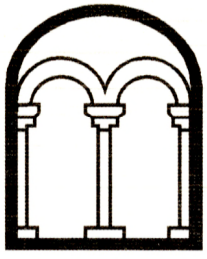
LAND AT 21 SANDY ROAD
EVERTON
BEDFORDSHIRE

FINAL REPORT

Albion
archaeology



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FINAL REPORT

Project: SR2997
Museum accession no.: BEDFM 2018.16
OASIS ref.: albionar1-359459
HER search ref.: 201718/297

Document: 2020/102
Version: 1.2

13th June 2022

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Produced for:
Burgess Homes Ltd

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Preface

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Acknowledgements

The project was commissioned by Burgess Homes Ltd. It was monitored on behalf of the Local Planning Authority by Slawomir Utrata (Central Bedfordshire Council Archaeological Officer).

The fieldwork was undertaken by Lewis Busby and Adam Williams (Archaeological Supervisors) with the assistance of Stefano Costanzo, Petros Fountoukidis, Sebastian Moya Garcia and Jonathan Nilsson (Archaeological Technicians /Assistant Archaeological Supervisors). All finds were processed by Jackie Wells (Finds Officer), and ecofact samples were processed by Arkadiusz Pruchniak (Assistant Archaeological Supervisor). The project was managed by Tori Guy (Project Officer) and Iain Leslie (Project Manager). All Albion projects are under the overall management of Drew Shotliff.

This report has been prepared by Lewis Busby, Tori Guy and Iain Leslie with contributions from Jackie Wells (artefacts), Rebecca Gordon (animal bone), John Giorgi (charred plant remains), Dana Challinor (charcoal), Gregg McIntosh (archaeomagnetic dating) and Joan Lightning (figures).

Version History

Version	*Issue date*	*Reason for re-issue*
1.2	*13/06/2022*	*CBCAO comments*
1.1	*09/11/2021*	*Updated results*
1.0	*15/03/2021*	*n/a*

Key Terms

The following abbreviations are used throughout this report:

CBCAO	Central Bedfordshire Council Archaeological Officer
CI*f*A	Chartered Institute *for* Archaeologists
Client	Burgess Homes Ltd
HER	Central Bedfordshire and Luton Historic Environment Record
LPA	Local Planning Authority
NPPF	National Planning Policy Framework
PDA	Permitted development area

Non-Technical Summary

Planning permission was granted for the redevelopment of land at 21 Sandy Road, Everton, Bedfordshire, SG19 2JU (CB/16/04926/FULL). The redevelopment comprised the refurbishment of no. 21 Sandy Road, 'The Bakehouse', including the demolition of existing barns and the erection of new outbuildings and garage, as well as the erection of an additional seven dwellings with associated access, parking and landscaping.

Archaeological evaluation identified the presence of archaeological remains in the southern part of the permitted development area (PDA), indicating that further archaeological investigation would be required. Albion Archaeology was commissioned to undertake archaeological mitigation works, in accordance with a Written Scheme of Investigation, approved by the CBC Archaeological Officer. This report presents the results of the mitigation works.

The archaeological investigation revealed several phases of activity, ranging in date from the early medieval to the modern periods. The earliest evidence for activity comprised clusters of early medieval storage/refuse pits probably associated with adjacent domestic plots fronting onto Sandy Road. In the late medieval period a holloway and boundary were established; the latter separated domestic plots on Sandy Road from agricultural/industrial areas to the east.

Most significant was the discovery of a late medieval pottery kiln, which showed at least three phases of construction and use. The kiln had been used to produce late medieval reduced ware pottery, for which there is a known industry within Everton during this period.

The kiln had gone out of use by the post-medieval period, at which point further boundaries and refuse pits were created. By the modern period the PDA was utilised for domestic and agricultural buildings.

A summary of the work has been published in the CBA South Midlands annual report; this report will be uploaded onto the OASIS website (ref. no.: albionar1-359459). With the landowner's permission the archive will be deposited with The Higgins Art Gallery & Museum, Bedford under accession number BEDFM 2018.16.

1 INTRODUCTION

1.1 Project Background

Planning permission was granted for the redevelopment of land at 21 Sandy Road, Everton, Bedfordshire, SG19 2JU (CB/16/04926/FULL). The redevelopment comprised the refurbishment of no. 21 Sandy Road, 'The Bakehouse', including the demolition of existing barns and the erection of new outbuildings and garage, as well as the erection of an additional seven dwellings with associated access, parking and landscaping.

Archaeological evaluation, comprising Stage 1 trial trenching (Albion Archaeology 2018) and its associated Stage 2 assessment by the Central Bedfordshire Council Archaeological Officer (CBCAO), identified the presence of archaeological remains in the southern part of the permitted development area (PDA), indicating that further archaeological investigation would be required (Stage 3). Before Stage 3 could be implemented, development on site commenced. The Local Planning Authority (LPA) became aware of the development and subsequently all works on site within the archaeologically sensitive area were ceased.

Albion Archaeology was commissioned to undertake archaeological mitigation works, in accordance with a Written Scheme of Investigation (WSI) (Albion Archaeology 2019) which was approved in advance by the CBCAO.

1.1 Site Location and Description

The PDA lies on the south-east side of Sandy Road opposite its junction with Warden Hill, a housing development dating to the 1960s (Figure 1). A range of modern terraced houses stands at the street frontage to the immediate north-west of the PDA. To the north-east and south-west are detached residential properties and agricultural land lies to the south-east.

The PDA contained a detached 19th-century dwelling, known as "The Bakehouse" (part of which was formerly a bakehouse) and several ancillary timber and brick-built buildings. The majority of the PDA comprised open ground (some of which was used for parking), scrubland and (to the rear) part of an agricultural field. It is centred on grid reference TL 2008 5106. The underlying geology consists of Woburn Sands Formation - Sandstone with no superficial deposits recorded[1].

1.2 Archaeological Background

1.2.1 Introduction

The archaeological and historical background of the site was discussed in detail in a heritage statement (Albion Archaeology 2016), submitted with the planning application. During the preparation of the WSI, updated data was obtained from the Central Bedfordshire and Luton Historic Environment Record (HER) (search no: 201920/081). A brief summary, including the results of the Stage 1 archaeological evaluation, is presented below.

[1] Contains British Geological Survey materials ©NERC [2016]

1.2.2 Archaeological evaluation (Stage 1)

Archaeological evaluation, comprising excavation of five trial trenches took place between 7th and 9th August 2018, with archaeological features present in four of the five trenches (Albion Archaeology 2018). The evaluation revealed features that provided evidence of activity on the site dating from the late medieval to the modern period.

Late medieval remains were identified in the south-west part of the PDA. A large N–S aligned ditch and three pits to its west were sealed by a late medieval soil layer. The recovered pottery and charred plant remains suggested that this activity was domestic in origin. The charred plant remains indicated potential to recover information on diet and aspects of the local arable economy. These remains related to the development of the historical settlement and were thought to be of at least local significance, with some potential to address regional research objectives.

Trenches elsewhere within the PDA contained ditches, pits and structural features representing field boundaries, refuse pits and footings for former street-front buildings and gardens — all dateable to the post-medieval/modern period. These remains were of local significance.

1.2.3 Central Bedfordshire and Luton Historic Environment Record

A number of prehistoric cropmark complexes lie in the vicinity of Everton and the site of a Roman kiln (HER 2002) has been recorded to the south of buildings along Sandy Road. All recorded assets lie at a distance of 200–600m from the PDA. No cropmarks have been recorded adjacent to the PDA.

Everton is at least late Anglo-Saxon in origin, based on the fact that the settlement was recorded as a fairly large estate in the Domesday Survey of 1086, comprising 31 households with a taxable value of 12 geld unit.

A medieval pottery kiln was recorded to the north-west of Church Road (HER 6715, 15671; EBD 709) (Slowikowski 2011). A large quantity of medieval pottery, denoting a further possible medieval pottery production site, was found near the kiln (HER 807). A dense scatter of 15th-century pottery, possibly also associated with pottery production was recovered at Manor Farm, to the south of Potton Road (HER 13768).

An archaeological investigation at 'The Elms' to the south of the PDA (Turner and Wells 2016) revealed medieval boundary ditches and pits that produced a fairly large assemblage of pottery, suggesting a settlement focus nearby. The medieval settlement was focussed on the cross-roads of Tempsford Road, Sandy Road and Potton Road.

Documentary sources mention at least three separate manors in Everton: Everton Manor, Everton Biggin and Everton Mosbury. Everton Mosbury is not mentioned until the late 15th century. Additionally, a scheduled medieval moated site, Storeys Moat, (HER805; NHLE1012300), lies *c.* 500m outside of the village to the north and may have been the manorial seat of Everton Manor. The PDA is located within the southern extent of the historic core of Everton (HER17153), south of the cross-roads.

The parish church of St Mary (HER1041; NHLE1114064; Grade I) lies at the north edge of the village, *c*. 350m north-east of the PDA. It is a 12th-century church with alterations through the 14th, 15th and 17th centuries. The Domesday survey mentions a church at Everton, suggesting there was a pre-existing building on the site.

Two listed buildings are within the vicinity of the PDA. These are the 18th-century house at no. 40 Sandy Road (HER5069; NHLE1114066), *c.* 100m to the south-west, and Manor Farm House (HER5057; NHLE1321654), a 17th-century house, *c.*110m to the north-east.

A number of post-medieval buildings and sites of former buildings have been recorded close to the PDA. Cartographic evidence shows that the PDA was occupied by tightly spaced cottages along the roadside with the present-day dwelling/bakehouse to their rear. Further, now demolished, buildings occupied parts of the rear of the site. The Stage 1 archaeological evaluation confirmed the presence of their surviving foundations.

1.3 Project/Research Objectives

The overall aim of the programme of archaeological works, as stated in the WSI (Albion Archaeology 2019), was to preserve the archaeological remains contained within the site by record and to determine and understand the nature, function and character of the site in its cultural and environmental setting.

The general purpose of the mitigation was to recover information on the:

- location, extent, nature, and date of any archaeological features or deposits that might be present within the PDA;
- integrity and state of preservation of any archaeological features or deposits that might be present within the PDA;
- nature of palaeo-environmental remains to determine local environmental conditions

Specific research objectives of the Stage 3 archaeological mitigation were derived from regional research frameworks (e.g. Brown and Glazebrook 2007; Oake et al. 2007; Medlycott 2011). The specific objectives were as follows:

- To determine the extents and nature of medieval archaeological remains present within the PDA.
- To determine if evidence for the Anglo-Saxon and post-medieval periods was present within the PDA.
- To assess if any heritage assets relating to earlier periods were present within the PDA.

1.4 Methodology

The full methodological approach to the project is detailed in the WSI (Albion Archaeology 2019). The project adhered throughout to the standards set out in the following documents:

Albion Archaeology	*Procedures Manual: Volume 1 Fieldwork* (3rd edn. 2017)
Bedford Borough Council	*Preparing Archaeological Archives for Deposition in Registered Museums in Bedford* (ver. 2.8, 2010)
CI*f*A	*Charter and By-law* (2014); *Code of conduct* (2019)
	Standard and guidance for archaeological excavation (2020) *Standard and guidance for the collection, documentation, conservation and research of archaeological materials* (2020)
Historic England	*Management of Research Projects in Historic Environment. PPN 3: Archaeological Excavation. English heritage Guidelines* (2015) *Management of Research Projects in the Historic Environment (MoRPHE) Project Managers' Guide* (2015)
	Environmental Archaeology: A guide to the theory and practice of methods, from sampling and recovery to post-excavation (2nd edn. 2011)
EAA	*Management of Research Projects in the Historic Environment PPN3: Archaeological Excavation* (Historic England 2015)

An area of *c.* 0.11ha was subject to archaeological open-area excavation. The overburden was removed by a mechanical excavator fitted with a flat-toothed bucket and operated by an experienced driver under archaeological supervision. The investigations were undertaken between 31st July and 17th September 2019.

1.5 Project Archive

With the landowner's permission, the project archive will be deposited with the Higgins Art Gallery & Museum (accession no.: BEDFM 2018.16). Details of the project and its findings will be submitted to the OASIS database (reference no.: albionar1-359459) in accordance with the guidelines issued by Historic England and the Archaeology Data Service.

2 CONTEXTUAL RESULTS

2.1 Introduction

The results of the excavations are presented below. This section presents the contextual evidence, whilst detailed information on the artefacts and ecofacts recovered can be found in Section 3. For ease of analysis and discussion, all features recorded on site were assigned to Sub-groups (indicated by a 'SG' prefix), which were then combined into Groups (indicated by a 'G' prefix). The Groups were assigned to Land-use Areas (indicated by 'L') and then to chronological Phases ('P'). A total of 296 context numbers were recorded and assigned to the hierarchy. Fifteen contexts excavated during the Stage 1 archaeological evaluation were also included in the analysis.

Phase		L	G	Description	No. Contexts
1	Early medieval	1	1	Southern group of pit sequence	16
		1	2	Central group of pit sequence	13
		1	3	Northern group of pit sequence	6
2	Late medieval	2	4	Holloway	2
		3	5	Internal pits	13
		3	6	NNE-SSW aligned boundary ditch	20
		3	6.02	NNE-SSW aligned boundary ditch	4
		3	6.03	NNE-SSW aligned boundary ditch	6
		3	6.04	NNE-SSW aligned boundary ditch	4
		3	6.05	NNE-SSW aligned boundary ditch	3
		3	7	Isolated post holes	6
		4	8	First-phase kiln	13
		4	9	Second-phase kiln	61
		4	10	Stokehole	16
		4	11	Third-phase kiln	28
		4	12	Boundary ditch	11
		4	13	Pit group north of kiln	9
		4	14	Backfill	6
3	Post-medieval	5	15	Land boundary	8
		6	16	Refuse pitting	26
4	Modern	7	17	Modern gullies	6
		7	18	Modern trenches	4
		7	19	Modern pit group	6
		7	20	Modern animal burial	3
		7	21	Modern fence line	10
		7	22	Modern machine-cut trenches	4
5	Overburden	8	23	Overburden, natural soils and rooting	7
Total					**311**

Table 1: Summary of Groups

The results which follow are structured by Phase and discussed by Group and Land-use Area. A plan of all the excavated features can be found on Figure 2, with detailed phase plans on Figures 3–7.

Most fills and deposits on site comprised relatively homogeneous mid-brown sandy silt or silty sand with minor variations, with the exception of those associated with kiln sequence L4. Individual deposits are described below where they differed significantly from this norm.

2.2 Early Medieval (Phase 1)

Evidence for activity in the early medieval period comprised clusters of storage/refuse pits L1 associated with domestic activity.

2.2.1 Pit sequence L1

A series of pits were located in the south-east of the excavation area (Figure 3). The most southerly pit group G1 comprised five pits which were *c*. 0.9m–3m in diameter and 0.5–1.1m deep. A central cluster of four pits G2 were *c*. 0.2–3.5m in diameter and *c*. 0.7–0.9m deep. A final cluster of three pits G3 was located to the north-west; they were *c*. 0.7–2.7m in diameter and *c*. 0.4–1.1m deep.

The fills of the pits were all relatively sterile, consisting of light brown silty sand. They produced *c*. 30g of early medieval pottery along with *c*. 40g of residual Romano-British and Anglo-Saxon pottery and intrusive post-medieval pottery. Stratigraphical relationships suggest they had gone out of use a substantial period of time before any later medieval activity. Most of the pits had vertical or undercutting sides and concave bases; they were potentially used as storage pits, to the rear of early medieval dwellings situated on the road frontage. The fills of G3 produced charred remains of free-threshing wheat, providing evidence of the final stages of crop cleaning and food preparation.

Pits G1 extended beyond the southern limit of the excavation area, where it is presumed they were truncated by modern development. Pit groups G2 and G3 were truncated by later activity and therefore their full extents were not determined.

2.3 Late Medieval (Phase 2)

Phase 2 comprised a holloway L2, a boundary with associated features L3, and a multi-phase kiln with associated features L4. Whilst the features are all firmly dated to the late medieval period, they are not necessarily directly contemporary, with some elements intercutting.

2.3.1 Holloway L2

The holloway (Figures 2 and 4) was aligned NW–SE and ran along the northern limit of the PDA. It survived as a *c*. 0.3m-thick deposit of mottled orange-brown sandy silt within a shallow U-shaped profile, most likely formed from many years of trample. The exposed area of the holloway showed it to be linear in form, with the west, east and north extents lying beyond the limits of the PDA. The surviving extents were *c*. 28m in length by *c*. 10.5m wide. The observed alignment suggests it was perpendicular to the modern Sandy Road, which probably reflects the line of the medieval road. It most likely provided access to the farmland to the rear of any domestic plots. Two trenches were excavated through L2 in order to expose any additional archaeological features that might have survived beneath it (Figure 4); however, none was identified.

Recovered finds comprised *c*. 1.8kg of Late Medieval Reduced Ware (LMRW) pottery sherds, probably deriving from the pottery production immediately to the south (Section 2.3.3).

2.3.2 Boundary and associated features L3

L3 comprised boundary ditches G6.2, G6.3 G6.4 and G6.5, and associated pits G5 and post holes G7 (Figure 2 and 4).

Four NE–SW aligned boundary ditches occupied the central area of the PDA, parallel to modern-day Sandy Road. Their location suggests they were likely to represent the rear boundaries of domestic plots on the road frontage. Ditches G6.3 and G6.4 truncated holloway L2; while ditches G6.2, G6.4 and G6.5 were truncated by later activity. Ditch G6.3 extended the length of the PDA.

Paired ditches G6.3 and G6.4 were parallel; only the north-east extent of G6.4 survived. Ditch G6.3 was *c*. 21m long and G6.4 was *c*. 9.5m long. Both had a similar U-shaped profile and were *c*. 0.7m wide by *c*. 0.25m deep. South-east of ditch G6.3, were short, truncated ditches G6.2 and G6.5. Ditch G6.5 was *c*. 1.3m long, *c*. 0.9m wide and *c*. 0.2m deep. Ditch G6.2 was *c*. 1.8m long, *c*. 0.5m wide and *c*. 0.3m deep. Both only survived in small portions but were presumably originally longer.

Finds recovered from these boundary ditches totalled *c*. 1.2kg (126 sherds) of LMRW pottery. The fills represented natural silting, and comprised brown silty sand, except ditch G6.3 which showed evidence for deliberate backfilling.

Approximately half-way along boundary ditches G6.3 and G6.4 was a sequence of three pits G5. They varied in size: *c*. 0.65–3.5m in diameter and up to *c*. 0.9m deep. All were truncated by the associated boundary ditches, although dating evidence suggests they were broadly contemporary. Pits G5 also included a further pit SG13 in the north-east corner of the site; it was *c*. 2m long, *c* .0.75m wide and *c*. 2m deep.

Further associated features were present in the form of three isolated post holes G7, two of which were within boundary ditches G6.3 and G6.4. The post holes varied in size: *c*. 0.25–0.5m in diameter and up to 0.45m deep. Their location near the boundary ditches may suggest an associated fence line.

2.3.3 Kiln and associated features L4

A large, three-phase kiln and associated features were located at the southern extent of the PDA (Figures 4–6 and 8).

The substantial artefact assemblage indicates that the kiln was used to produce LMRW pottery. A brief overview of the assemblage is presented here but a detailed analysis can be found in Sections 3.1.3 and 3.2. Charcoal and charred plant assemblages show that local resources such as broom and gorse were exploited as kiln fuel and there were modest crop-processing activities taking place within the vicinity of the PDA. A more detailed analysis can be found in Sections 3.7 and 3.6 respectively.

First-phase kiln G8

The earliest phase of the kiln only partially survived due to truncation by later phases. The surviving part was oval in shape, *c*. 2m long, *c*. 1.3m wide and *c*. 0.4m deep. It was aligned N–S, with near-vertical sides and a flat base. The sides and base were lined with compacted sand along with a thin, *c*. 0.05m-thick, lining layer of clay, which reinforced the sand outer. A pit to the south-east was *c*. 1m long, *c*. 0.65m wide and *c*. 0.2m deep; it contained frequent charcoal and may have been associated, potentially representing a stokehole.

Evidence of firing was present within the kiln in the form of a *c*. 0.15m-thick, dark, silty charcoal deposit (Figure 6). Overlying this was another layer of clay, which may indicate reconstruction/repair.

A *c*. 0.35m-thick deposit of sand, mixed with material similar to the kiln lining was present as a backfill. A total *c*. 1.6kg of fired clay was recovered, which may represent remnants of the collapsed kiln superstructure.

Second-phase kiln G9

The second kiln was constructed in the same location as its predecessor but was significantly larger (Figure 5). It was *c*. 4m long, *c*. 3.8m wide and *c*. 1.2m deep. It was aligned broadly E–W, with a contemporary stokehole G10 to the east. It had vertical sides with a *c*. 0.3m-thick outer lining consisting of grey, silty clay, which had been scorched. The lining provided evidence of at least three repairs, by way of layers of dark silt sealed between layers of reconstructed kiln lining.

Internally the kiln consisted of a central pedestal surrounded by the chamber, with a flue at the east end. The flue was *c*. 0.6m long and constructed with compacted clay similar to the other structural components. It had an arched shape which was *c*. 0.8m at its widest, and *c*. 0.5m high. Scorching of the clay lining at the west end of the kiln hints at the presence of a second flue or exhaust vent, although this is perhaps more likely to be associated with the third-phase kiln G11. The chamber, which extended either side of the pedestal, was *c*. 3.2m long, *c*. 0.5m wide and at least *c*. 0.4m deep, although originally it would have extended up and over the pedestal. The chamber allowed hot air to circulate from the flue around the pedestal, in order to fire the pottery.

Evidence for use was also seen in the chambers and flue. Apart from scorching of the clay lining, two charcoal layers separated by layers of clay repair were present in the southern chamber; there was also a shallow charcoal deposit in the base of flue. Evidence for the weathering and potential collapse of the wall of the northern chamber was present in the form of clay deposits overlying charcoal deposits associated with use of the kiln. This likely represents the final event before this kiln was backfilled and the next phase constructed. A red, heat-affected area of natural sand was present beneath the kiln. It measured *c*. 1.9m by *c*. 1.85m and up to *c*. 0.1m thick and represents a natural reaction caused by the repeated firings.

Stokehole G10 at the east end of the kiln truncated pit cluster L1 (Figure 2). It was *c*. 3.8m long, *c*. 3.5m wide and *c*. 0.7m deep (Figure 5). It was aligned E–W, was 'U'-shaped in profile and had steep sides and a base that sloped down towards the west, its deepest point, where it met the flue of the kiln (Figure 6). It would have served as an area to insert fuel into the flue and to rake-out burnt deposits. Two fills of friable, dark grey silt, with large amounts of charcoal, represent rake-out into the stokehole. When the kiln went out of use, the stokehole was deliberately backfilled with a dark grey silt and close to 50kg of LMRW pottery.

Third-phase kiln G11

The third and final phase of kiln construction/use is represented by G11 (Figure 5). The earlier kiln chamber and flue were backfilled with a dark grey silt, containing large amounts of charcoal. A layer of firm light grey-yellow clay sealed the backfilled chamber and created a simple oval shape, similar to the original kiln G8.

A small layer of charcoal on the top of the clay layer represents an episode of firing. Scorching of the clay lining at the western end suggests the flue may have been located here, although not enough of the superstructure survives to confirm this. The kiln was deliberately backfilled with mid- to dark grey silt, which contained *c*. 21kg of LMRW pottery.

To the east of kiln G11 was ditch G12, which was *c*. 5.7m long, *c*. 1.1m wide and *c*. 0.3m deep (Figure 4). It was aligned NNE–SSW and had a 'U'-shaped profile. It was backfilled predominately with LMRW pottery fragments, indicating potential use as some form of soakaway or drain, incorporating pottery waste from the kiln. Three pits G13 to the north of the kiln also contained large amounts of pottery (*c*. 14kg); their function is not known, but their contemporaneity with the pottery kiln is clear.

After activity associated with the kiln ceased, the area was overlain with a single layer of loose, light grey-brown, silty sand G14. It was *c*. 7.8m long, *c*. 3.25m wide and *c*. 0.2–0.4m thick. It is not clear whether this material represents an anthropogenic or a natural accumulation. It contained *c*. 49kg of LMRW pottery and only *c*. 165g of post-medieval pottery, suggesting it formed shortly after the kiln went out of use.

2.4 Post-Medieval (Phase 3)

2.4.1 Boundary L5

Two parallel boundary ditches, both *c*. 15m long, extended beyond the southern limit of the PDA (Figures 2 and 7). Each one was *c*. 1.2m wide and *c*. 0.2–0.35m deep. They were *c*. 2.5m apart, aligned NE–SW, and followed the alignment of earlier boundary ditches L3 (Phase 2). Artefacts recovered from the ditches included peg tile, Victorian glass vessel fragments, and a small amount of animal bone. In addition, *c*. 3.4kg of residual LMRW pottery was recovered.

2.4.2 Refuse pits L6

An area of post-medieval pitting covered a *c*. 17 x 15m area to the west of the site (Figures 2 and 7). The pits were irregular in shape and contained dark brown, sandy silt. Surface finds comprised animal bone, glasswork, ceramic building material and pottery (not retained) dating to the post-medieval period. A sole fragment of stoneware was recovered for dating confirmation but was not retained. These features represent refuse pitting and disturbance; their location to the west of boundaries L5 suggests they were located within domestic plots fronting onto Sandy Road.

2.5 Modern and Overburden (Phases 4 and 5)

Evidence for modern activity was mostly located at the north end of the PDA. It consisted of two modern gullies and pitting, along with machine-cut trenches, a fence line and an isolated animal burial.

Modern development in the form of the construction of a soak away and haul road had commenced within the PDA before the archaeological investigation commenced. This work had reduced the ground level below the level of archaeological survival in the north part and a portion of the west part of the site.

The overburden consisted of *c.* 0.2m of friable, dark grey, silt topsoil, overlying *c.* 0.1m of loose, grey-brown, sandy subsoil. It was consistent across the PDA with the exception of areas subject to modern intrusion, including the trial trenches and the modern housing development.

3 ARTEFACTS AND ECOFACTS

3.1 Pottery

3.1.1 Introduction

The assemblage totals 10,276 sherds (187kg), of which Everton-type late medieval reduced ware (LMRW) kiln products (Bedfordshire Ceramic Type Series fabric E01A) constitute 97% by both sherd count and weight, the majority associated with the deliberate backfilling of the Phase 2 kilns (Table 2). The remainder of the assemblage comprises a small group of pre-medieval, early medieval, post-medieval and modern wares. Methodology and fabric types are detailed in Appendix 1. Wares and forms are common and well-represented from published excavations across the county.

Phase	Total sherds	E01A sherds (%)	Total wt. (g)	E01A sherds (%)
1	17	8 (0.1)	162	90 (0.2)
2	10,033	9,725 (97.9)	181,987	177,250 (97.7)
3	181	180 (1.8)	3,537	3,468 (1.7)
4	19	9 (0.1)	375	63 (0.1)
5	14	14 (0.1)	322	322 (0.3)
Total	**10,264**	**9,936 (100.0)**	**186,383**	**181,193 (100.0)**

Table 2: Pottery quantification by Phase

3.1.2 Early medieval (Phase 1)

L1 pit clusters G1–G3 yielded 17 multi-phase sherds (162g), most associated with central cluster G2. Pottery datable to the 12th–13th centuries (31g) comprises five sand-tempered body sherds and a shelly ware jug rim, all highly abraded. Residual wares (41g) are single sherds of Roman greyware, early to mid-Anglo-Saxon sandy ware, and late Anglo-Saxon shell-tempered St Neots-type ware, the latter a jar rim of 'top-hat' form. Eight late medieval reduced ware body sherds (90g) are considered intrusive.

3.1.3 Late medieval (Phase 2)

Phase 2 features yielded 10,033 sherds (182kg), the majority associated with the construction, use and infilling of L4 kilns and associated features, and comprising Everton-type LMRW (Section 3.2). Table 3 quantifies the L4 assemblage by sherd count and weight, and details the percentage of wasters per Group.

Group	Description	Sherd	Wt. (g)	% waster
G8	First-phase kiln	78	1,316	-
G9	Second-phase kiln	727	28,825	12.6
G10	Stokehole	2,003	49,641	9.9
G11	Third-phase kiln and backfill	1,233	20,836	3.2
G12	Pottery dump in soakaway	1,130	11,127	7.2
G13	Refuse pits and associated pottery dump	1,403	14,265	0.6
G14	Layer	2,978	49,332	7.3
Total		**9,552**	**175,342**	**-**

Table 3: L4 Pottery quantification and percentage of wasters by Group

Residual 12th–13th-century wares total 287 sherds (4.1kg), representing a minimum of 103 vessels. With the exception of a single sherd from L3 post hole G7, they

derive entirely from L4 deposits. Early medieval pottery comprises a range of hand-built and wheel-thrown, undecorated, sand-tempered wares (fabrics C01, C04, C05, C59A, C71), likely to be of local manufacture, although no specific kiln sites are known. Five contemporary shelly sherds (B07) known to derive from production centres on the Beds./Bucks./Northants. borders also occur. Vessel forms are six rectangular rimmed bowls, four jugs with plain strap handles, and a single jar. Although most vessels are well-fragmented and weigh less than 100g, notable exceptions are two sand-tempered examples represented respectively by 113 sherds (1.2kg) and 38 sherds (551g), occurring in the fill of L4 soakaway G12.

Sixteen late medieval oxidised sandy body and knife-trimmed flat base sherds (E02: 545g) derived from L3 boundary ditch G6.2 and L4 kiln deposits G10–G12. These wares represent products of a potting tradition distinct from oxidised LMRW pottery sherds and probably derive from kilns in Northamptonshire or Buckinghamshire (Johnston et al. 1997; Farley and Lawson 1990). A 15th–16th-century German stoneware sherd (4g) from a drinking vessel (P23) and four 17th-century glazed red earthenware sherds (P01/P03: 179g) were collected from features associated with the final phase G11 and backfilling G14 of kiln G8.

3.1.4 Post-medieval (Phase 3)

Boundary L5 contained 180 LMRW sherds (3.4kg) considered to be residual. Forms are seven bowls, three jars and thirteen jugs, the latter mainly represented by plain strap handles. A cracked body sherd, classifiable as a usable second also occurred.

An 18th–19th-century brown stoneware bowl rim, weighing 69g (not retained) was the sole ceramic find from refuse pits L6.

3.1.5 Modern and overburden (Phases 4 and 5)

Modern features associated with activity L7 (Phase 4) yielded 19 sherds (375g), mainly comprising mass-produced white earthenwares and white salt-glazed stonewares of 19th-century and later date. Forms include ubiquitous Blue Willow pattern flatwares and a stoneware preserve pot. None were retained. Nine late medieval reduced ware body sherds (63g) and a sherd of contemporary oxidised ware (14g) are considered residual.

A further 14 LMRW body sherds (322g) derived from Phase 5 overburden L8.

3.2 Everton-type Late Medieval Reduced Ware

3.2.1 Introduction

The assemblage comprises 9,936 sand-tempered sherds (181.2kg) in the late medieval reduced ware tradition, representing products of a regional 14th–16-century rural potting industry within the south-east Midlands. The ware has a localised but prolific distribution, and is recovered from most late medieval consumption sites in the area. First recognised and described by Moorhouse (1974), production sites are known in Bedfordshire (Everton, Flitwick, Heath and Reach, Riseley), Northamptonshire (Higham Ferrers) and Buckinghamshire (Great Brickhill).

Within Everton, episodes of fieldwalking (principally Hassall 1976: EV75) and excavation have yielded various LMRW assemblages (Section 1.2.3) and kiln products (EK92) have been the subject of two studies (Hall 1993; Slowikowski

2011). Everton-type LMRW is represented on consumption sites across Bedfordshire and also known in Cambridgeshire, particularly in the south and west of the county (Spoerry 2016, 264).

3.2.2 Fabric

Macroscopically, the kiln assemblage primarily comprises a reduced, grey, quartz sand-tempered fabric (Hall's Fabric Group C 1993, 24) with subtle variations in vesicularity resulting from the burning or leaching-out of coarse calcareous inclusions (0.5–2mm). Other inclusions are rounded to sub-rounded quartz (0.3–0.5mm), occasional red or black iron ore (0.1–0.4mm) and a background of very fine mica, particularly visible on the surfaces (Slowikowski 2011, 14). Most sherds from the PDA are not vesicular, with examples of extreme vesicular appearance totalling less than 5% of the assemblage.

All fabric groups contain quartz sand, likely to derive from the Woburn Sands that outcrop in the vicinity of Everton, Sandy, Potton and Gamlingay (Vince 2011, 18). Local Greensand and Oxford clay deposits are also principal fabric components (Slowikowski 2011, 61).

3.2.3 Surface appearance

The majority of the assemblage is evenly and uniformly reduced to a dark grey colour, a typically desirable attribute of late medieval pottery from southern England (Vince 2005, 234). Only 4% by sherd count (12% by weight) comprises oxidised or partially oxidised pottery, indicating stringently controlled firing conditions and technically competent potters. While unintentionally oxidised vessels would have been serviceable as seconds, approximately 10% of the oxidised sherds have other defects identifying them as wasters.

3.2.4 Forms

Diagnostic forms total 14% of the assemblage by sherd count: ordered by prevalence they comprise a range of bowls, jugs, jars, cisterns and pipkins (Table 4). Vessels are wheel-thrown and competently made, although variable finish and surface colours indicate a range of firing conditions. The uniformity of fabric and form, and absence of sooting or other indicators of use, indicate the LMRW assemblage from the PDA represents production waste. Fragmentation is highly variable, with individual sherd weights ranging from 2–825g, the latter a base from a large bowl.

Form	No. sherd	% sherd	Wt. (g)	% wt.	MSW[2]
Bowl	720	53.1	26,388	53.4	36.6
Cistern	50	3.7	3,632	7.3	72.6
Jar	268	19.7	8,608	17.4	32.1
Jug	312	23.0	10,372	21.0	33.2
Pipkin	7	0.5	435	0.9	62.1
Total	**1,357**	**100**	**49,435**	**100**	**-**

Table 4: LMRW Vessel forms

The relative proportions of forms conform well to the established late medieval pattern, with ceramic bowls replacing the wooden examples common to early medieval assemblages, and a decline in the previously dominant ceramic jars/cooking pots, as they were replaced by increasingly affordable metal cooking vessels.

[2] **MSW** – mean sherd weight

Bowls

Bowls are 'open' forms which cover a wide variety of shape and size, and comprise over half of the assemblage by both sherd count and weight (Table 4). They have a broad range of diameters and depths; generally large and either flared or straight-sided, with everted rectangular or squared rims (see below) and bases often knife-trimmed to thin down the angles. Most rim diameters typically range from 381–440mm, with fewer examples spanning 181–380mm and 441–500mm, and several large bowls in excess of 500mm (*Table 5*), the latter termed Pans or Pancheons (MPRG 1998, 5.1.3).

Jugs

Jugs are mainly identified either from rims or handles, and total 23% of the assemblage, by sherd count (33% by weight). Rims range from 80–220mm in diameter, with peaks between 121–140mm and 161–180mm, and an outlier at 241–260mm (*Table 5*). Rims are upright, rounded or squared (see below), with simple spouts formed by pinching or pulling clay away from the rim. Throwing marks are often visible on both internal and external surfaces. Strap handles are dominant, although a few rod handles occur: some come directly off the rim, while others are attached at the neck. They are either applied or plugged into the vessel body. Bases are sagging or flat. Most examples are unglazed, although occasional glaze traces were recorded around the neck or shoulder, and it is apparent that glazed jugs did not form a significant part of the potter's repertoire.

Jars

Jars total 20% of the assemblage by sherd count (17% by weight) and occur in varying sizes, suggesting a range of functions, including cooking pots and storage-type vessels. Rims typically measure 121–280mm in diameter, peaking at 221–240mm, and with a few outliers at 281–360mm (Table 5). Jars are rounded, with slack shouldered and slightly sagging bases. Rims are generally everted, either simple or squared, or have neckless thickened right-angled rims (see below).

Other forms

In addition to the ubiquitous bowls, jugs and jars, other forms total approximately 4% of the assemblage and comprise cisterns and pipkins. As cisterns were identified principally by the presence of the characteristic bung hole near the base, and pipkins solely from their handles, it is possible that both are under-represented in the assemblage, as some of the jar rims may have derived from these forms. One definite cistern rim has a diameter of 260mm, and fits well within the typical range for jars. Similarly, some of the handles attributed to jugs could conceivably have derived from cisterns. Dripping pans and curfews, recorded in the EK92 assemblage (Hall 1993, 14) are absent.

	Bowl		Jar		Jug	
Rim diameter (mm)	**No. Sherd**	**%**	**No. Sherd**	**%**	**No. Sherd**	**%**
80-100	-	-	-	-	15	11.7
101-120	-	-	-	-	20	15.6
121-140	-	-	4	2.2	32	24.8
141-160	-	-	10	5.5	14	10.8
161-180	-	-	30	16.8	28	21.7
181-200	1	0.4	2	1.1	16	12.4
201-220	3	1.2	32	17.9	3	2.3
221-240	5	1.9	44	24.7	-	-
241-260	6	2.4	34	18.9	1	0.7

	Bowl		Jar		Jug	
Rim diameter (mm)	**No. Sherd**	**%**	**No. Sherd**	**%**	**No. Sherd**	**%**
261-280	7	2.7	16	8.9	-	-
281-300	5	1.9	2	1.1	-	-
301-320	4	1.6	3	1.7	-	-
321-340	10	3.9	1	0.6	-	-
341-360	12	4.8	1	0.6	-	-
361-380	10	3.9	-	-	-	-
381-400	29	11.4	-	-	-	-
401-420	26	10.2	-	-	-	-
421-440	51	19.9	-	-	-	-
441-460	23	9.0	-	-	-	-
461-480	19	7.5	-	-	-	-
481-500	15	5.9	-	-	-	-
>500	29	11.4	-	-	-	-
Total	**255**	**100**	**179**	**100**	**129**	**100**

Table 5: Rim diameters of major forms expressed by sherd count and percentage

3.2.5 Vessel components

Excluding body sherds, which are most numerous by sherd count and weight, vessel parts ordered by prevalence are rims, bases, handles, bung holes and spouts (*Table 6*). For consistency, rim profiles and handles have been classified in accordance with those identified by Slowikowski (2011, tables 9–12).

Vessel part	No. sherd	% sherd	Wt. (g)	% wt.
Base	706	7.1	29,912	17.0
Body sherd	7,756	78.4	97,401	55.3
Bung hole	49	0.5	3,533	2.0
Handle	162	1.6	7,267	4.1
Rim	1,212	12.3	37,840	21.5
Spout	5	0.1	63	0.1
Total	**9,890**	**100**	**176,016**	**100**

Table 6: LMRW vessel components

Rims

A range of fairly simple, functional vessel rims was identified, characteristic of the later medieval period when pottery was manufactured at speed and in large quantities. Most rims, although not all, are exclusive to a specific vessel form. The fairly restricted range and variety of rims suggest the vessels may be the work of a single potter. Bowl rims are mostly everted rectangular forms, principally R18 and its variant with a slight internal ledge, which total 90% of the assemblage by sherd count. A few examples with simple upright, slightly thickened rims (R23) occur (*Table 7*). Jar rims are generally everted, either simple or squared, or have neckless thickened right-angled rims. Dominant forms are R6 (27%), R31 (19%) and R36 (31%: *Table 8*). Jug rims are upright, rounded or squared, principally R62, which totals 82% of the assemblage (*Table 9*).

Bowl rim form	% sherd
R2	0.8
R5	0.2
R7	0.2
R8	0.2
R10	0.2
R16	0.9
R18 (and variants)	90.0
R20	0.2

Bowl rim form	% sherd
R23	0.9
R24	5.8
R35	0.3
R100	0.3
Total	**100**

Table 7: Bowl rim profiles by percentage sherd count

Jar rim form	% sherd
R5	0.5
R6	27.1
R13	0.5
R14	2.1
R15	0.5
R17	0.5
R29	1.0
R30	6.6
R31	18.6
R32	1.6
R36	31.3
R37	1.6
R45	2.1
R71	5.5
R91	0.5
Total	**100**

Table 8: Jar rim profiles by percentage sherd count

Jug rim form	% sherd
R4	1.8
R5	3.5
R12	0.9
R22	0.9
R50	0.9
R62	82.2
R77	8.0
R78	1.8
Total	**100**

Table 9: Jug rim profiles by percentage sherd count

Bases

Bases are mainly flat or sagging, with only six intermittently thumbed examples, and a single frilled base. Seven percent are knife-trimmed to thin down the angles, many bases showing wipe marks where the clay has been smoothed after trimming. Diameters were recorded where possible, although accuracy is a problem, given that sagging bases do not sit flat. Diameters span a wide range, peaking at 161–180mm and 201–260mm (Table 10). The absence of profiles made it difficult to determine the form of the vessels from which many bases derived, although where this could be observed, there seemed to be no correlation between base type and form.

Base diameter (mm)	No. sherd	%
80–100	1	1.1
101–120	1	1.1
121–140	2	2.2
141–160	6	6.4
161–180	12	12.9
181–200	8	8.6

Base diameter (mm)	No. sherd	%
201–220	13	13.9
221–240	17	18.2
241–260	13	13.9
261–280	4	4.4
281–300	7	7.5
301–320	1	1.1
321–340	3	3.2
341–360	4	4.4
>360	1	1.1
Total	**93**	**100**

Table 10: Base diameters by sherd count and percentage

Handles

A total of 143 strap and 19 rod handles was collected. Strap handles are mainly plain and occur in a number of forms (H1–H5, H7, H8, H14, H22, H27, H29), with type H2 best-represented. Widths range from 30–46mm, with two particularly wide examples in excess of 50mm. Rod handles (forms H6 and H18) range in diameter from 16–27mm. Most are plain, although slashed and stabbed examples occur (two of each). Handles are applied simply to the vessels, pressed onto the body and secured by thumbing on the exterior, with corresponding finger marks on the interior. A few examples are plugged into the vessel body. Some come directly off the rim, while others are attached at the neck. Scars are visible on several body sherds, indicating where handles have become detached.

Handles exhibit three basic functional and decorative finishing treatments (*Table 11*). Functional thumbing at the junction of the handle and body comprises large, smeared impressions smoothing the handle clay over the body to create a better join, while decorative thumbing occurs on the surface and sides of the handle. Knife-slashing and less commonly stabbing serve to open the clay to allow even drying and prevent cracking during firing, in addition to their decorative capacity.

Bung holes

Bung holes represent the most characteristic and defining part of a cistern. The circular bung hole is pushed though from the inside, leaving a raised lip on the vessel's exterior, the edge of which is knife-trimmed. Applied roundels of either squared or rounded profile are thumbed (41 examples) or plain (eight examples). Thumb impressions number between six and eleven, and range in execution from clumsy to precise. Bung hole diameters measure 20–23mm, corresponding with examples recovered from the EK92 kiln (Slowikowski 2011, 41), and were presumably standardised to accommodate a wooden spigot.

3.2.6 Modification and use

A single body sherd has been chipped around the edges to form an oval lid *c.*100 x 96mm. A few broken body sherds may have been shaped to function as purpose-made potters' tools (cf. Slowikowski 2011, 66, figs. 52 and 53), although identifications remain speculative.

3.2.7 Decoration

Characteristic of the LMRW tradition, decorated sherds are rare, and total only 2% of the assemblage (by sherd count). Single or multiple incised or combed horizontal lines/grooves on the bodies of jars and jugs are the most common element, collectively totalling 67% of the decorated material (*Table 11*). Thumbing (21%)

occurs mainly on jug handles and around bung holes, with only two instances of applied thumbed strips and a single thumbed rim. Six base angles are thumbed, although this may largely have served a functional purpose to steady a vessel with a sagging base. Slashing and stabbing is essentially restricted to jug handles (6%), with a single stabbed rim. Glazed pottery totals 6% of the assemblage: the glaze is a dark purple-brown and is unevenly and poorly applied to the necks or shoulders of jugs. Several sherds have unfluxed glazes (see below).

Decorative element	No. sherd	% sherd
Applied thumbed strip	2	0.9
Combed-horizontal linear	117	53.7
Glaze	12	5.5
Incised single/multiple linear grooves	29	13.3
Slashed- handle	10	4.6
Stabbed- handle	4	1.8
Stabbed- rim	1	0.5
Thumbing- bases	6	2.7
Thumbing- bung holes	16	7.3
Thumbing- handle	20	9.2
Thumbing- rims	1	0.5
Total	**218**	**100**

Table 11: Decorative elements by sherd count and percentage

3.2.8 Wasters

Wasters represent vessels damaged during manufacture, in particular during firing, and provide an insight into a range of manufacturing problems encountered by the potter. Eight percent of the kiln assemblage by sherd count (10% by weight) comprises wasters. Among the recognisable forms, jugs are the most frequently occurring waster (39% by sherd count), followed by jars (34%), bowls (23%), cisterns (3%) and pipkins (1%).

Several defects associated with the regulation of the kiln's temperature and the speed at which vessels heated up and cooled were recorded, with spalling, dunting (cracking) and crazing being the most common (*Table 12*).

Defect	No. sherd	%
Bloating	84	10.4
Detachment of applied parts	10	1.2
Distortion	5	0.6
Dunting (cracks) and crazing (cracked surfaces)	214	26.5
Fire clouds	79	9.7
Overfiring	28	3.4
Scars	4	0.5
Spalling / flaking / blown	371	46.0
Unfluxed glaze	14	1.7
Total	**806**	**100**

Table 12: Waster/defect types quantified by sherd count and percentage

Spalling occurs when the kiln temperature is raised too quickly and steam cannot escape through the fabric, resulting in large flakes being blown from the surface of a pot (Gibson and Woods, 1990, 246). Dunting and surface crazing result from uneven cooling, either where thinner parts of the pot cool quicker than thicker parts, or if the kiln has been prematurely opened (ibid. 143). Instances of bloating or bubbles in the fabric, resulting from the expansion of air and gases unable to escape from the clay (ibid. 106) are also well-represented. Several sherds have a brittle appearance

indicative of over-firing. Sherds displaying fire clouds or variable oxidised/reduced firing total *c.*10% of the assemblage and, as seconds, would have been more usable than other waster types, although aesthetically not particularly attractive.

There are several examples of applied parts–handles and bung hole roundels–coming away from the body, and a few instances of distortion, resulting from vessels either being misshapen during formation or subsequently squashed in the kiln. Unmatured glazes, resulting in a matt glaze or off-white powdery surface residue are present on a small number of jug sherds.

Wasters were recovered from all kiln-related groups (*Table 13*); the largest deposits (by sherd count) were associated with the backfilling of stokehole G10 and final disuse layer G14. By weight, the majority of wasters derived from G10 and G9. A large, abnormally thick (20mm) base angle with a diameter of 260mm (possible saggar?) was collected from L3 pits G5. The sherd (402g) survives in poor condition, with an overfired, spalled and blistered exterior, which also bears two finger impressions on the side.

Group		No. sherd	% sherd	Wt. (g)	% wt.
G9	Second-phase kiln	92	13.8	5,011	27.9
G10	Stokehole	198	29.8	5,873	32.7
G11	Third-phase kiln and backfill	65	9.8	1,830	10.2
G12	Pottery dump in soakaway	82	12.3	876	4.9
G13	Refuse pits and associated pottery dump	9	1.4	264	1.5
G14	Layer	219	32.9	4,100	22.8
Total		**665**	**100**	**17,954**	**100**

Table 13: Quantification of L4 wasters by Group

3.2.9 Dating

Samples taken from the burnt floor of kiln G9 and submitted for archaeomagnetic dating (Appendix 5) yielded two possible date ranges for the last use of the kiln: 1084–1330 and 1497–1539, demonstrating that the lifespan of the kiln cannot be easily estimated. An assessment of vessel forms and decorative elements suggests a solidly later medieval date, perhaps late 14th and 15th centuries. A high proportion of bowls with rectangular or square rims, presence of cisterns, absence of early forms such as curfews or dripping pans and scarcity of decorated sherds contrasts with the EK92 assemblage. Many forms from the latter displayed characteristics typical of a medieval tradition (14th-century and earlier) such as a preponderance of jars/cooking pots, bowls with upright thickened or inturned rims and abundance of decorated handles and frilled jug base sherds (Hall 1993, 16). Differences in vessel fabric and form observed between the field-walked (EV75) and EK92 kiln assemblage suggest that a proportion of the field-walked material may post-date that kiln group (Slowikowski 2011, 74). It could speculatively be suggested that at least some of the field-walking material derived from kiln L4.

Alternatively, it is possible that a number of LMRW kilns operated simultaneously in Everton, each specialising in different products.

3.2.10 Summary

Excavation of the Sandy Lane kiln has afforded an opportunity to examine a sizeable assemblage of pottery in the late medieval reduced ware tradition, which

complements the assemblage recovered from EK92, and augments the data-set for this rural potting industry. The kilns on both sites produced wheel-thrown, utilitarian pottery for domestic use–bowls, jars, jugs cisterns and pipkins typical of the late medieval period, which are well-represented on consumption sites across the county.

3.3 Ceramic Building Material

Ceramic building material comprises roof tiles, kiln lining and possible kiln furniture, the majority associated with features assigned to Phase 2.

Plain flat roof tiles (41 fragments: 2.8kg) derive mainly from L3 pits G5 (883g) and L4 deposits, principally backfill G14 (877g) and occur in an oxidised sand-tempered fabric (37 examples) with four Gault Clay fragments. Six pieces retain round peg holes. Although not products of the kilns within the PDA, they are likely to be of local manufacture. Quartz inclusions found in the sandy fabrics probably derive from the Greensand Ridge, and Gault Clay deposits run through the county from Leighton Buzzard in the south-west to Wrestlingworth in the north-east. Part of an unglazed Gault Clay paviour (thickness 35mm) was collected from modern L7 gullies G17.

L4 features G8, G9, G12 and G14 yielded 33 oxidised fired clay fragments (1.8kg), the majority representing the redeposited lining of the earliest kiln G8. Most pieces occur in a coarse sandy fabric to which organic matter has been added to strengthen the clay and improve adhesion. Fragments range in thickness from 15–50mm: several have crudely finger-smoothed surfaces and a couple retain wattle impressions.

Fired clay pieces representing a minimum of 22 hand-made fire bricks/tiles (2.9kg) were collected from kiln-related L4 features G9–G11, G13, G14, most associated with the infilling of stokehole G10 (816g) and backfill deposit G14 (723g). Post-medieval boundary ditch L5 (G15) yielded a further three fragments (930g). All occur in the same sandy fabric as the pottery; 22 examples are reduced and three are oxidised. They range in thickness from 25–30mm, although it was not possible to further estimate their original dimensions. Three have knife-trimmed edges and two are overfired and spalled.

In contrast with tiles/paving slabs recovered from the EK92 kiln (Slowikowski 2011, 80), the Sandy Road examples lack the worn surfaces and stabbed undersides characteristic of floor tiles, suggesting they did not serve this purpose. They may represent redeposited portable kiln furniture (although perhaps a little insubstantial), or could possibly have been used in the construction of the kiln.

3.4 Other Artefacts

G11 features associated with the remodelling of kiln G9 (L4, Phase 2) yielded an undatable perforated iron strip fragment (32 x 11 x 2mm) representing a possible binding for a box or casket.

Victorian bottle glass (65g) collected from post-medieval boundary ditch L5 (Phase 3) and modern deposits L7 (Phase 4) respectively comprises two joining sherds from a meat or fish paste jar, and an embossed mineral water bottle body sherd. Modern finds from L7 are part of a brown glazed ceramic electricity insulator and a sherd of green bottle glass.

The artefacts are of limited academic value and will not form part of the site archive.

3.5 Animal Bone

3.5.1 Introduction

In total, 173 animal bone fragments were recovered. Domestic activity at the site was limited, which was reflected in the low recovery of animal bone. The majority of the remains came from late medieval features (Phase 2), with a few fragments retrieved from post-medieval and modern features.

3.5.2 Methodology

The animal bones were identified using the author's reference collection. The remains were recorded using an 'all fragments' method. Bones that could not be identified to species were recorded to its nearest size category (i.e. large or medium) and those not defined to either category were recorded as unidentifiable. Fragments that came from the same species and element were recorded as one bone fragment. There were no bones from environmental samples, so small bones from mammals, birds and fish will be underrepresented.

As sheep and goat are morphologically similar, the term 'sheep/goat' was employed, unless it was possible to distinguish between the two species following Boessneck (1969) and Payne (1985). Epiphyseal fusion and the eruption and subsequent wear of mandibular teeth were recorded for cattle, sheep/goat and pig. Mandibular wear stages were recorded using Grant (1982) for cattle and pig and Payne (1973) for sheep/goat. Tooth wear was converted into age categories following Hambleton (1999).

Gnawing and butchery were recorded on identifiable bones. Butchery and its location were recorded using the codes devised by Lauwerier (1988). Bone preservation was recorded for identifiable post-cranial bones using Harland et al. (2003). Measurements were taken following von den Driesch (1976)

3.5.3 Taphonomy and bone modification

The assemblage had moderate preservation ranging between good and fair (Table 14). There were few incidences of butchery (5) and gnawing (7). In G9, an animal bone group (ABG) from one cattle metacarpal and carpal was observed.

Phase	Good	Fair	Poor	Total
2	14	14	2	30
3	2	-	-	2
4	1	9	1	11
Total	**17**	**23**	**3**	**43**

Table 14: Preservation for hand-collected post-cranial bones by Phase

Taxon	Phase 2	Phase 3	Phase 4	Total
Cattle	24	1	3	28
Sheep/goat	5	1	-	6
Sheep	2	-	-	2
Pig	6	-	-	6
Horse	3	-	-	3
Dog	3	-	9	12
Fallow deer	3	-	-	3
Unident medium	13	-	40	53
Unident large	59	1	-	60

Taxon	Phase 2	Phase 3	Phase 4	Total
Total	**118**	**3**	**52**	**173**

Table 15: Number of identifiable specimens present (NISP)

Phase	Chop	Cut	Saw	Total
2	2	1	-	3
3	-	1	-	1
4	-	-	1	1
Total	**2**	**2**	**1**	**5**

Table 16: Butchery marks for hand-collected post-cranial bones by Phase

3.5.4 Phase 2 – late medieval

Cattle, sheep/goat and pig were the most common remains (Table 15). There were also small quantities of horse, dog and fallow deer. Despite the assemblage size, the species and body parts suggest that the material comprised domestic waste. Bones from G9 contained young and adult cattle limb bones, which probably represent animals processed and consumed for food. Fallow deer (radii and ulna) were recovered from G10, G11 and G14 suggesting there was high-status consumption.

3.5.5 Phase 3 – post-medieval

This phase had one cattle and sheep/goat bone and an unidentifiable fragment from G6.

3.5.6 Phase 4 – modern

This assemblage had a cattle scapula (G17) which was sawn through at two angles to create a large triangular section. Fragments of a dog foot and tibia came from a modern animal burial (G20).

3.5.7 Discussion and conclusions

The size of the Sandy Road assemblage prevented worthwhile analysis of the remains. Nonetheless, the late medieval features contained domestic waste mostly from beef, veal and small amounts of mutton and pork. The occurrence of fallow deer suggests that venison was consumed, which was commonly eaten by high-status individuals.

3.6 Charred Plant Remains

3.6.1 Introduction

Environmental bulk soil samples were collected for the potential recovery of charred plant remains for information on economy (diet), arable agriculture (crop-husbandry and processing) and human activities on the site during the medieval period including the range of plant materials used as fuel for the pottery kilns.

3.6.2 Methodology

Twenty-four soil samples were collected, ranging in size from 1–30 litres (mostly 10–20 litres), 16 of which were from fills associated with the late medieval pottery kilns; six samples were from pit fills; and single samples from a ditch and post hole fill. Virtually all of the samples were from late medieval features (Phase 2) with just one from an early medieval feature (Phase 1).

The samples were processed using a Siraf-style flotation tank and meshes of 0.3mm and 1mm for the recovery of the flot and residue respectively. The flots were then dried along with the residues which were sorted for biological and artefactual remains. The flots were sorted for charred plant remains using a binocular microscope (with a magnification of up to x 40) and the material identified with the aid of modern and charred reference material and reference manuals (Cappers et al. 2006; Jacomet 2006). Two samples from a pit and kiln fill, which produced very large flots, were sub-sampled, one fraction (25% to 50%) being sorted for charred plant remains and the remaining fractions scanned for additional information.

The sorted charred seeds and fruits were counted while estimated frequencies were made of other plant remains of *Calluna vulgaris* (heather), thorn, stem, root/rhizome and wood charcoal and small cereal grain fragments (<2mm) using the following scale: + =1-10; ++ = 11-50; +++ = 51-100; ++++ = 101-250; +++++ = >250 items. This rating system was also used to record the estimated frequency of the charred plant remains in the scanned fractions of the two very large flots.

3.6.3 Results

All 24 samples produced variable amounts of identifiable charred plant remains with cereal grains accounting for 43% of the quantified remains, a small amount of cereal chaff making up 3% and other plants, mainly wild plant/weed seeds, accounting for 54%. Wild plant remains, however, probably made up a greater proportion of the charred plant material given that the *Calluna vulgaris* remains were not quantified. The charred plant remains are shown by Phase and Land-use Area in Table 18 with nomenclature and taxonomic order for the wild plants following Stace (2005), which was also used for ecological data together with Hanf (1983) and Wilson et al. (2003).

Uncharred seeds were also present in 19 samples, although most flots only contained a few such seeds with the exception of a post hole fill (G7) and two pit fills (G13) which contained good numbers of uncharred seeds from a range of wild plants/weeds including *Atriplex/Chenopodium* (orache/goosefoot etc), *Persicaria* (knotweeds), *Urtica* (nettle), *Rubus* (brambles), *Sambucus* (elder) and *Eleocharis* (spike-rush). These seeds are probably intrusive although woody seeds, such as blackberry/raspberry and elder, have been known to survive for long periods in the soil. A description and discussion of the different categories of plant material is presented below, followed by an examination of the results by Phase and Group.

Cereals

Cereal grains were present in all the samples, although poor preservation meant that a large quantity (*c.*60%) were not identifiable. There were variable amounts of small (<2mm) unquantifiable grain fragments in all the flots.

Rye (*Secale cereale*) was the best-represented cereal and was identified in 19 samples on the basis of grains and also occasional or small numbers of rachis fragments in nine flots. Wheat (*Triticum*) was the second best-represented grain, appearing in 14 samples. Well-preserved wheat grains in 11 samples all belong to free-threshing wheat, either bread wheat (*Triticum aestivum*) and/or rivet wheat (*T. turgidum*). It is not possible to distinguish between the two free-threshing wheats on the basis of grain morphology alone. A single hexaploid free-threshing wheat rachis fragment in kiln fill (1225) showed the presence of bread wheat. There were smaller numbers of barley (*Hordeum vulgare*) grains in 11 samples with hulled straight and twisted

grains showing the presence of (six-row) hulled barley in eight samples; barley was also identified on the basis of a few rachis fragments in four samples. A very small number of oat (*Avena*) grains were also recovered from six samples, although it is not possible to establish if these grains were from cultivated and/or wild species. A cultivated oat (*Avena sativa*) floret, however, was identified in late medieval pit [1183].

All four cereals in the samples—rye, free-threshing (bread) wheat, hulled barley and oats—are the most frequent grains found in archaeobotanical assemblages from medieval sites in southern Britain and were the main cereals cultivated at the time (Greig 1991, 321; Moffett 2006, 45). Both bread wheat and rivet wheat have been identified at medieval sites across southern England, although bread wheat tends to be the more common of the two (Moffett 2006, 49).

Rye, the main cereal at the site, was one of the two main bread-making grains during the medieval period, probably mainly used for peasant bread, the other being wheat which was the most valued cereal during this period (Hammond 1995, 2). Wheaten flour was also used for pies and pastries. All the different cereals, separately (except for oats) or together, may however have been used for bread, biscuits or cakes or in pottage (Campbell et al. 1993, 25). Barley and oats were also used for animal feed as well as in brewing (as was occasionally wheat), although there were no sprouted grains in the assemblages to suggest that any of the cereals were being used as such at the site.

Occasional and small numbers of Poaceae (grass) culm nodes and internode fragments were found in 13 samples. They may be from either wild grasses and/or cereals. Cereal straw had a number of potential uses as flooring and thatching materials, animal bedding, and fuel; while barley and oat straw was used for fodder (Barker 1985, 45).

Pulses

Legume seeds in 13 samples made up a small percentage (c 6%) of the quantified remains of other plants, the better-preserved remains showing traces of field bean (Vicia faba) and pea (Pisum sativum) in two samples; some of the large legume fragments (>2mm) in nine samples may be from beans and/or peas. Small leguminous seeds (<2mm) in seven samples may represent wild species.

Pulses, including beans and peas, are frequently found in medieval deposits in southern England but usually only in small amounts (Greig 1991, 323, Moffett 2006, 53). Beans and peas may have been grown as garden vegetables or field crops and used in pottage or together with cereals for bread (Wilson 1991, 201–2), particularly by the poor and following poor cereal harvests, while legumes were also used as fodder. Pulses could also have been dried after harvest and stored for long-term use and were a useful break crop between cereals for restoring nitrogen levels to the soil as part of crop rotation (Campbell et al. 1993, 134).

Wild food plants

Single seeds of elder (*Sambucus nigra*) and blackberry (*Rubus Glandulosus*) were recovered from separate samples and may represent the discarded burnt residues of wild fruits collected for food from hedgerow/woodland habitats close-by.

Crop husbandry

The charred remains of wild plants/weeds were found in all the samples, although individual species were generally represented by only a few or small numbers of seeds with the exception of *Rumex* (dock), which is a high seed producing plant found in a range of habitats. The charred plant remains included a good number of species associated with disturbed and waste ground habitats, including a good number of potential arable weeds which may have been incidentally harvested with the cereals and which may provide information on crop husbandry practices including the range of soils in which the cereals were grown, and sowing times.

Several of the weeds, including *Anthemis cotula* (stinking chamomile) and *Sherardia arvensis* (field madder), may suggest the cultivation of the fertile, low-lying poorly drained, calcareous loamy clay soils of the chalky boulder (Oxford) clays to the west of the site. *Sceleranthus annuus* (annual knawel) and *Centaurea cynaus* (cornflower), may point to the growing of crops on the less fertile free-draining acidic sandy soils of the lower greensand ridge on which the site lies. The presence of *Carex* (sedge) in ten samples and *Eleocharis* (spike-rush) in one may suggest the cultivation of damper areas of ground, possibly the lower-lying areas to the west of the site; sedges may have also been collected for other purposes, including as building/flooring materials.

Rye, the most abundant cereal in the samples, is drought tolerant and is often grown on sandy soils while free-threshing (bread) wheat grows best on heavy and rich soils (Moffett 2006, 48) and thus it is possible that the wheats were being cultivated on the low-lying clays just to the west and rye on the sandy soils around the site. Barley and oats may grow in a range of soils including poorer ones. Several of the weeds, *Galium aparine* (cleaver) and *Centuarea cyanus*, may point to the winter-sowing of cereals, both rye and free-threshing wheat mainly being winter-sown while barley and oats may be sown in both spring and winter (ibid., 48). Of the few legumes found at the site, beans grow best in heavier soils while peas prefer lighter ones (Lockhart and Wiseman 1975, 143).

The height of some of the weeds in the samples, including *Anthemis cotula* and *Sherardia arvensis*, may suggest that harvesting took place fairly low on the straw which, as noted above, may have had a number of uses on site; some of the root/rhizome fragments in the samples may imply harvesting by uprooting although these remains could equally be from the collection of other uprooted wild vegetation including heather.

Other charred plant remains

Other charred remains in the samples included the remains of heather in 16 samples, including almost all the kiln fills, represented by the leaves, floral parts and possibly some of the thin woody stem fragments in the samples. Heather has a wide range of potential uses as thatch, fodder, bedding, in wattle and daub and for making brooms and ropes (Mabey 1997, 159) as well as for fuel, which appears to have been its main use at the site as kindling for the pottery kilns.

The importance of this plant as fuel is shown by its other name, ‘ling’, derived from the Old English *lig* meaning fire (Davison 1992, 213). Heather was widely available from the heathlands around the site, heathland itself being a valued resource during the medieval period (Rackham 1997, 291). A few frond fragments of bracken (*Pteridium aquilinum*), another heathland plant, were also found in one of the kiln

samples, a plant also used as fuel as well as for litter for livestock and thatch (ibid., 295).

A large part of the charred woody material from the samples consisted of small round wood, woody twig and woody stem fragments as well as root/rhizome fragments (some of which may be from the uprooting of heather) with fewer larger wood charcoal fragments.

3.6.4 Phase 1 – early medieval

Just one sample was collected from this phase, from a pit fill (L1, G3). It produced a moderate number of very poorly preserved charred grains, most of the identifiable ones being of free-threshing wheat together with a few charred weed seeds and a little charcoal. These charred remains represent debris from low-level domestic activities associated with the final stages of crop-cleaning and food preparation, the grains accidentally burnt possibly during drying before milling or storage or as a result of cooking accidents.

3.6.5 Phase 2 – late medieval

L3: medieval boundary ditches and internal features

One sample from an isolated post hole G7 in the north part of the site produced a small number of grains, including free-threshing wheat and a single field bean, accidentally charred food debris from the final stages of crop-processing and food preparation.

L4: kilns and associated features.

The other 22 samples from Phase 2 were all from different phases of the kilns and associated features: the earliest kiln and burnt layer G8 (six samples); the second phase of kiln construction G9 (four samples); stoke-hole G10 (three samples); the final major kiln construction phase G11 (four samples); a ditch soakaway G12 (one sample); and a pit group G13 (four samples).

<u>The kiln samples (G8, G9, G10, G11)</u>

The 17 samples from the different phases of kiln use show a broadly similar botanical composition with no significant differences between the assemblages other than in the density of quantified remains. The two richest were from kiln fill (1212) (G9) with an estimated item density of *c*.37 and from kiln fill (1120) (G10) (density of 34), although neither calculation took account of the abundance of heather in the samples, for which only estimated frequencies were recorded.

The 17 samples show that a variety of plant materials was being used for fuelling the kilns; this included waste from crop-processing activities with modest numbers of grains, a few chaff fragments mostly from rye, a few legumes, a few weed seeds and possible straw fragments. *Rumex* seeds, small leguminous seeds including *Medicago/Trifolium* (medick/trefoil), *Carex* and wild Poaceae (wild grasses) appeared in all the kiln groups, some of which possibly may also be from the collection of wild vegetation. Heather, in all but two of the kiln samples, appears to have been an important component of the fuel used as kindling along with other heathland plants such as bracken. Much of the charred woody material in the kiln samples consisted of small round wood, woody twig and woody stem fragments as well as root/rhizome fragments.

While the charred plant remains provide an insight into the range of materials used as fuel, the high temperatures required for firing pottery would have meant that much of this fuel used in the kiln would have been reduced to ash, surviving only if smothered at the base of the fire or around the edges where the temperatures would have been lower. The charred remains in each of these phases represent the residues of the fuel used in the final firing of the kiln at each stage.

Associated features (G12, G13)
Small charred plant assemblages were recovered from features close-by, from a ditch fill (G12) to the east, and from four samples from a pit group north of the kiln (G13). The assemblages were broadly similar, consisting of small amounts of mainly crop-processing waste with occasional or small amounts of cereal grains and a few wild plant/weed seeds and charred woody material, including small round wood/twig and woody stem fragments and a few root/rhizome fragments. These remains probably represent re-deposited fuel waste from the kiln, all four fills containing good amounts of pottery along with burnt clay.

3.6.6 Discussion and conclusions

The charred plant remains assemblage suggests that rye was the main cereal being cultivated around the site. Free-threshing (including bread) wheat also appears to have been an important crop, although hulled barley and oat may have only been minor crops. Beans and peas were also being grown possibly in rotation with the cereals. The few weed seeds suggest the cultivation of the sandy soils around the site and the heavier soils to the west, possibly for rye and free-threshing wheat respectively, with winter-sowing of cereals and perhaps harvesting of the crops fairly low on the straw.

The fills associated with the different phases of the pottery kilns suggest that a range of plant materials were being used as fuel/kindling, including crop-processing debris (grain, chaff, straw, weed seeds) and heathland plants particularly heather and occasionally bracken, which may have been collected from the extensive heathlands of the Greensand Ridge. Charred woody materials included a good amount of small round wood, twig and woody stem fragments. The use of heather along with bracken and crop-processing waste as fuel has been found in other medieval pottery kilns including four 14th-century kilns at 70-76 Eden Street, Kingston upon Thames, London (Davis 1999). This site was also located in an area close to heathland with plant remains from Romano-British and other medieval pottery sites suggesting that the range of fuels used to fire kilns varied according to what would have been locally available (White et al. 2015, 41).

3.7 Charcoal

3.7.1 Introduction

Fifteen samples merited examination of the charcoal; all were associated with the late medieval (Phase 2) kilns L4. Several phases of kiln construction and use were represented G8–11, along with a ditch G12 and pits G13 to the north of the kiln.

3.7.2 Methodology

One or two of the most abundant assemblages were analysed per Group and the remaining samples were scanned for comparison.

Standard identification procedures were followed using identification keys (Hather 2000, Schweingruber 1990) and modern reference material. The charcoal was fractured and examined at low magnification (up to x 45), with representative fragments examined in longitudinal sections at high magnification (up to x 400). Classification and nomenclature follow Stace 2019.

3.7.3 Results

The condition of the charcoal was generally very good, with numerous well-preserved fragments of fine roundwood. Eleven taxa were positively identified:

FABACEAE:	*Cytisus/Ulex*, broom/gorse
ROSACEAE:	*Prunus spinosa/domestica,* blackthorn/plum
	Prunus avium (wild cherry)
	Maloideae, subfamily including *Malus*, apple; *Pyrus*, pear; *Sorbus,* service/ whitebeam/rowan and *Crataegus,* hawthorn
	Rubus sp., bramble
ULMACEAE:	*Ulmus* sp., elm
FAGACEAE:	*Quercus* sp., oak
BETULACEAE:	*Corylus avellana,* hazel
SALICACEAE:	*Populus/Salix,* poplar/willow
ERICACAE:	*Calluna/Erica,* heather/ling
OLEACEAE:	*Fraxinus excelsior,* ash

The taxa were all consistent with native species, but could include the Roman-introduced *Prunus domestica* (plum), which cannot be distinguished from the native *P. spinosa* (blackthorn). The two *Prunus* species were differentiated by ray width, with consistently narrow rays (2–4) in *P. avium* and wide rays (4–8) in *P. spinosa/domestica.* Ericaceae stem anatomy is too similar to allow distinction to genus, but the presence of multiple leaves and floral parts of *Calluna vulgaris* in the charred plant assemblages (Section 3.6.3) strongly suggests that this species is present in the charcoal.

The vast majority of the charcoal was of fine roundwood from ericaceous and other shrubby stems, with pith and bark preserved. Diameters range from 1–11mm, and commonly age ranges of 3–7 years, occasionally 1 year old or 10 years' age were also noted. Most of the fragments from tree taxa were also from narrow roundwood, with the exception of some of the fragments from larger trees (*Ulmus, Quercus* and, to a lesser extent, *Fraxinus),* which exhibited no or moderate ring curvature, indicative of larger branchwood or trunkwood. A single piece of oak heartwood also indicates a tree of some maturity.

3.7.4 Discussion and conclusions

The charcoal assemblages in the kilns and associated deposits were remarkably consistent, with no significant differences in taxonomic composition. All were clearly dominated by narrow stems of heather, and to a lesser extent, broom/gorse. In addition to representing 55% of the analysed fragments, heather was also present in 100% of all 15 samples. Both heather and broom/gorse would have grown on local heathlands and indicate the preference and selection of these resources as fuel for the kilns. The fact that the assemblages comprise significant components of ericaceous stems in both the earliest kiln phase G8 and the final phase of kiln construction G11 suggests consistency in separate fuelling events; since several phases are represented,

the charcoal does not represent only one final firing event. Moreover, the presence of fine stems in all samples, including in associated waste dumps G13, suggests that they were not used solely for kindling but represent a more significant and frequent component of the fuel used.

Both heather and gorse (and broom) provide a high, but fast heat, appropriate for rapidly raising the temperature in an oven—or as kindling—but not for slow or long burning purposes. Gorse was traditionally an important fuel in western areas of Britain, where its use was particularly recorded in medieval bread ovens and limekilns (Lucas 1960; Dickson and Dickson 2000; Gale and Cutler 2000; Rotherham 2007). The temperatures required for pottery firing depend upon the clay type, tempering and other modifications to the fabric, but it is unlikely that the fine stems found in the kilns at Sandy Lane would provide sufficient sustained heat for effective firing, unless whole turves were utilised as these would provide longer-lasting heat. The charcoal assemblages also contain elm, oak, ash and other hardwood types, which would provide more sustained heat, especially when larger branchwood or cut logs from trunkwood were utilised. However, a question remains on the issue of why these taxa appear, on the basis of both ubiquity and abundance analysis, to be less important components of the fuel used in the kilns on the site.

One possibility is that the apparent dominance of heather stems may be an accident of preservation; if the stems represent kindling, they could have been preserved by being smothered in ash (at the base or the margins of the fire), along with other small elements of the charred plant assemblage (Section 3.6.3), whereas the larger fuelwood would have burned to ash in the centre (and highest temperature) of the fire. Another possibility is that the larger hardwood stems and logs were used to sustain heat for much of the firing duration, with the fine stems added in the final re-stoking of the fire—to raise the heat to a final temperature high, prior to it beginning to cool. In that case, much of the fine material would burn to ash, but perhaps enough would survive if added in significant quantity and then allowed to cool. The final scenario is that woody stems, along with a range of kindling material (crop-processing waste, bracken etc.), were used as fuel throughout the firing by regular re-stoking to ensure a sustained burn, with the occasional supplementary use of larger logs. This scenario is most consistent with the charcoal evidence. It is also of note that there are Romano-British examples of pottery kilns fuelled by heather at sites in Norfolk (Gale 2003) and Dorset (Gale 1993), both of which were adjacent to heathlands. While a number of early medieval pottery kilns were fuelled by oak, there are heather-fuelled examples from London and it has been argued that heathlands were extensively exploited and managed for fuel in the medieval period (Smith 2002).

3.8 Archaeomagnetic Dating

3.8.1 Introduction

Ten orientated samples were taken from the kiln floor G11 (L4) in order to date the last firing of the kiln. The most salient information is presented here with the full report found in Appendix 5.

3.8.2 Methodology

A total of ten samples were taken from an area spanning approximately 1m^2 of the burnt floor of the kiln using the button method. All samples were oriented using a

magnetic compass. In the laboratory, the samples were trimmed using a small hacksaw blade and sandpaper, until they fit into standard sample holders.

An archaeomagnetic date was obtained using the SCHA.DIF.3K regional archaeomagnetic model (Pavon-Carrasco et. al 2011), which compares the mean archaeomagnetic direction with a model of the archaeomagnetic field calculated for the site coordinates.

3.8.3 Results

The natural remnant magnetisation (NRM) intensities ranges between 0/04 and 3.59 A m^{-1}. Stepwise alternating field magnetisation revealed a single northerly characteristic NRM component in samples 6–10. This is typical of well-heated samples that carry a stable archaeomagnetic direction. These samples also had high NRM intensities, another characteristic of well-heated material.

Samples 2–5 had low NRM intensities and did not exhibit a stable archaeomagnetic direction, which most probably indicates that they were heated to lower temperatures.

Sample 1 had a low initial NRM intensity, and yet yielded a northerly component of magnetisation that was demagnetised by 20 mT. This is likely an intermediate case where the sample was heated to a moderate temperature. The component identified between 0-20 mT has been taken as its characteristic NRM component, representing the archaeomagnetic direction acquired during the partial heating.

The mean archaeomagnetic direction was calculated using Fisher (1953) statistics from samples 1 and 6–10, with the results summarised in Table 1 of Appendix 5. An easterly mean declination of 16.8° and a moderate mean declination of 56.7° was obtained. The 95% angular confidence limit of 7.5°is relatively large as a consequence of the small number of sample directions used to calculate the mean direction.

3.8.4 Archaeomagnetic dating and conclusions

Two possible dates were given for the last firing of the kiln. These are 1084–1330 CE and 1497–1539 CE at the 95% confidence limit. Neither date can be rejected on archaeomagnetic grounds. The relatively large age range is due to the large uncertainty in the mean archaeomagnetic direction, itself a consequence of the small number of samples which had been fired to the requisite temperatures.

4 DISCUSSION AND CONCLUSIONS

4.1 Discussion

The results of the excavations at 21 Sandy Road, Everton revealed several phases of activity. It was possible to determine a broad chronological sequence based on a substantial artefact assemblage, supported by stratigraphic relationships. The Phase 2 ecofact and charcoal assemblages were considerable as a result of the LMRW pottery industry within the PDA. The relatively short-lived nature of the successive Phases suggests that whilst they represent separate episodes of activity, there may have been some chronological overlap between them.

4.1.1 Phase 1: early medieval

The earliest phase of activity is represented by a series of 12 storage pits at the east end of the PDA. The pits were in three clusters and displayed multiple recuts, suggesting reuse over a prolonged period of time. The recovered finds assemblage was relatively modest, especially in comparison to later Phases. Charred plant remains were indicative of crop-cleaning and food preparation. The location of the pits suggests that they may have been located at the rear of medieval domestic plots which fronted Sandy Road.

Small quantities of residual Roman and Anglo-Saxon pottery suggest low-level earlier activity in the vicinity of the PDA. Equally, the small number of intrusive, later LMRW pottery sherds shows that this phase of activity had probably ceased before any LMRW pottery production took place.

4.1.2 Phase 2: Late medieval

The majority of the remains on the site dated to the late medieval period. They comprised a multi-phase kiln, boundary and holloway.

The NW-SE aligned holloway would have provided access from Sandy Road to the agricultural fields at the rear of any dwellings. As with other elements within the PDA, continued respect of this trackway suggests some level of continuity within the landscape.

A boundary, defined by NE-SW aligned ditches, spanned the site, parallel to Sandy Road to the west. It is likely that the ditches represent the establishment of land boundaries between domestic plots (fronting Sandy Road) and industrial and agricultural areas to the east, including the pottery kilns.

The majority of the recovered evidence was associated with a series of pottery kilns located in the south-east of the PDA (L4). There were three identified phases of kiln construction and use, indicating a prolonged period of pottery production and perhaps reflecting changes in demand. Figure 8 shows a series of simplified sections and plans of the three phases of the kiln.

The first kiln G8 appears to be a simple, single-chambered structure. There was surviving evidence for a clay and sand-lined chamber and a possible stokehole, but no trace of a flue, pedestal or other kiln furniture (potentially due to later truncation). Fired clay within the backfilled kiln may represent remnants of the collapsed superstructure. This kiln was significantly smaller than its successor G9.

The second-phase kiln G9 was more complex in construction, comprising a larger chamber built into the sand geology with a central pedestal and sides reinforced with a thicker clay lining. This construction showed evidence of reworking along with firing layers, which suggests that the kiln was well-maintained over a period of time – the clay construction requiring greater maintenance than the stone-built examples seen on other LMRW pottery production sites, including the one previously identified in Everton (HER15671, EK92). The large pedestal, constructed in the centre of the chamber, would have allowed stacking of vessels and regulation of heat flow through the kiln. A single flue served to allow hot air to enter the chamber from a stokehole located to the east of the kiln. Scorching of the clay lining hints at a second possible flue or exhaust vent to the west, although this is perhaps more likely associated with the third-phase kiln. The increase in size and refinements to the kiln are likely to reflect an increased scale of production.

The final, third-phase kiln G11 returned to a simple, though large, structure, occupying the same footprint as second-phase kiln G9. Scorching of the clay lining at the west end suggests the flue may have been located there, although not enough of the superstructure survived to confirm this. No pedestal was present, although this is not to say that some removable structure (for which no evidence survives) served as such. The floor of this kiln was a burnt clay layer, which was subject to archaeomagnetic dating. Two possible date ranges for the last firing of the kiln were obtained: 1084–1330 and 1497–1539. The later of these date ranges is complemented by the stylistic dating of the vessel forms and decorative elements of the recovered pottery.

The lack of kiln furniture and superstructure implies that the final firing was not a failure, i.e. the superstructure did not collapse but was dismantled and perhaps re-used elsewhere. There is no evidence for continuation of the Everton pottery industry beyond the late medieval period. The reason for this remains uncertain but it is commonly observed across many kilns related to LMRW pottery production. Outlying features associated with the kiln were small but had relatively large LMRW pottery assemblages. Whilst they may have been associated with pottery production, their exact function is unknown.

The LMRW pottery assemblage from the kilns and associated deposits complements the similar assemblage recovered from the nearby EK92 kiln (HER15671) (Figure 9). Both produced wheel-thrown, utilitarian pottery for domestic use, typical of the late medieval period and well-represented on consumption sites across Bedfordshire and neighbouring counties. The vessel forms and decoration suggest a late 14th- to 15th-century date for the Sandy Road kilns, corresponding with the later archaeomagnetic dating final firing estimate of 1497–1539 (which itself may even hint at production persisting into the early 16th century). By contrast, the EK92 kiln assemblage was more consistent with a 14th-century or earlier date (Hall 1993, 16). This may suggest that pottery production at Sandy Road superseded that of EK92. It has been speculated previously that the fieldwalked material (HER13768) may post-date that of kiln EK92 (Slowikowski 2011, 74), and it is possible at least some of this material derived from the Sandy Road kilns. The size and complexity of the kilns, the fabrics/forms of the pottery, the relative rarity of oxidised vessels, and the high quantities of discarded pottery fragments encountered during excavation all point to

industrial pottery production by skilled potters. Along with EK92, these kilns likely contributed significantly to the regional potting industry.

Evidence from charcoal and charred plant remains suggests that heather and broom/gorse, sourced from the local heathlands, provided the main fuel source for the kilns, supplemented by occasional hardwood, with crop-processing waste and bracken used as kindling. As the heather and broom/gorse were fast-burning, the kilns would have required frequent re-stoking to ensure a sustained burn. It has been postulated that fuelling resources were becoming scarce towards the end of the medieval period (Slowikowski 2001, 70), meaning that while the heather/gorse might not have been the ideal fuel, its local availability probably made it the best choice at the time.

The charred plant remains also provide evidence for crop production in the vicinity. It appears rye was the main cereal being cultivated, free-threshing wheat was important, whilst hulled barley and oat were only minor crops. Beans and peas were rotated with the cereals, which were sown in winter, with both sandy and heavier soils cultivated. Although the animal bone assemblage was small, it did provide evidence for the consumption of beef, veal, mutton and pork. The consumption of venison is also suggested, which is most commonly associated with high-status individuals and, therefore, unusual in this village location, outside of any high-status residence.

4.1.3 Phase 3: post-medieval

Two parallel boundary ditches represent a re-definition of the boundary established in the late medieval period and probably served to separate domestic and industrial/agricultural areas. A lack of post-medieval features to the east of the PDA suggests that the site of the former kilns was left unused. The post-medieval features do, however, broadly respect the late medieval holloway, which suggests this continued in use into this period. The finds assemblage from the post-medieval features mostly comprised residual fragments of LMRW pottery.

The post-medieval refuse pits to the west of the boundary ditch appear to represent waste disposal from the domestic dwellings on Sandy Road. The 1884 25-inch OS map shows a copse of trees in this location, perhaps suggesting the reuse of the hollows left by felled trees rather than purposefully dug pits. This would explain the irregular shape of the features. The range of domestic refuse in the pits was typical of household waste.

4.1.4 Phase 4: modern

Three post holes which form a boundary in the same location as L3 and L5 (Phases 2 and 3 respectively) show continuity within the landscape in the form of land parcels occupying the same space over a span of at least *c*. 600 years.

4.2 Conclusions

The archaeological investigations at 21 Sandy Road, Everton produced evidence of a reasonably short but significant sequence of past human activity.

The earliest remains took the form of early medieval (Phase 1) pits. Occupation of the area from the early medieval period is indicated by the Domesday survey of 1086, when Everton was already recorded as a reasonably large estate with 31 households

and a taxable value of 12 geld unit. The early medieval pits within the PDA demonstrate domestic activity of this period, probably associated with adjacent domestic plots fronting onto Sandy Road.

Most of the archaeological remains within the PDA relate to late medieval activity (Phase 2) and represent an area defined by boundary ditches and a trackway, containing a multi-phase LMRW pottery kiln. The pottery industry in Everton has been well documented, with Roman (HER2002) and LMRW (HER15671, EK92) pottery kilns having been previously identified (Slowikowski 2011). In addition, dense scatters of LMRW pottery and kiln furniture (HER807, HER6715, HER13768) (Hassell 1976) (Figure 9), meant that the potential presence of further kilns had long been suspected (Slowikowski 2011, Oake et al., 2007, 107).

The kiln at 21 Sandy Road represents one of the previously suspected kilns and indeed the LMRW assemblage more closely matches scatters from fieldwalking (HER13768) than kiln EK92. The forms and decoration of the pottery, along with archaeomagnetic dating, suggests this kiln may have superseded that of EK92 in the late 14th and 15th centuries. The kilns were part of a prolific regional industry, with Everton-type LMRW represented on consumption sites across Bedfordshire and also known in Cambridgeshire, particularly in the south and west of the county (Spoerry 2016, 264).

The geographical location of Everton allowed exploitation of a variety of natural resources, with heathland to the east and the natural geology of Oxford clay to the west both exploited in the late medieval period. The local availability of heather and broom/gorse from heathlands provided ample, if not typical, fuel for the kilns, whilst local clay provided the base materials for pottery production.

Post-medieval activity within the PDA shows a distinct move away from pottery production. Within the county at this time, manufacture changed to brick production with no evidence for post-medieval pottery production sites (Oake et al., 2007, 130); the reason for this remains unknown. Whilst the excavations at Sandy Road cannot answer this question, they do provide another example of the cessation of the pottery industry.

A summary of the excavations has been published in CBA South Midlands annual report 2021; this report will be uploaded onto the OASIS website (ref. no.: albionar1-359459). With the landowner's permission the archive will be deposited with The Higgins Art Gallery & Museum, Bedford under accession number BEDFM 2018.16.

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6 APPENDIX 1: POTTERY METHODOLOGY AND TYPE SERIES

Pottery was examined in accordance with Historic England and PCRG/SGRP/MPRG guidelines (respectively 2015a and 2016). The assemblage was quantified by minimum vessel[3] and sherd count, and weight, and assigned forms and fabric groups. Vessel attributes, including decoration, manufacturing techniques and levels of abrasion, together with evidence for use (modification, residues / sooting and wear) were recorded. LMRW feature sherds such as rims, bases, handles, bung holes, decorated sherds and wasters were individually recorded by form. LMRW rim and base diameters were also recorded.

Pottery fabrics, based on surface appearance and the type, size and density of principal inclusions are summarised by chronological period in accordance with the Bedfordshire Ceramic Type Series. No new fabric types were identified.

Fabric Type	Common name	No. Sherd	Wt. (g)	MSW*
Pre-medieval				
R06C	Roman fine greyware	1	12	12.0
A16	Early to mid-Saxon coarse quartz	1	18	18.0
B01	Late Saxon St Neots-type ware	1	11	11.0
Medieval				
B07	Shelly ware	6	44	7.3
C01	Sandy ware	9	85	9.4
C03	Sandy ware (fine)	1	2	2.0
C04	Sandy ware (coarse)	7	142	20.3
C05	Sandy ware (red margins)	212	2,966	14.0
C59A	Sandy ware (smooth)	7	39	5.6
C59B	Sandy ware (harsh)	1	3	3.0
C71	Sandy ware (buff-grey cored)	51	761	14.9
E01A	Everton-type late med. reduced ware	9,938	181,211	18.2
E02	Late medieval oxidised ware	17	560	32.9
Post-medieval				
P01	Glazed red earthenware	3	100	33.3
P03	Black-glazed earthenware	1	79	79.0
P23	German stoneware (Raeren)	1	4	4.0
P30	Staffordshire Slipware	3	16	5.3
P36A	Brown salt-glazed stoneware	1	5	5.0
19th century+				
P37	White salt-glazed stoneware	1	6	6.0
P38	Creamware	1	5	5.0
P45	Transfer-printed earthenware	3	15	5.0
P48	English stoneware	4	903	225.7
P55	White earthenware	6	17	2.8

MSW = mean sherd weight

Table 17: Pottery type series

Despite the large size of the assemblage, all Everton-type LMRW sherds were retained at the request of the receiving museum. Following quantification and recording, pottery was bagged in context order by form and sherd type. Feature sherds, comprising rims, bases, handles and those with decoration, were individually marked with the site code and context number. Due to their quantity, it was impractical to mark undiagnostic body sherds and wasters.

[3] Non-kiln assemblage only

7 APPENDIX 2: CHARRED PLANT REMAINS

	Phase	1	2																								
	Landscape	1	3	4																							
	Group	3	7	8						9				10			11				12	13				
	Feature type	P	S	P			K				K		K		K		K	K	K	K	D	P		P	P
	Feature #	303	1149	1035			1307				1220		1281		1119		1106	1122	1133	1281	1101	1070		1072	1183
	Context #	304	1150	1036	1308	1309	1310	1310	1311	1207	1212	1214	1233	1120	1120	1121	1043	1123	1138	1225	1103	1071	1071	1073	1186
	Sample #	1	19	10	37	34	35	36	33	28	23	24	25	13	21	14	22	15	18	29	12	11	16	17	20
	Vol sample (l)	30	19	18	7	10	10	1	10	10	30	10	8	18	5	18	20	18	9	10	18	19	3	1	20
	Vol flot (ml)	3	16	c 1400	3	9	75	21	130	16	c 700	c 300	21	78	c 300	23	120	3	2	13	49	20	2	<1	45
	% Flot sorted			50							25														
	% Flot scanned			50							75														
Latin Name	English																								
Cereal grains																									
Triticum aestivum/ turgidum type	free-threshing wheat	3									+		1			1	1			1					1
T. cf. *aestivum/turgidum* type	?free-threshing wheat	4	2												2			1				1			
Triticum sp(p).	wheat	1	1		2	1										1									
cf. *Triticum* sp(p).	?wheat	2	2												2	5						2	1		
Triticum/Secale cereale L.	wheat/rye	1			2						3	+	1		1	2	1	1	4		1				
Secale cereale L.	rye			11	1		8	2	5		8	++	2	1	4	3	1	6	1	1					1
cf *S. cereale*	?rye	2		6 ++	1		2		3	1	21	+	10		10	3	2	6	9	2	1				1
Hordeum vulgare L.	barley, hulled twisted				1		1		1									1							2
H. vulgare L.	barley, hulled straight						1																		2
H. vulgare L.	barley, hulled, indet				1										1		1							1	4
H. vulgare L.	barley, indet																1								4
cf. *H. vulgare*	?barley, indet						1				+							1							
Avena sativa L.	cultivated oat floret																								1
Avena spp.	oat																2								
cf *Avena* sp(p).	?oat	1				1										1		2							

	Phase	1		2																								
	Landscape	1	3	4																								
	Group	3	7	8						9				10			11				12	13						
	Feature type	P	S	P			K			K			K	K			K	K	K	K	D	P		P	P			
	Feature #	303	1149	1035			1307			1220			1281	1119			1106	1122	1133	1281	1101	1070		1072	1183			
	Context #	304	1150	1036		1308	1309	1310	1310	1311	1207	1212	1214	1233	1120	1120	1121	1043	1123	1138	1225	1103	1071	1071	1073	1186			
	Sample #	1	19	10		37	34	35	36	33	28	23	24	25	13	21	14	22	15	18	29	12	11	16	17	20			
	Vol sample (l)	30	19	18		7	10	10	1	10	10	30	10	8	18	5	18	20	18	9	10	18	19	3	1	20			
	Vol flot (ml)	3	16	c 1400		3	9	75	21	130	16	c 700	c 300	21	78	c 300	23	120	3	2	13	49	20	2	<1	45			
	% Flot sorted			50								25																
	% Flot scanned				50								75															
Latin Name	English																											
Cerealia	indet. cereal grains	51	8	32		1	6	10	1	6	1	59		18	6	25	3	17	10	33		2	5	14	2	2	11			
Cerealia	indet cereal grain fragments <2mm	++	+	++	++ +	+	+	++	+	++	+	++	++ +	++	+	+	++	+	++	+++	+	+	+	++	+	+	+			
Cereal chaff																														
Triticum aestivum L.	hexapolid free-threshing wheat rachis																				1									
Secale cereale L.	rye rachis			3	+	2		3		6		5	+	3			4		2			1								
Hordeum vulgare L.	barley rachis							1				1	+	1			1													
Other plant/weed seeds																														
Pteridium aquilinum	bracken frond fragments											+	+																	
Ranunculus flammula L.	lesser spearwort																	1												
Chenopodium sp(p).	goosefoot etc				+		1						+				1													
Atriplex sp(p).	orache											2	+	1			5			1										
Stellaria media (L.) Vill.	common chickweed																1													
Scleranthus annuus L.	annual knawel														1															
Polygonum aviculare L.	knotgrass				+																									
Rumex sp(p).	dock					1	2	3	1	3		122	++ +	74		99	123	24	1	1	2			1						
Polygonaceae indet.	knotweeds											26				16	12	3												
Malva sp(p).	mallow											1	+				1													
Calluna vulgaris (L.) Hall	heather leaves			+	++ +			+	+	++		++	++ +	++			++	+		+	+			+						
C. vulgaris (L.) Hall	heather floral parts				++			+	+	++		++ +	++ +	++		++	+++	+		+	+									

	Phase	1		2																										
	Landscape	1	3	4																										
	Group	3	7	8						9				10			11				12	13				
	Feature type	P	S	P			K			K			K	K			K	K	K	K	D	P		P	P
	Feature #	303	1149	1035			1307			1220			1281	1119			1106	1122	1133	1281	1101	1070		1072	1183
	Context #	304	1150	1036	1308	1309	1310	1310	1311	1207	1212	1214	1233	1120	1120	1121	1043	1123	1138	1225	1103	1071	1071	1073	1186
	Sample #	1	19	10	37	34	35	36	33	28	23	24	25	13	21	14	22	15	18	29	12	11	16	17	20
	Vol sample (l)	30	19	18	7	10	10	1	10	10	30	10	8	18	5	18	20	18	9	10	18	19	3	1	20
	Vol flot (ml)	3	16	c 1400	3	9	75	21	130	16	c 700	c 300	21	78	c 300	23	120	3	2	13	49	20	2	<1	45
	% Flot sorted			50							25														
	% Flot scanned			50							75														
Latin Name	English																								
cf *C. vulgaris*	?heather thin woody stem fragments			++ + ++ ++	++		++	++	++	+	++ +	++ +	++++	++	+++	++++	+++	++		++					
Rubus sect *Glandulosus* Wimm. & Grab.	blackberry										1														
Vicia faba L.	broad bean		1														1								
cf *Vicia* sp(p).	?bean fragments																3								1
Vicia/Pisum sp.	bean/pea fragment											1		1			1								1
Vicia/Lathyrus sp(p).	vetch/tare/vetchling (>2mm)				1							1		2								1			
Vicia/Lathyrus sp.	vetch/tare/vetchling (<2mm)																			1					
Vicia/Lathyrus/ Pisum spp.	vetch/tare/vetchling/pea (<2mm)																2								
Pisum sativum L.	pea																								
cf Pisum sp.	?pea fragments																1								
Medicago/Trifolium sp(p).	medicks/clovers								3		6	+		11	1	6	2	4							
Fabaceae indet	large legume fragments (>2mm)									1	1						2				1	1			
Fabaceae indet	small legume fragments (<2mm)						1		1		5		5	2											
Plantago lanceolata L.	ribwort plantain				1		1							1				1				1			
Euphrasia/Odontites sp.	eyebrights/bartsias	1																							
Sherardia arvensis L.	field madder																					1			
Galium aparine L.	cleavers									1		+													
Sambucus nigra L.	elder																					1			
Centaurea cyanus L.	cornflower			+																					

	Phase	1		2																										
	Landscape	1	3	4																										
	Group	3	7	8							9				10			11				12	13							
	Feature type	P	S	P			K			K				K			K	K	K	K	D	P		P	P					
	Feature #	303	1149	1035			1307			1281				1220			1119	1106	1122	1133	1281	1101	1070		1072	1183					
	Context #	304	1150	1036		1308	1309	1310	1310	1311	1207		1212		1214	1233	1120	1120	1121	1043	1123	1138	1225	1103	1071	1071	1073	1186			
	Sample #	1	19	10		37	34	35	36	33	28		23		24	25	13	21	14	22	15	18	29	12	11	16	17	20			
	Vol sample (l)	30	19	18		7	10	10	1	10	10		30		10	8	18	5	18	20	18	9	10	18	19	3	1	20			
	Vol flot (ml)	3	16	c 1400		3	9	75	21	130	16		c 700		c 300	21	78	c 300	23	120	3	2	13	49	20	2	<1	45			
	% Flot sorted			50									25																	
	% Flot scanned				50									75																
Latin Name	English																													
Anthemis cotula L.	stinking chamomile																1		1					1							
Eleocharis palustris/uniglumis	spike-rush												2																		
Carex sp(p).	sedge			3	+	4				1			7	+	1		4	2	2			1	2								
Lolium temulentum L.	darnel							1										1													
Lolium spp.	rye-grass	2																													
Lolium/Festuca sp.	rye-grass/fescue																	1													
cf *Bromus* sp.	?brome						1																								
Poaceae indet.	wild grasses (large seeds)	1						2		1							1		1	1	2										
Poaceae indet.	wild grasses (small seeds)	1				4							5	+	2		3	1	2		2		1			1					
Poaceae indet.	wild grass/cerealculm node			+	+		+	+		+	+		++	++	+			+	+	+		+			+			+		
indeterminate	thorn fragments			+	+			+		+				+			+	+										+		
indeterminate	root/rhizome fragments			++	++	++	++			+++	+		++ +	++ +	+++	++	++	+++	++	+++	++	+	+	+	+	+			+		
indeterminate	wood charcoal	++ +	+++	+++++		+++++	+++++	+++++	+++++	+++++	+++++		+++++		+++++	+++++	+++++	+++++	+++++	+++++	+++++	+++	+++++	+++++	+++++	+++++	++	++++ +			
Total number of quantified charred plant items		70	14	55		22	12	35	4	30	4		275		120	8	182	170	69	44	62	5	11	9	22	5	3	29			
Item density of charred remains (per litre of processed soil)		2.3	0.7	6.1 e		3.1	1.2	3.5	4	3	0.4		36.7e		12	1	10.1	34	3.8	2.2	3.4	0.6	1.1	0.5	1.2	1.7	3	1.5			

Key: **S** = post hole **K** = Kiln **D** = Ditch **P** = Pit
Item Frequency: + =1-105; ++=11-50; +++=51-100; ++++=101-250; +++++=>250 items.

Table 18: Charred plant remains

8 APPENDIX 3: ENVIRONMENTAL SAMPLES

Phase	L	G	Feature type	Feature no	Context	Sample	Flot vol (ml)	Charcoal (>,<2mm)	Charred grain	Charred chaff	Charred seeds	Uncharred seeds	Bone	Snails	Insects	comments
1	1	3	Pit	303	304	1.00	3	1,2	3		1	1			1	Mod nos poorly preserved charred grains & occ charred seeds; traces of potentially id'ble charcoal fragments; occ uncharred seeds (*Chenopodium, Sambucus*); occ beetle fragments; some clinker; >sediment crumb
2	4	8	Pit	1035	1036	10.00	c 1400	5,5	3	1	2	2	1		1	Mod nos charred grains, occ charred chaff fragments & small nos charred seeds; occ charred culm nodes; >potentially id'ble charcoal fragments (including >4mm, chracoal mainly small roundwood/twig fragments); good amount of charred roots/rhizome fragments; small nos uncharred seeds (*Atriplex/Chenopodium*); occ small indet bone & beetle fragments; occ clinker; 50% flot sorted & 50% scanned
2	4	13	Pit	1070	1071	11.00	20	3,5	2		1	3	1		1	Small nos poorly preserved charred grains & occ charred seeds; mod good nos potentially id'ble charcoal fragments (including >4mm and small roundwood fragments); mod nos uncharred seeds (*Sambucus, Solanum nigrum, Atriplex/Chenopodium, Urtica*); occ indet bone & beetle fragments; some roots & clinker
2	4	12	Ditch	1101	1103	12.00	49	4,5	1		1	2		1	1	Occ charred grains & traces of charred seeds; good nos potentially id'ble charcoal fragments (including >4mm and small roundwood fragments) & occ charred root/rhizome fragments; small nos uncharred seeds (*Sambucus,Chenopodium, Betula*); occ snails & beetle fragments; occ clinker
2	4	10	Kiln	1119	1120	13.00	78	3,5	3		3	1			1	Mod good nos charred grains & good nos charred seeds; good nos potentially id'ble charcoal fragments (including >4mm) & mod nos charred root/rhizome & stem fragments; occ uncharred seeds (Lamiaceae, *Sambucus,Chenopodium*); occ beetle fragments
2	4	10	Kiln	1119	1121	14.00	23	4,5	2		3	2				Mod nos charred grains & mod good nos charred seeds; good nos potentially id'ble charcoal fragments (including >4mm) & small nos charred root/rhizome & stem fragments; small nos uncharred seeds (*Atriplex/Chenopodium*); occ clinker fragments
2	4	11	Kiln	1122	1123	15.00	3	2,3	3		2	1			1	Mod nos poorly preserved charred grains & small nos charred seeds; small nos potentially id'ble charcoal fragments & charred root/rhizome fragments; occ uncharred seeds (*Chenopodium*); occ beetle fragments
2	4	13	Pit	1070	1071	16.00	2	1,4	1		1	1			1	Occ charred grains & seeds; very occ potentially id'ble charcoal fragments; occ charred root/rhizome fragments; occ uncharred seeds (Betula, *Chenopodium*); occ beetle fragments; occ clinker;mod amount of sediment crumb
2	4	13	Pit	1072	1073	17.00	<1	1,2	1			1				Trace charred grain & potentially id'ble charcoal; occ uncharred seeds (*Betula*); mainly roots
2	4	11	Kiln	1133	1138	18.00	2	2,3	1		1	1			1	Occ charred grains & occ culm nodes and charred seeds; small nos potentially id'ble charcoal fragments; occ charred root/rhizome fragments; occ uncharred seeds (*Sambucus, Solanum nigrum, Chenopodium*); occ beetle fragments; some fine sediment crumb
2	3	7	Structure	1149	1150	19.00	16	2,3	2		1	3				Small nos charred grains & occ charred seeds; small nos potentially id'ble charcoal fragments; mod nos uncharred seeds (*Atriplex/Chenopodium, Rubus, Betula*); > amount of clinker& occ hammerscale; good amount of fine sediment crumb & roots

Phase	L	G	Feature type	Feature no	Context	Sample	Flot vol (ml)	Charcoal (>,<2mm)	Charred grain	Charred chaff	Charred seeds	Uncharred seeds	Bone	Snails	Insects	comments
2	4	13	Pit	1183	1186	20.00	45	3,5	2		1	4	1	1	1	Mod nos charred grains & very occ charred culm nodes & seeds; mod good nos potentially id'ble charcoal fragments (including >4mm); good nos uncharred seeds (*Sonchus, Persicaria lapathifolia, P. maculosa, Potentilla, Eleocharis, Atriplex/Chenopodium, Rubus, Sambucus*); occ small bone fragments; occ snails; occ beetle fragments; occ clinker; some roots; godo amount of sediment crumb
2	4	10	Kiln	1119	1120	21.00	c 300	5,5	2	1	3		3			Small/mod nos charred grains, occ charred chaff & culm node fragments & good nos charred seeds; >nos potentially id'ble charcoal fragments (including >4mm & good nos small round wood/twig fragments) & good amount of charred root/rhizome fragments; mod nos small mammal/bird bone fragments; occ clinker
2	4	11	Kiln	1106	1043	22.00	120	5,5	2	1	2	1	1		1	Small/mod nos charred grains, occ charred chaff & culm node fragments & small nos charred seeds; very good nos potentially id'ble charcoal fragments (including >4mm & small round wood fragments) & mod nos charred root/rhizome fragments; occ uncharred seeds (*Fallopia convulvulus, Atriplex/Chenopodium*); occ beetle fragments & small bone fragments; mod amount of clinker & >sediment crumb
2	4	9	Kiln	1220	1212	23.00	c 700	5,5	3	1	3	1			1	Good nos charred grains, occ charred chaff fragments & good nos charred seeds; occ charred culm nodes; >potentially id'ble charcoal fragments (including >4mm, chracoal mainly small roundwood/twig fragments); good amount of charred roots/rhizome fragments; occ uncharred seeds (*Atriplex/Chenopodium*); occ beetle fragments; 25% flot sorted & 75% scanned
2	4	9	Kiln	1220	1214	24.00	c 300	5,5	2	1	3				1	Small/mod nos charred grains, occ charred chaff & culm node fragments & good nos charred seeds; >potentially id'ble charcoal fragments (including >4mm & small round wood/twig fragments) & >nos charred root/rhizome fragments; occ beetle fragments & worm eggs
2	4	9	Kiln	1281	1233	25.00	21	3,5	1			1				Very occ charred grains; good nos potentially id'ble charcoal fragments (including >4mm and small round wood fragments) & small nos root/rhizome fragments; occ uncharred seeds (*Atriplex*); mod amount of clinker
2	4	9	Kiln	1220	1207	28.00	16	3,5	1		1					Very occ charred grains, culm nodes & seeds; mod nos potentially id'ble charcoal fragments & small nos charred root/rhizome fragments; some roots
2	4	11	Kiln	1281	1225	29.00	13	3,5	1	1	1	1			1	Very occ charred grains, chaff and weed seeds; mod good nos potentially id'ble charcoal fragments (including >4mm) & occ root/rhizome fragments; occ uncharred seeds (*Betula*); occ beetle fragments; some sediment crumb
2	4	8	Kiln	1307	1311	33.00	130	5,5	2	1	2	1				Small nos charred grains, occ charred chaff & culm node fragments & small nos charred seeds; very good nos potentially id'ble charcoal fragments (including >4mm & small round wood fragments) & mod nos charred root/rhizome & stem fragments; occ uncharred seeds (*Sambucus, Chenopodium*); small amount of clinker& sediment crumb
2	4	8	Kiln	1307	1309	34.00	9	3,5	1		1	1				Small nos charred grains & occ charred culm nodes & seeds; mod good nos potentially id'ble charcoal fragments (including >4mm and small roundwood fragments); charred root/rhizome fragments; occ uncharred seeds (*Chenopodium*); occ clinker fragments
2	4	8	Kiln	1307	1310	35.00	75	5,5	2	1	1	1				Small nos charred grains, occ charred chaff & seeds; good nos potentially id'ble charcoal fragments (including >4mm & small round wood fragments) & mod nos charred root/rhizome & stem fragments; occ uncharred seeds (*Sambucus, Atriplex*); occ clinker

Phase	L	G	Feature type	Feature no	Context	Sample	Flot vol (ml)	Charcoal (>,<2mm)	Charred grain	Charred chaff	Charred seeds	Uncharred seeds	Bone	Snails	Insects	comments
2	4	8	Kiln	1307	1310	36.00	21	3,5	1		1					Very occ charred grains & seeds; mod good nos potentially id'ble charcoal fragments & small nos charred root/rhizome & stem fragments
2	4	8	Kiln	1307	1308	37.00	3	2,5	2	1	1					Occ charred grains & seeds & traces charred chaff; small nos potentially id'ble charcoal fragments & root/rhizome fragments; occ clinker fragments

Key: L = Landscape area **G** = Group
Item Frequency: 1 = 1-10; 2 = 11-50; 3 = 51-100; 4 = 101-250; 5 = >250 items

Table 19: Biological remains in the flots

9 APPENDIX 4: CHARCOAL

Group	8					9				10			11		12	13	
Group type	Earliest kiln and burnt layer					First phase of large kiln construction				Stokehole			Kiln G9 remodelling		Soakaway	Pit group north of kiln	
Feature type	Pit 1035	Kiln 1307				Kiln 1220		Kiln 1281		Kiln 1119			Kiln 1106	Kiln 1281	Ditch 1101	Pit 1070	Pit 1183
Sample no.	10	33	34	35	36	23	24	28	25	13	14	21	22	29	12	11	20
Cytisus/Ulex broom/gorse	1r	8r	+	6r	+	11r	14r			++	++	14r	11r	+	9r	++	8r
Prunus spinosa/domestica blackthorn/plum													1				
Prunus avium L. wild cherry							1r										
Maloideae hawthorn etc.	1r		+														1r
Rubus sp. bramble						1r											
Ulmus sp. elm	2	1					2			+	+	5 (r)	5		2		1
Quercus sp. oak				1		1h							2r				1r
Corylus avellana L. hazel																	3r
Populus/Salix poplar/willow	1																
Ericaceae heather	22r	21r	+	22r	+	16r	13r	++	+	++	++	10r	10r	+	19r	++	16r
Fraxinus excelsior L. ash	3s			1r		1r				+	+	1	1				

Key: r = roundwood; **h** = heartwood; **s** = sapwood; brackets denotes present in some frags only; ++=frequent; +=present

Table 20: Charcoal from L4 kilns and associated deposits

10 APPENDIX 5: ARCHAEOMAGNETIC DATING

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Archaeomagnetic dating of structure 1248, Sandy Lane, Everton.

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Executive summary

- Ten oriented samples were taken from the burnt floor of the kiln.
- The mean archaeomagnetic direction was dated using a regional field model that generated a reference curve at the location of the kiln.
- Two possible ages for the last use of the kiln were identified: 1084 – 1330 CE and 1497 – 1539 CE.

Table 1. Summary of key results.

Structure	1248			
Location	Sandy Lane, Everton			
Latitude	52.14° N			
Longitude	-0.25° E			
Number of samples	**Number of accepted samples**	**Mean declination**	**Mean inclination**	**95% angular confidence limit**
10	6	16.8°	56.7°	7.5°
Ages	1084 – 1330 CE 1497 – 1539 CE			

Site details

A total of 10 samples were taken from an area spanning approximately 1 m^2 of the burnt floor of the kiln using the button method (Fig. 1). All samples were oriented using a magnetic compass. In the laboratory, the samples were trimmed using a small hacksaw blade and sandpaper, until they fit into standard sample holders.

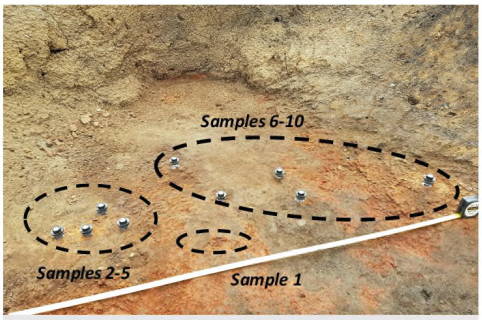


Figure 1. Sample distribution.

Archaeomagnetic results

The initial natural remanent magnetisation (NRM) intensities ranged between 0.04 and 3.59 A m^{-1}. Stepwise alternating field demagnetisation revealed a single, northerly characteristic NRM component in samples 6-10 (Fig. 2a). This is typical of well-heated samples that carry a stable archaeomagnetic direction. These samples also had high NRM intensities, another characteristic of well-heated material.

Samples 2-5 had low NRM intensities and did not exhibit a stable archaeomagnetic direction, which most probably indicates that they were heated to lower temperatures.

Sample 1 (Fig. 2b) had a low initial NRM intensity, yet yielded a northerly component of magnetisation that was demagnetised by 20 mT. This is likely an intermediate case, where the sample was heated to a moderate temperature. The component identified between 0-20 mT has been taken as its characteristic NRM component, representing the archaeomagnetic direction acquired during the partial heating.

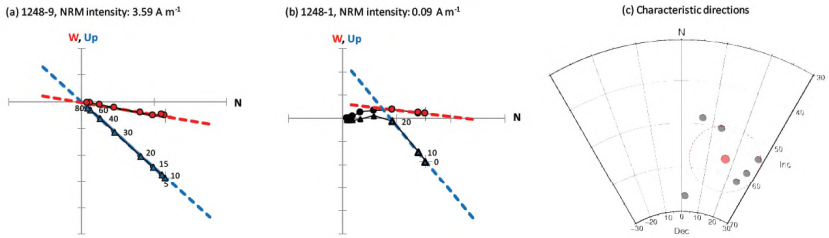


Figure 2. Representative demagnetisation plots and characteristic directions. (a) A well-heated sample and (b) a moderately heated sample. [The red/blue dashed lines indicate the characteristic direction projected on the horizontal (N-W)/vertical (N-Up) plane.] (c) Characteristic directions, with the mean direction and its 95% angular confidence limit shown in red. [Dec = declination, Inc = inclination.]

The mean archaeomagnetic direction was calculated using Fisher (1953) statistics from samples 1 and 6-10, with the results summarised in Table 1 and Fig. 2c. An easterly mean declination of 16.8° and a moderate mean inclination of 56.7° was obtained. The 95% angular confidence limit of 7.5° is relatively large as a consequence of the small number of sample directions used to calculate the mean direction.

Archaeomagnetic dating

An archaeomagnetic date was obtained using the SCHA.DIF.3K regional archaeomagnetic model (Pavon-Carrasco et al., 2011), which compares the mean archaeomagnetic direction with a model of the archaeomagnetic field calculated for the site coordinates. The results are summarised in Table 1 and Fig. 3, giving two possible dates for the last use of the kiln, of 1084 – 1330 CE and 1497 – 1539 CE at the 95% confidence limit. Neither date can be rejected on archaeomagnetic grounds. The relatively large age range is due to the large uncertainty in the mean archaeomagnetic direction, itself a consequence of the small number of samples used in its determination.

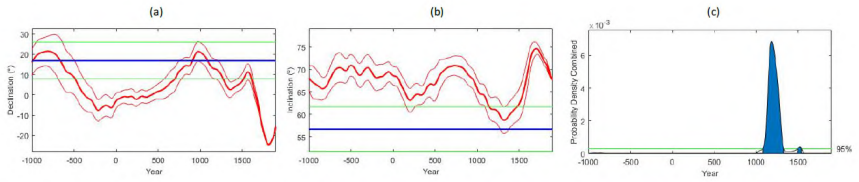


Figure 3. Archaeomagnetic dating. (a) Declination and (b) Inclination. [Reference curves and their error envelope shown in red, archaeomagnetic results and their error envelope shown in blue and green respectively.] (c) Probability density function from combined declination and inclination results. [Highlighted in blue at the 95% confidence limit.]

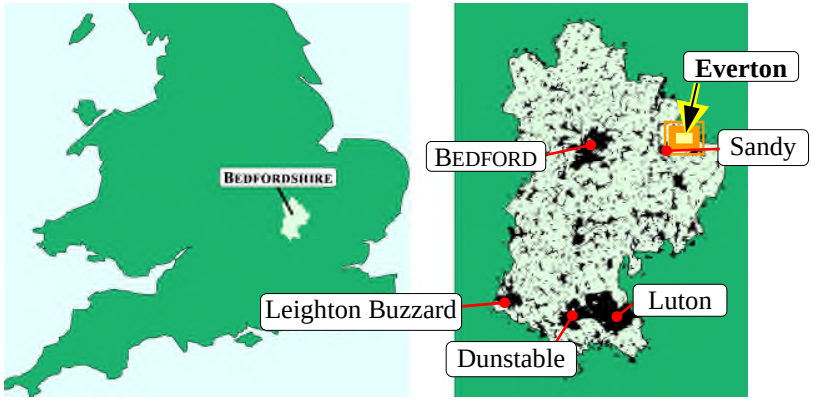
Conclusions

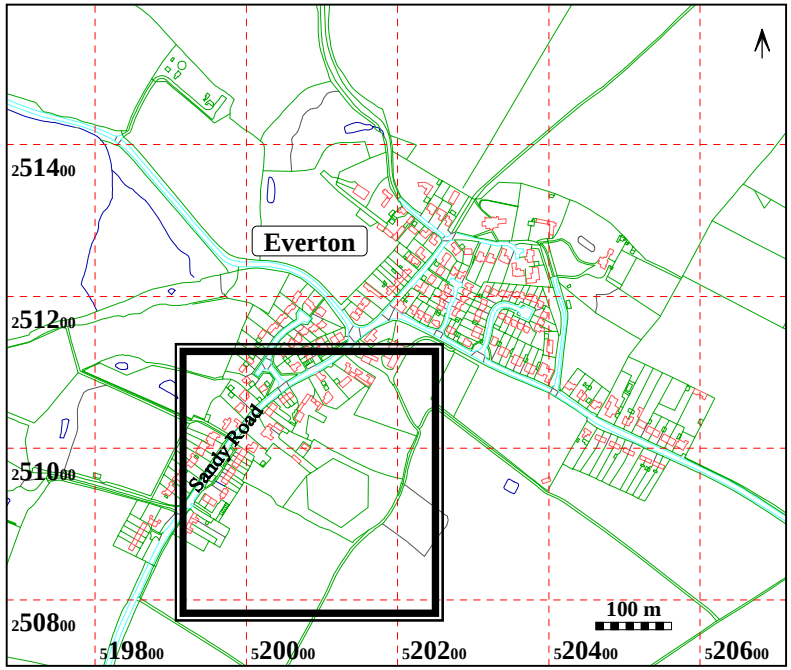
Ten oriented samples were taken from the burnt floor of the kiln, of which six were heated strongly enough to yield a stable archaeomagnetic direction. The mean direction was dated using the SCHA.DIF.3K regional archaeomagnetic model (Pavon-Carrasco et al., 2011), yielding two possible ages for the last use of the kiln: 1084 – 1330 CE and 1497 – 1539 CE. Neither age can be rejected on archaeomagnetic grounds.

References

Fisher, RA. 1953. Dispersion on a sphere. Proceedings of the Royal Society of London A, 217, 295-305.

Pavon-Carrasco, FJ, Rodriguez-Gonzalez, J, Osete, ML & Torta, JM. 2011. A matlab tool for archaeomagnetic dating. Journal of Archaeological Science, 38 (2), 408-419.





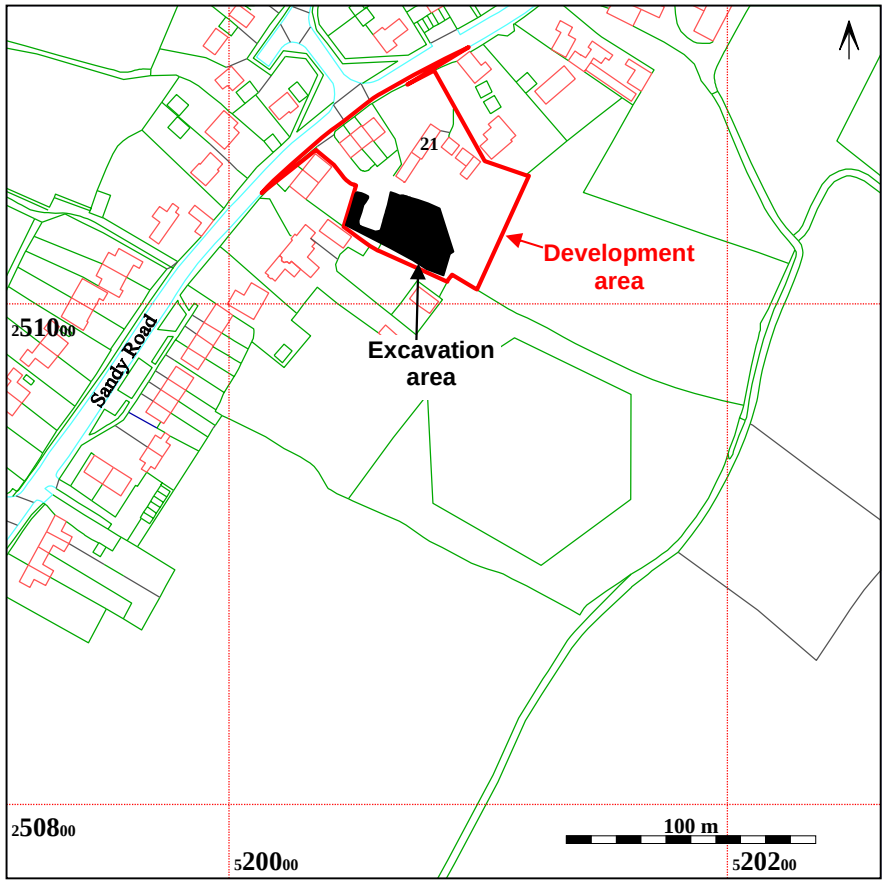


Figure 1: Site location plan

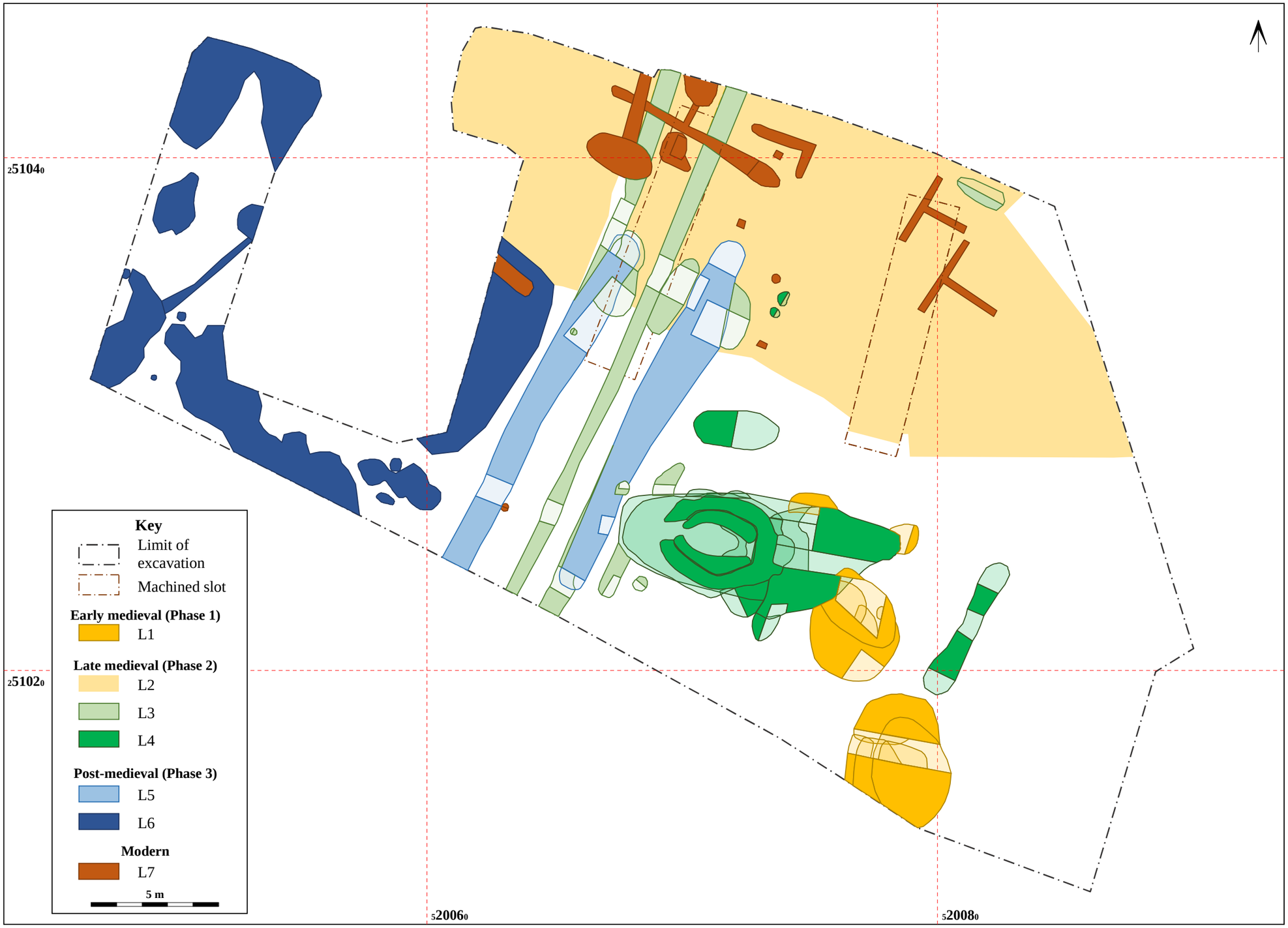
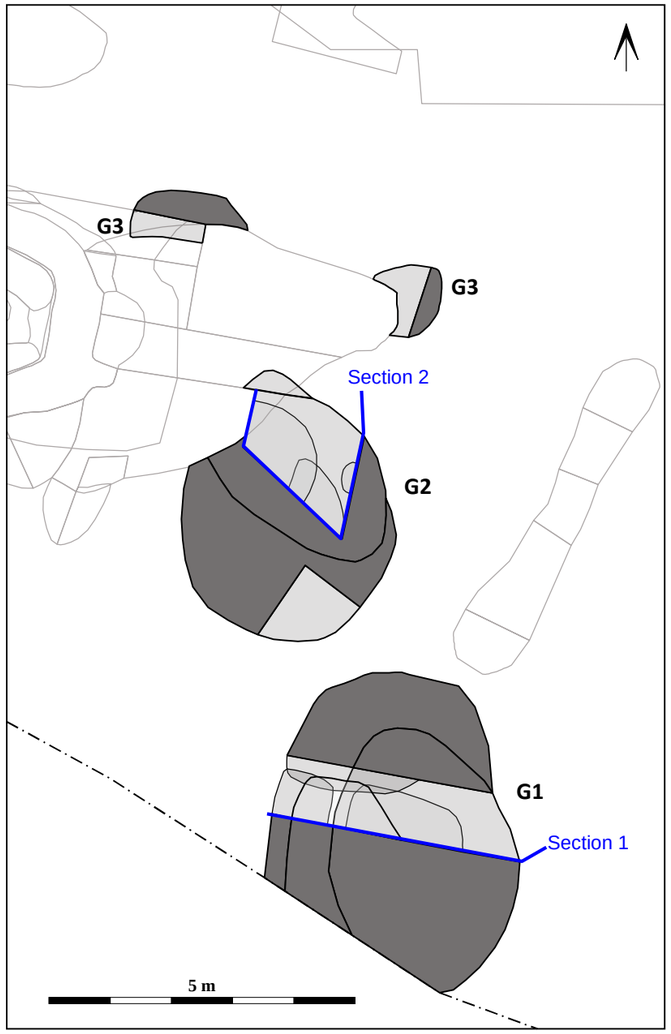
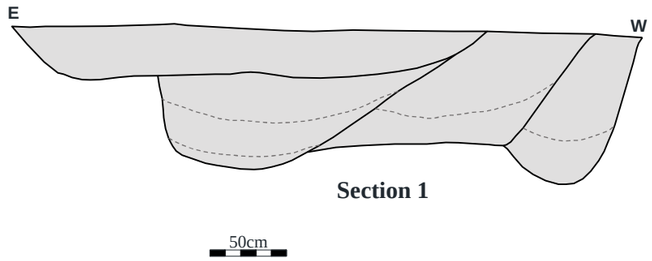
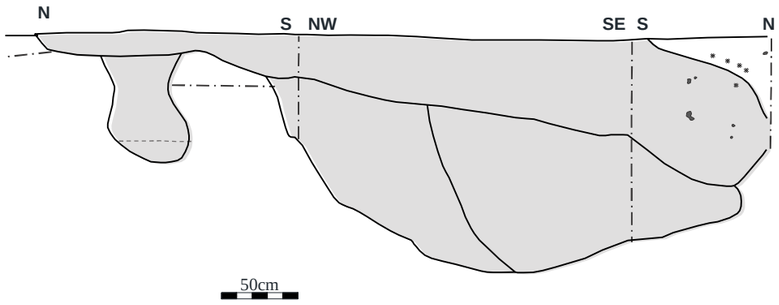


Figure 2: All-features plan showing Land-use Areas (L)





Section 1

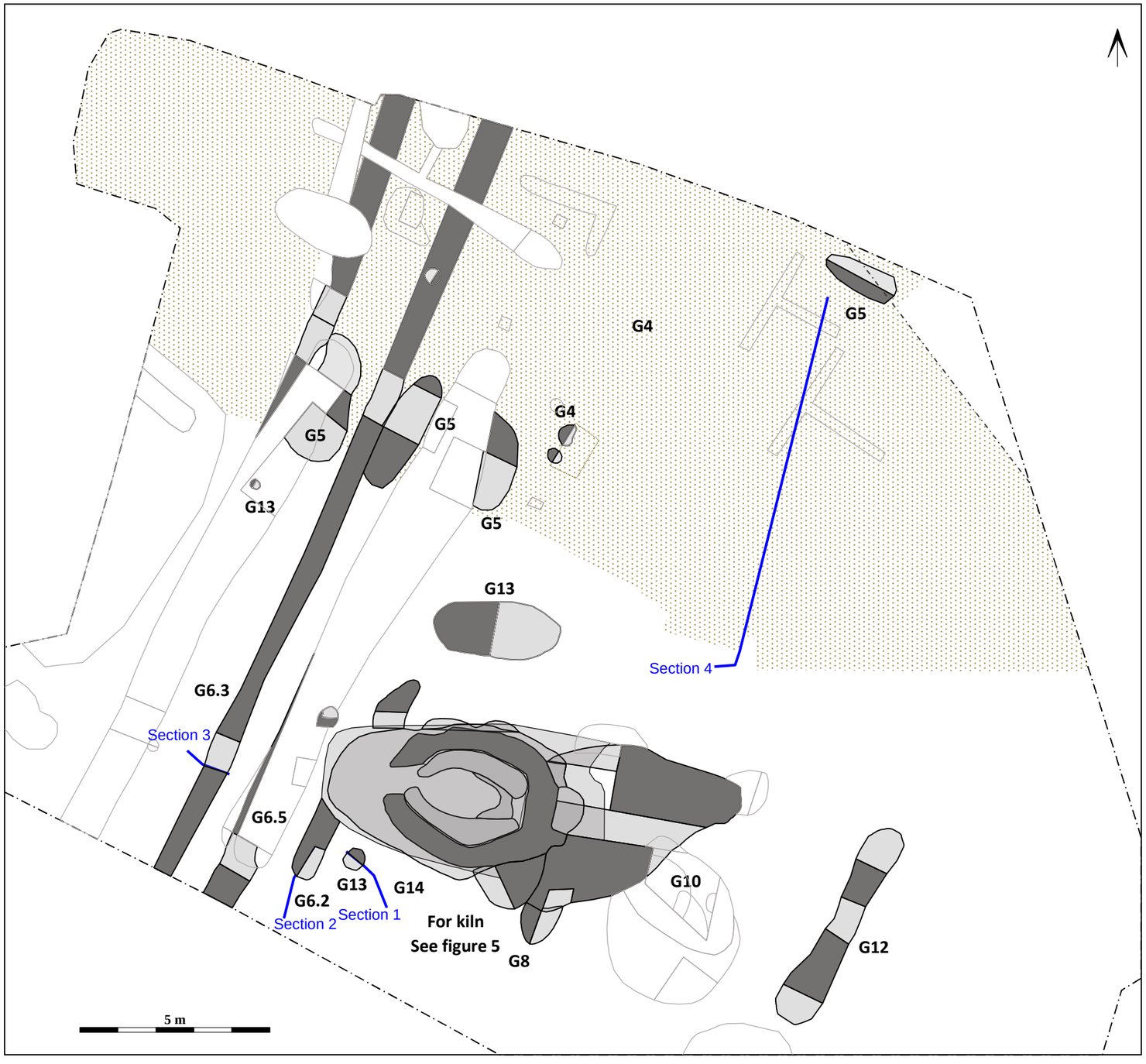


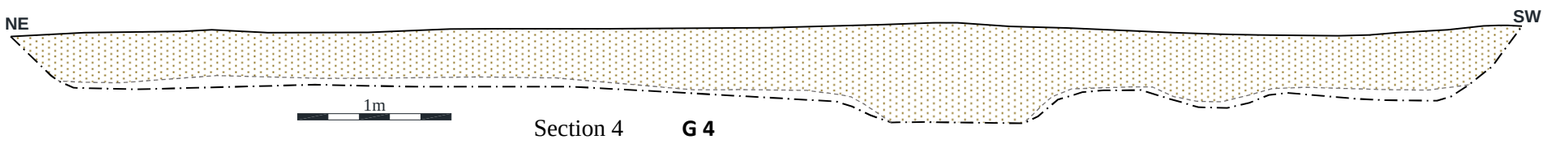
Section 2

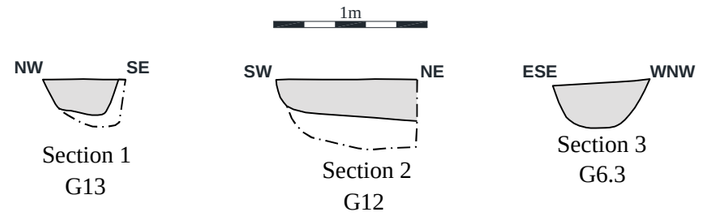
G1, looking ENE (scale 1m)

G2, looking SWS (scale 1m)

Figure 3: Plan of Phase 1 features with selected sections and photographs

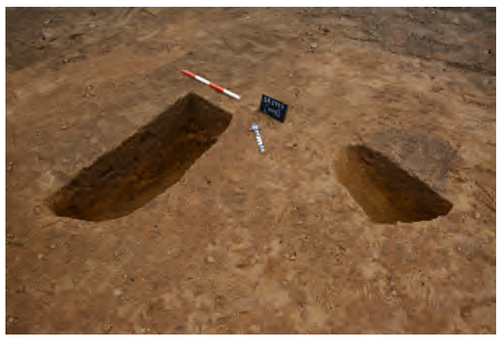






G4 layer, machine slot, looking NNE (scale 1m)

G6.3, looking south-west (scale 0.4m)



G6.2 and G13, looking north (scale 0.4m)

Figure 4: Plan of Phase 2 features with selected sections and photographs

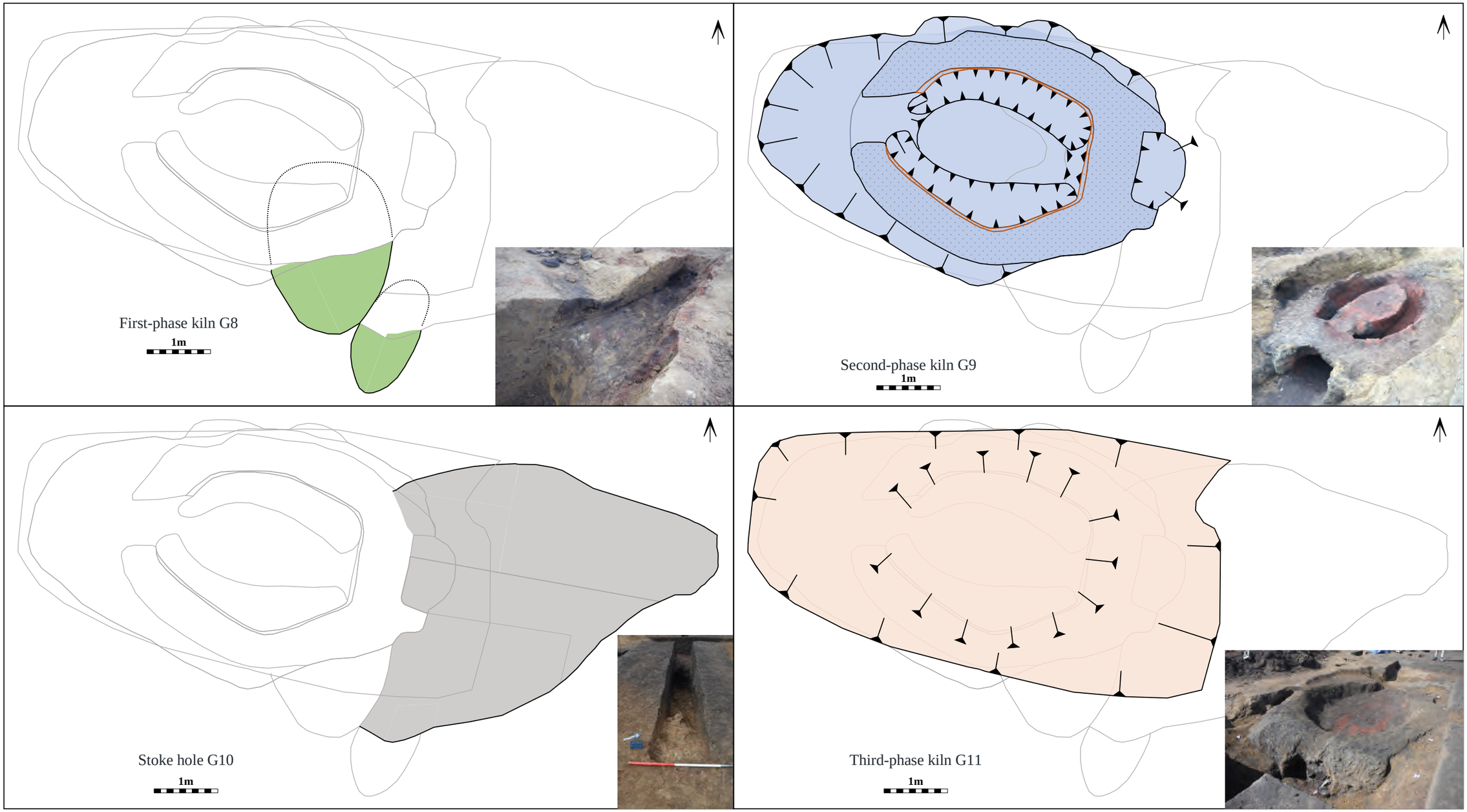
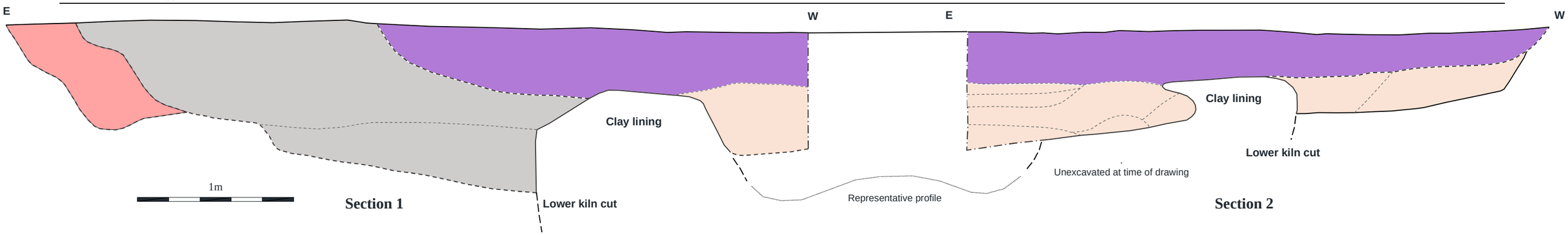
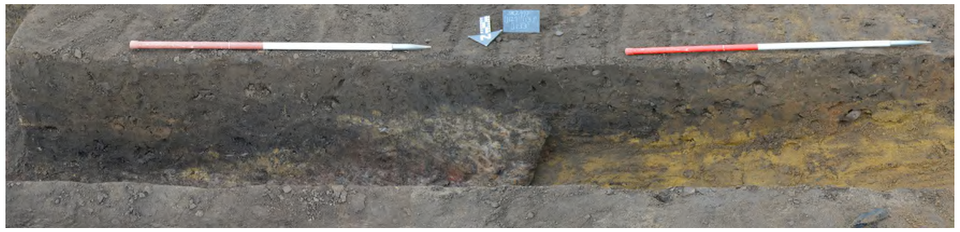


Figure 5: Kiln phase plan and representative photographs

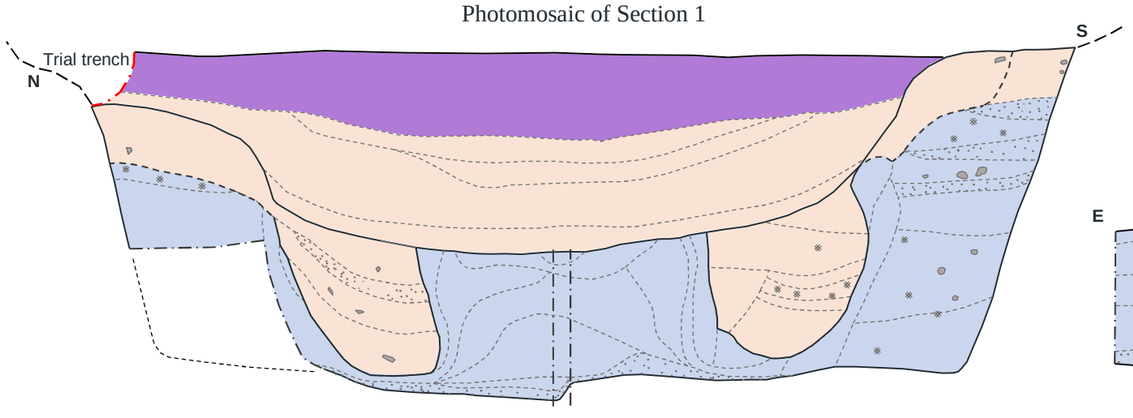


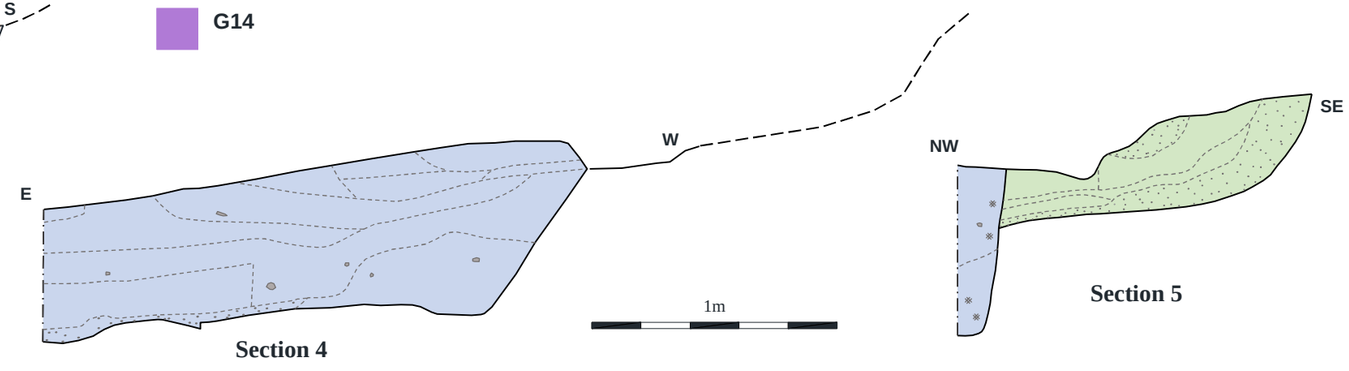
Photomosaic of Section 1

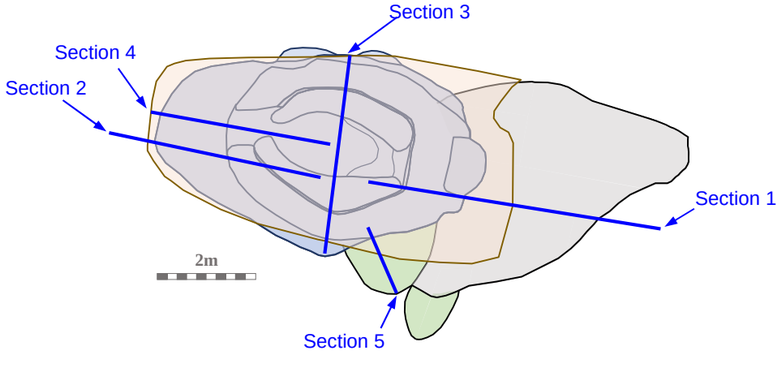
G2
G8
G9
G10
G11
G14

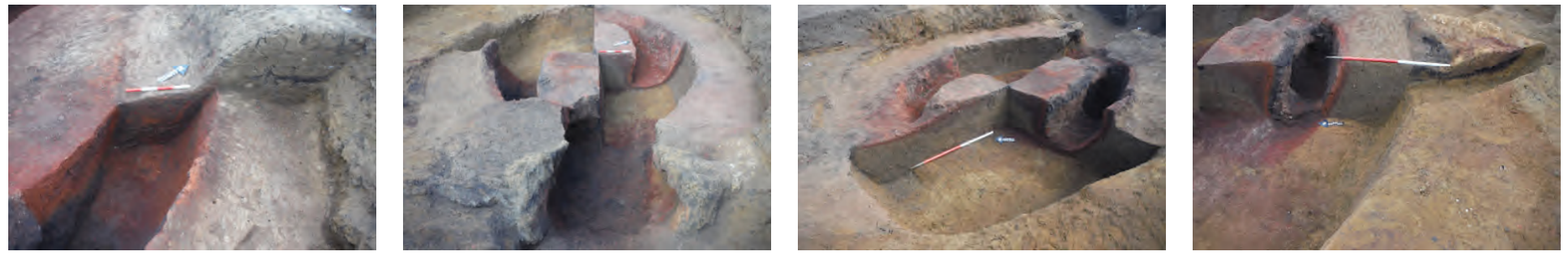


Photomosaic of Section 2









Photographs showing kiln quadrants

Figure 6: Kiln sections and photographs

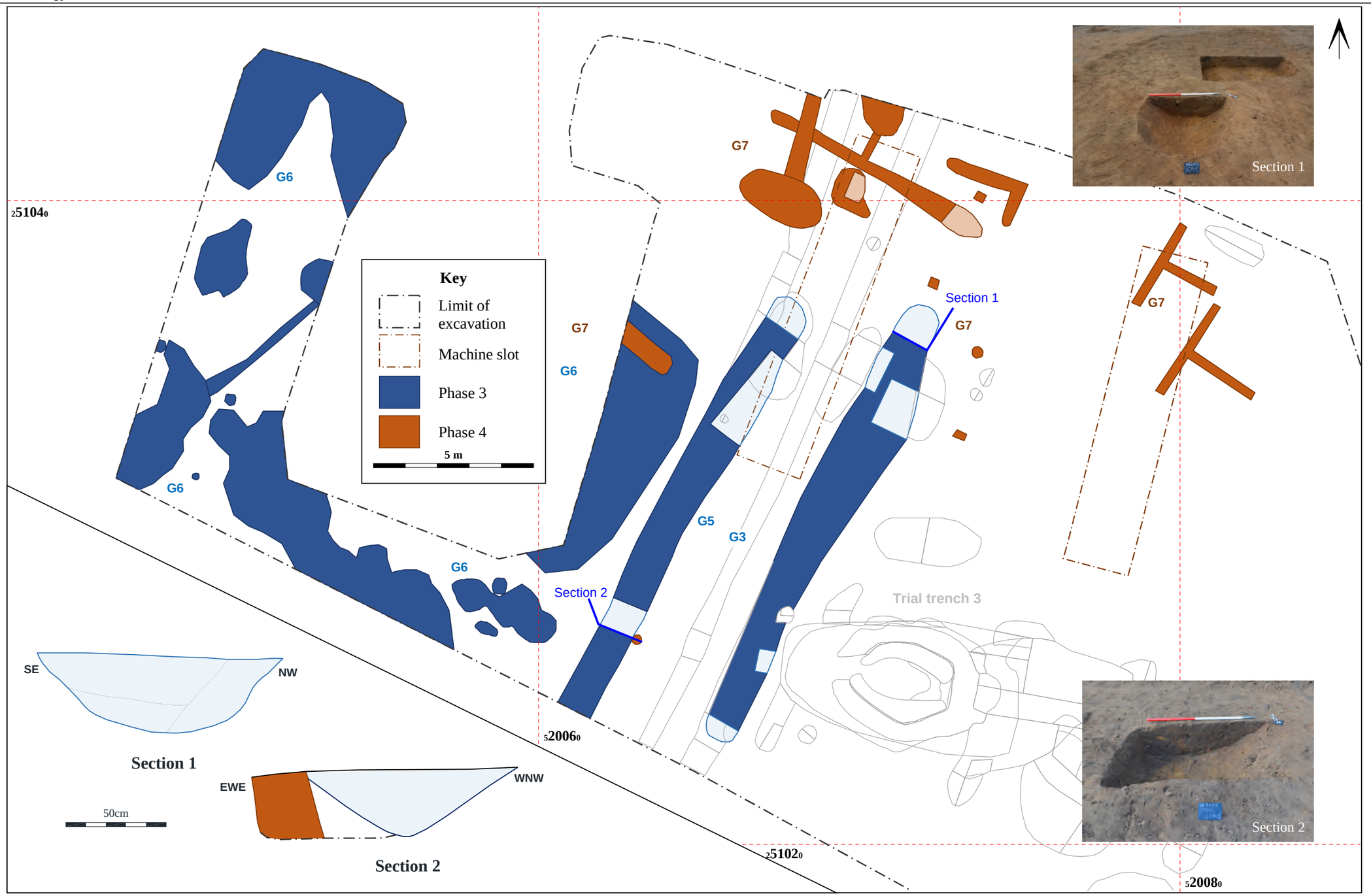


Figure 7: Plan of Phase 3 and 4 features with selected sections and photographs

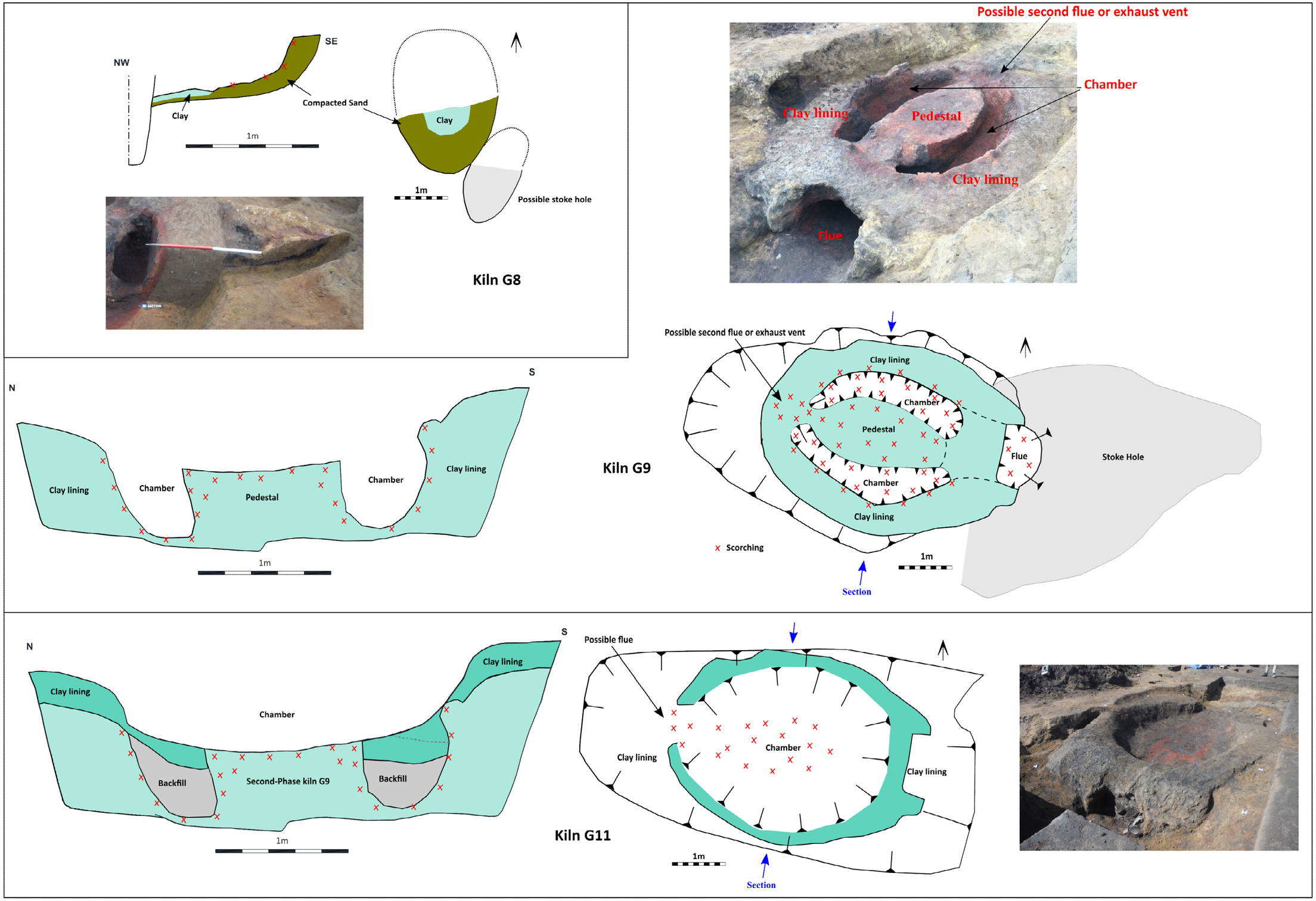


Figure 8: Simplified kiln sections and plans with representative photographs

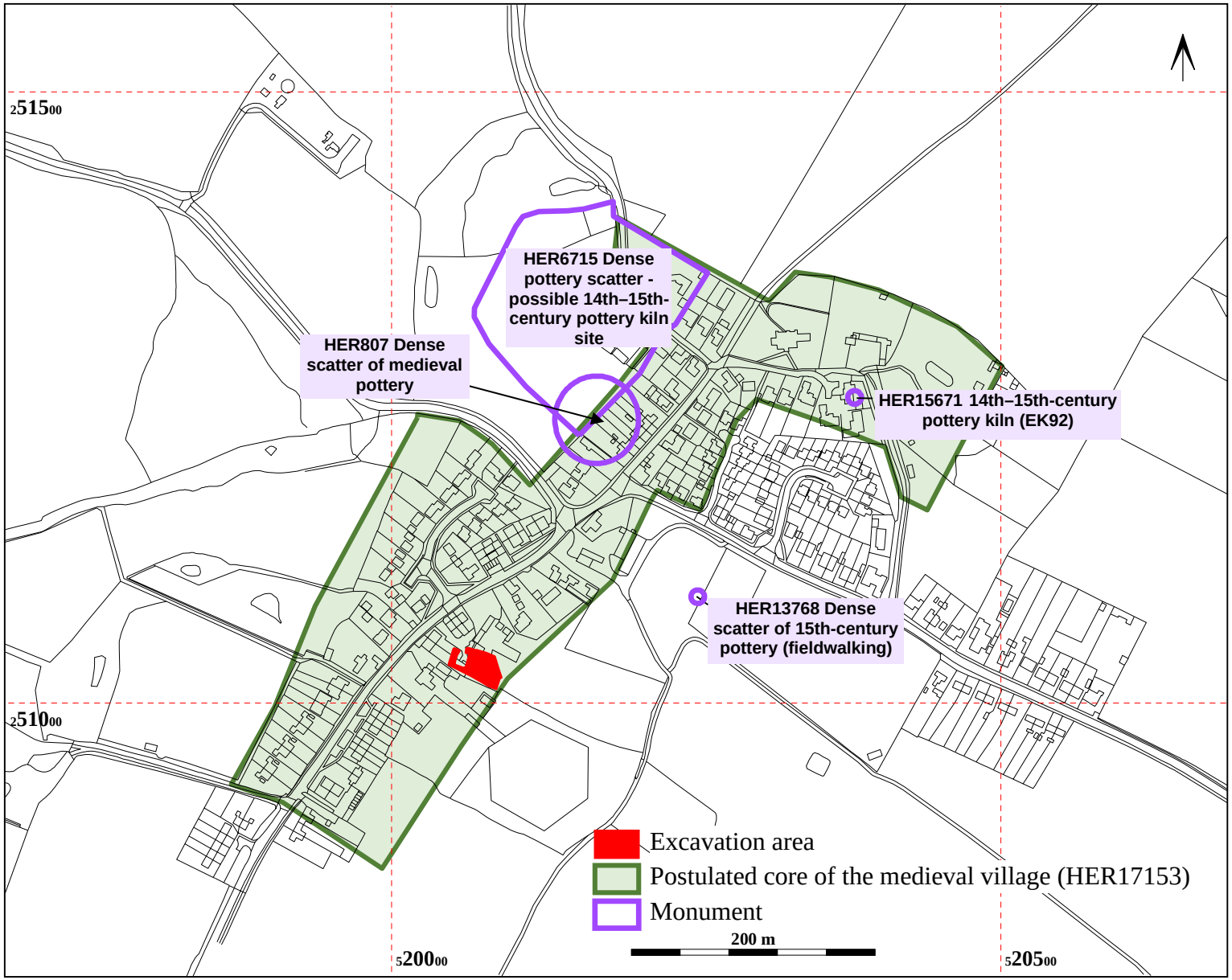


Figure 9: Selected heritage assets in the vicinity of the excavation

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