

INDEX DATA	RPS INFORMATION
Scheme Title M1 Field eval J 8-9.	Details Geophysics surv.
Road Number M1.	Date Apr/May '95.
Contractor ST. Albans Museum S.	
County	
OS Reference	
Single sided <input checked="" type="checkbox"/>	
Double sided	
A3 6 Colour 3A3.	

A Report for

ST ALBANS MUSEUMS

on a

Geophysical Survey

carried out on

M1 FIELD EVALUATION

J8-9

April/May 1995

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Abstraction of anomalies - The Aubreys

INTRODUCTION

This geophysical survey was commissioned as part of the archaeological evaluation of eight areas affected by the proposed widening of the M1 motorway between Junctions 8 and 9 identified by a surface investigation carried out by St Albans Museums during February and March 1993. A correlation of these results with the geophysical survey results has been made in the discussion for each site.

Site 7 and part of Site 3 were under crop at the time of the survey (April/May 1995), and are due to be surveyed once the crop has been taken off, possibly in late July 1995.

DESCRIPTION OF THE SITES

Site No.	OS Ref	Soils/Geology	Ground cover
1	TL 095 077	Fine silty and fine loamy soils over Plateau Drift and Clay with Flints	cereal crop
2	TL 096 094	"	cereal crop
3	TL 094 074	"	cereal crop
4	TL 098 072	"	oil seed rape
6	TL 094 135	"	cereal crop
8	TL 095 087	"	cereal crop
The Aubreys	TL 096 113	"	grass

METHODOLOGY

Two techniques were used during this survey, both of which are described briefly below.

Magnetometer

Although the changes in the magnetic field resulting from differing features in the soil are usually weak, changes as small as 0.2 nanoTesla (nT) in an overall field strength of 48,000nT, can be accurately detected using an appropriate instrument.

The mapping of the anomaly in a systematic manner will allow an estimate of the type of material present beneath the surface. Strong magnetic anomalies will be generated by buried iron-based objects or by kilns or hearths. More subtle anomalies such as pits and ditches can be seen if they contain more humic material which is normally rich in magnetic iron oxides when compared with the subsoil.

To illustrate this point, the cutting and subsequent silting or backfilling of a ditch may result in a larger volume of weakly magnetic material being accumulated in the trench compared to the undisturbed subsoil. A weak magnetic anomaly should therefore appear in plan along the line of the ditch.

The magnetic survey was carried out using an FM36 Fluxgate Gradiometer, manufactured by Geoscan Research. The instrument consists of two fluxgates

mounted 0.5m vertically apart, and very accurately aligned to nullify the effects of the earth's magnetic field. Thus readings relate to the difference in localised magnetic anomalies compared with the general magnetic background. Readings are taken automatically with a sample trigger and held in an 'on board' data logger. The data is later downloaded into a computer for processing and presentation.

Processing can emphasise various aspects contained within the data but which are often not easily seen in the raw data. Basic processing of the magnetic data involves 'flattening' the background levels with respect to adjacent traverses and adjacent grids. 'Despiking' is also performed to remove the anomalies resulting from small iron objects often found on agricultural land. Once the basic processing has flattened the background it is then possible to carry out low pass filtering to reduce 'noise' in the data and hence emphasise the archaeological or man-made anomalies. The presentation of the data for each site involves a print-out of the raw data both as grey scale and trace plots, together with grey scale plots of the "flattened" and despiked data, and, if appropriate, after further processing to emphasise various aspects within the data.

Magnetic features have been identified and plotted onto the 'Abstraction of Anomalies' drawing for each site, numbered for ease of reference and prefixed with the letter 'M'.

Resistance Meter

This method relies on the relative inability of soils (and objects within the soil) to conduct an electrical current which is passed through them. As resistivity is linked to moisture content, and therefore porosity, hard dense features such as rock will give a relatively high resistivity response, while features such as a ditch which retains moisture give a relatively low response.

The resistance meter used was an RM15 manufactured by Geoscan Research incorporating a mobile Twin Probe Array. The Twin Probes are separated by 0.5m and the associated remote probes were positioned approximately 15m outside the grid. This instrument uses an automatic data logger which permits the data to be recorded on site for later downloading to a computer for processing and presentation.

The processing typically involves the 'despiking' of high contact resistance readings and the passing of the data through a high pass filter. This has the effect of removing the larger variations in the data often associated with geological features. The net effect is to enhance the archaeological or man-made anomalies contained in the data. The presentation of the data for each site normally involves a print-out of the raw data as well as 'despiked and filtered' data.

Resistance features have been identified and plotted onto the 'Abstraction of Features' drawing for each site, numbered for ease of reference and prefixed with the letter 'R'.

Though the values being logged are actually resistances in ohms they are directly proportional to resistivity (ohm-metres) as the same probe configuration was used through-out.

DISCUSSION

Site 1 (Figures 4-7)

Many small anomalies were found on this site which are thought to be iron objects, common on arable land. The dummy logs M1/1, M1/2, M1/3 and M1/4 are trees. M5/1 is the path running diagonally across the site. M1/6, M1/7, M1/8 and M1/9 are areas of positive magnetic levels, possibly the sites of bonfires which may be associated with the feature M1/10, a linear anomaly made up of small magnetic anomalies, thought to be the remains of an old hedgerow.

During the surface investigation carried out by St Albans Museums, an ill-defined scatter of Roman pottery sherds was discovered, but there is no evidence in the geophysics to suggest the source of this pottery.

Site 2 (Figures 8-11)

The large magnetic anomaly M2/1 is a sign adjacent to the motorway.

A scatter of early Medieval pottery sherds was found on this site during the surface investigation, but there is no evidence in the geophysics to support the presence of a settlement.

Site 3 (Figures 12-15)

The area of mixed magnetic levels (M3/1) adjacent to the road is thought to be as a result of brick/hardcore on the surface.

Although there was an area of flint hammer stones, Prehistoric, Roman and Medieval pottery, flint flakes and Roman building materials discovered during the surface investigation, no evidence is seen in the geophysics of any structures which may have been associated with these finds.

Site 4 (Figures 16-19)

M4/1 and M4/2 are thought to be as a result of buried ferrous objects.

A scatter of early Medieval pottery was discovered by St Albans Museums during their investigation. Although it was suspected that this scatter may mark the site of a medieval building, there is no supporting evidence in the geophysics.

Site 6 (Figures 20-24)

M6/1 is a pipeline crossing the survey area approximately 43m from the southern end running north. The processed plot to remove the effects of the pipeline shows a very weak right angled feature M6/2 which may be of interest. M6/3 is thought to be the

effect of another pipeline as a marker is to be seen in this area, but it should be noted that the character is such that a very large ferrous object is close by or buried.

It is felt that the strong response from the pipeline has masked any features which may be associated with the scatter of Neolithic to Bronze Age flint flakes found in the earlier investigation.

Site 8 (Figures 25-28)

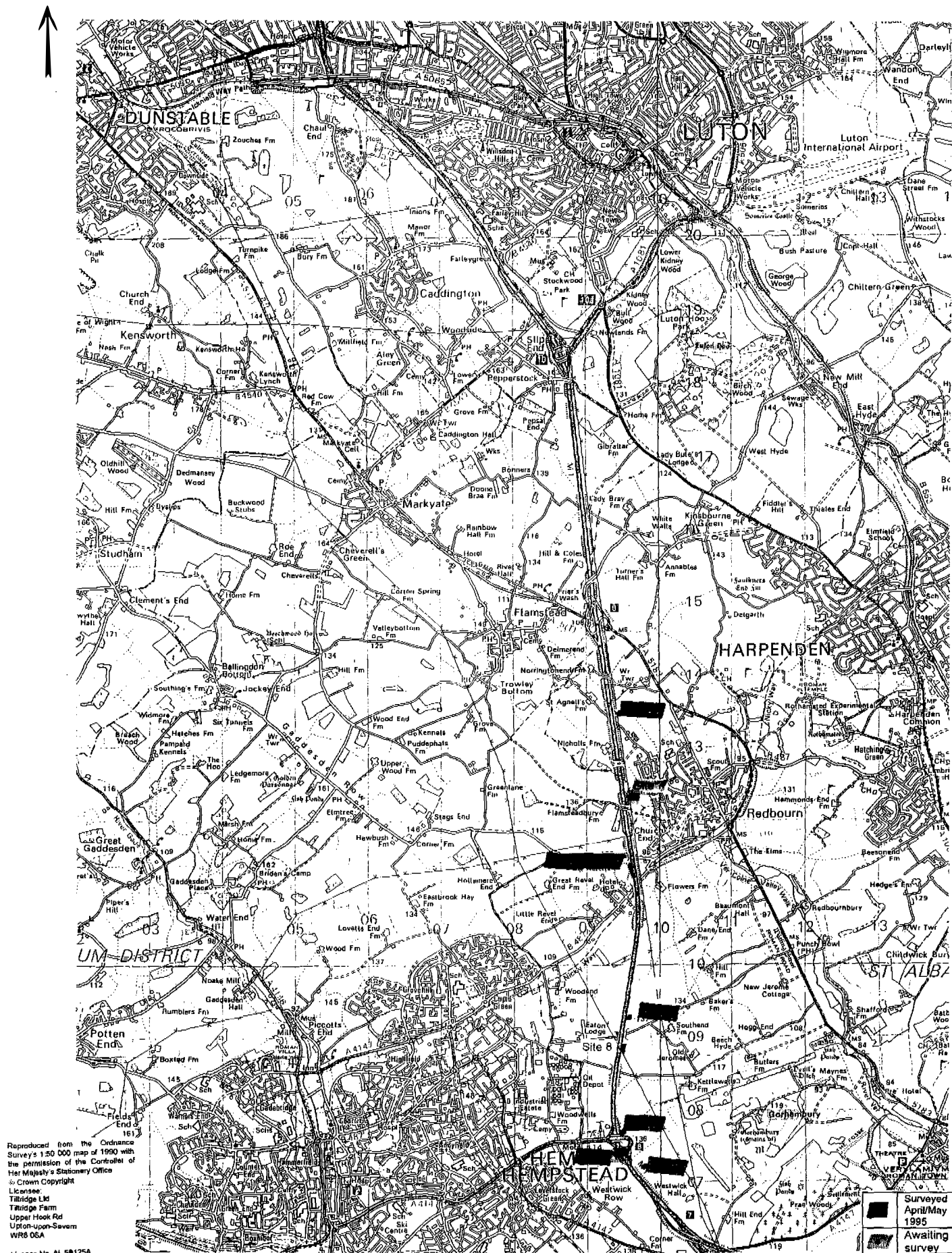
The large anomaly M8/1 is thought to be a large ferrous object. However, in the light of the metal working debris found in this site by St Albans Museums, it may warrant further investigation as it may, for example, be the remains of a smelting hearth. M8/2 is possibly another pipeline. M8/3, M8/4 and M8/5 may be metallic objects in the thick hedgerow adjacent to the motorway. M8/6 is possibly the effect of a road sign. M8/7 is a weak linear feature made up of small magnetic anomalies.

The Aubreys (Figures 29 -34)

As this site is a known archaeological site with standing banks and ditches, both magnetometer and resistivity were used in order to investigate the possible continuation of the known ramparts and ditches.

The magnetometer survey shows very little of interest save for a scatter of magnetic debris in the northern part of the survey area including the larger anomaly MA/1.

The resistivity survey was more productive. The continuation of the rampart can be seen in anomalies RA/5 and RA/6, while the continuation of the ditches is seen in anomalies RA/1 together with RA/3 and RA/2 together with RA/4. The conjectural lines of the base of the rampart and the continuation of the ditch have been plotted onto the Interpretation in Figure 34.



Date April/May 1995

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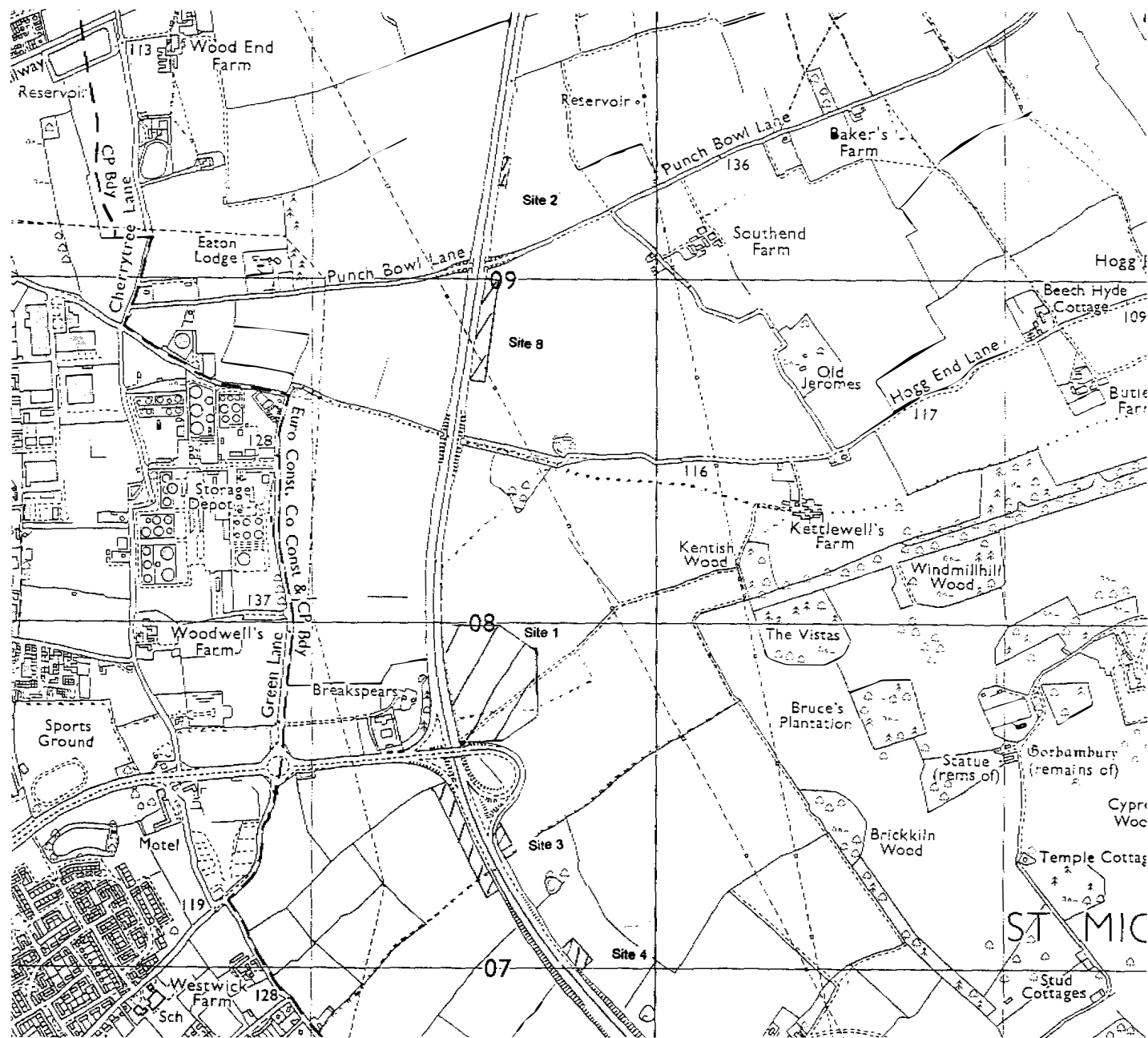
Subject

Geophysical Survey - M1 Field Evaluation
 General Location Plan

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	1995
	Awaiting
	survey

Date April/May 1995

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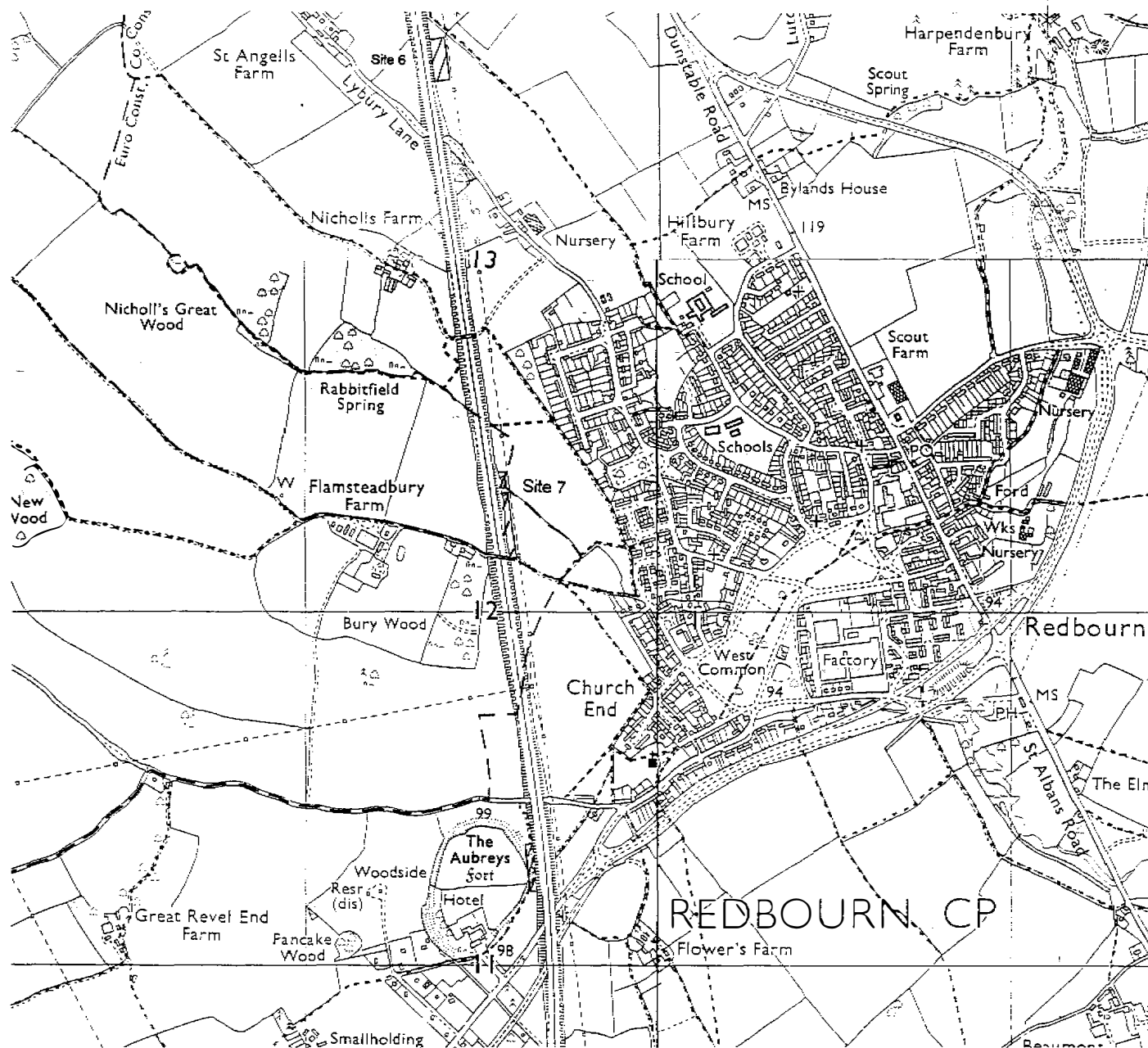
Figure 2

Scale 1:12 500

Subject Geophysical Survey - M1 Field Evaluation
Detailed Location Plan - Southern section

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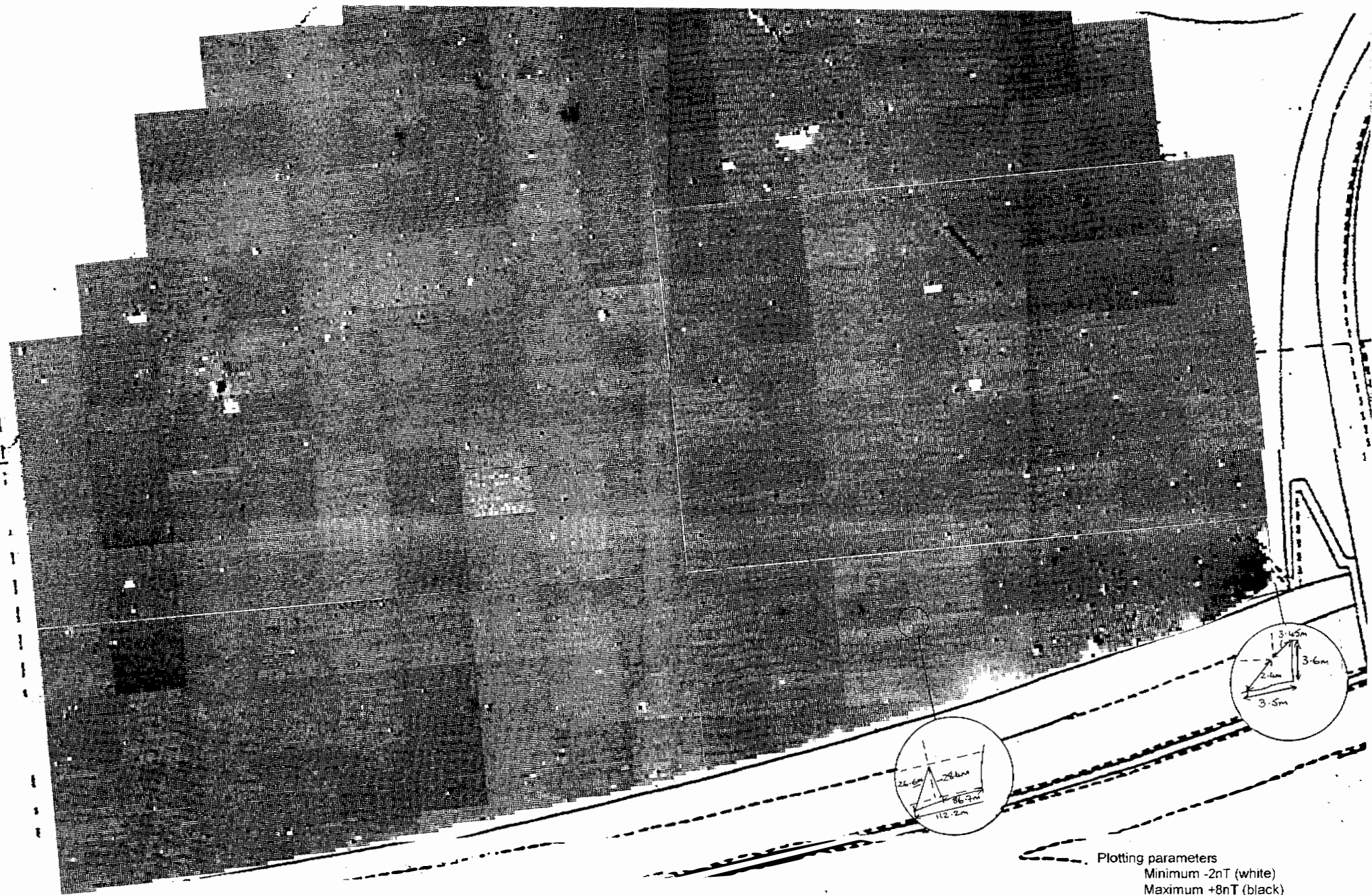
Figure 3

Scale 1:12 500

Subject Geophysical Survey - M1 Field Evaluation
 Detailed Location Plan - Northern section

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Plotting parameters
 Minimum -2nT (white)
 Maximum +8nT (black)

Date April/May 1995

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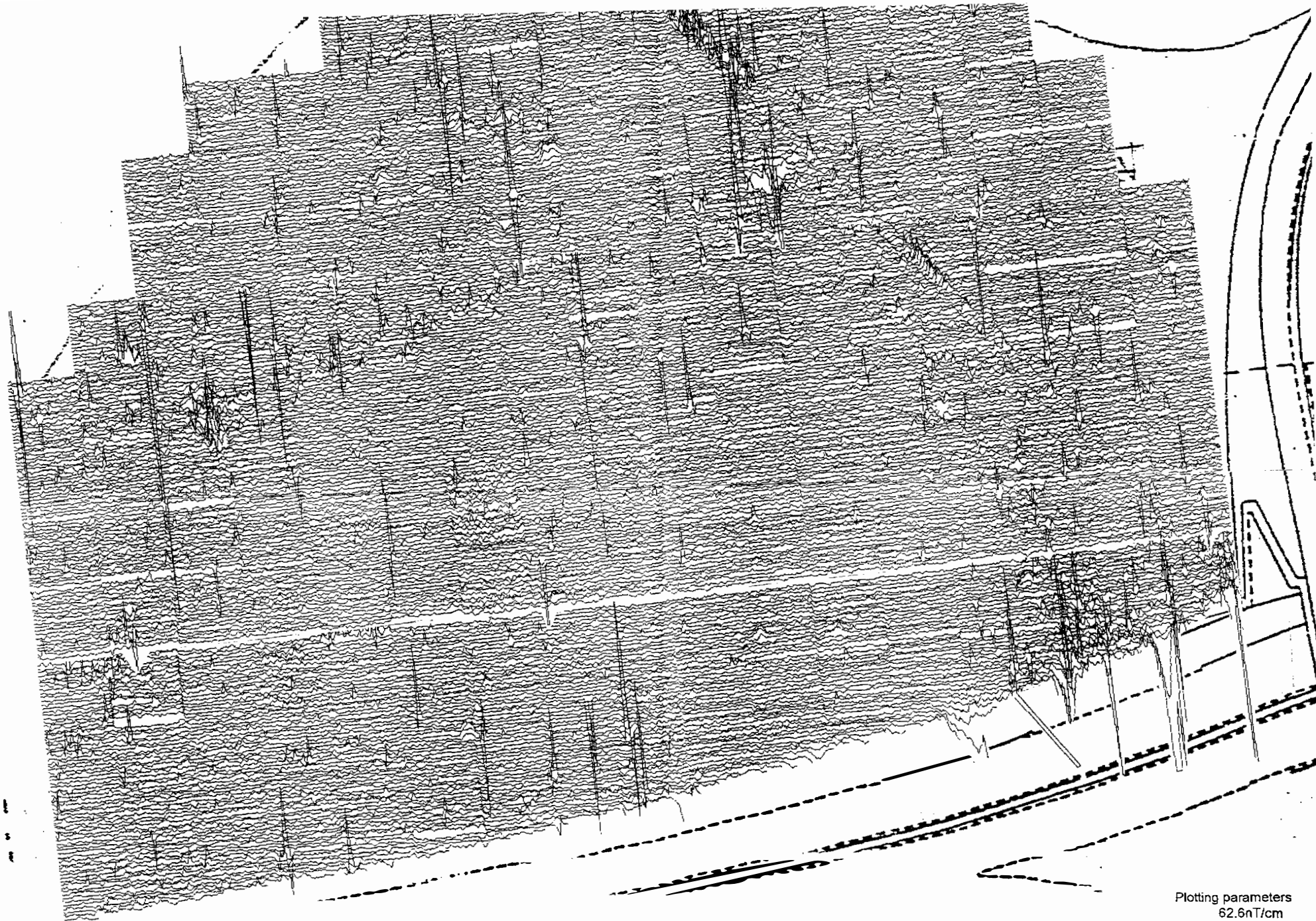
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Scale 1:1000

Subject Geophysical Survey - M1 Field Evaluation
 Plot of raw magnetometer data - Site 1

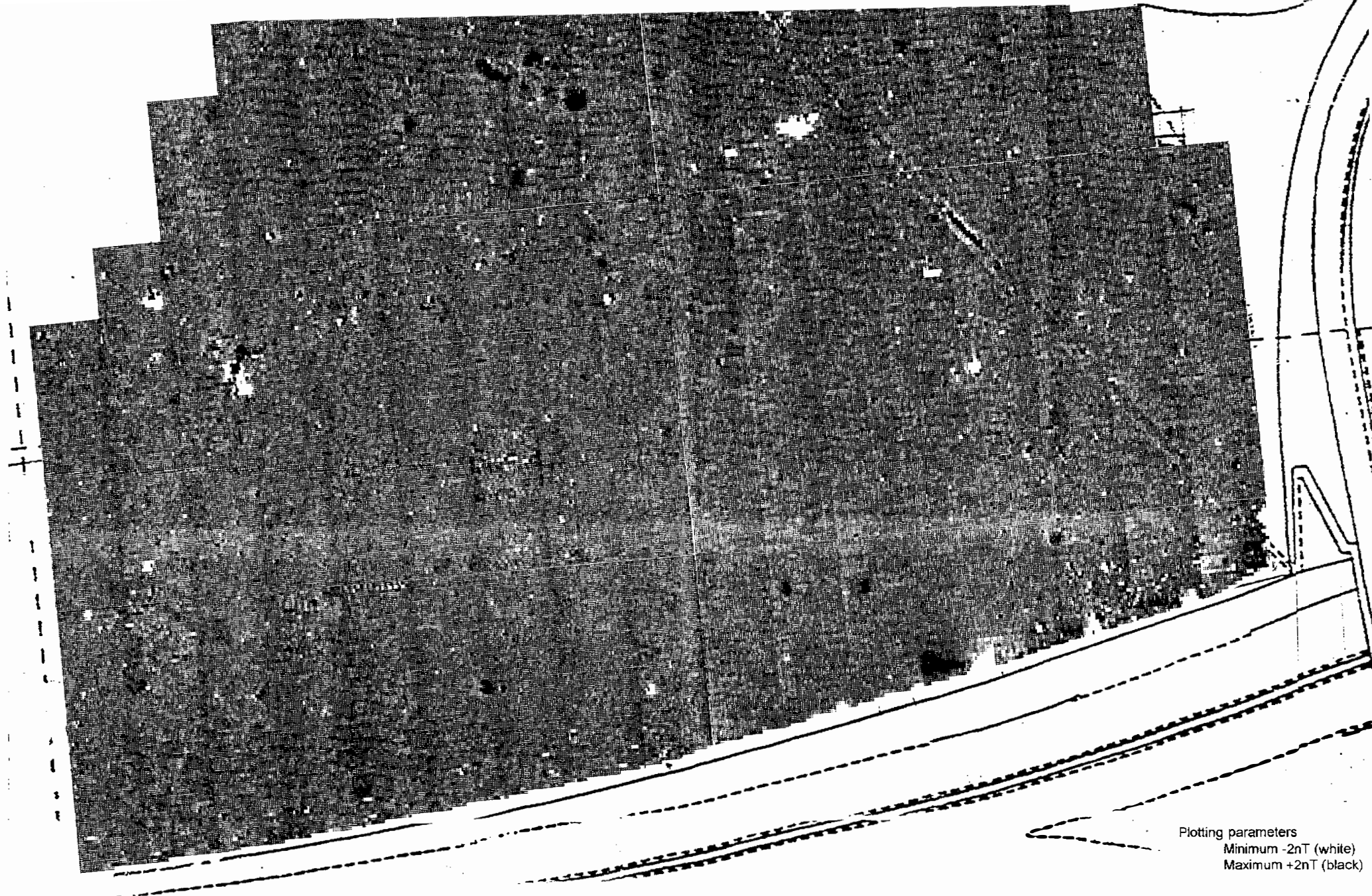
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Plotting parameters
62.6nT/cm

Date	April/May 1995	Client	ST ALBANS MUSEUMS	Figure	5	STRATASCAN™ GEOPHYSICAL & SPECIALIST SURVEY SERVICES	TILTRIDGE FARM UPPER HOOK ROAD UPTON UPON SEVERN WORCESTERSHIRE WR8 0SA UK TEL: 01296 411111
Scale	1:1000	Subject	Geophysical Survey - M1 Field Evaluation Trace plot of raw magnetometer data - Site 1				



Plotting parameters
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 Maximum +2nT (black)

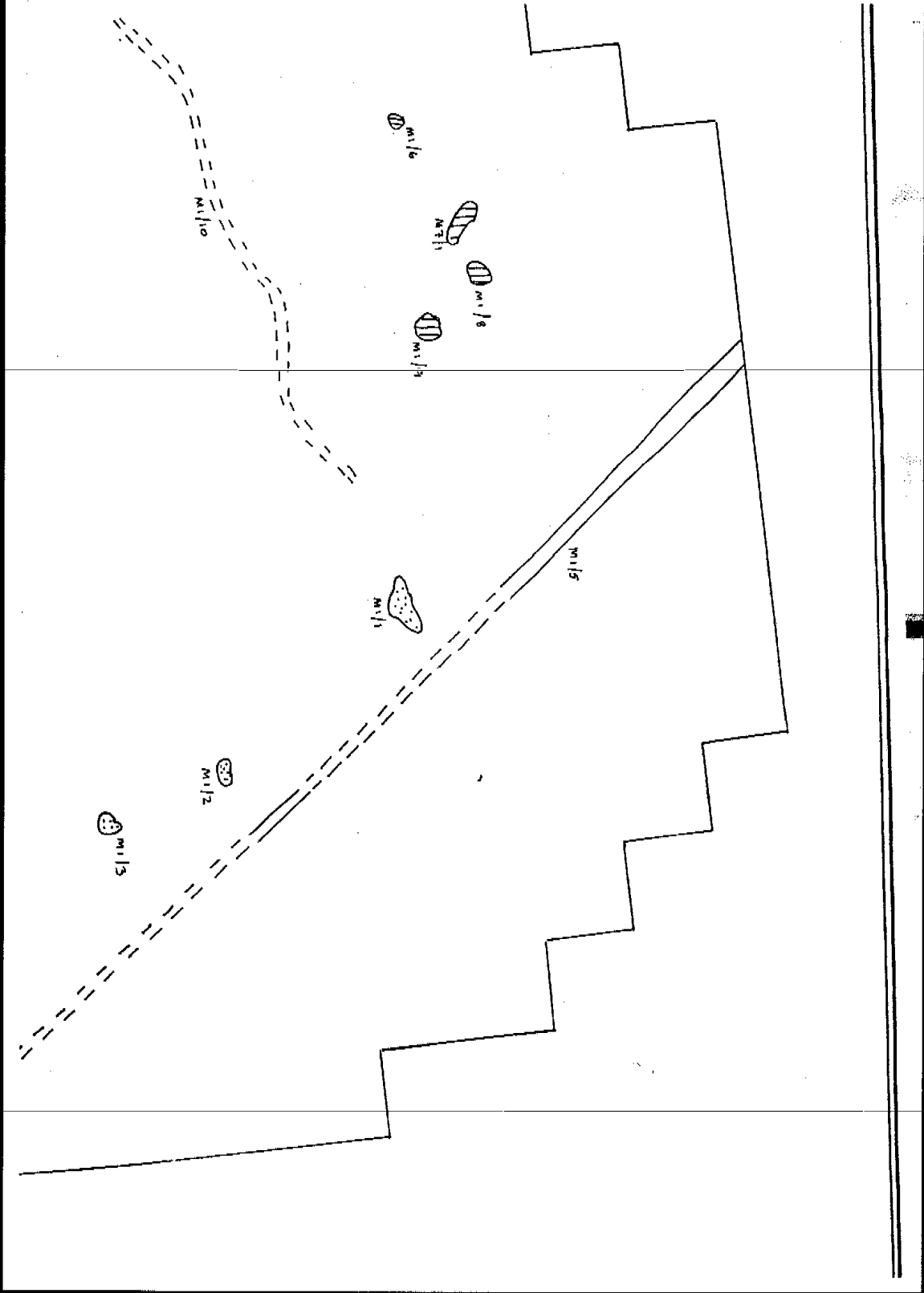
Date	April/May 1995	Client	ST ALBANS MUSEUMS	Figure	6
Scale	1:1000	Subject	Geophysical Survey - M1 Field Evaluation Plot of processed magnetometer data - Site 1		

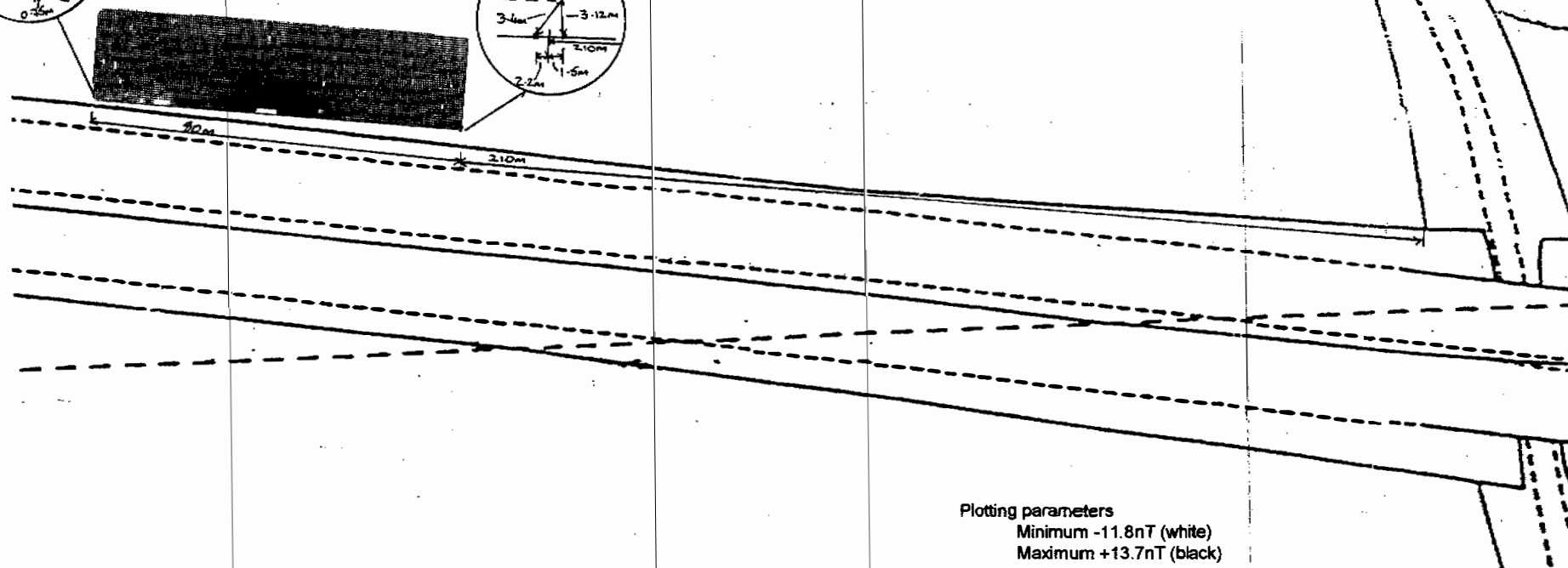
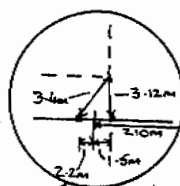
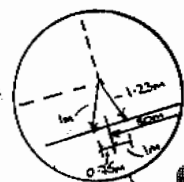
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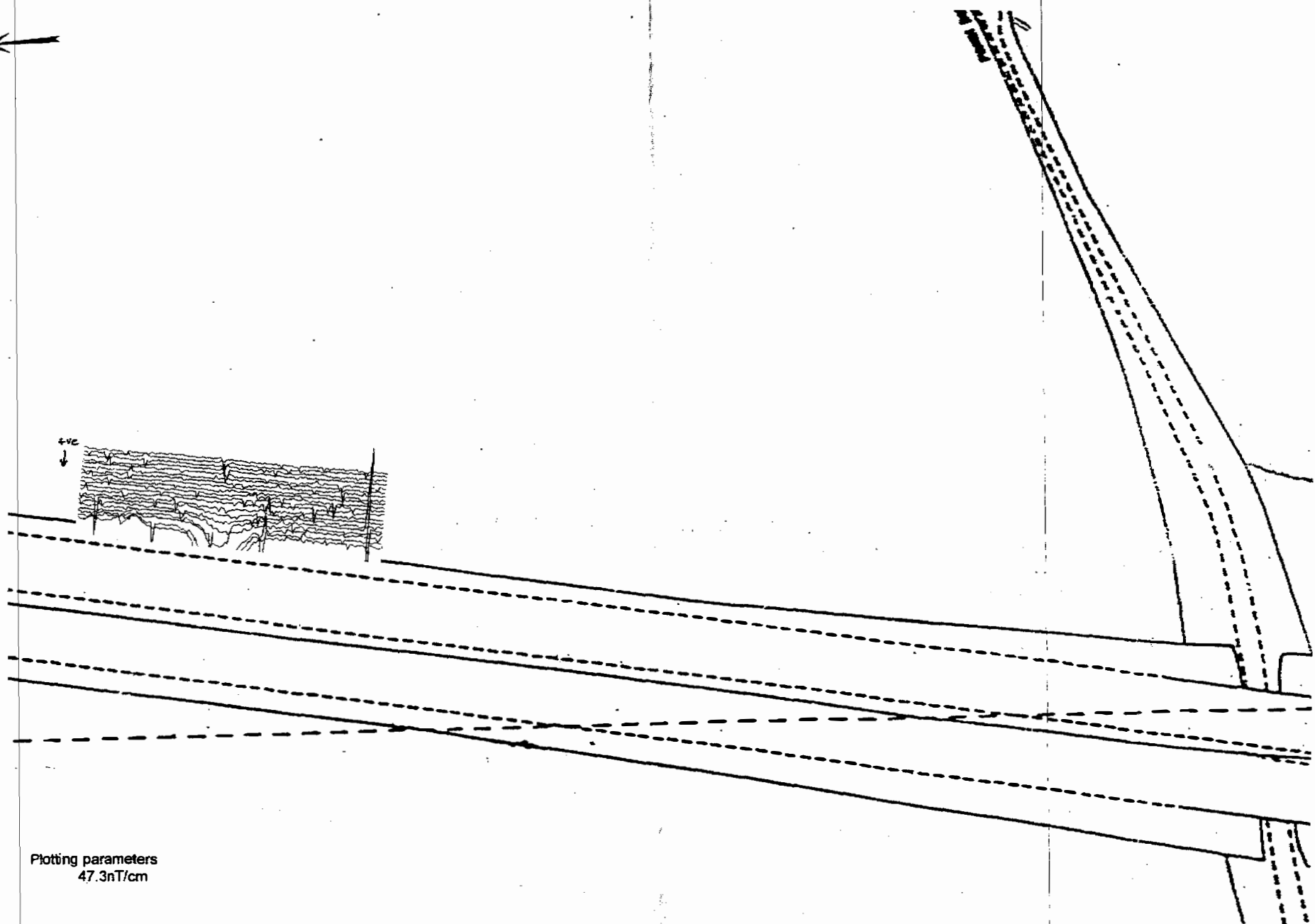
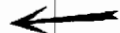
Date	April/May 1995	Client	ST ALBANS MUSUEMS	Figure	7	STRATASCAN™ GEOPHYSICAL & SPECIALIST SURVEY SERVICES TILTRIDGE FARM UPPER HOOK ROAD UPTON UPON SEVERN WORCESTERSHIRE WR8 0SA UK TELEPHONE (01684) 592266 FAX (01684) 594142
Scale	1:1000	Subject	Geophysical Survey - M1 Field Evaluation Abstraction of Anomalies - Site 1			





Plotting parameters
 Minimum -11.8nT (white)
 Maximum +13.7nT (black)

Date	April/May 1995	Client	ST ALBANS MUSEUMS	Figure	8	STRATASCAN™ GEOPHYSICAL & SPECIALIST SURVEY SERVICES TILTRIDGE FARM UPPER HOOK ROAD UPTON UPON SEVERN WORCESTERSHIRE WR8 0SA UK TELEPHONE (0684) 592266 FAX (0684) 594142
Scale	1:1000	Subject	Geophysical Survey - M1 Field Evaluation Plot of raw magnetometer data - Site 2			



Plotting parameters
47.3nT/cm

Date April/May 1995

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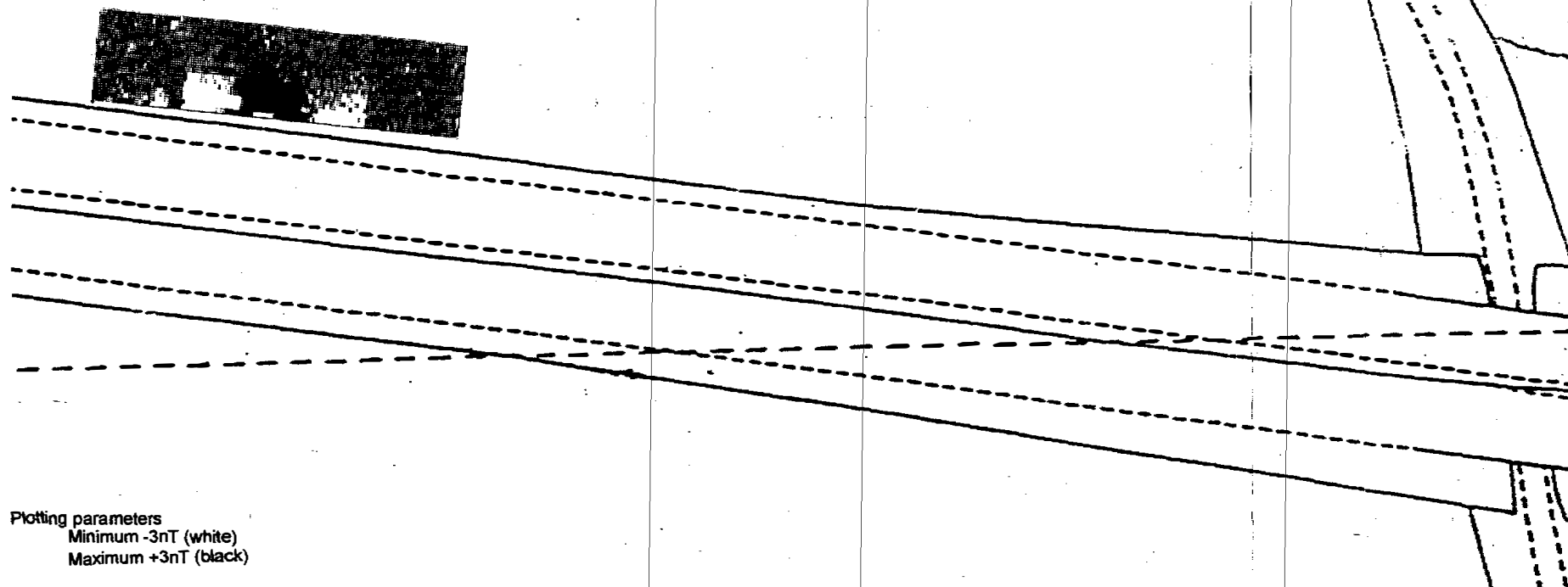
Figure 9

Scale 1:1000

Subject Geophysical Survey - M1 Field Evaluation
Trace plot of raw magnetometer data - Site 2

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Plotting parameters
Minimum -3nT (white)
Maximum +3nT (black)

Date April/May 1995

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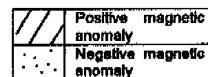
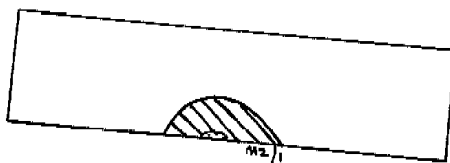
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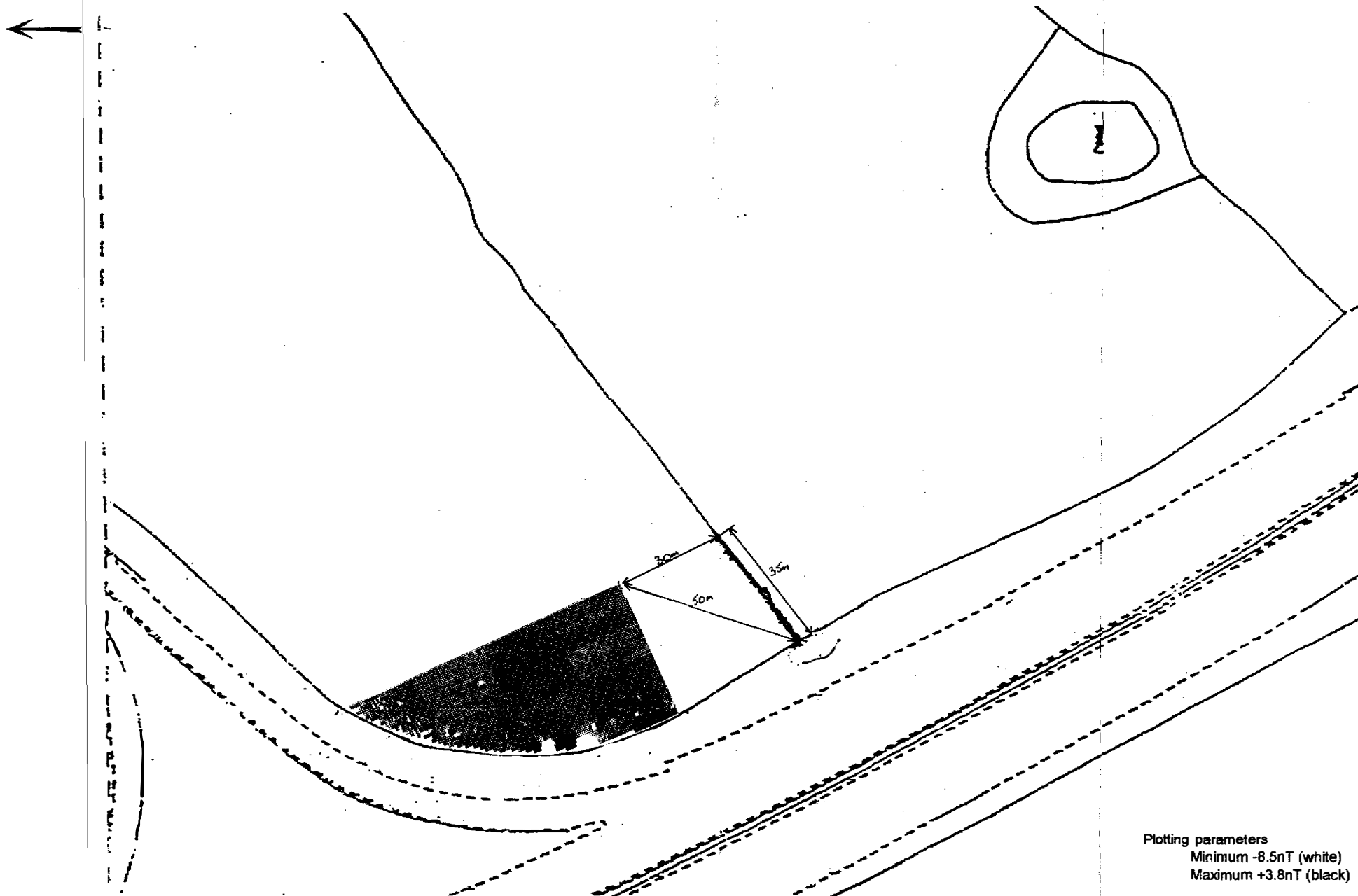
Subject Geophysical Survey - M1 Field Evaluation
Plot of processed magnetometer data - Site 2

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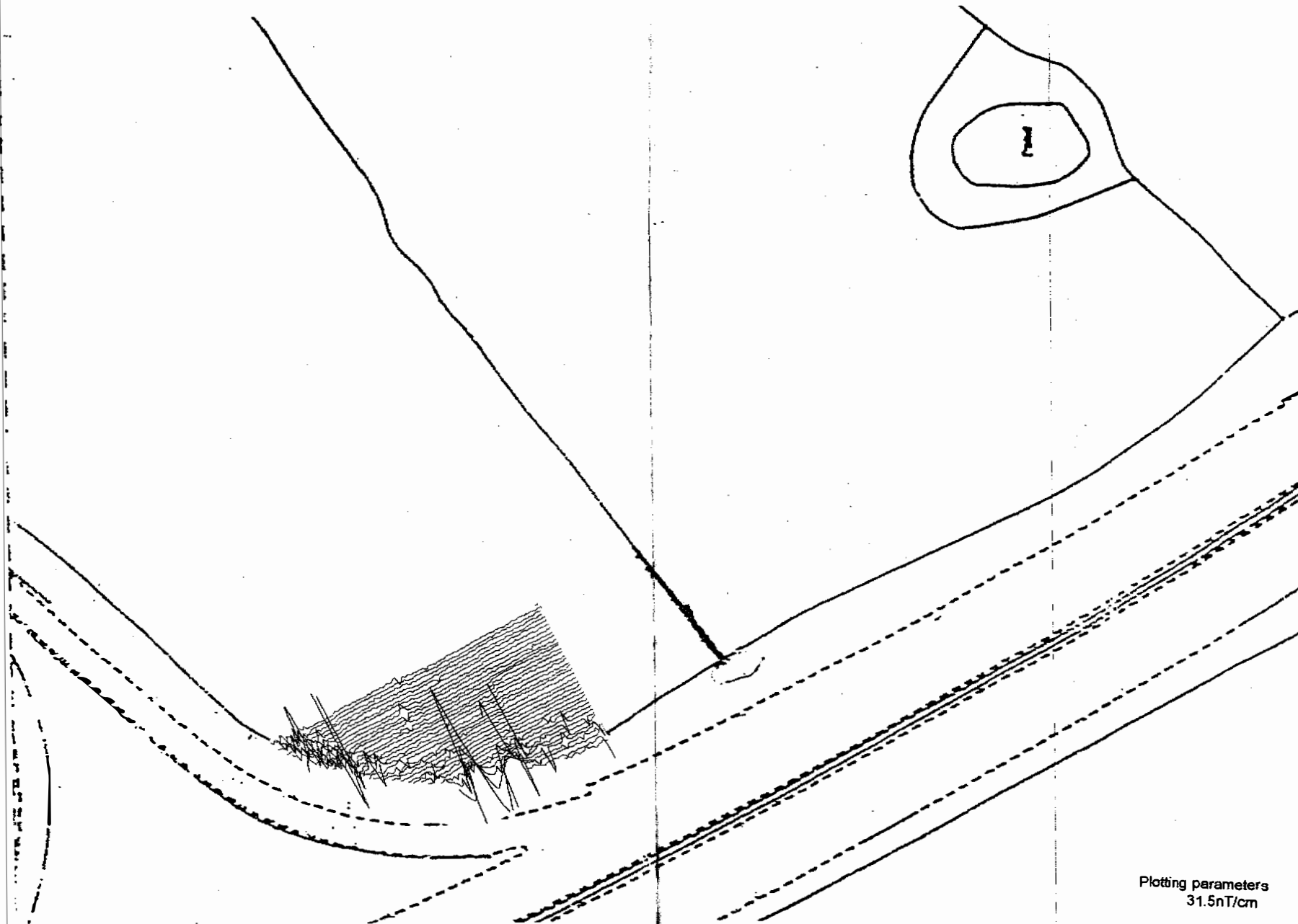
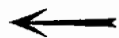
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Date April/May 1995	Client ST ALBANS MUSUEMS	STRATASCAN™ TILTRIDGE FARM UPPER HOOK ROAD UPTON UPON SEVERN WORCESTERSHIRE WR8 0SA UK TELEPHONE (01684) 592266 FAX (01684) 594142
Scale 1:1000	Subject	
Figure 11	Geophysical Survey - M1 Field Evaluation Abstraction of Anomalies - Site 2	



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Scale	1:1000	Subject	Geophysical Survey - M1 Field Evaluation Plot of raw magnetometer data - Site 3			



Plotting parameters
31.5nT/cm

Date April/May 1995

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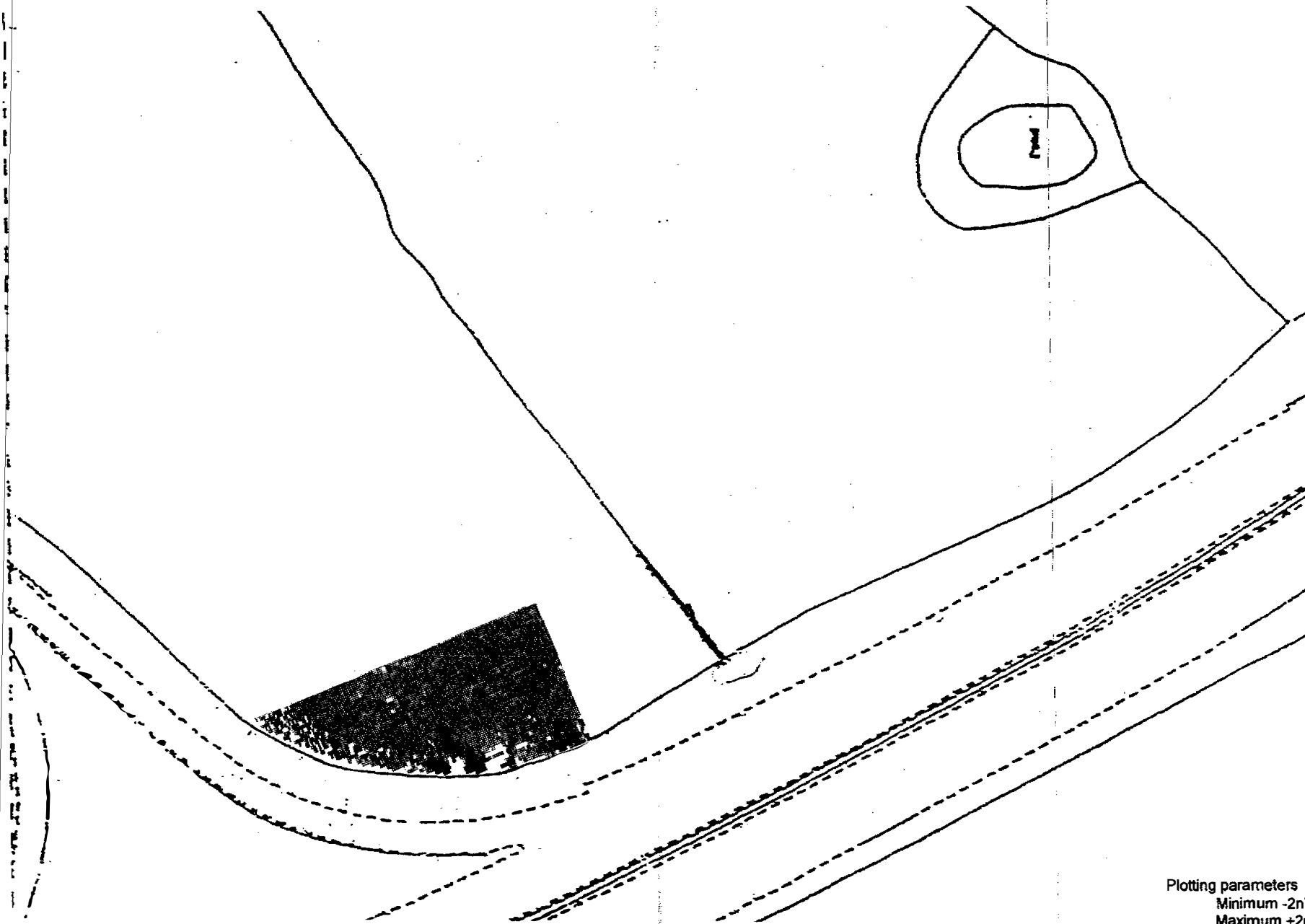
Figure 13

Scale 1:1000

Subject Geophysical Survey - M1 Field Evaluation
Trace plot of raw magnetometer data - Site 3

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Plotting parameters
Minimum -2nT (white)
Maximum +2nT (black)

Date April/May 1995

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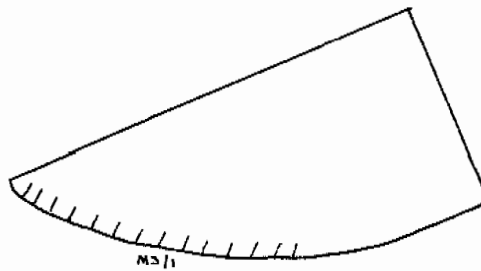
Figure 14

Scale 1:1000

Subject Geophysical Survey - M1 Field Evaluation
Plot of processed magnetometer data - Site 3

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	Positive magnetic anomaly
	Negative magnetic anomaly

Date April/May 1995

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Scale 1:1000

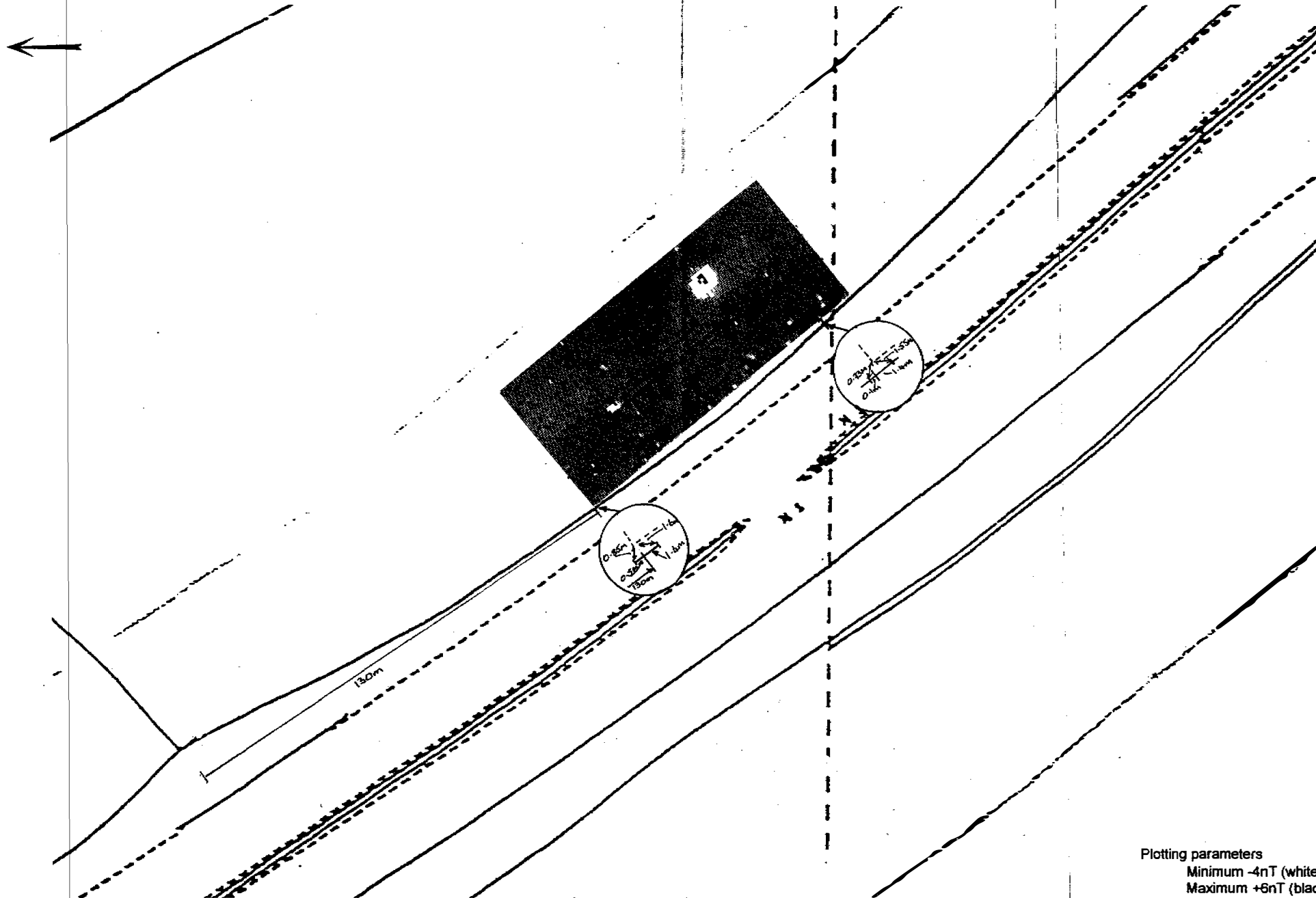
Subject

Figure 15

Geophysical Survey - M1 Field Evaluation
Abstraction of Anomalies - Site 3

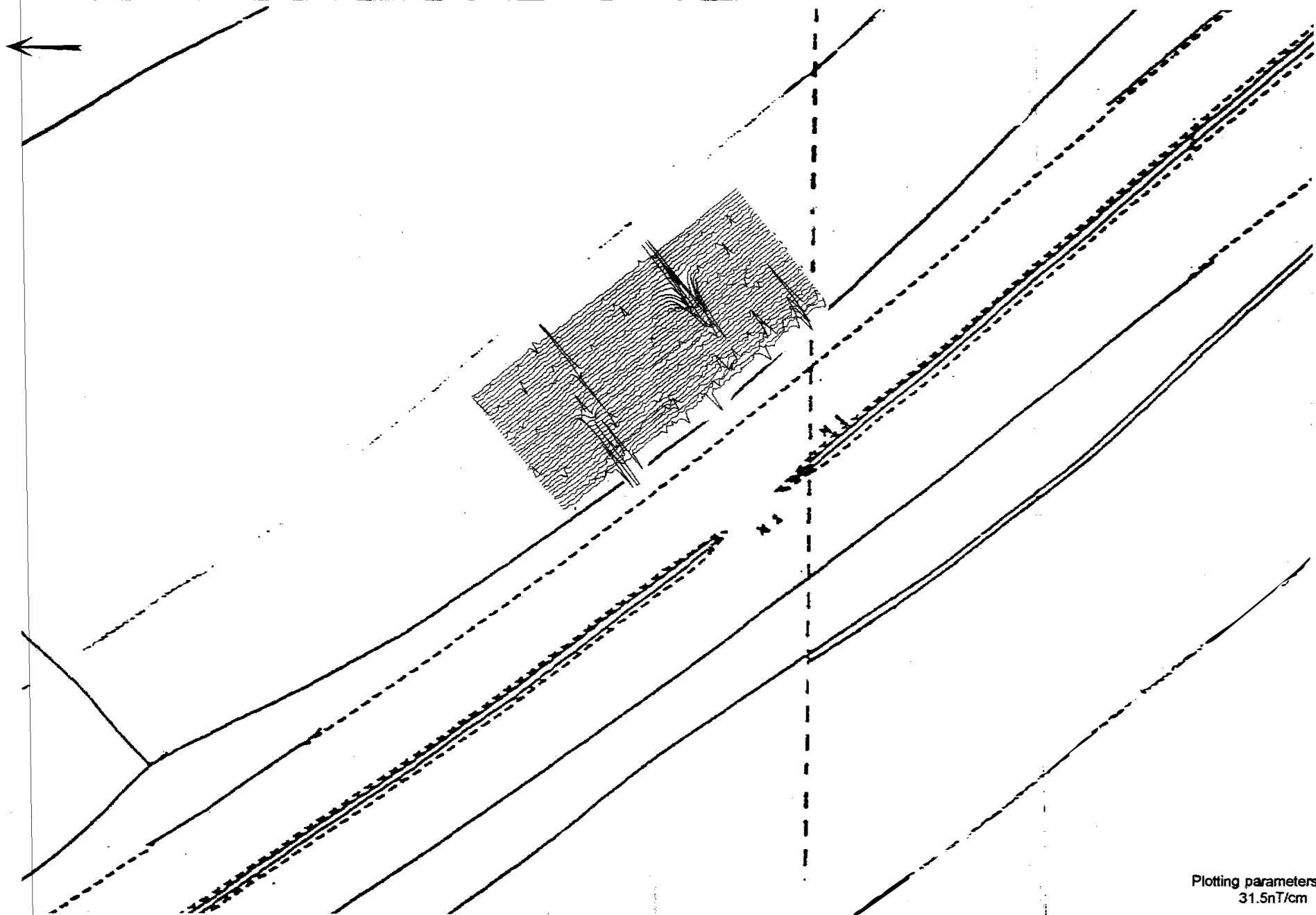
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Plotting parameters
 Minimum -4nT (white)
 Maximum +6nT (black)

Date	April/May 1995	Client	ST ALBANS MUSEUMS	Figure	16	STRATASCAN™ GEOPHYSICAL & SPECIALIST SURVEY SERVICES TILTRIDGE FARM UPPER HOOK ROAD UPTON UPON SEVERN WORCESTERSHIRE WR8 0SA UK TELEPHONE (0684) 592266 FAX (0684) 594142
Scale	1:1000	Subject	Geophysical Survey - M1 Field Evaluation Plot of raw magnetometer data - Site 4			



Plotting parameters
31.5nT/cm

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Client ST ALBANS MUSEUMS

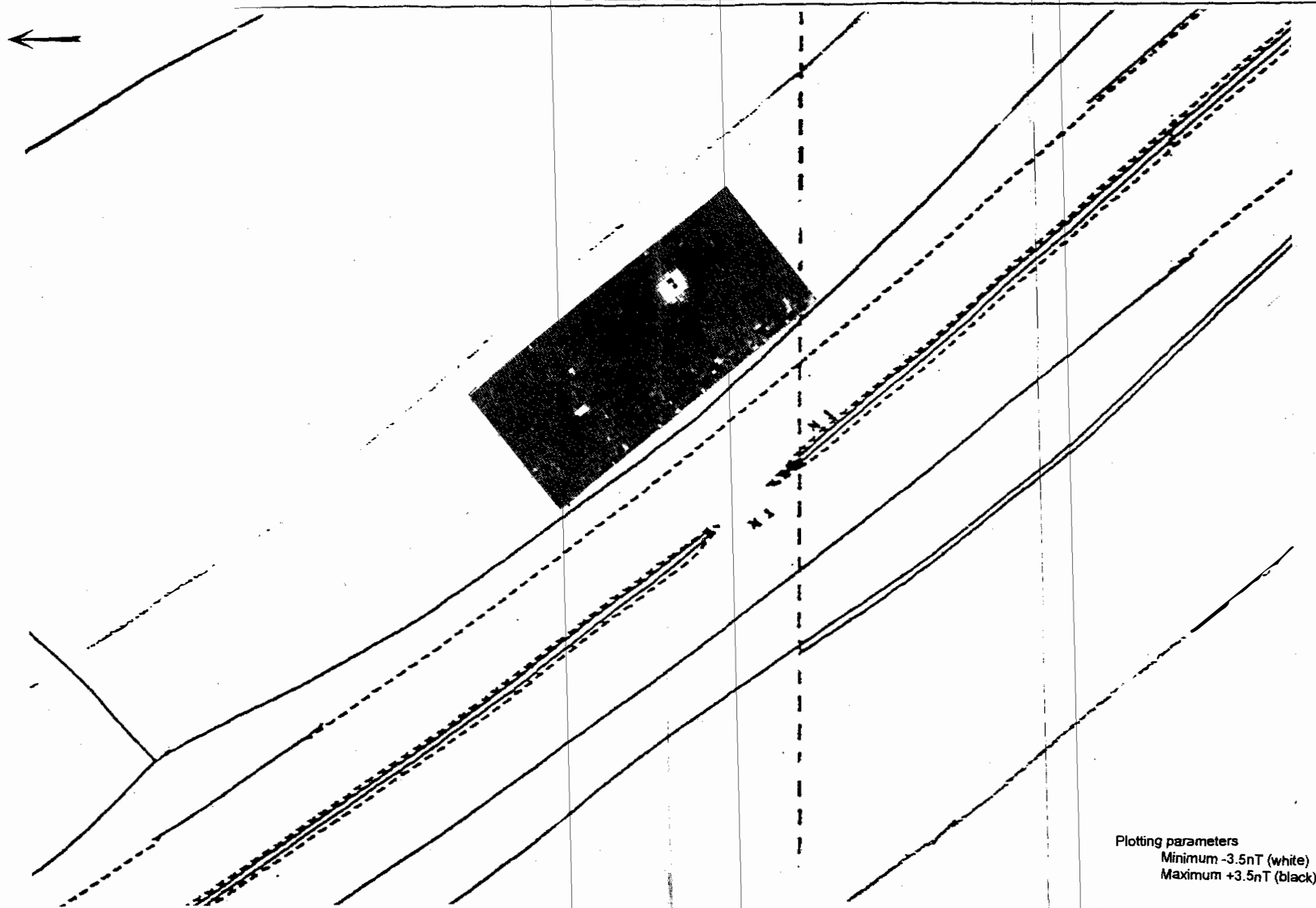
Figure 17

Scale 1:1000

Subject Geophysical Survey - M1 Field Evaluation
Trace plot of raw magnetometer data - Site 4

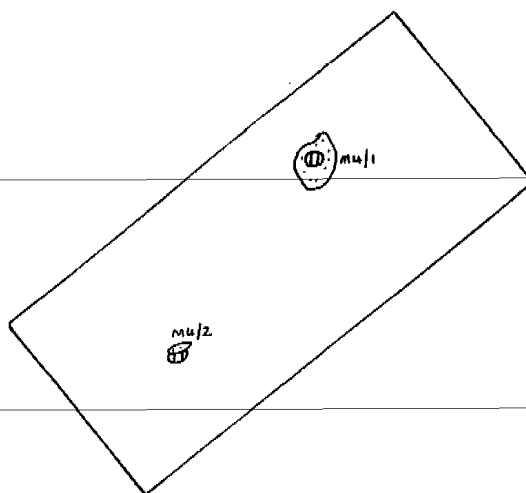
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Plotting parameters
 Minimum -3.5nT (white)
 Maximum +3.5nT (black)

Date	April/May 1995	Client	ST ALBANS MUSEUMS	Figure	18	STRATASCAN™ GEOPHYSICAL & SPECIALIST SURVEY SERVICES TILTRIDGE FARM UPPER HOOK ROAD UPTON UPON SEVERN WORCESTERSHIRE WR8 0SA UK TELEPHONE (0684) 592266 FAX (0684) 594142
Scale	1:1000	Subject	Geophysical Survey - M1 Field Evaluation Plot of processed magnetometer survey - Site 4			



	Positive magnetic anomaly
	Negative magnetic anomaly

Date April/May 1995

Client ST ALBANS MUSUEMS

Scale 1:1000

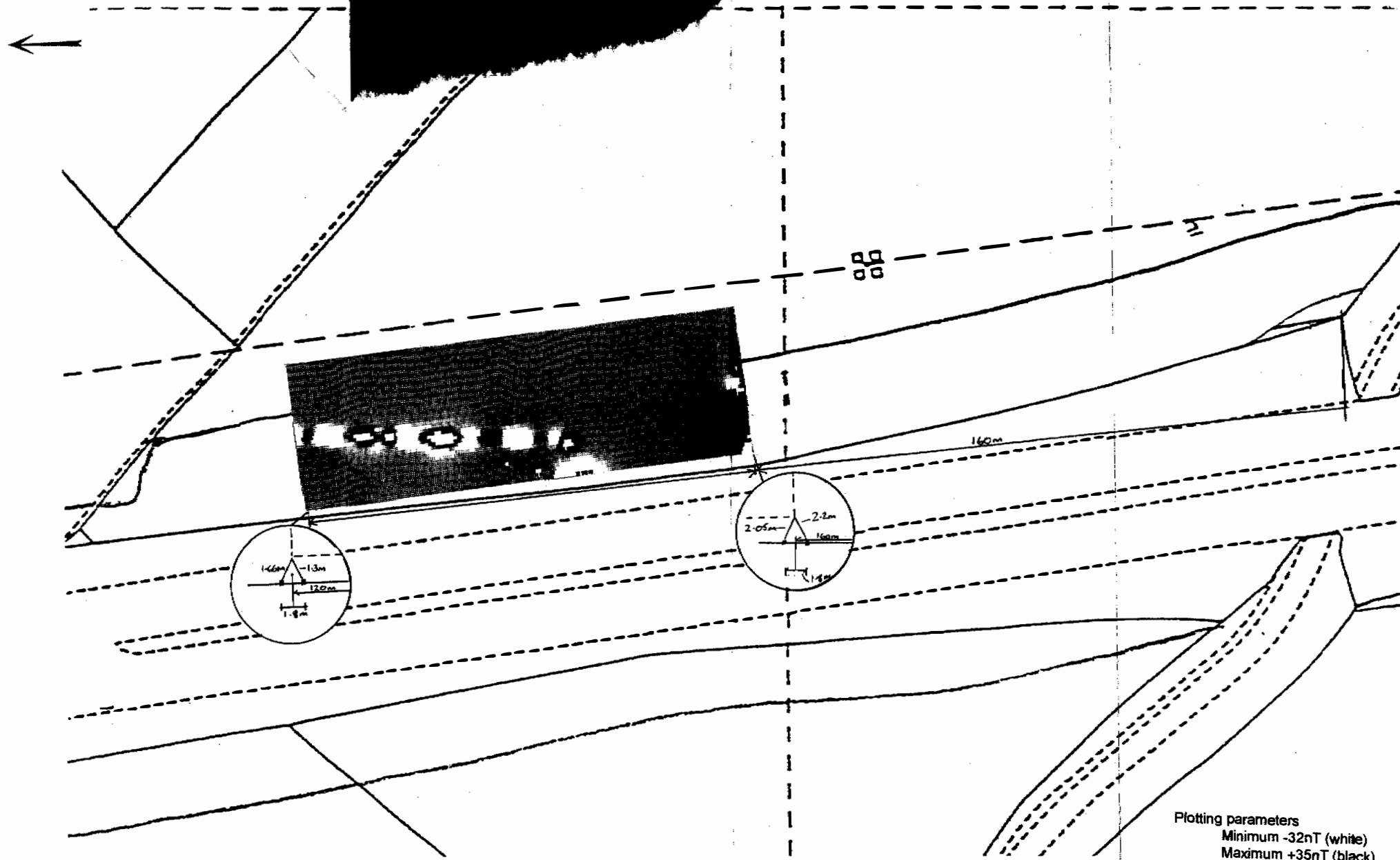
Subject

Geophysical Survey - M1 Field Evaluation
Abstraction of Anomalies - Site 4

Figure 19

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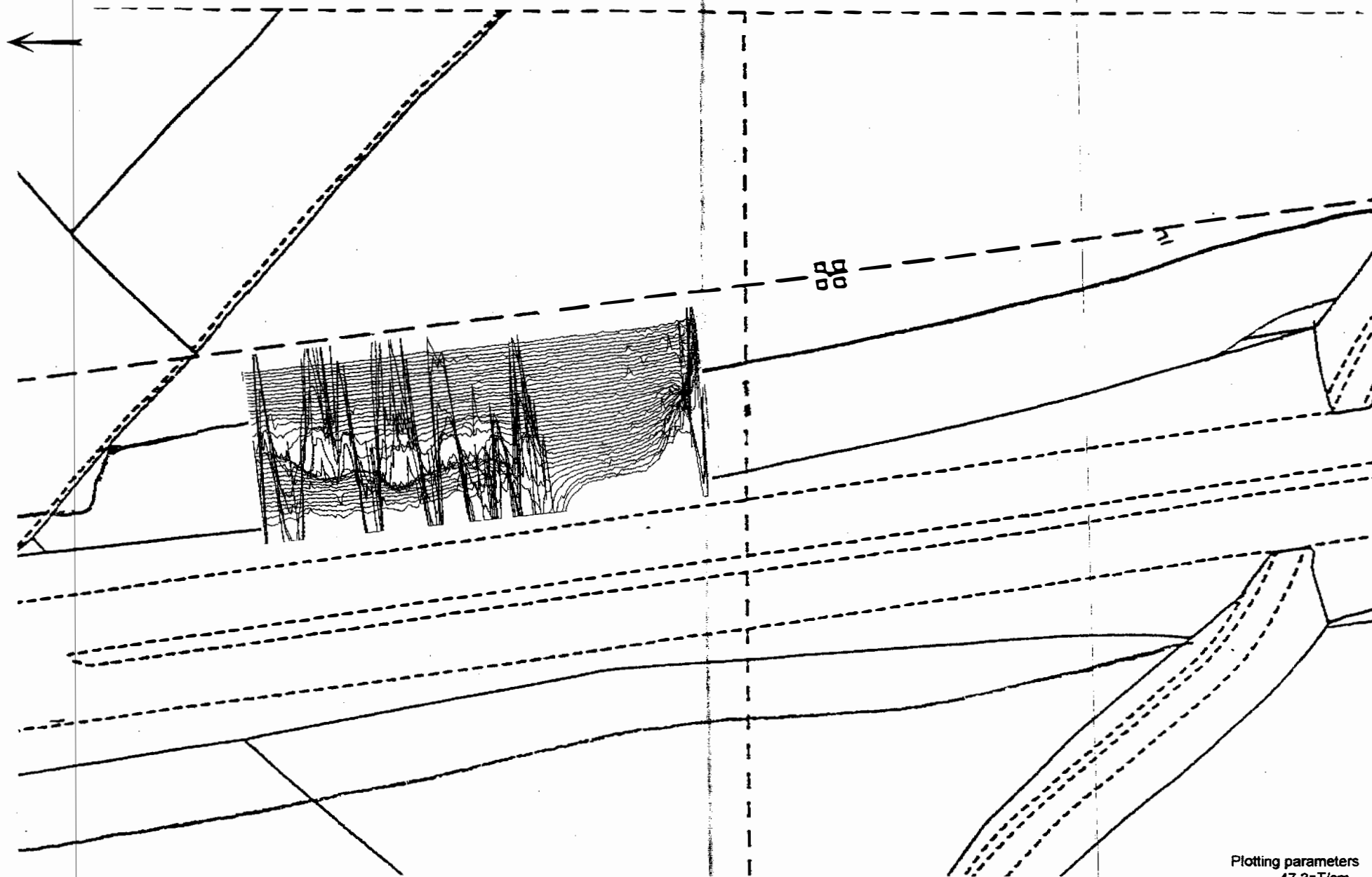
Figure 20

Scale 1:1000

Subject Geophysical Survey - M1 Field Evaluation
Plot of raw magnetometer data - Site 6

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Plotting parameters
47.3nT/cm

Date April/May 1995

Client ST ALBANS MUSEUMS

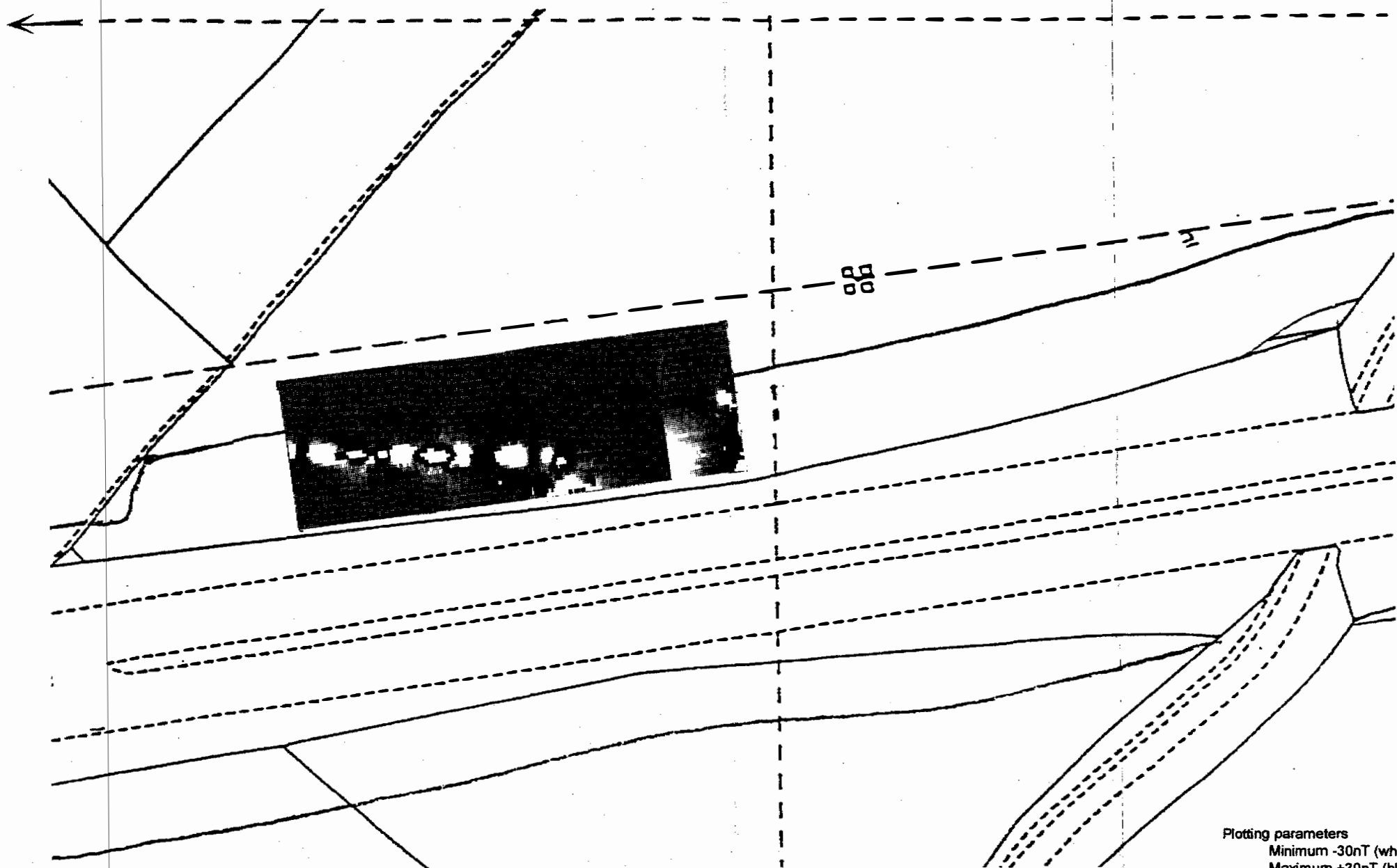
Figure 21

Scale 1:1000

Subject Geophysical Survey - M1 Field Evaluation
Trace plot of raw magnetometer data - Site 6

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Plotting parameters
 Minimum -30nT (white)
 Maximum +30nT (black)

Date April/May 1995

Client ST ALBANS MUSEUMS

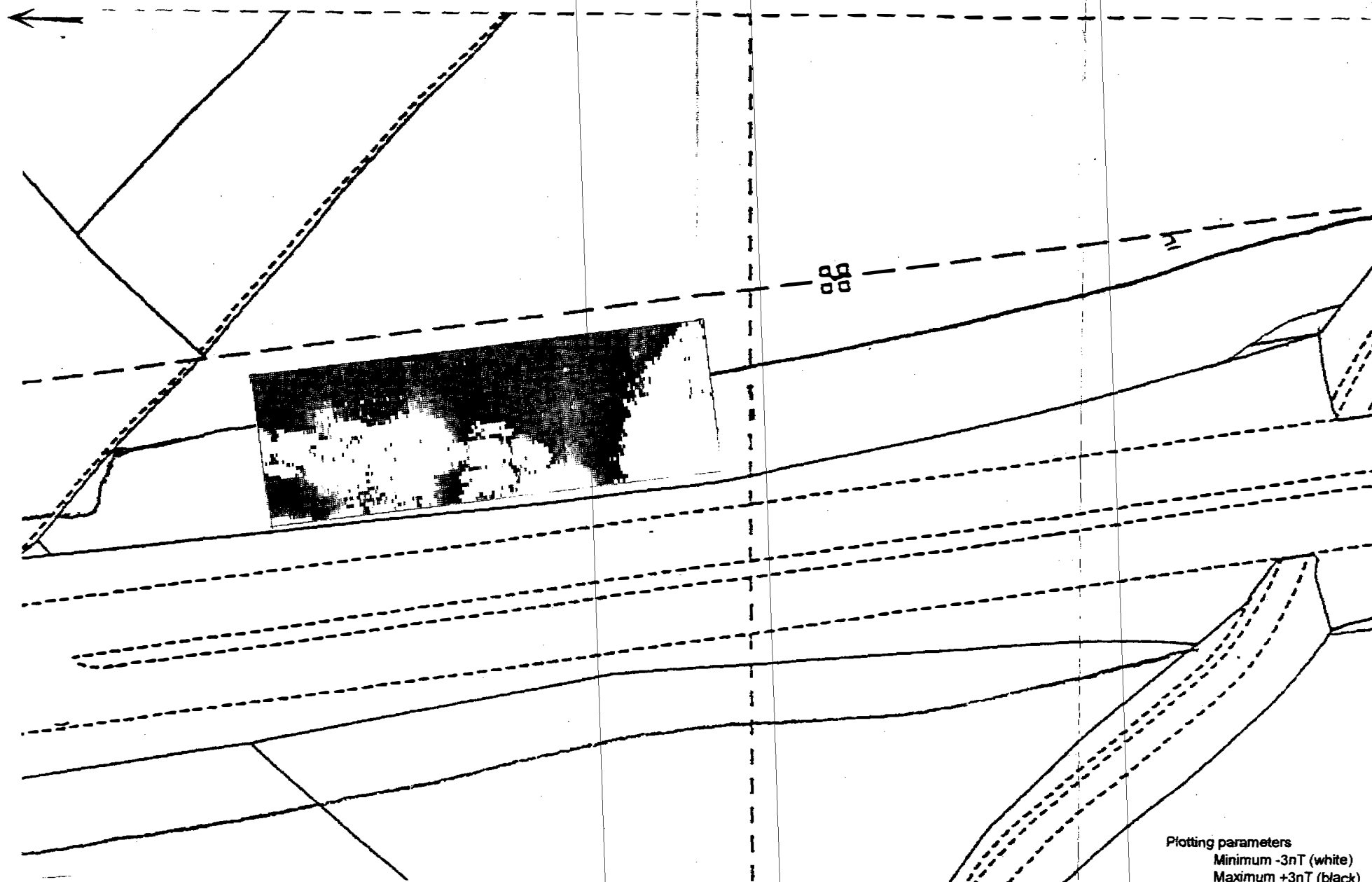
Figure 22

Scale 1:1000

Subject Geophysical Survey - M1 Field Evaluation
 Plot of processed magnetometer data - Site 6

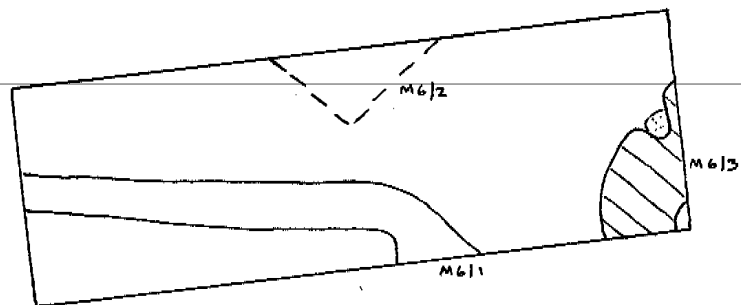
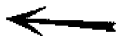
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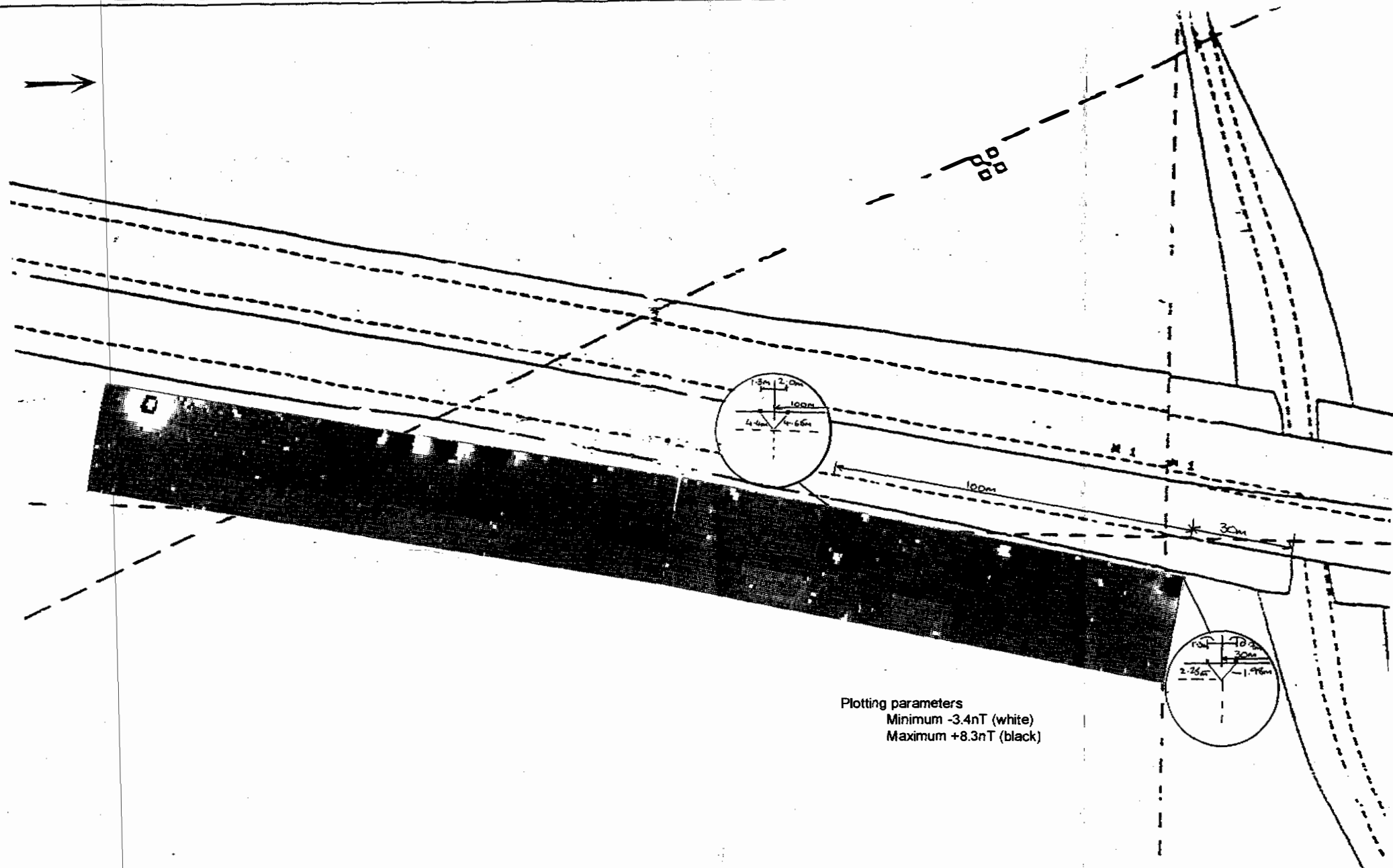
Plotting parameters
 Minimum -3nT (white)
 Maximum +3nT (black)

Date	April/May 1995	Client	ST ALBANS MUSEUMS	Figure	23	STRATASCAN™ GEOPHYSICAL & SPECIALIST SURVEY SERVICES TILTRIDGE FARM UPPER HOOK ROAD UPTON UPON SEVERN WORCESTERSHIRE WR8 0SA UK TELEPHONE (0684) 592266 FAX (0684) 594142
Scale	1:1000	Subject	Geophysical Survey - M1 Field Evaluation Plot of magnetometer data after processing to remove effects of pipeline - Site 6			



///	Positive magnetic anomaly
...	Negative magnetic anomaly

Date April/May 1995	Client ST ALBANS MUSUEMS	STRATASCAN. TILTRIDGE FARM UPPER HOOK ROAD UPTON UPON SEVERN WONCESTERSHIRE WR8 0SA UK TELEPHONE (01864) 592266 FAX (01864) 594142
Scale 1:1000	Subject	
Figure 24	Geophysical Survey - M1 Field Evaluation Abstraction of Anomalies - Site 6	



Date April/May 1995

Client ST ALBANS MUSEUMS

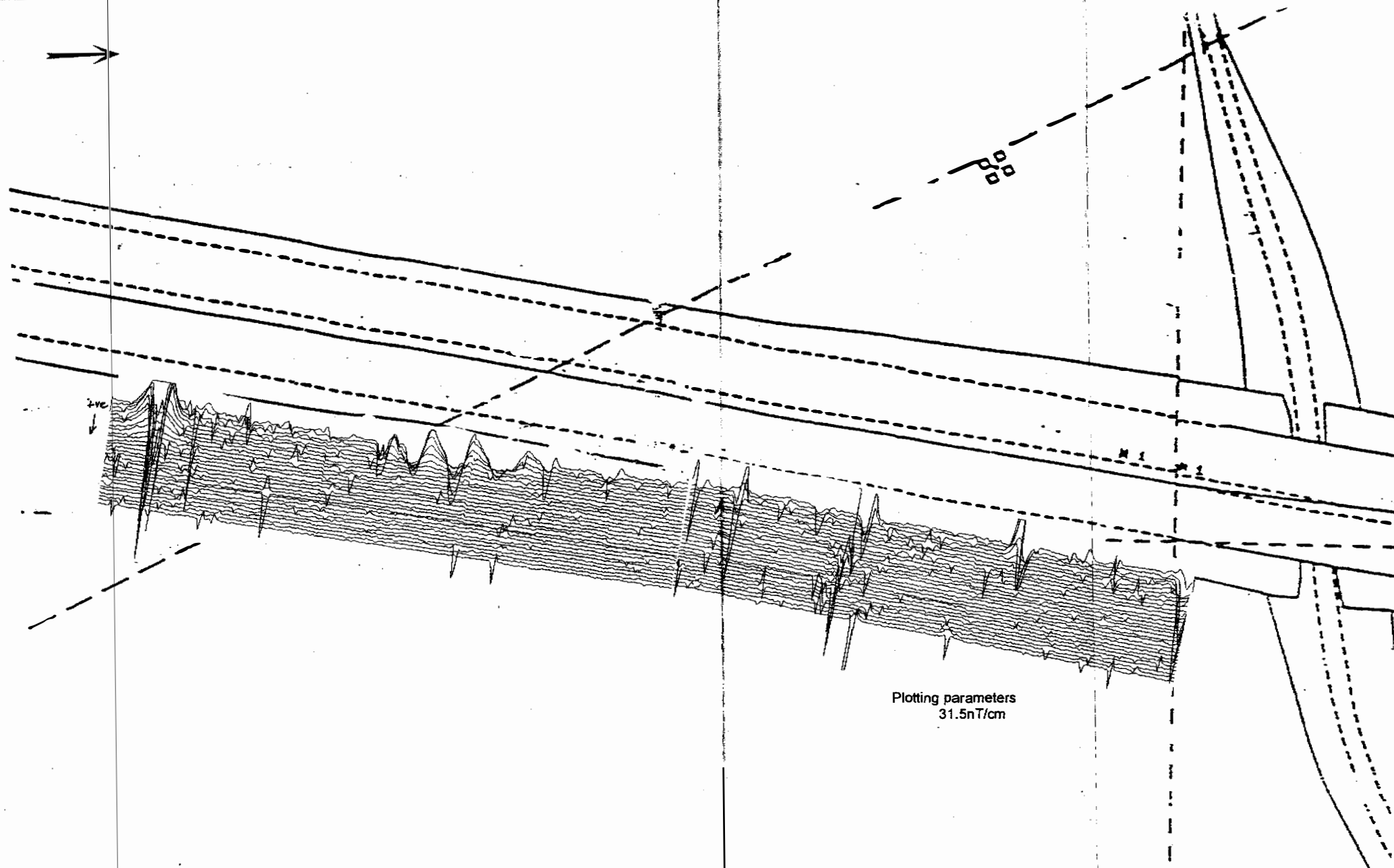
Figure 25

Scale 1:1000

Subject Geophysical Survey - M1 Field Evaluation
 Plot of raw magnetometer data - Site 8

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Date April/May 1995

Client ST ALBANS MUSEUMS

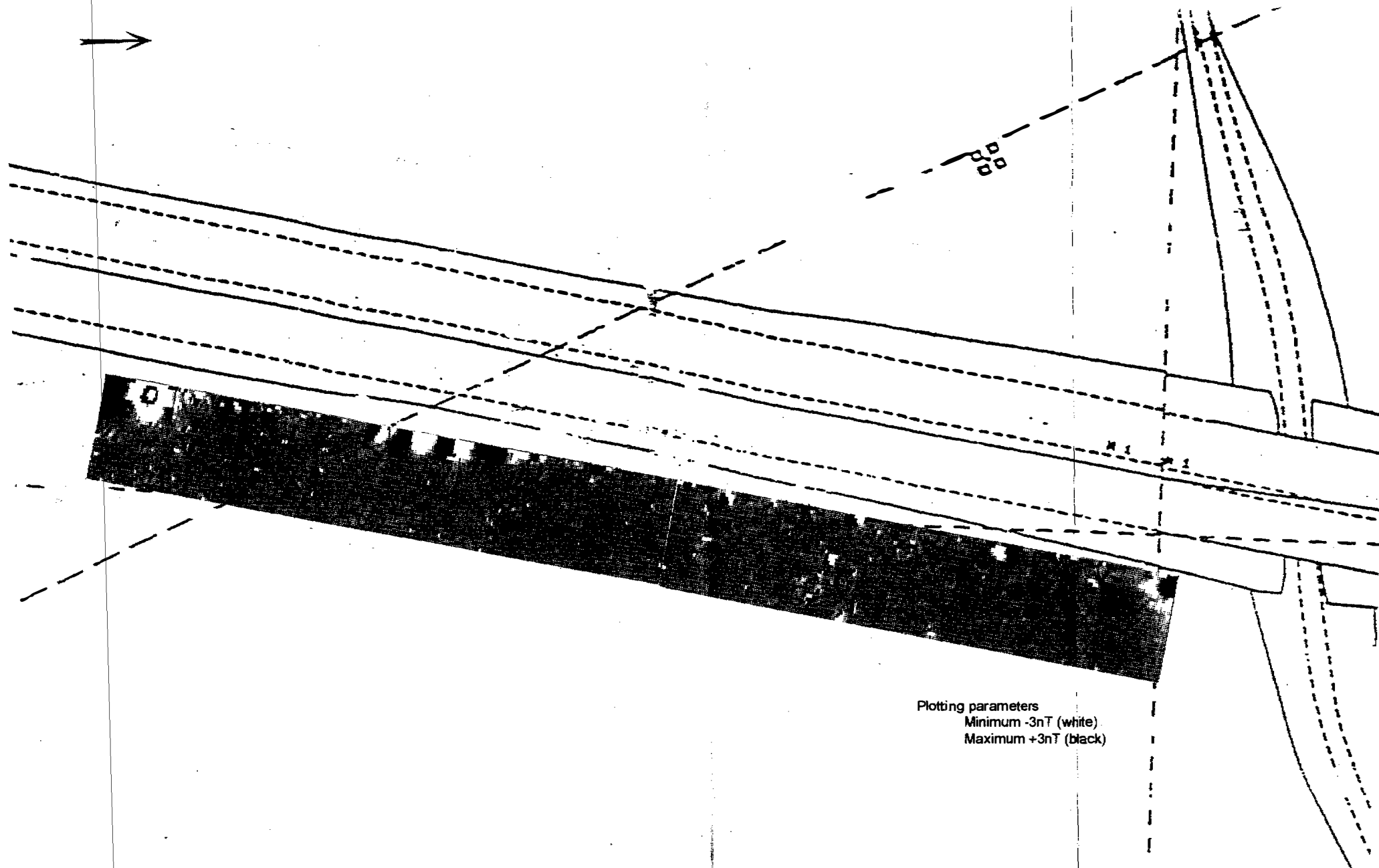
Figure 26

Scale 1:1000

Subject Geophysical Survey - M1 Field Evaluation
Trace plot of raw magnetometer data - Site 8

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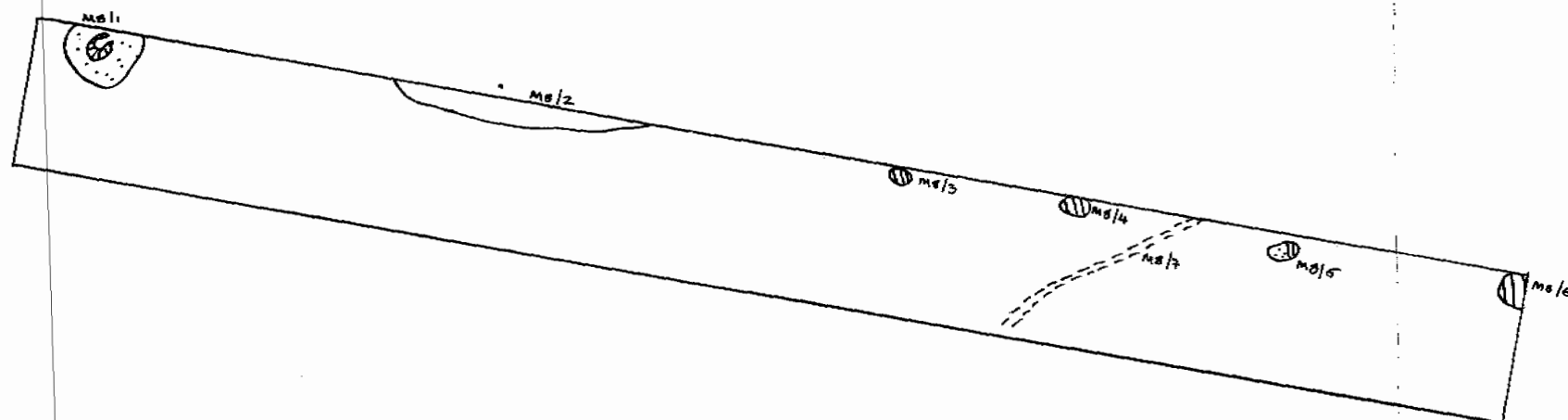
Figure 27

Scale 1:1000

Subject Geophysical Survey - M1 Field Evaluation
 Plot of processed magnetometer data - Site 8

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///	Positive magnetic anomaly
...	Negative magnetic anomaly

Date April/May 1995

Client ST ALBANS MUSUEMS

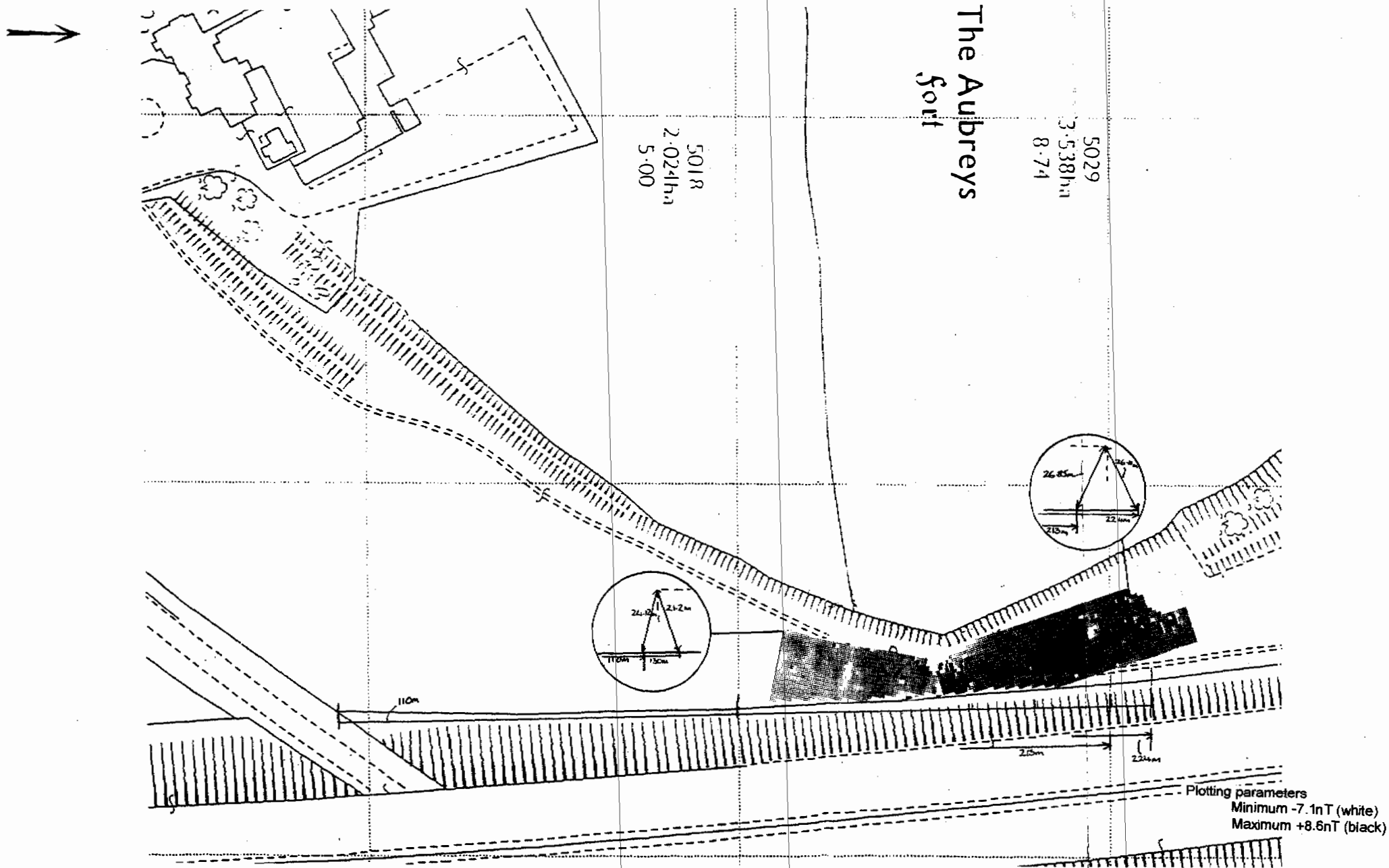
Figure 28

Scale 1:1000

Subject Geophysical Survey - M1 Field Evaluation
Abstraction of Anomalies - Site 8

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Date April/May 1995

Client ST ALBANS MUSEUMS

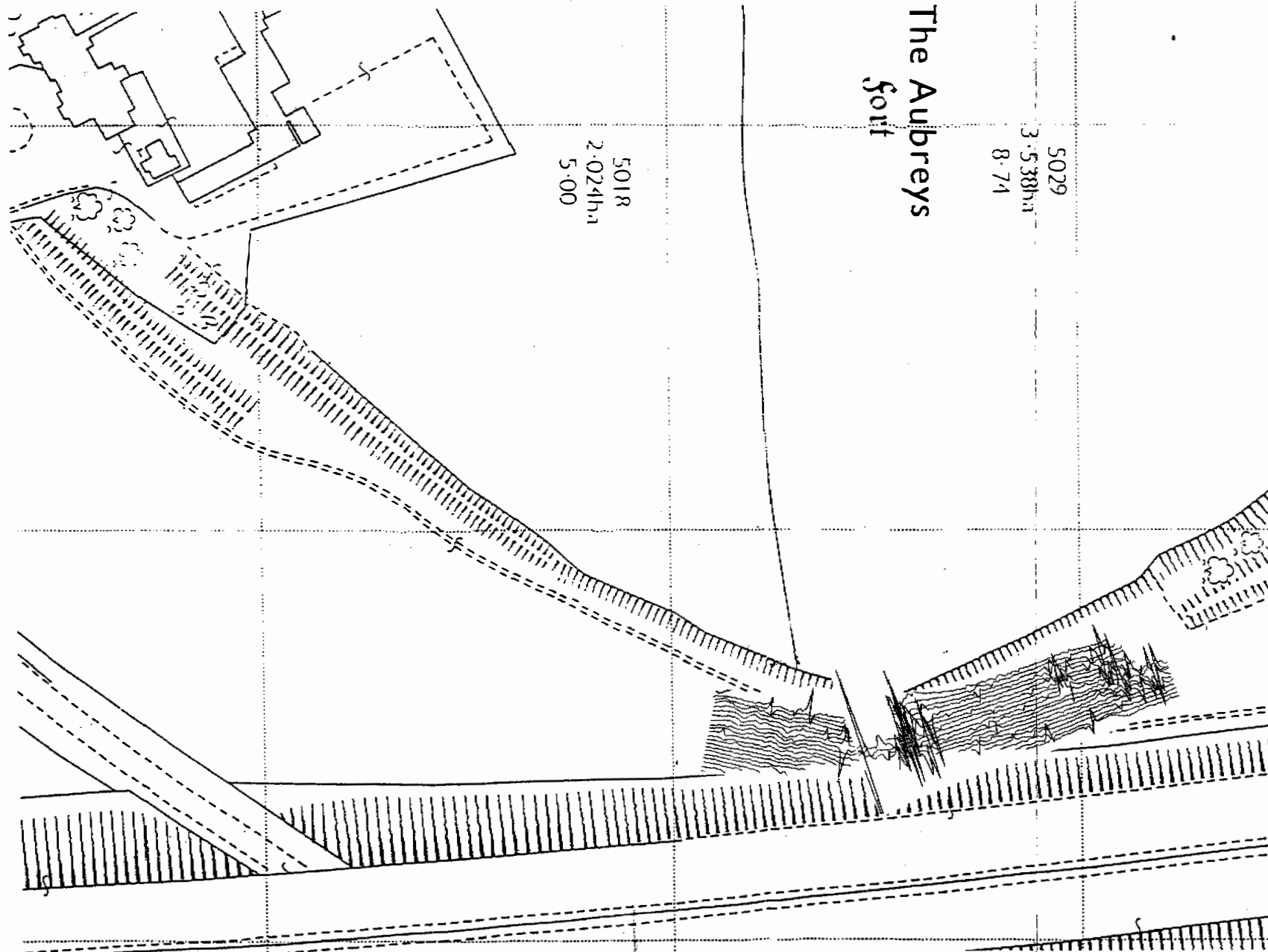
Figure 29

Scale 1:1000

Subject Geophysical Survey - M1 Field Evaluation
Plot of raw magnetometer data - The Aubreys

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5018
2.024h.a
5.00

The Aubreys
font

5029
3.538h.a
8.74

Plotting parameters
49.6nT/cm

Date April/May 1995

Client ST ALBANS MUSEUMS

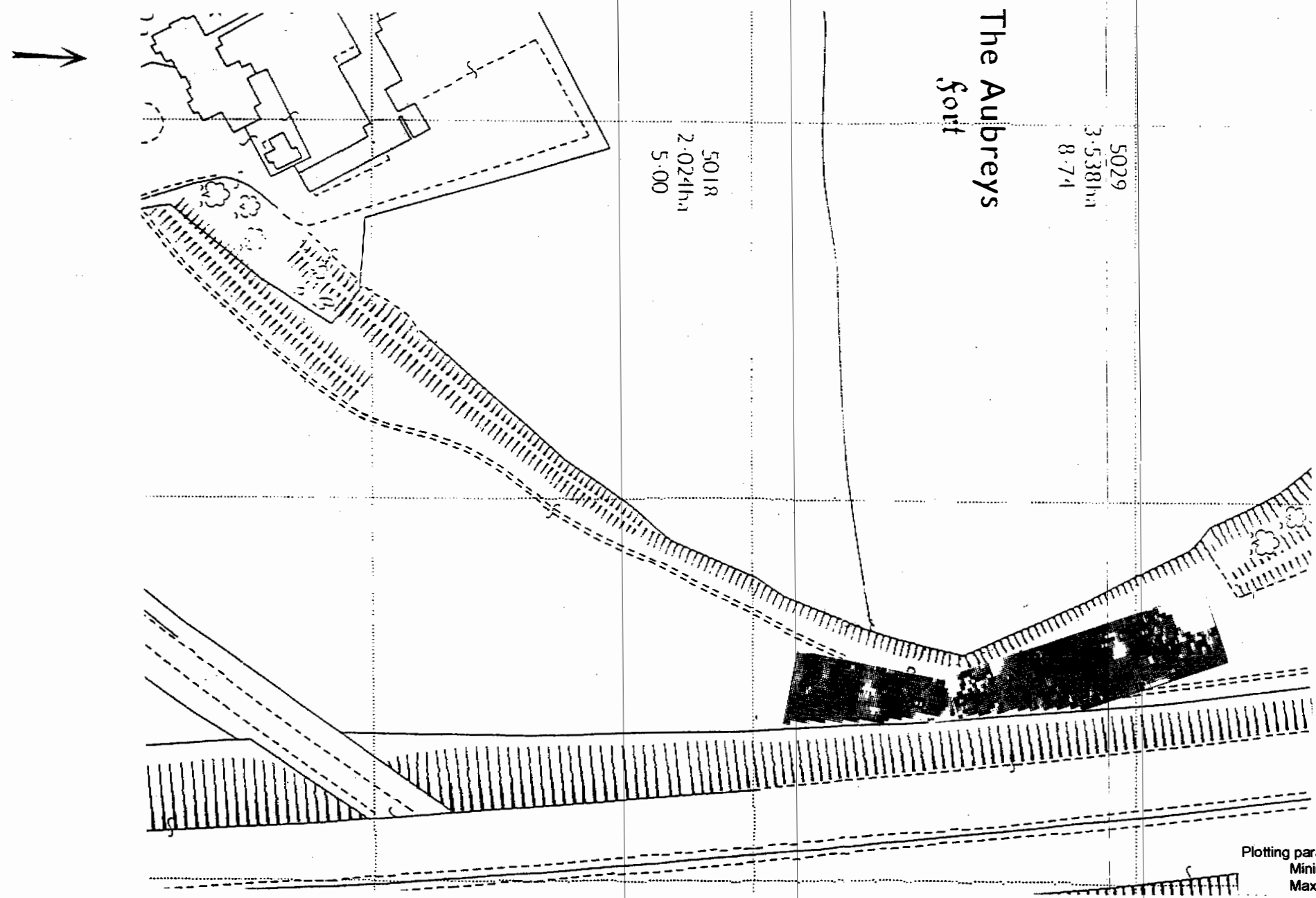
Figure 30

Scale 1:1000

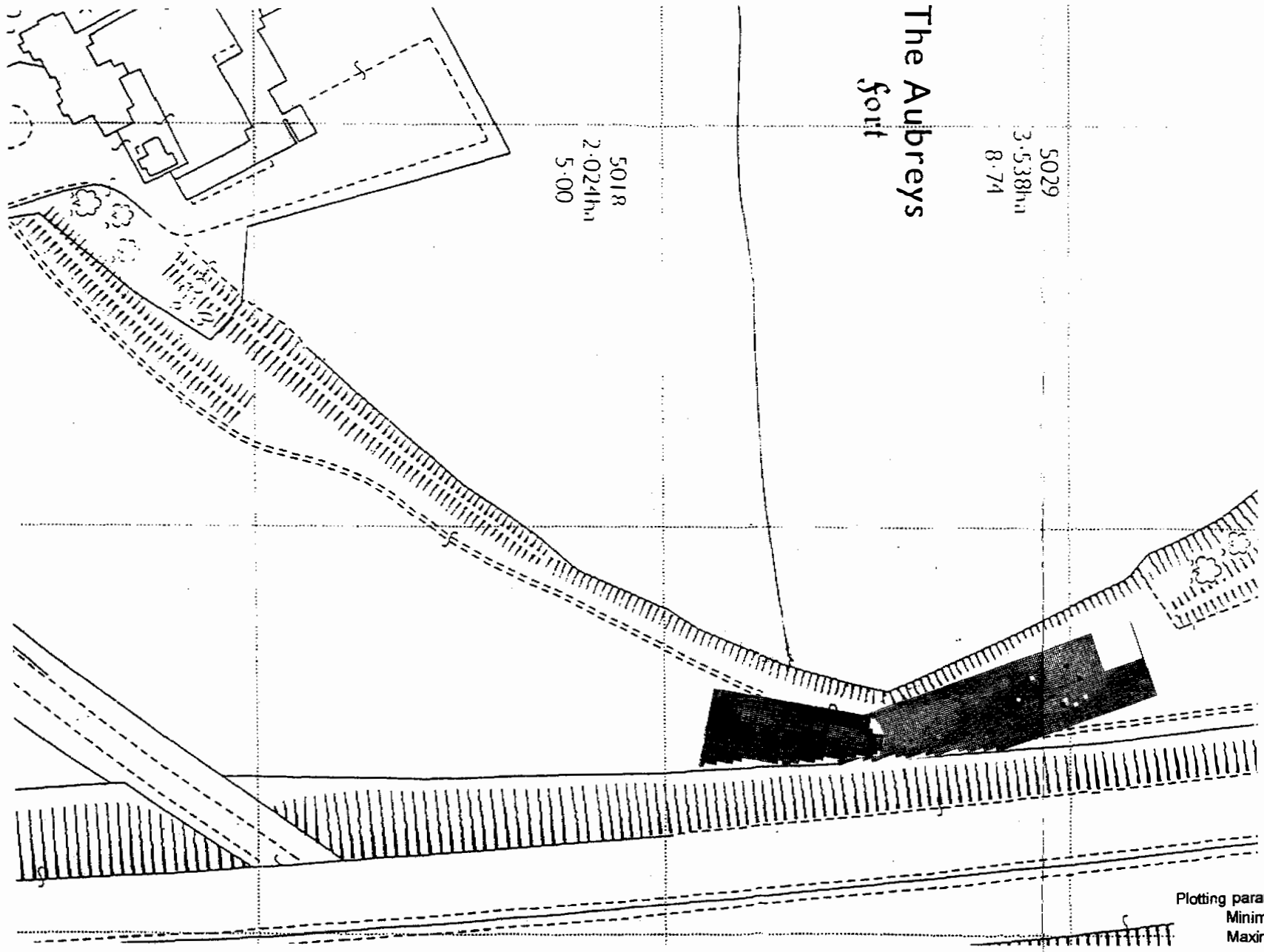
Subject Geophysical Survey - M1 Field Evaluation
Trace plot of raw magnetometer data - The Aubreys

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Date	April/May 1995	Client	ST ALBANS MUSEUMS	Figure	31	STRATASCAN™ GEOPHYSICAL & SPECIALIST SURVEY SERVICES	TILTRIDGE FARM UPPER HOOK ROAD UPTON UPON SEVERN WORCESTERSHIRE WR8 0SA UK TELEPHONE (0684) 592266 FAX (0684) 594142
Scale	1:1000	Subject	Geophysical Survey - M1 Field Evaluation Plot of processed magnetometer data - The Aubreys				



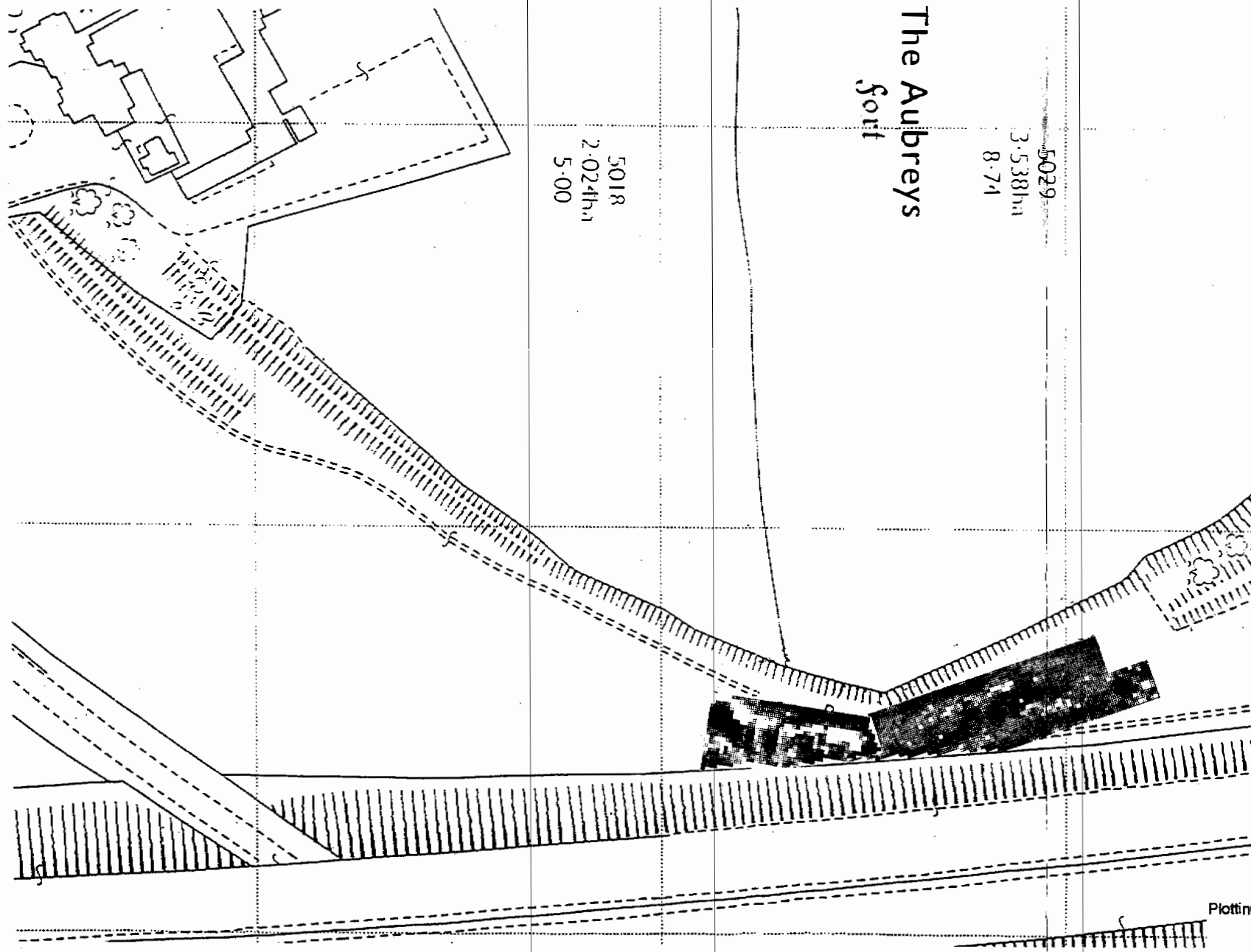
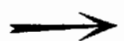
5018
2.024h
5.00

The Aubreys
fort

5029
3.538h
8.74

Plotting parameters
Minimum -19.5Ω (white)
Maximum +73.3Ω (black)

Date	April/May 1995	Client	ST ALBANS MUSEUMS	Figure	32	STRATASCAN™ GEOPHYSICAL & SPECIALIST SURVEY SERVICES TILTRIDGE FARM UPPER HOOK ROAD UPTON UPON SEVERN WORCESTERSHIRE WR8 0SA UK TELEPHONE (0684) 592266 FAX (0684) 594142
Scale	1:1000	Subject	Geophysical Survey - M1 Field Evaluation Plot of raw resistivity data - The Aubreys			



Plotting parameters
Minimum -7 Ω (white)
Maximum +7 Ω (black)

Date April/May 1995

Client ST ALBANS MUSEUMS

Figure 33

Scale 1:1000

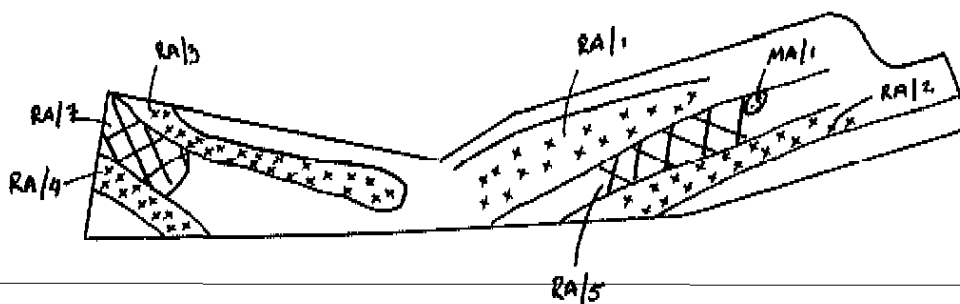
Subject Geophysical Survey - M1 Field Evaluation
Plot of processed resistivity data - The Aubreys

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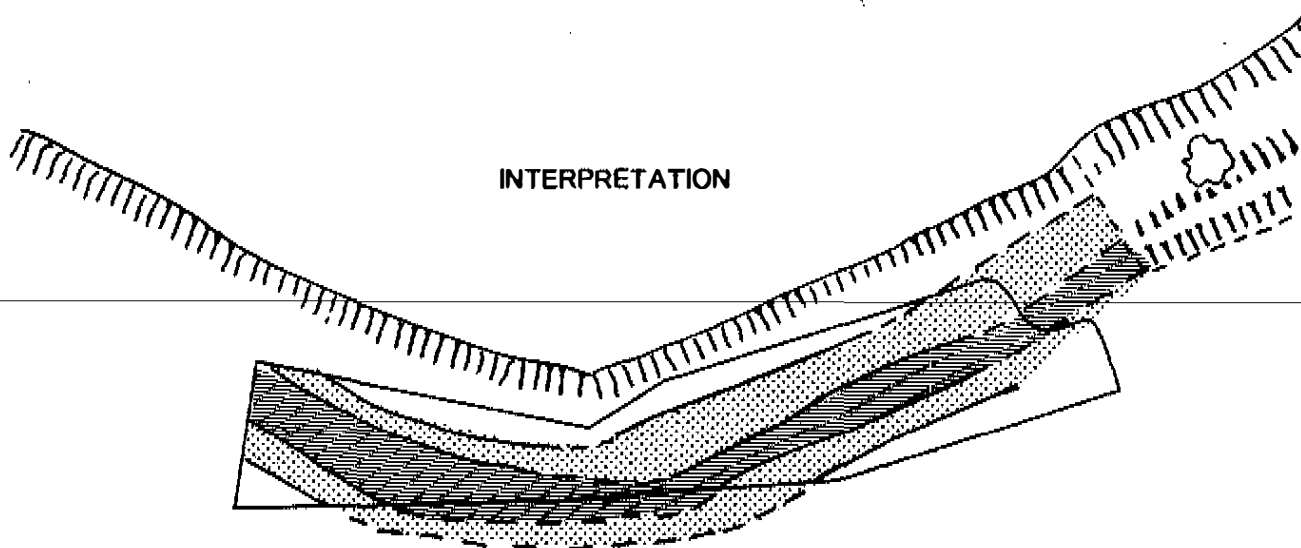
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ABSTRACTION OF ANOMALIES



INTERPRETATION



	Conjectural line of ditch
	Conjectural line of base of rampart

	Positive magnetic anomaly
	Negative magnetic anomaly
	Positive resistivity anomaly
	Negative resistivity anomaly

Date April/May 1995

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Scale 1:1000

Subject Geophysical Survey - M1 Field Evaluation
Abstraction of anomalies and Interpretation
The Aubreys

Figure 34

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