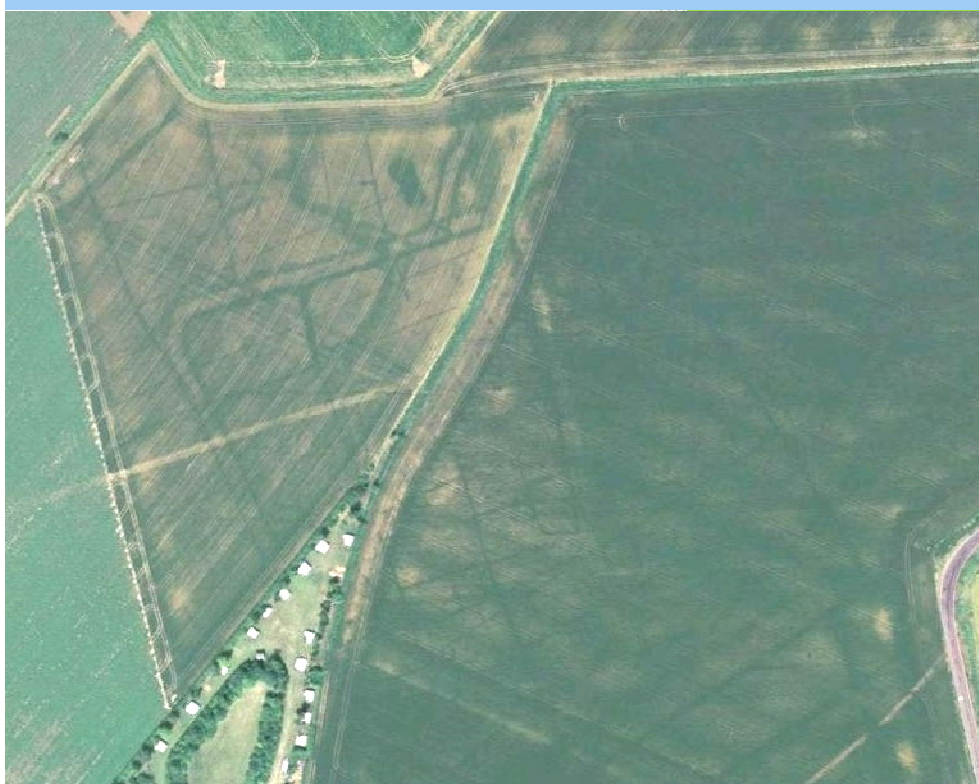




Northamptonshire Archaeology

Archaeological geophysical survey of land at
Halfpenny Toll Road, Three Holes, Upwell, Norfolk
October 2013



Northamptonshire Archaeology

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Report 13/267

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QUALITY CONTROL

	Print name	Signed	Date
Checked by	Pat Chapman	<i>PC</i>	02/01/2014
Verified by	Andy Chapman	<i>AC</i>	02/01/2014
Approved by	Steve Parry	<i>SP</i>	30/12/2013

OASIS REPORT FORM

PROJECT DETAILS		OASIS No: 167533
Project name	Archaeological geophysical survey of land at Halfpenny Toll Road, Three Holes, Upwell, Norfolk, October 2013	
Short description	Northamptonshire Archaeology was commissioned by Mr Greg Owen to carry out a magnetometer survey on c 5ha of land to the west of Halfpenny Toll Road, Three Holes, Upwell, Norfolk. The purpose of the survey was to investigate part of a cropmark complex of presumed Roman date. The results were dominated by geological anomalies indicating a former network of creeks. Only a few disjointed anomalies could be related to the cropmarks, and little new archaeological information was obtained. The disappointing nature of these results is probably due to the unfavourable magnetic properties of the local soils.	
Project type	Geophysical survey	
Site status	None	
Previous work	Fieldwalking	
Current Land use	Arable	
Future work	Not known	
Monument type/ period	Probable Roman ditches (settlement or field system)	
Significant finds	None	
PROJECT LOCATION		
County	Norfolk	
Site address	Halfpenny Toll Road, Three Holes	
Study area	5ha	
OS Easting & Northing	TL 5032 9845	
Height aOD	c 2m aOD	
PROJECT CREATORS		
Organisation	Northamptonshire Archaeology (NA)	
Project brief originator	Greg Owen	
Project Design originator	NA	
Director/Supervisor	Paul Clements	
Project Manager	Mark Holmes	
Sponsor or funding body	Greg Owen	
PROJECT DATE		
Start date	28 October 2013	
End date	31 December 2013	
ARCHIVES	Location	Content
Physical		
Paper	ENF133239	Site survey records
Digital		Geophysical survey & GIS data
BIBLIOGRAPHY		
Title	Archaeological geophysical survey of land at Halfpenny Toll Road, Three Holes, Upwell, Norfolk, October 2013	
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**ARCHAEOLOGICAL GEOPHYSICAL SURVEY OF LAND AT
HALFPENNY TOLL ROAD, THREE HOLES, UPWELL, NORFOLK
OCTOBER 2013**

Abstract

Northamptonshire Archaeology was commissioned by Mr Greg Owen to carry out a magnetometer survey on c 5ha of land to the west of Halfpenny Toll Road, Three Holes, Upwell, Norfolk. The purpose of the survey was to investigate part of a cropmark complex of presumed Roman date. The results were dominated by geological anomalies indicating a former network of creeks. Only a few disjointed anomalies could be related to the cropmarks, and little new archaeological information was obtained. The disappointing nature of these results is probably due to the unfavourable magnetic properties of the local soils.

1 INTRODUCTION

Northamptonshire Archaeology was commissioned by Mr Greg Owen to carry out an archaeological geophysical survey on a probable Roman site near Halfpenny Toll Road, Three Holes, Upwell, Norfolk (Fig 1). This site, which was first identified from cropmarks, is the subject of an ongoing programme of private research.

The fieldwork was conducted from 28 to 30 October 2013 and comprised the detailed magnetometer survey of c 5ha of land, encompassing the north-western part of the cropmarks. It was intended that this work would serve as a preliminary test, to determine whether a more extensive survey would be justified.

As the project was not a developer funded one, it did not require any formal input from Norfolk Historic Environment Service. However, the County Archaeologist, David Gurney, was informed of the work as a matter of courtesy and was supplied with a copy of the written scheme of investigation (NA 2013). Also, an event number, ENF133239, was obtained, so that the work could be properly recorded on the Norfolk Historic Environment Record (NHER).

2 TOPOGRAPHY AND GEOLOGY

The survey area is located in the parish of Upwell, in the far west of Norfolk, at national grid reference TL 5032 9845. It comprises a single block of arable land, lying 200m north of Primrose Hall Farm, between Halfpenny Toll Road to the east and the Old Croft River to the west (Fig 1). It is low-lying, at an elevation of c 2m aOD, and is largely flat.

As the site lies within the Fens, its geology is dominated by Holocene sediments of marine and alluvial origin. No detailed, site specific information is available, but the uppermost deposits are likely to comprise marine silts of late prehistoric date, which would have been sufficiently dry and elevated to support settlement in the Roman period (Coles and Hall 1994, fig 68 & 114-119). The fact that the cropmarks on the site are well defined, and that fieldwalking of the surrounding area has recovered Roman pottery (Owen pers com), suggests that no substantial accumulation of post-Roman sediment is present.

3 ARCHAEOLOGICAL BACKGROUND

The survey area covers part of an extensive set of rectilinear cropmarks of probable Roman date (Cover photo and Fig 1). The most distinctive element of these is a rounded square corner, apparently defined by a double ditch, which is reminiscent of a Roman fort or defended town. Fieldwalking across the cropmarks has led to the recovery of Samian ware and other diagnostic Roman pottery, as well as glass oyster shells, ceramic building material and other archaeological finds (NHER 2478; Owen pers com).

In the near vicinity of the site, there are many further cropmarks. Those in Norfolk are recorded as NHER 16617, NHER 25080 and NHER36709 and those to the west of the old Croft River, in Cambridgeshire, have been mapped and published as part of the Fenland Survey (Hall 1996, fig 96). The majority of the Cambridgeshire cropmarks represent the ditches of regularly laid out Roman field systems, although small groups of probable settlement enclosures have also been identified (Hall 1996, 169-82). A Roman road, the 'Fen Causeway', runs through this landscape, passing a few hundred meters south of the present survey area (Fig 1).

4 METHODOLOGY

The magnetometer survey was conducted with Bartington Grad 601-2, twin sensor array, vertical component fluxgate gradiometers (Bartington and Chapman 2003). These are standard instruments for archaeological survey and can resolve magnetic variations as slight as 0.1 nanoTesla (nT).

An independent system of 30m grids was established across the survey area by means of a tape measure and optical square. The gradiometers were carried at a brisk but steady pace through each grid square, collecting data along 1m spaced traverse lines. Measurements were automatically triggered every 0.25m along the traverses, giving a total of 3600 measurements per grid. All fieldwork methods complied with guidelines issued by English Heritage and by the Institute for Archaeologists (EH 2008; IfA 2011).

The processing of the data comprised two steps, de-striping to remove the effects of sensor imbalances, and de-staggering to compensate for traverses walked marginally too fast or slow. Under normal circumstances, both steps would have been undertaken with Geoplot 3.00v software, but in this case the complex background anomalies did not respond well to that software's 'zero mean traverse' de-striping function. Thus an alternative method was employed, using a spreadsheet-based de-striping routine developed in-house at Northamptonshire Archaeology. This method better preserved the variable magnetic background, although at the cost of some weak residual striping in the data.

The processed data is presented in this report in the form of a greyscale plot at a range of +5nT (black) to -5nT (white). This has been scaled, rotated and resampled (georectified) for display against the Ordnance Survey base mapping in Figure 2. An interpretative overlay is presented in Figure 3 and a plot of the unprocessed data is presented in Figure 4. Figure 5 presents the survey data after destriping with the standard 'zero mean traverse' function, for comparison with the data in Figure 2.

5 SURVEY RESULTS

The southern part of the survey data exhibits two zones of fairly uniform magnetic background readings, but to the north a complex dendritic pattern of broad negative anomalies predominates. A few linear anomalies, arising from various archaeological and modern features, may be discerned against these broad-scale background variations (Fig 2).

Four disjointed positive linear anomalies, all trending approximately north-north-west to south-south-east, correspond with elements of the cropmark complex and may be confidently interpreted as representing ditches. It is not known why these magnetic anomalies should appear so much more fragmentary than their corresponding cropmarks, but the most likely reason would be that the ditch fills have very variable magnetic characteristics, and have only been detected where some particular factor (perhaps iron panning, or the accumulation of ceramics or burnt soil) has caused localised magnetic enhancements.

A few other linear and curvilinear anomalies, marked as possible archaeology on the interpretation plot (Fig 3), perhaps represent further segments of ditch. Two are of doubtful significance because they lie parallel with the south-west to north-east striping, which is a residual artefact of the data collection (see Section 4, above), and the remainder are too short or weakly defined to support a confident interpretation.

The broad dendritic negative anomalies are of geological origin, representing a network of former channels (probably tidal creeks) within the fen. The complexity of the layout hints that there may be several intersecting networks present, representing successive phases of landscape development. The two zones of smoother data to the south probably indicate a small part of a much broader channel oriented east to west. It is likely that all these channels pre-date the cropmarks, as the latter show no signs of disruption by the former.

At the western edge of the survey area, there is a sporadic but intense linear anomaly of varying magnetic polarity. This indicates segments of an iron pipe, most probably one which has gone out of use and been partially removed. A short but similarly intense anomaly which branches off it to the east presumably represents part of a second pipe.

Close to the southern end of the survey area there is a weakly negative linear anomaly which lies parallel to the modern field boundary. Such anomalies, which are commonly detected by magnetometer survey, usually indicate the edges of modern plough headlands.

6 CONCLUSION

The geophysical survey results are disappointing, showing much geological detail but only slight traces of archaeological features. A few fragmentary linear anomalies, all trending from north-west to south-east, may be correlated with the ditches previously identified from cropmarks, and some others, less convincingly suggest the presence of further remains.

The preferential detection of geological, rather than archaeological anomalies on this site probably reflects mineralogical variations through the soil profile. Research on a geologically similar fenland site in Spalding (Lincolnshire), and on other sites in the Netherlands, has shown that magnetic iron sulphides can form under reducing conditions in waterlogged marine sediments. These accumulate more readily in fine grained mud-flat deposits than in coarser textured channel fills, thus giving rise to the negative creek anomalies (Kattenberg 2008, 171-4). Different processes which occur at higher levels, where the water table is absent or fluctuating, can deplete the magnetic the magnetism of shallow archaeological features, rendering them difficult or impossible to detect (Katttenber 2008, 71-75).

The results of this survey suggest that whilst further magnetometer survey may be of marginal benefit in evaluating this site, and could aid an understanding of its geological context, it is unlikely to provide substantial new archaeological information. Thus it may be better to focus effort and resources on the deployment of other archaeological techniques.

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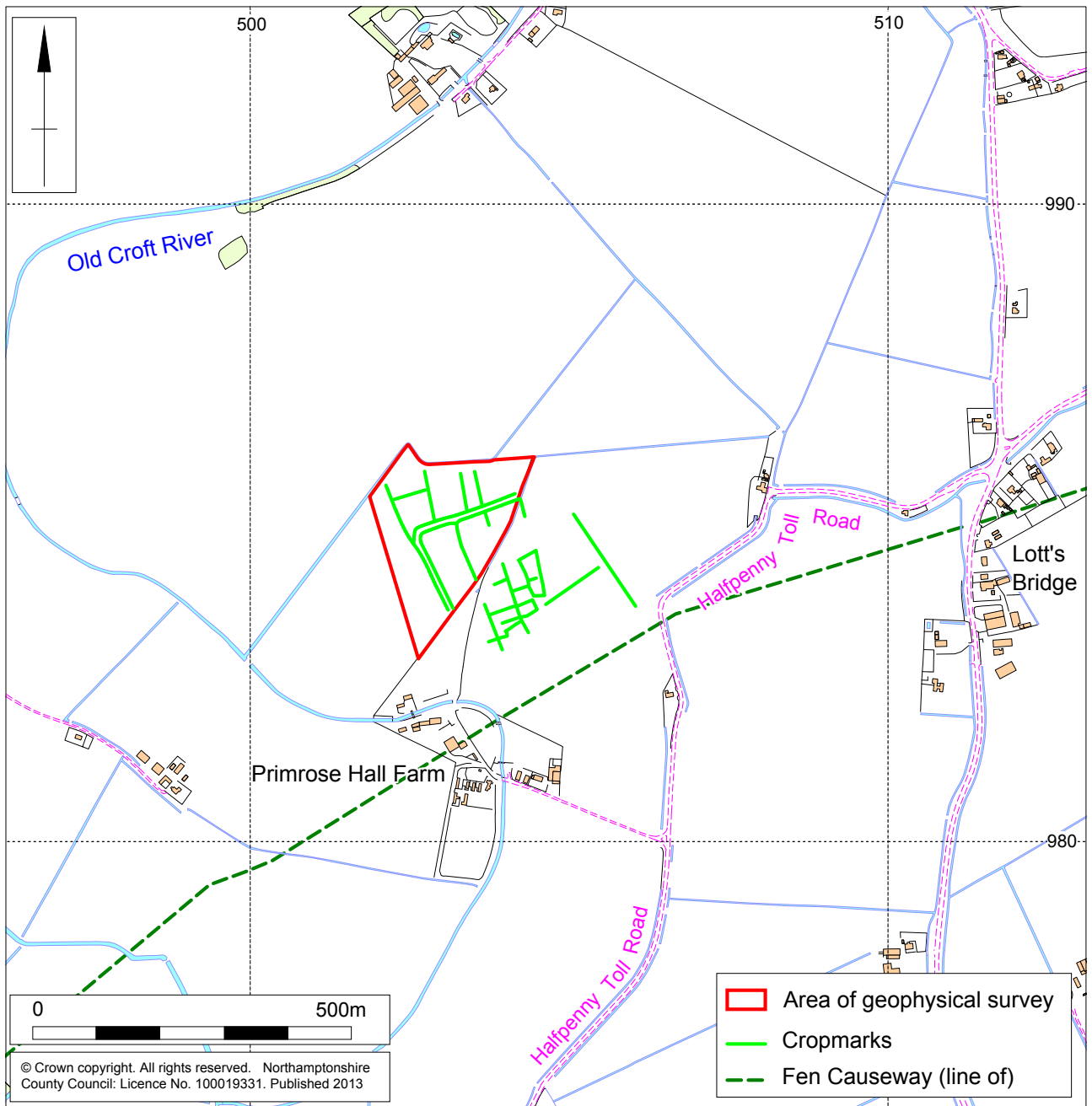
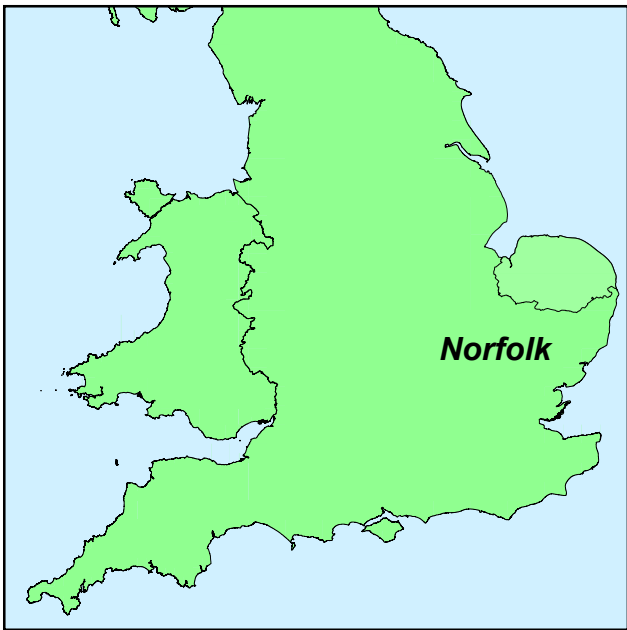
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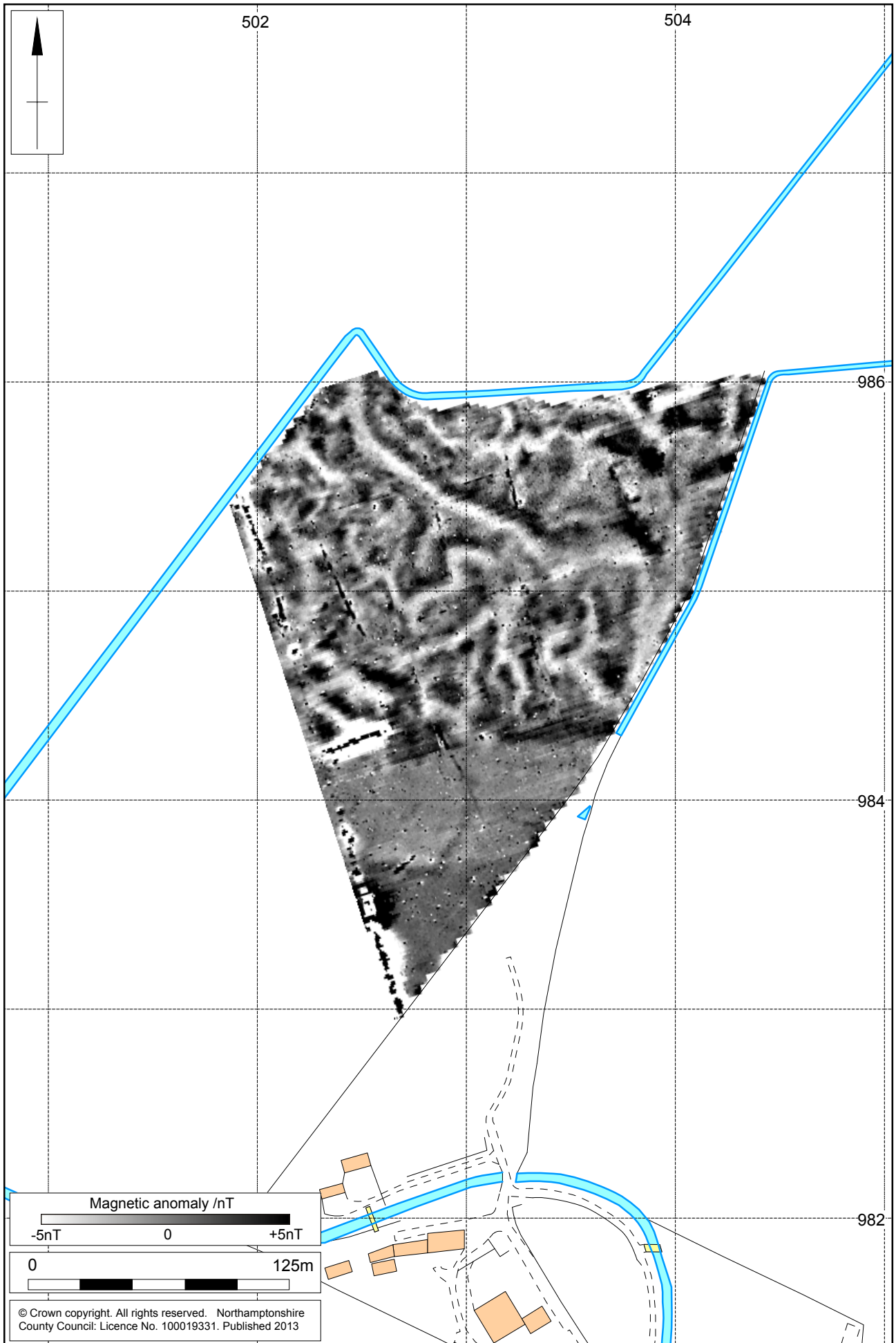
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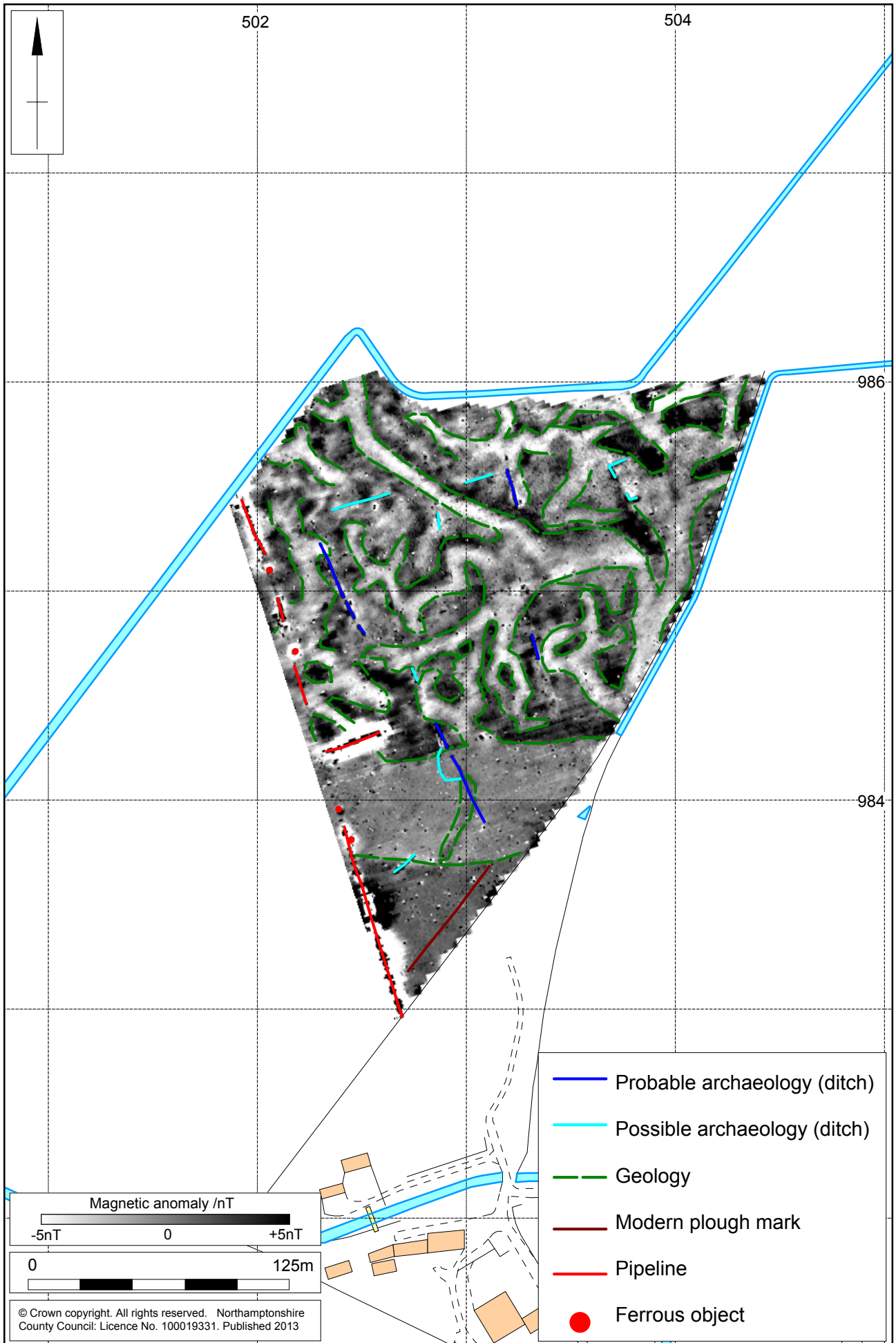
Scale 1:10,000

Site location Fig 1



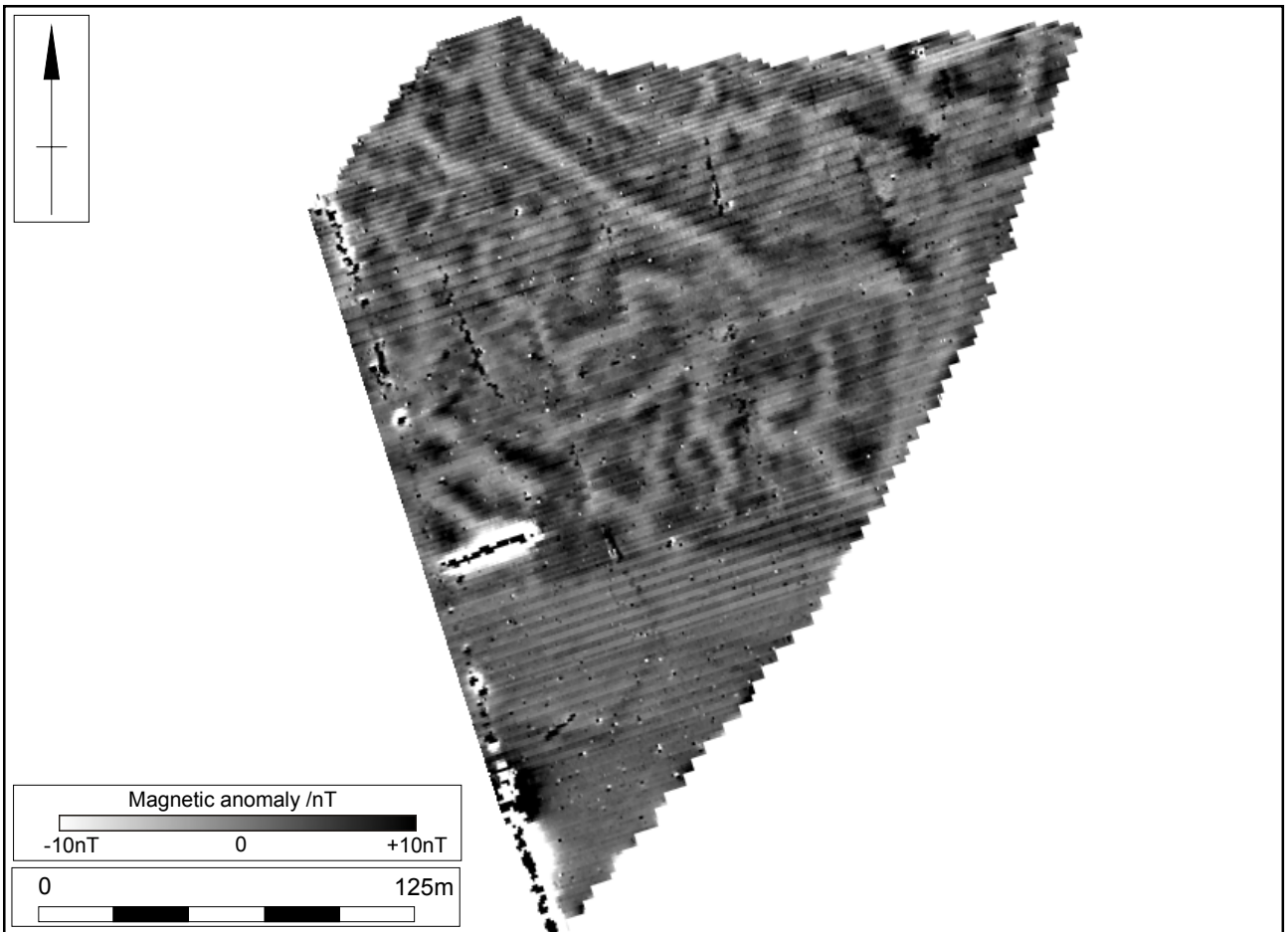
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Magnetometer survey results Fig 2



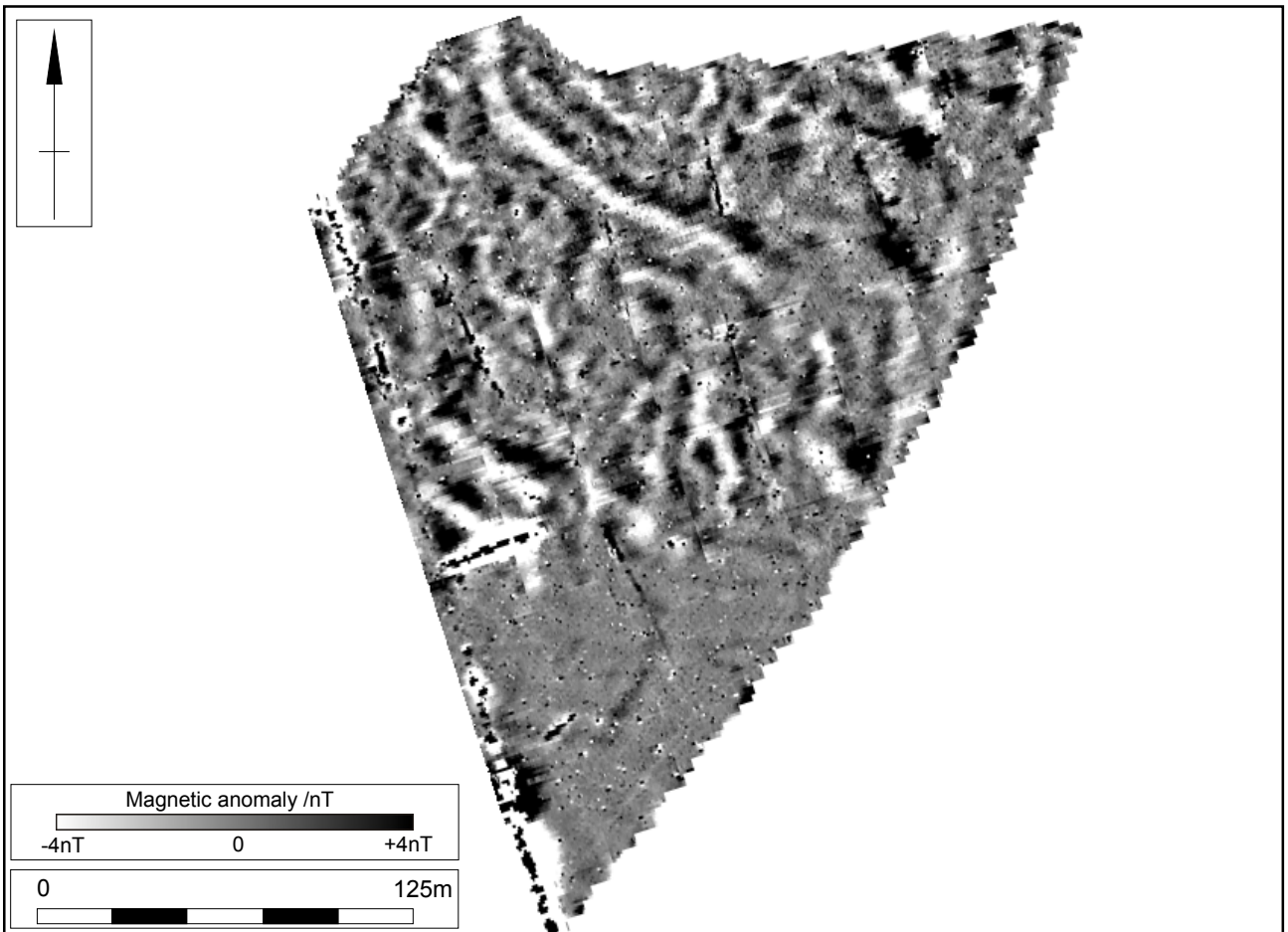
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Magnetometer survey interpretation Fig 3



1:2500

Unprocessed magnetometer survey data Fig 4



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Magnetometer data, processed with 'zero mean traverse' function Fig 5



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