

**ARCHAEOLOGICAL EVALUATION REPORT:
GEOPHYSICAL SURVEY BY MAGNETOMETRY
ON LAND AT COMPARTMENT 55d, NORBURY PARK, NORBURY, STAFFORDSHIRE**

NGR: SJ 79708 23402
Planning Reference: pre-planning
AAL Site Code: NORP 13
Oasis Number: allenarc1-150774



Report prepared for Norbury Park

By
Allen Archaeology Limited

AAL Report Number 2013053

May 2013



Allenarchaeology



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Cover image: General shot of the site during surveying looking north

Executive Summary

- A geophysical survey by magnetometer was undertaken by Allen Archaeology Limited for Norbury Park on land at Compartment 55d prior to the submission of a planning application for tree planting.
- The site lies to the north of a medieval moated enclosure, and the discovery of 17th century glass bottles and burnt industrial waste had indicated the presence of a possible post-medieval glassworks on the site.
- The site conditions proved receptive to geophysical surveying, and identified a number of linear and amorphous positive anomalies that may represent archaeological activity within the site. Of specific interest are the two parallel positive magnetic anomalies at the north end of the site that may represent buried walls, possibly related to a post-medieval glassworks. Possible scattered waste pits were also identified in the southern part of the site, along with modern drains and services.

1.0 Introduction

- 1.1 Allen Archaeology Limited was commissioned by Norbury Park to undertake a geophysical survey by magnetometer on land at compartment 55d in Norbury, Staffordshire as a condition of planning permission for tree planting.
- 1.2 The site works and reporting conform to current national guidelines, as set out in '*Geophysical Survey in Archaeological Field Evaluation*' (English Heritage 2008), '*The Use of Geophysical Techniques in Archaeological Evaluations*' (IfA Paper 6) and the Institute for Archaeologists '*Standard and guidance for archaeological geophysical survey*' (IfA 2011) and a specification prepared by this company (AAL 2013).
- 1.3 The site is archaeologically sensitive, lying in an area of archaeological interest and potential.

2.0 Site Location and Description

- 2.1 Norbury is located in the Borough of Stafford in southwest Staffordshire, approximately 6.4km northeast of Newport. The proposed development site itself (hereafter referred to as 'the site') is c.1 hectare in area and is located c.1.15km to the east of the village, to the east of Shropshire Union Canal. The site is currently pasture, and is centred on NGR SJ 79708 23402.
- 2.2 The bedrock geology for the site comprises Bronsgrove Sandstone Formation with superficial deposits of Devensian Glaciofluvial Sand and Gravel present (<http://mapapps.bgs.ac.uk/geologyofbritain/home.html>).

3.0 Planning Background

- 3.1 The Norbury Park estate is currently seeking to undertake a programme of tree planting across their land holdings. One of the areas proposed (Compartment 55b) has been identified by the Principal Archaeologist at Staffordshire County Council as potentially containing a post-medieval glassworks. It has therefore been requested that a programme of archaeological investigation should be undertaken, to provide further information concerning the archaeological potential of the proposed development area, and to allow the planning authority to establish appropriate measures to mitigate the effect of the proposed development upon the archaeological resource. The first stage of these investigations is the current non-intrusive geophysical survey.
- 3.2 The approach adopted is consistent with the recommendations of the National Planning Policy Framework (NPPF), with the particular chapter of relevance being '*Chapter 12: Conserving and enhancing the historic environment*' (Department for Communities and Local Government 2012).

4.0 Archaeological and Historical Background

- 4.1 The Principal Archaeologist at Staffordshire County Council has indicated that a post-medieval glassworks (Staffordshire Historic Environment Record (SHER) Reference 00835) appears to exist in the southern half of the proposed development site. The possible glassworks has been identified as a result of a number of 17th century sack bottle bases that were recovered from the site around 1950. Quantities of brown glazed pottery, burnt soil, charcoal and coal were also recorded on the site.
- 4.2 Immediately to the south of the site are the remains of a moated medieval manor (SHER Reference 00188). Originally of 13th century date, the house was remodelled in the Tudor period by the Skrymsher family and demolished in the 19th century. It is now protected by Scheduled Monument status (Reference 1011875).

5.0 Methodology

- 5.0.1 The geophysical survey consisted of a detailed gradiometer survey of the entirety of the proposed development area that was available for survey, totalling approximately 1 hectare.
- 5.0.2 The fieldwork was carried out by a team of two experienced geophysicists from AAL over a period of one working day, Tuesday 14th May 2013. The site was divided into 30m by 30m grids, established on site with reference to local fixed boundaries and accurately tied into the National Grid with Ordnance Survey base mapping using a Leica GS08 Net rover receiving RTK corrections.
- 5.0.3 The survey was undertaken using a Bartington Grad601-2 Dual Fluxgate Gradiometer with an onboard automatic DL601 data logger. This instrument is a highly stable magnetometer which utilises two vertically aligned fluxgates, one positioned 1m above the other. This arrangement is then duplicated and separated by a 1m cross bar. The 1m vertical spacing of the fluxgates provides for deeper anomaly detection capabilities than 0.5m spaced fluxgates. The dual arrangement allows for rapid assessment of the archaeological potential of the site. Data storage from the two fluxgate pairs is automatically combined into one file and stored using the onboard data logger.
- 5.0.4 Data collection was undertaken in a zigzag traverse pattern, using a sample interval of 0.25m and a traverse interval of 1m.
- 5.0.5 The fieldwork and reporting were carried out in accordance with the procedures in 'Geophysical Survey in Archaeological Field Evaluations' (English Heritage 2008) and 'The Use of Geophysical Techniques in Archaeological Evaluations: IfA Paper 6' (Gaffney et al. 2002)

5.1 Summary of Survey Parameters

5.1.1 Fluxgate Magnetometer

Instrument:	Bartington Grad601-2 Dual Fluxgate Gradiometer
Sample interval:	0.25m
Traverse interval:	1.00m
Traverse separation:	1.00m
Traverse method:	Zigzag
Resolution:	0.1 nT
Processing software:	Terrasurveyor 3.0.20
Surface conditions:	Grass crop
Area surveyed:	1 ha
Date surveyed:	Monday 25 th April 2013
Surveyor:	Iain Pringle
Survey assistants:	Grace Monnery
Data interpretation:	Iain Pringle and Robert Evershed

5.2 Data Collection and Processing

5.2.1 The grids were marked out using tapes from the southwest corner of the site. The collection of magnetic data using a north – south traverse pattern is preferable for a magnetic survey, as enhancements to the magnetic field caused by buried features is mapped increasingly stronger the closer the traverse direction can get to a magnetic north – south direction (Breiner 1999). On this occasion magnetic data was collected on a north-northeast – south-southwest alignment due to the orientation of the survey grids and the field. Data was collected by making successive parallel traverses across each grid in a zigzag pattern. Several key points of the survey grids were accurately tied into the National Grid with Ordnance Survey base mapping using a Leica GS08 Net rover receiving RTK corrections.

5.2.2 The data collected from the survey has been analysed using the current version of Terrasurveyor 3.0.20. The resulting data set plots are presented with positive nT/m values and high resistance as black and negative nT/m values and low resistance as white.

The data sets have been subjected to processing using the following filters:

- De-stripe (also known as Zero Mean Traverse or ZMT)
- Clipping

5.2.3 The de-stripe process is used to equalise underlying differences between grids or traverses. Differences are most often caused by directional effects inherent to magnetic surveying instruments, instrument drift, instrument orientation (for example off-axis surveying or heading errors) and delays between surveying adjacent grids. The de-stripe process is used with care however as it can sometimes have an adverse effect on linear features that run parallel to the orientation of the process.

5.2.4 The clipping process is used to remove extreme data point values which can mask fine detail in the data set. Excluding these values allows the details to show through.

5.2.5 Plots of the data are presented in processed linear greyscale (smoothed) with any corrections to the measured values or filtering processes noted, and as separate simplified graphical interpretations of the main anomalies detected.

6.0 Magnetometer Survey Results (Figures 3 – 6)

- 6.1 For the purposes of interpreting the anomalies, the survey data has been processed to the values of -3 to 3 nT/m (Figure 4). This enhances faint anomalies that may otherwise not be noted in the data; however it also includes all ferrous and other magnetically enhanced material within the study area, making the resulting greyscale image particularly 'noisy'. The survey results revealed a number of anomalies across the data set, and these are discussed in turn and noted as single digit numbers in square brackets.
- 6.2 Running southeast – northwest with a slight turn to the east at the northern end is a linear anomaly [1]. This produced magnetic readings of between -4 to 6nT/m. It is evident from historic maps that this follows the line of a drain through the site; although no physical evidence of this was noted during the survey.
- 6.3 Crossing the southern half of site, aligned northeast – southwest, are two linear anomalies [2]. These have magnetic readings of between -2 to 6nT/m and are most probably field drains, feeding into drain [1].
- 6.4 Almost parallel to the previous two linear anomalies [2] is a short linear dipolar anomaly [3] producing readings of -6 to 8nT/m. This may also represent a field drain or possibly a service pipe relating to the nearby telegraph poles (see 6.10 below).
- 6.5 Continuing the alignment of [3] is a possible positive linear magnetic anomaly that runs southwest and then turns at a right angle to run southeast to the corner of the site. This produced readings of 1 to 2nT/m and may represent an enclosure ditch, path or track.
- 6.6 There are a number of amorphous positive magnetic anomalies across the site [5]. These have magnetic readings of up to 20nT/m. They may represent soil-filled hollows or pits. It is possible that they may contain the remains of industrial material associated with the postulated glassworks.
- 6.7 To the northeast of [1] and close to the northern boundary there are two parallel, positive linear anomalies [6], with a magnetic signature of between 5 to 10nT/m. Due to their sharply defined edges it is possible that these may represent buried walls from a structure on the site, with the brick or stone being more magnetic than the surrounding soil.
- 6.8 The area of magnetic noise [7], producing readings of 0.5 to 2nT/m, is likely to be of geological origin.
- 6.9 The area of magnetic noise [8], producing readings of -2 to 4nT/m, may represent detritus or waste associated with cleaning or digging the drain running through the site or a dump of material in this area.
- 6.10 The area of magnetic noise running along part of the western boundary is almost certainly the result of an accumulation of modern waste and detritus along the field boundary and the

presence of an infilled pond [9] seen on historic maps. The area of noise produced a magnetic reading of -50 to 40nT/m, with frequent dipolar spikes.

- 6.11 A number of dipolar responses with some examples highlighted as yellow circles, were detected across the survey area. These are likely to be associated with ferrous waste or highly fired material within the ploughsoil. A number of extremely large dipolar readings on the northwest and southeast site boundaries, [10] and [11], are the result of modern telegraph poles which are still standing. They have magnetic readings of -3,000 to 3,000nT/m.

7.0 Discussion and Conclusions

- 7.1 The site conditions proved receptive to geophysical surveying, with evidence for anthropogenic activity identified across the study area.
- 7.2 The majority of the anomalies identified in the survey probably relate to modern land management and agricultural activities on the site. However there are a few possible pits and linear anomalies that may relate to archaeological activity on the site. The two parallel positive linear anomalies [6] at the north end of the site have the potential to indicate the presence of the foundations of a buried structure, although the date and function of the feature remains uncertain. If it were to represent an element of the former glassworks, one would expect a very strong positive anomaly indicating a kiln or furnace, or a strong signal suggestive of highly fired material in the ploughsoil. The absence of such material thus casts some doubt on the interpretation of the feature. A number of scattered positive anomalies [5] may potentially represent waste pits.

8.0 Effectiveness of Methodology

- 8.1 The non-intrusive evaluation methodology employed was particularly appropriate to the scale and nature of the site to be surveyed. Magnetometry surveying was the prospection technique best suited to the identification of archaeological remains on the site. Other techniques would have required justification and may have proved too time consuming or cost-prohibitive.

9.0 Acknowledgements

- 9.1 Allen Archaeology would like to thank Norbury Park for this commission.

10.0 References

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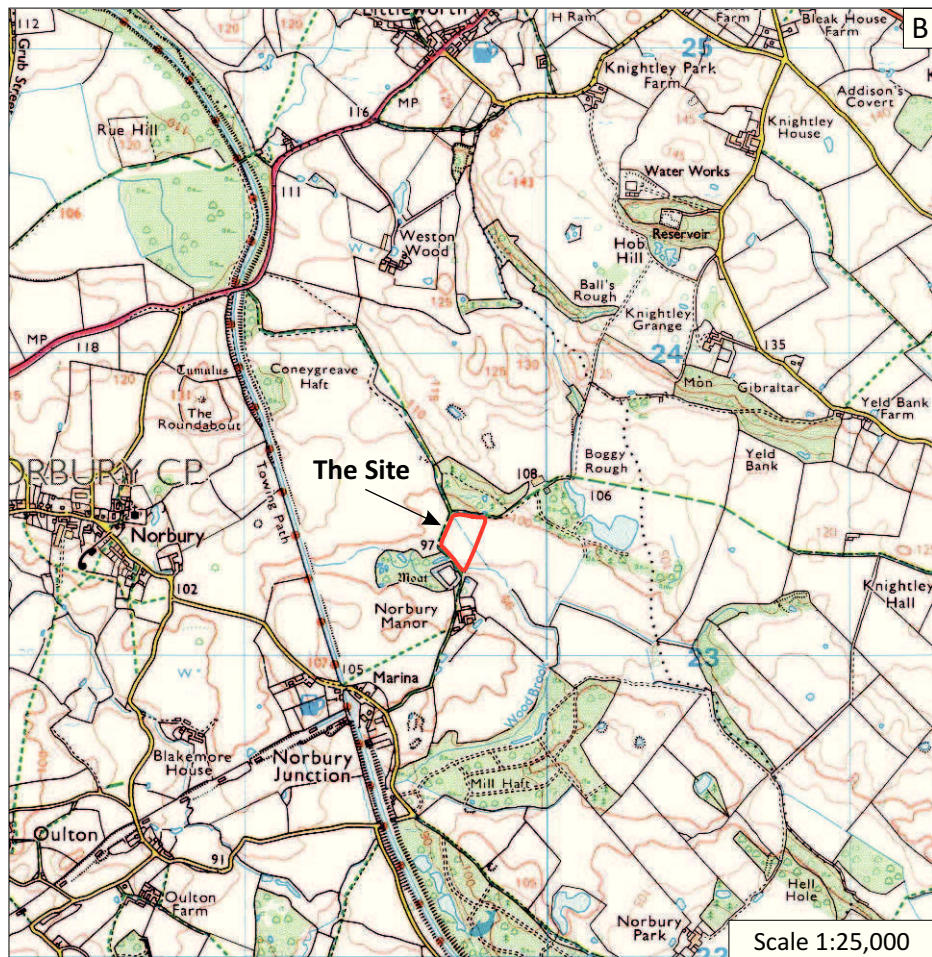
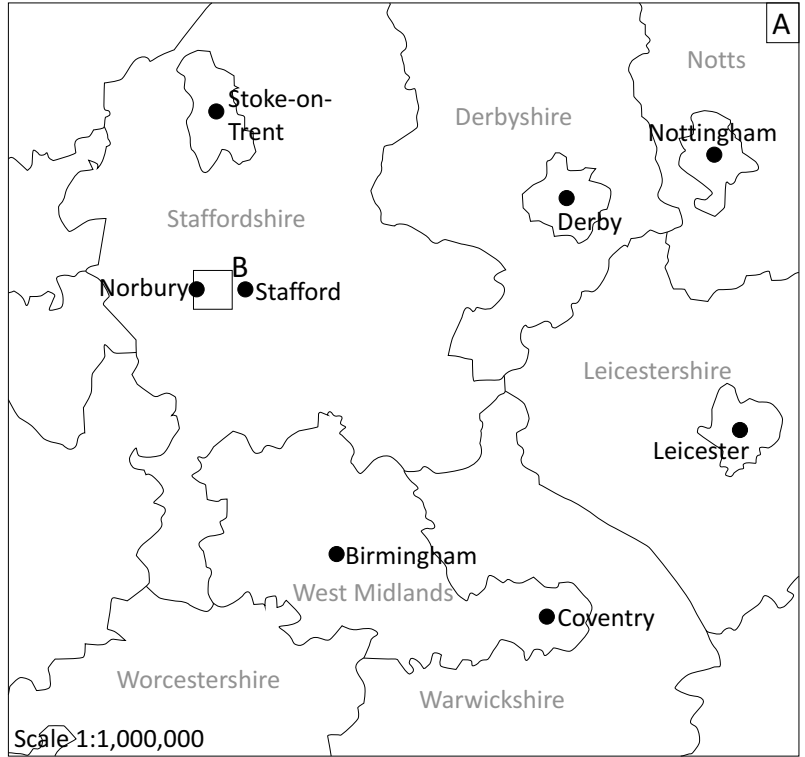
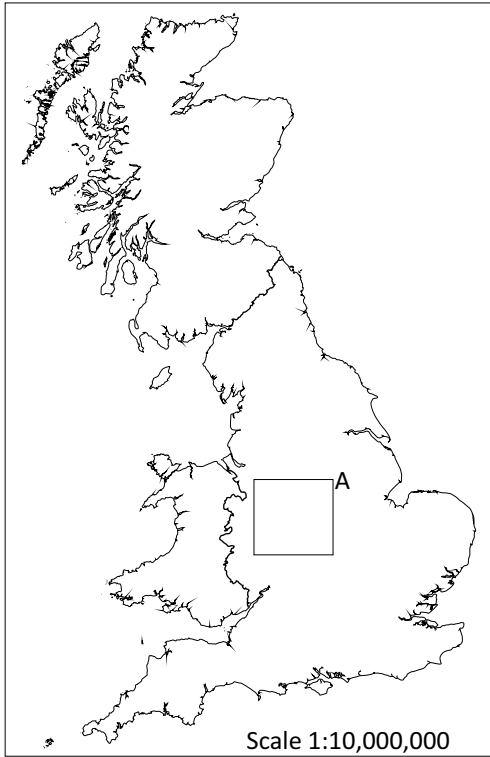


Figure 1: Site location outlined in red

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Site Code	NORP 13
Scales	1:10,000,000 1:1,000,000 1:25,000 @ A4
Drawn by	I. Pringle
Date	20/05/13

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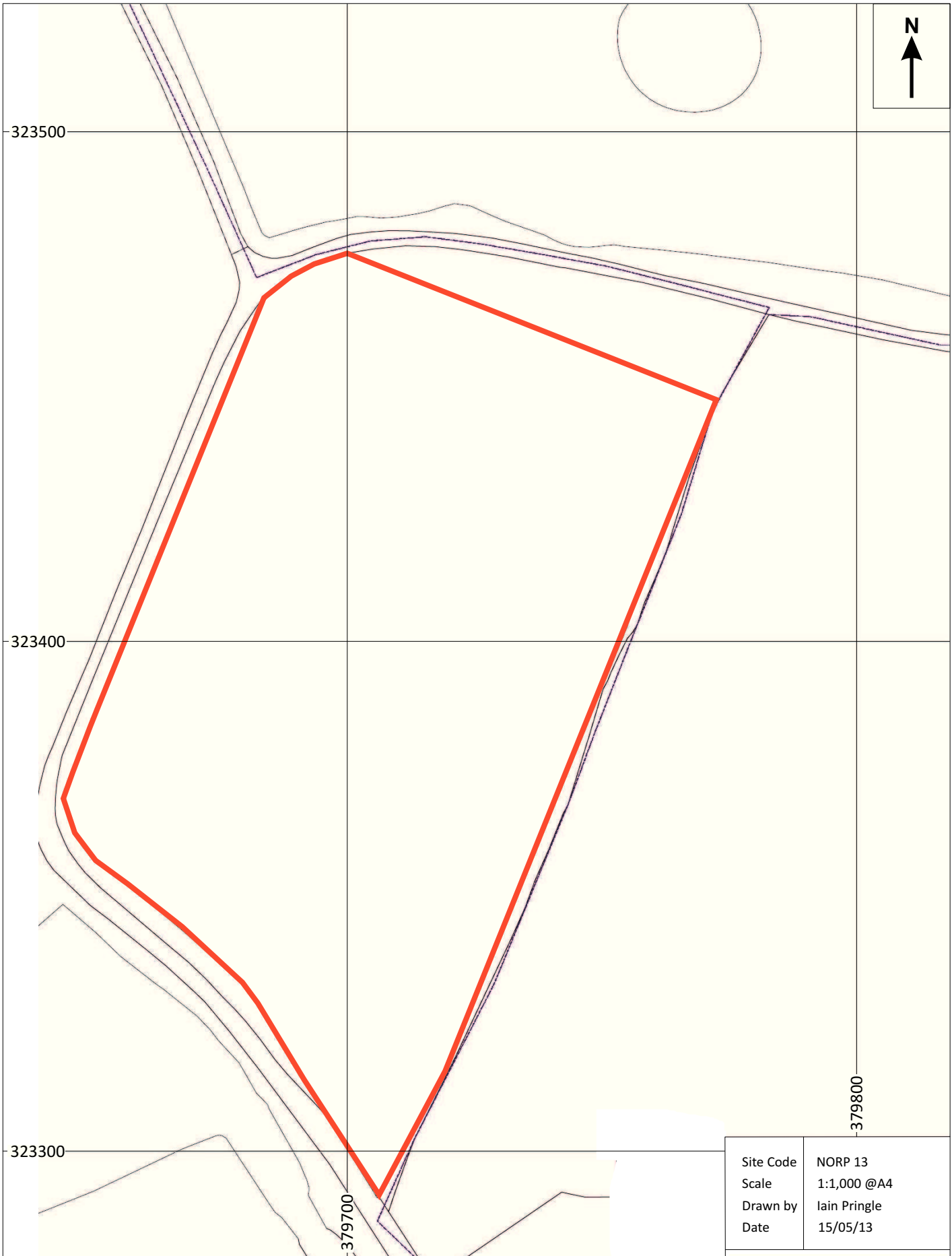


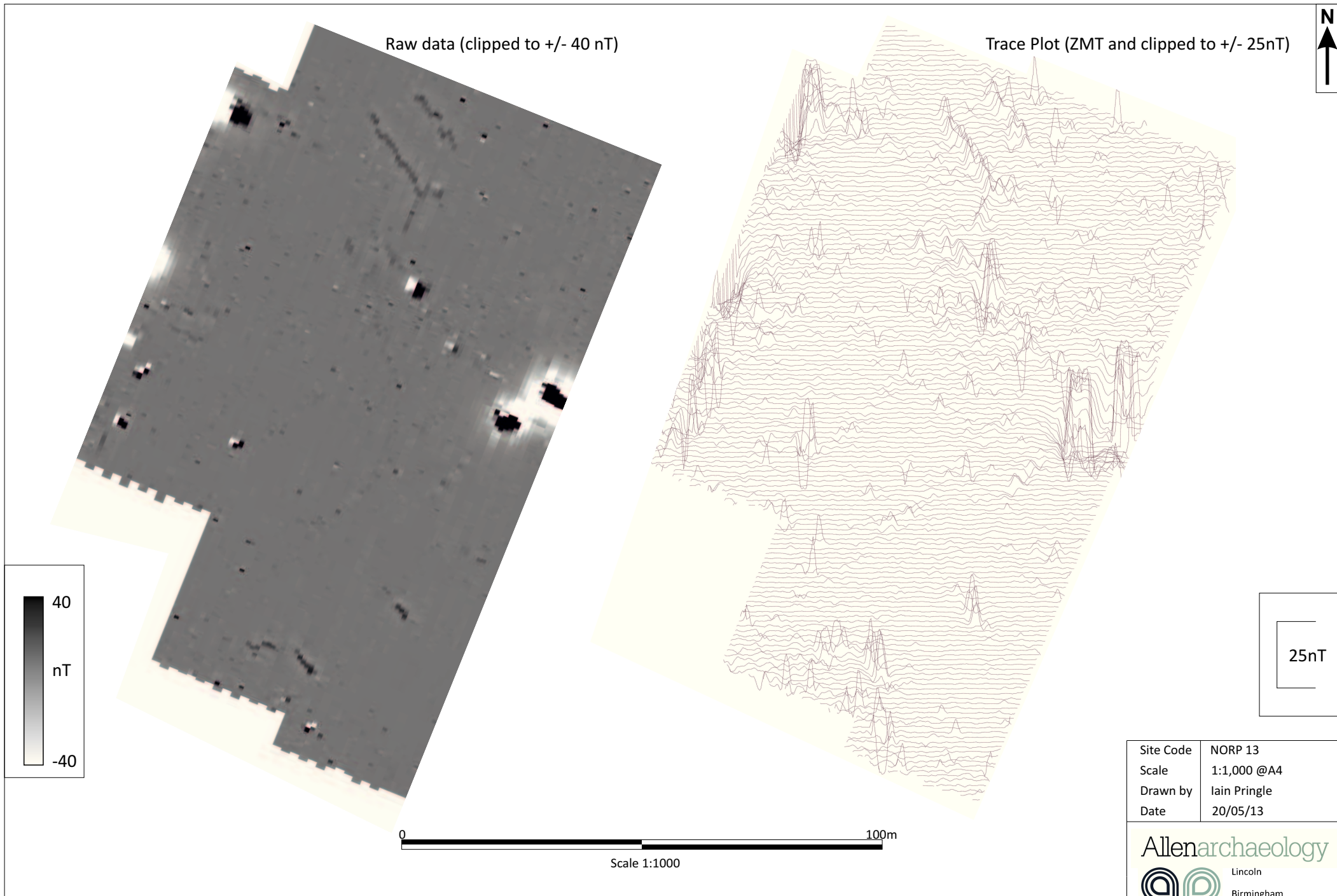
Figure 2: Site location, with the survey area outlined in red

Site Code	NORP 13
Scale	1:1,000 @A4
Drawn by	Iain Pringle
Date	15/05/13

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Raw data (clipped to +/- 40 nT)

Trace Plot (ZMT and clipped to +/- 25nT)

40
nT
-40

25nT

0 100m

Scale 1:1000

Site Code	NORP 13
Scale	1:1,000 @A4
Drawn by	Iain Pringle
Date	20/05/13

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Figure 3: Greyscale raw data and processed trace plot

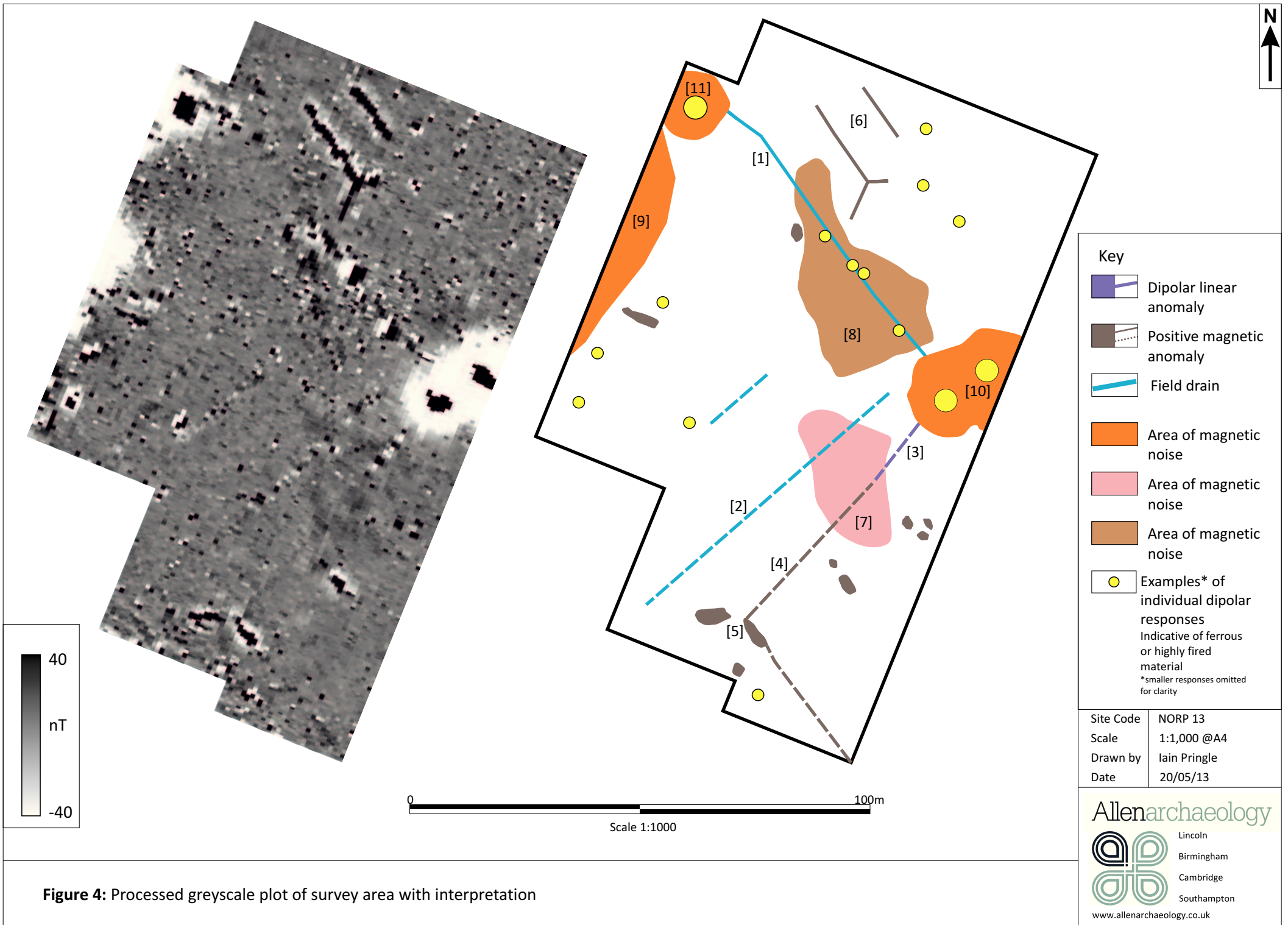


Figure 4: Processed greyscale plot of survey area with interpretation

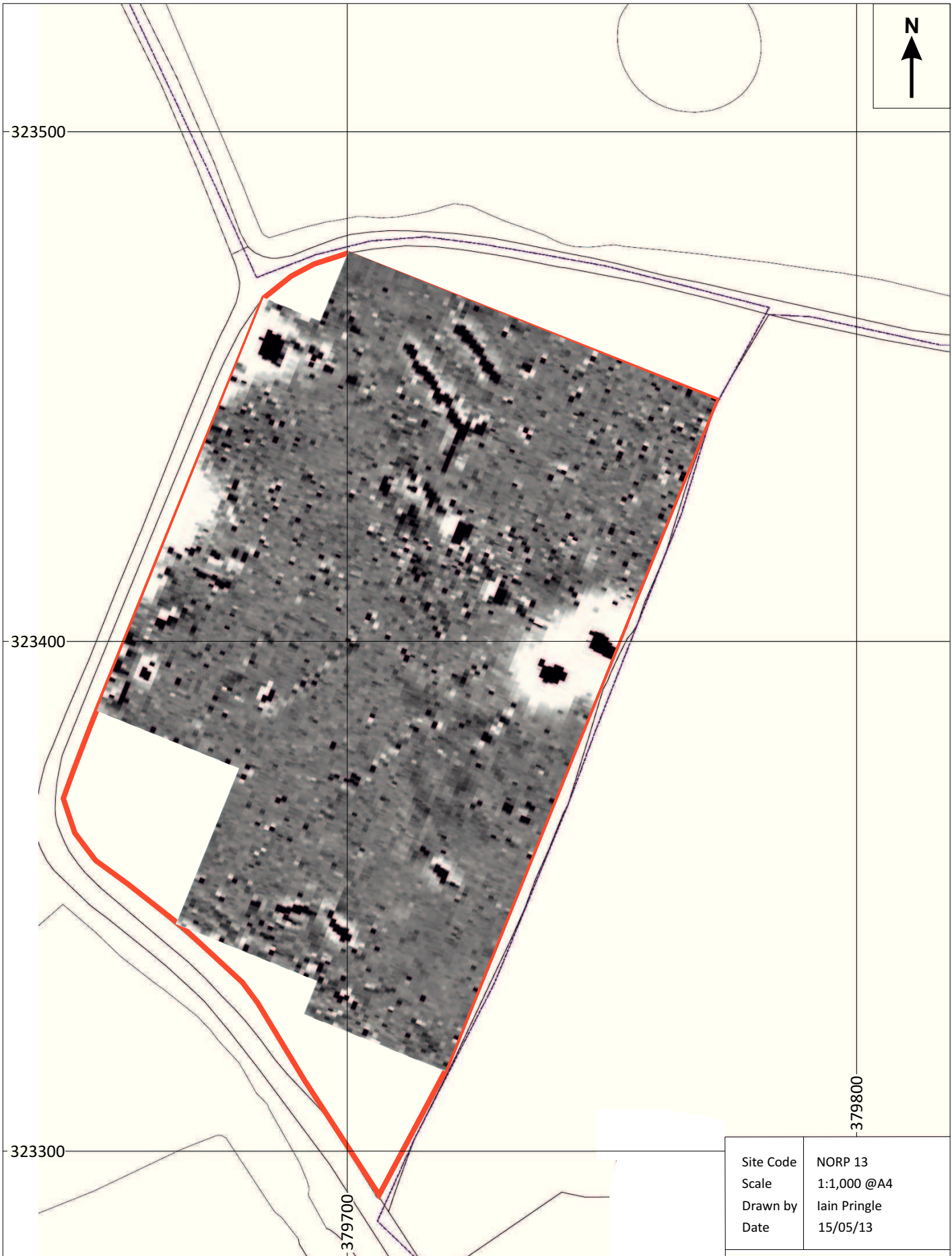


Figure 5: Processed greyscale plot located in real space

Site Code	NORP 13
Scale	1:1,000 @A4
Drawn by	Iain Pringle
Date	15/05/13

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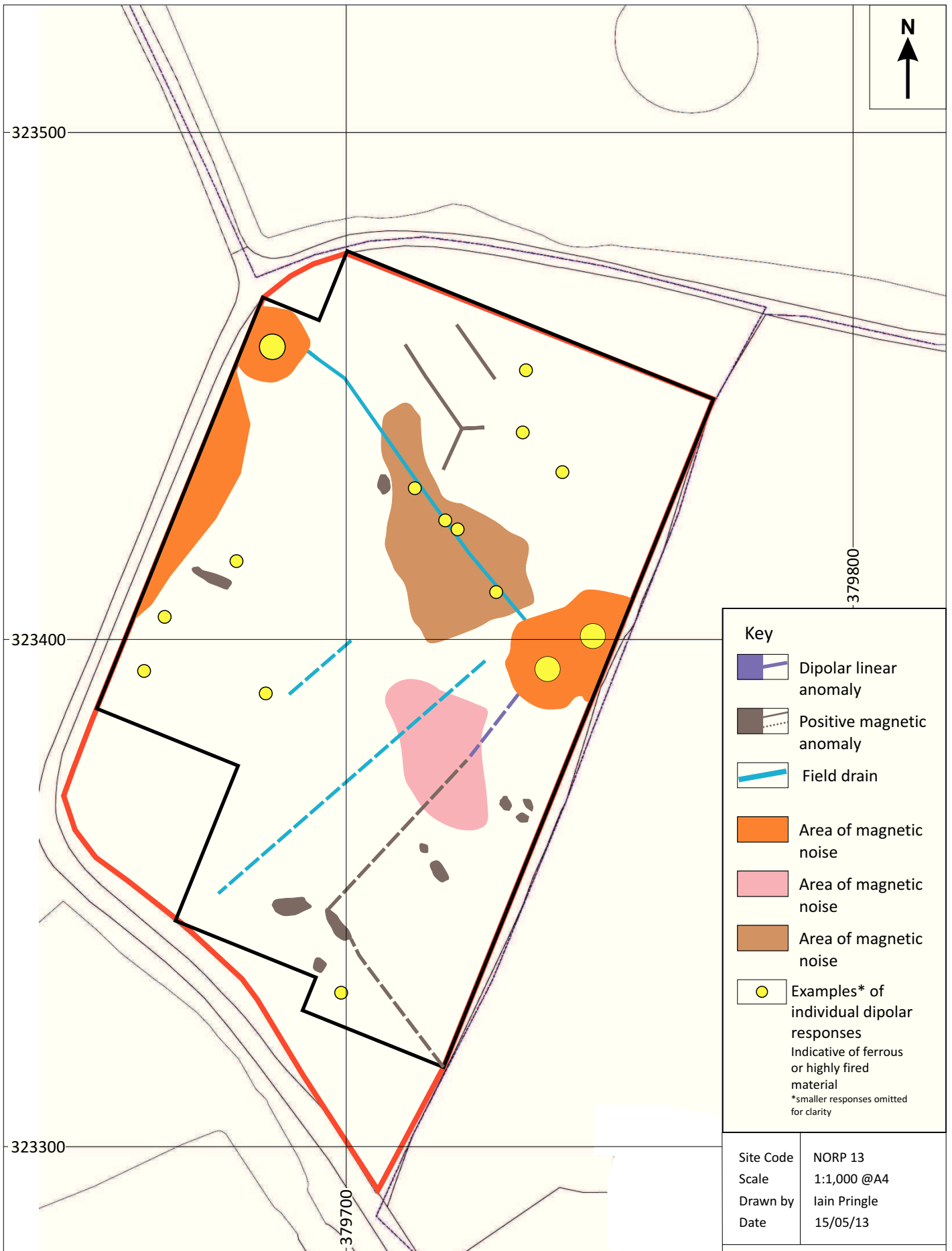


Figure 6: Interpretative plot in real space, at scale 1:1,000



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