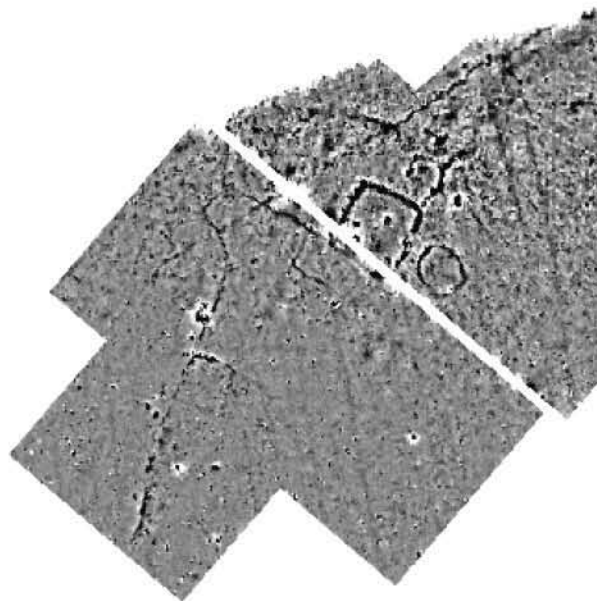




Northamptonshire
County Council

Northamptonshire Archaeology

Archaeological geophysical survey
in support of a proposed quarry extension
Ketton, Rutland
November 2006 to November 2008



Carol Simmonds, Mark Holmes, Ian Fisher

November 2008

Report 08/15

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OASIS REPORT FORM

PROJECT DETAILS		
Project name	Archaeological geophysical survey in support of a proposed quarry extension, Ketton, Rutland, November 2006 – November 2008	
Short description (250 words maximum)	Northamptonshire Archaeology conducted a geophysical survey of two separate areas of land to the west and north-west of Ketton, Rutland. The survey formed part of an ongoing archaeological study of areas to be considered for future quarrying operations and was undertaken on behalf of Castle Cement Ltd. An area of some 168ha was subject to reconnaissance scanning by magnetometer and this identified nine separate locations comprising 19ha to be sampled by detailed survey. This report follows on from an interim report produced by Northamptonshire Archaeology in May 2007. Evidence of enclosures and settlement, possibly of Iron Age or Roman date, have been found in five of the areas.	
Project type	Geophysical Survey	
Site status (none, NT, SAM etc)	None	
Previous work (SMR numbers etc)	NA 1997, 2000, 2004, 2006, 2007.	
Current Land use	Arable and pasture	
Future work	Unknown	
Monument type/ period	Unknown	
Significant finds (artefact type and period)	N/A	
PROJECT LOCATION		
County	Rutland	
Site address (including postcode)	Ketton Quarry, Ketton	
Study area (sq.m or ha)	168 ha	
OS Easting & Northing	SK 968 072 (centre) and SK 966 045 (centre)	
Height OD	50-105m OD	
PROJECT CREATORS		
Organisation	Castle Cement	
Project brief originator	Richard Clark, Leicestershire County Council	
Project Design originator	Northamptonshire Archaeology	
Director/Supervisor	Ian Fisher and Steve Morris	
Project Manager	Adam Yates	
Sponsor or funding body	Castle Cement Ltd	
PROJECT DATE		
Start date	November 2006	
End date	November 2008	
ARCHIVES	Location	Content
Physical		
Paper	Northamptonshire Archaeology	Survey notes
Digital	Northamptonshire Archaeology	Geophysical data
BIBLIOGRAPHY		
	Journal/monograph, published or forthcoming, or unpublished client report (NA report)	
Title	Archaeological geophysical survey in support of a proposed quarry extension, Ketton, Rutland, November 2006 – November 2008	
Serial title & volume	NA Report 08/15	
Author(s)	Carol Simmonds, Mark Holmes, Ian Fisher	
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ARCHAEOLOGICAL GEOPHYSICAL SURVEY
IN SUPPORT OF A PROPOSED QUARRY EXTENSION,
KETTON, RUTLAND

NOVEMBER 2006 - NOVEMBER 2008

ABSTRACT

Northamptonshire Archaeology conducted a geophysical survey of two separate areas of land to the west and north-west of Ketton, Rutland. The survey formed part of an ongoing archaeological study of areas to be considered for future quarrying operations and was undertaken on behalf of Castle Cement Ltd. An area of some 168ha was subject to reconnaissance scanning by magnetometer and this identified nine separate locations comprising 19ha to be sampled by detailed survey. This report follows on from an interim report produced by Northamptonshire Archaeology in May 2007. Evidence of enclosures and settlement, possibly of Iron Age or Roman date, have been found in five of the areas.

1 INTRODUCTION

Within the period of the currently proposed Minerals Plan, Castle Cement Ltd will be proposing to extend its existing quarries at Ketton, Rutland to ensure sufficient raw materials for the long term viability of its operations there. Whilst at present the location for the quarry extension has not been finalised, Castle Cement has contracted Northamptonshire Archaeology to conduct a series of archaeological surveys of an area of land to the north-west and south-west of the present Ketton Quarry (Fig 1 NGR SK 968 072 & SK 966 045). As part of these investigations an archaeological geophysical survey was undertaken between November 2006 and November 2008.

The objective of the geophysical survey was to identify, locate and characterise instances of anomalous magnetic activity which might indicate buried archaeological remains. A staged approach was used. An initial reconnaissance survey was first undertaken to locate any such magnetic anomalies and then a second stage of detailed survey was implemented to sample the anomalies and define their extent and character. The methodology was described in a specification agreed with Richard Clark, Senior Archaeologist for the Historic and Natural Environment Team, Leicestershire County Council, acting in his capacity as archaeological advisor to Rutland County Council (NA 2007a, 3-4).

The initial reconnaissance survey was undertaken between November 2006 and January 2007 and was reported upon in an interim statement (NA 2007b). One area of land not available for survey at

this time, Field 1, was consequently scanned in May 2007 when the sample areas were subject to detailed survey. It was not until November 2008 that Field 1 was subject to detailed survey.

This report follows on from the interim geophysical survey produced in May 2007 (NA 2007c) which reported on the six areas. This report includes the final three fields which were not surveyed earlier due to the presence of an oil seed rape crop and heavily ploughed conditions. The final surveys took place in September 2007 and November 2008.

2 TOPOGRAPHY AND GEOLOGY

The land subject to geophysical survey falls into two separate areas (Fig 2). The northern area lies 2km to the south-west of Empingham village, immediately at the south of the Stamford Road (NGR SK 968 072). It comprises *c* 130ha of land predominantly sited upon a stratum of Upper Lincolnshire Limestone. A linear depression within Field 2 probably represents a north-east to south-west running slade (dry valley).

The southern area covers some 38ha and lies *c* 1km to the north-west of Ketton (NGR SK 966 045). The underlying geology is Rutland formation and Blisworth formation limestones. These are capped in the western half of the area by glacial Boulder Clay deposits.

3 METHODOLOGY

Reconnaissance survey

The 'scanning' was undertaken in parallel transects spaced 10m apart using Geoscan Research FM-series fluxgate gradiometers which were constantly monitored for anomalous magnetic activity. Where anomalous readings ($>3\text{nT}$ from the background) were encountered, their immediate surroundings were scanned to investigate the extent and trace-form. Anomalies of ferrous origin were ignored, but all other areas or points of anomalous activity were marked in the field and tied into the Ordnance Survey National Grid by means of a Leica System 1200 GPS (Fig 2).

Detailed gradiometer survey

All detailed magnetometer survey was undertaken using Bartington Grad601-2 fluxgate gradiometers. The Grad601-2 is constructed as a dual-sensor instrument with two vertical gradiometers separated on a yoke to enable two lines of survey to be recorded in tandem.

A total of 217, 30m by 30m grid-squares, covering 19ha, were surveyed in detail. The location of the detailed sample areas was agreed with the Senior Archaeologist for the Historic and Natural Environment Team, Leicestershire County Council. Each grid square was traversed at rapid walking pace in zigzag traverses spaced at 1m intervals with data recorded every 0.25m along these. All fieldwork was carried out in accordance with English Heritage and the Institute of Field Archaeologists Guidelines (EH 1995 & Gaffney, Gater and Ovendon 2002).

The data was analysed using Geoplot 3.00T software. Low (negative) magnetism is shown as white and high (positive) magnetism as black in the resultant greyscale plots. To avoid the introduction of bias, minimal processing was carried out on the data. The 'Zero Mean Traverse' function was applied in order to bring the average level of each line of data into a balanced zero.

The processed data is presented here in the form of greyscale highlighting the weaker magnetic anomalies (-4nT / +4nT scale, Figs 4 - 7) and interpretative plots (Figs 8 - 11) and are referred to directly in the following section.

4 SURVEY RESULTS

Reconnaissance survey

Numerous magnetic anomalies were detected in fields of both the northern and southern areas. The anomalies particularly group on the ridges sloping down north-easterly towards the River Gwash in the north and towards the River Chater in the south. The widespread nature of the anomalies suggested that some, at least, are probably caused by localised variations in the underlying geological strata. The subsequent detailed survey revealed linear anomalies probably caused by fissures within the limestone as well as discreet areas of archaeological features.

Detailed survey

To test the results of the reconnaissance survey, nine separate detailed grids were positioned over the major concentrations of magnetic anomalies (Figs 2 and 3). Fields 3, 8, 9, 10 and 12 were all under cereal crops at the time of the survey whilst Field 2 was given over to pasture. The grids in Fields 4 and 5 were surveyed later when an oil seed rape crop had been harvested. Whilst Field 1 was not available for survey until November 2008.

4.1 Northern area

Field 1 (Figs 6 and 10)

The large rectangular enclosure, and linear feature as seen in Field 4, extend into Field 1. The linear feature extends south-west and intersects with a sinuous curvilinear feature that extends out from the enclosure in a north-west direction and turns south-west to form a 'D' shaped enclosure. Further south a second rectangular enclosure, measuring *c* 15m by 20m, is visible attached to the linear feature. A third rectangular enclosure, measuring *c* 15m by 15m, is visible west of the large enclosure. North to south anomalies represent medieval ridge and furrow or modern ploughing.

Field 2 (Figs 5 and 9)

Field 2 contains a roughly lenticular-shaped enclosure, 75m long by 42m wide. Within its circuit are a number of positive magnetic anomalies that possibly represent pits. Thin, sinuous anomalies leading away from the enclosure at both the south-east and the north-west are likely to represent associated ditches. Amorphous agglomerations of dipolar anomalies situated to the north and west represent either geological faults, such as solution hollows, or possibly former quarries. The remains of north to south cultivation lines are evident across the whole area, these being either the remnants of modern ploughing or former medieval ridge and furrow agriculture.

Field 3 (Figs 4 and 8)

The sinuous geological features observed in Field 12 continues into Field 3. However, there are also faint magnetic anomalies representing possible buried ditches. These appear to form a sub-rectangular enclosure, *c* 30m by 20m, with two smaller curvilinear ditches at its north-west corner. Their low magnetic response, coupled with the presence of geological features makes interpretation difficult and the patterning observed may in fact be natural rather than archaeological.

Field 4 (Figs 6 and 10)

Field 4 contains two small rectangular enclosures and one circular enclosure with two linear features to the north. These features are located in the north-western corner at *c* 150m south-east of the enclosure in Field 2. The larger rectangular enclosure extends into Field 1. Highly magnetised irregular positive anomalies in the east of the field probably represent geological features as in Fields 3, 5 and 12. There are also a series of north to south aligned linear features across the field probably indicating former medieval ridge and furrow or remnants of modern ploughing.

Field 5 (Figs 6 and 10)

Field 5 contains north-east to south-west linear anomalies across the whole area, probably representing geological features as in Fields 3, 4 and 12. Additionally there are five anomalies

possibly representing ferrous disturbance in the upper soils.

Field 12 (Figs 4 and 8)

Field 12 produced only responses to the underlying natural geology. These are evident as three sinuous lines of positive magnetic readings running south-west to north-east. They probably represent 'cracks' or fissures in the underlying limestone geology.

4.2 Southern area

Field 8 (Figs 7 and 11)

Field 8 contains only one possible archaeological feature, probably a length of ditch. Other linear anomalies were present but are thought to be field drains. The more nebulous magnetic anomalies apparent in the data area similar to those in Field 2 and are thought likely to represent either geological faults or possibly former quarries.

Field 9 (Figs 7 and 11)

Field 9 contains a small rectangular, ditched enclosure. It measures *c* 40m by 50m, but it is unclear if the circuit is continuous, as no eastern ditch was immediately visible. There is a possible opening on its southern side and two curvilinear ditches within the enclosure may represent roundhouse ring ditches. Further cultivation marks are visible in the surveyed area.

Field 10 (Figs 7 and 11)

Field 10 only appears to contain a series of land drains.

5 CONCLUSION

The geophysical survey found evidence of archaeological activity in both the northern and southern survey areas. This activity took the form of enclosures and settlement features, which although undated, may belong to the Iron Age or Roman periods based upon their morphology. These archaeological features appeared to be limited in extent and probably of local significance. In addition, geological features, agricultural cultivation lines and possibly evidence of former quarrying were also found.

BIBLIOGRAPHY

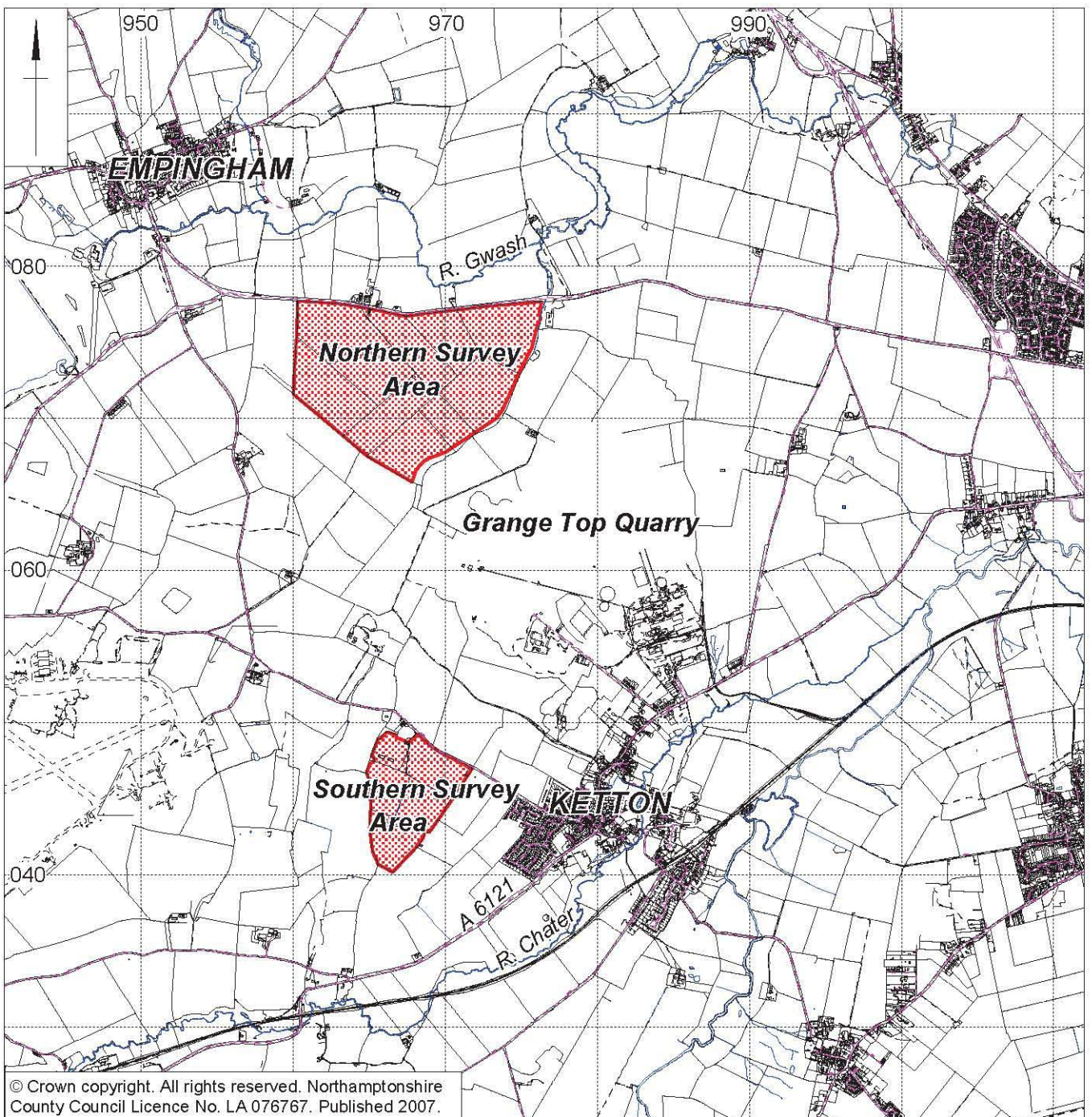
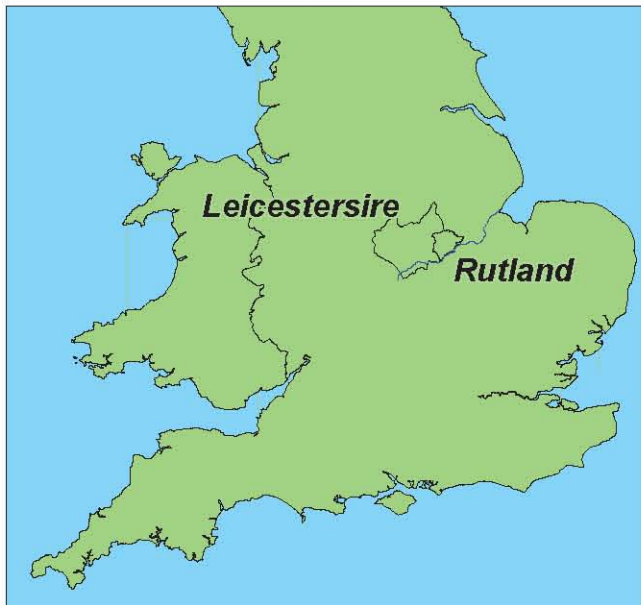
EH 1995 *Geophysical Survey in Archaeological Field Evaluation*, English Heritage Research and Professional Services Guideline, 1

Gaffney, C, Gater, J, and Ovendon, S, 2002 *The Use of Geophysical Techniques in Archaeological Evaluations*, Institute of Field Archaeologists Technical Paper, 6

NA 2007a *Castle Cement Ltd, Grange Top Quarry, Ketton, Scheme of Archaeological Investigation in Support of a Future Quarry Extension*, Northamptonshire Archaeology

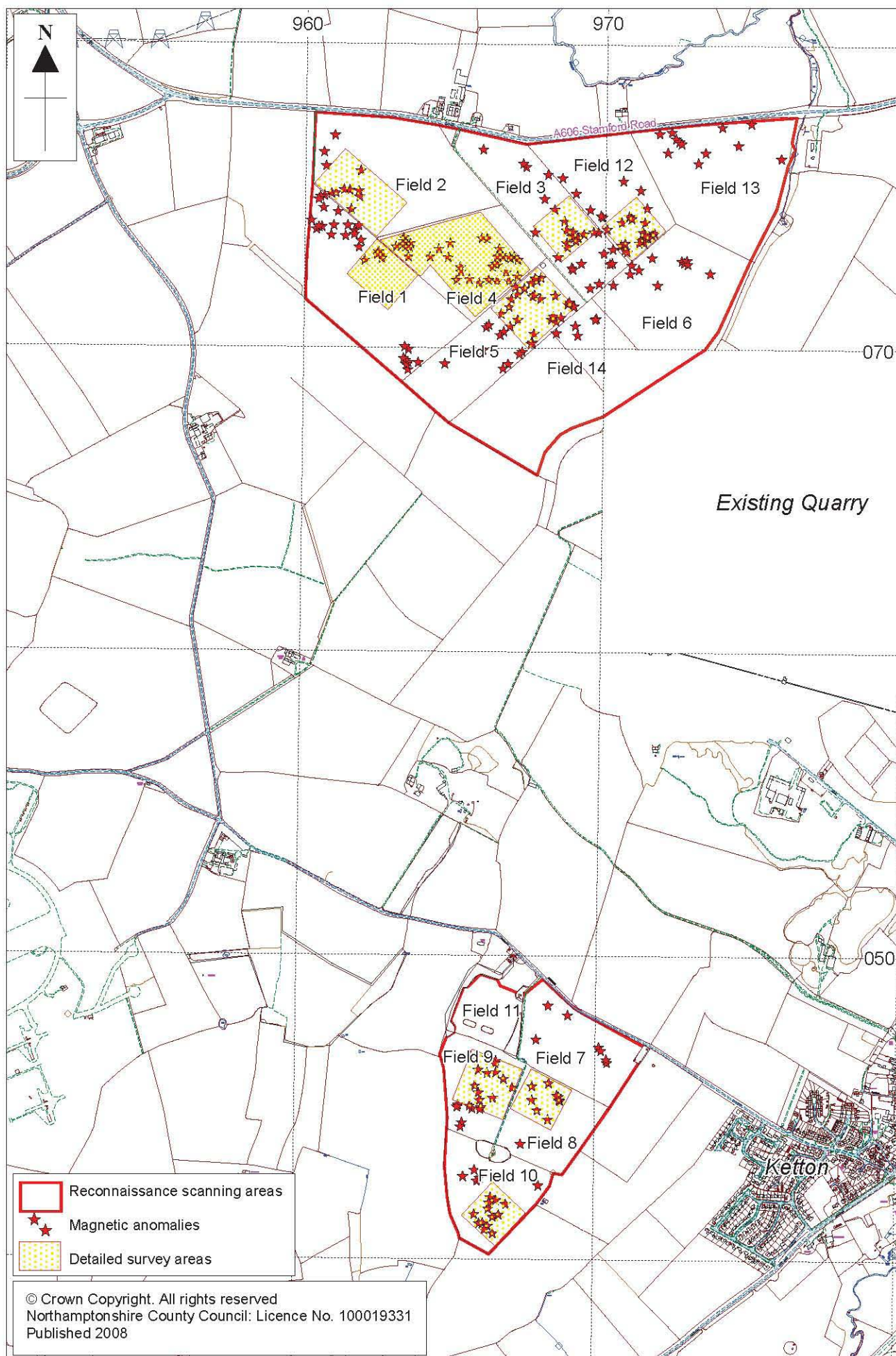
NA 2007b *Archaeological Geophysical Reconnaissance In Support of a Future Proposed Ketton Quarry Extension*, Northamptonshire Archaeology

NA 2007c *Archaeological Geophysical Reconnaissance In Support of a Future Proposed Ketton Quarry Extension, Interim Report*, Northamptonshire Archaeology, Report 07/082



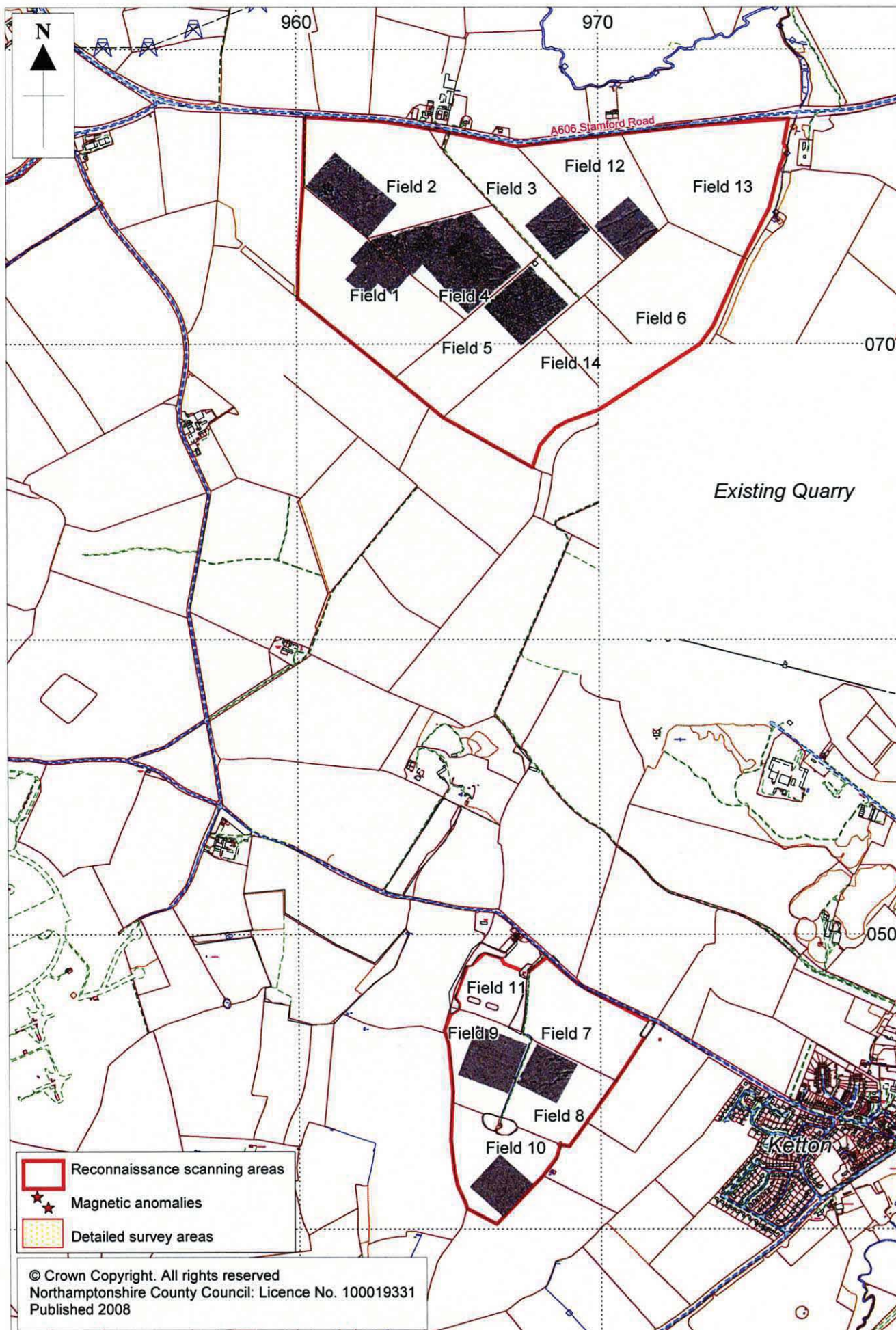
Site location

Fig 1



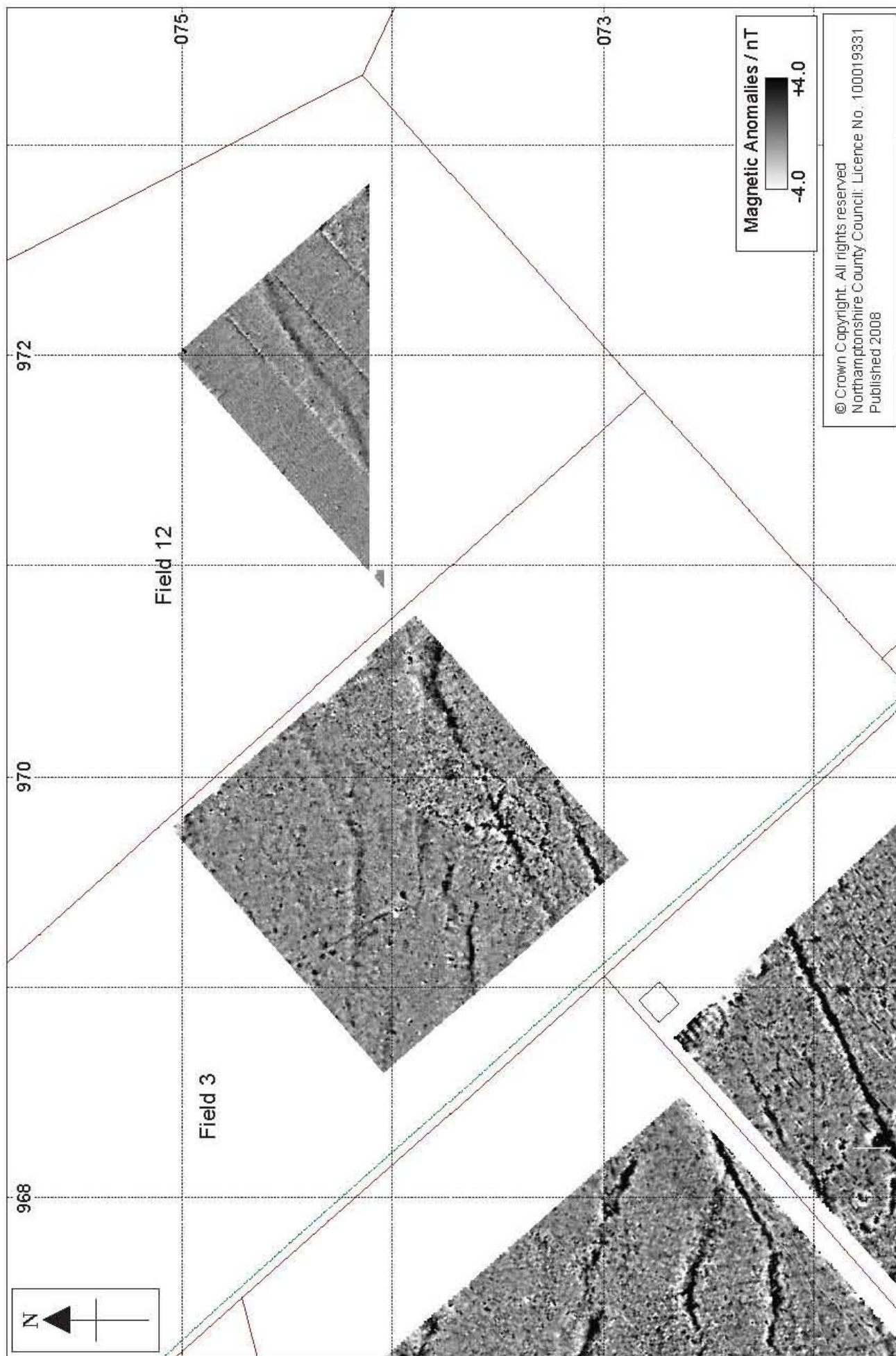
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Gradiometer scanning results & detailed survey areas Fig 2



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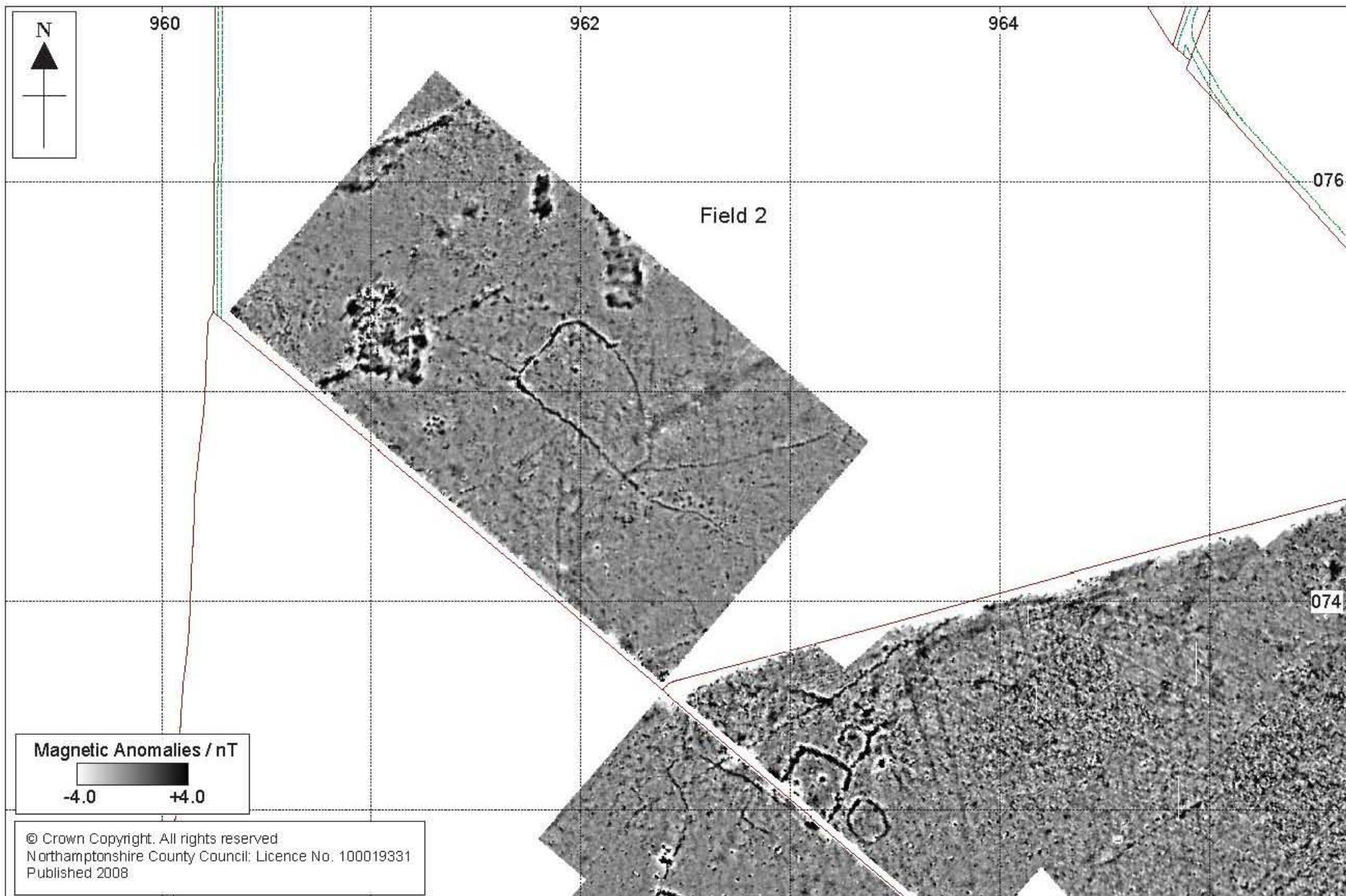
Gradiometer survey results, all fields Fig 3



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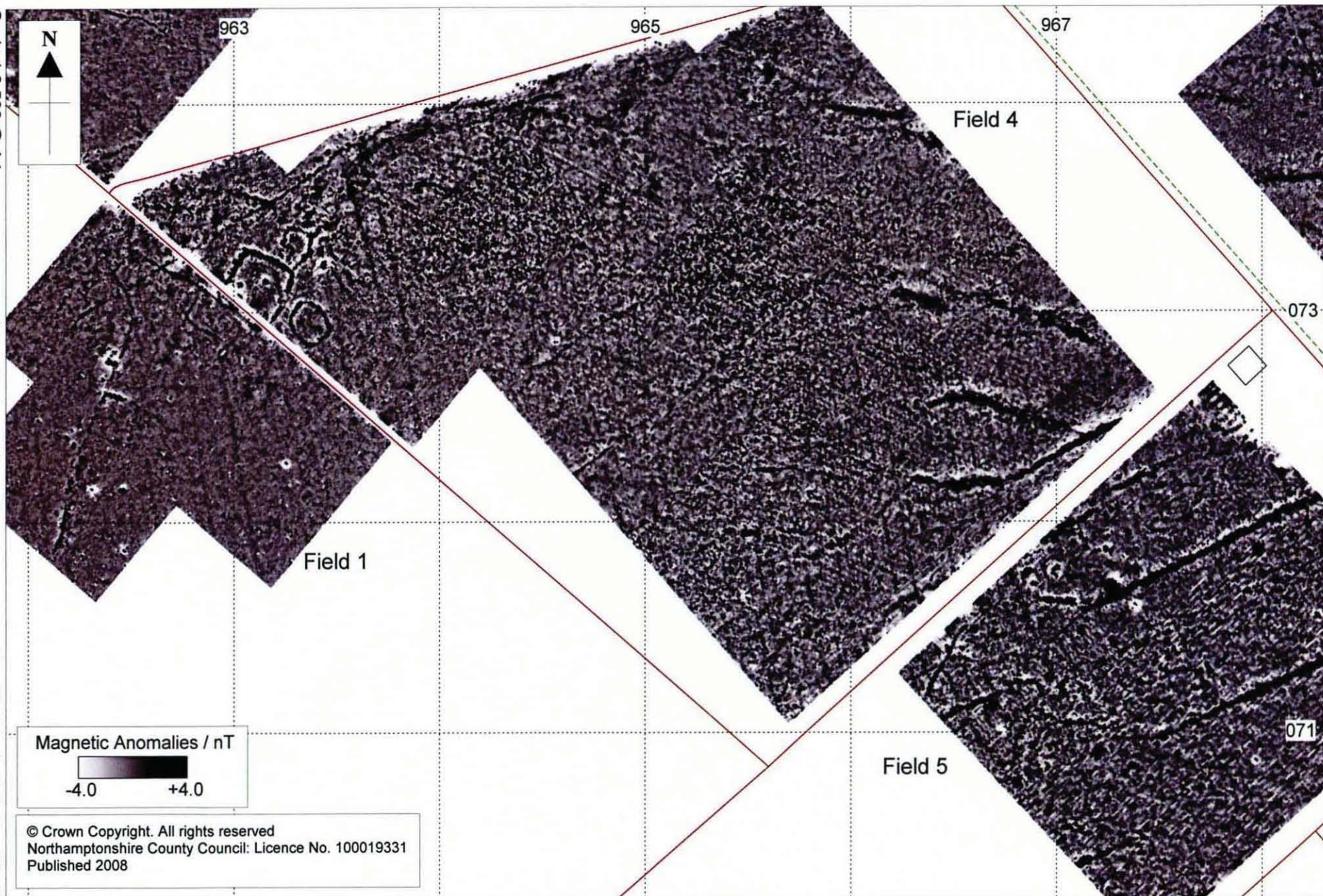
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Detailed gradiometry survey results, Fields 3 & 12 Fig 4

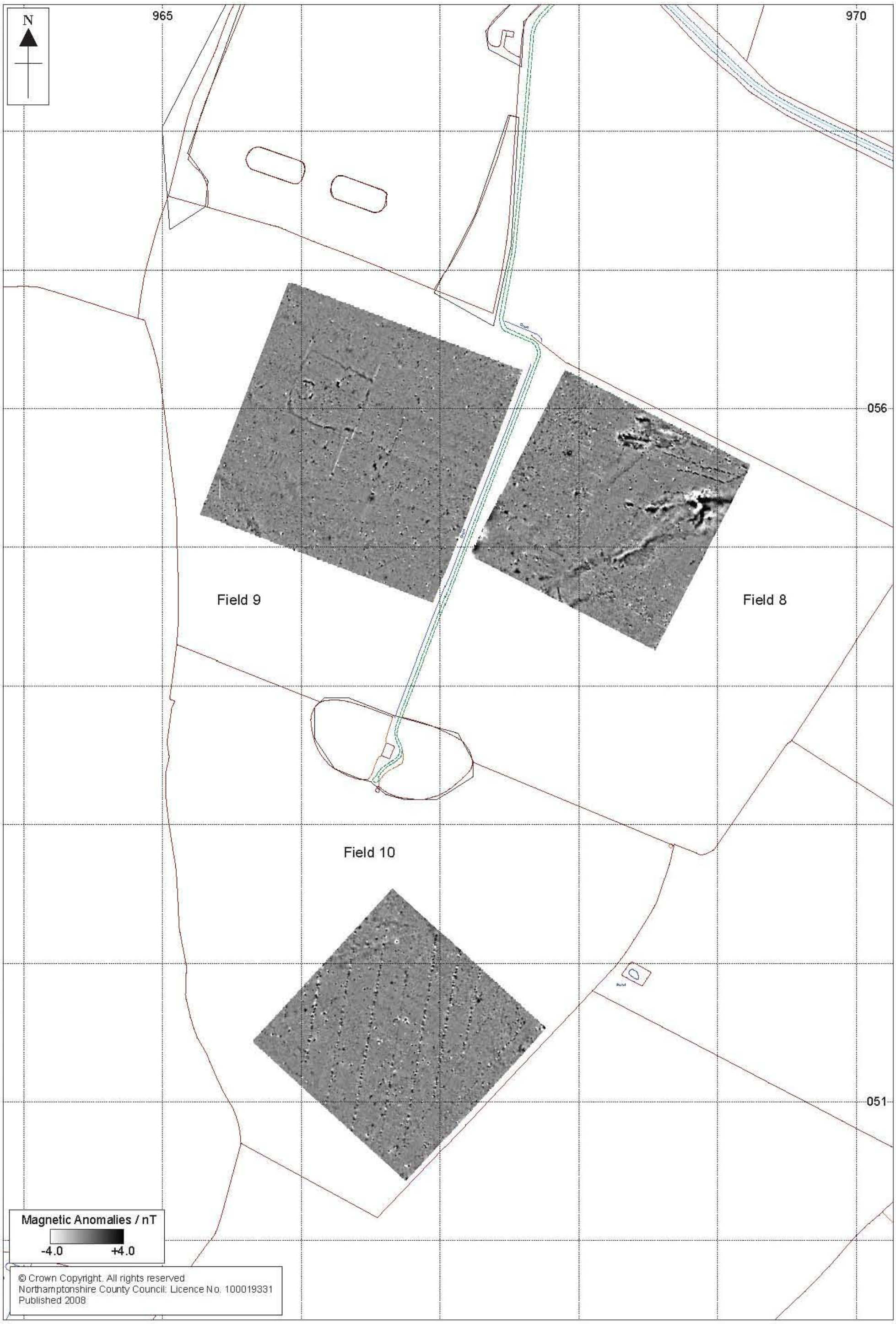


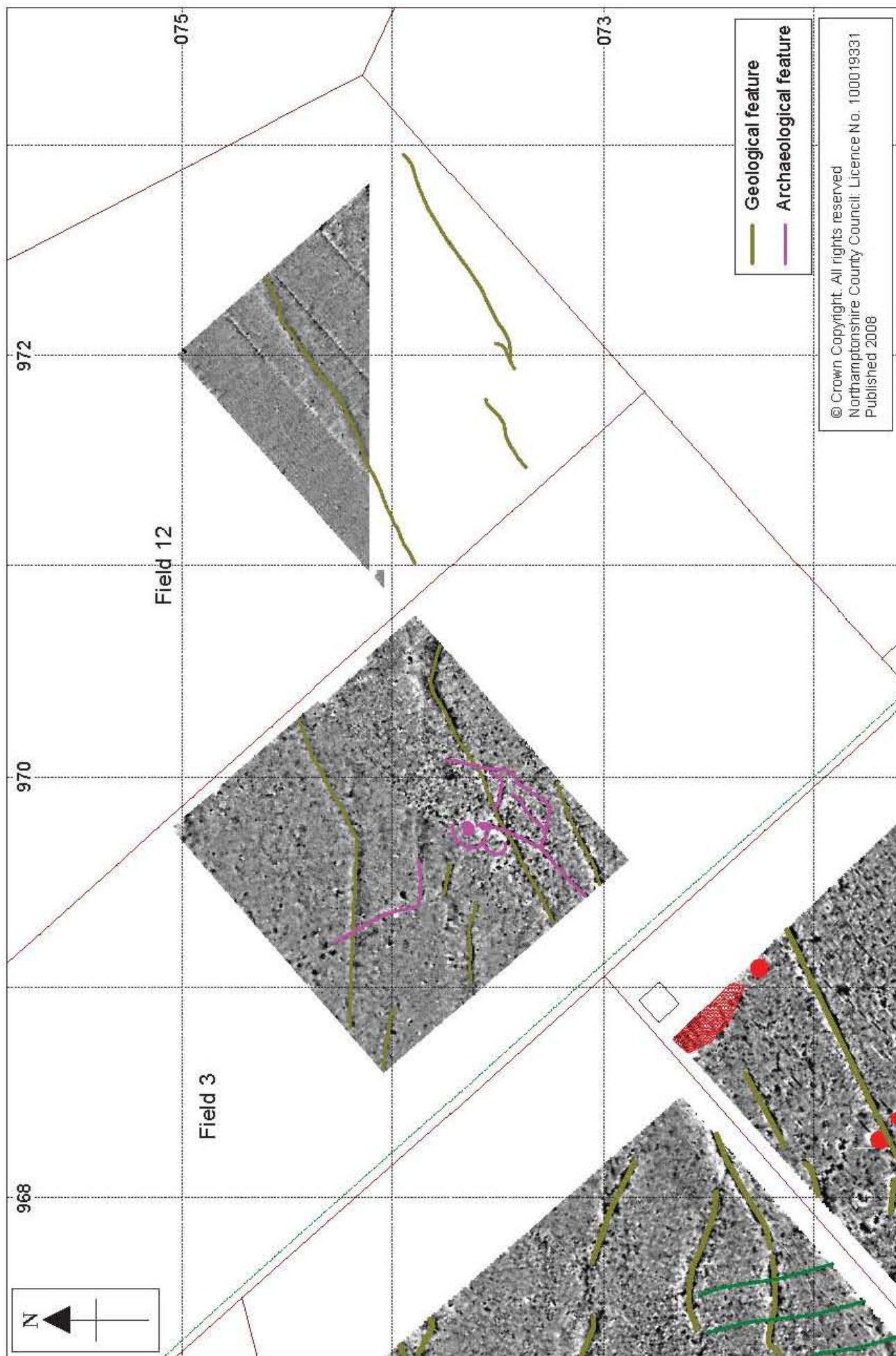
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Detailed gradiometry survey results, Fields 1, 4 & 5 Fig 6



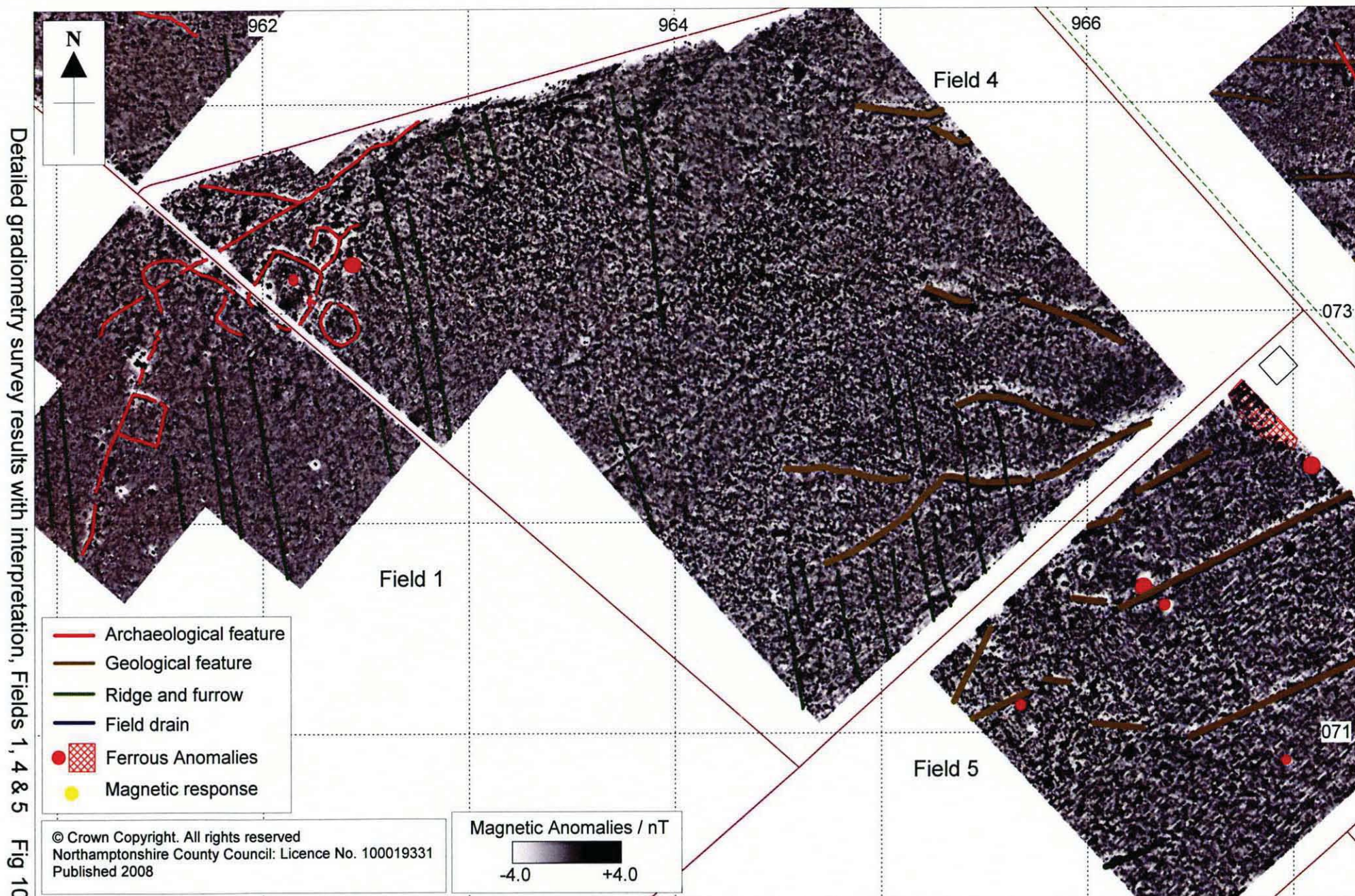
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Scale 1:2,500 @ A4 Detailed gradiometry survey results with interpretation, Fields 3 & 12 Fig 8





Detailed gradiometry survey results with interpretation, Fields 1, 4 & 5 Fig 10