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LINDSEY ARCHAEOLOGICAL SERVICES

Linwood Road Market Rasen

Site Code: MRL 99

NGR: TF 111 885

Archaeological Investigation

Assessment Report

for

For Hugh Bourn

Developments (Wragby) Ltd

LAS Report No. 525

July 2001

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M1/26.

Fig. 1 Location of the Market Rasen Linwood Road site (C based on the 1956 Ordnance Survey 1:25,000 map Sheet TF 19. © Crown copyright, reproduced at reduced scale with the permission of the Controller of HMSO. LAS Licence No. AL 100002165).

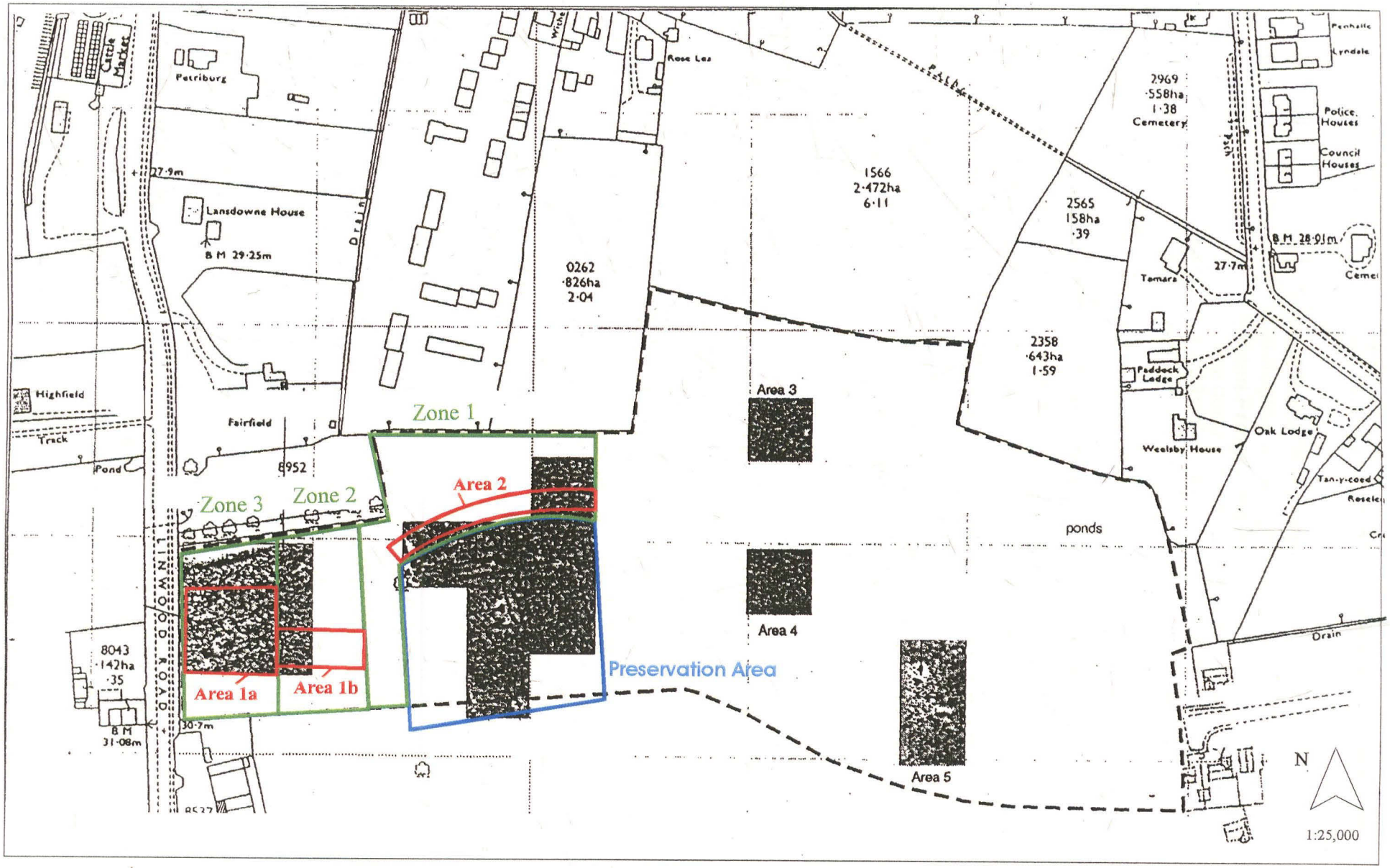

Fig. 2 Plan showing areas of geophysical investigation, evaluation and areas of subsequent archaeological investigation (after Johnson 1998).

Linwood Road Market Rasen
Archaeological Investigation
Updated Project Design
Site Code: MRL 99
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Summary

Following archaeological evaluation and geophysical survey on the site excavation was targeted in two areas. Area 1 on the west side of the site, adjacent to Linwood Rd revealed numerous intercutting quarry pits of Roman date. To the east were features probably associated with phases of pottery manufacture including settling tanks and possible drying areas. A single kiln was excavated in Area 2 along with pits and ditches containing pottery production waste. The site is one of the most extensive excavated areas in Lincolnshire associated with pottery production and can provide information on the chronology and distribution of pottery from this important production area.

Introduction

Lindsey Archaeological Services was commissioned by Hugh Bourn Developments (Wragby) Ltd to undertake an archaeological excavation at Linwood Road, Market Rasen, Lincolnshire. The excavation was carried out according specification prepared by Pre-Construct Archaeology (Lincoln) and amended by a letter dated March 1999, and the general requirements of the Archaeology Section of Lincolnshire County Council as set out in the Archaeological Handbook (Lincolnshire County Council 1998).

Site Location and Description

The development site lies immediately south-east of Market Rasen. It is irregular in plan and is defined to the west by Linwood Road and to the north and east by field and/or property boundaries.

The development site measures approximately 6.7 ha in extent and at the time of the excavation was largely under stubble and weed. The area set aside for archaeological investigation covered 0.36ha in the western half of the development. This comprised Excavation Area 1 adjacent to the western boundary of the site (2315m^2) and Excavation Area 2 which extends east along the proposed access road and is (600m^2).

Planning Background

The land falls within the area designated as residential in the West Lindsey local plan. Planning permission was granted for residential development comprising 50 houses, subject to archaeological investigations on the site.

Archaeological Background

There are no prehistoric finds recorded from the vicinity of the site, the nearest recorded remains being a possible prehistoric enclosure located 1km to the SE and a flint axe found in 1905, 2km to the SE.

There is very little known about the Roman settlement in the area although extensive pottery production is known from an area south east of the modern town extending into the adjoining parish of Linwood. This production centre is part of a group with further kiln sites at Claxby and Walesby.

Evaluation to the north of the current development site by Lindsey Archaeological Services in October 1998 revealed the presence of kilns and associated features.

Two fragments of hanging bowl mounts, three sleeve-clasps and part of a cruciform brooch have been found, indicating the likely presence of an early Anglo Saxon inhumation cemetery in the vicinity of Market Rasen, although the focus of the Saxon settlement in not known. The site lies beyond the core of the medieval settlement which developed into Market Rasen.

Previous Work

A full summary of previous work on the site is contained in the mitigation strategy prepared by Pre-construct Archaeology (1998). The programme comprised a desk top study, fieldwalking, geophysical survey and evaluation trenching.

The geophysical survey was carried out by Oxford Archaeotechnics, which identified areas of magnetic anomaly indicative of archaeological remains. Subsequent evaluation trenches revealed evidence of pottery production in the form of quarry pits and deposits of production waste material, although the kilns themselves were notable in their absence. The dating of the majority of pottery from the evaluation was late 3rd century.

The density of features identified during the evaluation, some of which were not identified by the geophysical survey gave some indication of the complexity of the site. Also six pieces of iron slag were found which were thought to indicate other industrial activity on the site.

Aims of the Mitigation Programme of Excavation

The aims of the mitigation strategy prepared by PCA identified an area of high archaeological potential which was incorporated into the housing scheme as public open space in order to preserve the remains in situ. Two other areas where the archaeological remains, although

less well preserved, were in the greatest danger from the development were designated for excavation.

Area 1. (approximately 2400m2) situated immediately east of Linwood Road. This zone was deemed to be most at risk from the development. It constituted part of the frontage and extending back into a hollow area thought to be clay extraction pits.

Area 2. (approximately 500m2) extended along the proposed access road and cycle path. This area incorporated part of an area, which was sampled during the evaluation and geophysical survey. It was thought to be less well preserved than Area 1.

The specific site objectives were:

- To identify and excavate all (or a selection if numerous) pottery kilns located within the excavation areas in order to gain a better understanding of the kiln construction and technical processes
- To investigate related kiln structures and processing areas (e.g. quarry pits, potters workshops, drying sheds etc).
- To establish the date range of vessels being produced on the site and to compare the range found to other sites in the vicinity.
- To assess the range of products being produced on this site and consider their role in a regional context compared to other production sites
- To establish weather Parisian wares were being produced on the site
- To identify and excavate any other evidence for iron production on the site such as iron working, including evidence for smelting or smithing, and to consider the relationship between these industries
- To determine whether there is any domestic occupation on the site
- To record any other archaeological features of significance.

Method

Overburden was mechanically removed using a 1.6m wide toothless dyking bucket. The area were hand-cleaned to reveal features in plan. Carefully selected cross-sections through the features were excavated to enable sufficient information about form, development date and stratigraphic relationships to be recorded.

A full written (single context) and photographic record was made of the site, including site plans at a scale of 1:50, and section drawings at 1:20. In addition, further plans and sections will be made of individual features, or groups of features, as appropriate. A full photographic record was made during the progress of the excavation to cover each feature together with

general site shots. LAS operates a standard context recording system, developed by its staff over the past 20 years based on MOLAS and CAS models.

Excavation Results

All the features identified on the site were sectioned and a full written photograph and drawn record was kept. Sampling strategy varied depending upon the nature of the feature ranging from machining excavation of the quarry pits to 100% hand excavation of the kiln. This was taken in consultation with the curatorial archaeologist.

Many of the features were securely dated, primarily by pottery but had undergone truncation and in the case of the kiln had been severely disturbed by modern drainage pipes (although it was possible to retrieve much information on dating and structure).

The excavation records from the site comprise, 847 context sheets, 11 context registers, 1 small finds register, 1 levels register, 5 drawings registers, also 805 Photographs, 190 scale drawings on 42 sheets of drawing film together with site note book.

All the significant archaeological material from the site was dated to the Roman period (the only other was medieval ridge and furrow).

Area 1

Within this area there was extensive evidence for clay extraction, a machine section revealed an area of at least 50x50m of intercutting pits at the western part of this area which seems to have been filled rapidly with kiln waste. Two features were identified cut into the top of the backfilled pits both contained Roman pottery. The first was a small pit filled with ash and pottery possibly rake out material. The second a very small burnt area which also contained pottery; it seemed to be little more than a bonfire.

To the east of the quarrying in Area 1 numerous features dated by Roman pottery were identified. These consisted of pits and linear features along with a well and are tentatively identified as an area of water management features possible related to clay processing prior to firing. The fills of the features did not contain the same black pottery-rich material that characterised the production deposits identified elsewhere.

Area 2

This area largely consisted of pits and ditches quite different in character to features in the western part of area 1. They contained more pottery and burnt material probably relating to the kiln activity. Two small hearths was also located within the eastern part of the area along with a small number of postholes which may relate to a structure (drying shed?). A single kiln

and rake out pit was found in the area, which was fully excavated, and excavated, complete with the rake out pit. The western part of the site, again characterised by ditches and pits was different in kind with less material. Also two possible beam slots may represent structural evidence. At the extreme eastern part of the site features were identified which were much larger and again did not contain the waste material deposits identified elsewhere.

Watching Brief

The watching brief carried out on houses immediately of Area 2 did not reveal any significant further archaeology. There was a continuation of a number of ditches already identified during excavation into the house plots but no signs of industrial activity of any sort.

Statement of Potential

The excavation provides potential to further understand the spatial characteristics of the production site. It is possible that with further analysis different areas of the site will be identified to different parts of the production sequence.

A technical/typological analysis of the kiln will need to be carried out, comparing the kiln to other recorded examples in the area and elsewhere.

A comparison of the spatial characteristics of the site will be carried out which in order to further understand the structure of the site. Comparing excavated remains with pottery distribution will allow further understanding of the purpose of different area (see below). Also incorporating the environmental report will give a much better understanding to the nature and development of the site.

An analysis of the site with its local and regional context will be carried out to provide a better understanding of its role in the local and regional economy and its place within the regional settlement structure.

Pottery (Appendix 1)

The ceramic evidence forms a substantial part of this project. 9991 sherds were recovered weighing 312.878kg. The material was mostly from stratified contexts (66-72%) with the largest quantity coming from Area 2 where the kiln was located. The material is typical of a pottery production site with a small admixture of occupation debris. Over 90% of the material was grey ware with Parisian wares, Oxidised wares and Iron Age tradition coarse fabrics forming only 1% or more of the material. Very few sherds of mortaria and Samian wares were recovered from the site.

Statement of Potential.

The pottery dating evidence suggests that the site was in use to some extent throughout the Roman period with pottery ranging from Late Iron Age type through to late 4th century. This adds an extra dimension to the research as the pottery dating was initially thought to be largely confined to the late 3rd century.

Together with the excavation results the pottery is vital to understanding the:

- The spatial and chronological development of the site
- The use of particular areas site e.g. processing, storage or occupation areas.

Although there is no evidence, at this stage, that Parisian ware was manufactured on site the remaining objectives for the pottery remain true. The specific pottery research aims are:

- To establish the date range of vessels being produced and to consider the longevity of the pottery industry in the market Rasen area
- To assess the range of products being produced in Market Rasen and consider there role in a regional context compared to other production sites.

Environmental (Appendix 2)

Environmental samples from the site comprised 46 soil samples, 12 samples from auguring, six pieces of worked structural timber from a well, and a small collection of small roundwood. The natural soils on the site (Aeolian sands) meant that preservation was largely restricted to charred plant remains and charcoal.

Statement of Potential

The environmental assessment report identifies 4 possible research areas as identified in the environmental assessment report summarised as follows:

- The fuelling of the kilns is unusual with no incidence of larger wood fragments, brushwood or coppice wood. This is unusual and the fuelling of the kilns is of high priority.
- The character of the charred crop remains including there relative proportions of grain, chaff and weed seeds.
- The pollen and plant macrofossil data from the three waterlogged samples from the site should be analysed in order to obtain a picture of the environment of the site.
- The structural evidence from the well may give an indication of the local availability of timber and provide further information as to the reason behind the apparent lack of larger charcoal fragments as kiln fuel.

Potential Integration with Other Projects

Lincolnshire County Council Archaeological Section is currently in negotiation with English Heritage to fund the identification and publication of pottery from other kilns in the Market Rasen area, mainly recorded in the 1960s .

Publication

It is planned that the report will be published in Lincolnshire History and Archaeology unless the project becomes integrated with the larger Market Rasen project funded by English Heritage. Publication will have to be reassessed of such a large report could not be undertaken by the local journal unless in monograph form. The report has been planned to focus primarily on the pottery recovered from the site, including full description, analysis and discussion with drawings and selected photographs. The report contents will include:-

1. Background including geology, topography and archaeological background to the site.

2. The excavations. Description of methods used and narrative of the results. Site location with section drawings of significant features. A more detailed record of the kiln and the well will be produced.

3. Pottery. Full analysis and drawings.

4. Other specialist reports

4. Discussion. This will discuss the site within a local regional and national context and will describe the contribution the site has made to our archaeological knowledge.

The method of presentation will be primarily text with black and white line drawings and photographs. The pottery report will include graphs and tables although the number can not be specified at this stage.

Post Excavation Tasks Already Completed.

Preparation of Site Archive including cross checking of site records (paper, photographic and drawn). Site drawings.
Initial preparation of artefacts i.e. washing, marking and bagging.
Initial pottery quantification i.e. basic sorting and quantification.
Processing of environmental samples
Preparation of pottery and environmental assessment reports.

Post Excavation Work to be Completed

Task	Personnel	Time (Days)	Cost
Management			
Project Management	Mark Williams	4	480
	Naomi Field	6	960
Specialist Reports			
Roman Pottery	Margaret Darling	20	3000
Pot Drawings	Dave Hopkins	40	3200
Post Roman Pottery	Jane Young	0.5	75
Small Finds	Jen Mann	1	160
Environmental			
Charcoal I.D	R.Gale		850
Wood I.D	R.Gale		130
Charred plant I.D	J. Rackham		900
Pollen Analysis	J. Rackham		390
Waterlogged plant and insect I.D	J. Rackham		1000
Report production	J. Rackham		495
Excavation Report			
Text preparation	Mark Williams	20	2600
Illustrations	Mark Williams	6	984
Editorial work	Naomi Field	5	900
Publication costs*			3000
		Total	**£19124**

*subject to confirmation from printer
assumes joint publication with EH material

MRL 99

Chapter outline

Introduction

*Topography and setting of Market Rasen

*Archaeological background

*The Market Rasen Pottery Production sites and their discovery

Linwood road circumstances of the archaeological investigations

- Desk Top assessment
- Geophysical survey
- Evaluation trenches
- Strategy for fuller excavation

Excavation Results

- The areas of excavation
- The zoning of the production area
  - a) Quarry pits
  - b) Clay processing
    - Ditches
    - Pits
    - Well
  - c) The kiln
  - d) Ovens
  - e) Other features

*The Roman Pottery (M. Darling)

Environmental Report (J Rackham)

Other Finds Reports

Discussion

The insight that the Linwood Road site has given into the arrangement of pottery production and its importance in relation to the other sites.

The Kiln Construction and comparanda

The context of the market Rasen Pottery industry in relation to the soci-economic development of the region.

Conclusion

Acknowledgements

References

Illustrations

1. Location of Market Rasen
2. Site location
3. Site plans showing location of geophysical survey, evaluation and excavation trenches
4. The Geophysical survey results
5. Area 1 trench plan
6. Profile of quarry pits from auger survey
7. Sections representing pits and ditches
8. Well section and plan
9. Area 2 trench plan
10. Kiln plan and section
11. Oven plan and sections
12. Sections of representative pits and ditches
13. County map showing other pottery production sites

Photos

Up to ten including general site and selected feature photos

Appendix 1

The Pottery

By Maggi Darling

20/6/2000

REPORT 63 ON THE POTTERY FROM LINWOOD ROAD, MARKET RASEN, MRL99

for LINDSEY ARCHAEOLOGICAL SERVICES

by Margaret J. Darling, M.Phil., F.S.A., M.I.F.A.

June 2000

QUANTITY AND CONDITION

The pottery amounts to 9991 sherds weighing 312.878 kg producing 246.56 EVEs (estimated vessel equivalents based on rim percentages) from 263 contexts and three unstratified groups. The condition is generally good, given that it included quantities of production waste, some under-fired. Upper site layers were more fragmented and abraded. No problems are anticipated for long term storage. The pottery has been archived according to the guidelines of *The Study Group for Roman Pottery*, but as a pottery production site, with the addition of full quantification of count, weight, and EVEs to enable a better definition of vessel types and sizes. Vessel forms have been defined using mnemonic codes, some derived from the City of Lincoln type series, and some based on the illustrations in the unpublished thesis by John Samuels (Samuels 1983). Lists of all codes used for fabrics, forms and decoration and manufacture with details are available to accompany the archive database. A copy of the quantified database is available on disk.

The pottery came from the two areas excavated, together with a small unstratified quantity not located to an area, as table 1. This also shows the average sherd weight, and the brokenness measure, the later calculated as the number of sherds per EVE. Since the count figures are of all sherds, including body sherds, this shows the relative brokenness by area. Brokenness of the principal fabric is further defined below based on rim records alone. [mrl99fig.xls]

Table 1 Pottery by site area

Area	EVEs	%	Sherds	%	Weight	%	g/sherd	Brokenness
1	90.33	36.64	3540	35.43	114275	36.52	32.3	39.2
2	154.77	62.77	6394	64	197310	63.06	30.9	41.3
US	1.46	0.59	57	0.57	1293	0.41	22.7	39.0
Total	246.56		9991		312878			

2785 sherds are unstratified, mostly from Area 1, leaving the stratified pottery distributed across the site as Table 2. [mrl99fig.xls]

Table 2 Stratified pottery by site area

Area	EVEs	%	Sherds	%	Weight	%	g/sherd	Brokenness
Area 1	30.61	18.7	1635	22.7	41240	19.2	25.2	53.4
Area 2	133.12	81.3	5571	77.3	173107	80.8	31.1	41.8
	163.73	100	7206	100	214347	100	29.7	44.0

The stratified pottery represents between 66-72% of the total assemblage, with the largest quantity coming from Area 2 where the kiln was located. Area 2 has less fragmented sherds, with a higher sherd weight, and lower brokenness. although the unstratified pottery from the

area is more fragmented than the unstratified material from Area 1. A check on the fragmentation based on the records of rims only produces a similar result, with the brokenness measure based on rims from Area 2 being 10.1 against 11.7 from Area 1.

QUANTITIES AND DATING BY CONTEXT

The quantities and dating by context are shown in Appendix 1 [mrl99dts.xls], with comments and sherd links. The size of individual contexts has an important bearing on context dates, the smaller contexts with fewer diagnostic sherds generally being dated more widely. Analysis of the stratified contexts by area shows those from Area 2 being on average over double the size of the Area 1 contexts, so that a higher percentage of Area 1 contexts are broadly dated, as to the 2nd to 3rd century. Both areas have pottery dating over the whole period from the 2nd to late 4th centuries; two contexts in Area 2 are dated to the very late 4th century (2055 and 2060) on the basis of the occurrence of late LCOA jars sherds, recognized as an indication of very late Roman dating in Lincoln. These are, however, relatively rare in any 4th century assemblage, and there are indications that marginally more later 4th century contexts occur in Area 2.

Sherd links are noted in Appendix 1 and will be explored when the pottery data has been merged with the site data.

OVERVIEW OF FABRICS

The fabrics from the two areas are detailed on Table 3. The small quantity of unstratified pottery has been excluded. [mrlfabtb.xls]

Table 3 Fabrics by Area

	EVEs				Sherds				Weight			
	Area 1	%	Area 2	%	Area 1	%	Area 2	%	Area 1	%	Area 2	%
CR	0	0	100	0.65	2	0.06	4	0.06	17	0.01	112	0.06
CRSA	0	0	0	0	0	0	1	0.02	0	0	20	0.01
DWSH	5	0.06	69	0.45	1	0.03	27	0.42	8	0.01	505	0.26
GFIN	25	0.28	133	0.86	17	0.48	21	0.33	209	0.18	419	0.21
GREY	8467	93.73	14006	90.5	3326	93.95	5843	91.38	107907	94.43	173024	87.69
GROG	13	0.14	24	0.16	4	0.11	10	0.16	306	0.27	441	0.22
GRRO	73	0.81	20	0.13	12	0.34	12	0.19	586	0.51	527	0.27
IAGR	17	0.19	361	2.33	1	0.03	160	2.5	88	0.08	14265	7.23
IASH	0	0	25	0.16	0	0	2	0.03	0	0	146	0.07
LCOA	0	0	30	0.19	0	0	5	0.08	0	0	125	0.06
MOMH	11	0.12	3	0.02	3	0.08	1	0.02	270	0.24	84	0.04
MORT	0	0	8	0.05	1	0.03	2	0.03	19	0.02	70	0.04
MOSP	9	0.1	10	0.06	1	0.03	2	0.03	47	0.04	113	0.06
NAT	0	0	11	0.07	0	0	1	0.02	0	0	89	0.05
NVCC	0	0	5	0.03	0	0	4	0.06	0	0	24	0.01
NVGW	0	0	0	0	0	0	1	0.02	0	0	13	0.01
OX	152	1.68	259	1.67	52	1.47	105	1.64	2311	2.02	3016	1.53
OXL	0	0	20	0.13	0	0	1	0.02	0	0	7	0
OXRO	0	0	15	0.1	0	0	7	0.11	0	0	86	0.04
OXWS	0	0	10	0.06	0	0	2	0.03	0	0	33	0.02
PART	224	2.48	244	1.58	103	2.91	73	1.14	2327	2.04	1180	0.6
PRO	0	0	0	0	3	0.08	29	0.45	15	0.01	404	0.2
SAMCG	2	0.02	0	0	8	0.23	1	0.02	26	0.02	1	0
SHEL	0	0	0	0	1	0.03	0	0	4	0	0	0
VESIC	35	0.39	124	0.8	5	0.14	80	1.25	135	0.12	2606	1.32

Total	9033	100	15477	100	3540	100	6394	100.01	114275	100	197310	100

Expansions of the fabric codes are given below (Appendix 2). The notable feature is that over 90% of the pottery is of standard GREY fabric, the main product of the Market Rasen kiln field, reflecting the results from the evaluation LRM97 (Darling 1998). The only other fabrics representing 1% or more are Parisian PART, oxidized OX (some of which are likely to be mis-fired grey), and Iron Age tradition coarse fabric IAGR, which occurs mainly in Area 2. Only 10 sherds of mortaria, 9 sherds of samian and 4 sherds of NVCC occur. Other fabrics either definitely, or likely to be, from outside the area are SAMCG, CR, CRSA, DWSH, NVGW, SHEL, and probably OXWS. There are no amphora sherds. The assemblage is typical of that anticipated from a pottery production site, with a minimal admixture of occupation rubbish. The local products are mainly in a grey fabric of no particular distinction macroscopically, the inclusions being the same as seen in many grey fabrics from other local sources. The grey fabric has extremes, the finer versions verging on the very fine Parisian fabric, while others are notably coarser. Thin-section and chemical analysis will be needed to define the fabrics. A few are notable for having more well-rounded quartz, occurring in both reduced and oxidized (GRRO and OXRO).

The sherds known as **Parisian ware** (PART; Elsdon 1982) appear to be slightly more concentrated in Area 1, where the average sherd weight indicates lower fragmentation. The vessels are mostly from closed forms, beakers and flasks, but there is a variety of open forms, commoner in Area 2. The forms include disc-necked flasks and copies of the samian bowl form 38, mostly with rouletted zones below the flanges. The evidence of the flasks (a type more common in the later Roman period), and probably also the bowl, substantiates the view (Darling 1984, 80) that production of vessels in this fine fabric continued after the normal *floruit* of Parisian ware, and it is particularly useful to have this evidence from a production site. The commonest decoration is rouletting, but comb stamps and two block stamps also occur, one unusually on a base. Not all the sherds are in the very fine fabric normally associated with Parisian ware. The finer grey fabrics (**GFIN**) are closely related to the Parisian sherds, and are commoner in Area 2, again with more open forms than found in Area 1. There is less evidence in the forms in GFIN to indicate a wide date range, and most would fit 2nd century dating.

The precise source of the vessels in a late Iron Age tradition (**IASH and IAGR and GROG**) is unknown; the IAGR fabrics are similar to those seen in Lincoln, but also in the Trent Valley, and have a wide variation in the fabric group. These fabrics continue in use well into the 2nd century, and could be current when pottery production first started in the area. A single **SHEL** shell-gritted sherd is not certainly of the Dales ware type, and some of the vesicular sherds (**VESIC**) are likely to have been originally shell-gritted. The lost tempering on other sherds is uncertain, and thin-section analysis is needed to help define the different fabrics in this fabric group; the forms and dating range widely from bowls in the late Iron Age tradition through to later Roman types.

The few sherds of **samian** are all from Lezoux, Central Gaul, and consist of a single rim and bodysherd likely to be from form 18/31 or 31 dish, a footring from a form 33 cup, and bodysherds and flakes. An early to mid 2nd century date is probable. All except a single chip came from Area 1.

Mortaria from the Mancetter-Hartshill kilns include a hammer-head type (Dwg 186), and two hooked rims (Dwgs 294-295), and a bodysherd. Apart from a rim from 2100, all are from unstratified layers in Area 1. Later mortaria from the Swanpool kilns in Lincoln came from 1058, a bead-and-flange type in very poor condition, a bodysherd from 2241B, and a hammer-head type from unstratified layers in Area 2 (Dwg 329). Mortaria of unknown source occurred as bodysherds from 1163 (with quartz and flint) and unstratified Area 2 (with fine

slag trituration), and as a reeded rim type from 2066 (Dwg 158) with slag trituration. An unusual mortarium from the evaluation LRM97 with slag trituration is considered to be possibly of local origin, and all sherds will need to be examined with this possibility in mind. There are, however, so few sherds that it seems unlikely that mortaria were produced on this site.

OVERVIEW OF FORMS

Analysis of the forms is based on the grey wares. The overall composition of the grey assemblage is shown in table 4. This excludes the untyped body sherds. [mrlgryfm.xls]

Table 4 Grey wares, forms

	EVEs	%	Sherds	%	Weight	%
Flagon	220	0.97	11	0.25	634	0.33
Jar	7378	**32.63**	1284	**29.36**	52415	**27.36**
Jar/beaker	299	1.32	42	0.96	1328	0.69
Jar large	139	0.61	97	2.22	13047	6.81
Jar or Bowl	140	0.62	475	10.86	16303	8.51
Beaker	372	1.64	85	1.94	2330	1.22
Closed	0	0.00	256	5.85	13957	7.28
Bowl	9393	**41.54**	1229	**28.10**	56055	**29.26**
Dish	2996	13.25	359	8.21	14047	7.33
Bowl/dish	1356	6.00	389	8.90	13464	7.03
Open	0	0.00	119	2.72	6580	3.43
Lid	104	0.46	14	0.32	600	0.31
Unusual	217	0.96	13	0.30	839	0.44
Total	22614	100	4373	100	191599	100

The measure giving the more accurate information is EVEs based on rim sherds, where the percentage of bowls at 41.5% surpasses that of jars at 32.6%. Body sherds that could be positively identified for form would account for the almost identical percentages of bowls and jars by sherd count and weight. This is demonstrated by table 5 which shows an analysis of the grey ware forms based on records containing rims, excluding the bodysherd records. [mrlgreve.xls]

Table 5 Grey wares forms, based on rim records

	EVEs	%	Sherds	%	Weight	%	g/sherd	Brokenness
Flagon	2.2	0.97	10	0.43	614	0.62	61.4	4.5
Jar	73.78	32.63	674	28.74	28138	28.32	41.7	9.1
Jar/beaker	2.99	1.32	17	0.72	486	0.49	28.6	5.7
Jar large	1.39	0.61	15	0.64	738	0.74	49.2	10.8
Beaker	3.72	1.64	19	0.81	895	0.90	47.1	5.1
Jar/bowl	1.4	0.62	24	1.02	504	0.51	21.0	17.1
Bowl	93.93	41.54	1059	45.16	48643	48.96	45.9	11.3
Dish	29.96	13.25	344	14.67	13719	13.81	39.9	11.5
Bowl/dish	13.56	6.00	170	7.25	4668	4.70	27.5	12.5
Lid	1.04	0.46	8	0.34	309	0.31	38.6	7.7
Unusual	2.17	0.96	5	0.21	637	0.64	127.4	2.3
Total	226.14	100.00	2345	100.00	99351	100.00	42.4	10.4

This shows relatively similar percentages for the principal forms, jars and bowls, by all three measures. Here the brokenness measure is more closely calculated on rims (and any associated bodysherds). The designation as a cross-form, i.e., jar/bowl or bowl/dish comes from the incompleteness of the sherds leading to difficulties of secure identification, and this

is clearly demonstrated by the brokenness measure and average sherd weight for these categories.

The relative fragmentation between the two excavated areas is best assessed on the basis of the predominant grey wares, particularly derived from records including rims. This is shown on table 6. [mrlgreve.xls]

Table 6 Fragmentation: brokenness measure by area, based on grey ware rim records

	Area 1	Area 2
Flagon	4.0	6.7
Jar	10.6	8.4
Jar/beaker	6.9	5.4
Jar large	10.3	15.4
Beaker	14.0	3.5
Jar/bowl	20.0	15.9
Bowl	13.4	10.1
Dish	11.6	11.3
Bowl/dish	12.4	12.8
Lid	7.0	8.2
Unusual	2.0	2.4
Total	11.9	9.4

All the principal forms show lower figures, i.e., less broken with fewer sherds per EVE, from Area 2.

The range of forms cover a relatively wide period, including vessels likely to be of mid to late 2nd century date, but running through to parallels with the late Lincoln Rookery Lane and Swanpool kilns (Webster 1960; Webster & Booth 1947). Since rim diameters have been recorded, it will be possible to establish the range of sizes for the commoner vessels. Many vessels are paralleled by those illustrated by Samuels (1983), although there are notable new forms. The open forms, bowls and dishes, are dominated by the quantity of wide-mouthed bowls, accounting for 19.3% of all grey wares. This is the commonest vessel type. Flanged bowls and dishes represent 8.9%, while triangular-rimmed bowls and dishes amount to 5.9%. The commonest dish is the plain-rimmed type, 10.8%, while grooved-rim types account for 1.25%. Later bowls include bead-and-flange types at 6.7%, and the later inturned type (a common type at the late Swanpool kilns in Lincoln) represent 1.4%.

Most of the jars have everted or curved rims. A distinctive lid-seated type (J105) represents 2.4%, and also occurs in IAGR fabric. These are paralleled among the products of the Roxby kilns (Rigby & Stead 1976), and should belong to the earlier 2nd century production. Rusticated jars, mostly with linear rustication also occur, dating to the 2nd century. Copies of dales ware jar types (also occurring in VESIC fabric) belong to the mid-late 3rd century. Later jars with narrow rims, paralleled at the late Swanpool kilns, amount to 1.7%.

Decoration includes a wide variety of burnished decoration, rustication, rouletting, scoring and slashing, quite apart from stamping on the parisian wares. An oxidized bowl possibly of the type of samian form 36 is decorated with painted blobs and curves, and a NVCC body sherd from a closed form also has remnants of painted decoration.

DISCUSSION

The presence of "waste" from pottery production occurs in both areas, although the only kiln structure was found in Area 2. The dating of the pottery from these areas differs from that currently accepted for this pottery industry of c AD150-200 (Samuels 1983, 684; Swan 1984,

fiche 457-8), although Swan suggests a broader late 2nd to 3rd century range. Types illustrated by Samuels, however, suggest that his dating was based on samian and Parisian ware, the latter being a minor part of the production from these kilns. It is proposed to undertake a dating analysis to establish the chronological ranges for each area to establish if there is evidence for a chronological basis for a spatial spread of the industry, given that kilns are known from the west side of Linwood Road (Swan 1984). This will be based on the combination of fabric and form, and using a technique developed at the City of Lincoln Archaeological Unit.

It seems clear that the Marekt Rasen pottery industry has a long-life, certainly starting in the 2nd century, but continuing through into the later Roman period. This longevity confirms the considerable importance of this industry for the area. The quantity of slag from the site suggests a close association between the potters and iron workers, and wheat impressions on fired clay from earlier excavations in the area may be evidence for the proximity of threshing. This appears to indicate an important industrial area for an adjacent settlement and surrounding area. This has significant implications for the area, and further information about the pottery industry at Market Rasen is needed to assess Roman settlement in the area, and its relationship to other kilns to the south and east.

The evidence from these excavations needs to be amalgamated with that from the other interventions in this area in the 1960s, and later, particularly including the original evaluation on this particular site (LRM97), and the evaluation on the west side of Linwood Road (MRH98). Some of the pottery from the 1960s work has been studied by Samuels (1983), but much remains unstudied and unillustrated. A complete type series to illustrate the range and chronology is needed, and scientific analysis of the fabrics to define them more clearly. This basis is essential to explore the distribution of the kilns to get them into the Roman landscape.

NEED TO CHECK RE KILN FURNITURE! QUANTITIES ETC.

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APPENDIX 1
QUANTITIES AND DATING BY CONTEXT

Area	Cxt	EVEs	Sherds	Weight	Date	Comments & links
1	1000	22	12	183	3-4	ABR
1	1002	21	17	301	4C	VABR;SCRAPPY
1	1004	80	31	628	L3-4?	VABR
1	1013	0	1	8	ROM	
1	1015	21	47	939	3-4?	ABR;FEW DIAGNOSTIC
1	1016	0	11	196	ML2+	
1	1017	243	126	4158	L3-4	
1	1019	0	2	10	ROM	
1	1023	59	62	674	4C?	VABR;SCRAPPY
1	1026	22	9	361	L2-3	
1	1027	103	70	1474	M3+?	WASTE;SOME ABR
1	1028	266	195	3231	ML3?	ABR;FRAGMENTED
1	1029	302	189	4098	3C	ABR
1	1030	39	12	1082	3C?	
1	1033	9	8	71	L3+	
1	1036	78	27	688	3C/POST-MED	
1	1039-40	37	32	593	ML3?	ABR
1	1041	9	5	82	3C?	
1	1042	17	14	366	L3-4	SOME ABR
1	1044	4	7	57	L2+	
1	1047	51	16	552	2-3C	
1	1049	61	35	526	L2-3	
1	1052	8	9	198	2-3C	
1	1053	433	314	5830	ML4	ABR;SCRAPPY
1	1058	9	5	102	L3-4?	DATE ?MOSP
1	1059	4	14	295	3C?	POOR COND;ABR
1	1069	10	7	156	L3-4?	POOR COND;ENCRUST SAND
1	1070	0	2	24	ML2+	ENCRUST SAND
1	1071	0	1	23	ROM	ENCRUST SAND
1	1083	40	9	263	3C?	BIBF? ENCRUST SHS
1	1087	15	1	56	L2-3	
1	1089	0	3	23	ML2+	
1	1093	0	1	12	ROM	
1	1095	10	4	281	ML3?	
1	1099	0	1	56	M2-3	
1	1106	7	3	33	ML3	
1	1108	10	8	259	ML2+	
1	1128	15	5	174	ML3+	ABR
1	1141	29	5	406	L2-3	Links to 1150
1	1144	18	4	187	ML4	
1	1145	14	12	258	L2-3?	
1	1146	30	3	262	M3+?	
1	1150	35	1	411	L2-3	Link to 1141
1	1152	0	1	5	ROM	
1	1155	7	1	50	L3-?4	
1	1159	100	3	41	L3-?4	
1	1161	0	1	7	ROM	
1	1163	0	1	19	2C?	
1	1165	0	1	100	3C+	
1	1172	0	1	15	ROM	
1	1220	7	2	137	L3-4	
1	1230	104	22	980	ML2+	HEAVY SLAG ENCRUST
1	1233	26	4	118	M3?+	

1	1237	0	1	7	ROM	
1	1240	36	12	323	L2-3?	ENCRUSTED
1	1251	37	5	93	ML2+	ENCRUSTED
1	1260	0	3	26	ROM	
1	1261	0	1	37	ROM	
1	1262	9	4	33	L2-3?	
1	1263	0	6	31	ROM	
1	1266	14	4	61	L3+	
1	1269	0	1	15	ROM	
1	1271	0	4	1287	ML2?	
1	1273	7	1	23	L2-3	
1	1274	0	1	49	ROM	
1	1277	0	3	80	2-3C	
1	1281	6	2	51	L3-4	
1	1289	0	5	33	ROM	
1	1291	30	10	686	L3-4	
1	1292	0	3	72	ROM	
1	1295	0	8	87	L2-3	
1	1308	0	1	9	ROM	VABR
1	1311	3	5	69	M3+	
1	1318	0	1	40	ROM	
1	1325	0	15	112	L2-3	
1	1328	0	1	247	ML2+	
1	1329	241	46	3189	L2M3?	VIRT COMP JAR
1	1331	94	13	468	ML2+	
1	1336	0	6	152	ML2+	
1	1338	9	10	263	L2-3	
1	1356	8	6	118	L2+?	
1	1357	16	8	132	ML3	ABR
1	1359	0	1	1	E2+	
1	1362	0	5	200	L2-3	
1	1364	0	4	34	ROM	
1	1366	0	3	63	ROM	
1	1367	0	1	24	ROM	
1	1396	12	1	23	ML2?	
1	1400	0	4	104	2C	
1	1401	0	13	273	ML2	Link to 1402
1	1402	33	5	229	ML2+	Link to 1401
1	1406	0	1	25	ROM	
1	1408	0	2	24	L2-3	
		2930	1603	39852		
1	EVAL-1	131	32	1388	L3-?4	
1	US-1	5972	1905	73035	3C	ABR-VABR
-	US	146	57	1293	3-4C	VABR
2	2002	140	185	2543	ML4?	VABR
2	2005	355	216	6236	4C	
2	2008	182	61	1815	L3-4	SOME ABRASION
2	2009	94	40	919	4C	
2	2010	0	1	11	ROM	
2	2012	19	2	143	ML3?	
2	2013	43	27	707	L3+?	
2	2016	10	14	218	L3-4	
2	2018	317	140	3251	4C	SOME ABR
2	2020	17	4	97	L3?	
2	2021	34	11	473	L3-4	
2	2022	49	10	305	L3?	
2	2024	5	1	26	4C	

2	2025	30	3	282	L3?	
2	2030	21	15	310	4C	VABR
2	2032	187	104	2021	M2	MOST U'FIRED WASTE
2	2034	58	17	257	M2-3?	ABR
2	2036	15	8	110	4C	
2	2042	0	3	59	ROM	
2	2043	53	11	694	L3-4	MOST=2 BWM'S
2	2046	9	17	370	3C?	
2	2048	0	2	14	ML2+	
2	2049	11	7	75	3C?	
2	2051	0	1	29	3C?	
2	2055	30	35	500	VL4?	ABR
2	2060	58	31	966	VL4?	VABR
2	2061	33	18	295	4C?	VABR
2	2063	0	10	136	3-4?	
2	2066	55	19	419	M3+	SCRAPPY BSS
2	2070	0	4	47	M3+?	
2	2072	0	14	109	3C?	NO DEFINITE DATE
2	2074	113	33	985	ML2?	LGE PT 2 JARS
2	2076	0	5	29	3C?	
2	2077	109	31	941	L3-4?	ABR
2	2081	32	16	259	M3+	ABR;SCRAPPY
2	2083	0	4	61	ROM	
2	2087	100	24	1544	3C?	SCRAPPY EXC BOWL
2	2090	0	3	34	ROM	
2	2092	15	15	195	3C?	ABR
2	2095	53	41	668	4C	ABRADED;SCRAPPY
2	2096	15	19	382	L3-4	
2	2100	30	16	463	L3-4	Link to 2109
2	2102	0	2	19	ROM	
2	2104	12	10	334	3C?	
2	2107	26	6	78	ML2?	
2	2109	6	3	79	L3-4	Link to 2100
2	2111	0	1	20	2-3C	
2	2112	10	4	103	3C?	
2	2114	0	3	20	ML3?	
2	2115	6	10	42	2C+	
2	2118	26	11	338	3C?	
2	2121	42	9	75	M2?	
2	2123	166	59	722	L4	VABR; Link to 2169
2	2125	9	13	241	ROM	
2	2126	38	10	254	3-4?	
2	2131	0	2	24	M2+	
2	2133	11	5	407	L2-3	
2	2135	11	4	49	L4/POSTRO	
2	2137	5	7	48	L2-3	
2	2141	5	11	103	ROM	
2	2142	41	17	410	3C?	NO DEF EVID DATE
2	2144	0	5	42	ROM	
2	2145	0	4	17	ROM	
2	2146	0	1	76	2C	
2	2147	97	37	646	ML2?	
2	2149	94	26	462	L2-3?	
2	2152	40	16	213	ML2?	
2	2153	6	16	299	2-3C?	NO DEF EVID DATE
2	2154	10	1	22	2C?	
2	2162	73	25	731	L3	
2	2164	24	16	237	M2?	Link to 2167

2	2166	5	17	578	ML2?	Link to 2167
2	2167	25	8	196	ML2?	Links to 2164;2166
2	2169	96	25	1029	ML2-3?	Link to 2123
2	2172	65	21	624	3C?	
2	2173	11	5	47	3C?	
2	2174	0	5	69	ROM	
2	2175	0	9	193	2C?	
2	2178	11	1	56	ML2	
2	2179	3	1	11	ML2	
2	2184	8	5	53	2C?	ABR
2	2188	29	10	155	EM2?	
2	2190	3	4	32	ML3?	
2	2191	45	26	467	L3	
2	2192	132	74	2487	L3	
2	2194	4	12	328	3C?	
2	2196	35	19	560	3C?	
2	2197	0	2	32	2-3C	
2	2200	110	25	551	L3	
2	2201	10	34	610	L3	
2	2208	11	18	391	M2-3	NO DEF DATE EVID
2	2211	11	6	125	L3?	
2	2214	0	1	17	2C	
2	2215	8	2	32	M2?	
2	2216	4	14	170	M2?	
2	2222	2	7	129	L3-4	VABR
2	2224	0	5	16	ROM	
2	2234	0	3	7	ROM	
2	2236	2	6	30	ROM	
2	2238	0	3	5	ROM	
2	2240	102	47	1991	M3?	Links to 2295;2303;2304
2	2241A	769	278	8764	L3?	FRAGMENTED;SOME ABR
2	2241B	956	350	11160	L3?	
2	2249	1162	452	18208	L3	
2	2249A	264	93	2805	L3	
2	2253	0	2	176	L2-3	
2	2265	23	18	223	L3-4	
2	2267	0	2	15	ROM	
2	2270	66	29	453	ML2?	Links to 2271;2273
2	2271	136	39	811	ML2?	1 ?BWM LATER?;Link to 2270
2	2271?	140	35	787	L3-4	SOME ABR;?U/S
2	2272	14	11	171	2C?	
2	2273	0	2	13	2C	Link to 2270
2	2276	156	43	1624	4C	
2	2281	4	21	381	2C?	NO DEF DATE EVID
2	2282	100	1	640	L2-3?	SINGLE SF STRAINER
2	2283	32	8	334	M3	
2	2284	36	5	424	3C?	
2	2289	34	74	1131	3C?	Link to 2293
2	2291	7	14	77	ML2	
2	2293	314	110	2826	M2+?	Links to 2289;2295
2	2294	40	11	182	2C?	
2	2295	2595	958	38083	ML2-EM3	MOST WASTE;LATE INTR?;Links to 2240;2293
2	2302	46	32	866	L3	
2	2303	24	15	1039	L2-3	Links to 2240;2304
2	2304	8	8	243	L2-3	Links to 2240;2303
2	2307	297	22	1286	ML2?	
2	2308	76	31	1334	ML2?	IA TRAD BOWL

2	2310	0	1	2	ROM	
2	2312	0	18	361	2C	
2	2313	0	3	68	ROM	
2	2314	46	12	743	ML2	
2	2315	38	16	279	ML2?	
2	2316	154	37	1938	ML2?	
2	2317	24	11	728	M2?	
2	2320	4	18	450	ROM	
2	2321	8	9	150	ML2?	
2	2322	0	18	562	ML2	
2	2324	4	10	299	ML2?	
2	2325	29	13	319	ML2?	
2	2326	0	1	81	2-3C	
2	2331	111	55	925	L3-4	SCRAPPY;ABR;RESID 2C
2	2332	32	12	307	L3-?4	SOME ABR
2	2333	96	36	1068	L3	
2	2335	54	24	365	L3	
2	2336	11	3	97	L3	
2	2345	0	2	18	ROM	VABR
2	2353	0	4	20	ROM	VABR
2	2356	0	3	18	ROM	VABR
2	2358	5	10	143	M3+/POST-MED	
2	2359	17	13	139	2-3C?	
2	2365	307	109	3170	M2?	OCCUP & WASTE?
2	2370	71	9	231	M2?	
2	2371	175	3	5109	ML2	
2	2372	426	119	5369	L3?	
2	2376	188	79	2535	L3	
2	2388	34	20	707	L3	
2	2394	22	11	301	3C?	Links to 2395;2396
2	2395	71	34	940	4C	SOME ABR;Links to 2394;2396
2	2396	62	94	1296	4C	SOME ABR;Links to 2394;2395
2	2398	21	10	210	L2-3	
2	2403	55	33	2311	2C	
2	2409	0	2	27	ROM	
2	2411	25	1	186	2C	
2	2412	11	1	89	1-2?	
2	2417	0	1	7	ROM	
2	2433	8	7	64	L3?	
2	2439	13	5	147	2C?	
2	KRAKE-2	109	53	1172	L3	
		13312	5571	173107		
2	US-2	2165	823	24203	3-4C	ABR-VABR
	Total	24656	9991	312878		

APPENDIX 2
FABRIC CODES

Fabrics to be fully defined in publication.

CODE	Fabric
CR	Cream
CRSA	Cream sandy
DWSH	Shell-gritted dales ware
GFIN	Grey fine
GREY	Grey
GROG	Grog-tempered
GRRO	Grey rounded quartz
IAGR	Iron Age tradition gritty
IASH	Iron Age tradition shell-gritted
LCOA	Late coarse grey pebble inclusions
MOMH	Mortaria Mancetter-Hartshill
MORT	Mortaria unsourced
MOSP	Mortaria Swanpool Lincoln kilns
NAT	Native coarse
NVCC	Nene Valley colour-coated ware
NVGW	Nene Valley grey ware
OX	Oxidized red-brown (some mis- or re-fired grey)
OXL	Oxidized light shades
OXRO	Oxidized rounded quartz
OXWS	Oxidized with white exterior slip
PART	Parisian ware type
PRO	Post Roman
SAMCG	Samian Central Gaul
SHEL	Shell-gritted
VESIC	Vesicular

TO CONSIDER/DO

Any other notables - unusual types
Expansion of fabric codes
Expansion of vessel type codes - done
Expansion manuf/decor codes - done
Decoration
Dating - plotdate?
Basic need to merge with site data to examine contexts specific to kiln
Publication should include details of rim diameters by vessel type
Estimate of drawing work - need to check LRM97
Publication to include full definition of fabrics and thin-section analysis
Material will need to be related to the evaluation LRM97 & material from MRH98.

APPENDIX 2
FABRIC CODES

Fabrics to be fully defined in publication.

CODE	Fabric
CR	Cream
CRSA	Cream sandy
DWSH	Shell-gritted dales ware
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GREY	Grey
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GRRO	Grey rounded quartz
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IASH	Iron Age tradition shell-gritted
LCOA	Late coarse grey pebble inclusions
MOMH	Mortaria Mancetter-Hartshill
MORT	Mortaria unsourced
MOSP	Mortaria Swanpool Lincoln kilns
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NVCC	Nene Valley colour-coated ware
NVGW	Nene Valley grey ware
OX	Oxidized red-brown (some mis- or re-fired grey)
OXL	Oxidized light shades
OXRO	Oxidized rounded quartz
OXWS	Oxidized with white exterior slip
PART	Parisian ware type
PRO	Post Roman
SAMCG	Samian Central Gaul
SHEL	Shell-gritted
VESIC	Vesicular

APPENDIX 3 MARKET RASEN MRL99 VESSEL FORM CODES

References to Lincoln types are to the types defined in the type series of the City of Lincoln Archaeological Unit (forthcoming; original references noted). References to Samuels' types are to the illustrations in Samuels 1983.

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CODE	Form	Details
18/31 OR 31	Dish	as samian 18/31 or 31
33	Cup	as samian form 33
B	Bowl	
B113	Bowl	as Samuels 113
B316	Bowl	Lincoln 316 (Petch 1962; fig 7; 24)
B318	Bowl	Lincoln 318 (Petch 1962; fig 7; 23)
B318V	Bowl	Lincoln 318 variant
B321	Bowl	Lincoln 321 (Webster 1949; fig 14; 72)
B334	Bowl	Lincoln 334 (Petch 1962; fig 5; 8-10)
B36	Bowl	as samian 36
B38	Bowl	as samian 38
B38V	Bowl	as samian 38 variant
BCAR	Bowl	carinated
BCU15	Bowl	as samian Curle 15
BCUR	Bowl	curved rim
BD	Bowl or dish	
BDFL	Bowl or dish	flanged
BDLS	Bowl or dish	lid-seated
BDRR	Bowl or dish	round rim
BDTR	Bowl or dish	triangular rim
BEV	Bowl	everted rim
BFB	Bowl	bead-and-flange
BFBH	Bowl	bead-and-flange high
BFBL	Bowl	bead-and-flange low
BFL	Bowl	flanged
BHEM	Bowl	hemispherical
BIBF	Bowl	inturned bead-and-flange
BJS13	Bowl	as Samuels 13
BJS17	Bowl	as Samuels 17
BJS25	Bowl	as Samuels 25
BJS25V	Bowl	as Samuels 25 variant
BJS34	Bowl	as Samuels 34
BJS36	Bowl	as Samuels 36
BJS38	Bowl	as Samuels 38
BK	Beaker	
BK110	Beaker	as Samuels 110
BKCAR	Beaker	carinated
BKEV	Beaker	everted rim
BKFN	Beaker	funnel-necked
BKFO	Beaker	folded

BKPH	Beaker	poppy-head
BKROU	Beaker	rouletted
BL	Bowl	large
BNAT	Bowl	native type
BNK	Bowl	necked
BNNK	Bowl	no neck
BPR	Bowl	plain rim
BREED	Bowl	reeded rim
BRR	Bowl	rounded rim
BST	Bowl	strainer
BTR	Bowl	triangular rim
BWM	Bowl	wide-mouth
BWM101	Bowl	wide-mouth as Samuels 101
BWM101-2	Bowl	wide-mouth as Samuels 101/2
BWM102	Bowl	wide-mouth as Samuels 102
BWM103	Bowl	wide-mouth as Samuels 103
BWM104	Bowl	wide-mouth as Samuels 104
BWM52	Bowl	wide-mouth as Samuels 52
BWM97	Bowl	wide-mouth as Samuels 97
BWM98	Bowl	wide-mouth as Samuels 98
BWM99	Bowl	wide-mouth as Samuels 99
BWMEV	Bowl	wide mouth everted
CHP	Cheese-press	
CLSD	Closed	
CPEV	Jar	cooking pot everted rim
CPN	Jar	cooking pot native type
D	Dish	
D36	Dish	as samian form 36
D452	Dish	Lincoln 452 (Thompson & Whitwell 1973; fig 13; 12)
DFL	Dish	flanged
DGR	Dish	grooved rim
DPR	Dish	plain rim
DPRS	Dish	plain rim straight wall
DTR	Dish	triangular rim
F	Flagon	
FC	Flagon	cupped
FDN	Flagon	disc-neck
FGR	Flagon	grooved rim
FR	Flagon	ringed
FS	Flask	
FTR	Flagon	triangular rim
J	Jar	
J105	Jar	Lincoln 105 (Coppack 1973; fig? ; 17)
J105V	Jar	Lincoln 105 variant
J55	Jar	as Samuels 55
J56	Jar	as Samuels 56
J56V	Jar	as Samuels 56 variant
J60	Jar	as Samuels 60
J73	Jar	as Samuels 73
J85	Jar	as Samuels 85
J86	Jar	as Samuels 86
J86V	Jar	as Samuels 86 variant
J93	Jar	as Samuels 93
JB	Jar or bowl	
JBCUR	Jar or bowl	curved rim
JBEV	Jar or bowl	everted rim
JBK	Jar or beaker	

JBKCUR	Jar or beaker	curved
JBKEV	Jar or beaker	everted
JBNAT	Jar or bowl	native type
JBRR	Jar or bowl	round rim
JBWM	Jar or bowl	wide mouth
JCR	Jar	collared rim
JCUR	Jar	curved rim
JDLS	Jar	double lid-seated
JDW	Jar	as dales ware
JDWV	Jar	as dales ware variant
JEV	Jar	everted
JH	Jar	handled
JIR	Jar	inturned rim
JL	Jar	large
JLH	Jar	lug-handled
JLS	Jar	lid-seated
JNN	Jar	narrow-necked
JRR	Jar	rounded rim
JRUST	Jar	rusticated
JS82	Jar	as Samuels 82
JS86	Jar	as Samuels 86
JSQ	Jar	square-rim
JTR	Jar	triangular rim
JUR	Jar	undercut rim
L	Lid	
L106	Lid	as Samuels 106
L107	Lid	as Samuels 107
LSQ	Lid	square rim
M	Mortarium	
MBF	Mortarium	bead and flange
MHH	Mortarium	hammer-head
MHK	Mortarium	hook rim
MRR	Mortarium	reeded rim
OPEN	Open	
PL	Plate	
ST	Strainer	
TZ	Tazza	
Z	Unusual	

APPENDIX 4
MARKET RASEN MRL99
DECORATION & MANUFACTURE CODES

CODE	Type	Details
BCCIR	Burnished	concentric circles
BCIR	Burnished	circles
BDL	Burnished	diagonal lines
BVL	Burnished	vertical lines
BVL;BHL	Burnished	vertical & horizontal lines
BIA	Burnished	intersecting arcs
BIWL	Burnished	intersecting wavy lines
BS	Burnished	scroll
BSCR	Burnished	vertical scroll
BSPIR	Burnished	spiral
BV	Burnished	vertical
BVL	Burnished	vertical lines
BVLZ	Burnished	vertical line zone
BVLZ;ZZ	Burnished	vertical line zone above zig-zag
BVZ	Burnished	vertical
BWL	Burnished	wavy line
BWLV	Burnished	wavy line vertical
COST	stamped	comb
GRAF?	Graffito	
GROOVED	Grooved	
TUBE RING	Impressed	tube rings
HBONE STAB	Stabbed	herringbone
HM	Hand-made	
JUDD	Juddered	
LA	Burnished	lattice
AP BOSS	Applied	boss
LML	Burnished	lattice multi-line
BHL	Burnished	horizontal line
NOTC	Notched	
NOTC;FF	Notched	fingered
PA	Painted	
PAB	Painted	blobs
PCUR	Painted	curves
RIB	Ribbed	
RLIN	Rusticated	linear
RNOD	Rusticated	nodular
ROUL	Rouletted	lines
ROUZ	Rouletted	zone
RUST	Rusticated	
SCRIB	Scribbled	
SDL	Scored	diagonal lines
SHBONE	scored	herringbone
SLAS	Slashed	
STAB	Stabbed	
STMP	Stamped	
STRO	Stamped	round
SWL	Scored	wavy lines
SZZ	Scored	zig-zag

Appendix 2

The Environmental Report

By James Rackham

Market Rasen, Lincolnshire – MRL99

Environmental Archaeology Assessment

Introduction

Excavations were conducted by a team from Lindsey Archaeological Services on the site of a Roman pottery kiln at Market Rasen. During the course of the excavations a series of samples were taken from deposits in Area 2 associated with the kiln structure (2004), two hearth features, 2127 and 2128, and ditches and gullies. In Area 1 a small number of samples were taken from a series of features including a well. In addition to these the sediments infilling six pottery vessels were also sampled. In total 46 soil samples were collected for assessment (Table 1). In addition to these samples twelve small samples were taken during augering of the deposits in Area 1 to ascertain the depth of the quarry pits in advance of excavation. Woodwork and timbers survived in the well excavated in Area 1 and six pieces of worked structural timber from the well and a small collection of small roundwood, possibly wicker or wattle was also sampled (Table 2). During the excavations animal bone was recovered by hand and the small assemblage has been recorded. The pottery dates the site to the 2nd- late 3rd/4th century AD.

The site lies on acid aeolian sands and it was recognised prior to excavation that the primary environmental material would be charred plant remains and charcoal, with the possible fuels being used to fire the pottery kilns being one area for research. Evidence for other activities such as domestic occupation or other industrial processes being a secondary aspect of the environmental work.

Methods

The soil samples were processed in the following manner. Sample volume and weight was measured prior to processing. The samples were washed in a 'Siraf' tank (Williams 1973) using a flotation sieve with a 0.5mm mesh and an internal wet-sieve of 1mm mesh for the residue. Both residue and float were dried, except for the waterlogged contexts, and the residues subsequently re-floated to ensure the efficient recovery of charred material and mollusc shells. The first flot of the waterlogged contexts was kept wet and the residue refloated while it was still a little damp. The second flot was only partially dried before bagging. The dry (or damp) volume of the flots was measured, and the volume and weight of the residue recorded.

The residue was sorted by eye, and environmental and archaeological finds picked out, noted on the assessment sheet and bagged independently. A magnet was run through each residue in order to recover magnetised material such as hammerscale and prill. The residue was then discarded. The float of each sample was studied under a low power binocular microscope. The presence of environmental finds (ie snails, charcoal, carbonised seeds, bones etc) was noted and their abundance and species diversity recorded on the assessment sheet. The float was then bagged. The float and finds from the sorted residue constitute the material archive of the samples.

The individual components of the samples were then preliminarily identified and the results are summarised below in Tables 3 and 4.

Results

A few uncharred seeds of goosefoots, *Chenopodium* sp., and docks, *Polygonum* sp., recent rootlets and occasional worm egg capsules were recorded in a number of the samples indicating low levels of contamination.

Table 1: Market Rasen. Samples taken for environmental analysis

sample no.	area	context	sample vol. l.	sample wt kg	feature type	Date
1	1	1000	5	5	Burnt deposit	Rom.
2	1	1059	10	12.5	Organic layer, well	Rom.
3	1	1033	9	12	Organic layer, well	Rom.
4	2	2109	7	7	Charcoal from primary fill 2099	Rom.
5	1	1119	14	13	Organic waterlogged secondary fill	Rom.
6	2	2200	10	12	Fill inside kiln 2004	Rom.
7	2	2201	30	37	Charcoal rich fill of fire pit	Rom.
8	2	2139	2	1.5	Secondary fill hearth 2127	Rom.
9	2	2280	2	2	Primary fill hearth 2127	Rom.
10	2	2281	4	4	Tertiary fill hearth 2277	Rom.
11	2	2282	9	8.5	Secondary fill (ash) hearth 2277	Rom.
12	2	2283	1	0.5	Burnt clay from 2203, hearth 2277	Rom.
13	2	2284	4	4	Mixed 2284/2285, hearth 2277	Rom.
14	2	2285	5	4.5	Hearth material 2277	Rom.
15	2	2286	3	2.5	Single fill of gully 2287	Rom.
16	2	2138	3	2.5	Tertiary fill hearth 2127	Rom.
17	2	2335	8.5	11	Fill inside kiln 2004	Rom.
18	2	2241	10	13	Rake out for kiln 2004	Rom.
19	2	2302	10	13	Rake out for kiln 2004	Rom.
20	2	2388	10	11	Rake out for kiln 2004	Rom.
21	2	2249	10	13	Rake out for kiln 2004	Rom.
22	2	2301	5	6	Rake out for kiln 2004	Rom.
23	2	2372	10	15	Rake out for kiln 2004	Rom.
24	2	2333	10	15	Rake out for kiln 2004	Rom.
25	2	2359	7	6	Secondary fill of hearth? 2128	Rom.
26	2	2285	8	8	Hearth make-up 2128	Rom.
27	2	2358	8	8	Secondary fill of hearth 2128	Rom.
28	2	2381	3	2.5	Primary fill hearth 2128	Rom.
29	2	2377	3	3	Fill of hearth 2128	Rom.
30	1	1329	7	9	?tertiary fill of 1332	Rom.
31	1	1330	7	11	?secondary fill of 1332	Rom.
32	1	1049	19	22	Fill of pit 1050	Rom.
33	2	2010	7	11	Fill of 2007	Rom.
34	2	2005	29	40	Secondary fill of 2006	Rom.
35	2	2013	20	28	Primary fill of 2006	Rom.
36	2	2412	30	55	Primary fill of 2407	Rom.
37	2	2095	20	27	Tertiary fill of 2097	Rom.
38	2	2096	20	29	Primary fill of 2097	Rom.
39	2	2439	5	6.5	Single fill of 2438	Rom.
/6\			5	7.5	Vessel fill	Rom.
/17\	2	2295	4	4.5	Vessel fill	Rom.
/18\	2	2307	1	1	Vessel fill	Rom.
/22\	2	2371	1	1	Vessel fill	Rom.
/24\	2	2372	2	1.5	Vessel fill	Rom.
	2	2284	0.5	0.5	Vessel fill	Rom.
U/S			3	3.5	Vessel fill	Rom.

Area 1

Seven samples were taken from Area 1. Samples 1, 30 and 31 derive from dumps within the upper fills of an area of quarrying. Sample 32 is a fill of pit 1050 which is cut in to the top of the quarry fills and sample 5 is an organic rich deposit from the base of a quarry pit. Samples 2 and 3 derive from two fills of well 1332.

All these deposits produced Roman pottery, while those from the quarry and features in the quarry also produced reduced fired clays. Three samples produced a little slag and bone (Table 3). Two of the contexts were rich in charcoal, 1049 and 1330, both from features cut into the quarry fills. These also produced small quantities of charred grain and weed seeds, with a little chaff in feature 1332.

The well fills and deposits at the base of a quarry pit (1119) were all waterlogged and contained exceedingly well preserved organic assemblages. These included numerous seed and beetle fragments, wood – including small roundwood, twigs and plant stems. The invertebrates included caddis larval cases, waterfleas (*Daphnia* sp.) in sample 5, many terrestrial beetles including carabids, weevils, dung beetles and other families. The plant remains are dominated by seeds and small wood fragments with occasional leaves, including possible gorse, and seed heads. The condition, abundance and diversity of the plant and invertebrate remains is exceptional and can be expected to give a good indication of the immediate environment of the well and quarry pits.

Table 2: Small soil and wood samples from Area 1

Samples		
auger no.	depth	description
1	0-0.45	fine yellow sand
1	0.45-0.5	grey sandy clay
2	1.0m	grey brown slightly silty sand
2	1.1	grey slightly sandy clay
3	1.35	dark grey slightly silty sand *
6	1.25	dark grey organic humic silty sand *
8	0.25	dark grey humic sand
10	1.1	dark grey organic silty sand *
12		grey silty sand
14	0.15-0.2	grey sandy clay
16	0.25	grey slightly silty sand
18	0.4-0.45	grey slightly silty sand
Timber		
context	feature	description
1034	well 1031	radially split timber
1034	well 1031	radially split timber
1034	well 1031	radially split timber
1034	well 1031	timber
1034	well 1031	timber
1034	well 1031	3 small pieces timber
1035	wicker?	several pieces small roundwood

* samples suitable for pollen analysis

No work has been carried out on the timber from the well or the small roundwood or wicker samples. These will require identification and assessment of the evidence for working in the context of the well structure and context 1035.

No processing has been conducted on the soil samples collected during the augering. On the basis of the results of the assessment of the bulk samples from the well and quarry pit the samples marked with an asterisk in Table 2 may be suitable for pollen analysis and could give a more regional picture of the local environment around the site.

Area 2

A series of discrete features were sampled in Area 2. These included ten samples from deposits within and associated with the kiln, 2004; two from the secondary and tertiary fills of ditch 2006; one from the primary fill of ditch 2007; two from the primary and secondary fills of ring gully 2097; one from feature 2099 adjacent to hearth 2277; three from deposits of hearth 2127; five from deposits of hearth 2128; five from the fills of 2277 a part of hearth structure 2128; and single fills of ditches 2287, 2407 and 2438.

Kiln 2004

The rake out deposits and fills of kiln 2004 are characterised by relatively large quantities of pottery, a large amount of reduced fired clay, a few small globules of slag and occasional fragments of animal bone (Table 3). The fired clay is presumably part of the fabric of the kiln. The pottery are reduce fired grey wares.

The environmental finds from these samples are consistent. They are all dominated by charcoal with only a few charred cereal grains, but several charred weed seeds. There is no chaff in any of the samples. The charcoal element of the flots is made up almost entirely of small and very small twisted twiggy material, with occasional tuberous matter. The presence of charred flower buds and shoots, the latter apparently of heather (*Calluna vulgaris*), with small twiggy material suggests that most of the charcoal may derive from heather or something similar. There is little to no small brushwood or roundwood charcoal with a diameter of greater than 6mm in the charred state. The tuberous material might derive from grasses and the relative abundance of small weed seeds perhaps indicates some dry plant matter being used as kindling for the kiln fire.

Wheat, barley, pulses and a plum stone have been preliminarily identified among the charred remains.

There is a slight variation in the assemblages from different parts of the kiln. Samples 6, 7 and 17 were taken from the oven area, while samples 18-24 were the rake out from the kiln. The rake out samples contain much higher concentrations of charcoal than the oven samples, and in these latter samples charred grain is absent or at a much lower concentration.

Hearths 2127, 2277 and 2128

This group of features lies adjacent in one area of the site and were preliminarily identified as hearths for the drying of the pots prior to firing.

Feature 2127 is provisionally identified as a hearth. The primary, secondary and tertiary fills of this feature were sampled in small samples (see Table1). Archaeological finds were fairly limited with a few small sherds of pottery, a little fired clay and fragments of slag, coal, and a little animal bone in the tertiary fill. The fired clay in this feature was generally oxidised rather than the reduced fired clays found in the kiln samples. The flots were small (Table 4) and produced little material, although the tertiary fill, sample 16, included an abundance of

Table 3: Archaeological finds from the assessed samples

sample no.	context	feature	sample vol. l.	residue vol. ml.	pot £/#	fired clay wt. *	ham'er scale	slag	fuel ash slag	coal	bone wt	other
3	1033	well	9	350	1/7							
2	1059	well	10	100	13/39						4	small frags brick/tile
1	1000	quarry	5	150	6/16	56						burnt flint
5	1119	quarry	14	250	68/187	3		11				
32	1049	1050	19	1750	75/594	696		+			<1	
30	1329	1332	7	50	7/48	+						
31	1330	1332	7	75	5/11	27		+			<1	
6	2200	2004	10	600	18/34	421		+	+	+		
7	2201	2004	30	1250	47/115	1187		2		+		burnt stone
18	2241	2004	10	300	20/86	180	+	+				
21	2249	2004	10	800	16/71	488		+				splinter of glass
22	2301	2004	5	250	5/34	104		+		+	1	
19	2302	2004	10	500	7/21	258		+				
24	2333	2004	10	1000	14/40	753				+	<1	
17	2335	2004	8.5	600	8/13	432			+			
23	2372	2004	10	550	20/123	281				+	1	
20	2388	2004	10	400	11/53	261		+			1	
34	2005	2006	29	1000	70/628	336	+	+		+	<1	
35	2013	2006	20	750	53/185	313		+		+	<1	
33	2010	2007	7	200	8/108	6	+	+				
37	2095	2097	20	250	18/86	77		+			<1	
38	2096	2097	20	150	15/267	37	+	+		+	<1	
4	2109	2099	7	50		4			+		<1	
16	2138	2127	3	10		4	+	+		+	1	
8	2139	2127	2	8	4/<1	+				+		
9	2280	2127	2	100	4/<1	9		?*	+	+		
26	2285	2128	8	100	1/<1	30		2			1	
27	2358	2128	8	100	6/12	17					<1	
25	2359	2128	7	100		22		+	+			
29	2377	2128	3	20		8						
28	2381	2128	3	50		8						
10	2281	2277	4	100	11/21	17		?	+	+		
11	2282	2277	9	400	5/6	28		80	+			
12	2283	2277	1	10					+			
13	2284	2277	4	250		31						
14	2285	2277	5	150		64			+	+		
15	2286	2287	3	25	2/5	16		+		+		burnt flint
36	2412	2407	30	50	7/23	1						
39	2439	2438	5	25	4/3	3	+					
U/S			3	100	14/199	14						
/6\			5	70	18/26	<1					<1	
	2284		0.5	30		18						
/17\	2295		4	25	30/15	<1					<1	spalled pottery sherds
/18\	2307		1									
/22\	2371		1	6							3	eroded bone fragments
/24\	2372		2	10		8						

£/# - no sherds/weight in g.

+ present in quantities of less than 1 gramme weight or 1-10 pieces; ++ = >10 pieces

* sorted from >7mm fraction of residue only (+ present in <7mm fraction)

charred cereal grain, with wheat, barley, oats(?) and pulse (possible pea) preliminarily identified. This concentration of grain in the tertiary fill may derive from deposits in the adjacent feature 2128/2277 (see below).

Hearth 2277/2128

This feature appeared to be a sunken hearth and was filled by numerous layers most of which were individually sampled. Ten samples were collected from nine layers, and sample size varied from one to nine litres of deposit. A little pottery was recovered from six of the samples with small quantities of fired clay coming from all but the smallest. Most of the fired clay was fired under oxidising conditions. A little slag and fuel ash slag was present in a number, whilst samples 9 and 11 produced relatively large quantities of light vescicular grey slag. Close examination (up to x30 magnification) shows that some of these slag pieces have a top and bottom surface. On the bottom surface many unfused grains of sand are visible within the slag matrix, while on the upper surface almost all the grains are fused and glassy. This suggests the slag has formed from the natural sands on the site, probably at temperatures up to approximately 600° C.

The flots from these samples are not large, but a group of three samples from three of the earlier fills of the feature (see Fig. 00) produced relatively large flots which were dominated by charred cereal grain, and in two of the contexts included abundant chaff fragments and weed seeds (2377 and 2381). Context 2099 (sample 4) associated with hearth 2277 is the richest sample from the site with large quantities of charcoal, charred grain, chaff and weed seeds (Table 4), suggesting perhaps a primary deposit of this debris within Area 2. The cereals included wheat, barley and oats with legumes, and probably peas and beans also present. These assemblages have the appearance of crop processing debris, and may occur in this feature as a result of being used for fuel or may indicate the drying of corn, prior to threshing, over fires that were also used for drying the pots. A detailed botanical and statistical analysis of these assemblages may help to resolve the character of the charred plant assemblages and establish whether this feature could have indeed served a dual purpose.

Ditch and gully fills

For the location of these fills see Figure 00. Two samples were taken from a ring gully, 2097, west of the kiln. These contained pottery, fired clay, a little slag and bone much like most of the other samples. The flots included fairly high concentrations of charred cereal grain and chaff, as well as charcoal, and although a much lower density of material than in 2128 the assemblage appears similar and suggests the inclusion of crop processing waste in the gully.

The two samples from ditch 2006, a few metres west of the kiln, produced a finds and environmental assemblage very similar to that from the kiln rake out (Tables 3 and 4) suggesting that this probably represents material redeposited or distributed from the rake out of the kiln, or potentially another kiln not excavated within the trench.

The remaining ditches produced small quantities of pottery, fired clay, occasional hammerscale, charcoal, charred grain and weed seeds. This assemblage is an amalgam of the debris on the site and presumably reflects the incorporation of the general site debris in these features with no specific evidence of one activity or another.

Table 4: Environmental finds from the assessed samples

sample no.	cont.	feature	sample vol. l.	flot vol. ml.	char-coal	charr'd grain	charr'd chaff	charr'd seeds	snails	burnt bone	
3	1033	well									
2	1059	well									
1	1000	quarry	5	1	1	?		1	1		
5	1119	quarry	14								
32	1049	1050	19	160	5+	2		4			buds, shoots
30	1329	1332	7	6	3		1	2			shoots
31	1330	1332	7	55	5	2	2	2		+	
6	2200	2004	10	9	2			1		+	
7	2201	2004	30	50	4	1		4	1	+	wheat, barley?, plum, shoots
18	2241	2004	10	28	4	1		2			
21	2249	2004	10	50	5	1		2			barley?
22	2301	2004	5	40	5	1		2	1		buds
19	2302	2004	10	65	5			3		+	buds
24	2333	2004	10	60	5	1		3			barley?, buds, shoots, cattle
17	2335	2004	8.5	11	3			3	1		
23	2372	2004	10	55	5	1		3			barley, pulse?, buds
20	2388	2004	10	40	5	1		2	1		buds, shoots
34	2005	2006	29	68	5	1		2	1	+	wheat, buds
35	2013	2006	20	42	5	1		2	1		pulse?
33	2010	2007	7	8	3	1	1	1			barley
37	2095	2097	20	50	5	3	2	1	1		wheat, barley
38	2096	2097	20	35	4	3	2	2	1		wheat, barley
4	2109	2099	7	350	5+	5	5	3		+	wheat, barley, oats
16	2138	2127	3	6	1	4	1	1			wheat, barley, oats?, pulse/pea?
8	2139	2127	2	1	2						
9	2280	2127	2	<1	1						
26	2285	2128	8	1	1	2	1	2			wheat, oats
27	2358	2128	8	1	2	2					wheat, barley?
25	2359	2128	7	10	2	4		3			wheat, barley, oats
29	2377	2128	3	4	2	4	3	3			wheat, barley, oats, pea/bean, legume
28	2381	2128	3	7	3	5	2	5	1		wheat, barley, oats, bean, pea?, legume
10	2281	2277	4	6	2	2		2		+	wheat, barley, bean?, pea?
11	2282	2277	9	4	2	1		1			barley?
12	2283	2277	1	<1							
13	2284	2277	4	6	2	1	1				
14	2285	2277	5	8	3	1	1	1			wheat, barley
15	2286	2287	3	<1	1	2		3			wheat, barley, cherry/sloe
36	2412	2407	30	4	2	1		1			
39	2439	2438	5	9	3	1		1			
U/S			3								
/6\			5	1	1	1		1			
	2284		0.5	1	1						
/17\	2295		4	<1	1						
/18\	2307		1	<1							
/22\	2371		1	<1							
/24\	2372		2	3	2			1			shoots

* frequency – 1=1-10; 2=11-50; 3=51=150; 4=151-250; 5=>250 items

Vessel contents
The seven small samples taken from within pottery vessels produced very little material (Table 3). Small finds <6>, <17> and U/S included pottery, that from <17> being all spalled sherds, while U/S was a major part of the pot itself. Small find <24>, that from context 2284 and U/S also produced some fired clay. <22>, context 2371, produced only eroded bone, probably animal bone with a little coarse sand. The environmental components of the samples were even more restricted with a little charcoal in five of them, charred weed seeds in two and a few charred cereal grains in one (Table 4).

The contents of these vessels appears to be fairly incidental and is probably composed of the soils that surrounded the pots when they were discarded.

Discussion
Industrial evidence
The occurrence of very small quantities of hammerscale in six of the samples, all of them in Area 2, perhaps suggests that some iron smithing was taking place somewhere in the vicinity. At these low concentrations such activities need not have been very close to the excavated trench.

Much of the small quantities of slag from the site are probably fuel ash slags that have derived merely from the fires being used to fuel the kiln and hearths. Two contexts produced rather larger assemblages, 2280 and 2282. 2282 was described on site as an ash layer and 2280 as charcoal rich. Both derive from hearth type structures and the character of the slag is similar to the smaller fuel ash slag from the site. These contexts may indicate *in situ*, perhaps repeated, firing producing a vitrification of the sandy matrix of the hearth, or perhaps the redeposition of such material from a hearth. This slag clearly indicates that fairly high temperatures were probably reached in these hearths, perhaps up to 600° C.

Charcoal
The charcoal from the site is characterised by a lack of larger wood fragments, brushwood or coppice wood. Apart from one or two pieces in several samples the majority of the charcoal is thin, less than 6mm diameter, twisted stem and twig fragments. Although none of this has been identified the presence of small charred shoots apparently of heather (*Calluna vulgaris*), charred flower buds or seed heads, and a similar looking stem type in all the features suggests that there may have been a specific selection of heather and similar fuel types to fire both the kiln and hearths on the site.

This lack of larger wood fuel is unusual, and has not been recorded on any other Roman kiln sites (pers comm. Rowena Gale and Paul Booth) where a mixed species assemblage of brushwood and roundwood is more typical. The presence of shoots and buds also suggests that the fuel is being collected and possibly used while still green. The site lies on aeolian acid sand upon which a heathland may have developed and gorse and heather may have been local resources.

Charred plant remains
Two elements of the charred plant remains are interesting. Most of the kiln and other flots include small plant stems, tuberous material and fairly frequent weed seeds – even when little or no cereals are present. It may be that this component of the charred material derives from

something like tinder used to start the fires. Although species such as heather and gorse catch fire very easily when dried, if being used green, as has been suggested above, a tinder would may have been needed.

The second element is the charred cereal assemblages rich in grain and chaff. This appears to be an indication of crop processing on the site but will need to be specifically identified and quantified before a final interpretation can be made. Its presence particularly around hearth 2128 and 2099 suggests that these structures may have been functioning as corn driers as well as, or possibly rather than, pot drying hearths.

Waterlogged samples
The three waterlogged samples from Area 1 are likely to give little information relating to the activities taking place at the site. On the other hand their richness and excellent preservation means that the plant and insect remains that survive in them may give a good picture of the environment of, and around, the quarry pits contemporary with their filling. Three of the samples from the auger survey are suitable for studying the pollen preserved in the sediments to give a broader environmental picture than the macrofossil evidence.

The waterlogged deposits in the well also preserved some of the timbers of the well structure. These are clearly worked and should be described and their species and reduction method analysed.

Excavated Animal Bone
A small collection of fifty-three bone fragments, several of them in pieces, was made during excavation. These have been identified and recorded following the procedures of the Environmental Archaeology Consultancy (see Appendix). There is a fairly wide range in the state of preservation of the material, from severely eroded bone fragments to those in an excellent state of preservation from the organic fills at the base of the quarry pit. Nearly 80% of the bone fragments were recorded from Area 1, while only thirteen pieces were recovered from Area 2. The bone from Area 2 was in poorer condition. Some of the preservation is sufficiently poor to suggest that some bones will have been lost from the assemblage completely as a result of post-depositional corrosion in the acid sands of the site.

Table 5: Excavated animal bones

	Area 1	Area 2
Horse	5	1
Cattle	12	4
Cattle size	14	8
Sheep/goat	4	
Sheep size	1	
Pig	2	
Dog	1	
Unidentified	1	

Bones of cattle, horse, sheep/goat, pig and dog have been specifically identified (Table 5). This small assemblage includes both immature and adult cattle and sheep, and immature horse. A few of the bones are butchered and a similar proportion dog gnawed.

Recommendations

There are a number of important facets about the environmental assemblages from this site that are unusual and justify further work. There is very little bone from Area 2. This may be, in part, due to preservation but is more likely a reflection of a lack of domestic activity on the site. Most of the environmental data can be readily placed within an industrial context, whether pottery making or corn drying. The environmental evidence falls into four areas of possible research:

1. The fuelling of the kiln and nearby hearths. - The charcoal and charred plant and tuberous material from selected samples from the kiln, 2004, and hearths 2099, 2127, 2128 and 2277 should be identified to species and characterised in order to define the fuel being used at this site. The site may have lain in an area of heathland with heathers and gorse a locally available fuel resource. The analysis of the pollen from the base of the quarry pits may help characterise the local vegetation around the site.

2. The character of the charred crop remains and their functional significance. - The charred plant assemblages from selected samples from the kiln (2004), hearths 2099, 2127, 2128 and 2277, and the fills of ditches 1332, 2097 and 2287 should be studied. The study should include the identification of the cereal species present and their relative abundance; the weed taxa present; and the proportion of grain, chaff and weed seeds. These results should be used to interpret the origin of the assemblages and their probable context on this site and compared with other contemporary assemblages, such as Marijke van der Veen's (1989) work on Roman corn dryer assemblages. It may be that the possible corn drying was being carried out on a commercial basis reflecting the industrial rather than domestic or agricultural character of the site.

3. The palaeoenvironment of the site and its region. – The three waterlogged samples from Area 1 should be studied for plant macrofossils, wood and invertebrate remains to establish the character of the immediate environment of the site with a more regional picture being obtained from pollen analysis of three samples taken during the auger survey. The pollen data may be an important element for considering the reasons for the fuel selection at the site.

4. The identification and description of the structural timber and wood. – The sampled timbers and wood from the structure of the well should be identified to species and consideration given to the manner in which the timbers were reduced or worked to their functional shape. The apparent absence of large charcoal as a fuel on the site may indicate a relative lack of timber and the species selection and character of the wood used to construct the well may also reflect the local availability of timber.

Acknowledgments
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Bibliography
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THE ENVIRONMENTAL ARCHAEOLOGY CONSULTANCY

Key to codes used in the cataloguing of animal bones

SPECIES

BOS	cattle
CSZ	cattle size
SUS	pig
OVCA	sheep or goat
OVI	sheep
SSZ	sheep size
EQU	horse
CER	red deer
CAN	dog
MAN	human
UNI	unknown
CHIK	chicken
GOOS	goose, dom
LEP	hare
UNB	indet bird
MALL	duck, dom.
GULL	gull sp.
FISH	fish
UNIB	bird indet
UNIF	fish indet
GSZE	goose size
BEAV	beaver
CORV	crow or rook
POLE	polecat/ferret
PART	partridge
ORC	rabbit
ROD	rodent
JACK	jackdaw
OWL	owl indet.
AUR	aurochs
DUCK	duck sp.
CRA	goat
FER	feral dove
DAM	fallow deer

BONE

SKL	skull
TEMP	temporal
FRNT	frontal
PET	petrous
PAR	parietal
OCIP	occipital
ZYG	zygomatic
MAN	mandible
MAX	maxilla
ATL	atlas
AXI	axis
CEV	cervical vertebra
TRV	thoracic vertebra
LMV	lumbar vertebra
SAC	sacrum
CDV	caudal vertebra
SCP	scapula
HUM	humerus
RAD	radius
MTC	metacarpus
MC1-4	metacarpus 1-4
INN	innominate
ILM	ilium
PUB	pubis
ISH	ischium
FEM	femur
TIB	tibia
AST	astragalus
CAL	calcaneum
MTT	metatarsus
MT1-4	metatarsus 1-4
PH1	1st phalanx
PH2	2nd phalanx
PH3	3rd phalanx
LM1-LM3	Lower molar 1 - molar 3
UM1-UM3	upper molar 1 - molar 3
LPM1-LPM4	lower premolar 1-4
UPM1-UPM4	upper premolar 1-4
DLPM1-4	deciduous lower premolar 1-4
DUPM1-4	deciduous upper premolar 1-4
MNT	mandibular tooth
MXT	maxillary tooth
LBF	long bone
UNI	unidentified
STN	sternum
INC	incisor
TTH	indet. tooth
CMP	carpo-metacarpus
SKEL	skeleton

SIDE

W - whole
L - left side
R - right side
F - fragment

FUSION

Records the fused/unfused condition of the epiphyses
P - proximal; D - distal; E - acetabulum;
N - unfused; F - fused; C - cranial; A - posterior

TOOTH WEAR - Codes are those used in Grant, A. 1982 The use of tooth wear as a guide to the age of domestic animals, in B.Wilson, C.Grigson and S.Payne (eds) *Ageing and sexing animal bones from Archaeological sites, 91-108.*

Teeth are labelled as follows in the tooth wear column:

h ldpm4/dupm4
H lpm4/upm4
I lm1/um1
J lm2/um2
K lm3/um3
f ldpm2/dupm2
g ldpm3/dupm3

ZONES - zones record the part of the bone present.
The key to each zone on each bone is on page 2

MEASUREMENTS - Any measurements are those listed in A.Von den Driesch (1976) *A Guide to the Measurement of Animal Bones from Archaeological Sites*, Peabody Museum Bulletin 1, Peabody Museum, Harvard, USA

PRESERVATION

1 - enamel only surviving
2 - bone very severely pitted and thinned, tending to break up teeth with surface erosion and loss of cementum and dentine
3 - surface pitting and erosion of bone, some loss of cementum and dentine on teeth
4 - surface of bone intact, loss of organic component, material chalky, calcined or burnt
5 - bone in good condition, probably with some organic component

ZONES - codes used to define zones on each bone

SKULL -
1. paraoccipital process
2. occipal condyle
3. intercornual protuberance
4. external acoustic meatus
5. frontal sinus
7. entorbitale
8. temporal articular facet
9. facial tuber
0. infraorbital foramen

MANDIBLE
1. Symphyseal surface
2. diastema
3. lateral diastemal foramen
4. coronoid process
5. condylar process
6. angle
7. anterior dorsal acsending ramus posterior M3
8. mandibular foramen

VERTEBRA
1. spine
2. anterior epiphysis
3. posterior epiphysis
4. centrum
5. neural arch

SCAPULA
1. supraglenoid tubercle
2. glenoid cavity
3. origin of the distal spine
4. tuber of spine
5. posterior of neck with foramen
6. cranial angle of blade
7. caudal angle of blade

HUMERUS
1. head
2. greater tubercle
3. lesser tubercle
4. intertuberal groove
5. deltoid tuberosity
6. dorsal angle of olecranon fossa
7. capitulum
8. trochlea

RADIUS
1. medial half of proximal epiphysis
2. lateral half of proximal epiphysis
3. posterior proximal ulna scar and foramen
4. medial half of distal epiphysis
5. lateral half of distal epiphysis
6. distal shaft immediately above distal epiphysis

ULNA
1. olecranon tuberosity
2. trochlear notch- semilunaris
3. lateral coronoid process
4. distal epiphysis

METACARPUS -
1. medial facet of proximal artciulation, MC3
2. lateral facet of proximal articulation, MC4
3. medial distal condyle, MC3
4. lateral distal condyle, MC4
5. anterior distal groove and foramen
6. medial or lateral distal condyle 6. ectorbitale

FIRST PHALANX
1. proximal epiphysis
2. distal articular facet

INNOMINATE
1. tuber coxae
2. tuber sacrale + scar
3. body of illium with dorso-medial foramen
4. iliopubic eminence
5. acetabular fossa
6. symphyseal branch of pubis
7. body of ischium
8. ischial tuberosity
9. depression for medial tendon of rectus femoris

FEMUR
1. head
2. trochanter major
3. trochanter minor
4. supracondyloid fossa
5. distal medial condyle
6. lateral distal condyle
7. distal trochlea
8. trochanter tertius

TIBIA
1. proximal medial condyle
2. proximal lateral condyle
3. intercondylar eminence
4. proximal posterior nutrient foramen
5. medial malleolus
6. lateral aspect of distal articulation
7. distal pre-epiphyseal portion of the diaphysis

CALCANEUM
1. calcaneal tuber
2. sustentaculum tali
3. processus anterior

METATARSUS
1. medial facet of proximal artciulation, MT3.
2. lateral facet of proximal articulation, MT4
3. medial distal condyle, MT3
4. lateral distal condyle, MT4
5. anterior distal groove and foramen
6. medial or lateral distal condyle

Archive Catalogue of Animal Bone from Market Rasen - MRL99

site	context	species	bone	no.	side	fusion	zone	butchery	gnawing	toothwear	measurement	path.	comment	preservation
MRL99	1015	BOS	UPM3	1	L					G12			LOCALLY ERODED TOOTH DENTINE AND ENAMEL	3
MRL99	1028	EQU	FEM	1	F								SHAFT FRAGMENT	4
MRL99	1029	EQU	FEM	1	F								DISTAL SHAFT FRAGMENT - WITH PART ZONE 4	4
MRL99	1029	SUS	SKL	1	F								PARIETAL FRAG-SUTURE OPEN	4
MRL99	1033	OVCA	MTC	1	R		125						PROX END AND SHAFT	4
MRL99	1033	OVCA	TIB	1	L	DF	567				SD-6.3 Bd-30.8 Dd-22.9		DISTAL HALF	5
MRL99	1053	BOS	TIB	1	L								DISTAL SHAFT- 2 PIECES	4
MRL99	1053	CSZ	RIB	1	F								4 PIECES-SHAFT FRAG	3
MRL99	1053	CSZ	TIB	1	F								SHAFT-MANY FRAGMENTS-SPLITTING	3
MRL99	1070	OVCA	ULN	1	R	PN	2						PROX FRAGMENT- 2 PIECES-CONCRETED	3
MRL99	1083	BOS	HC	1	L		1						BASAL HALF CORE AND PART FRONTAL- 12 PIECES-OVAL SECTION FORWARD CURVING	3
MRL99	1083	CAN	MAX	1	R								FRAGMENT WITH CARNBASSIAL AND MOLARS-ERODING- SOME LOSS OF TOOTH TISSUE	3
MRL99	1083	CSZ	TRV	1	F								TRANSVERSE PROCESS	3
MRL99	1095	BOS	DLP3	1	R					h7				3
MRL99	1095	BOS	INN	1	L	EF	59						ACETAB FRAGMENT- SEVERELY ERODED	2
MRL99	1144	BOS	RAD	1	L		3	CH	DG				PROX HALF SHAFT-PROX END CHEWED-SHAFT CHOPPED	3
MRL99	1145	BOS	INN	1	R	EF	34579						3 PIECES-SEVERELY ERODED	2
MRL99	1145	BOS	SCP	1	L	DF	12345						FRAGMENTED - 10 PIECES	2
MRL99	1145	BOS	TIB	1	L	DJ	567						DISTAL END	2
MRL99	1145	CSZ	UNI	6	F								PROBABLY PARTS OF ABOVE	2
MRL99	1145	SUS	LC	1	F								FRAG CANINE- MALE	4
MRL99	1240	BOS	AST	1	R		1						COMPLETE-ERODED	2
MRL99	1240	CSZ	RIB	1	F								SHAFT FRAG	3
MRL99	1260	EQU	PH3	1	F								FRAGMENT	3
MRL99	1262	OVCA	TIB	1	R		7		DG				DISTAL HALF SHAFT-DISTAL CHEWED	4
MRL99	1262	SSZ	LBF	1	F								SHAFT FRAG	3
MRL99	1262	UNI	LBF	1	F								INDET	4
MRL99	1289	BOS	HUM	1	L		69		DG				DISTAL SHAFT-END CHEWED- 7 PIECES	4
MRL99	1291	BOS	HUM	1	L		69	KN					DISTAL SHAFT-MEDIAL SIDE WITH CUT MARKS	4
MRL99	1291	CSZ	RIB	1	F								SHAFT FRAG- 7 PIECES	4
MRL99	1325	CSZ	UNI	3	F								PARTS OF ABOE BONES?	4
MRL99	1325	EQU	FEM	1	L	DJ	4567						DISTAL END- 6 PIECES	4
MRL99	1325	EQU	TIB	1	L	PN	123						PROX EPI-SAME JOINT AS ABOVE- 2 PIECES	4
MRL99	2020	CSZ	RIB	1	F								SHAFT FRAG-4 PIECES	3
MRL99	2087	CSZ	UNI	1	F			C					CALCINED FRAG-ACETAB?	4
MRL99	2142	BOS	LM2	1	R					J6			POST CUSP ONLY	4

Archive catalogue MRL99 (continued)

site	context	species	bone	no.	side	fusion	zone	butchery	gnawing	toothwear	measurement	path.	comment	preservation
MRL99	2276	CSZ	UNI	1	F								FRAGMENT-?LBF	2
MRL99	2276	CSZ	UNI	4	F								INDET	3
MRL99	2283	BOS	ULN	1	F								SHAFT FRAG DISTAL TO SEMILUNARIS-VERY ERODED	2
MRL99	2295	BOS	HUM	1	L	DF	78						DISTAL END-SEVERELY ERODED- 6 PIECES	2
MRL99	2370	BOS	TTH	1	F								ENAMEL FRAGMENTS- 7 PIECES	1
MRL99	2396	CSZ	RIB	1	F								SHAFT FRAG- 3 PIECES	3
MRL99	2412	EQU	LPM2	1	R								WORN-DENTINE AND CEMETUM LOST	2

Market Rasen
Environmental post-excavation estimates

Charcoal Identification and report R.Gale		
Kiln 2004	oven area – contexts 2201	
	rake out – contexts 2302, 2333, 2372	
Hearth 2277	contexts 2285, 2099	
Ring gully 2097	contexts 2095, 2096	
Ditch 2006	contexts 2005, 2013	
Pit 1050	context 1049	
Well 1332	context 1330	850.00
Wood identification and report R.Gale		
Well timbers	context 1034- 8 pieces	
Wicker? Work	context 1035	
Quarry pit	context 1119	
Well fill	contexts 1033, 1059	130.00
Charred plant identification and report		
Well 1332	context 1330	
Pit 1050	context 1049	
Kiln 2004	oven area – contexts 2201, 2335	
	rake out – contexts 2302, 2333, 2372	
Ring gully 2097	contexts 2095, 2096	
Hearth 2277	contexts 2099, 2281	
Hearth 2127	context 2138	
Hearth 2128	contexts 2285, 2359, 2377, 2381	
Gully 2287	context 2286	900.00
Waterlogged plant and insect identification and report		
Quarry pit	context 1119	
Well 1332	contexts 1033, 1059	1000.00
Pollen analysis and report R. Scaife		
Quarry pits	auger samples 3, 6, 10	390.00
Organisation, collation, editing and final report production		495.00
	Total	3765.00