



UNIVERSITY OF
LEICESTER

Archaeological Services

**An Archaeological Evaluation at
Fair Farm, Melton Road, Waltham on the Wolds,
Leicestershire (NGR SK 80159 24526)**



Ian Reeds

ULAS Report No. 2018 - 191 ©2018

**An Archaeological Evaluation at
Fair Farm, Waltham on the Wolds, Leicestershire**

NGR: SK 80159 24526

Ian Reeds

For: Bellway Homes Ltd (East Midlands)

Filename/Version	Checked by	Date
Waltham_FairFarm_Draft_Report.docx	J Thomas	11/01/2019

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ULAS Report Number 2018 - 191
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Accession Number XA 126 2018

Contents

Summary	1
Introduction.....	1
Site Location, History and Geology.....	1
Archaeological Aims and Objectives.....	2
Methodology	3
Results	5
Trench 2	7
Trench 3	9
Trench 4	11
Trench 5	13
Trench 16	14
The Finds	16
Roman pottery, tile and iron objects – <i>Nicholas J. Cooper</i>	16
Introduction	16
Discussion and Conclusion	17
Archive.....	18
Publication	18
Acknowledgments.....	19
Bibliography	19
Appendix 1 Trench record photographs	20
Appendix 2 Aerial Survey Report	

Figures

Figure 1: Location of Waltham on the Wolds.	2
Figure 2: Location of the development site in the village of Waltham on the Wolds (in yellow).	3
Figure 3: Trench plan over geophysics results (provided by Stratoscan).....	4
Figure 4: The site at Fair Farm prior to trenching	5
Figure 5: Actual trench plan with geophysical anomalies shown in red	6
Figure 6: Trench 2. Archaeological features in black, geophysical interpretation in red.....	7
Figure 7: Trench 2 looking east	8
Figure 8: Section through ditch [1] in T2	8
Figure 9: Section 1.01 showing ditch cut [1].....	9
Figure 10: Trench 3. Archaeological features in black, geophysical interpretation in red.....	10
Figure 11: Trench 3 looking north east.....	10
Figure 12: Section 1.02	
Figure 13: Section through ditch [3] in trench 3.....	11
Figure 14: Section through ditch [5] in trench 3	
Figure 15: Section 1.03.....	11
Figure 16: Trench 4. Archaeological features in black, geophysical interpretation in red.....	12
Figure 17: Trench 4 looking North-West	12
Figure 18: Trench 5 over geophysical anomalies	14
Figure 19: Trench 5 looking east	14
Figure 20: Trench 16.....	15
Figure 21: Trench 16 looking north-east	15
Figure 22: Section though posthole [9] in trench 16	

Figure 23: Section 1.05	15
Figure 24: Trench 1 looking east	20
Figure 25: Trench 2 looking east	20
Figure 26: Trench 3 looking south-west	21
Figure 27: Trench 4 looking north-west	21
Figure 28: Trench 5 looking east	22
Figure 29: Trench 6 looking north north-east	22
Figure 30: Trench 7 looking north east	23
Figure 31: Trench 8 looking east	23
Figure 32: Trench 9 looking north east	24
Figure 33: Trench 10 looking east	24
Figure 34: Trench 11 looking north east	25
Figure 35: Trench 12 looking east	25
Figure 36: Trench 13 looking south east	26
Figure 37: Trench 15 looking north-east	27
Figure 38: Trench 16 looking north-east	27
Figure 39: Trench 17 looking north-east	28
Figure 40: Trench 18 looking north-east	28
Figure 41: Trench 19 looking south south-east	29
Figure 42: Trench 20 looking north-east	29

Tables

Table 1: Trench descriptions	7
Table 2: quantified record of Roman pottery	17

Summary

University of Leicester Archaeological Services (ULAS) carried out an archaeological evaluation at Fair Farm, Waltham on the Wolds, Leicestershire, on behalf of Bellway Homes Limited (East Midlands), on a 2.9 hectare pasture field on the southern edge of the village.

An initial geophysical survey conducted by Stratascan was followed by a programme of archaeological trial trenching to evaluate the character, extent and preservation of any heritage assets in order that the potential impact of any development may be assessed by the Planning Authority and the need for any further archaeological work considered.

The results of the evaluation confirmed the indication from the geophysical survey that the main concentration of remains was located in the south-west quarter of the development area. Remains in four of the evaluation trenches in this part of the site included ditches and gullies containing Roman pottery dated to the second or third century. One other potential archaeological feature was found in the central/eastern area of the site, but excavation revealed that it was modern in origin.

The site archive will be held by Leicestershire Museums under the Accession Number X.A126.2018.

Introduction

Initial planning permission has been given to Bellway Homes Ltd (East Midlands) for residential development on land at Fair Farm, 33 Melton Road, Waltham on the Wolds, Leicestershire, LE14 4AJ (SK 80159 24526). This report presents the results of an aerial earthwork survey and programme of archaeological trial trenching carried out in advance of the development.

The program of investigation was carried out in accordance with the National Planning Policy Framework (NPPF) Section 16: Conserving and Enhancing the Historic Environment (DCLG 2012) and Conditions of the Planning Consent. The work took place between 12th November and 21st November 2018.

Site Location, History and Geology

The village of Waltham on the Wolds lies within the parish of Melton Mowbray, which is located to the south west approximately 5 miles away. It is a surprisingly busy village, with shops and amenities, which is probably partly due to it being the home of MARS Food UK Ltd, Centre for Pet Nutrition. The village gets its name from the compound of the Saxon words Weald and Ham, meaning residence near a wood, and Wold – meaning high open area.

The parcel of land to be developed is approximately 2.9 ha in extent and lies at a height of c.173m aOD, with underlying geology of Northampton Sand Formation – Sandstone, Limestone and Ironstone from the Jurassic period (British Geological Survey). The site is a greenfield site that lies directly off the A607, (SK 80159 24526) on the southern edge of the village. To the south of the site is Waltham Hall Private Nursing home, and a row of modern houses border the site on the western side. To the north is a current housing development and on the eastern side of the site is the location of Fair Farm. The name 'Fair Farm' is derived from the horse fairs that took place on the land in the late 19th and early 20th centuries.

A Desk-based Assessment (Dawson 2015) and Heritage Statement (Dawson 2016) have been prepared for the development site. The site contains particularly well preserved ridge and furrow which runs mainly on a north south axis (fig 3), and has been recorded by aerial photographic survey (see Appendix 2). A geophysical survey undertaken by Stratascan in 2015 identified an area of settlement in the south-western quarter of the site comprising a series of rectilinear and sub-circular enclosures, possibly reflecting an Iron Age or Roman date (Stratascan 2015). No other archaeology has been recorded on the site, however the Salt Way, a Roman road, runs close by to the north, and a number of Roman and medieval finds have been recorded from the vicinity of the site, such as a medieval gold ring. The earliest known mention of Waltham on the Wolds is

from the Domesday Book of 1086. In this record the land is said to have been owned by one Hugh de Grandmesnil (<http://local-history.org.uk/waltham/> accessed 26/11/2018), who was granted the land (along with many others) by William the Conqueror.

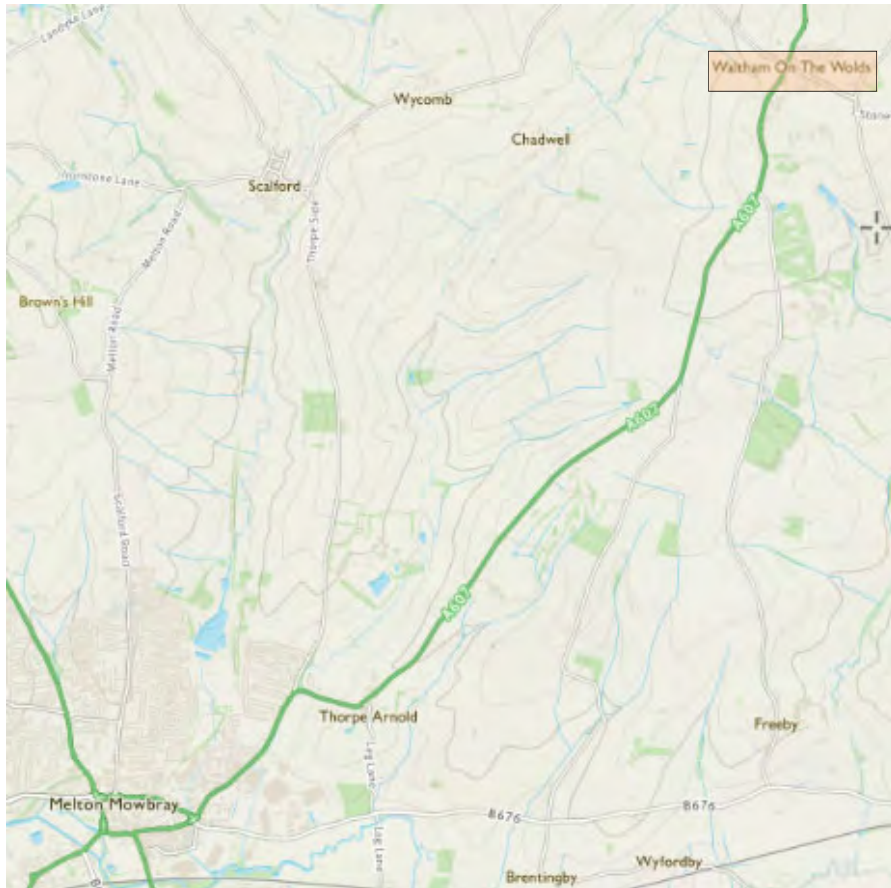


Figure 1: Location of Waltham on the Wolds.

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Archaeological Aims and Objectives

- To identify the presence/absence of any archaeological deposits.
- To establish the character and extent and depth for any archaeological deposits to be affected by the development and to record any archaeological deposits found.
- The archaeological investigations have the potential to add to the, *East Midlands Heritage: an Updated Research Agenda and Strategy for the Historic Environment of the East Midlands* (Knight et al 2012).
- *Roman*
A Roman road has been identified north of the site, and the results of the geophysical survey suggest the presence of a small rural settlement in the western part of the site (Research Agenda 5.4.4 – 5.4.6).
- *Saxon – Medieval*

There has been a small find of a gold medieval ring found in the village (www.culture24.org.uk/history-and-heritage/archaeology/art17867accessed_26/11/2018). The likelihood of any other medieval archaeology relating to anything other than agriculture is low. However, any environmental samples taken from medieval deposits will help towards exploring Research Agenda points 6.7 – 6.7.5.

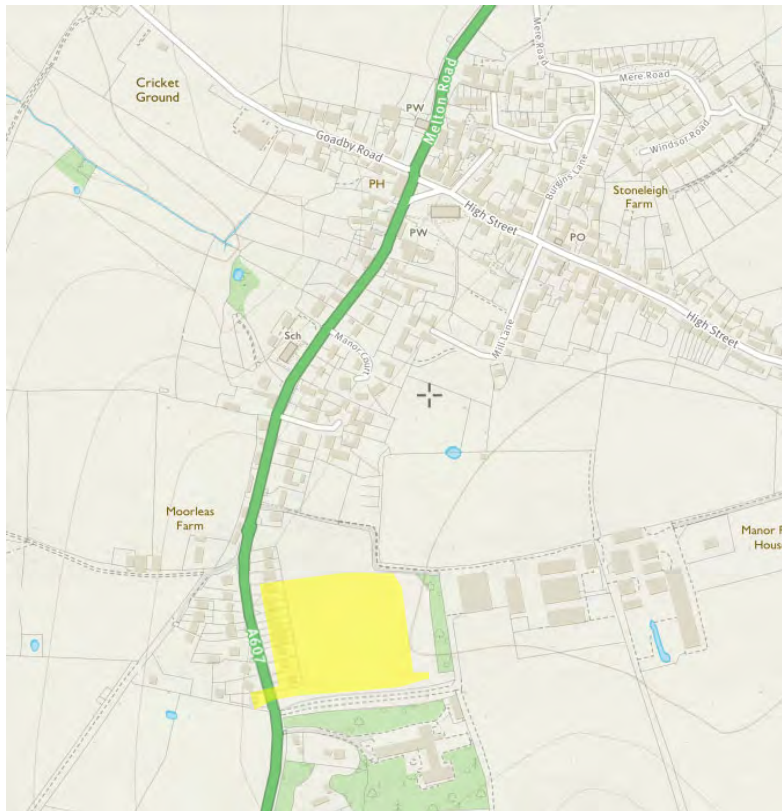


Figure 2: Location of the development site in the village of Waltham on the Wolds (in yellow).
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Methodology

The work followed the Written Scheme of Investigation (ULAS, 2018) and the Chartered Institute for Archaeologists (CIfA) Code of Conduct (2014a) and adhered to their Standard and Guidance for Archaeological Evaluations (2014b). An accession number/site code was obtained prior to commencement of the project and this was used to identify all records and artefacts.

- Prior to any work commencing photographs were taken of the site.
- A trench plan was agreed with the Leicestershire County Archaeologist following a geophysical survey carried out by Stratascan in 2015 (ref.J8318) with some of the trenches targeting anomalies shown on the survey. Initially the trench plan comprised 23, 30m x 1.8m trenches, but was reduced to 20 trenches on arrival due to constraints from an existing building program encroaching upon the site to the north; and an associated fenced off area which held a spoil heap. The total area trenched was approximately 5% of the proposed development area.
- Trenches 2 and 11 were repositioned slightly from the initial trench plan to avoid standing water pipes in the field that were used for animal feeding.



Figure 3: Trench plan over geophysics results (provided by Stratascan)

- Excavation of the trenches was carried out using a 16 ton 360 mechanical excavator, equipped with a 1.8m wide flat-bladed ditching bucket. The machine was fitted with rubber tracks to avoid any damage to the farm road when unloading the machine during delivery.
- Trench positions were recorded using a Topcon GPS SR Network RTK system which was tied into the Ordnance Survey National Grid.
- The overburden was removed in level spits under archaeological supervision, with topsoil and subsoils being split. Overburden was taken down to the archaeological horizon or undisturbed natural – whichever came first. Due to the preservation of the ridge and furrow the depth required to get to undisturbed natural varied considerably.
- The spoil from each trench was scanned with a metal detector.
- The trenches were cleaned by hand, photographed with section measurements taken every 5m, any archaeological features being investigated and recorded at the appropriate scale on pro-forma sheets.
- Trenches were backfilled once recording was complete.



Figure 4: The site at Fair Farm prior to trenching

Results

Excavation of the trenches showed overburden layers were fairly consistent across the site. Topsoil was found to be mid grey in colour and very loose and fibrous. The subsoil was mainly mid – light yellow brown in colour with a more firm texture, but still friable. The natural substrata was extremely bright orange brown in colour with patches of fragmented ironstone:

Seven of the 20 trenches excavated (6, 9, 10, 13, 14, 19 and 20) yielded no archaeological deposits, eight trenches (1, 8, 11, 12, 15, 16, 17 and 18) showed only modern cuts or modern land drains, and five trenches (2, 3, 4, 5 & 16) contained archaeological deposits.

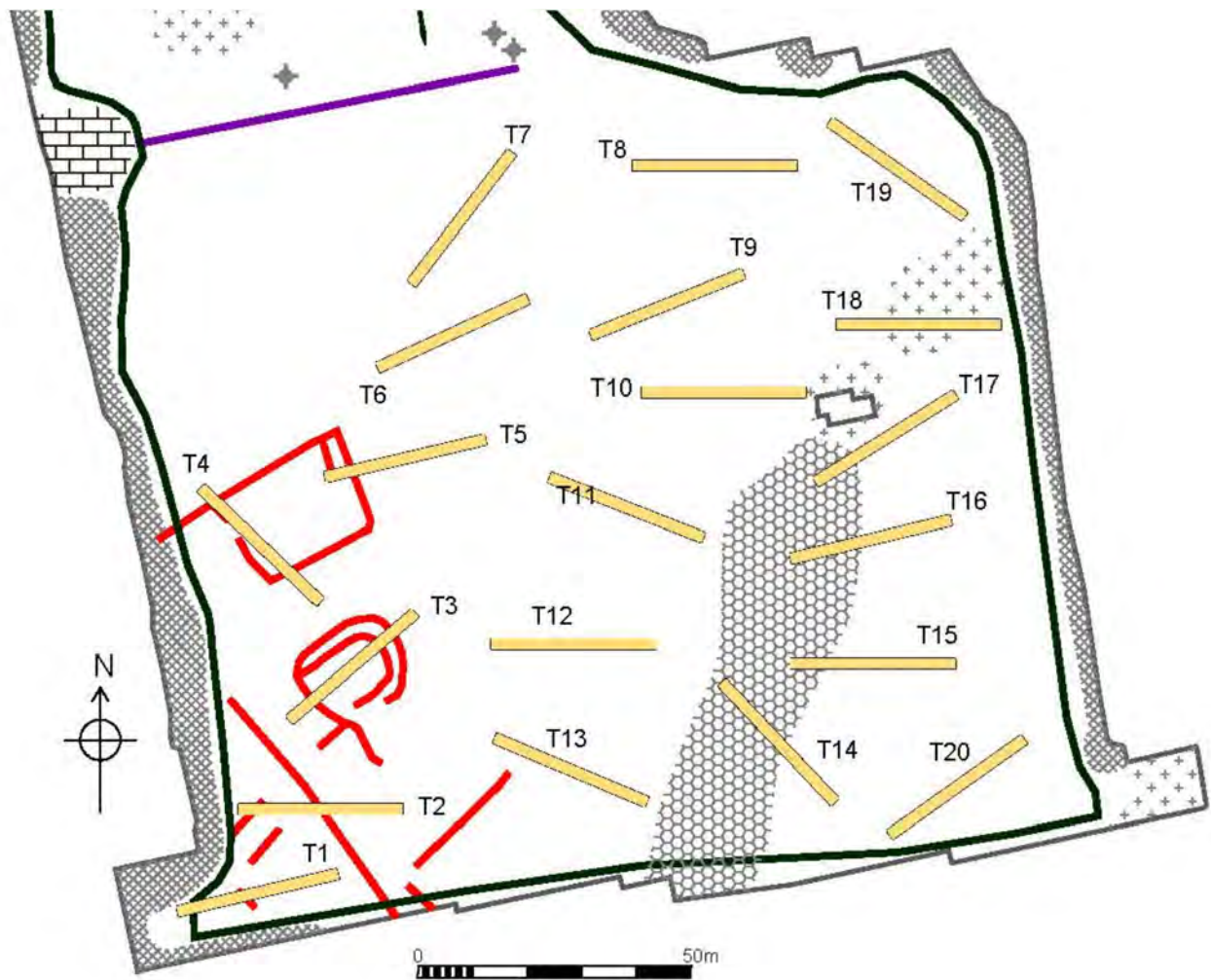


Figure 5: Actual trench plan with geophysical anomalies shown in red

Trench No	Orientation	Min Depth	Max Depth	Comments	Context No
1	E-W	0.46m	0.66m	uncertain modern feature	
2	E-W	0.67m	0.74m	2 linear features running NW-SE and possible butt end	(1), (2)
3	NE - SW	0.50m	0.71m	a number of linear features running N - S	(3), (4), (5),(6)
4	NW - SE	0.46m	0.67m	a number of linear features running N - S and NW - SE	(7), (8), (12), (13)
5	E - W	0.49m	0.58m	linear feature running N - S	
6	ENE - WSW	0.42m	0.63m	blank trench	
7	NE - SW	0.45m	0.71m	linear feature running NW - SE	
8	E - W	0.34m	0.69m	land drain running N - S	
9	NE - SW	0.38m	0.70m	blank trench	
10	E - W	0.35m	0.56m	blank trench	
11	SE - NW	0.35m	0.69m	land drain running N - S	
12	E - W	0.29m	0.53m	land drains running N - S and NE - SW	
13	SE - NW	0.26m	0.52m	blank trench	
14	SSE - NNW	0.30m	0.60m	blank trench	
15	E - W	0.35m	0.56m	land drain running N - S	
16	E - W	0.24m	0.60m	land drain running N - S and posthole	(9), (10), (11)
17	NE - SW	0.34m	0.62m	land drains running N - S and NE - SW	
18	E - W	0.28m	0.39m	land drain running NE - SW	
19	SSE - NNW	0.34m	0.70m	blank trench	
20	NE - SW	0.39m	0.51m	blank trench	

Table 1: Trench descriptions

Trench 2

Trench 2 was positioned E–W, and located to target anomalies identified during the geophysical survey. Archaeological remains were revealed at a depth of 0.67m below the present ground level and were cut into a light orange grey clay substrata, with fragmented ironstone. As well as the features identified on the geophysical survey, there were two other linear features found in Trench 2, one at the eastern end of the trench running N-S, and one possible termini feature at the western end of the trench running NE – SW. There was also one geophysical anomaly in this area that was not identified.

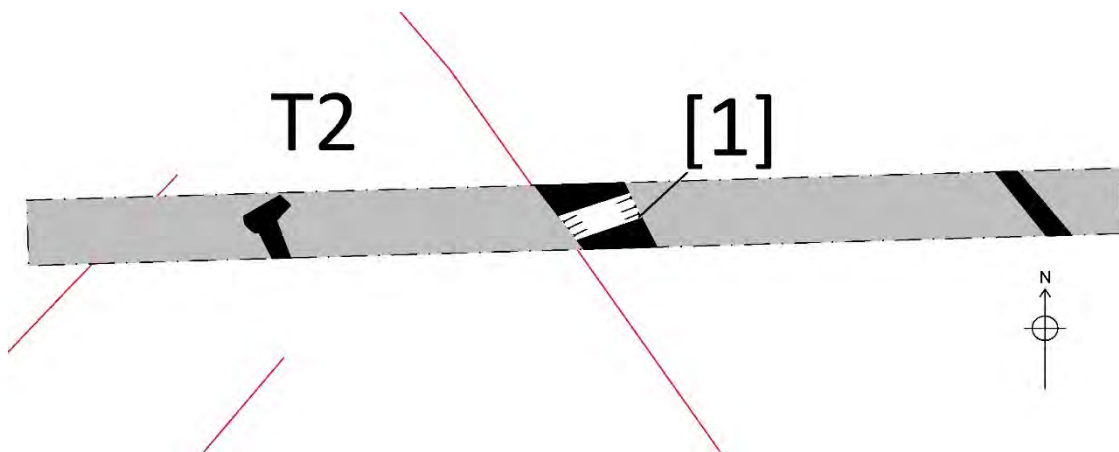


Figure 6: Trench 2. Archaeological features in black, geophysical interpretation in red



Figure 7: Trench 2 looking east

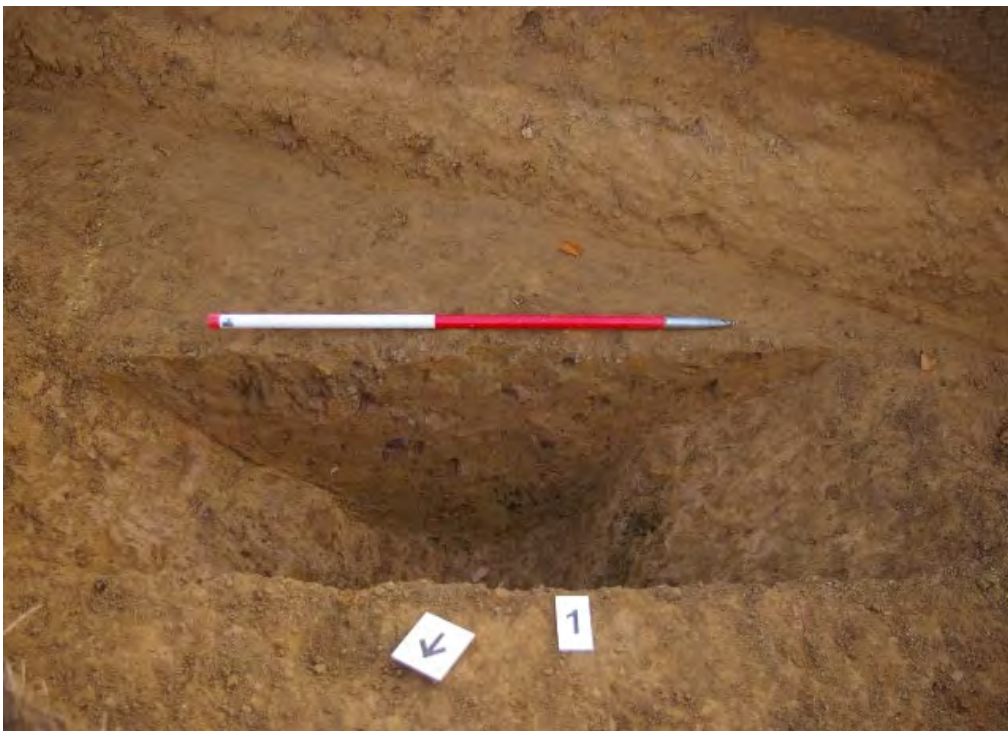


Figure 8: Section through ditch [1] in T2

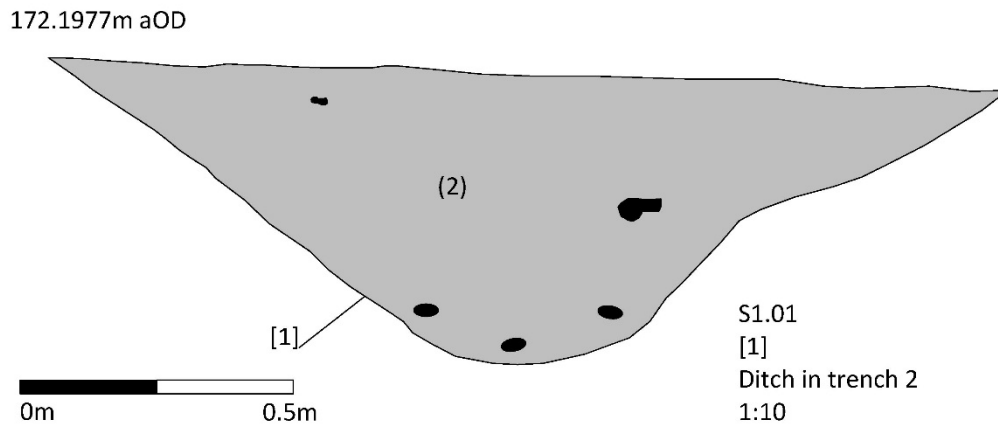


Figure 9: Cross section of ditch cut [1]

One of the linear features, Ditch [1], was sample excavated in this trench. The ditch had a width of 1.74m and a maximum depth of 0.55m, with a shallow cut of less than 45°. The fill (2) was mid orangey grey in colour and extremely firm. This fill was interpreted as backfill of the ditch, and was similar to the natural substrata it truncated. A total of 14 sherds of Roman pottery were recovered from context (2), with all except 1 sherd being of 2nd -3rd century date; with single sherd of rim from a jar dating to the 3rd – 4th century.

Trench 3

Trench 3 was positioned NE – SW and located over geophysical anomalies. Archaeology was reached at a depth of 0.5m at the SW end of the Trench and 0.65m at the NE end. This trench showed both the features located in the survey, plus other linear features running N-S across the trench. Features seen at the NE end of the trench required further investigation to establish their extent and so the trench was both lengthened and widened to the north and south. Two of the features in Trench 3 were investigated, Ditch [3] and Ditch [5], both of which were interpreted as enclosure ditches. Ditch cut [3] was 1.06m wide and 0.33m deep and contained one fill (4) of mid orange grey silty clay, with occasional fragmented ironstone. The deposit was interpreted as a backfill. It was extremely firm and hard to excavate, and very similar in nature to the natural substrata the ditch was cut into. There were no finds from context (4).

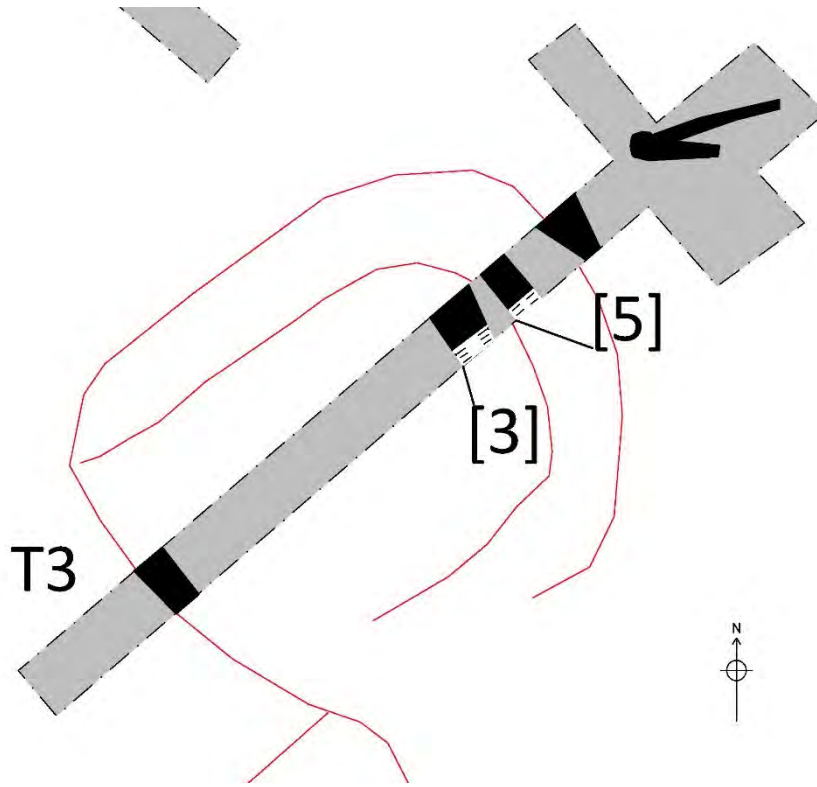


Figure 10: Trench 3. Archaeological features in black, geophysical interpretation in red.



Figure 11: Trench 3 looking north-east

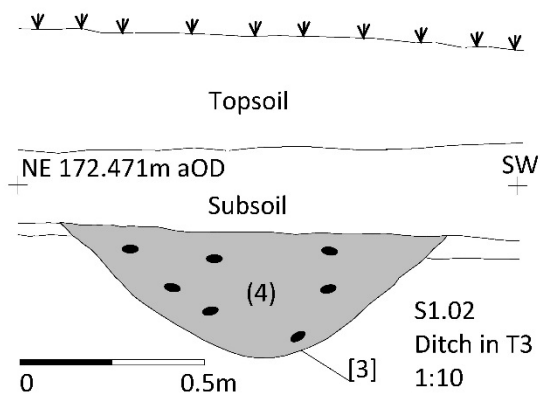


Figure 12: Cross section of Ditch [3]

Figure 13: Section through Ditch [3]

The second feature examined in Trench 3 was Ditch [5], which was also interpreted as an enclosure ditch cut in to natural [5], with dimensions of 1.12m wide and 0.44m in depth. The fill, (6), was the same as fill (4) - mid grey orange silty clay with fragmented ironstone and very firm. It produced 8 sherds of Roman pottery, with 6 sherds dating to the 2nd – 3rd century, 1 piece of Mortarium dating to the mid-2nd – to early 3rd century, and 1 piece of Central Gaulish Samian dish (which was heavily abraded) dating to the mid-2nd century.

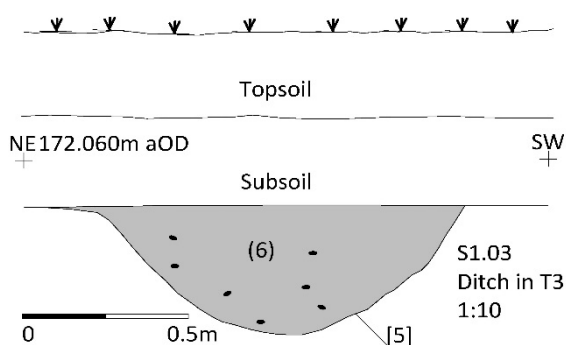


Figure 14: Section through ditch [5] in trench 3

Figure 15: Cross section of Ditch [5]

Trench 4

Trench 4 was positioned NW-SE to target anomalies highlighted on the geophysical survey. Archaeology was found at a depth of 0.46m, with three linear features running across the trench, one of which, ditch [7], was located at the SE end of the trench. This was part of what appeared on the geophysics results to be a large rectangular enclosure. Ditch cut [7] appeared to be 1.14m wide and 0.39m in depth. It was truncated on the southern edge of the cut by a modern land drain.

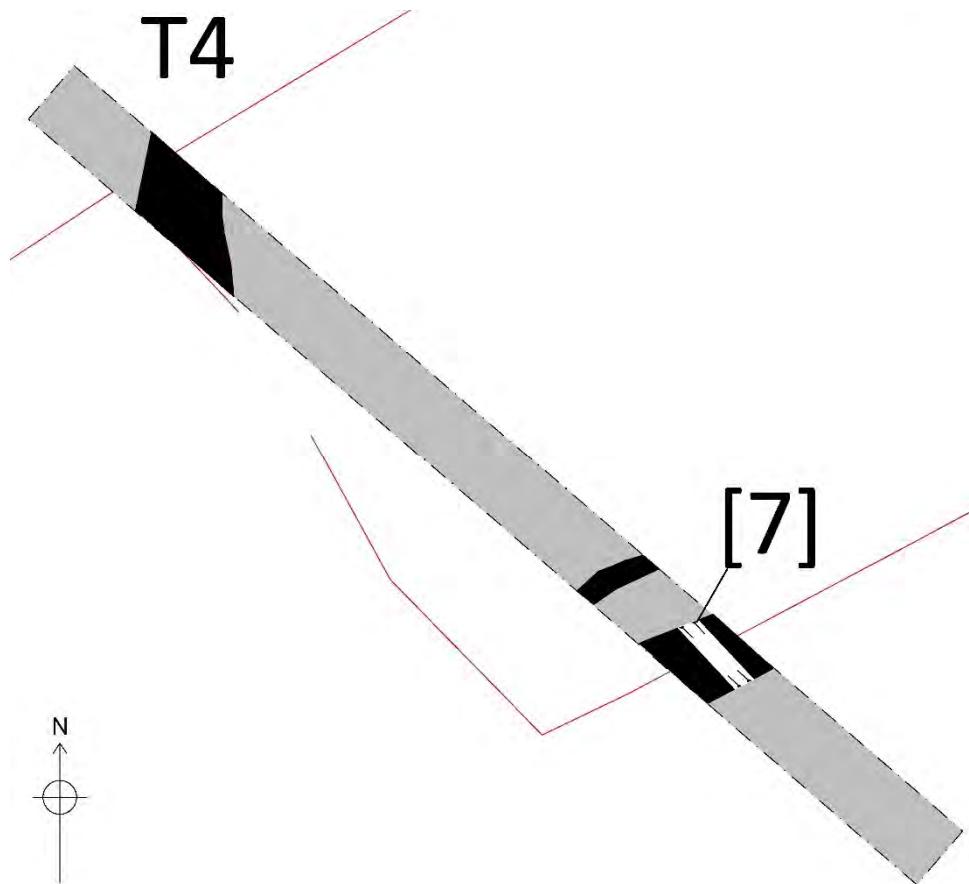


Figure 16: Trench 4. Archaeological features in black, geophysical interpretation in red.



Figure 17: Trench 4 looking North-West

The fill, (8), was the same as previous fills of (4) and (6) in Trench 3, being mid grey orange in colour, and firm, silty clay with fragmented ironstone. It was interpreted as backfill of the ditch and produced 1 sherd of Roman pottery dating to the 2nd – 3rd century. A single sherd of pottery was recovered from the surface of

the unexcavated ditch feature in Trench 4. The ditch was assigned the numbers [12] and fill (13). The pottery sherd was also Roman, dating to the 2nd- 3rd century.

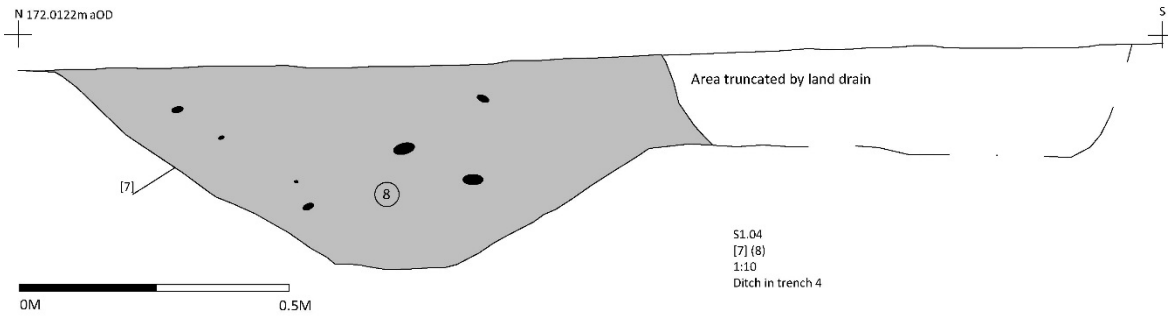


Figure 18: Cross Section across Ditch [7]



Figure 19 Section through ditch [7] in Trench 4

Trench 5

Trench 5 was positioned NE-SW over geophysical anomalies. Archaeology was reached at a depth of 0.51m and was interpreted as part of the same large enclosure feature as seen in Trench 4, characterised by two linear features running N-S across the trench. It was decided with the agreement of the project manager and Planning Archaeologist, that it was not necessary to investigate either of these features at present. It is expected that the site will go to excavation in due course.

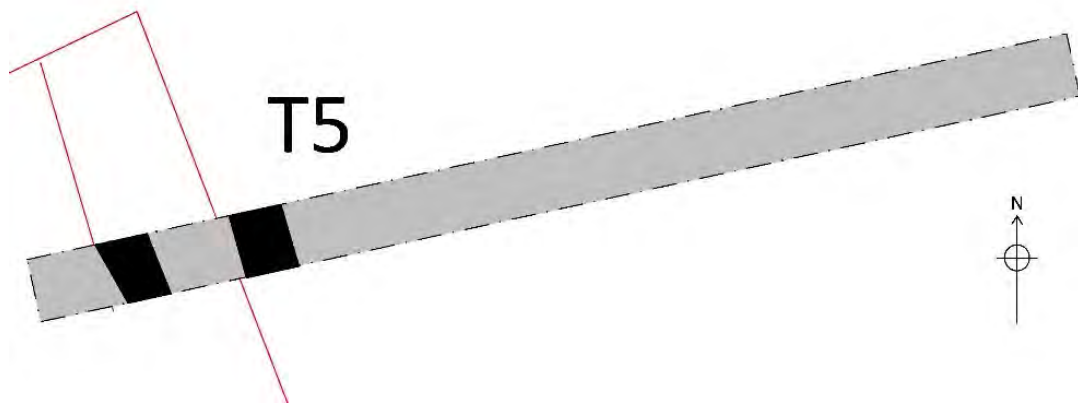


Figure 18: Trench 5 over geophysical anomalies

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Figure 19: Trench 5 looking east

Trench 16

Trench 16 was positioned NE – SW in an area that contained no geophysical anomalies. A single post hole was recorded in the base of the Trench at 0.60m below ground level. The post hole was half sectioned and comprised of two fills (10) a black charcoal deposit, (11) a dirty brown grey mixture of charcoal and redeposited natural. Fill (10) was interpreted as the burnt primary remains of a post, with (11) as a tertiary backfill. No finds were found in either fill. The depth of this Trench varied considerably due to the ridge and furrow undulations.

T16

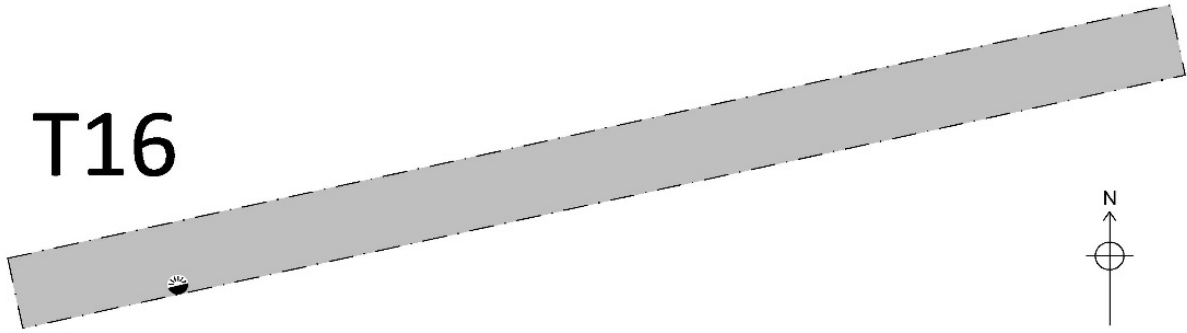


Figure 20: Trench 16



Figure 21: Trench 16 looking north-east

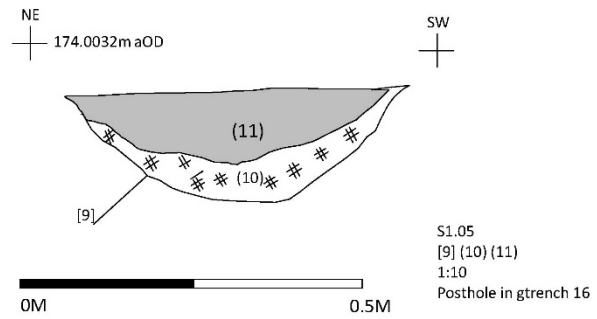


Figure 22:

Section through posthole [9]
section of post hole [9]

Figure 23: Cross

The Finds

Roman pottery, tile and iron objects – *Nicholas J. Cooper*

Introduction

A stratified but rather abraded assemblage of 28 sherds (302g) (0.62 EVEs) of Roman pottery came from four contexts; (2), (6), (8) and (13) in Trenches 2, 3 and 4. The pottery has been analysed by form and fabric using the Leicestershire County Museums Roman pottery fabric series (Pollard 1994, 113), in accordance with *The Standard for Pottery Studies in Archaeology* (Barclay *et al.* 2016), and quantified by sherd count, weight and EVEs.

In addition to the pottery, three abraded fragments of Roman tile (250g), unclassifiable to type, were recovered from (8) and have not retained in the finds archive.

Analysis of the pottery by form and fabric

The quantified record of the assemblage is presented in Table 2 below.

Roman Pottery Waltham on the Wolds XA126.2018											
Trench	Context	Fabric	Form	Type	part	Rim	Sherds	Weight	EVEs	Diam	Date
2	2	C2NV	Jar	necked	rim	bead	1	10	0.1	160	L3rd-4th
2	2	GW5	jar	necked	rim	bead	1	10	0.13	110	2nd-3rd
2	2	GW6	jar	necked	rim	curved	5	35	0.1	200	2nd-3rd
2	2	GW4	jar	misc	base		1	22			2nd-3rd
2	2	GW3	misc	misc	body		6	11			2nd-3rd

3	6	CGSam	Dish	18/31	rim	bead	1	5	0.03	200	100-150
3	6	MO	Mort	B&F	rim	bead	1	35	0.14	200	150-E3rd
3	6	GW7	Jar	necked	rim	bead	1	10	0.06	160	M2nd-3rd
3	6	GW5	jar	misc	base		1	10			2nd-3rd
3	6	GW6	jar	misc	body		4	95			2nd-3rd
4	8	GW5	Jar	necked	rim	curved	1	5	0.06	120	2nd-3rd
4	13	GW6	Jar	misc	body		5	54			2nd-3rd
Total							28	302	0.62		

Table 2: quantified record of Roman pottery

Fabrics

GW – Grey Ware types

CGSam – Central Gaulish Samian ware

C2NV – Nene Valley ware

The Roman assemblage spans much of the Roman period but is weighted towards the 2nd and into the 3rd century characterised by necked jars with beaded rims in a variety of grey ware (Fabrics GW3/4/5/6 and 7) primarily produced locally but with those in GW4 and 7 possibly from either the Lower Nene Valley or Mancetter Hartshill. The only import is an abraded sherd of Central Gaulish samian from Lezoux, of dish Form 18/31 dating to the first half of the 2nd century, recovered from (6). As the most closely dated piece, this might tend to indicate that the assemblage as a whole dates to the 2nd century and this is supported by the bead and down-curved flange mortarium from (6). The source is uncertain (perhaps Mancetter Hartshill) but the fact that the bead rises above the flange would tend to suggest a date in the middle or later 2nd.

Overall, though small, the assemblage is typical of other jar-dominated rural settlements, with low occurrence of fine wares but some specialist wares such as the mortarium. The evaluation has demonstrated the occurrence of well-dated stratified contexts of Roman date and further work would generate a larger assemblage of pottery with research potential.

Iron Objects

Using a metal detector, 20 objects were recovered unstratified from the spoil heaps of Trenches 5-7, 9-12, 15, 16, 18 and 19. With the exception of a large handmade nail from Trench 11, and two smaller ones from Trench 15 which could be of Roman to later medieval date, the objects appear to be of modern date. None have been retained in the finds archive.

Discussion and Conclusion

ULAS carried out an archaeological evaluation at Fair Farm, Waltham on the Wolds, Leicestershire. The work involved the machine excavation of 20, 30m long trial trenches located throughout the development area, and included areas containing geophysical anomalies possibly associated with archaeological remains.

The topsoil and subsoil appeared consistent across the study area, with the natural substratum consisting of predominantly orange-brown clay with occasional small fragmented ironstone inclusions. Occasional fragmented ironstone bands were also recorded in the base of some trenches running through the natural.

The site has been left to pasture for a considerable time, with ridge and furrow very pronounced on the surface. Furrows could be seen on the geophysical survey results; and were also recorded in all of the trenches excavated, representing agricultural farming and ploughing from the medieval period. Field drains were also present in most trenches. The north-east area of the site did not show surviving ridge and furrow with the ground found to have been disturbed to a considerable depth in modern times.

Archaeological deposits were encountered in 5 of the 20 trenches. These were trenches 2, 3, 4, 5 and 16. The features represent ditches and 1 posthole.

Ditch cuts recorded in Trenches 2, 3, 4 and 5 confirmed the presence of a series of enclosure ditches initially indicated on the geophysical survey results. Sections put through these ditches produced Roman pottery, totalling 28 sherds (302g), with a date range of the 2nd and 3rd centuries and primarily of local and regional origin. There was 1 sherd of imported Samian ware from Lezoux dating from the first half of the second century. There were fragments of Roman tile from context (8) in Trench 4 suggesting that once a substantially constructed building stood close to the vicinity of the site. All the fills were consistent with one another, being very similar to the natural they truncated in colour and feel, but slightly darker. This fill proved very heavy and time consuming to dig through.

Despite no clear indications on the geophysical survey, additional linear features were identified in Trenches 2, 3 and 4. This appears to indicate a more dense spread of archaeological deposits than initially shown on the geophysical survey, although the archaeology does seem to be restricted to the western section of the proposed development area, with the northern limit being shown in Trench 5.

Metal-detector scanning of the spoil heaps adjacent to the trenches produced a variable assemblage, much of which was modern however 3 handmade nails from Trenches 11 and 15 could be of Roman to late medieval in date.

Trench 16 also produced a positive archaeological result with a posthole [9] seen in the western end of the trench. The charcoal layer (10) at the base of the feature suggests possible burnt post remains, with the upper fill being a very mixed, dirty backfill. There was no datable material from these 2 contexts.

No environmental samples were taken during the evaluation due to the sterile-looking nature of the archaeological deposits encountered.

Archive

The site archive (X.A.126 2018), consisting of paper, drawing and photographic records, in addition to pottery sherds, will be deposited with Leicestershire County Council.

The archive consists of:

- 1 Unbound copy of this report
- 20 x Trench record sheets
- 12 context sheets
- 1 A4 photographic record sheet
- 1 x A3 drawing sheet
- 1 CD of digital photographs
- 28 x sherds of Roman Pottery

Publication

Since 2004 ULAS has reported the results of all archaeological work through the *Online Access to the Index of Archaeological Investigations* (OASIS) database held by the Archaeological Data Service at the University of York. A summary of the work will also be submitted for publication in a suitable regional archaeological journal in due course.

Acknowledgments

ULAS undertook this archaeological evaluation on behalf of Bellway Homes Limited (East Midlands). The project was managed by John Thomas, the ceramic analysis was carried out by Nick Cooper, the fieldwork was carried out by Donald Clark and Ian Reeds all of ULAS. The black and white cover picture of the horse fair at Waltham on Wolds taken from the village's website the <http://local-history.org.uk/waltham/>. The plant machinery was provided by Planters (Leicester) Ltd.

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www.ordnancesurvey.co.uk

Appendix 1 Trench record photographs



Figure 24: Trench 1 looking east



Figure 25: Trench 2 looking east



Figure 26: Trench 3 looking south-west



Figure 27: Trench 4 looking north-west



Figure 28: Trench 5 looking east



Figure 29: Trench 6 looking north north-east



Figure 30: Trench 7 looking north east



Figure 31: Trench 8 looking east



Figure 32: Trench 9 looking north east



Figure 33: Trench 10 looking east



Figure 34: Trench 11 looking north east



Figure 35: Trench 12 looking east



Figure 36: Trench 13 looking south east



Figure 39: Trench 14 looking south south-east



Figure 37: Trench 15 looking north-east



Figure 38: Trench 16 looking north-east



Figure 39: Trench 17 looking north-east



Figure 40: Trench 18 looking north-east

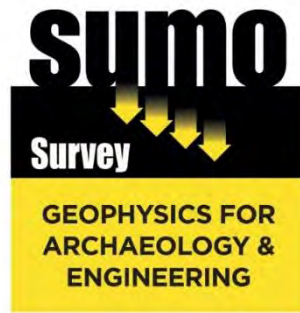


Figure 41: Trench 19 looking south south-east



Figure 42: Trench 20 looking north-east

Appendix 2 Aerial Earthwork Survey



AERIAL PHOTOGRAMMETRY SURVEY REPORT

Land off Melton Road, Waltham on the Wolds, Leicestershire

Client

University of Leicester Archaeological Services

Survey Report

SOR014821

Date

March 2019



Survey Report SOR014821: Land off Melton Road, Waltham on the Wolds, Leicestershire

Survey dates	17 October 2018
Field co-ordinator	Adam Stanford MCifA FSA
Report Date	20 March 2019
Report Author	Robbie Austrums BSc Lichenstone Geoscience
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TABLE OF CONTENTS

1	SUMMARY OF RESULTS	2
2	INTRODUCTION	2
3	METHODS	4
4	RESULTS	5
5	DATA APPRAISAL & CONFIDENCE ASSESSMENT	11
6	CONCLUSION	11
7	REFERENCES	11

LIST OF FIGURES

Figure 1	[1:25000] - Site Location.....	3
Figure 2	[1:1500] - Digital Elevation Model.....	5
Figure 3	[1:1500] - Flattened Topography.....	6
Figure 4	[1:1500] - Orthophoto.....	7
Figure 5	[1:1500] - Interpretation.....	8
Figure 6	[1:1500] - Locations of Profiles.....	9
Figure 7	- Profile 1.....	10
Figure 8	- Profile 2.....	10
Figure 9	- Profile 3.....	10

1 SUMMARY OF RESULTS

An aerial photogrammetry survey was conducted on land at Waltham on the Wolds, Leicestershire. The survey has recorded fairly well-preserved ridge and furrow across most of the survey area.

2 INTRODUCTION

2.1 Background Synopsis

SUMO Geophysics Ltd were commissioned to undertake an aerial photogrammetry survey. This survey forms part of an archaeological investigation being undertaken by University of Leicester Archaeological Services.

2.2 Site Details

NGR / Postcode	SK 800 246 / LE14 4AJ
Location	The site is located on land east of Melton Road, on the southern perimeter of Waltham on the Wolds.
HER	Leicestershire and Rutland HER
District	Melton District
Parish	Waltham on the Wolds and Thorpe Arnold CP
Topography	Mostly flat, rising slightly to the south east.
Current Land Use	Grassland – pasture.
Geology	Bedrock: Northampton Sand Formation – Sandstone, Limestone and IronStone. Superficial: None recorded. (BGS 2019).
Archaeology	Ridge and furrow is present in the survey area.
Survey Methods	Aerial photogrammetry.
Study Area	2.95 ha

2.3 Aims and Objectives

To locate and characterise any earthworks or other surface features of possible archaeological interest within the study area.

2.4 Location Map

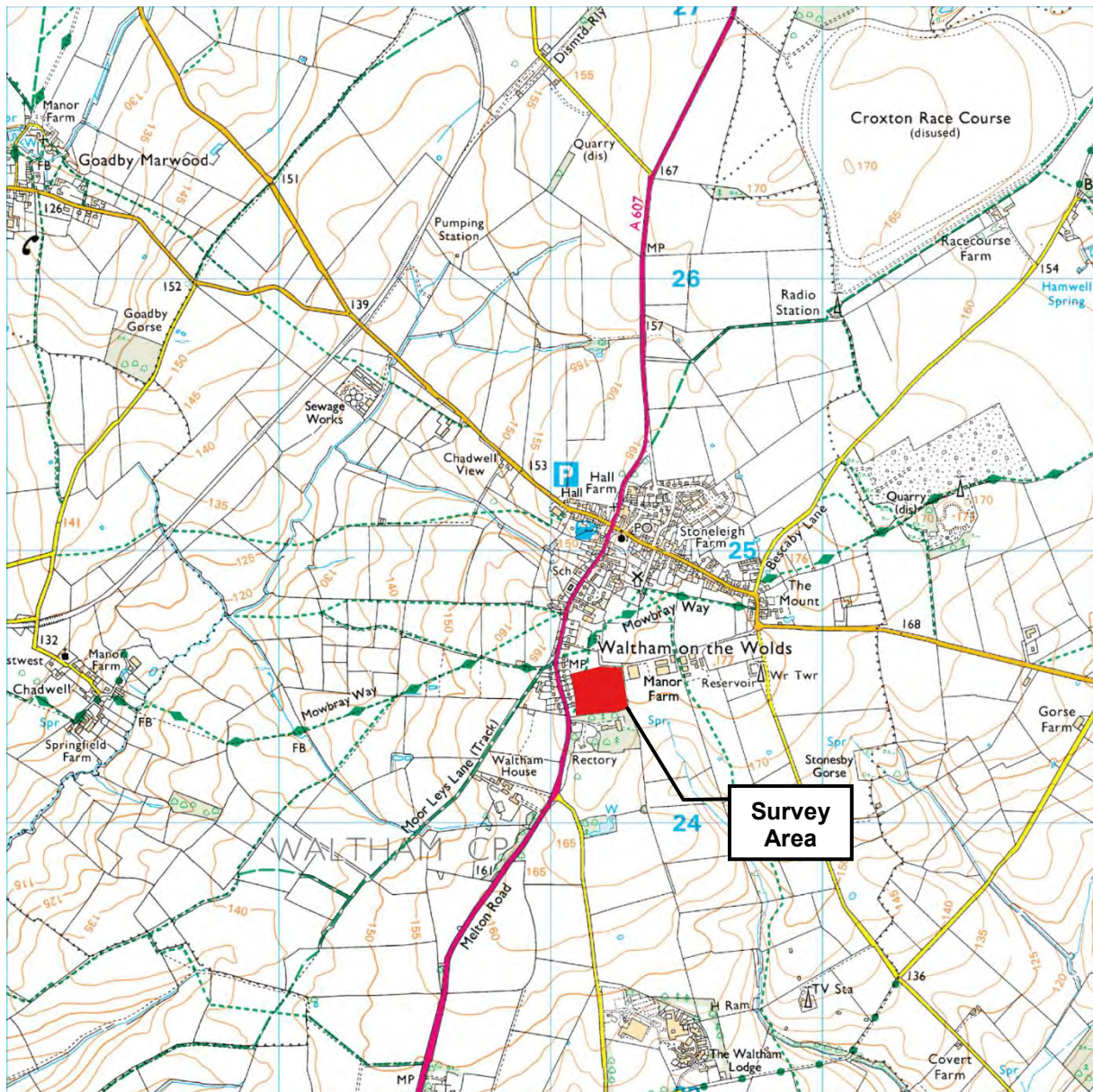


Figure 1 [1:25000] - Site Location

Reproduced from Ordnance Survey's 1:25 000 map of 1998 with the permission of the controller of Her Majesty's Stationery Office. Crown Copyright reserved. Licence No: AL 50125A

3 METHODS

3.1 Survey Methodology

3.1.1 PHOTOGRAPHY

A UAV with a gimbal mounted camera was flown at 57m above ground level to obtain a spatial resolution of 1.4cm per image pixel.

3.1.2 PHOTOGRAMMETRY

Images were processed in photogrammetry software to produce a 3D pointcloud with a horizontal density of 330 points per square metre. Data were exported as a raster digital elevation model with a 5cm spatial resolution and an orthophoto with a 1.4cm spatial resolution.

3.1.3 REFERENCING

The photogrammetric model was referenced by six ground control points that were distributed around the survey area. These points are visible in the aerial photographs and were also surveyed using high accuracy GPS to facilitate georeferencing to OS coordinates. A best-fit transformation resulted in 3D RMS residual of 1.85cm.

3.2 Data Processing and Visualization

3.2.1 DIRECTIONAL LIGHT SHADING

Simulated illumination of the terrain surface from a chosen light source direction. This gives the viewer an intuitive sense of the 3D topography but can fail to reveal some features that are aligned with the light source.

3.2.2 AMBIENT LIGHT SHADING

Simulated illumination of the terrain surface from a continuous encompassing light source. Illumination of a given point is determined by surrounding terrain and other objects which occlude incoming light. It gives the viewer an intuitive sense of the 3D topography but can fail to reveal subtle features near much larger objects

3.2.3 TERRAIN FLATTENING

Terrain flattening entails constructing a mathematical model that approximates broad-scale variation in the topography. This model surface is then subtracted from the original DEM to produce a new dataset that reflects only smaller scale features.

4 RESULTS

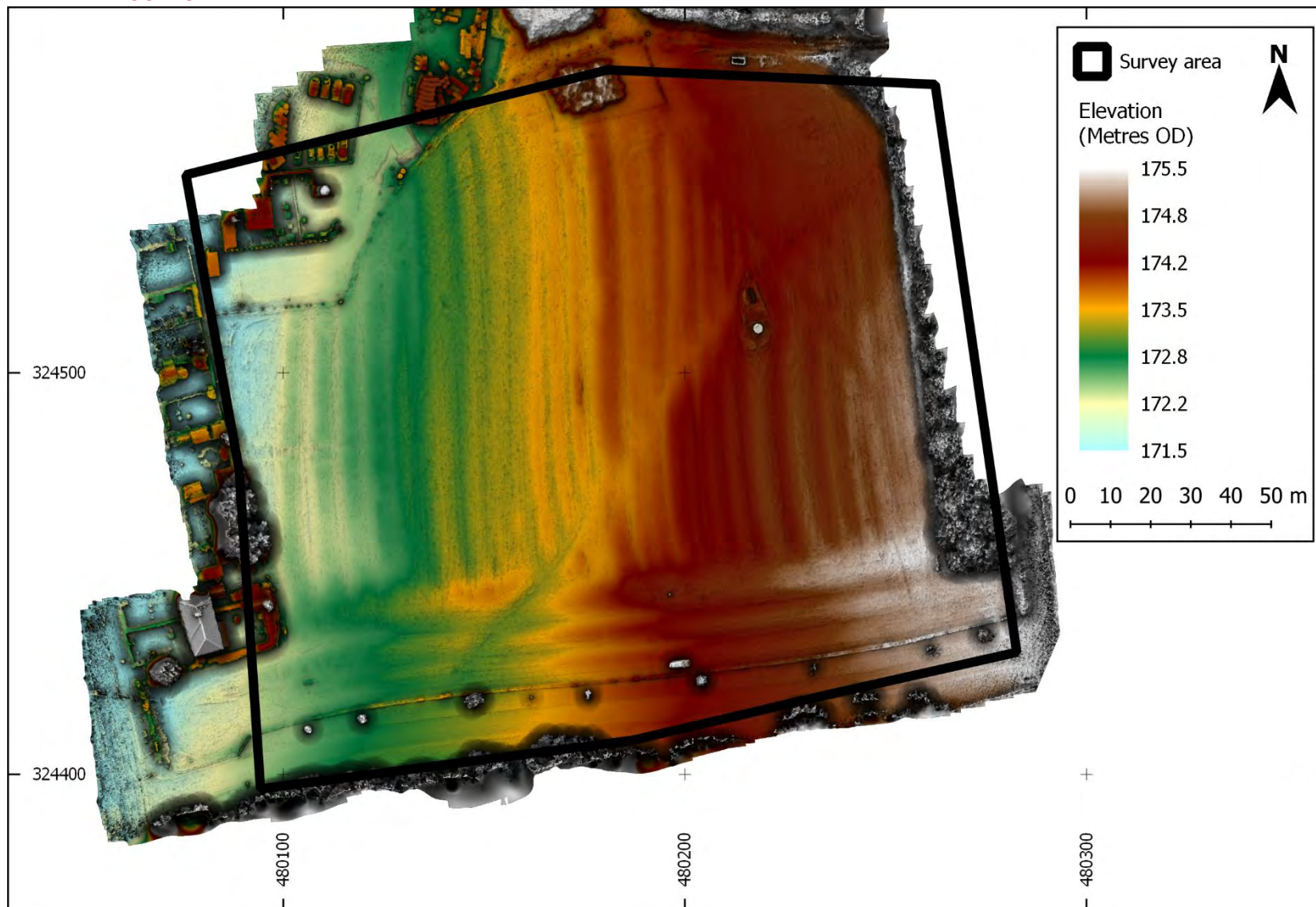


Figure 2 [1:1500] - Digital Elevation Model
Colour-scale image of terrain heights shaded with simulated ambient illumination.

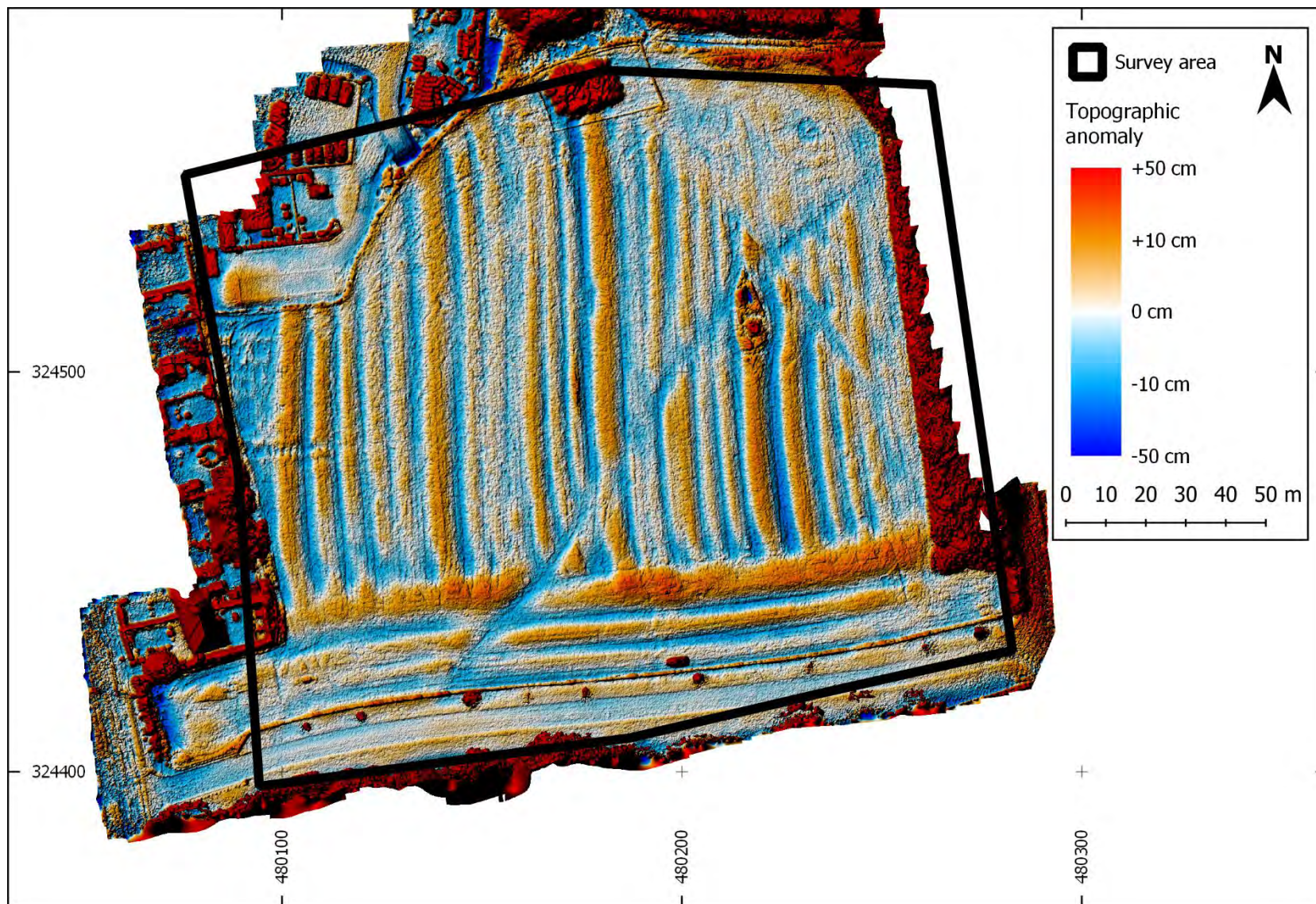


Figure 3 [1:1500] - Flattened Topography
Colour scale image of small-scale topography shaded with simulated illumination from the northwest.



Figure 4 [1:1500] - Orthophoto
Orthophoto with enhanced luminance and colour contrast.

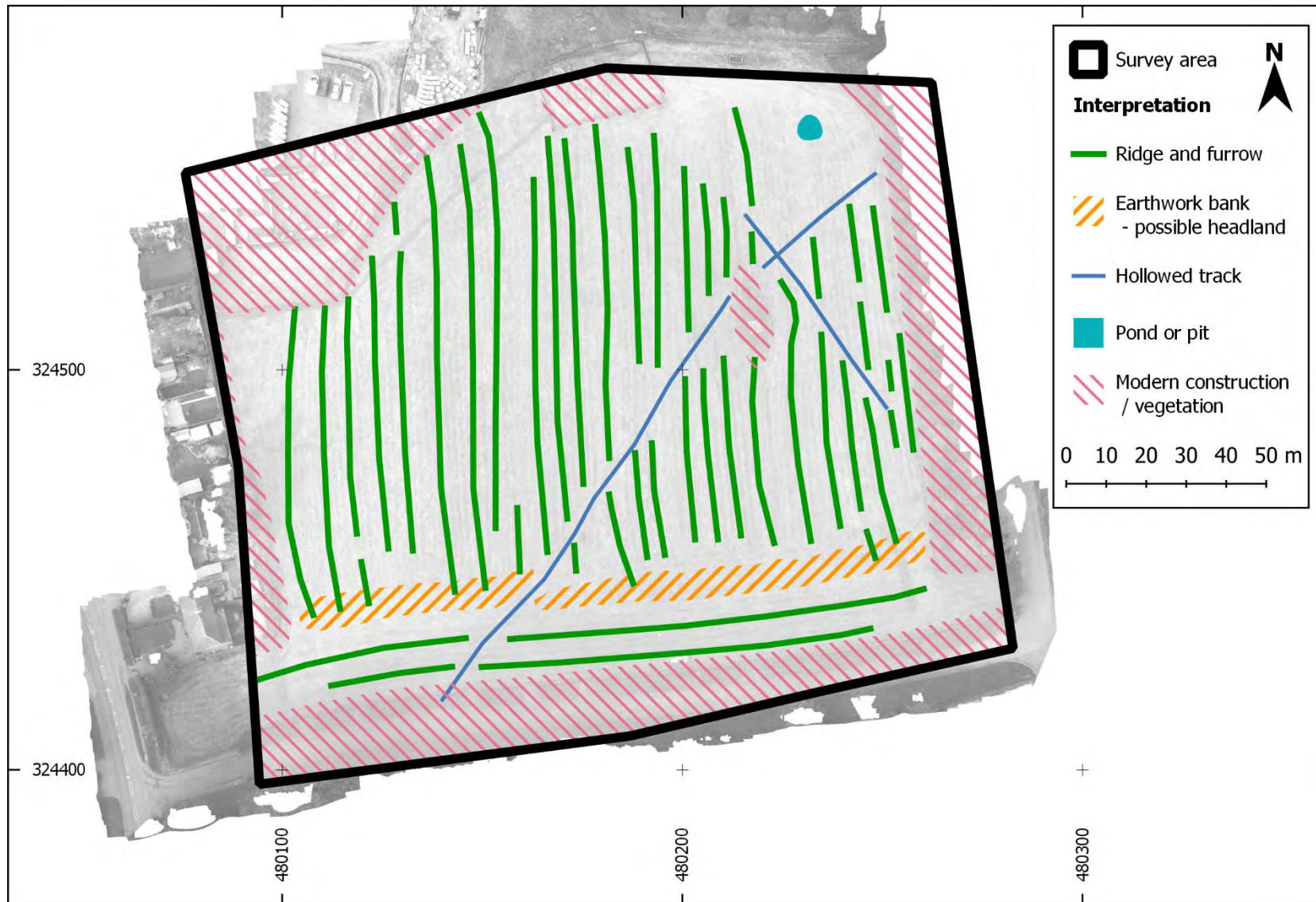


Figure 5 [1:1500] - Interpretation



Figure 6 [1:1500] - Locations of Profiles
Diagram showing the locations and directions of the profile charts presented below.

Profile 1 – West to East

Ridge and furrow, 5 - 9m spacing, slightly inverse s-shaped in plan.

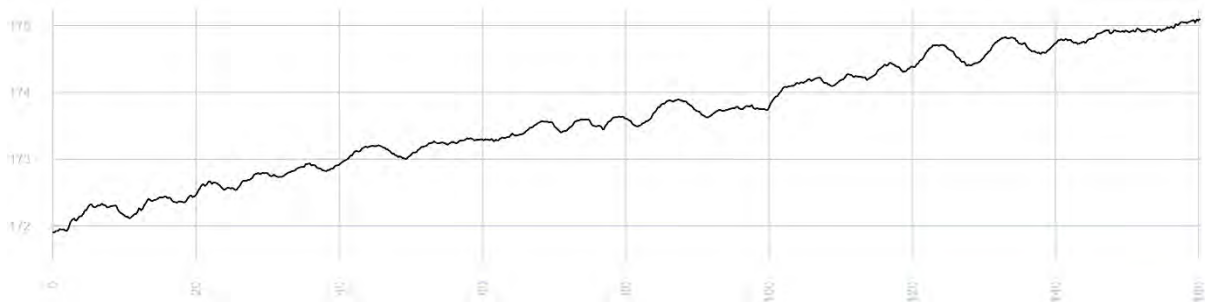


Figure 7 - Profile 1

Profile 2 – South to North

- 0-16m: **A** - Road construction and fence, possible remains of ridge and furrow.
- 10-20m: **B** - Ridge and furrow - two ridges 7m apart, slightly inverse s-shaped in plan.
- 22-38m: **C** - Broad earthwork bank, 8 - 10m wide – Possible headland.



Figure 8 - Profile 2

Profile 3 – South to North

- 10-17m: **A** – Discrete negative feature, 6x7m, 10 - 12cm deep - Possible infilled pit or pond.

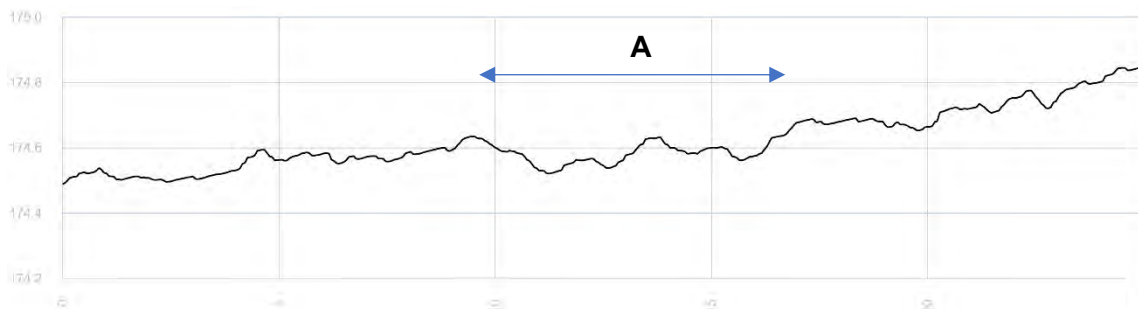


Figure 9 - Profile 3

4.1 **Probable Archaeology**

4.1.1 RIDGE AND FURROW

Ridge and furrow covers most of the survey area. All identified areas are spaced 5-9m ridge to ridge and have a subtle but distinct 'inverse s' morphology.

The larger region of ridge and furrow, which covers the northern three-quarters of the site, clearly abuts a broad earthwork bank, 8 - 10m wide, on its southern margin that may be a headland.

4.2 **Possible Archaeology**

A shallow 6x7m depression in the north-east of the survey area may be an infilled pit or pond.

Two subtle linear depressions cross the area that are interpreted as probable hollowed tracks. These cut through, and therefore clearly post-date, the ridge and furrow but may still be of some antiquity.

4.3 **Probable Modern**

Approximately 25% of the survey area is occupied by modern constructions and vegetation

5 **DATA APPRAISAL & CONFIDENCE ASSESSMENT**

The photogrammetry survey has produced an accurate and detailed model which has adequately resolved surface features smaller than 0.3m in size.

6 **CONCLUSION**

The aerial photogrammetry survey at Waltham in the Wolds has provided comprehensive data on the morphology of ridge and furrow within the survey area. It has also revealed a possible pit or pond and two probable hollowed tracks which may be of archaeological interest.

7 **REFERENCES**

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website: (<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>)



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