SELHURST PARK FARM, EARTHAM, WEST SUSSEX

Report on Geophysical Survey, August 2006

Introduction

Chichester District Council (CDC) has organized a series of archaeological projects over recent years aimed at engaging local people with their heritage. This included the site of a Late Middle Iron Age enclosure at Selhurst Park Farm, near the village of Eartham, West Sussex (NGR SU 927102) first excavated in 2005. During the second season of excavation in 2006, English Heritage conducted a training exercise in geophysical survey with a team of some 13 volunteers from the Chichester District Archaeological Society (CDAS). The survey was conducted over a second group of enclosures, identified to the south of the site from aerial photography, thought to be either paddocks associated with the Middle Iron Age activity, or a further potentially unrelated settlement possibly of Romano British date. It was hoped that the volunteer training would provide information for future investigation at Selhurst Park Farm and provide a capability for non-destructive research through geophysical survey to further the wider aims of the CDAS group.

Over the course of the four days of training, practical tuition was provided for the use of fluxgate magnetometer, twin electrode earth resistance and differential Global Positioning System (GPS) survey techniques. Following the completion of the training, the initial magnetometer survey was expanded to the south with a further strip of 30m grid squares by CDAS working independently on their own accord.

The site (Figure 1) lies on a gentle south-east facing slope on the edge of the South Downs overlooking the course of Roman Stane Street and the Sussex coastal plain. The underlying geology consists of Cretaceous Upper (Newhaven) Chalk overlain by flinty shallow well drained calcareous silty soils of the Andover 2 association (British Geological Survey 1996; Soil Survey of England and Wales 1983). The survey was carried out during a lengthy period of warm and dry weather with the occasional scattered shower. The site was under pasture at the time of the survey in 2006, but the area is also periodically under arable cultivation.

Method

The magnetometer survey was conducted using Geoscan FM36 fluxgate gradiometers over a series of 30m grid squares set out using a Trimble 4800 series GPS. Readings were recorded on the 0.1 nanotesla (nT) resolution range of the instrument at 0.25m intervals along successive parallel traverses aligned north south and spaced 1.0m apart. Earth resistance data was recorded with a 1.0m reading interval using a Geoscan RM15 resistance meter and a PA5 electrode frame in the Twin-Electrode configuration, with a mobile probe spacing of 0.5m. The data collected by the volunteers was periodically downloaded and plotted on the

screen of a portable computer using Geoplot version 3.0 to monitor progress and to display the data as the survey progressed.

The magnetometer data is presented in linear greyscale and traceplot form in Figures 2 and 4 after minimal post acquisition processing including the truncation of extreme values outside the range of ±50 nT and the setting of each traverse to a zero mean, to remove any effects of directional sensitivity and instrument drift. Due to the novice nature and the number of different operators involved in the geophysical data collection at Selhurst Park, the quality of the magnetometer data varies considerably from one 30m grid square to the next. The data is widely affected by superficial small scale instrument noise introduced by periodic motion of the sensors in relation to the gait of the instrument operator as well as more random magnetic effects of small magnetic objects in items of clothing such as zips. Further processing was therefore carried out on the data to selectively remove the strong localized magnetic effects of near surface iron objects by the use of a 1.5m radius thresholding median filter (Scollar *et al* 1990; p190-1) followed by the application of a frequency domain band-pass filter to remove periodic motion induced noise in the data. The resulting magnetic data clarifies the main archaeological trends in the data from buried ditches and is presented in the form of a trace and greyscale plots in Figure 5.

The earth resistance data is presented in linear greyscale and traceplot form on Figure 4 with minimal processing applied except for the suppression of spurious high value readings caused by occasional poor probe contact by the application of a 2m by 2m thresholding median filter (Scollar *et al.* 1990; 190-1). Graphical summaries of significant geophysical anomalies discussed in the text are identified by the prefixes **[m]** on Figure 6 and **[r]** on Figure 7, for the magnetic and earth resistance surveys respectively. Due to the variable quality of the data some caution has been applied to the interpretation of the results as the widescale presence of noise precludes overly detailed analysis of more tentative magnetic anomalies.

Results

Magnetometer survey

The magnetometer survey has clearly mapped the layout of the in-filled ditches defining the southern enclosure system as a series of positive linear magnetic anomalies **[m1-5]** with a maximum magnitude of 2.5 nT. The main enclosure system appears as a ladder like pattern of contiguous enclosures aligned NE-SW along the course of an adjacent track-way defined by parallel ditches to the south **[m6]**. The survey also revealed that the area of the settlement probably extends into the field to the west in the form of a number of weak linear magnetic anomalies **[m7-8]** with a positive response of only 1.0 nT above background readings. This suggests that they lie further away from the main focus of settlement, represented by the higher magnitude anomalies from the enclosures to the south and east.

Within the enclosures a number of strong, discrete positive anomalies are found, one of which **[m9]** produced a response of 10-12 nT in magnitude. Following the geophysical survey a limited excavation was carried out to investigate **[m9]** and this revealed the presence of a large oblong pit containing strongly burnt deposits. This feature is still not fully understood but a number of interpretations have been put forward including the suggestion that it may be related to charcoal production.

Earth resistance survey

There is very little indication in the resistance data of the ditches revealed in the magnetic survey (e.g. a very tentative high resistance anomaly **[r1]** that correlates with **[m5]**) probably due to a combination of the dry weather conditions prevailing at the time, the well drained soil conditions and the chalky infill of the ditches. The background resistance does, however, appear higher in the area of the enclosure system **[r2]** and this may indicate some form of either hard surfacing within the enclosures or possibly thinner top-soils. A group of high resistance readings at **[r3]** may be more significant, possibly reflecting the presence of stone-building remains, although this would be a rather tentative interpretation due to the ambiguous nature of the anomaly and the absence of any corroborating evidence in the magnetic data.

Conclusions

The magnetometer survey successfully mapped the enclosure complex previously identified from aerial photography and provided additional evidence for internal features. The anomalies were partially investigated by the 2006 excavations and the trenches indicated that up to five different phases of enclosure exist in the survey area, spanning a date range from the late Middle Iron Age through to the third century AD. A comparatively large quantity of pottery found within the ditches, indicative of settlement activity, is further supported by the presence of the internal magnetic anomalies. Due to the limited size of the excavation trenches, little could be said about the wider layout of the enclosures, but the magnetometer data adds considerably to understanding the overall plan. The archaeological features present at Selhurst Park appear to consist largely of in-filled pits and ditches containing chalky and flinty material and these proved less well suited to detection by earth resistance survey largely due to the very dry ground conditions prevailing at the time of the fieldwork.

It is hoped that the team of volunteers trained at Selhurst Park Farm in 2006 will be able to return to the area to extend the survey in preparation for additional excavation in the future. The CDAS team have subsequently undergone a further training session in the use of data processing and downloading software, and have since undertaken several successful magnetometer surveys at other Romano-British sites in West Sussex.

Surveyed by: A Payne (English Heritage) Date of Survey: 15-18/8/2006
I Allison (CDAS volunteers)
J Bigmore " "
S Clarke
M Collins
A Davies
M Dunn
T Duthie
R Emery
D Fry
N Haskins
R Millington
H Owen

T Pullan

Reported by: A Payne Date of Report: 14/12/2007

References

British Geological Survey 1996 Chichester and Bognor. England and Wales Sheet 317/322. Solid and Drift Geology. 1:50,000. Keyworth, Nottingham: British Geological Survey.

Scollar, I, Tabbagh, A, Hesse, A and Herzog, I, Eds. (1990). *Archaeological Prospecting and Remote Sensing*. Cambridge.

Soil Survey of England and Wales 1983 Soils of England and Wales: Sheet 6 - South East England, 1:250,000 soil map. Lawes Agricultural Trust, Harpenden.

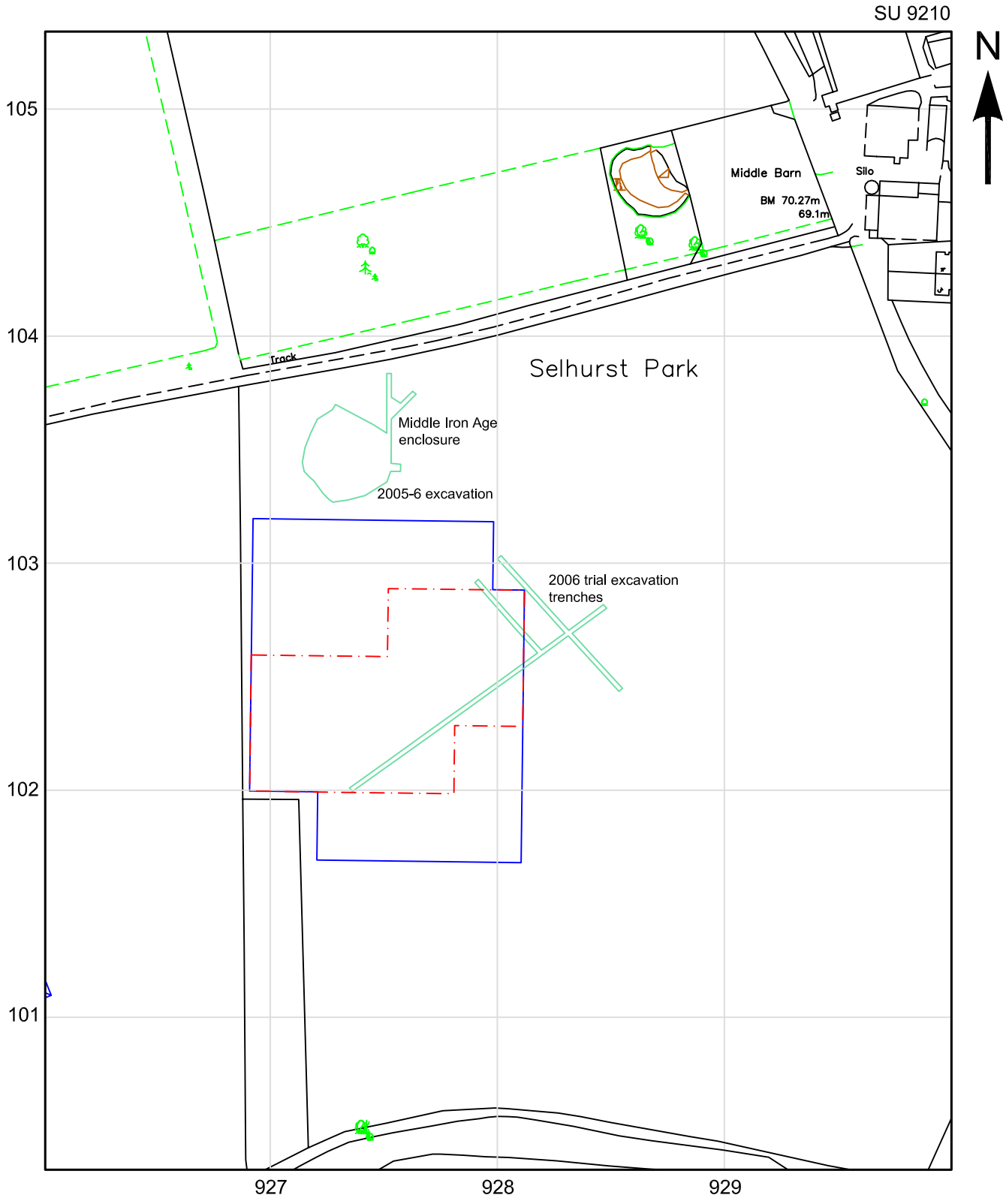
List of Figures

Report front cover photograph

The late Middle Iron Age enclosure at Selhurst Park Farm in the process of excavation in August 2006 viewed from the south. The geophysical survey area lies just to the south of the excavation of the enclosure (or below the bottom edge of the view shown in the photograph). Photograph reproduced by permission of George Anelay (Chichester District Council).

Figure 1

SELHURST PARK FARM, EARTHAM, WEST SUSSEX
Location of Geophysical Surveys and Excavations, August 2006



1 : 2500

0 50 100 150m

Excavation trenches

Magnetometer survey area

Earth resistance survey area

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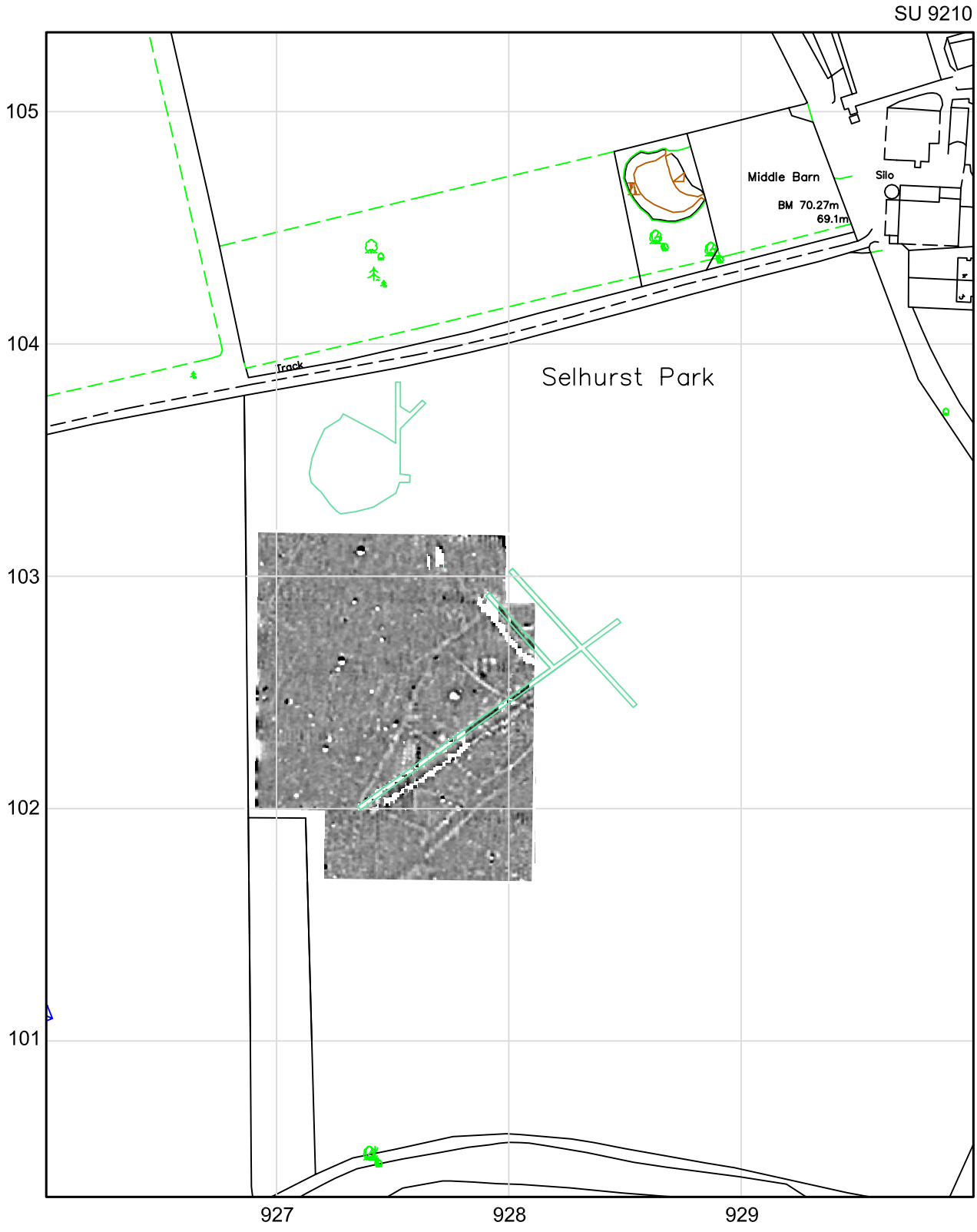
Figure 2

SELHURST PARK FARM, EARTHAM, WEST SUSSEX
Location of Fluxgate Magnetometer Survey, August 2006



Excavation trenches

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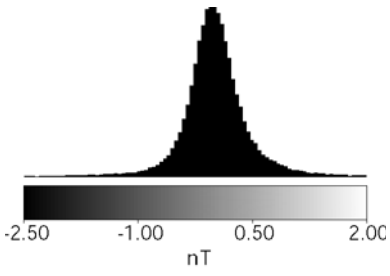

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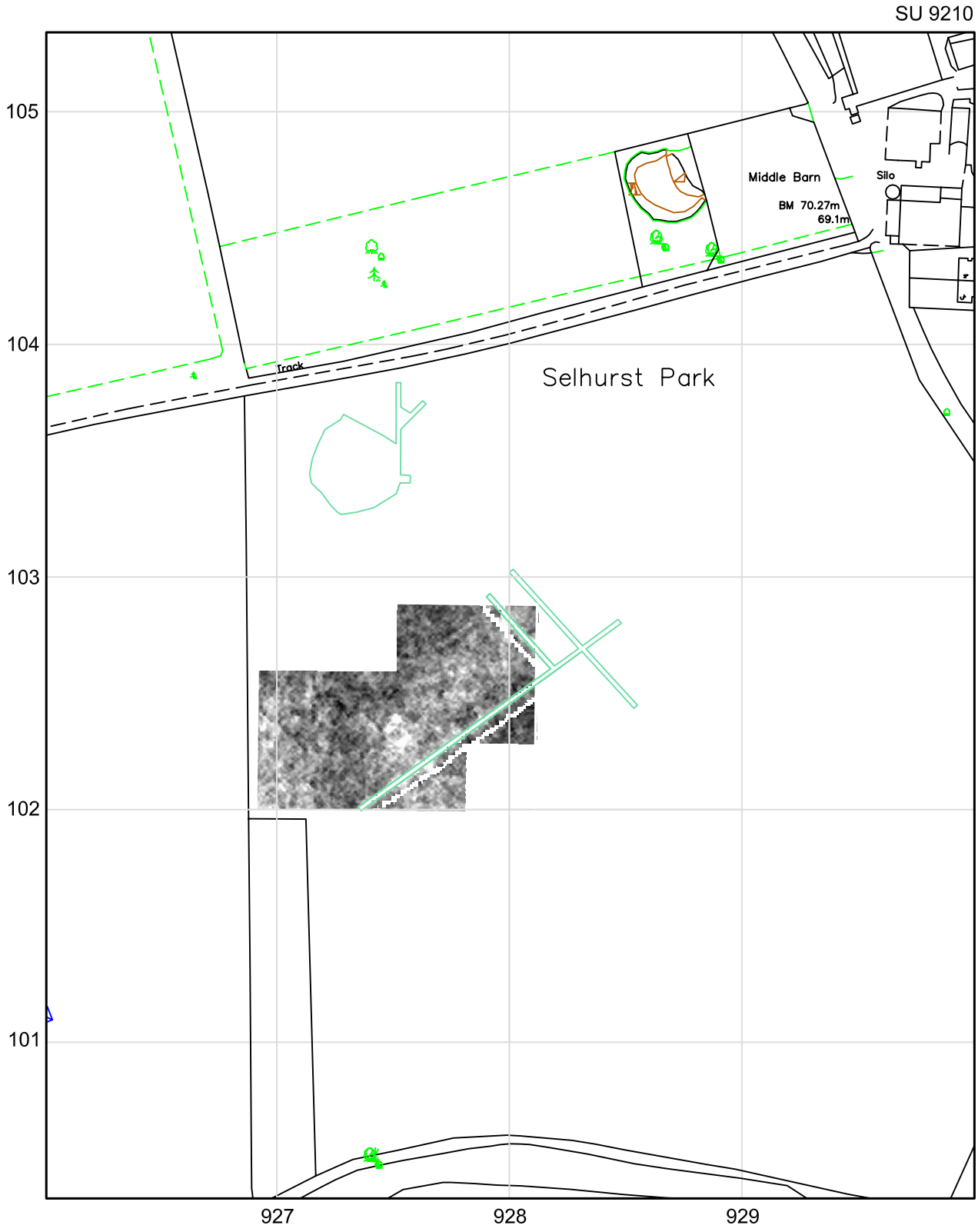
Figure 3

SELHURST PARK FARM, EARTHAM, WEST SUSSEX
Location of Earth Resistance Survey, August 2006



Excavation trenches

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0 50 100 150m

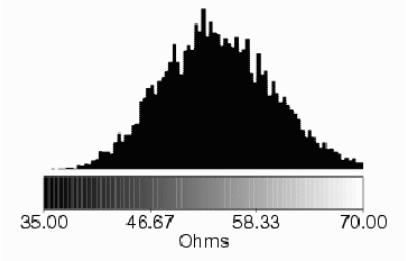

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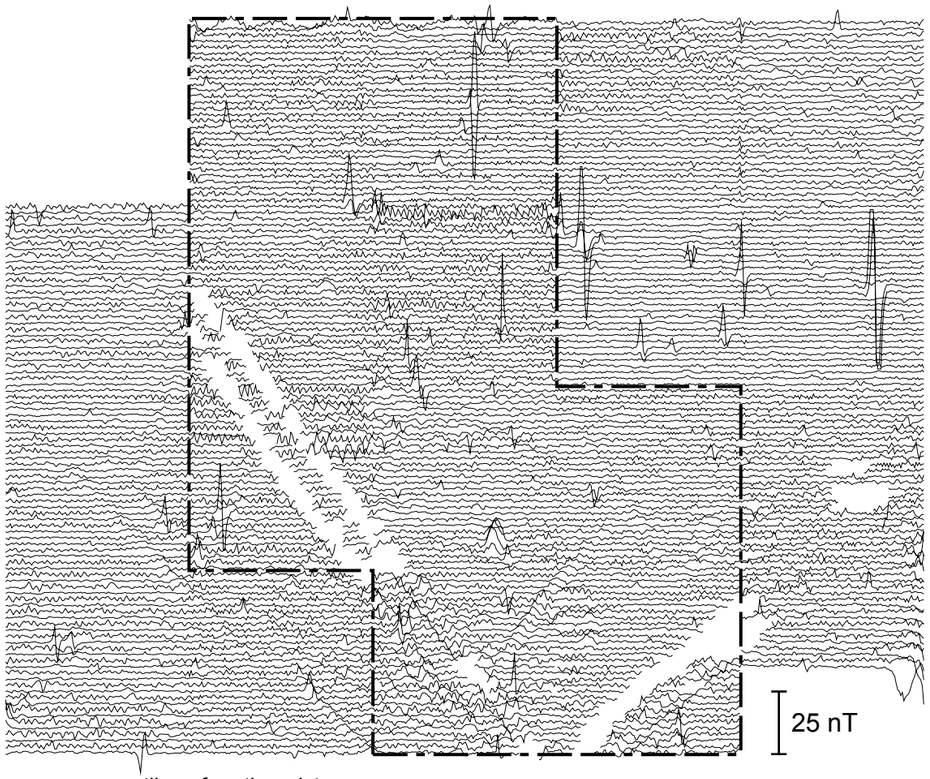
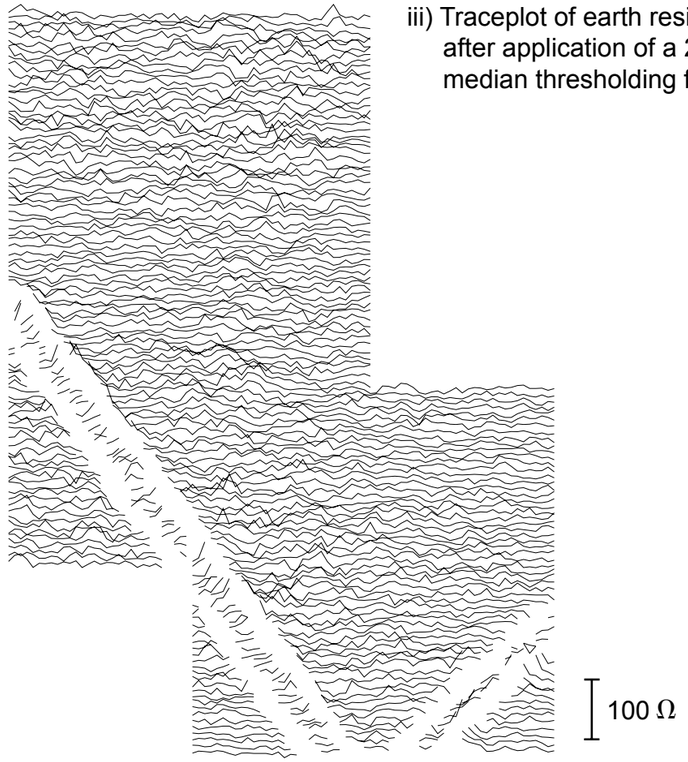
Figure 4

SELHURST PARK FARM, EARTHAM, WEST SUSSEX Geophysical Surveys, August 2006

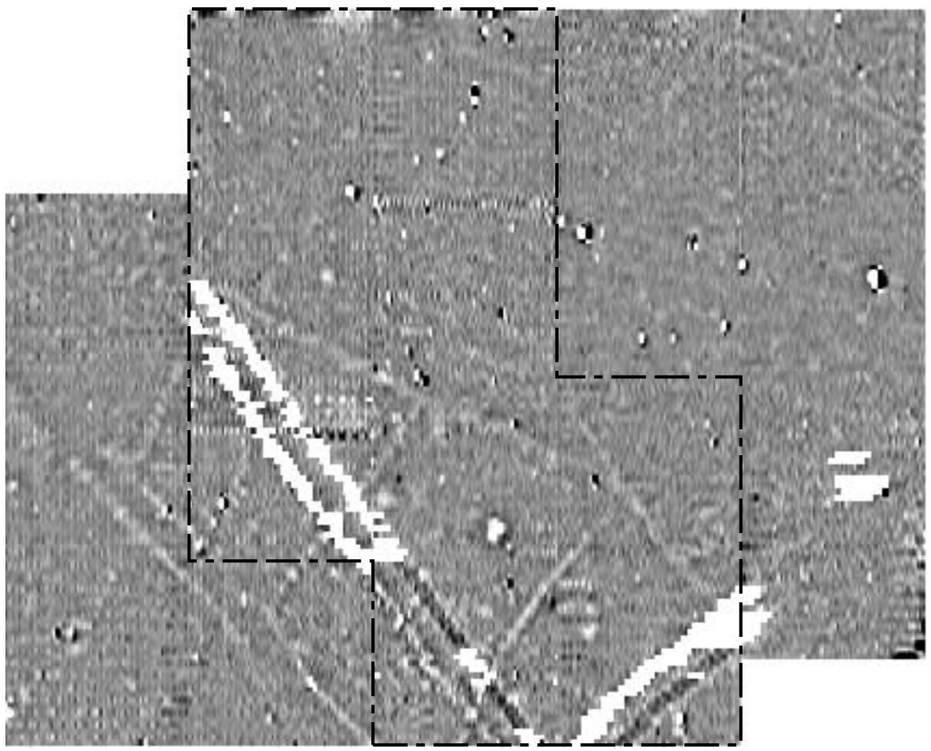


i) Traceplot of magnetometer data after drift correction and range truncation

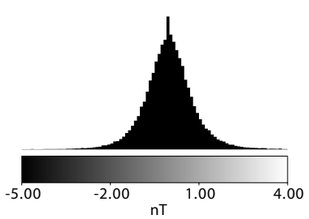
z

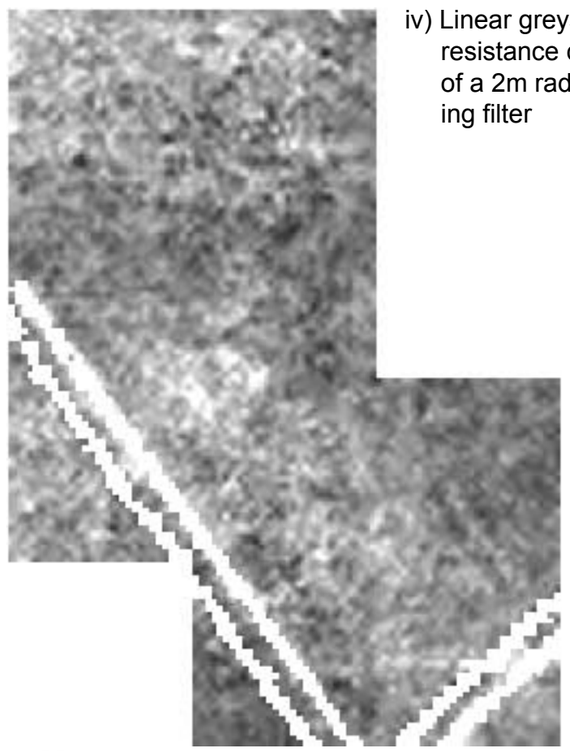


iii) Traceplot of earth resistance data after application of a 2m radius median thresholding filter

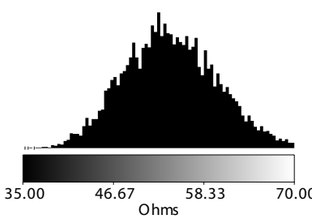


ii) Linear greyscale plot of magnetometer data after drift correction and range truncation





iv) Linear greyscale plot of earth resistance data after application of a 2m radius median thresholding filter



0 90m

1:1000

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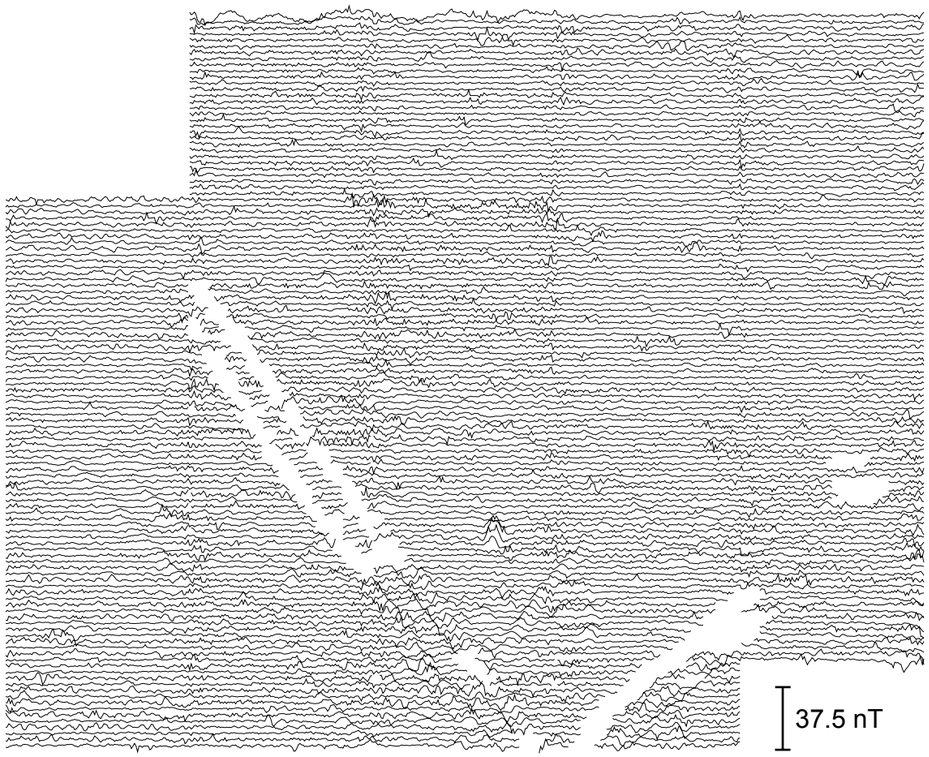
SELHURST PARK FARM, EARTHAM, WEST SUSSEX Filtered fluxgate magnetometer data

i) Traceplot of cleaned data



ii) linear greyscale plot of cleaned data

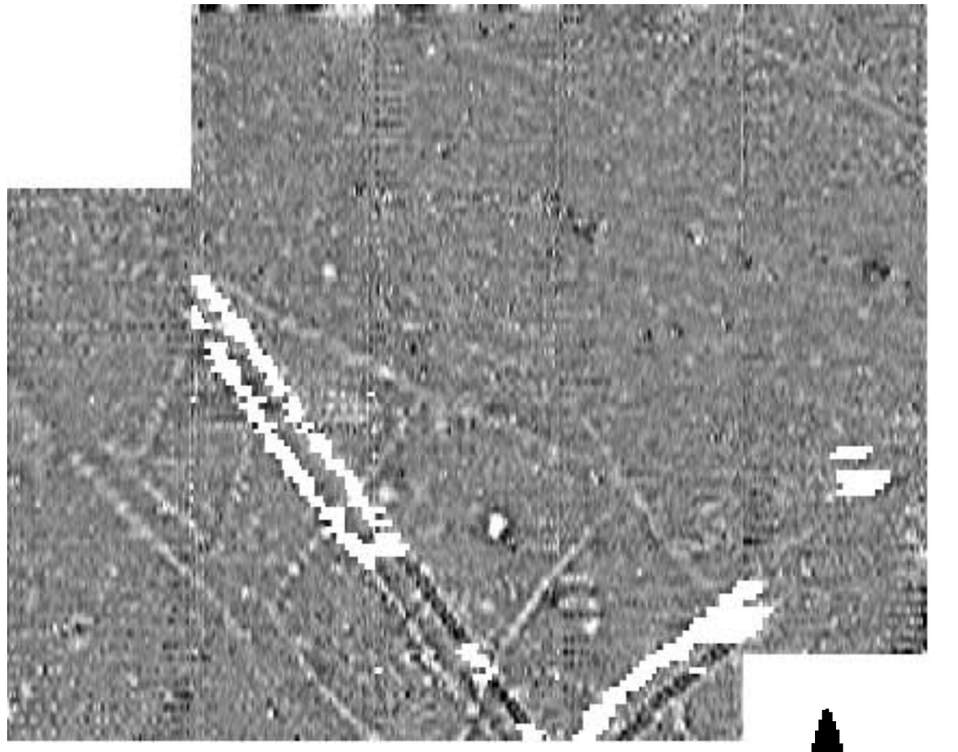


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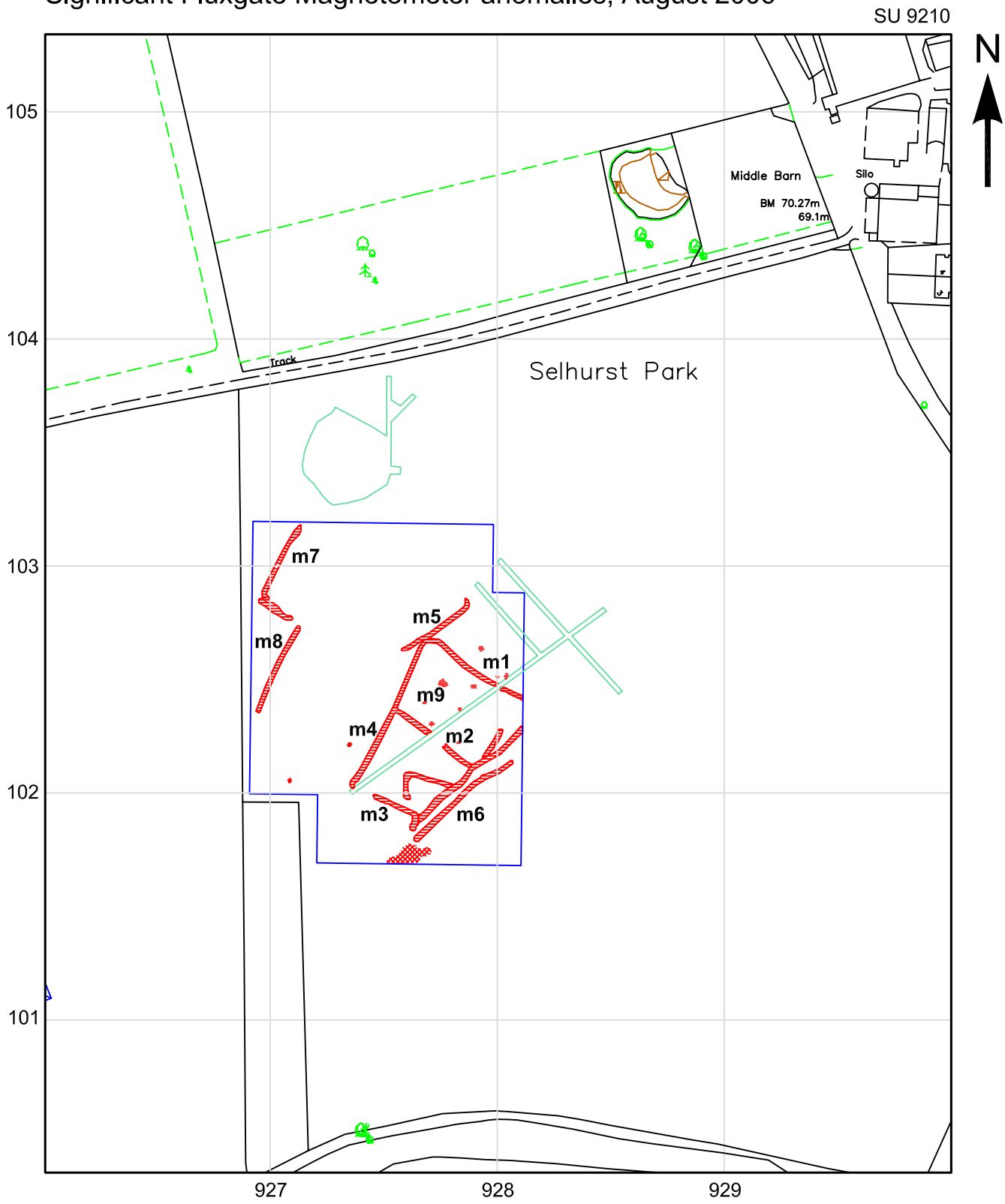
Figure 6

SELHURST PARK FARM, EARTHAM, WEST SUSSEX
Significant Fluxgate Magnetometer anomalies, August 2006



1 : 2500

0 50 100 150m

Excavation trenches

Magnetometer survey

positive linear magnetic anomalies - ditches

localised positive linear magnetic anomalies - pits

large irregular positive magnetic anomaly - quarry or natural feature

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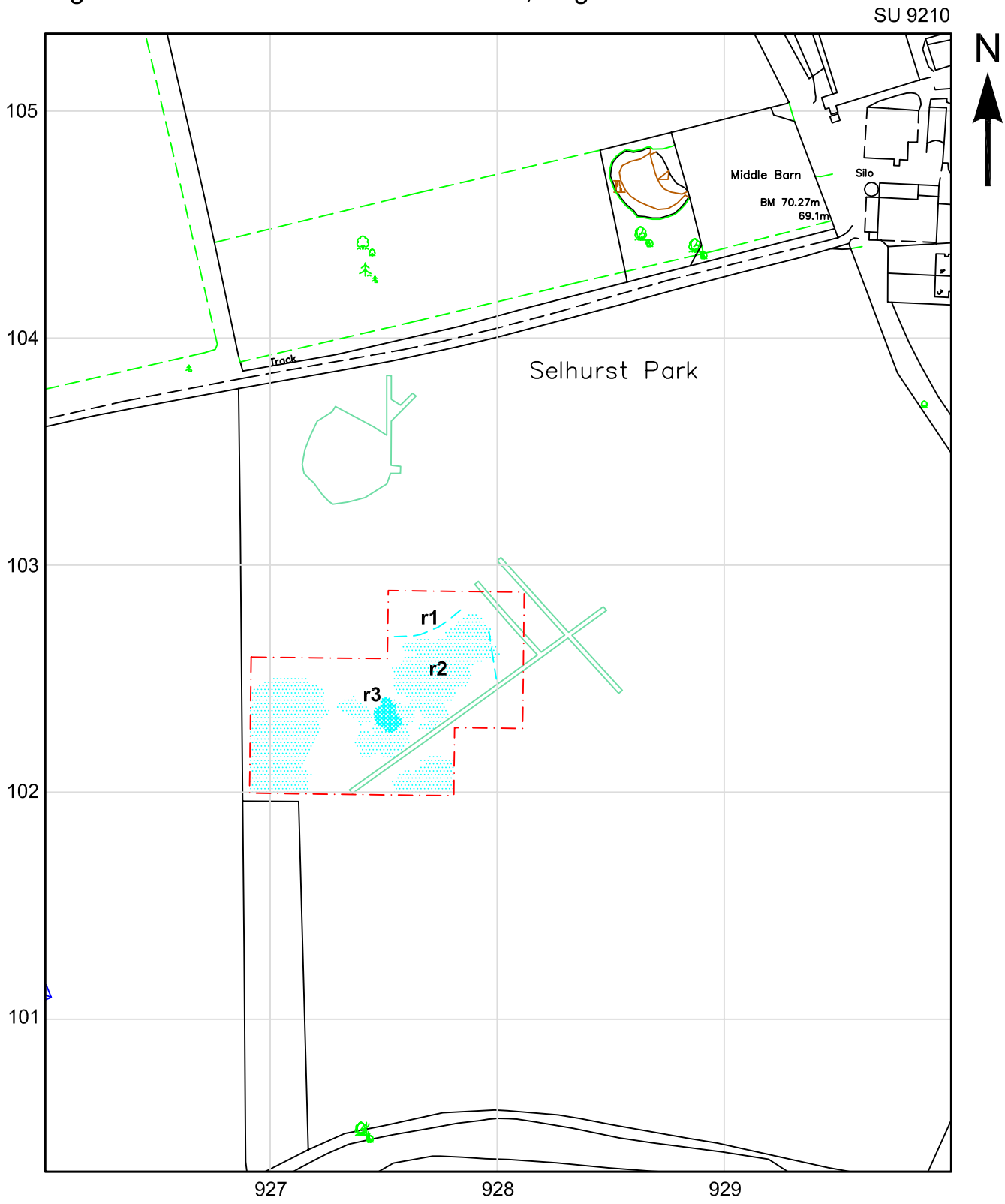
Figure 7

SELHURST PARK FARM, EARTHAM, WEST SUSSEX
Significant Earth Resistance anomalies, August 2006



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0 50 100 150m

Excavation trenches

Earth resistance survey area

high resistance area

areas of higher background resistance

tentative linear high resistance anomaly

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