.3.4 An extensive swathe of saltern mounds are recorded around North Lynn. These not only reflect the importance of the salt industry, but the location and progressive land reclamation along the Saxon and medieval coast line. Until recently, most of the saltern mounds were thought to be medieval or later in origin, particularly the western examples towards the current line of the Great Ouse. However, radiocarbon dating from recent excavations immediately south of the site have revealed that some of the mounds in this area have a Middle Saxon origin, pushing the date of the salt industry in this landscape back by several hundred years (Clarke 2017a-b; Fig. 2, ENF139746 and ENF141949). Mid to Late Saxon radiocarbon dates were also achieved for a saltern excavated at Marsh Lane, *c*. 650m to the north-east (Fig. 2, NHER 27899; Clarke and Clarke forthcoming; Clarke 2016), demonstrating that this was not a one-off, but evidence of a developed Anglo-Saxon saltworking landscape.

1.3.5 Clay-lined pits, filtration units and brine boiling hearths of various forms were found at both sites, with differences in the size and shape of these features possibly indicating changes in manner and scale of production over time.

1.3.6 A sense of the extent of this industry is revealed by the fact that most records in the NHER recorded within a 500m radius of the site, relate to saltern mounds or salt-making activity (e.g. NHER 5524, 27886, 27893-6, 27899-902, 27906-912 and 38265). Saltern mounds are recorded on all sides of the site, and most significantly, three have been identified on the site itself from aerial photographs (NHER 27908; 27909) and a further two are suspected to encroach on the southern end of the site, based on the results of recent investigations immediately adjacent (Clarke 2017a-b; Fig. 2, ENF139746 and ENF141949).

1.3.7 All of three mounds recorded from 1946 RAF vertical aerial photographs partially lie within the site, around the north-west (NHER 27908), north-east and eastern edges of the proposed development area (NHER 27909). The mounds are recorded as being between 65-88m in diameter, and lie between the drainage ditches which bisect the

site – the curves in the ditches appearing to skirt them. Those revealed in recent excavations to the south survived to depths of over 1m.

1.3.8 The salt-making industry declined during the post-medieval period, however, several of the saltern mounds were put to other uses during this time, some being incorporated into the King's Lynn siege defences during the Civil War. (e.g. NHER 13785, not illustrated). The subsequent drainage of the Fens during the 17th century exposed a large area of land in the environs of the site and made it available for cultivation and extended permanent grazing pastures.

1.3.9 Remnant ridge and furrow or 'lazybedding' agricultural features are recorded *c*. 200m to the south-east site (Fig. 2, NHER 27890), with further examples further south (Fig. 2, NHER 27865). Earthworks of possible medieval banks, ditches and drains in the area also attest to the process of land reclamation which made the area habitable (Fig. 2, e.g. NHER 13785 and 27891). Aerial photographs and LIDAR (Light Detection and Ranging) images of the sites itself show a series of at least five east-west aligned linear earthwork features, likely to be post-medieval or earlier drainage ditches. These are still visible on the site today. Excavation immediately south of the site also revealed two circular gullies representing drainage channels for hayricks/ Riley circles (Clarke 2017a-b; Fig. 2, ENF139746 and ENF141949).

1.3.10 Faden's map of 1797 shows the site located on the Gaywood Marsh north of Salter's Road. Drainage ditches crossing the site are subsequently shown on the 1820 Inclosure map and 1916 Tithe Map. These are also depicted on the OS first edition series maps from 1884, and are still visible today at the site.

2 EVALUATION AIMS AND METHODOLOGY

2.1 Aims

The emerging historical salt-making landscape of Gaywood, King's Lynn, Norfolk

2.1.1 This project will take place within a wider context of research into the salt-making industry of Gaywood, King's Lynn, which is being undertaken by OA East through a series of investigations in the vicinity of the site.

2.1.2 The specific goals of this wider investigation have been set out in the document 'Lynnsport 1-5: The emerging historical salt-making landscape of Gaywood, King's Lynn, Norfolk. Overarching Written Scheme of Investigation' (Brudenell and Clarke 2017).

2.1.3 These goals are directly relevant to the current investigation at this site and will contribute to addressing the same wider research themes/questions outlined below.

Saltern mounds and mound formation

2.1.4 What period did the mounds develop over? Can we retrieve sufficient material to date mound sequences and bracket their chronology?

2.1.5 Were there periods of hiatus in mound formation, and can this be identified from soil stabilisation horizons?

2.1.6 Is there any evidence to support the hypothesis that mounds further east (landward) are earlier than those to the west (seaward)? In particular, are there further Mid-Late Saxon dates on eastern/landward salterns?

2.1.7 What evidence is there for the secondary use of the salt mounds and surrounding flats after the salt industry declined?

Saltern fixtures and features

2.1.8 What structures were associated with the salterns (salt-cotes) and what activities were conducted in them?

2.1.9 What are the forms of the brine boiling hearths and how did hearth technology change over time? Were different hearth forms linked to the production of different grades of salt? Can such variation be measured from the chemical composition of the salt slags?

2.1.10 Is there patterning in the layout of tanks and filtration units? Is there any evidence that they changed in form and size over time?

2.1.11 What clay was used for lining the filtration units and constructing the hearths? What fuel was being burnt in the hearths? What were the sources?

2.1.12 Is there any evidence that channels and creeks were being modified or lagoons created to improve the efficiency of the salt-making process?

Salt makers and social context

2.1.13 Can we gauge anything about the scale and duration of episodes of salt-making from the refuse left behind by the salt makers (pottery, animal bone etc.)? Is there any associated settlement activity?

2.1.14 Is there any evidence to support the hypothesis that salt-making was only a seasonal activity?

2.1.15 What other activities were taking place on the saltern mound? Evidence for iron smithing was found at Marsh Lane, but how widespread is this?

2.1.16 Can historical sources help us to better understand the scale and organisation of salt-making in North Lynn?

Salterns and landscape change

2.1.17 Can the investigations help us to understand the natural environment and landscape in which the salt-making was taking place?

2.1.18 How do the salterns relate to the Gaywood River and the main channel of the Great Ouse, and what were their palaeoenvironments?

2.1.19 How did the salt-making industry contribute to the reclamation of the saltmarsh and what can it tell us about the dating/phasing of that process?

Research frameworks

2.1.20 More broadly, the site investigation takes place within, and will contribute to the goals of Regional Research Frameworks relevant to this area.

- Research and Archaeology: A Framework for the Eastern counties: 2. Research Agenda and Strategy (Brown & Glazebrook 2000, East Anglian Archaeology Occasional Papers 8):

2.1.21 *'From the Middle Anglo-Saxon period onwards there is evidence of both urban and rural craft production and industry. Is there a relationship between the two? To what extent was urban production city-serving and rural production largely conducted by itinerant craftsmen?'*

2.1.22 *'The rich material culture of towns, often present in dense quantities, must continue to be assessed and the results analysed and synthesised in order to increase understanding of the economic foundations of towns. Research work must target: evidence for commercial and industrial activity; definition, specialisation, marketing and distribution of products; linkages between social and political development and economic activity; and communications between towns and with the hinterland*.'

2.1.23 *'Industrial output, either from craft industries or early modern large-scale processes, will affect the urban environment. The impact of the economy can therefore be explored by: examination of evidence for industrial zoning; study of the relationship of industrial and commercial sites to distribution routes; and correlation of evidence for status with product specialisation and output*.'

2.1.24 *'Within urban culture, as in the rural hinterland, the church with its organisation, its role in society and its economic power deserves special attention. The following areas of research need to be amplified:..... the economic influence of the church.'*

- Research and Archaeology Revisited: A Revised Framework for the East of England (Medlycott 2011, East Anglian Archaeology Occasional Papers 24):

2.1.25 '*The Norfolk Coast and Broads NMP projects recorded large numbers of saltern mounds within The Wash and, to a lesser extent, around Breydon Water and the former Great Estuary (Albone et al. 2007). This has made a significant contribution to the study of this important medieval industry, and represents the first comprehensive identification and analysis of such sites within the county. The recognition of evidence for the possible Late Saxon origins of some of the saltern mounds provides further evidence for the early development of this form of salt-making (i.e sand washing).*'

2.2 Methodology

2.2.1 The methodology for the topographical survey is described in Section 3.2.1.

2.2.2 In accordance with the WSI (Brudenell *et al*. 2017) a total of 420m of linear trenching were excavated (Trenches 21-34), representing a 2% sample of the 3.8ha proposed development area. All trenches were proposed to be 30m long by 2m wide.

2.2.3 Subsequently, during the excavation Trench 31 was shortened, due to the heavy scrub overlying Saltern 5, to a total length of 22.5m.

2.2.4 Machine excavation was carried out under constant archaeological supervision with 360º mechanical excavators using 2m-wide toothless ditching buckets.

2.2.5 The site survey was carried out using a Leica GPS GS08 with SmartNET.

2.2.6 Spoil, exposed surfaces and features were scanned with a metal detector.

2.2.7 All archaeological features and deposits were recorded using OA's pro-forma sheets. Trench locations, plans and sections were recorded at appropriate scales and colour and monochrome photographs were taken of all relevant features and deposits.

2.2.8 A total of 21 bulk samples were taken from the excavated features. These each totalled between 1L to 40L and were processed by flotation at OA's environmental processing facility at Bourn.

2.2.9 Site conditions were good, with rain at times.

3 RESULTS

3.1 Introduction and presentation of results

3.1.1 Descriptions of the ground conditions encountered, features identified and artefacts recovered are presented below and described numerically by each group of salt-making deposits (Salterns 1, 4-8). As described above, this project may be considered part of the wider context of research currently being undertaken for the Lynnsport development by OA into the salt-making landscape of Gaywood (Fig. 1). This is especially the case for Salterns 1 and 4 whose southern extents were excavated as part of the adjacent Lynnsport 4 and 5 developments. Consequently Salterns 2 and 3, excavated as part of the neighbouring development, lie wholly outside the current investigation area (Clarke 2017a-b). Further context descriptions with dimensions are given in Appendix A; Table 3.

3.1.2 Figure 2 shows the location of the site in relation to the Norfolk Heritage Environment Records (NHER) for the area. Figures 3-5 present the raw and interpretive topographical models of the site resulting from the earthwork survey carried out prior to the trenching works. Figure 6 provides an overall plan of the results of the evaluation and Figures 7-11 provide a more detailed plan of the salt-making deposits encountered within each trench. Selected sections of features are given in Figure 12.

3.2 Earthwork survey

Introduction and methodology

3.2.1 As part of the archaeological evaluation of the site, an earthwork survey was carried out using elevation data supplied by a walkover of the site using a Leica GPS GS08 with SmartNET. The data was then processed using QGIS software to produce a topographical model of the site (Fig. 3).

Results

3.2.2 The topographical model was used to create an interpretive plan of the earthworks encountered on the site and presented as Figure 4. This, in conjunction with the NHER and DBA assessment produced for the site (see Section 1.3) was drawn together to produce a plan of the features likely to be encountered by the trial trenches (Fig. 5). These features comprised a group of up to six saltern mounds (Salterns 1, 4-8) and a network of drainage ditches on the lower lying ground between the mounds along with some raised platforms associated with the site's current use as a children's playpark.

Discussion

3.2.3 This system of drainage is probably associated with the historical use of Gaywood's 'North Marsh' as pasture during the later medieval/post-medieval periods (Norfolk Records Office (NRO) reference: BL/MA 2/2). Each saltern mound resulted from the period of significant salt-making activity on North Marsh during the later Saxon and early medieval periods (see Sections 1.3.3-6). This activity significantly raised the level of the land to form desirable parcels of pasture. Along with systems of drainage ditches placed on the lower lying land between disused saltern mounds, the North Marsh

would have become a zone of 'reclaimed' land. In this way the marsh evolved from being a salt-making landscape in the later Saxon/early medieval periods in the intertidal zone to being pastureland during the later medieval/post-medieval periods. This land reclamation is presumed to have commenced on the landward sides of the marsh during the later Saxon period. The drainage network uncovered on the site would have ultimately led, via the main broadly north-south drainage channel, to the Gaywood River. The course of the river ran to the north of the site, through the central part of the marsh until 1425, when it was diverted to its present course (Fig. 2; Clarke 2017b).

3.3 Borehole investigations – deposit model

Introduction

3.3.1 The underlying geology of the adjacent Lynnsport 4 and 5 development (to the south) was mapped in February 2016 during ground investigation works by Richard Jackson Ltd (Sheridan & Warner 2016). The subsequent Oxford Archaeology evaluation (Fig. 2, ENF139746; Clarke 2017a) also drilled a borehole that confirmed the salt-making deposits commenced on the marine tidal flats at a height of approximately 2m OD.

3.3.2 A single borehole was drilled by Oxford Archaeology (BH1-5; Fig. 6) using manual hand-auguring technique into each trench found to contain salt-making deposits on the site (Salterns 1, 4-8) to determine their extent.

3.3.3 This section details the interpretation of the sedimentary sequence revealed by the trenches and boreholes.

Results

3.3.4 Borehole BH1 was drilled into the Saltern 5 deposits within Trench 31, at the eastern edge of the site, at a height of 3.38m OD:

- 0-0.1m bgl (below ground level): dark grey with red mottling fine sandy silt (218; Group 203)
- 0.1-1m bgl: loose mid yellowish brown silty fine sand (203; Group 203)
- 1-1.7m bgl: soft mid yellowish brown fine sandy silt (Group 203)
- 1.7-2.35m bgl: soft greyish brown fine sandy silt (Group 200)

  2.35-2.55m+ bgl: lenses of loose yellowish brown silty fine sand and soft dark grey fine sandy silt (Group 200)

3.3.5 Borehole BH2 was drilled into the Saltern 6 deposits within Trench 27, at a height of 2.31m OD:

- 0-0.1m bgl: soft red and grey fine sandy silt (204; Group 204)
- 0.1-0.6m bgl: soft yellowish brown fine sandy silt (230; Group 204)
- 0.6-0.85m+ bgl: soft light grey slightly clayey fine sandy silt (Group 200)

3.3.6 Borehole BH3 was drilled into the Saltern 7 deposits within Trench 22, at a height of 2.29m OD:

- 0-0.95m bgl: loose mid yellowish brown fine to medium sand (205; Group 205)
- 0.95m+ bgl: soft light grey fine sandy silt (Group 200)

3.3.7 Borehole BH4 was drilled into the Saltern 4 deposits within Trench 34, at a height of 2.99m OD:

- 0-1.8m bgl: loose mid yellowish brown fine to medium sand (227; Group 202)
- 1.8-2.0m+ bgl: soft mid grey fine sandy silt (Group 200)

3.3.8 Borehole BH5 was drilled into the Saltern 1 deposits within Trench 32, at a height of 3.1m OD:

- 0-1.5m bgl: loose mid yellowish brown, with some light grey bands, silty fine sand (Group 201)
- 1.5-2m bgl: loose light grey silty fine sand (Group 201)
- 2m+ bgl: loose mid grey silty sand (Group 200)

3.3.9 The boreholes demonstrated that the salt-making deposits commenced at heights between 1.19-1.71m OD (Table 1). These heights are lower than the 2m OD height observed at the base of the salterns excavated by OA to the south, adjacent to the historical Salter's Way (current Greenpark Avenue; Clarke 2017b).

Borehole	Saltern	Height (m OD)	Thickness of borehole saltern deposits (m)	Total thickness of saltern deposits, including Trench profile	Base of mound height (m OD)
1	5	3.38	1.7	1.95	1.68
2	6	2.31	0.6	1.1	1.71
3	7	2.29	0.95	0.9	1.34
4	4	2.99	1.8	2.15	1.19
5	1	3.1	1.5	1.9	1.6

Table 1: Summary of borehole results

Deposit model for the site

3.3.10 The deposits revealed in the beneath the site during these borehole investigations may be grouped into nine units, described stratigraphically below:

- **Group 200**: Natural tidal flat deposits underlying the saltern mounds;
- **Group 201**: Saltern 1, salt-making deposits;
- **Group 202**: Saltern 4, salt-making deposits;
- **Group 203**: Saltern 5, salt-making deposits;

- **Group 204**: Saltern 6, salt-making deposits;
- **Group 205**: Saltern 7, salt-making deposits;
- **Group 206**: Saltern 8, salt-making deposits;
- **Group 207**: This group represents the build-up of more recent (post-medieval onwards) marsh deposits found to overlie the edges of the saltern mound deposits. Consisted of soft mid greyish brown sandy silt;
- **Group 208**: Topsoil, consisted of soft dark grey sandy silt;
- **Group 209**: Modern truncation of Saltern 1 deposits observed in Trench 32; and
- **Group 210**: Made ground overlying the truncation of Saltern 1 observed in Trench 32 and heaped intermittently over topsoil and observed in Trenches 29 and 33. Found to consist mostly fragments of recent ceramics, metal, plastic, glass and concrete in a silty sand matrix.

3.3.11 Ground conditions throughout the evaluation were generally wet, with the lower lying trenches (outside/beyond the saltern mounds) submerged with water. However, archaeological features, where present, were easy to identify against the underlying natural geology.

3.4 General distribution of archaeological deposits

3.4.1 Figure 6 provides an overall plan of the results of the evaluation. The topographical survey of the site along with NHER data indicated that the remains of six saltern mounds (including NHER 27907/Saltern 8 and NHER 27909/Saltern 6) partially or wholly lay within the bounds of the proposed development (Figs 3-5; Section 3.2). The evaluation confirmed the presence of these salterns and their associated features. Two of the salterns (Salterns 1 and 4) extended beyond the western and southern boundary of the site where they were previously excavated by OA East in 2017 as part of the Lynnsport 4 development (Fig. 1; Clarke 2017a-b). The remains of a further saltern (Saltern 7) was located wholly within the development. The remaining mounds (Salterns 5, 6 and 8) lay on the periphery of the site where they extended beyond the proposed development area into neighbouring plots of land.

3.4.2 These mounds comprised deposits derived from silt filtration and brine boiling techniques considered to be diagnostic of the salt-making tradition of the later Saxon and medieval periods. Notably, the northeastern end of Trench 27 and the southeastern end of Trench 32 (Salterns 6 and 1 respectively) contained concentrations of burnt material along with fragments of hearth lining, indicative of broken-up brine boiling hearths. A thick tip of hearth waste was also revealed towards the southwestern end of Trench 34 excavated into Saltern 4. The remains of clay-lined water tanks indicative of silt filtration activity was also revealed in Trenches 22, 31 and 34 (Salterns 7, 5 and 4 respectively). A single pit was also revealed cut into deposits comprising Saltern 4. No datable artefacts were recovered from any of the salt-making deposits.

3.4.3 In addition to these remains, the presence of drainage ditches, indicated to be present and described in the earthwork survey (Section 3.2; Fig. 5) and historic aerial photograph (Plate 1), were also identified in Trenches 21, 23, 26 and 28. The presumed later medieval/post-medieval date for these ditches was confirmed with the recovery of ceramic building material (CBM) and pottery from the fills of some of these features during the excavation.

3.5 Trench results

3.5.1 A total of 14 trenches were excavated on the site (Trenches 21-34; Fig. 6; Table 1). No subsoil was observed underlying the topsoil in any of the trenches. Trench 31 was shortened to 22m in length due to obstruction by dense undergrowth overlying Saltern 5 (Plate 2). Trench 22 was extended northwards to fully reveal a clay-lined tank (**221**). Trenches 25, 29, 30 and 33 were devoid of archaeological features and found to be located over the more recent natural marsh deposits of Group 207.

Trench number	Length (m)	Average topsoil depth (m)	Archaeological summary	Finds
21	30	0.3	Later Saxon/early medieval Saltern 8 (deposit 206). Later medieval/post-medieval drainage ditches **237** and **239**	(240) residual flint flake; Incomplete iron hinge; later medieval/post-medieval pottery; clay tobacco pipe stem; residual ?Roman and later medieval/post-medieval brick and tile; sheep/goat bone
22	30	0.3	Later Saxon/early medieval Saltern 7 (deposit 205). Clay-lined water tank **221**. Modern pit **264**	(205) animal bone
23	30	0.3	Later medieval/post-medieval drainage ditches **243** and **245**	(246) post-medieval pottery; tobacco pipe stem;
24	30	0.3	Later Saxon/early medieval Saltern 1 (deposit 201)	None
25	30	0.3	No archaeology	None
26	30	0.3	Later medieval/post-medieval drainage ditches **247**, **249** and **251**	(250) post-medieval tile

Trench number	Length (m)	Average topsoil depth (m)	Archaeological summary	Finds
27	30	0.3	Later Saxon/early medieval Saltern 6 (deposits 204, 229 and 230)	(204) fired/burnt clay and crude handmade brick along with slag; (229) fired/burnt clay (broken-up brine boiling hearth lining) along with slag
28	30	0.3	Later medieval/post-medieval drainage ditch **253**	(254) post-medieval brick
29	30	0.3	No archaeology	None
30	30	0.3	No archaeology	None
31	22	0.3	Later Saxon/early medieval Saltern 5 (deposits 203, 211, 212, 213 and 217-220). Clay-lined water tanks **214** and **231**	(212 & 218) fired/burnt clay
32	30	0.3	Later Saxon/early medieval Saltern 1 (deposits 201, 224 and 255-260). Modern truncation **209** overlain by made ground 261	(224) lump of lead (256) fired/burnt clay
33	30	0.3	No archaeology	None
34	30	0.3	Later Saxon/early medieval Saltern 4 (deposits 202 and 225-228). Clay-lined water tank **234** and pit **262**	(225) fired clay

Table 1: Summary trench descriptions

Trench 21 (Fig. 6)

3.5.2 In the northwestern part of the site, Trench 21 revealed a low mound of loose yellowish brown sand (206) at its northern end (Saltern 8). This deposit was probably derived from silt filtration activity, as part of the salt-making process, during the later Saxon/early medieval period.

3.5.3 To the south of the salt-making deposit lay two ditches (**237** and **239**) on an east-west alignment. These correspond to the alignment of the possible drainage ditches indicated on the topographical survey (Figs 3-5) and shown on the historic photograph of 1946 (Plate 1). Each ditch measured 1m wide and 0.5m deep with U-shaped profiles. The fills (238 and 240 respectively) similarly consisted of firm greyish brown sandy silt. The fill of ditch **239** (Fig. 12, Section 108) produced a range of artefacts dating from the later medieval to post-medieval periods including: nine sherds (86g) of pottery along with fragments of clay tobacco pipe stem (3g), brick and tile (111g), and an iron hinge along with sheep/goat bone (48g). The fill also yielded a residual prehistoric flint flake (3g). One of the CBM pieces may also be a residual Roman item.

Trench 22 (Fig. 7)

3.5.4 This trench, in the northern part of the site, contained a mound deposit (Saltern 7) consisted of loose mid yellowish brown sand (205). This deposit, a by-product of the

filtration of salt encrusted silts as part of the salt-making process, produced a single small fibula (calf bone) fragment (3g) from a (unidentified) medium animal.

3.5.5 In the central part of the trench, the remains of a sub-square clay-lined pit (**221**) was observed to cut the mound deposit at a height of 2.5m OD (Fig. 12, Section 105; Plate 4). It measured up to 2m in length by 1.9m wide by 0.35m deep (Section 105). The cut was lined with bluish grey clay (222) up to 0.05m thick (Plate 5). The backfill (223) consisted of soft mid greyish brown sandy silt.

3.5.6 The saltern mound was found to be truncated by a partly revealed sub-square pit (**264**), up to 5m in length, in the southwestern part of the trench. The pit was of recent origin and filled with modern material including concrete and metal debris.

Trench 23 (Fig. 6)

3.5.7 Similar to Trench 21 to the north, this trench in the western part of the site revealed two ditches (**243** and **245**) on an east-west alignment. These features correspond to drainage ditch alignments shown on the topographical survey (Figs 3-5) and historic photograph of the site (Plate 1). The northern of the two ditches (**243**) measured 3m wide and 0.5m deep with a U-shaped profile (Plate 6). The ditch (**245**) located towards the southern end of the trench measured 1m wide and 0.5m deep with a U-shaped profile (Fig. 12, Section 106). Both fills (244 and 246 respectively) consisted of firm greyish brown sandy silt. Fill 246 produced a sherd (5g) of post-medieval pottery along with fragments of tobacco pipe stem (2g).

Trench 24 (Fig. 8)

3.5.8 To the west of Trench 23, Trench 24 revealed a low mound of loose mid yellowish brown silty sand (201) that extended across its southern part (Saltern 1). As described for the deposits encountered at the northern end of Trench 21, these deposits are likely to be derived from silt filtration activity. As indicated by the topographical survey, these deposits continued southwards to Trench 32.

Trench 26 (Fig. 6)

3.5.9 This trench lay along the northern boundary of the site and revealed a further set of three ditches (**247**, **249** and **251**), on a north-south alignment, that correspond to the layout of drainage ditches indicated by the topographical survey (Figs 3-5) and historic photograph of the site (Plate 1). Each ditch measured 0.5m wide and 0.2m deep with U-shaped profiles (Fig. 12, Section 107). The fills (248, 250 and 252 respectively) consisted of firm greyish brown sandy silt. Fill 250 contained a fragment (104g) of post-medieval tile.

Trench 27 (Fig. 9)

3.5.10 To the east of Trench 26, in the northeastern corner of the site, a mound of salt-making remains was uncovered that extended across its northeastern part (Saltern 6). A deposit of soft mid yellowish brown sandy silt (230) representing the build-up of discarded filtration waste extended across the majority of the trench. Two thin bands of reddish brown silt were also observed that probably represent further tips of discarded brine-boiling hearth waste material.

3.5.11 At the northeastern corner of the trench a more concentrated mass of burnt material (204) was observed that consisted of dark grey, yellow and red sandy silt that contained many fragments of fired clay (111g recovered) along with large lumps of fuel ash slag (777g recovered) and charcoal inclusions. This deposit is clearly indicative of brine-boiling activity upon the saltern in the near vicinity. A couple of the larger fragments of hearth lining were recovered that display green vitrified surfaces (Plate 7).

3.5.12 Overlying these deposits was a layer of burnt material that displayed less structure, consisted of soft dark reddish brown silt (229, not on plan) up to 0.35m thick. It contained many small fragments of fired clay (62g recovered) and fuel ash slag (8g recovered) along with charcoal inclusions. This deposit probably represents an upper 'weathered' layer of burnt mound deposits.

Trench 28 (Fig. 6)

3.5.13 Located to the south of Trench 27, this trench revealed a further drainage ditch (**253**) on a north-south alignment that corresponds to the drainage ditch alignments shown on the topographical survey (Figs 3-5) and historic photograph of the site (Plate 1). It measured 1m wide and 0.5m deep with a U-shaped profile. The fill (254) consisted of firm greyish brown sandy silt that produced a fragment of post-medieval brick (137g).

Trench 31 (Fig. 10)

3.5.14 In the southeastern part of the site, Trench 31 was excavated into a substantial mound of salt-making remains (Saltern 5; Fig. 12, Section 101; Plate 8). The majority of the deposits consisted of layers of soft yellowish brown sandy silt/silty sand (203, 211, 213 and 219). As described for the similar deposits detailed above, these layers are likely to have derived from silt filtration activity. These layers were separated by thin tips of burnt material (212, 217, 218 and 220) comprising dark grey/greyish brown/reddish brown silty sand indicative of brine boiling hearth waste. Deposits 212 and 218 produced fragments of fired clay (157g and 26g respectively) probably originating from broken-up (disused) brine boiling hearths.

3.5.15 Cut into deposit 213, this trench also contained the partially revealed remains of a sub-square clay-lined pit (**231**), up to 1.6m wide, that extended northwards from the trench. The cut was lined with bluish grey clay (232) up to 0.05m thick overlain by a backfill (233) consisting of loose mid yellowish brown silty sand. A clay lined pit (**214**) was also revealed cut into deposits 211-213 in the northern section of the trench (Figure 12, Section 101). The pit measured 1.25m in diameter and 0.4m deep with a U-shaped profile. The bluish grey clay lining (215) was found to be up to 0.1m thick, overlain by a loose mid yellowish brown silty sand backfill (216). These fills were observed to be sealed beneath deposits 219 and 220.

Trench32 (Fig. 8)

3.5.16 In the southwestern part of the site, Trench 32 revealed the southward extension of the salt-making mound deposit (Saltern 1; 201) encountered in Trench 24, resulting from the silt-filtration process. The excavation of the trench's southeastern part revealed a more complex build-up of salt-making deposits (Fig. 12, Section 103; Plate 9). Further waste silts consisting of mid yellowish brown sandy silt (255) were revealed

at the base of this sequence overlain by a firm layer of burnt material (256) comprising firm yellow, red and grey clay with frequent inclusions of fired clay (840g recovered). This layer was overlain by a dark brownish grey sandy silt (224) above which were thin lenses of grey, brown, red and yellow sandy silt (257), both containing frequent charcoal inclusions. Significantly, deposit 224 yielded a small lead item that may be a drip of metal resulting from lead melting, indicative of lead pan repair. When taken together these more concentrated deposits of burnt material are indicative of brine boiling activity, and along with the lead item further indicate that the remains of a hearth probably lies in the near vicinity of the trench. These deposits were overlain by further tips of mid yellowish brown sandy silt filtration waste (259) and mid greyish brown sandy silt hearth waste (260). At the top of this sequence lay a dark grey sandy silt loam (258), up to 0.35m thick.

3.5.17 This mound of salt-making deposits was found to be truncated in this trench at a height of approximately 2.8m OD (**209**) over which lay a deposit of modern material consisted of firm grey and brown sandy silt that contained fragments of concrete, plastic, metal and textile (261).

Trench 34 (Fig. 11)

3.5.18 To the east of Trench 32, Trench 34 uncovered a further mound of salt-making deposits (Saltern 4) that consisted mostly of the build-up of yellowish brown waste filtration sands and silts (202, 227 and 228). Similar to the sequence of deposits making-up the other saltern mounds encountered on the site, these layers were separated by tips of burnt dark brownish grey/reddish grey silty sand representative of hearth waste material (225 and 226). Deposit 225 (Fig. 12, Section 104; Plate 10) was found to be a build-up of hearth waste up to 0.6m thick and contained fragments of fired clay (242g recovered) and charcoal. Thinner tips/bands of filtration waste were also observed within this deposit.

3.5.19 Filtration waste deposit 202 was found to be truncated by a small circular clay-lined pit (**234**) up to 0.5m in diameter and 0.2m deep. The bluish grey lining (235), up to 0.05m thick, was overlain by a backfill (236) that consisted of mid yellowish brown silty sand with charcoal inclusions. This pit is considered to represent the heavily truncated remains of a silt filtration unit. Similar examples with only the deeper, circular water-tank ends surviving, have been found previously on recent nearby excavations into saltern mounds (Marsh Lane, Clarke 2016; Lynnsport 4 and 5, Clarke 2017a-b). A further pit (**262**) without a clay lining and backfilled with dark grey silty sand (263) was observed in section to cut filtration waste deposit 227 and in turn was overlain by hearth waste deposit 225.

3.6 Finds summary

Metalwork (Appendix B.1)

3.6.1 A total of two metal artefacts was recovered from the site, comprising an iron object from the fill of drainage ditch **239** and a small lump of lead (SF 1) from hearth waste deposit 224 of Saltern 1. The lead item may possibly represent a drip of metal resulting from lead melting; perhaps for lead pan repair.

Flintwork (Appendix B.2)

3.6.2 A single residual worked flint (3g) was recovered from later medieval/post-medieval drainage ditch **239** in Trench 21. It is the broken distal portion of a secondary flake, which is not chronologically diagnostic.

Non-metallic slag and fuel by-products (Appendix B.3)

3.6.3 Nine fragments of fuel ash slag (0.785kg) were collected from layers of hearth waste (204 and 229) comprising Saltern 6 in Trench 27. This vesicular fuel ash slag, in some cases, is attached/fused to pieces of fired clay, possibly once forming part of salt-making (brine boiling) hearth structures.

Pottery (Appendix B.4)

3.6.4 A small domestic assemblage of pottery (10 sherds weighing 0.091kg), spanning the late medieval to the 18th/19th centuries, was recovered from drainage ditches **239** and **245** in Trenches 21 and 23 respectively. The pottery present in ditch **239** is very mixed and includes Pearlwares, Creamware, Staffordshire-type Slipware, Glazed Red Earthenware and a sherd from a Frechen bellarmine/Bartmann jug. Ditch **245** produced a base angle sherd from a Pearlware vessel. None of the material should be considered as primary deposition but may relate to rubbish deposition from nearby occupation. Furthermore, none of the pottery may be linked to salt-making activity.

Ceramic building material and fired or burnt clay (Appendix B.5)

3.6.5 A fragmentary assemblage of CBM (0.111kg) was recovered from drainage ditches **239** (Trench 21), **249** (Trench 26), **253** (Trench 28). Fragments of fired or burnt clay (4.592kg) were also recovered from layers of saltern hearth waste 204/229 (Saltern 6, Trench 27), 212/218 (Saltern 5, Trench 31), 256 (Saltern 1, Trench 32) and 225 (Saltern 4, Trench 34). In addition, a crude handmade brick (0.469kg) was found in Saltern 6 hearth waste deposit 204.

Clay tobacco pipe (Appendix B.6)

3.6.6 Three fragments of white ball clay tobacco pipe (0.008kg) were recovered from drainage ditches **239** and **245** in Trenches 21 and 23 respectively. The fragments represent what are most likely broken pipes discarded during the 18th or 19th century.

3.7 Environmental summary

Faunal remains (Appendix C.1)

3.7.1 A small fragment of (unidentified) medium mammal fibia (3g) was recovered from waste filtration silt deposit 205 of later Saxon/early medieval Saltern 7. Five fragments (51g) of sheep/goat bone were recovered from the fill of post-medieval ditch **239**. The sheep/goat assemblage demonstrates the animal was above 30 months at time of death and suggests the animal was kept for secondary products i.e wool or milk, not simply for meat production.

Environmental samples (Appendix C.2)

3.7.2 Twenty-one bulk samples were taken from salt-making deposits and features on the site. The preserved charcoal from these samples has potential for species identification, to indicate fuel type, and also for radiocarbon dating. The presence of the associated fuel ash slag could indicate a different fuel choice, such as seaweed. Foraminifera and ostracods are present with the potential to provide information on salinity and environmental conditions. However, molluscs were found to have low research potential with the frequent occurrence of the burrowing snail along with a scarcity of other land and water snails.

4 DISCUSSION

4.1 Reliability of field investigation

4.1.1 The archaeological features and deposits were clearly visible within the evaluation trenches. The natural geological horizon beneath the topsoil and subsoil overburden on which the salt-making deposits lay and into which the drainage ditches were cut were also clearly identifiable. However, the drainage ditches that lay outside the footprints of the saltern mounds were liable to flooding, with standing water present in all of these lower lying trenches.

4.1.2 Therefore, the results of the evaluation trenching are considered to have a good level of reliability.

4.2 Evaluation objectives and results

4.2.1 The project aims and objectives defined in the WSI (Brudenell *et al.* 2018) and listed in Section 2.1 are included below with summary statements outlining the remains encountered on the site and how these help in achieving these objectives.

The emerging historical salt-making landscape of Gaywood, King's Lynn, Norfolk

4.2.2 No datable artefacts were recovered from any of the salt-making deposits or features within the saltern mounds. However, the relative abundance of charcoal recovered from these salterns (Appendix C.2), with the exception of Saltern 8, demonstrate that a chronology for the salt-making activities uncovered by the evaluation is most likely to be provided by radiocarbon dating. Significantly, the excavations into the southern extent of Saltern 1 as part of the adjacent Lynnsport 4 and 5 developments yielded a few sherds of Thetford-type ware pottery that in conjunction with radiocarbon dating demonstrated salt-making commenced in this mound during the Middle Saxon period; possibly as early as the 8th century AD (Clarke 2017b). The lack of any later artefacts from the salterns on the current site suggests that these salt-making remains, when taken as a whole, are of broadly contemporary date. The recovery of the handmade brick from Saltern 6 of a type possibly originating between the later 14th and 15th century, suggests a greater longevity for this saltern which may have still been in use into the later medieval period. Therefore, these remains are considered to have potential to make a significant addition to the study of the emerging salt-making landscape of Gaywood's historical North Marsh. This landscape was first identified by the National Mapping Programme (NMP) survey (Albone *et al.* 2007, 116).

Saltern mounds and mound formation

4.2.3 All of the saltern mounds encountered on the site were of similar morphology: composing mostly filtration waste silts, with varying quantities of hearth waste that consisted of thinner bands/tips/lenses of burnt deposits rising and falling through each mound's profile. Each of these layers therefore represents the evolution over time of successive pre-existing land surfaces upon each mound as they rose from the saltmarsh. The borehole survey of the site demonstrates salt-making activity commenced on the saltmarsh at a height between *c*.1.19-1.71m OD. These are noticeably lower than the *c*.2m OD basal mound horizons encountered to the south

within the Lynnsport 4 and 5 developments; possibly due to the site's more 'advanced' and 'seaward' location.

4.2.4 Unlike the excavations into the neighbouring salt-making deposits of Lynnsport 4 and 5, the salterns on the current site did not reveal any thin 'grey' bands or leaching horizons indicative of buried soils. Such soils are believed to possibly indicate periods of temporary abandonment of salt-making sites or periods of flooding (Clarke 2017b). The topographical model of the site (Fig. 3) provides a final 'snapshot' of each saltern mound after salt-making activity on it had ceased. Recent truncation of these remains appears to have been slight with only Saltern 1 displaying a line of modern truncation (2.8m OD) in the area of Trench 32.

4.2.5 The presence of the drainage ditch network, whose fills yielded a broad range of later medieval and post-medieval artefacts, supports the documentary evidence (see Section 1.3.8) for the North Marsh of Gaywood having been utilised as valuable salt-marsh pasture throughout these later periods.

Saltern fixtures and features

4.2.6 No evidence for salt-cotes or any other structures were encountered in any of the evaluation trenches. Concentrations of fired clay with some pieces displaying diagnostic salt-boiling hearth features (hardened green inner wall/vitrified surface, Plate 7) and/or fuel ash slags resulting from reactions of salty solutions with hearth waste were observed on Salterns 1 (Trench 32) and 6 (Trench 27). A single fragment of lead was also recovered from Saltern 1. Remains of brine boiling hearths are therefore likely to be present near to both these locations. In addition, Saltern 6 also produced a crude handmade brick (469g). Examples of these 'soft fired' bricks, that were probably used as supports for lead pans on the hearths, have been found previously on the nearby site of Marsh Lane (Clarke 2016) and further afield on the salt-making site excavated at Walpole St Peter, Norfolk (Clarke 2009). The brick probably dates to the late 14th to 15th century, indicating this saltern may have possibly have still been in use into the later medieval period.

4.2.7 Significantly, these remains appear to be of the same enclosed hearth-type excavated at the former Queen Mary's Nursing Home (Cope-Faulkner 2014) and Marsh Lane (Clarke 2016), King's Lynn sites. This type of technology is considered typical of that employed during the later Saxon and medieval periods to boil the concentrated brine produced by filtration units. Finely stratified hearth waste deposits were also observed to be present over the hearth remains encountered in Trench 32, suggesting good preservation of deposits at depth within Saltern 1.

4.2.8 Deposits of similar burnt material uncovered on recent excavations to the south of the site (Lynnsport 4 and 5, Clarke 2017b) are known to represent waste resulting from brine boiling activity as part of the salt-making process. The fragments of fired clay represent the broken-up clay-lining of disused hearths and slags formed as a result of the build-up of salty residues or spent fuel ash associated with the intense heat of brine boiling.

4.2.9 Filtration units for the 'sand washing/sleeching' process were found to be present in Salterns 4 and 5 (Trenches 34 and 31 respectively). This group of clay-lined features,

to aid the retention of the concentrated brine being produced by the units, consisted of two partially revealed examples of both a sub-rectangular filtration tank end and circular collection tank end within Trench 31 (**231** and **214** respectively) and a heavily truncated example of a circular collection tank end within Trench 34 (**234**). As with the enclosed hearths, these features are considered typical of the 'sleeching' process employed during the later Saxon and medieval periods for the stripping of muds collected from the intertidal zone (to the west) of their salt content for the production of concentrated brine. Parallel examples of clay-lined filtration units have been found on the recent nearby excavations into saltern mounds (Marsh Lane, Clarke 2016; Lynnsport 4 and 5, Clarke 2017a-b).

4.2.10 The sub-square clay-lined pit encountered in Trench 22 (Saltern 7) probably represents the remains of a water storage tank; possibly the concentrated brine produced by the filtration units. The excavation of the pit revealed that it cut further clay lined features at depth within the mound. No other feature of this type was encountered during the excavations, however parallel examples of circular and sub-rectangular clay-lined pits (other than filtration units) have been found on recent nearby excavations into salterns at Marsh Lane (Clarke 2016) and the adjacent Lynnsport 4 and 5 developments (Clarke 2017a-b).

4.2.11 The salterns are believed to have been connected and serviced by a network of tidal creeks and channels that facilitated the transport of salt-rich estuarine muds, fuels and other materials as well as labourers to salt-making sites. Such channels would also be employed to take the salt to the local markets established at this time adjacent to the Bishop of Norwich's Palace at Gaywood and at the Bishop's Lynn (the current King's Lynn). Names of many of these channels that extended across the historical North Marsh (e.g 'le Bull', 'le Goole', 'le Salt Ea', 'salt rivallett', etc) such as are recorded in the Gaywood Dragge (survey) of 1487 (NRO reference BL/MA 2/2). However, no evidence for channels or creeks were identified in any of the trenches. The network of drainage ditches uncovered in the lower lying parts of the site proved to be too small in scale and recent in date. However, the larger unexcavated drainage channel observed to extend broadly north to south across the site (skirting Salterns 5 and 7; Fig. 5) may possibly delineate a historical creek.

Salt makers and social context

4.2.12 There was a notable lack of any artefacts recovered from the salt-making deposits on the site to evidence the scale or duration of the salt-making campaigns. The lack of finds indicates (seasonal?) salt-making was undertaken away from settlement areas. Only a very small quantity of fragmentary animal bone was recovered from the waste filtration sits comprising Saltern 7. The paucity of artefactual remains is considered to be typical of these salt-making sites. For example, the excavations into Salterns 1 and 4 extending southwards into the adjacent Lynnsport development only produced a handful of Late Saxon pottery sherds (Clarke 2017b). It is possible that historical sources may provide more detail on the social context of salt-working.

Salterns and landscape change

4.2.13 The salterns would have lain on the saltmarsh, close to the intertidal zone to exploit the salt-rich estuarine muds. This landscape pre-dated the diversion of the Great Ouse to King's Lynn in the 13th century, when the local coastal environment in the vicinity of Bishop's (King's) Lynn was fed by a series of smaller rivers such as the Old Wiggenhall Eau, the Nar and Gaywood rivers. Documentary evidence demonstrates that prior to the River Gaywood's diversion along the southern margins of the historical North Marsh in 1425, it flowed through the marsh's central part (north of the site) where it was known as 'le Seadyck' (NRO reference BL 55/1). The borehole survey demonstrated that the salterns uncovered on the site commenced at a lower height than that previously observed for the neighbouring salterns to the south (Lynnsport 4 and 5 developments). It is postulated that the spatial layout of the saltern mounds represent a 'seaward' migration of salt-making activity over time, with the seaward sites remaining active whilst the landward sites fall out of use to become desirable higher/dryer sites for saltmarsh grazing (Clarke 2017b). In this way, the salt-making industry facilitated the reclamation of the North Marsh that became, from the later medieval period, an extensive and valuable pastureland.

4.2.14 The assemblages of ostracods and foraminifera recovered from the site demonstrate there is potential for environment sampling on any further excavations to provide an environmental context for the salt-making remains, including trends in salinity levels over time.

Research frameworks

4.2.15 As the summary statements above demonstrate, the evaluation has provided a substantial corpus of salt-making remains with a high potential to help address the research aims stated in the regional research frameworks (see Section 2.1.20-25).

4.2.16 In particular regarding Section 2.1.24-25, there is greater potential for these remains when combined with the wider study area into later Saxon and medieval salt-making currently being investigated as part of the adjacent Lynnsport residential developments. The results of both the proposed school and residential developments provide a unique opportunity to study a substantial proportion of the salt-making sites on the North Marsh. These are documented to have been part of the ecclesiastical lordship of Gaywood, held as part of an Episcopal See from at least the Late Saxon period (successively the East Anglian Bishops of North Elmham, Thetford and Norwich; Little Domesday Book of *c*.1086, NRO reference E 31/1/2/1051).

4.3 Interpretation

Later Saxon to early medieval salt-making remains

4.3.1 The evaluation revealed evidence for salt-making on the site in the form of six mounds and their associated features comprising Salterns 1, 4-8. Two of these salterns (Salterns 1 and 4) continue south into the Lynnsport 4 and 5 developments, where they were excavated by Oxford Archaeology in 2017 and found to be of Middle to Late Saxon origin (*c*.8-10th centuries AD). The remains of Saltern 7 lay wholly within the development area. The remaining salt-making mounds (Salterns 5, 6 and 8) only partially lay within the bounds of the current development. The mound comprising

Saltern 5 was observed to be particularly substantial, as a significant earthwork surviving along the southeastern boundary of the site.

4.3.2 As well as revealing waste deposits from the salt-making process constituting the saltern mounds, the evaluation also revealed the remains of two probable brine boiling hearth sites at the northeastern end of Trench 27 (Saltern 6) and at the southeastern end of Trench 32 (Saltern 1). These two sites were surrounded by notable concentrations of fired clay and/or slags along with greater quantities of charcoal. The clay-lined features encountered in Trench 22 (Salterns 7), Trench 31 (Saltern 5) and Trench 34 (Saltern 4) represent *in-situ* filtration units and a water tank.

4.3.3 The salt-making waste deposits making up all of the identified saltern mounds predominantly comprised successive layers of yellowish brown silts and sands representing dumps of estuarine muds, stripped of their salt content by the filtration process. Layers of burnt material of varying thickness and extent were also identified within Salterns 1, 4, 5 and 6, representing discarded tips of brine boiling hearth waste.

4.3.4 These remains are considered to be typical of the known later Saxon to early medieval salt-making remains previously excavated in the area, such as the excavations at Marsh Lane (Clarke 2016) and on the Lynnsport 4 and 5 developments (Clarke 2017a-b) in Gaywood, as well as excavations in the wider vicinity such as at the former Queen Mary's Nursing Home in King's Lynn (Cope-Faulkner 2014).

Later medieval/post-medieval drainage ditches

4.3.5 On the ground surrounding the saltern mounds, the topographical survey and subsequent evaluation also revealed a network of drainage ditches, probably representing a single phase of drainage, that in conjunction with the raising of the local land level as a result of the saltern mounds, 'reclaimed' this part of Gaywood's historical North Marsh during the later medieval and post-medieval periods. The date for these features was reinforced with the recovery of pottery, CBM and ceramic tobacco pipe-stem from the fills of these features. Salt-making activity on the site may have ceased at the start of this period with a lack of any artefacts recovered from the trenching into the saltern mounds. These findings complement historical evidence of the period that documents the North Marsh as an extensive tract of pasture (Gaywood Dragge, NRO reference BL/MA 2/2). This valuable pastureland comprised multiple parcels of land held by the local populace that included land held by burgesses from neighbouring Bishop's (King's) Lynn along with lands held by larger ecclesiastical institutions such as the local church, hospitals and priory at Bishop's Lynn. These lands were enfeoffed by the Bishop of Norwich who still held the lordship of Gaywood during this later period.

4.4 Significance

4.4.1 The evaluation has demonstrated significant salt-making remains are present on the site. These remains probably date from the later Saxon to early medieval periods. The remains of most significance revealed by the trenching were two sites of probable brine boiling activity located within the mounds of Salterns 1 and 6. Also of importance were the sites of sand washing/sleeching activity identified within the mounds of Salterns 4, 5 and 7. The salt-making remains comprising Saltern 8 are considered to be

of less importance, being only comprised of sterile filtration waste silts, that only marginally extended onto the development area from the north. When taken as a whole, a significant and extensive area of Mid-Late Saxon/early medieval salt-making is clearly present on the site.

4.4.2 The later medieval/post-medieval drainage ditches may also be considered to be remains of lesser importance, although the larger (broadly north-south) channel traversing the site may potentially follow the course of a former creek related to the saltworking.

4.5 Recommendations

4.5.1 Recommendations for any future work based upon this report will be made by the County Archaeology Office.

APPENDIX A CONTEXT INVENTORY

Cxt.	Cut	Trench	Category	Feature Type	Function	Group	Period	Thickness (m)	Colour	Fine component	Coarse component	Compaction	Breadth (m)	Depth (m)	Shape in Plan	Orientation
200			layer	natural	tidal deposit	Saltmarsh deposits	1		grey	sandy silt		soft				
201		32	layer	saltern mound	filtration waste	Saltern 1	2	1.5	mid yellowish brown	silty sand		loose				
202		34	layer	saltern mound	filtration waste	Saltern 4	2	1.8	mid yellowish brown	sand		loose				
203		31	layer	saltern mound	filtration waste	Saltern 5	2	2.35	mid yellowish brown	sandy silt		soft				
204		27	layer	saltern mound	hearth waste	Saltern 6	2	0.6	grey, yellow and red	sandy silt	fired clay, slag and charcoal inclusions	soft				
205		22	layer	saltern mound	filtration waste	Saltern 7	2	0.95	mid yellowish brown	sand		loose				
206		21	layer	saltern mound	filtration waste	Saltern 8	2	0.3	mid yellowish brown	silty sand		loose				
207			layer	natural	marsh deposit	Recent Marsh deposits	3	unknown	mid grey and reddish brown	sandy silt		soft				
208			layer	natural	topsoil	Topsoil	4	0.3	dark grey	sandy silt		soft				
209			cut	modern truncation	modern	Modern truncation	4								(not in plan)	

Cxt.	Cut	Trench	Category	Feature Type	Function	Group	Period	Thickness (m)	Colour	Fine component	Coarse component	Compaction	Breadth (m)	Depth (m)	Shape in Plan	Orientation
210			layer	made ground	modern	Made ground	4	0.4	mid yellowish brown	silty sand		loose				
211		31	layer	saltern mound	filtration waste	Saltern 5	2	<0.35	light yellowish brown	sandy silt		soft				
212		31	layer	saltern mound	hearth waste	Saltern 5	2	0.2	dark grey	silty sand		loose				
213		31	layer	saltern mound	filtration waste	Saltern 5	2	<0.4	light yellowish brown	sandy silt		soft				
214	214	31	cut	filtration unit	concentrated brine production	Saltern 5	2						1.3	0.4	(not in plan)	
215	214	31	fill	filtration unit	clay lining	Saltern 5	2	0.1	brown	clay		firm				
216	214	31	fill	filtration unit	disuse	Saltern 5	2	0.25	mid yellowish brown	silty sand		loose				
217		31	layer	saltern mound	hearth waste	Saltern 5	2	0.1	dark greyish brown	silty sand		loose				
218		31	layer	saltern mound	hearth waste	Saltern 5	2	0.08	light reddish brown	silty sand		loose				
219		31	layer	saltern mound	filtration waste	Saltern 5	2	0.15	mid brownish yellow	silty sand		loose				
220		31	layer	saltern mound	hearth waste	Saltern 5	2	0.25	dark brownish grey	silt		soft				
221	221	31	cut	filtration unit	concentrated brine production	Saltern 7	2						2	0.35	sub-square	

Cxt.	Cut	Trench	Category	Feature Type	Function	Group	Period	Thickness (m)	Colour	Fine component	Coarse component	Compaction	Breadth (m)	Depth (m)	Shape in Plan	Orientation
222	221	22	fill	filtration unit	clay lining	Saltern 7	2	0.1	light bluish grey	clay		firm				
223	221	22	fill	filtration unit	disuse	Saltern 7	2	0.3	mid greyish brown	sandy silt		soft				
224		32	layer	saltern mound	hearth waste	Saltern 1	2	0.2	dark brownish grey	sandy silt	charcoal inclusions	soft				
225		34	layer	saltern mound	hearth waste	Saltern 4	2	0.6	dark brownish grey	silty sand	charcoal inclusions	loose				
226		34	layer	saltern mound	hearth waste	Saltern 4	2	0.5	dark reddish grey	silty sand		loose				
227		34	layer	saltern mound	filtration waste	Saltern 4	2	unknown	mid orange brown	silty sand		loose				
228		34	layer	saltern mound	filtration waste	Saltern 4	2	unknown	mid greyish brown	silty sand		loose				
229		27	layer	saltern mound	hearth waste	Saltern 6	2	0.35	dark reddish brown	silt	Charcoal, slag and fired clay inclusions	soft				
230		27	layer	saltern mound	hearth waste	Saltern 6	2	0.5	mid yellowish brown	sandy silt	charcoal inclusions	soft				
231	231	31	cut	filtration unit	concentrated brine production	Saltern 5	2						1.5		sub-rectangular	
232	231	31	fill	filtration unit	clay lining	Saltern 5	2	unknown	mid brown	clay		firm				

Cxt.	Cut	Trench	Category	Feature Type	Function	Group	Period	Thickness (m)	Colour	Fine component	Coarse component	Compaction	Breadth (m)	Depth (m)	Shape in Plan	Orientation
233	231	31	fill	filtration unit	disuse	Saltern 5	2	unknown	mid yellowish brown	silty sand		loose				
234	234	34	cut	filtration unit	concentrated brine production	Saltern 4	2						0.5	0.2	circular	
235	234	34	fill	filtration unit	clay lining	Saltern 4	2	0.05	bluish grey	clay		firm				
236	234	34	fill	filtration unit	disuse	Saltern 4	2	0.15	mid greyish brown	silty sand	charcoal inclusions	loose				
237	237	21	cut	ditch	drainage	Drainage ditches	4						1	0.5	linear	east-west
238	237	21	fill	ditch	silting	Drainage ditches	4	unknown	greyish brown	sandy silt		firm				
239	239	21	cut	ditch	drainage	Drainage ditches	4						1	0.5	linear	east-west
240	239	21	fill	ditch	silting	Drainage ditches	4	unknown	greyish brown	sandy silt		firm				
243	243	23	cut	ditch	drainage	Drainage ditches	4						3	0.5	linear	east-west
244	243	23	fill	ditch	silting	Drainage ditches	4	unknown	greyish brown	sandy silt		firm				
245	245	23	cut	ditch	drainage	Drainage ditches	4						1	0.5	linear	east-west
246	245	23	fill	ditch	silting	Drainage ditches	4	unknown	greyish brown	sandy silt		firm				
247	247	26	cut	ditch	drainage	Drainage ditches	4						0.5	0.2	linear	north-south
248	247	26	fill	ditch	silting	Drainage ditches	4	unknown	greyish brown	sandy silt		firm				
249	249	26	cut	ditch	drainage	Drainage ditches	4						0.5	0.2	linear	north-south

Cxt.	Cut	Trench	Category	Feature Type	Function	Group	Period	Thickness (m)	Colour	Fine component	Coarse component	Compaction	Breadth (m)	Depth (m)	Shape in Plan	Orientation
250	249	26	fill	ditch	silting	Drainage ditches	4	unknown	greyish brown	sandy silt		firm				
251	251	26	cut	ditch	drainage	Drainage ditches	4						0.5	0.2	linear	north-south
252	251	26	fill	ditch	silting	Drainage ditches	4	unknown	greyish brown	sandy silt		firm				
253	253	28	cut	ditch	drainage	Drainage ditches	4						1	0.5	linear	north-south
254	253	28	fill	ditch	silting	Drainage ditches	4	unknown	greyish brown	sandy silt		firm				
255		32	layer	saltern mound	filtration waste	Saltern 1	2	<0.3	mid yellowish brown	sandy silt		soft				
256		32	layer	saltern mound	hearth waste	Saltern 1	2	<0.2	grey, yellow and red	clay	fired clay inclusions	firm				
257		32	layer	saltern mound	hearth waste	Saltern 1	2	<0.3	lenses of grey, brown, red and yellow	sandy silt	charcoal inclusions	soft				
258		32	layer	saltern mound	loam	Saltern 1	2	0.3	dark grey	sandy silt (loam)		soft				
259		32	layer	saltern mound	filtration waste	Saltern 1	2	0.3	mid yellowish brown	sandy silt		soft				
260		32	layer	saltern mound	hearth waste	Saltern 1	2	0.25	mid greyish brown	sandy silt		soft				
261	209	32	layer	saltern mound	modern truncation	Saltern 1	4	0.3	grey and brown mixed	sandy silt	concrete, plastic, metal and textile inclusions	firm				

Cxt.	Cut	Trench	Category	Feature Type	Function	Group	Period	Thickness (m)	Colour	Fine component	Coarse component	Compaction	Breadth (m)	Depth (m)	Shape in Plan	Orientation
262	262	34	cut	pit	unknown	Saltern 4	2						0.4	0.4	(not in plan)	
263	262	34	fill	pit	backfill	Saltern 4	2	0.35	dark grey	silty sand		loose				
264	264	22	cut	pit	unknown	Modern	4						5		complex	
265	264	22	fill	pit	backfill	Modern	4	unknown	light grey	silt	concrete, glass, plastic, metal and textile inclusions	firm				

Table 3: Context inventory

APPENDIX B FINDS REPORTS

B.1 Metalwork

By Denis Sami

Introduction and description

4.5.2 A total of two metal artefacts was recovered from the site (Table 4). An iron object was recovered from the fill of drainage ditch **239** (Trench 21) and a small lump of lead (SF 1) was produced by hearth waste deposit 224 from Saltern 1 (Trench 32).

4.5.3 The iron object is incomplete and in poor condition. It possibly formed part of a hinge that may be attributed, based on preservation and forging technique, to the post-medieval or modern periods.

Discussion

4.5.4 The function of this item can only be speculated upon but possibly represents a drip of metal resulting from lead melting; perhaps for lead pan repair. The method of salt-making employed in the early medieval period used lead pans to boil concentrated brine over purpose built (enclosed) hearths to produce the salt (Clarke 2016, 36). Lead repairs and off-cuts have been found previously on saltern mounds and generally only survive as small fragments (Cope-Faulkner 2014, 80).

Catalogue

SF	Context	Trench	Feature	Description	Chronology
1	224	32	Saltern 1	Lump of lead of irregular form. L: 19.4 mm; W: 14.3 mm; Wg: 4.9 g.	Medieval to post-medieval
	240	21	**239**	Incomplete, possibly part of a hinge made of a bar with rectangular cross-section. At one end the bar split into two truncated stems with sub-circular cross-section. L: 79.3 mm; 28.7 mm; T: 8.4 mm; Wg: 46 g.	Post-medieval to modern

Table 4: Metalwork catalogue

Retention, dispersal and display

B.1.1 No further work is needed for this assemblage. The lead item should be incorporated into the archive with the iron artefact deselected prior to archival deposition.

B.2 Flintwork

By Lawrence Billington

B.2.1 Archaeological works produced a single worked flint (3g) from ditch **239** in Trench 21. The flint is a broken distal portion of a secondary flake, which is not chronologically diagnostic. The ditch also produced medieval, post-medieval and 18th-19th century pottery.

B.3 Non-metallic slag and fuel by-products

By Carole Fletcher

Introduction and methodology

B.3.1 Nine fragments of fuel ash slag weighing 0.785kg were collected by hand during the evaluation. The materials were weighed and rapidly recorded, with basic description and weight recorded in the text.

Assemblage

B.3.2 The slag was almost entirely recovered from layer 204, part of Saltern 6 in Trench 27, comprises eight fragments weighing 0.777kg, with a single fragment weighing 0.008kg recovered from context 229.

B.3.3 The slag consists of irregular fragments of moderately dense to dense, somewhat glassy, fuel ash slag. Overall the colour is grey, reddish-black to black in places, with numerous small, and occasional larger, vesicles up to 5mm. The surfaces are rough, irregular and, in some cases, there are attached fused pieces of fired clay, possibly part of the salt-making hearth structures.

Discussion

B.3.4 The fuel ash slag is undiagnostic and although not closely datable, is likely to be contemporary with Saltern 6.

Retention, dispersal or display

B.3.5 The slag assemblage is related to salt-making and directly to the fired clay recovered from the same features. Should further work be undertaken, additional material would almost certainly be recovered. If no further work is undertaken, this statement acts as a full record and the fuel ash slag may be deselected prior to archive deposition.

B.4 Pottery

By Carole Fletcher

Introduction

B.4.1 The site produced a small assemblage of pottery, 10 sherds (0.091kg) spanning the late medieval to the 18th/19th centuries, recovered from features in Trenches 21 & 23. The condition of the assemblage is moderately abraded to unabraded (Table 5).

Methodology

B.4.2 The Prehistoric Ceramics Research Group (PCRG), Study Group for Roman Pottery (SGRP), The Medieval Pottery Research Group (MPRG), 2016 *A Standard for Pottery Studies in Archaeology* and the MPRG *A guide to the classification of medieval ceramic forms* (MPRG 1998) act as standards.

B.4.3 Recording was carried out using OA East's in-house system, based on that previously used at the Museum of London. Fabric classification has been carried out for all sherds, and post-medieval types named, using the Museum of London fabric codes where possible (MoLA 2014). All sherds have been counted, classified, minimum number of vessels (MNV) established, and weighed on a context-by-context basis. The assemblage is recorded in the catalogue at the end of this report. The pottery and archive are curated by Oxford Archaeology East until formal deposition or dispersal.

Catalogue

Trench	Context	Cut	Fabric and form	MNV	No. of Sherds	Weight (kg)	Pottery Date
21	240	**239**	Yellow ware: bowl or dish base angle, moderately abraded	1	1	0.013	1820-1900
			Creamware: rim, internally thickened (small bead), rounded, from a plate or dish. Moderately abraded	1	1	0.004	1740-1830
			Staffordshire-type Slipware (marbled): unabraded press-moulded dish or bowl body sherd with relief decoration	1	1	0.021	1680-1800
			Glazed Red Earthenware: moderately abraded body sherd, internally and externally glazed, external incised lines	1	1	0.004	1550-1800
			Frechen stoneware: neck sherd from a bellarmine/Bartmann jug with part of moulded face	1	1	0.012	1550-1700
			?Late medieval and transitional: unabraded jar or jug rim (externally thickened), traces of glaze on rim are likely to be the result of being in a mixed firing	1	1	0.020	1400-1600
			Oxidised unglazed coarseware: body sherds	1	3	0.012	Not closely datable
23	246	**245**	Pearlware: base angle with foot ring, from small plate or saucer, with internal transfer-printed decoration	1	1	0.005	1770-1840
Total				**8**	**10**	**0.091**	

Table 5: Pottery catalogue

Assemblage

B.4.4 Trench 21, ditch **239**, produced the bulk of the pottery recovered from the evaluation, consisting of 9 sherds weighing 0.086kg. The pottery present is very mixed and includes Pearlwares, Creamware, Staffordshire-type Slipware, Glazed Red Earthenware and a sherd from a Frechen bellarmine/Bartmann jug. Also present are three abraded, unglazed, oxidised coarseware sherds that are not closely datable.

B.4.5 Ditch **245**, in Trench 23, produced a base angle sherd from a Pearlware vessel with internal transfer-printed decoration (*c*.1770-1820), possibly a saucer.

Discussion

B.4.6 The small and fragmentary assemblage of pottery may be domestic in origin. With dates ranging from the 15th to the late 19th century, the overall date of the assemblage is early 19th century. The pottery may relate to rubbish deposition from nearby occupation, possibly thrown directly into the ditches, although none of the material should be considered as primary deposition. None of the pottery recovered has been affected by salt and there is no definitive link between the pottery and the salterns found on the site.

Retention, dispersal and display

B.4.7 If further work is undertaken, more pottery may be recovered, however, only at low levels. Due to the fragmentary nature of the assemblage, it is of little significance, beyond indicating low levels of rubbish deposition from at least the 15th century into the 19th century.

B.4.8 Should further work be undertaken, the pottery should be incorporated into any later archive. If no further work on the site is undertaken, the following catalogue acts as a full record and the pottery may be deselected prior to archival deposition.

B.5 Ceramic building material and fired or burnt clay

By Carole Fletcher

Introduction and methodology

B.5.1 A fragmentary assemblage of ceramic building material (CBM), weighing 0.580kg, and fired or burnt clay (4.592kg) was recovered from ditches **239**, **249**, **253** and from layers of saltern waste across four trenches (Table 6). The CBM assemblage is composed of tile and brick fragments, no complete examples were recovered, and all are moderately abraded or abraded. The CBM recovered varies in date, from material tentatively identified as Roman, through 14th-15th century fragments dating to the post-medieval period. The fired or burnt clay saltern waste cannot be closely dated. The material is broadly similar to that recovered from the Lynnsport 4 and 5 investigations carried out by Oxford Archaeology in 2017 (Fig. 2, ENF141949; Clarke 2017a-b).

B.5.2 The assemblage was quantified by context, counted, weighed, and form recorded where this was identifiable. Fabrics are described, and dating is tentative, only

complete dimensions were recorded, which was most commonly thickness. Archaeological Ceramic Building Materials Group Minimum Standards (ACBMG 2002) forms the basis for recording and Woodforde (1976), McComish (2015) and Drury (1993) form the basis for identification. The assemblage is recorded in the catalogue at the end of this report. The fired or burnt clay, CBM and archive are curated by Oxford Archaeology East until formal deposition or dispersal.

Assemblage

B.5.3 Ditch **239** in Trench 21 produced post-medieval tile fragments, a fragment of tile tentatively identified as Roman and a small fragment of estuarine clay brick (?late 14th-15th century) alongside a mix of 15th to 19th century pottery. Ditch **249** in Trench 26 also produced post-medieval tile fragments.

B.5.4 Trench 27 produced the bulk of the fired or burnt clay assemblage, from layers associated with Saltern 6. Much of this material is hearth lining or hearth structure and is mostly salt-affected with greenish surfaces and some greenish glassy deposits on the upper surface of some fragments. This glassy material has formed due to a reaction between the siliceous clay silts into which the hearths were cut, alkalis in the fuel, most likely charcoal, and salt from the manufacturing process. These are all the ingredients required to make glass, which then forms on the surface of the hearth.

B.5.5 Context 204 produced hearth waste, which was present in both large blocks, including a fragment with wattle impressions, and small fragments. The context also produced a fragment of brick tentatively identified as a Drury 'early brick' (Drury 1993). The surviving dimension and its unsanded nature suggest it is a Group B brick. These Group B bricks Drury describes as having 'a purple tinge indicating production from salt-rich estuarine clays.' (Drury 1993, 163) and describes them as being made in an unsanded form, on a surface covered with vegetable matter, probably hay (ibid). Drury dates the Group B bricks to the 14th-15th centuries. Context 229, also part of Saltern 6, produced further fragments of salt-affected burnt clay.

B.5.6 Ditch **253** in Trench 28 produced two fragments of CBM, most likely post-medieval brick.

B.5.7 Trench 31 produced further hearth waste from contexts 212 and 218, both associated with Saltern 5; relatively low levels of material were recovered from this trench. Small amounts or hearth or waste material were also recovered from Trench 32, Saltern 1, context 256 and from Saltern 4, context 225, in Trench 34.

Discussion

B.5.8 A fragmentary and mixed assemblage of CBM was recovered from the site, with post-medieval CBM recovered from ditches **239** and **249**, and possible medieval 'early brick' from ditch **239** in Saltern 6. The bulk of the fired or burnt clay is salt-affected to various degrees and is mostly hearth structural material, as the inclusion of organic material within some fired or burnt clay and the presence of withy impressions, in at least one fragment, indicates some degree of construction.

Overall, the saltern waste is not closely datable. It lacks the recognisable briquetage forms, either pans or supports, that would indicate Iron Age or Roman saltworking,

and the lack of lead off-cuts, waste or dribbles of molten lead tends to exclude the early or high medieval period. The exception to this is Saltern 1 which produced a single piece of lead dross. However, the presence of a possible early brick in the waste from Saltern 6 suggests that this saltern at least may represent late medieval salt-working.

Retention, dispersal and display

B.5.9 The material is fragmentary and, although indicative of saltworking, is difficult to date. Similar material was recovered from ENF139746 and ENF141949 (Clarke 2017a-b), interpreted as the possible use of early brick, perhaps in relation to late medieval salterns. Should further work be undertaken, additional material would certainly be recovered and this CBM and fired/burnt clay should be incorporated into any later catalogue. If no further work on the site is undertaken, the following catalogue acts as a full record, and the CBM and fired/burnt clay may be deselected prior to archival deposition.

Catalogue

Trench	Context	Cut	Form	CBM or Fired/Burnt clay description	No. of fragments	Weight (kg)	Date
21	240	**239**	Tile	Irregular fragments of relatively hard tile. Upper and lower surfaces survive, and an edge on one piece. Lower surface irregular on one fragment. Very pale yellow, fine silty fabric with moderate grog and slag fragments, both up to 10mm, occasional voids - some irregular or elongated, and rare mica. Rare vegetation impressions on surfaces. Thickness 18-20mm	2	0.055	Post-medieval
			Tile	Sub-triangular fragment of abraded tile. Upper and sanded lower surfaces survive, and edge along the longest side. Pale orange smooth silty fabric, occasional red grog pellets, mica and black grains. Thickness 15-16mm	1	0.036	Roman?
			?Brick	Irregular fragment of CBM, probably brick, hard fired. Fine silty fabric, dull purplish-red, occasional grog pellets and rare mica. Colour suggests this is a fragment of estuarine brick. Very similar fabric to the brick recovered from Saltern 6 and likely of a similar date	1	0.020	Late 14th-15th century
26	250	**249**	Tile	Irregular fragments of relatively hard tile. Upper and sanded lower surfaces survive, and edge along the longest side. Very pale yellow, fine silty fabric with moderate grog and slag fragments, both up to 13mm, occasional voids - some irregular or elongated, and rare mica. Rare vegetation impressions on surfaces. 14mm thick, rapidly increasing to 18mm at edge	1	0.104	Post-medieval

Trench	Context	Cut	Form	CBM or Fired/Burnt clay description	No. of fragments	Weight (kg)	Date
27	204		Fired/Burnt Clay	Large block of hearth lining, broken into three pieces. Pale orange-pink fine sandy silty fabric, changing to pale blue-green at the surviving surface. Blue-green alteration is 20-25mm thick and surface is hard and roughly flat with signs of vitrification. Vegetation impressions throughout	3	1.196	Not closely dateable
			Fired/Burnt Clay	Fragments of hearth lining. Pale orange-pink fine sandy silty fabric, changing to pale blue-green at the surviving surface. Blue-green alteration is 20-25mm thick and surface is hard and roughly flat with clear vitrification developing a green glassy slag surface, some smoother areas, otherwise rough and concreted	4	0.219	Not closely dateable
			Fired/Burnt Clay	Thin dense fragments of hard fired clay. Pale grey silty fabric with rare mica. 3-9mm thick. May be metal-rich debris from boiling off seawater	6	0.043	Not closely dateable
			Fired/Burnt Clay	Formless fragments of fired clay without surviving surface(s)	(50+)	0.923	Not closely dateable
			Brick	Fragment of crude handmade brick. Parts of three uneven surfaces survive – upper/side/lower; it is unclear which way was up. Dark red and dark purplish-red sandy silty fabric with occasional very dark red grog. 52mm thick. Colour suggests this is a fragment of estuarine brick, possibly a Drury Group B brick (Drury 1993 163-165)	1	0.469	Late 14th-15th century
			Fired/Burnt Clay	Fragments of fired clay with probable surface. Pale orange-pink sandy silty fabric with occasional mica	7	0.298	Not closely dateable
			Fired/Burnt Clay	Fragments of fired clay with wattle/withy impressions. Buff and black sandy silty fabric with occasional mica	6	0.144	Not closely dateable
			Fired/Burnt Clay	Fragment of fired clay/CBM. Pale orange-pink to pink fine silty fabric with occasional mica	1	0.012	Not closely dateable
27	229		Fired/Burnt Clay	Irregular fragments of abraded fired clay. Larger fragments include two with surviving surfaces at right angles and several thinner pieces 8-13mm thick. Dull patchy orange and pale brown, fine silty fabric, with moderate small voids and rare mica	58	0.189	Not closely dateable
			Fired/Burnt Clay	Irregular fragments of abraded fired clay. Dull orange, buff, pale grey and mid grey, fine silty fabric, with rare small voids mica	32	0.062	Not closely dateable
28	254	**253**	Brick	Irregular fragment of brick, no complete dimensions survive. Two surfaces at right angles survive, neither appears sanded. Pale yellow and pale pink poorly mixed and folded silty	1	0.137	Post-medieval

Trench	Context	Cut	Form	CBM or Fired/Burnt clay description	No. of fragments	Weight (kg)	Date
				fabric, with occasional grog and small voids			
31	212		Fired/Burnt Clay	Irregular fragment of abraded fired clay. Dull pale orange to buff, fine silty fabric, with occasional tiny voids and rare mica. Some small areas of possible surface and evidence of vegetation impressions in the form of long narrow grooves	1	0.157	Not closely dateable
31	218		Fired/Burnt Clay	Irregular fragments of abraded fired clay. Dull pale orange to buff, fine silty fabric, with occasional tiny voids and rare mica	6	0.026	Not closely datable
32	256		Fired/Burnt Clay	Irregular fragments of abraded fired clay, one with a portion of surviving surface. Dull buff to blue-grey, fine sandy silty fabric, with occasional tiny voids and rare mica	4	0.840	Not closely datable
34	225		Fired/Burnt Clay	Fragment of abraded fired clay with a single uneven surface. Dull pale orange, surface pale pink and buff, fine silty fabric, with occasional tiny voids and rare mica. Evidence of vegetation impressions in the form of long narrow grooves on surviving surface	1	0.242	Not closely datable
Total					**136**	**5.172**	

Table 6: CBM and fired/burnt clay catalogue by Trench

B.6 Clay tobacco pipe

By Carole Fletcher

Introduction and methodology

B.6.1 During the evaluation, three fragments of white ball clay tobacco pipe, weighing 0.008kg, were recovered from features in Trenches 21 and 23. Simplified recording only has been undertaken, with basic description and weight recorded in the text. Terminology used in this report is taken from Oswald's simplified general typology (Oswald 1975, 37–41), and Hind and Crummy (Crummy 1988, 47-66).

Assemblage

B.6.2 From Trench 21, ditch **39**, a single fragment of undecorated clay tobacco pipe stem (0.003kg) was recovered. The stem is abraded, 27mm long and teardrop shaped, flaring slightly, suggesting it has broken close to the bowl of the pipe. Two fragments of undecorated, clay tobacco pipe stem were recovered from ditch **245** in Trench 23. The larger fragment (0.003kg, 34mm long and slightly oval 8.1-8.6mm) is weathered and abraded, while the second length of stem (0.002kg, 31mm long and 7.2mm in diameter) is only moderately abraded, with relatively clean breaks and visible neatly trimmed seams.

B.6.3 The ditches from which the clay tobacco pipe were recovered also produced pottery. Medieval, post-medieval and 18th-19th century pottery was recovered from ditch **239** and a single sherd of late 18th-early 19th century pottery came from ditch **45**.

Discussion

B.6.4 The fragments of clay tobacco pipe recovered represent what are most likely casually discarded broken pipes. The stem fragments do little, other than to indicate the consumption of tobacco on, or in the vicinity of, the site, most likely in the 18th or 19th century.

Retention, dispersal or display

B.6.5 The fragmentary nature of the total assemblage means it is of little significance. If no further work on the site is undertaken, this report acts as a full record and the clay tobacco pipe may be deselected prior to archival deposition.

APPENDIX C ENVIRONMENTAL REPORTS

C.1 Faunal remains

By Zoë Uí Choileáin

Introduction and methodology

C.1.1 A total of six fragments or 51g of mammal bone was recovered from contexts 205 and 240 (Table 7). The material was identified using Schmid (1972) and the OA East reference collection.

Trench	Cut	Context	Feature Type	Element	Species	Weight (g)
22	-	205	Saltern 7	Fibula	Medium mammal	3
21	239	240	Drainage Ditch	Humerus	Medium mammal	17
21	239	240	Drainage Ditch	Radius	Sheep/goat	12
21	239	240	Drainage Ditch	Ulna	Sheep/goat	10
21	239	240	Drainage Ditch	Tibia	Sheep/goat	9

Table 7: Animal bone summary catalogue

Assemblage and discussion

C.1.2 The surface condition of the bone is good and there is little fragmentation. The proximal epiphyses of the radius and ulna in context 240 are fully fused, meaning that the animal was above 30 months at time of death. This many suggest that the animal was kept for secondary products i.e wool or milk not simply for meat production.

Recommendations and further work

C.1.3 This is a small assemblage which can provide little information about the nature of the site. No further work is recommended.

C.2 Environmental Remains

By Rachel Fosberry

Introduction

C.2.1 Twenty-one bulk samples were taken from salt-making deposits and features on the site in order to assess the quality of preservation of plant remains and their potential to provide useful data as part of further archaeological investigations.

Methodology

C.2.2 The samples were soaked in a solution of sodium carbonate for 24hrs prior to processing to break down the heavy clay matrix. The total volume (up to 37L) of each of the samples was processed by tank flotation using modified Siraff-type equipment for the recovery of preserved plant remains, dating evidence and any other artefactual evidence that might be present. The floating component (flot) of the samples was collected in a 0.3mm nylon mesh and the residue was washed through 10mm, 5mm, 2mm and a 0.5mm sieve. The larger residue fractions were sorted by eye and any artefacts were picked out and integrated with the hand-excavated material. The <2mm

residue fractions were scanned under the microscope to check for ostracods and forminifera that may not have floated.

C.2.3 The dried flots were scanned using a binocular microscope at magnifications up to x 60 and an abbreviated list of the recorded remains is presented in Table 8. Identification of plant remains is with reference to the Digital Seed Atlas of the Netherlands (Cappers et al. 2006) and the authors' own reference collection. Nomenclature is according to Stace (2010).

Quantification

C.2.4 For the purpose of this initial assessment, items such as seeds and cereal grains have been scanned and recorded qualitatively according to the following categories:

= 1-5, ## = 6-25 specimens

C.2.5 Items that cannot be easily quantified such as charcoal and molluscs have been scored for abundance

+ = rare, ++ = moderate, +++ = abundant

Key to table:

f=fragmented

Results

C.2.6 Preservation of plant remains is poor to moderate; many of the flots contain rootlets and other plant material that are untransformed in that they are not preserved by charring and it is unclear if they are contemporary remains or modern intrusions. Seeds of elderberry (*Sambucus nigra*), bramble (*Rubus* sp.), hawthorn (*Crategus mongyna*), nettles (*Urtica dioica*), sedges (*Carex* sp.), docks (*Rumex* sp.) and goosefoots (*Chenopodium* sp.) are frequent within many of the assemblages. Fungal sclerotia were also noted. Seeds/fruits of hawthorn are quite large (up to 6mm) for bioturbation, but the seed assemblage is consistent with the recent flora noted prior to excavation. The burrowing snail (*Ceciliodes acicula*) was also frequently noted in the samples and the brackish water snail, *Hydrobia*, is occasionally present (they all floated).

C.2.7 Charcoal is present in many of the samples in the form of wood charcoal and charred stems of 'woody' plants such as shrubs/small trees.

C.2.8 The results are discussed by trench:

Trench 21: Saltern 8

C.2.9 Filtration waste (206) of Saltern 8 contains foraminifera (moderate density, good diversity) and occasional untransformed seeds. Charcoal is absent.

Trench 22: Saltern 7

C.2.10 Filtration waste (205) of Saltern 7 contains foraminifera (abundant density, good diversity), ostracods and occasional shells of *Hydrobia* sp. Untransformed seeds are abundant and charcoal is present. Samples from the water tank (222, 223) of Saltern 7 contain noticeably less ostracods and no foraminifera or charcoal.

Trench 27 : Saltern 6

C.2.11 The filtration waste (229) of Saltern 6 was unproductive, possibly due to small sample size. Samples from the hearth waste associated with this saltern contain abundant fuel ash slag, briquetage, occasional foraminifera and occasional untransformed seeds and charcoal.

Trench 31: Saltern 5

C.2.12 Filtration waste deposits (203, 211, 213) of Saltern 5 differ slightly in content. A sample taken from a borehole deposit 203 contains sparse charcoal only. Deposit 211 contains ostracods, occasional charcoal and untrasformed seeds whereas deposit 213 also contains occasional foraminifera. The samples of hearth waste (212, 214) both contain charcoal. Deposit 212 also contains a charred small flower bud.

Trench 32: Saltern 1

C.2.13 Filtration waste 201 of Saltern 1 contains occasional foraminifera and ostracods. The hearth waste deposits (218, 224, 257, 258) all contain charcoal, abundant untransformed seeds, occasional shells of *Hydrobia* and fuel ash slag. A poorly preserved, indeterminate charred cereal grain was recovered from deposit 258 in addition to a charred seed of cleaver (*Galium* sp.). and an unidentified charred item (comprised of fibrous 'felted' material, 0.8cm x 0.5cm). A charred grass (Poaceae) seed was recovered from deposit 224.

Trench 34: Saltern 4

C.2.14 Filtration waste deposits (202, 235, 236) of Saltern 4 all contain good density and diversity of foraminiferea. Charcoal is sparse as are other remains such as untransformed seeds. The hearth waste deposits (225, 226) both contain abundant charcoal that would be suitable for species identification. 226 also contains abundant fuel ash slag.

Sample No.	Context No.	Trench no.	Feature	Volume processed (L)	Flot Volume (ml)	Charred Seeds	Untransformed Seeds	Molluscs (density/diversity)	Hydrobia sp.	Ostracods	Foraminifera	Estimated charcoal volume	Pottery	Large mammal bones	Fired clay/briquetage	Slag (magnetic)	Slag (fuel ash)
158	206	21	Filtration waste; saltern 8.	16	3	0	#	0	0	0	0	0	0	0	0	0	0
150	205	22	Filtration waste, Saltern 7	18	10	0	#	##/2	+	++	++++	5	0	0	0	0	0
170	223	22	water tank, Saltern 7	16	50	0	#	#/1	0	+	0	0	0	0	0	0	+
171	222	22	water tank, Saltern 7	18	10	0	##	#/1	0	0	0	0	0	0	0	+	0
157	204	27	Hearth waste. saltern 6.	37	90	0	#	#/1	+	0	++	5	0	0	++++	+	+++

Sample No.	Context No.	Trench no.	Feature	Volume processed (L)	Flot Volume (ml)	Charred Seeds	Untransformed Seeds	Molluscs (density/diversity)	Hydrobia sp.	Ostracods	Foraminifera	Estimated charcoal volume	Pottery	Large mammal bones	Fired clay/briquetage	Slag (magnetic)	Slag (fuel ash)
159	229	27	Filtration waste Saltern 6.	1	<1	0	0	0	0	0	0	0	0	0	0	0	+
151	213	31	Filtration waste, Saltern 5	16	15	0	##	0	+	+	+	<1	0	0	+	0	0
152	212	31	Hearth waste, Saltern 5	18	100	0	###	#/1	0	0	0	20	#	0	++	+	0
153	211	31	Filtration waste, Saltern 5	17	100	0	###	#/2	0	++	0	2	0	0	0	0	0
154	218	31	Hearth waste, Saltern 5	16	80	0	##	#/1	+	+	0	5	0	0	++	+	0
169	203	31	Filtration unit, Saltern 5	1	<1	0	0	0	0	0	0	<1	0	0	0	0	0
155	224	32	Hearth waste; saltern 1.	16	30	0	##	0	+	0	0	25	0	0	+++	0	0
156	201	32	Filtration waste; saltern 1.	18	5	0	#	0	0	+	+	<1	0	0	0	0	0
166	257	32	Hearth waste, Saltern 1	8	20	#F	##	#/2	+	0	0	7	#	0	0	0	+
167	258	32	Hearth waste, Saltern 1	9	45	#	####	#/1	+	0	0	5	#	0	0	0	0
168	224	32	Hearth waste, Saltern 1	8	20	#	#	0	0	0	+	<1	0	0	0	+	+
160	225	34	Hearth waste; saltern 4.	18	100	0	#	#/1	0	0	0	130	#	#	++	+	0
161	226	34	Hearth waste; saltern 4.	16	110	0	#	#/2	0	0	0	40	0	#	+++	+	+++
162	202	34	filtration waste. Saltern 4.	16	5	0	#	#/1	+	0	+++	<1	0	0	0	0	0
163	235	34	Filtration unit, Saltern 4	3	<1	0	#	0	0	0	++	0	0	0	0	0	0
164	236	34	Filtration unit, Saltern 4	8	2	0	#	0	0	0	0	1	0	0	0	0	+

Table 8: Environmental samples

Discussion

C.2.15 The environmental samples taken during the evaluation of this site indicate that charcoal has been preserved which has the potential for species identification to

indicate fuel type and also for radiocarbon dating (if required). The presence of fuel ash slag could indicate a different fuel choice such as seaweed.

C.2.16 Two charred seeds have been recovered indicating that there is potential for further recovery from future excavations. Untransformed seeds are frequent but their contemporaneity is uncertain.

C.2.17 Foraminifera and ostracods are present and have the potential to provide information on salinity and environmental conditions. Molluscs have low potential in that the burrowing snail is frequent and other land and water snails are scarce.

C.2.18 A monolith sample was taken through the Saltern 5 deposits for future study (if required) and will be retained in the cold room at OAE Bourn.

C.2.19 If further excavation is planned for this area, it is recommended that environmental sampling is carried out in accordance with Historic England guidelines (2011).

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APPENDIX E OASIS REPORT FORM

Project Details

OASIS Number	Oxfordar3-308730
Project Name	Land north of Greenpark Avenue, King's Lynn, Norfolk

Start of Fieldwork	15/3/18	End of Fieldwork	23/3/18
Previous Work	No	Future Work	Yes

Project Reference Codes

Site Code	XNFGAP17	Planning App. No.	Pre-application
HER Number	ENF143325 Topo. Survey ENF143326 trial trenching	Related Numbers	

Prompt	Direction from Local Planning Authority – PPS5
Development Type	School
Place in Planning Process	Pre-application

Techniques used (tick all that apply)

☐	Aerial Photography – interpretation	☐	Grab-sampling	☐	Remote Operated Vehicle Survey
☐	Aerial Photography - new	☐	Gravity-core	☒	Sample Trenches
☐	Annotated Sketch	☐	Laser Scanning	☐	Survey/Recording of Fabric/Structure
☒	Augering	☐	Measured Survey	☐	Targeted Trenches
☐	Dendrochonological Survey	☒	Metal Detectors	☐	Test Pits
☐	Documentary Search	☐	Phosphate Survey	☒	Topographic Survey
☒	Environmental Sampling	☐	Photogrammetric Survey	☐	Vibro-core
☐	Fieldwalking	☐	Photographic Survey	☐	Visual Inspection (Initial Site Visit)
☐	Geophysical Survey	☐	Rectified Photography		

Monument	Period	Object	Period
Salterns	Early Medieval (410 to 1066)	fired clay, slags	Early Medieval (410 to 1066)
Ditches	Post Medieval (1540 to 1901)	Pottery, tobacco pipe, CBM	Post Medieval (1540 to 1901)
	Choose an item.	flint	Late Prehistoric (- 4000 to 43)

Insert more lines as appropriate.

Project Location

County	Norfolk
District	King's Lynn and West Norfolk
Parish	North Lynn
HER office	Norfolk
Size of Study Area	3.8 ha
National Grid Ref	TF 6278 2124

Address (including Postcode)

Land north of Greenpark Avenue, King's Lynn, Norfolk, PE30 2LA

Project Originators

Organisation	OA East
Project Brief Originator	James Albone (NCC/HES)
Project Design Originator	Matthew Brudenell (OA East)
Project Manager	Matthew Brudenell (OA East)
Project Supervisor	Graeme Clarke (OA East)

Project Archives

	Location	ID
Physical Archive (Finds)	Norwich Castle Museum	ENF143325
Digital Archive	OA East	XNFGAP17
Paper Archive	Norwich Castle Museum	ENF143325

Physical Contents	Present?	Digital files associated with Finds	Paperwork associated with Finds
Animal Bones	☒	☒	☒
Ceramics	☒	☒	☒
Environmental	☒	☒	☒
Glass	☐	☐	☐
Human Remains	☐	☐	☐
Industrial	☒	☒	☒
Leather	☐	☐	☐
Metal	☒	☒	☒
Stratigraphic		☐	☐
Survey		☐	☐
Textiles	☐	☐	☐
Wood	☐	☐	☐
Worked Bone	☐	☐	☐
Worked Stone/Lithic	☐	☐	☐
None	☐	☐	☐
Other	☐	☐	☐

Digital Media		Paper Media	
Database	☒	Aerial Photos	☐
GIS	☒	Context Sheets	☒
Geophysics	☐	Correspondence	☐
Images (Digital photos)	☒	Diary	☐
Illustrations (Figures/Plates)	☒	Drawing	☐
Moving Image	☐	Manuscript	☐
Spreadsheets	☐	Map	☐
Survey	☒	Matrices	☐
Text	☐	Microfiche	☐
Virtual Reality	☐	Miscellaneous	☒
		Research/Notes	☒
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		Plans	☒
		Report	☒
		Sections	☒
		Survey	☒

Further Comments

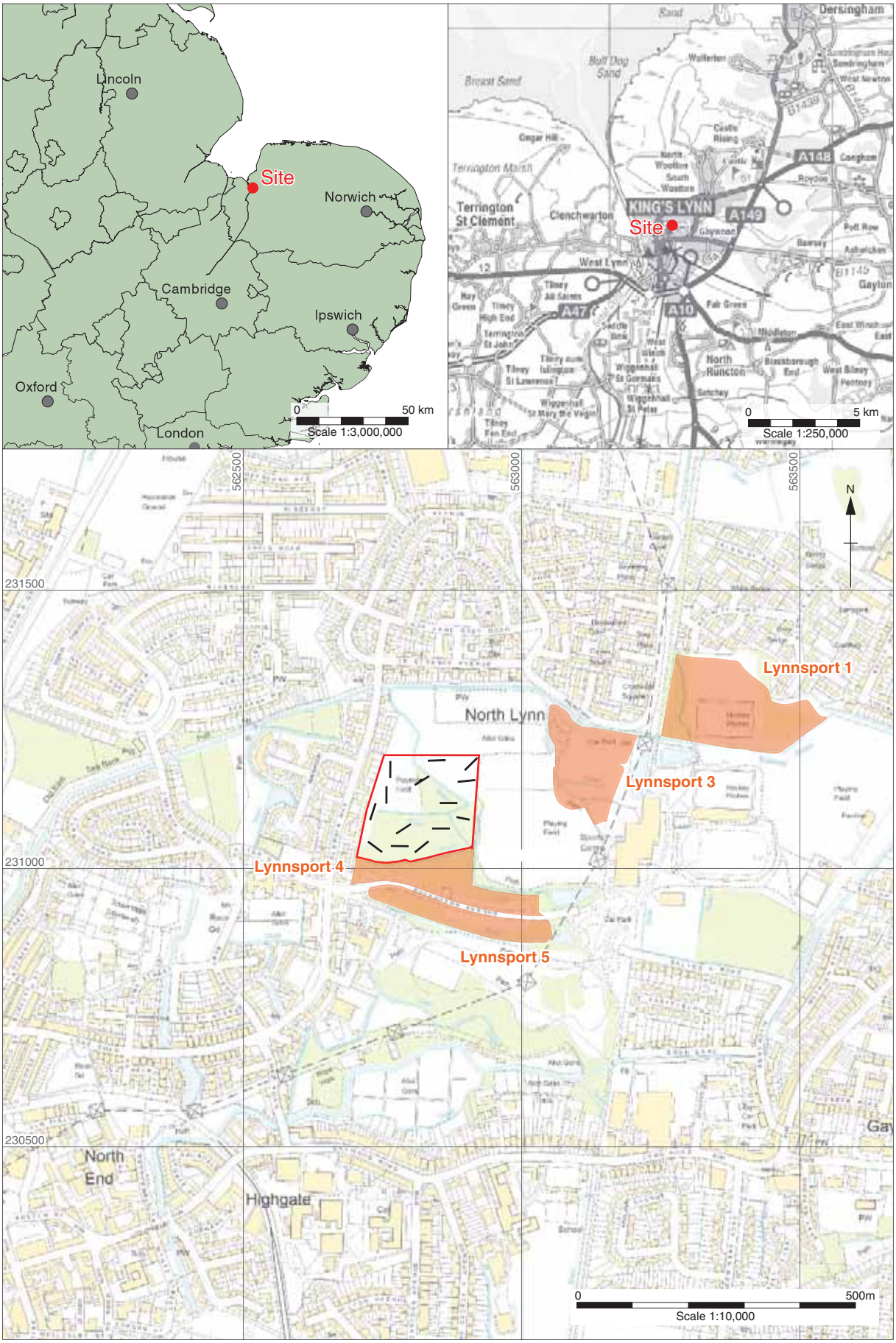


Figure 1: Site location showing archaeological trenches (black) in development area (red) and adjacent Lynnsport sites (orange)

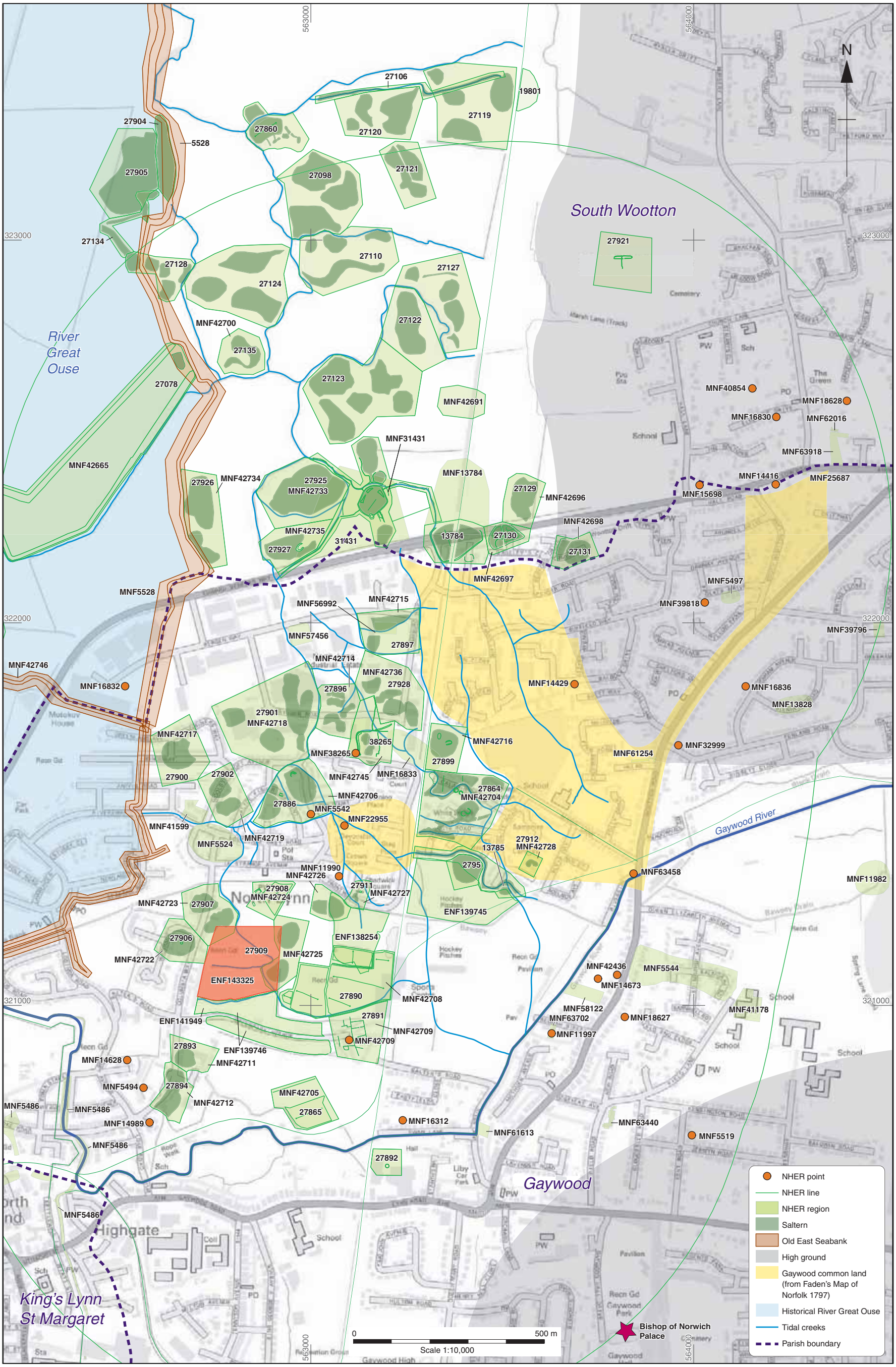


Figure 2: Map showing location of NHER records with NMP data (Copyright Historic England National Mapping Programme, licensed to Norfolk County Council). Sea banks & pre-existing tidal creeks mapped from historic photograph (NHER reference: TF62_TF6321_A_RAF_16Apr1946.tif). Site development areas shown in red.

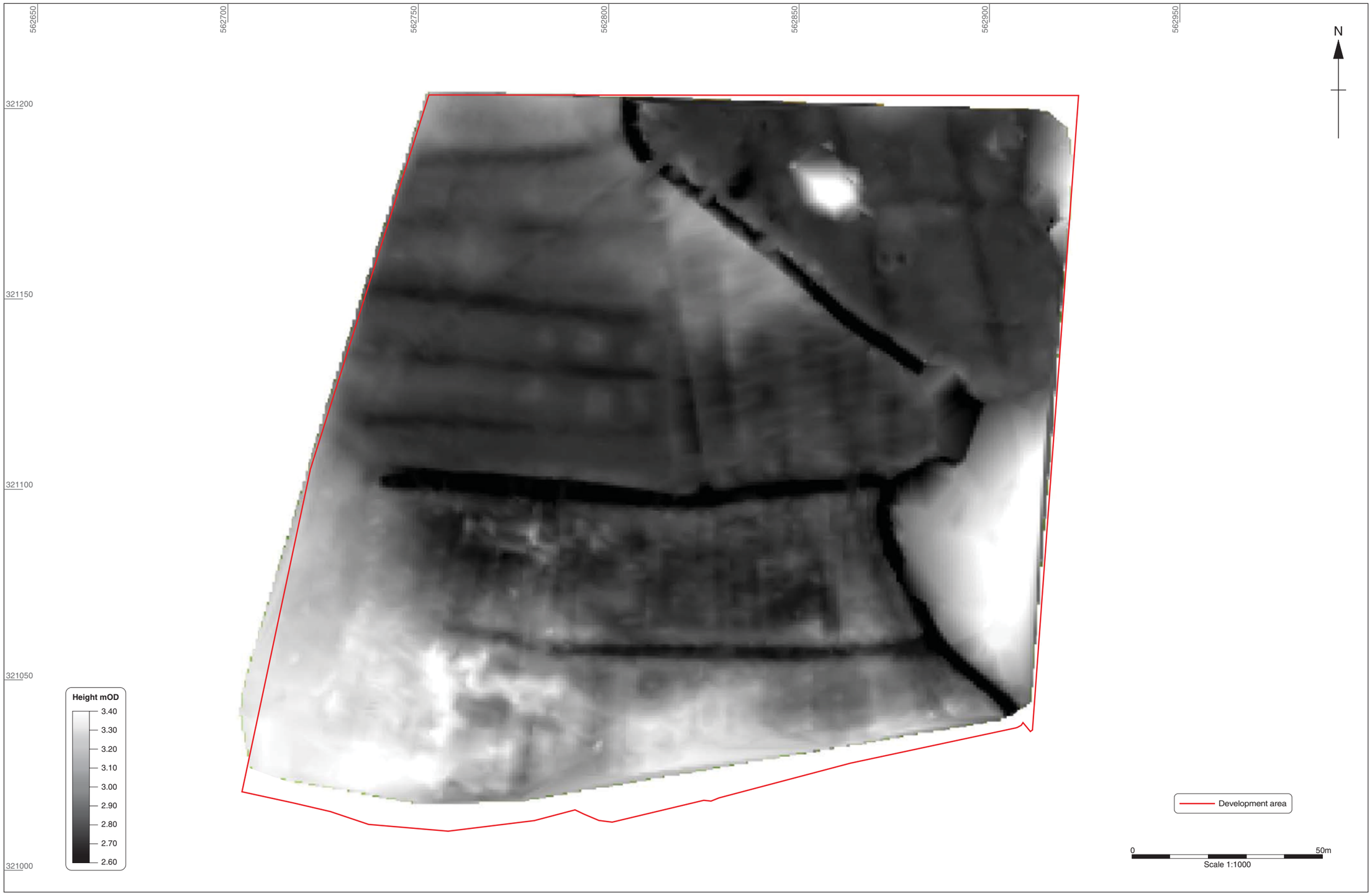


Figure 3: Topographical survey results

Figure 4: Interpretive plan of earthwork survey

Figure 5: Topographical interpretation

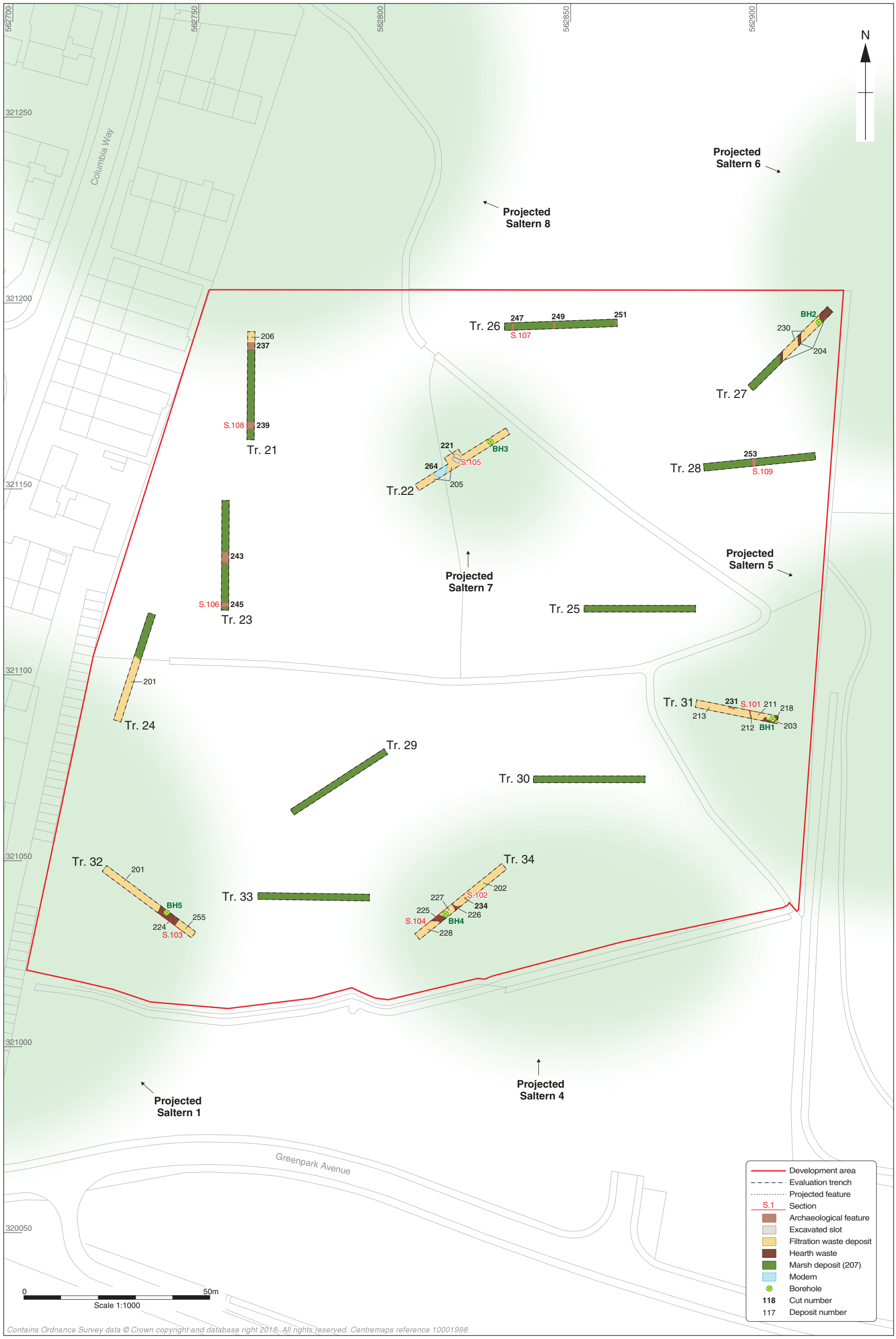


Figure 6: Results of evaluation, showing borehole locations

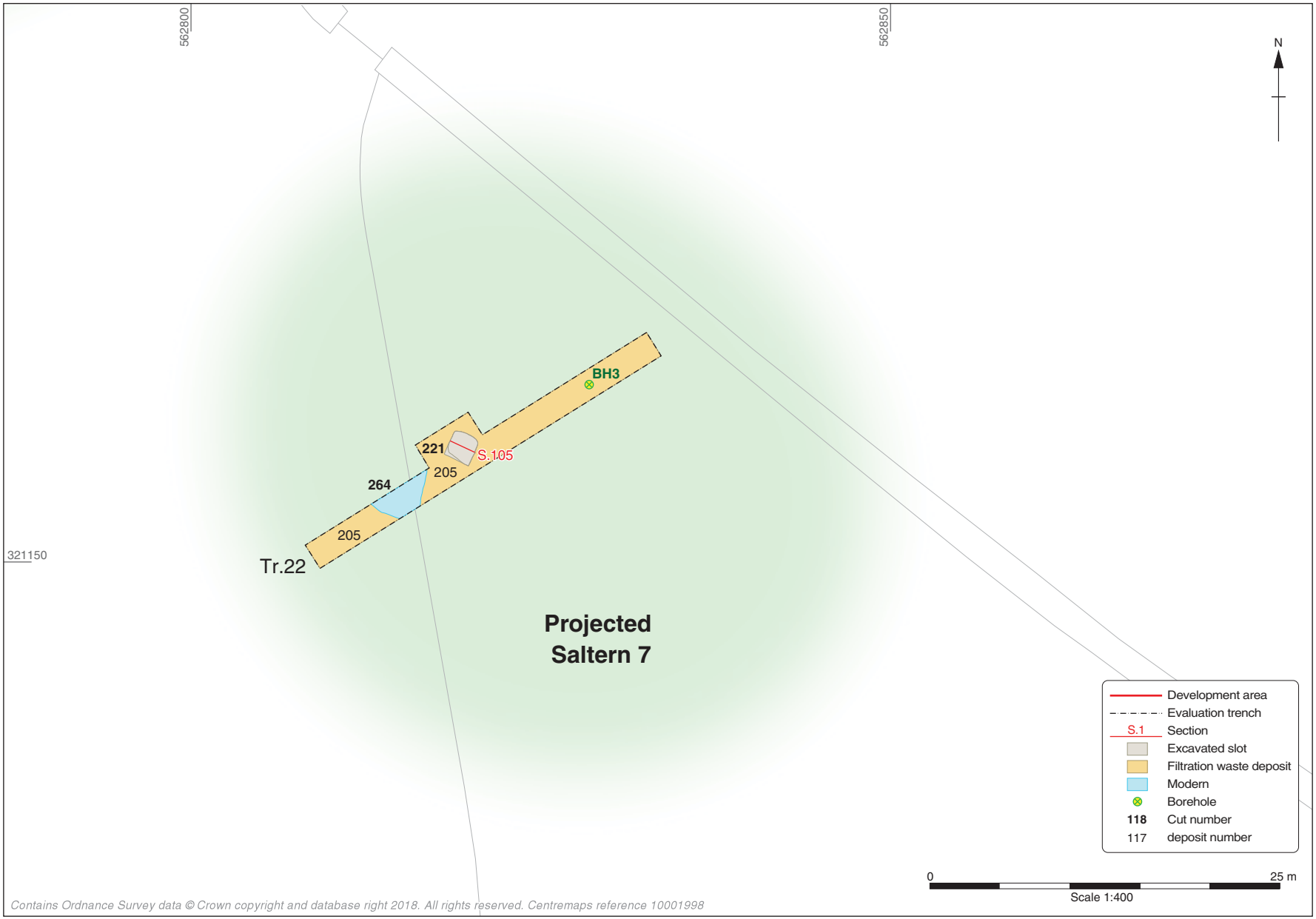


Figure 7: Plan of Saltern 7 remains in Trench 22

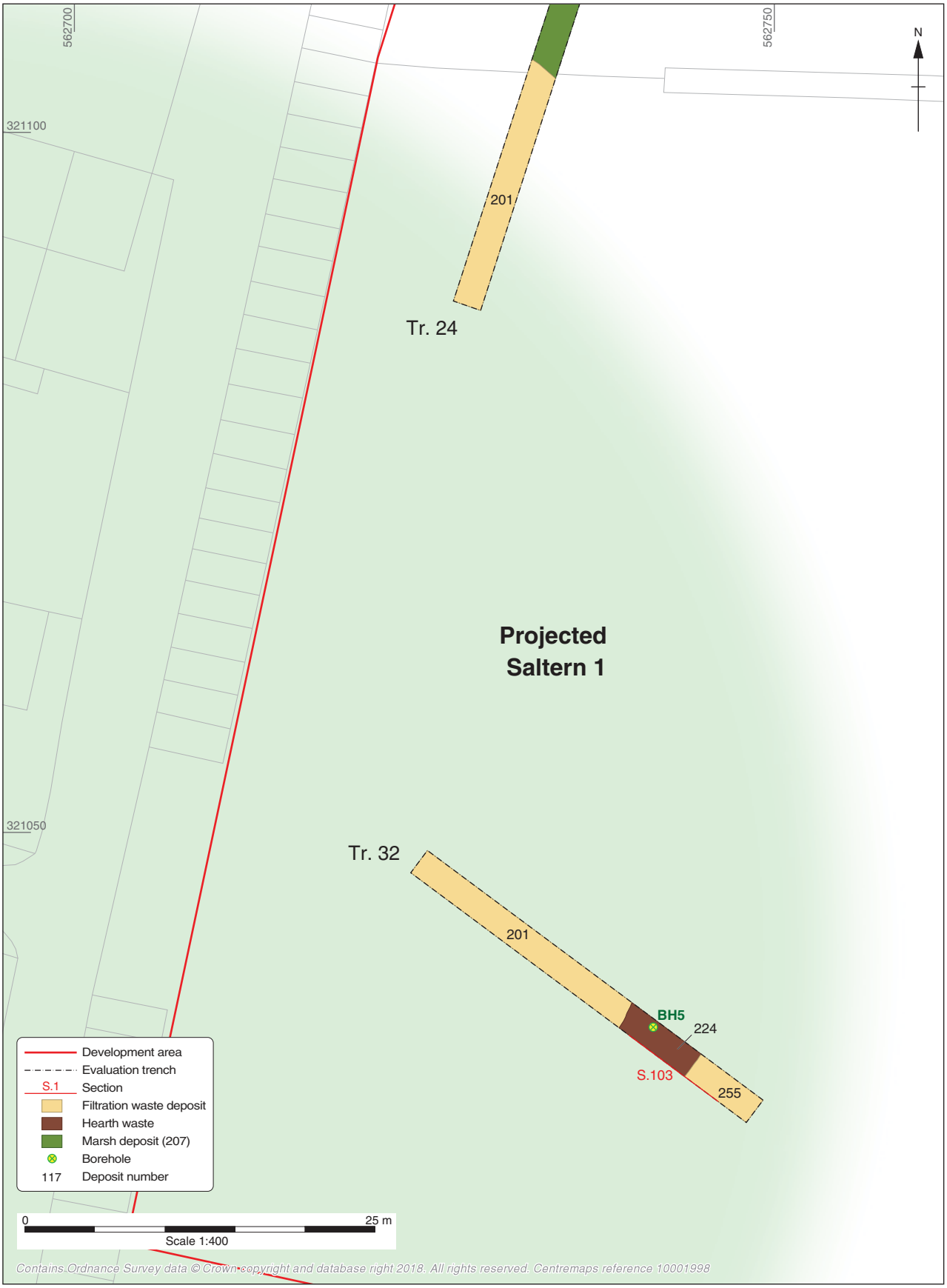


Figure 8: Plan of Saltern 1 remains in Trenches 24 and 32

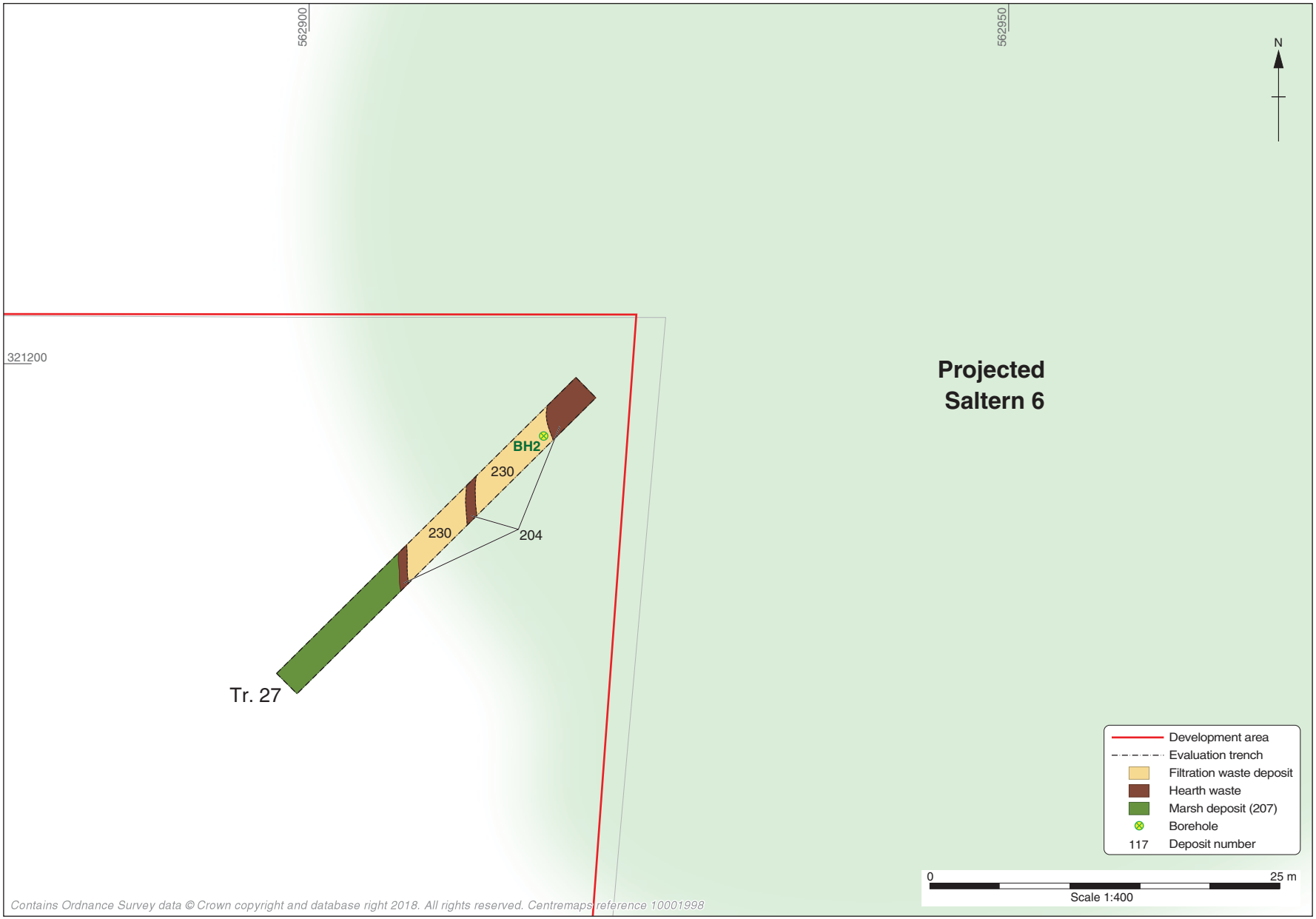


Figure 9: Plan of Saltern 6 remains in Trench 27

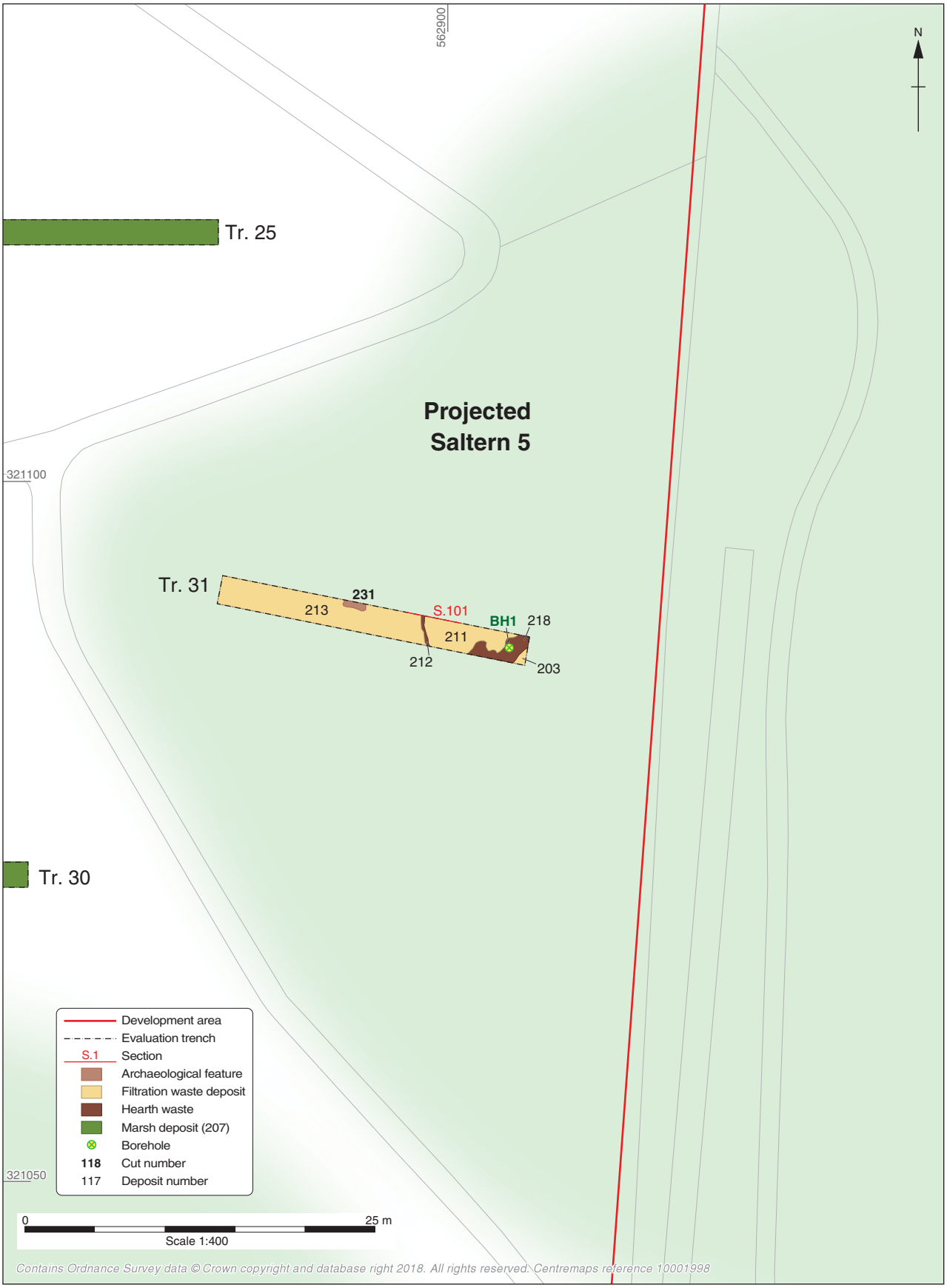


Figure 10: Plan of Saltern 5 remains in Trench 31

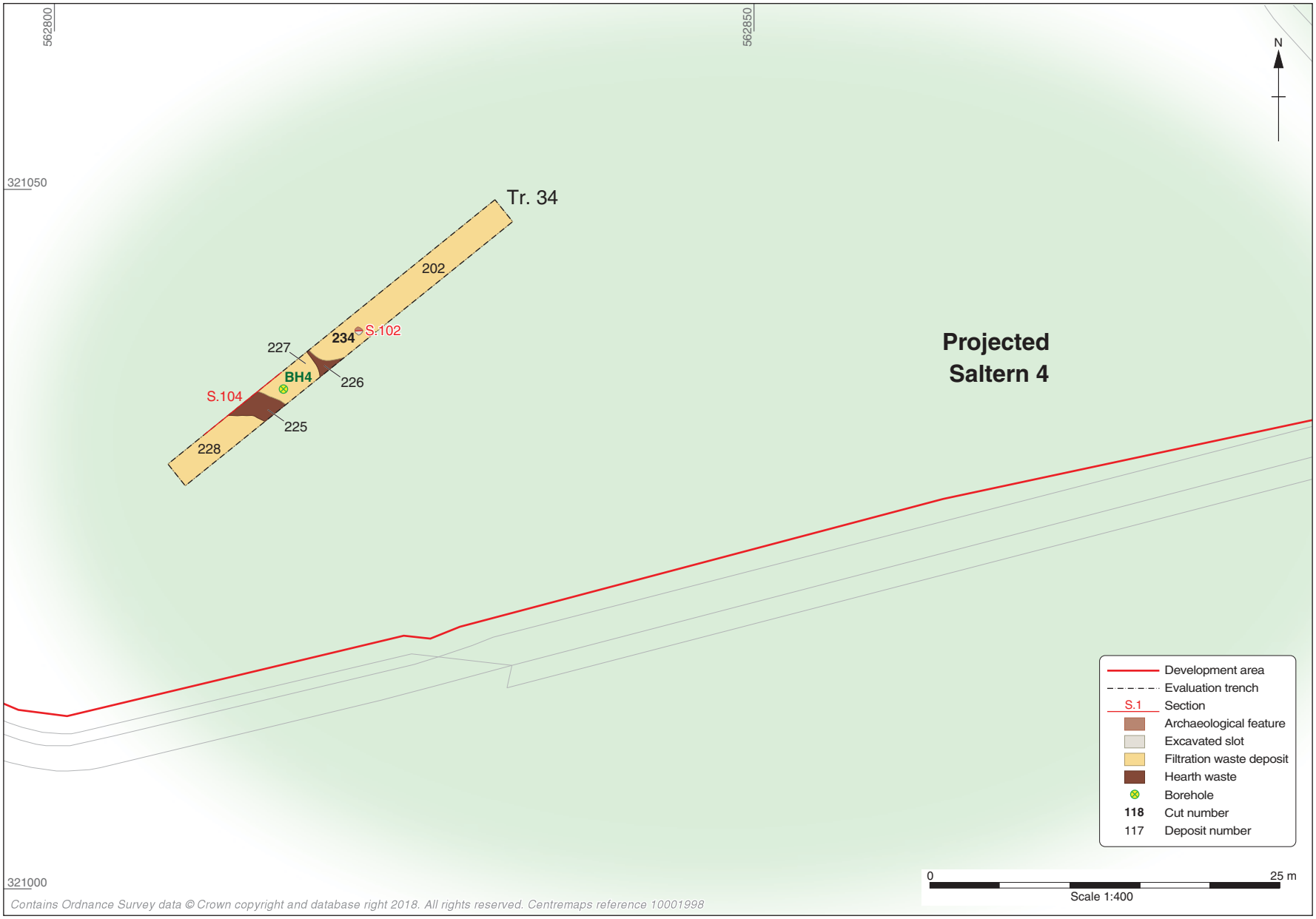
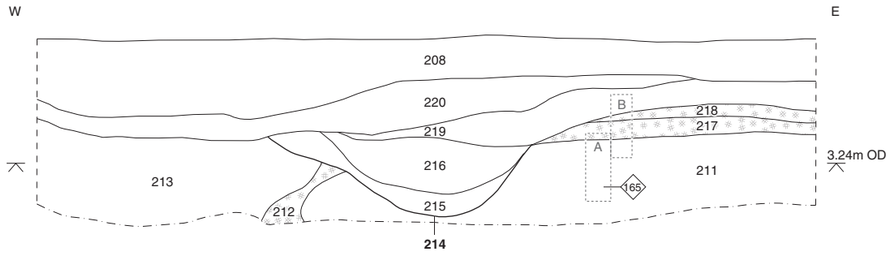
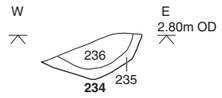


Figure 11: Plan of Saltern 4 remains in Trench 34

Section 101 - *Trench 31*

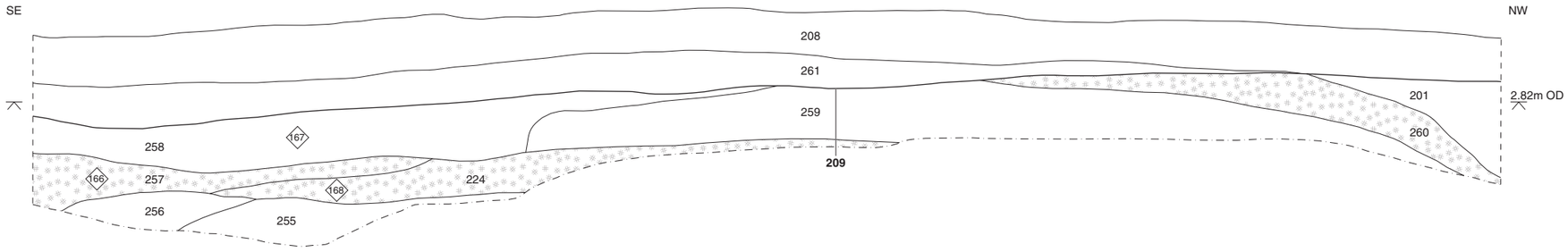


Section 102 - *Trench 34*



Cut
Deposit horizon
Deposit horizon uncertain
Top of surface/natural
Limit of excavation
Limit of section/break in section
Monolith
Brick
Charcoal
118 Cut number
117 Deposit number
18 Sample number
18.45m OD Ordnance datum

Section 103 - *Trench 32*



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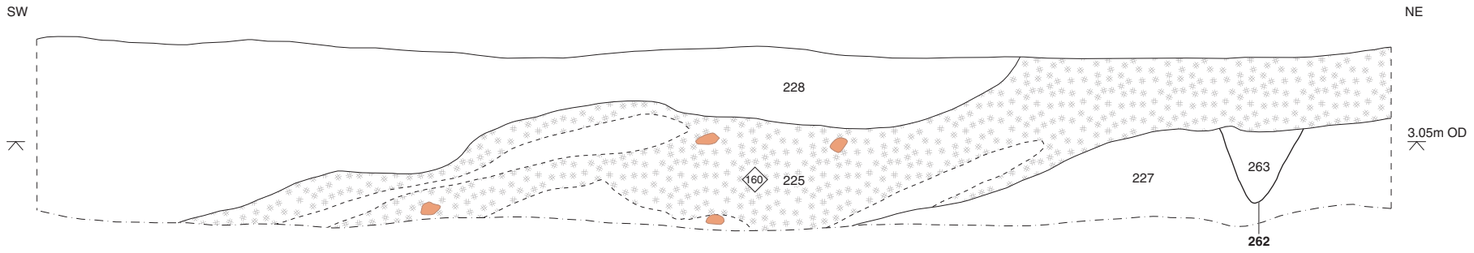
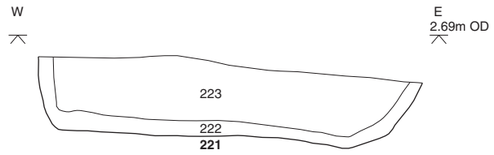
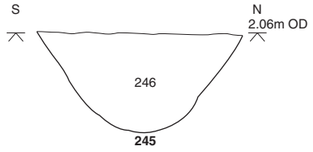


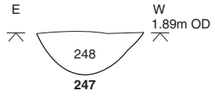
Section 105 - *Trench 22*



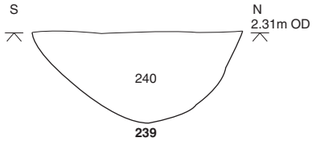
Section 106 - *Trench 23*



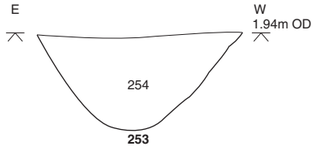
Section 107 - *Trench 26*



Section 108 - *Trench 21*



Section 109 - *Trench 28*



0 1 m
Scale 1:30

Figure 12: Selected sections

Plate 1: Historic aerial photograph with the site outlined in red (NHER reference: TF62_TF6321_A_RAF_16Apr1946.tif)

Plate 2: The site, looking east towards Saltern 5

Plate 3: The site, looking north towards Trenches 21-24

Plate 4: Excavation of Saltern 7 tank **221**, looking south

Plate 5: Tank **221** with clay lining, looking west

Plate 6: Ditch **243** in Trench 23, looking east

Plate 7: Briquetage with vitrified surface, recovered from Saltern 6 (204)

Plate 8: Saltern 5 deposits in Trench 31, looking west

Plate 9: Section 103 of Saltern 1 in Trench 32, looking west

Plate 10: Section 104 of Saltern 4 in Trench 34, looking north

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