NORTHAMPTONSHIRE COUNTY COUNCIL

NORTHAMPTONSHIRE ARCHAEOLOGY

MARCH 2006

GEOPHYSICAL SURVEY

FOR FINMERE QUARRY EXTENSION,

FINMERE, OXFORDSHIRE

FEBRUARY 2006

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QUALITY CONTROL

	Print name	Signature	Date
Checked & Approved by	Steve Parry		23/03/06

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Figures

OASIS REPORT FORM

PROJECT DETAILS		
Project name	Geophysical survey at Finmere Quarry, Oxfordshire, February 2006	
Short description (250 words maximum)	*Northamptonshire Archaeology conducted a geophysical survey, on behalf of Premier Aggregates Ltd on an area of land of totalling approximately 34 ha proposed for mineral extraction. Magnetic susceptibility survey revealed several areas of enhanced readings possibly indicating archaeological features. Detailed gradiometer survey in the northernmost part of the site identified a circular and sub rectangular enclosure with related ditches, possibly an extension to a known archaeological site to the east. Elsewhere most anomalies relate to ridge and furrow or modern agriculture.*	
Project type	Evaluation	
Site status		
Previous work	Evaluation & Excavation by CAT 2000	
Current Land use	Arable	
Future work		
Monument type/ period		
Significant finds		
PROJECT LOCATION		
County	Oxfordshire	
Site address	Finmere Quarry	
Study area (esq. or ha)	34 ha	
OS Easting & Northing	425000 221000	
Height OD		
PROJECT CREATORS		
Organisation	Oxfordshire County Council	
Project brief originator	Hugh Coddington	
Project Design originator	Andrew Josephs Ltd	
Director/Supervisor	Adrian Butler	
Project Manager	Bill Boismier	
Sponsor or funding body	Premier Aggregates	
PROJECT DATE		
Start date	February 2006	
End date	February 2006	
ARCHIVES	Location (Accession no.)	Content (e.g. pottery, animal bone etc)
Physical		
Paper		
Digital	N.A.	Magnetic data, CAD, GIS
BIBLIOGRAPHY	Journal/monograph, published or forthcoming, or unpublished client report (NA report)	
Title		
Serial title & volume		
Author(s)		

A GEOPHYSICAL SURVEY FOR FINMERE QUARRY

EXTENSION, FINMERE, OXFORDSHIRE

FEBRUARY 2006

ABSTRACT

Northamptonshire Archaeology conducted a geophysical survey, on behalf of Premier Aggregates Ltd on an area of land of totalling approximately 34 ha proposed for mineral extraction.. Magnetic susceptibility survey revealed several areas of enhanced readings possibly indicating archaeological features. Detailed gradiometer survey in the northernmost part of the site identified a circular and sub rectangular enclosure with related ditches, possibly an extension to a known archaeological site to the east. Elsewhere most anomalies relate to ridge and furrow or modern agriculture.

1 INTRODUCTION

Northamptonshire Archaeology conducted geophysical survey at Finmere Quarry, Oxfordshire, on behalf of Premier Aggregates Ltd, in February 2006. The survey was targeted at two sites designated for mineral extraction (area 27ha) and clay extraction (area 7ha) which are to be quarried (Centres: NGR SP 622 322 & SP 628 320 Fig 1).

2 ARCHAEOLOGICAL BACKGROUND

The archaeological background to the development area is summarised in the Brief prepared by Oxfordshire County Council (Coddington 2005) and in a Cultural Heritage Assessment (Josephs 2005). Substantial archaeological remains dating from the Bronze Age through to the early modern period have been discovered near to the proposed extension.

In addition, six sites of potential interest are known from within the proposed mineral extraction area with a single site within the clay extraction site (Josephs 2005, 17).

3 GEOLOGY AND TOPOGRAPHY

The site lies to the south-west of Finmere adjacent to the A421 Buckingham Road (Fig 1). The underlying geology comprises Great Oolite limestone covered by a drift boulder clay and morainic drift with variable patches of sand and gravel. (http://www.bgs.ac.uk/geoindex/index.htm consulted 06/01/06).

Seven fields were available for survey (Fig 1). The following table shows ground cover for each of these fields:

Field	Ground Cover
1	Short pasture
2	Low crop
3	Short stubble
4	Low crop
5	Maize stubble + maize stand in middle
6	Maize stubble
7	Stubble

The weather at time of survey varied between dry and, snow and heavy rain.

4 GEOPHYSICAL SURVEY

Methodology

Geophysical survey was carried out in accordance with English Heritage and the Institute of Field Archaeologists Guidelines (EH 1995 & Gaffney, Gater and Ovendon 2002).

Reconnaissance Survey

Initial extensive geophysical survey of the site was carried out by topsoil (volume specific) magnetic susceptibility (MS) survey. It is understood that where archaeological sites exist, feature fills may be ploughed up to the surface, thus increasing the MS of the ploughsoil in that area. The geophysicist is therefore studying MS contrasts across a site to indicate buried archaeology, and as an additional benefit, the results of other soil processes (Gaffney, Gater and Ovendon 2002).

The survey utilised a Bartington MS2D MS meter and field coil. Readings were obtained on a 20m x 20m grid over the site. The data was subsequently entered into Geoplot v.3.00s software and georeferenced in MapInfo v.6 GIS to be displayed as a continuous grey tone plot, in which higher MS levels are shown as darker shades (Fig 2).

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 234 separate 30m x 30m grid-squares, totalling *c* 7.2ha, were surveyed in detail. Each grid square was traversed at rapid walking pace in zigzag (alternate north-south/south-north) traverses spaced at 1m intervals with data recorded every 0.25m along these.

The data was analysed using Geoplot 3.00s software. Low (negative) magnetism is shown as white and high (positive) magnetism as black in the resultant greyscale plots. The following processing functions were 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. Small-scale extreme readings were excised and replaced with the local mean.

The processed data is presented here in the form of a greyscale highlighting the magnetic anomalies (-2nT / +2nT scale, Figs 3 & 4) and an interpretative diagram generalised from the results (Fig 5). These are referred to directly in the following Survey Results section.

Results

Reconnaissance Survey

Results of the reconnaissance (Fig 2) showed an average level of *c*19.2 $x10^{-5}$ SI units across the site. MS levels varied enormously between fields, probably due to changes in agricultural practices. Field 1 produced a large, *c* 160m diameter, area of MS enhancement (mean 56 $x10^{-5}$ SI units). This zone may have been derived from archaeological features, especially considering the known archaeology nearby across the railway to the east. Field 2 produced an enhanced MS area in the north-east corner (*c*46 $x10^{-5}$ SI units) which may indicate archaeology or simply a change in soil types. Field 3 produced a fairly consistent MS background, as did Field 4 although a high level was recorded around the track and gate in the north-eastern corner of the field. A high maize crop prevented survey in the centre of Field 5 where MS enhancement was detected along a track in the north of the field, adjacent to a plantation. Field 6 (mean MS 7.3 $x10^{-5}$ SI units) suffered from high levels of waterlogging which probably denuded the overall MS. The results from Field 7 showed a decline in MS from north to south where the ground was boggy. Gleying of soils is known to have a negative effect on the magnetic iron oxides that make archaeological features magnetic.

Detailed Survey

The intensive gradiometry was targetted based upon the results of the MS survey and previously suspected archaeology (Figs 3, 4 & 5). The results are summarised by field, where anomalies have been labelled 1-7.

Field 1

1 Positive magnetic anomalies detected in the northern corner of Field 1 appear to form a long sinuous ditch and a circular enclosure approximately 11m diameter, containing a central pit. A further possible ditched enclosure was also located further south. These features are situated approximately 150m north-west of the Bronze and Middle Iron-Age archaeology excavated in 2000 (Josephs 2005, 6)

2 A west-orientated linear anomaly, probably a ditch was detected apparently crossing from beneath the railway line

3 A large positive magnetic anomaly likely to indicate a pit of *c* 4m diameter was located towards the centre of Field 1.

Field 2

4 Positive and negative anomalies detected in the North of Field 2 may represent the intrusion of local geology, such as oolitic limestone into the shallow subsurface.

5 An area of noisy dipolar signals in the centre of Field 2 probably indicates a spread of ferrous or ceramic fragments, possibly sourced from a central major anomaly.

6 An intense positive anomaly in the south of Field 2 almost certainly represents a ferrous feature such as a vertically installed pipe.

Field 4

This field is characterised by the parallel banding known to reflect former ridge and furrow ploughing.

Field 7

This field is characterised by the parallel banding known to reflect former ridge and furrow ploughing.

7 A line of dipolar anomalies on the west of the survey area probably indicates a ceramic field drain.

5 CONCLUSION

Geophysical survey in Field 1 may have identified a circular and sub rectangular enclosure with related ditches, possibly an extension to a known archaeological site to the east A linear ditch and large pit were also identified. Work in Field 2 also indicates possible geology, a distribution of ceramic and ferrous fragments and a ferrous object. Elsewhere, in Field 4 and 7 there was traces of

ridge and furrow from former open field agriculture.

BIBLIOGRAPHY

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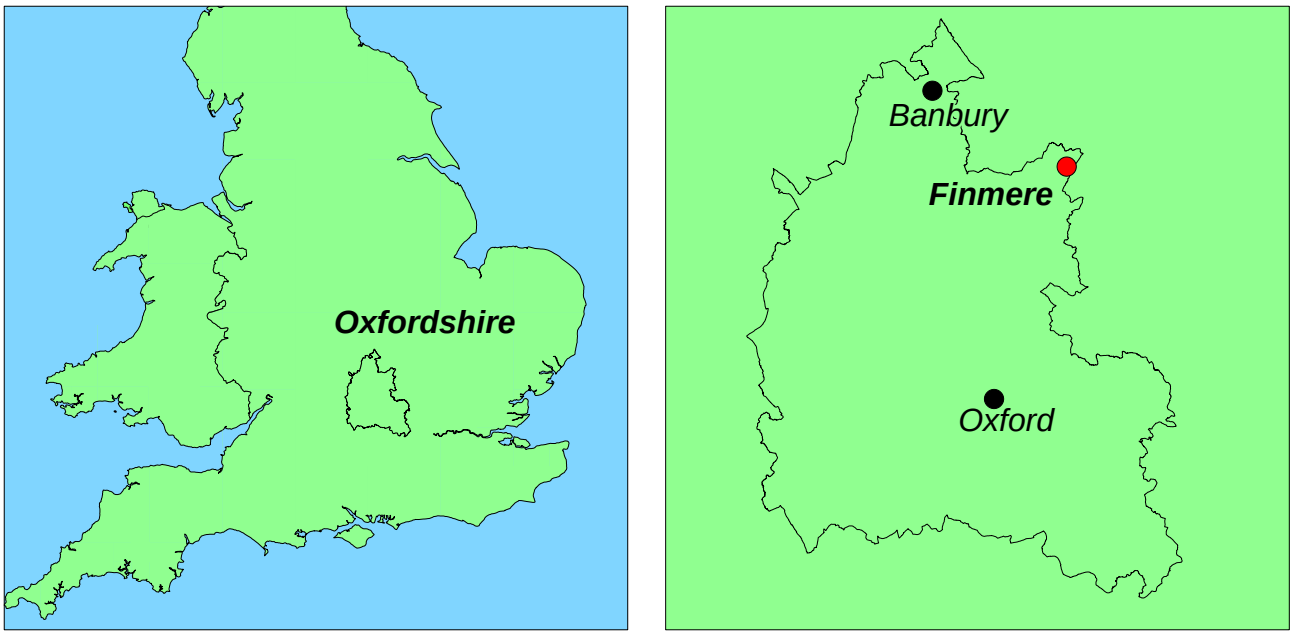
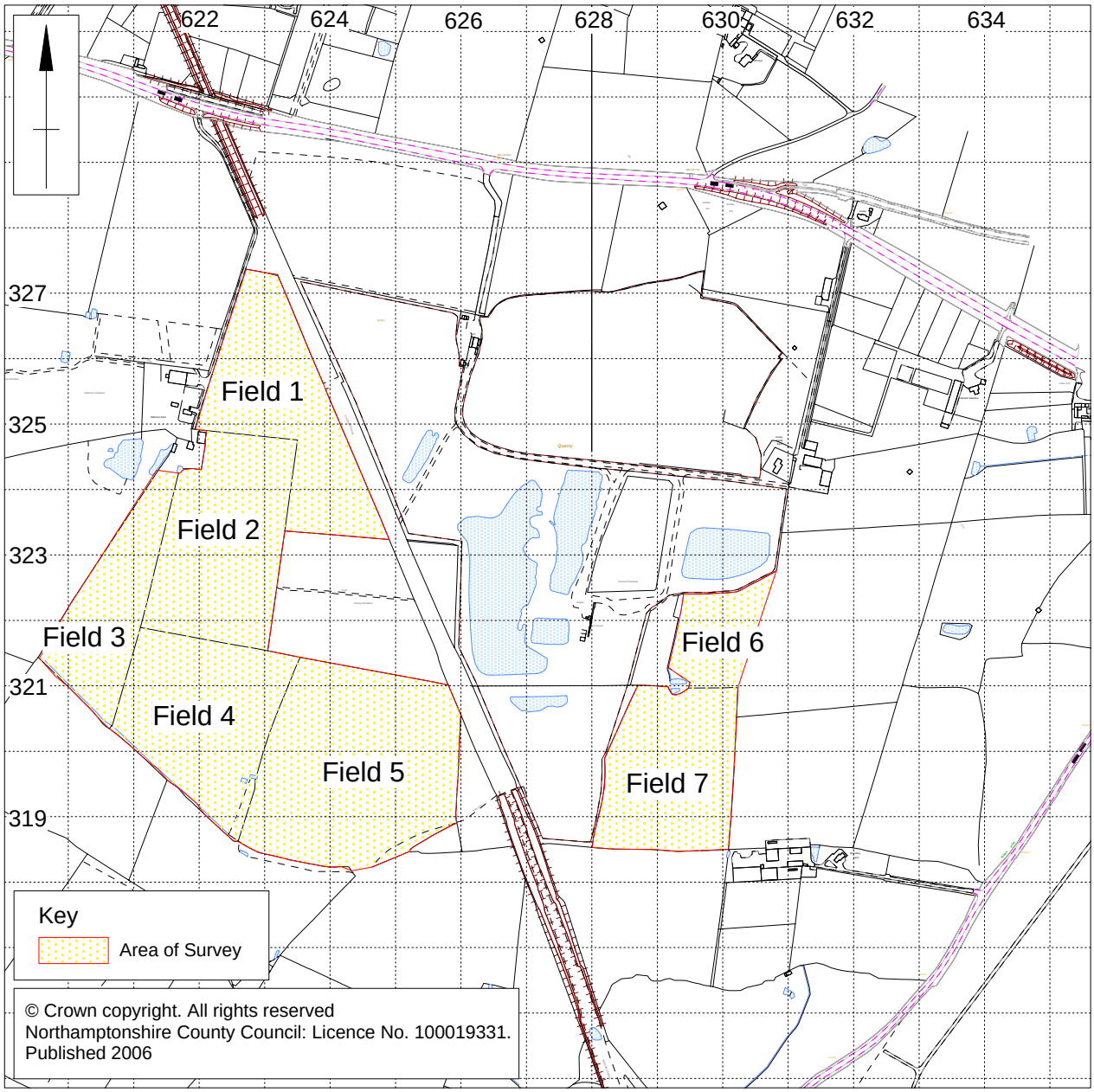
EH 1995 *Geophysical Survey in Archaeological Field Evaluation,* English Heritage Research and Professional Services Guideline, **1**

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

Josephs, A, 2005 *Finmere Quarry Extension, Cultural Heritage Assessment*, Andrew Josephs Environmental Consultant.





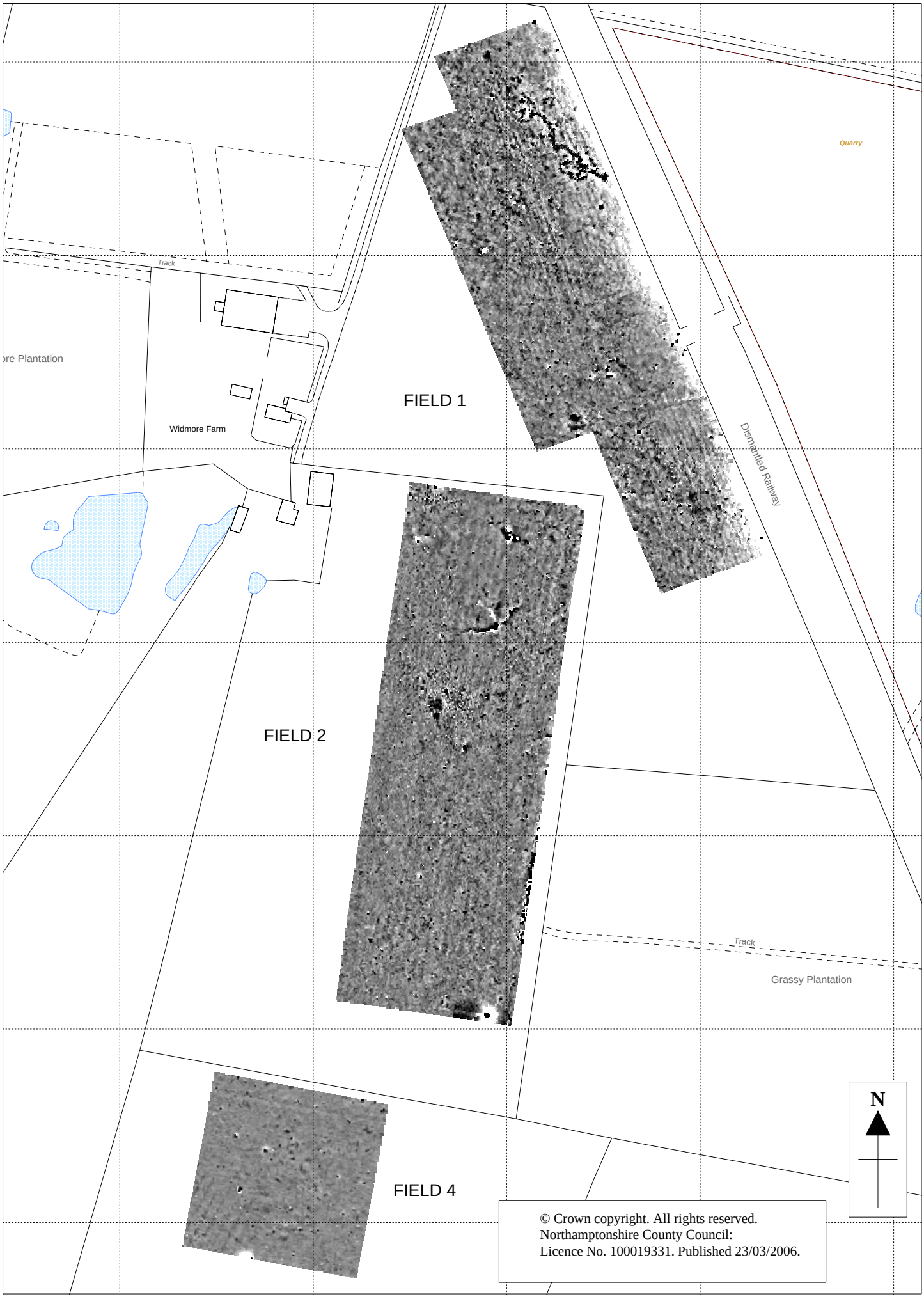
Scale 1:10,000

Fig. 1

MS Levels -/+2 Standard deviations (white/black)

Scale 1:5000

Finmere Quarry Reconnaissance Survey Fig. 2



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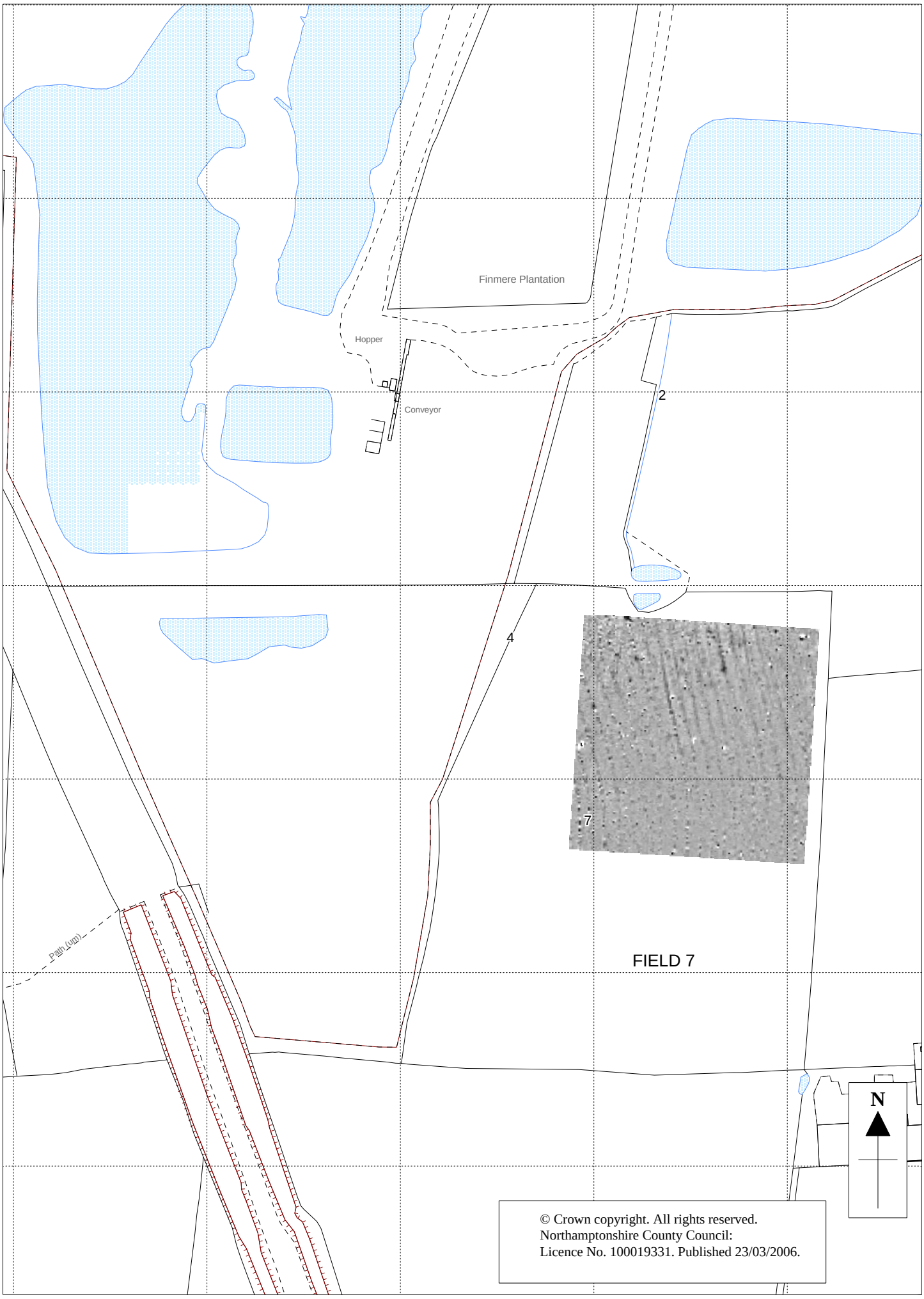
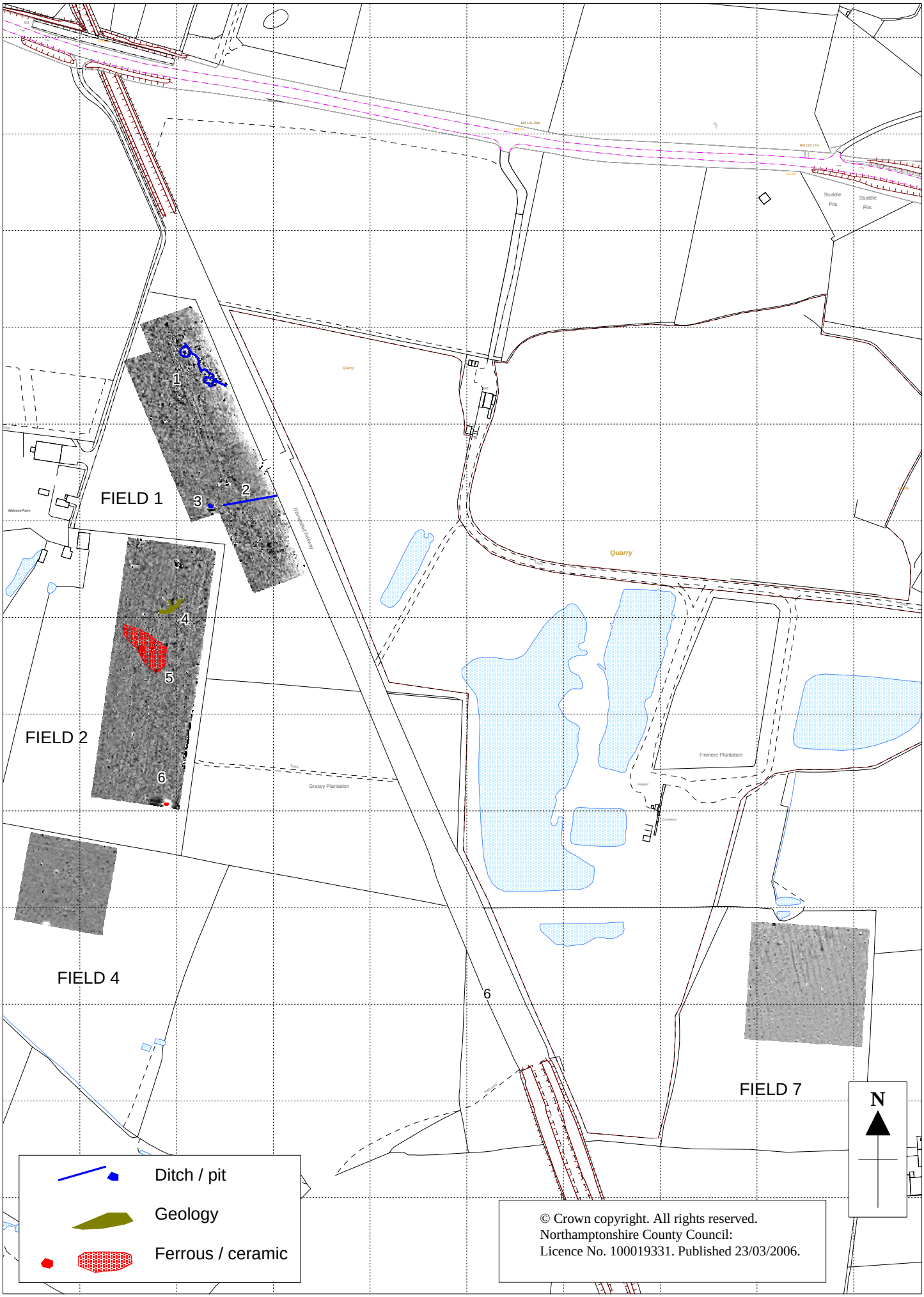
FInmere Quarry Gradiometer Results -2nT(white) ~ +2nT(black) Fig. 3



Scale 1:2500

FInmere Quarry Gradiometer Results -2nT(white) ~ +2nT(black) Fig. 4



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FInmere Quarry Gradiometer Results & Interpretation Fig. 5