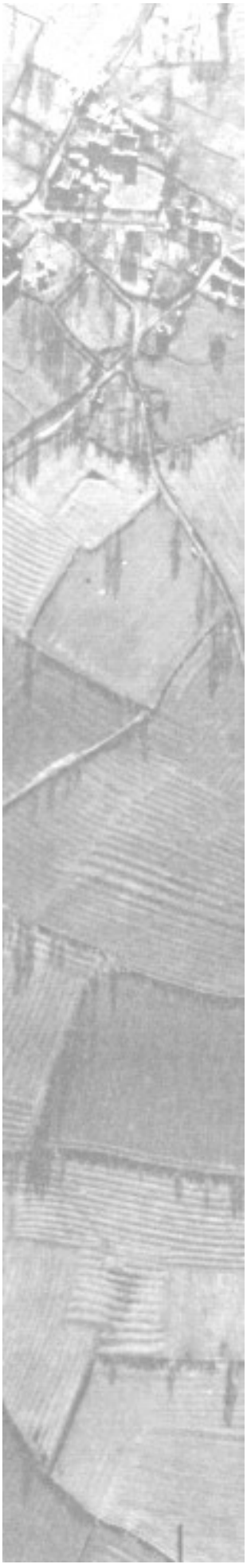


ARCHAEOLOGICAL SURVEYS

GEOPHYSICAL SURVEY REPORT

Upper Heyford Park, Oxfordshire

Magnetometer Survey

for

Oxford Archaeology

David Sabin and Kerry Donaldson

December 2006

Ref no. 165

ARCHAEOLOGICAL SURVEYS

Upper Heyford Park, Oxfordshire

Magnetometer Survey

for

Oxford Archaeology

Fieldwork by David Sabin and Francis Sabin
Report by David Sabin and Kerry Donaldson

Survey date – **1st to 5th December 2006**
Ordnance Survey Grid Reference – **SP 515 266**

Archaeological Surveys
2, Westway Close, Castle Combe, Wiltshire, SN14 7QZ
Tel. 01249 782234 FAX 0871 661 8804
Email: info@archaeological-surveys.co.uk
Web: www.archaeological-surveys.co.uk

CONTENTS

LIST OF PLATES

LIST OF FIGURES

SUMMARY

A geophysical survey was carried out over 7ha within the former Upper Heyford Airbase. Detailed magnetic survey revealed widespread magnetic debris and disturbance from modern material such as buried services which were located within the majority of the survey areas. Low magnitude positive linear and discrete anomalies were found within nine of the fourteen separate survey areas, however due to the proximity of modern structures and buried services their origin could not be confidently interpreted. It is possible that such anomalies may relate to cut features but it is possible that they have a modern origin.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys was commissioned by Oxford Archaeology to undertake a geophysical survey of three sections of land within the former Upper Heyford Airbase, now known as Heyford Park, that have been outlined for landscaping. This survey formed part of an assessment of any potential archaeology that may be affected by the landscaping.

1.2 Survey objectives

1.2.1 The objective of the survey was to use magnetometry to locate geophysical anomalies that may be archaeological in origin so that they may be assessed prior to development of the site.

1.2.2 Initially a 50% sampling strategy using 20m alternate transects was devised to cover the 15ha area outlined by the client for survey. This strategy was modified due to the presence of former airfield structures and hard surfaces within the survey area. Survey grids were located within blocks of unobstructed grassland to cover a total area of approximately 7ha.

1.3 Site location

1.3.1 The site is located at the former Upper Heyford Airbase in Oxfordshire and centred on OS grid reference SP 515 266.

1.4 Site description

1.4.1 The geophysical survey covers an area of approximately 7ha of grassland within the former airbase. The majority of the site is flat although it slopes away westwards at the extreme western end of the site. The survey was conducted over three parts of the site, to the extreme eastern and western ends of the former runway and a strip along the western edge. Within the survey area close to the western edge are reinforced concrete hangers and other disused airfield structures and all three areas contain service roads (see Plates 1 – 3).

Plate 1 Central western part of survey area looking N

Plate 2 Western end of runway looking W

Plate 3 Eastern end of runway looking NW

1.5 Site history and archaeological potential

1.5.1 Upper Heyford was set up as an airfield in 1918 by the Royal Flying Corps and was used by the RAF in World War II. During the Cold War the site was used by the United States Air Force until its role as an airbase finished in 1994. No further information on the archaeological potential of the site was made available to Archaeological Surveys.

1.6 Geology and soils

1.6.1 The underlying geology is Great Oolite (BGS 2001). Upper Heyford lies between the Cotswolds to the west and clay vales to the east although the character of the landscape is most similar to the former.

1.6.2 The overlying soils are from the Aberford association which are typical brown calcareous earths. These consist of shallow, locally brashy, well drained calcareous fine loamy soils over limestone. (Soil Survey of England and Wales 1983).

1.6.3 Magnetic survey on this geology and soil type is known to be effective (English Heritage 1995). Previous magnetic surveys carried out on similar geology and soils by Archaeological Surveys has produced very good results.

2 METHODOLOGY

2.1 Technical synopsis

2.1.1 Detailed magnetometry records localised magnetic fields that can relate to former human activity. Alteration of iron minerals present within topsoil is related to activities such as burning and the break down of biological material. These minerals become weakly magnetic within the Earth's magnetic field and can accumulate in features such as ditches and pits that are cut into the underlying subsoil. Mapping this magnetic variation can provide evidence of former settlement and land use. Additional technical details can be found in Appendix A.

2.1.2 The localised variations in magnetism are measured as sub-units of the tesla which is a SI unit of magnetic flux density. These sub-units are nanoteslas (nT) which are equivalent to 10^{-9} tesla (T).

2.2 Equipment details and configuration

2.2.1 The detailed magnetic survey was carried out using a Bartington Grad601-2 gradiometer. This instrument effectively measures a magnetic gradient between two fluxgate sensors mounted vertically 1m apart. Two sets of sensors are mounted on a single frame 1m apart horizontally. The instrument is extremely sensitive and is able to measure magnetic variation to 0.1 nanoTesla (nT). All readings are saved to an integral data logger for analysis and presentation.

2.2.2 Data was collected at 0.25m centres along traverses 1m apart. The survey area was separated into 20m by 20m grids giving 1600 recorded measurements per grid. This sampling interval is very effective at locating archaeological features and is the recommended methodology for archaeological prospection (English Heritage, 1995).

2.2.3 The survey grids were set out using a Topcon GTS212 total station and CSI Wireless dGPS (differential Global Positioning System). The dGPS was used to establish and reference a baseline orthogonal to the Ordnance Survey National Grid using the OSGB36 datum. Positional accuracy achievable using dGPS is considered as sub-metre as correction signals are received either from ground-based beacons or a geostationary satellite. A number of parameters are constantly monitored by the system in order to achieve best accuracy.

2.3 Data processing and presentation

2.3.1 Magnetometry data downloaded from the Grad 601-2 data logger is analysed and processed in specialist software known as ArcheoSurveyor. The software allows greyscale and trace plots to be produced for presentation and display. Survey grids are assembled to form an overall composite of data (composite file) creating a dataset of the complete survey area. Appendix B contains specific information concerning the survey and data attributes and is derived directly from ArcheoSurveyor.

2.3.2 Only minimal processing is carried out in order to enhance the results of the survey for display. Raw data is always analysed and displayed in the report as processing can modify anomalies. The following schedule sets out the data and image processing used in this survey:

Processing schedule

- Clipping of the raw data at ±10nT to improve greyscale resolution
- Clipping of processed data at ±3nT to enhance low magnitude anomalies
- Clipping of trace plots at ±100nT in order to minimise strong readings obscuring low magnitude responses
- Destagger may also be used to enhance linear anomalies
- Zero mean/median traverse is applied in order to balance readings along each traverse

Clipping

Clipping replaces the values outside the specified minimum and maximum with those values. The process is useful for displaying detail as extreme values are removed allowing greyscale shades to be allocated to a narrower range of values which improves the definition of anomalies.

Zero mean/median traverse

The mean/median of each traverse is calculated ignoring data outside a threshold value, the mean/median is then subtracted from the traverse. The process is used to equalise slight differences between the set-up and stability of gradiometer sensors and is used to remove striping.

2.3.3 An abstraction and interpretation is offered for all geophysical anomalies located by the survey. A brief summary of each anomaly with an appropriate reference number is set out in list form within the results (Section 3), to allow a rapid assessment of features within each survey area.

2.3.4 The main form of data display used in this report is the greyscale plot. Magnetic data is also displayed as a traceplot. Both 'raw' and 'processed' data have been shown followed by an abstraction and interpretation plot. Graphic raster images in windows bitmap format are initially prepared in ArcheoSurveyor. These images are combined with base mapping using AutoCAD LT 2007 creating DWG file formats. All images are fully embedded within the file and not externally referenced. Although AutoCAD DWG files are a universally excepted format, the programme does not handle fully embedded graphics well and there is inevitable compromise of quality. Quality is also compromised by rotation of graphics in order to allow the data to be orientated with respect to grid north; this is considered acceptable as the survey results are effectively georeferenced allowing relocation of features using GPS, resection method etc.. A digital archive including raster images is produced with this report allowing separate analysis if necessary, see 2.4 below.

2.4 Archive

2.4.1 Survey results are produced in hardcopy using A4 for text and A3 for plots (all plots are scaled for A3). In addition digital data created during the survey is supplied on CD. Further information on the production of the report and the digital formats involved in its creation are set out below.

2.4.2 This report has been prepared using the following software on a Windows XP platform:

- ArcheoSurveyor version 2.1.2.2 (geophysical data analysis)
- AutoCAD LT 2007 (report figures)
- JASC Paint Shop Pro 8 (image rotation)
- Microsoft Word 2000 (document text)
- PDF Creator version 0.9 (PDF archive).

2.4.3 Digital data is supplied on CD ROM and includes the following files:

- ArcheoSurveyor grid and composite files for all geophysical data
- CSV files for raw and processed composites
- Composite graphics as windows bitmaps
- AutoCAD DWG file in 2000 version

- Microsoft Word 2000 doc file
- PDFs of all figures
- Photographic record in JPEG format

2.4.4 The CD ROM structure is formed from a tree of directories under the title J165 Heyford – CD. Directory titles include Data, Documentation, CAD, PDFs and Photos. Multiple directories exist under Data separating resistivity from magnetometry – each data directory holds grid, composite and graphic files with CSV composite data held in export.

2.4.5 The CAD file contains embedded graphics as bitmaps, see 2.3.4, with separate A3 size layouts for each figure. Layouts are fixed using frozen layers and named views allowing straightforward plotting or analysis on screen.

3 RESULTS

3.1 General overview

3.1.1 The detailed magnetic survey was carried out over a total of 14 survey areas covering an area of 7ha. Geophysical anomalies located can be generally classified as positive linear and discrete anomalies of an uncertain origin, negative linear anomalies of an uncertain origin, areas of magnetic debris and disturbance, strong multiple dipolar linear anomalies relating to buried pipelines and services and strong dipolar anomalies relating to ferrous objects and material in the topsoil. All anomalies have been abstracted, however anomalies relating to modern ferrous material, magnetic disturbance and debris have not been listed within the results below.

3.1.2 The brief listing of anomalies below attempts to set out a number of separate categories that reflect the range and type of likely causative features:

Anomalies with an uncertain origin

(Positive anomalies abstracted are plotted in orange)

The category applies to a range of anomalies where there is not enough evidence to confidently suggest an origin. Within small area surveys often the full extent and shape of an anomaly remains unknown due to the constraints of the survey area. Anomalies in this category may well be related to archaeologically significant features but equally relatively modern features, geological/ pedological anomalies and agricultural features should be considered.

Anomalies with a modern origin

The magnetic response is often strong and dipolar indicative of ferrous material and may be associated with extant above surface features such as wire fencing, cables etc. Often a significant area around such features has a strong magnetic flux which may create magnetic disturbance – such disturbance can effectively obscure low magnitude anomalies if they are

present. Strong multiple dipolar linear anomalies are caused by the presence of buried services or pipelines. These anomalies are seen within all of the survey areas and although they have been abstracted, they have not been listed within the results.

Anomalies associated with magnetic debris

The response often appears as areas containing many small dipolar anomalies that may range from weak to strong in magnitude. Magnetic debris often occurs where there has been dumping or ground make-up and is related to magnetically thermoremnant materials such as brick or tile or other small fragments of ferrous material. These anomalies have been abstracted but are not listed within the results.

3.2 Area 1

Area centred on OS grid reference 453217, 227053, see Figures 6-9.

Anomalies with an uncertain origin

(1) – Three parallel positive linear anomalies oriented approximately north to south.

(2) – A series of positive and negative linear anomalies extend across the long axis of the survey area. They are parallel with the runway and boundary fencing and may relate to modern activity.

(3) – Two positive linear anomalies extend along the survey area and are situated close to the edges. The southern anomaly is parallel to a service and it is possible that both these anomalies relate to cut trenches associated with the runway or related services.

3.3 Area 2

Area centred on OS grid reference 453187, 227154, see Figures 6-9.

Anomalies with an uncertain origin

(4) – Two positive linear anomalies extend from the north to the southern part of the survey area.

(5) – Two positive curvilinear anomalies are located within the eastern part of the survey area.

(6) – Two positive anomalies are located within the eastern part of the survey area.

(7) – Two low magnitude discrete positive anomalies are located within the northern half of the survey area. This type of response could indicate cut

features such as pits, however whether these are of archaeological origin cannot be determined.

(8) – Extending across the length of the survey area are a series of parallel fragmented linear anomalies, they are similar in appearance to anomalies (2) seen in Area 1 to the south.

3.4 Area 3

Area centred on OS grid reference 450413, 227059, see Figures 10-13.

Anomalies with an uncertain origin

(9) – A positive curvilinear anomaly and a short positive linear anomaly are located close to the north-eastern corner of the survey area. The curvilinear anomaly appears penannular in form and has a magnitude of between 2 and 6nT. It is possible that it relates to an archaeological cut feature however due to its proximity to magnetic disturbance and modern structures it is not possible to confidently interpret the origin of this anomaly.

(10) – A low magnitude positive response is uncertain in origin, however it is possible that it relates to an in-filled depression or cut feature.

(11) – A discrete positive anomaly can be seen in the centre of the survey area, and may also be a response to an in-filled depression or cut feature.

(12) – Two negative linear anomalies cross the survey area. Although uncertain in origin it is possible that they relate to modern services. Within the survey area to the south of anomaly (12) is an aluminium outlet for an underground storage tank, therefore it is possible that some anomalies with Area 3 are modern in origin.

3.5 Area 4

Area centred on OS grid reference 450461, 227175, see Figures 10-13.

Anomalies with an uncertain origin

(13) – A low magnitude positive linear anomaly extends through the survey area from the south-western corner to the north-eastern edge. Area 4 contains a large amount of magnetic disturbance and debris from modern pipelines and material and it is not possible to ascertain if anomaly (13) relates to a cut feature with archaeological significance or if it is also a modern feature.

3.6 Area 5

Area centred on OS grid reference 450519, 227255, see Figures 10-13.

Area 5 contains widespread magnetic disturbance and magnetic debris with a modern origin.

3.7 Area 6

Area centred on OS grid reference 450120, 226437, see Figures 14-17.

Anomalies with an uncertain origin

(14) – Area 6 contains three positive linear anomalies with an uncertain origin. Two of them appear to join close to the north-western corner of the area.

3.8 Area 7

Area centred on OS grid reference 450116, 226567, see Figures 14-17.

Anomalies with an uncertain origin

(15) – Two positive linear anomalies have a moderate magnitude of up to 13nT and some associated negative response. The magnitude of the anomalies suggests that they may relate to cut features with an enhanced fill, however they could be modern in origin.

(16) – To the east of anomalies (15) are a pair of low magnitude positive linear anomalies but their origin is difficult to determine.

(17) – Two negative linear anomalies are located to the west of the centre of the area and are oriented approximately northeast to southwest. They are parallel to a modern service seen approximately 20m to the east and may also have a modern origin although this is not certain.

(18 & 19) – Within the eastern part of the survey area, two positive linear anomalies cross. Although this type of anomaly may be a response to the magnetically enhanced fill of cut features such as ditches, the presence of nearby modern disturbance has made it difficult to be confident in the interpretation.

(20) – A positive linear anomaly is located approximately 10m to the south of (19) and is parallel with it.

(21) – In the north of the survey area is an amorphous positive area anomaly.

3.9 Area 8

Area centred on OS grid reference 449900, 226527, see Figures 18-21.

Anomalies with an uncertain origin

(22 & 23) – A positive linear anomaly (22) and a positive area anomaly (23) are located within the survey area.

3.10 Area 9

Area centred on OS grid reference 459921, 226409, see Figures 18-21.

Anomalies with an uncertain origin

(24) – A positive linear anomaly extends from the centre of Area 9 to the eastern edge.

(25) – A negative linear anomaly is located close to (24) but appears to extend towards an area of magnetic disturbance.

(26) – Positive responses in the north of the survey area are low in magnitude and of a diffuse nature.

3.11 Area 10

Area centred on OS grid reference 450323, 226840, see Figures 22-25.

Area 10 is widely affected by magnetic disturbance and no significant anomalies were detected.

3.12 Area 11

Area centred on OS grid reference 450294, 226724, see Figures 22-25.

Area 11 contains widespread magnetic disturbance.

3.13 Area 12

Area centred on OS grid reference 450281, 226621, see Figures 26-29.

Anomalies with an uncertain origin

(27 & 28) – Positive linear anomalies have been located within Area 12 but their origin cannot be determined.

3.14 Area 13

Area centred on OS grid reference 450289, 226449, see Figures 26-29.

Area 13 contains a modern pipeline/service with magnetic disturbance and magnetic debris. No significant anomalies were located.

3.15 Area 14

Area centred on OS grid reference 450280, 226342, see Figures 30-33.

Anomalies with an uncertain origin

(29) – A negative linear anomaly extends across the majority of the survey area, however it is not possible to determine its origin.

4 CONCLUSION

4.1.1 The detailed magnetic survey revealed that the former airbase at Upper Heyford has been extensively modified both above and below the land surface. Buried pipelines, services and tanks as well as structures situated around the site have caused expansive areas of strong magnetic disturbance. The effect of the widespread disturbance is that the origin of other low magnitude anomalies cannot be confidently interpreted.

4.1.2 Survey Areas 1 and 2 at the eastern end of the site contain many positive and negative linear anomalies that are parallel with the runway. It is possible that they are associated with the airfield or relate to former agricultural activity.

4.1.3 In the western extremity of the site, Areas 6 to 10 and 12 to 14, all contain positive linear and discrete anomalies with a low magnitude. Although this type of anomaly may be a response to the magnetically enhanced fill of cut features such as ditches and pits, due to their proximity to modern features and ground disturbance their origin cannot be determined.

4.1.4 Survey Area 3 contains a low magnitude positive curvilinear anomaly that appears to form a pennanular cut feature. A cautious approach has been taken with the interpretation of this anomaly as the survey area is close to and contains a number of modern features that have resulted in magnetic disturbance and debris. Underground pipelines and other buried services indicate that the area has been greatly modified during the use of the airbase.

5 REFERENCES

British Geological Survey, 1977, *Geological Survey Ten Mile Map, South Sheet, First Edition (Quaternary),* Scale 1:625 000.

British Geological Survey, 2001, *Solid Geology Map, UK South Sheet, 1:625 000 scale, 4th edition.*

English Heritage, 1995, *Geophysical survey in archaeological field evaluation. Research and Professional Service Guideline No 1*.

Soil Survey of England and Wales, 1983, *Soils of England and Wales, Sheet 4 Eastern England.*

Appendix A – basic principles of magnetic survey

Iron minerals are always present to some degree within the topsoil and enhancement associated with human activity is related to increases in the level of magnetic susceptibility and thermoremnant material.

Magnetic susceptibility is an induced magnetism within a material when it is in the presence of a magnetic field. This can be thought of as effectively permanent due to the presence of the Earth's magnetic field.

Thermoremnant magnetism occurs when ferrous material is heated beyond a specific temperature known as the Curie Point. Demagnetisation occurs at this temperature with re-magnetisation by the Earth's magnetic field on cooling.

Enhancement of magnetic susceptibility can occur in areas subject to burning and complex fermentation processes on biological material; these are frequently associated with human settlement. Thermoremnant features include ovens, hearths and kilns. In addition thermoremnant material such as tile and brick may also be associated with human activity and settlement.

Silting and deliberate infilling of ditches and pits with magnetically enhanced soil can create an area of enhancement compared with the surrounding soils and subsoils into which the feature is cut. Mapping enhanced areas will produce linear and discrete anomalies allowing an assessment and characterisation of hidden subsurface features.

It should be noted that areas of negative enhancement can be produced from material having lower magnetic properties compared to topsoil. This is common for many sedimentary bedrocks and subsoils which were often used in the construction of banks and walls etc. Mapping these 'negative' anomalies may also reveal archaeological features.

Magnetic survey or magnetometry can be carried out using a fluxgate gradiometer and may be referred to as gradiometry. The gradiometer is a passive instrument consisting of two fluxgate sensors mounted vertically 1m apart. The instrument is carried about 30cm above the ground surface and the upper sensor measures the Earth's magnetic field as does the lower sensor but this is influenced to a greater degree by any localised buried field. The difference between the two sensors will relate to the strength of magnetic field created by the buried feature. If no enhanced feature is present the field measured by both sensors will be similar and the difference close to zero.

There are a number of factors that may affect the magnetic survey and these include soil type, local geology and previous human activity. Situations arise where magnetic disturbance associated with modern services, metal fencing, dumped waste material etc., obscures low magnitude fields associated with archaeological features.

Appendix B – survey and data information

Area 1 raw

COMPOSITE
Filename: Area1-raw.xcp
Instrument Type: Grad 601
(Magnetometer)
Units: nT
Surveyed by: on 03/12/2006
Assembled by: on 03/12/2006
Direction of 1st Traverse: 180 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Origin: One

Dimensions
Composite Size (readings): 160 x 240
Survey Size (meters): 40 m x 240 m
Grid Size: 20 m x 20 m
X Interval: 0.25m
Y Interval: 1m

Stats
Max: 10.00
Min: -10.00
Std Dev: 2.64
Mean: -0.17

Processes: 2
1 Base Layer
2 Clip from -10 to 10

Source Grids: 24
1 Col:0 Row:0 grids\01.asg
2 Col:0 Row:1 grids\02.asg
3 Col:0 Row:2 grids\03.asg
4 Col:0 Row:3 grids\04.asg
5 Col:0 Row:4 grids\05.asg
6 Col:0 Row:5 grids\06.asg
7 Col:0 Row:6 grids\13.asg
8 Col:0 Row:7 grids\14.asg
9 Col:0 Row:8 grids\15.asg
10 Col:0 Row:9 grids\16.asg
11 Col:0 Row:10 grids\17.asg
12 Col:0 Row:11 grids\18.asg
13 Col:1 Row:0 grids\07.asg
14 Col:1 Row:1 grids\08.asg
15 Col:1 Row:2 grids\09.asg
16 Col:1 Row:3 grids\10.asg
17 Col:1 Row:4 grids\11.asg
18 Col:1 Row:5 grids\12.asg
19 Col:1 Row:6 grids\19.asg
20 Col:1 Row:7 grids\20.asg
21 Col:1 Row:8 grids\21.asg
22 Col:1 Row:9 grids\22.asg
23 Col:1 Row:10 grids\23.asg
24 Col:1 Row:11 grids\24.asg

Area 1 processed

COMPOSITE
Filename: Area1-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 1.36
Mean: -0.07

Processes: 5
1 Base Layer
2 Clip from -10 to 10
3 De Stagger: Grids: All Mode: Both By: -1 intervals
4 DeStripe Mean Traverse: Grids: All Threshold: 1 SDs
5 Clip from -3 to 3

Area 2 raw

COMPOSITE
Filename: Area2-raw.xcp
Instrument Type: Grad 601
(Magnetometer)
Units: nT
Surveyed by: on 03/12/2006
Assembled by: on 03/12/2006
Direction of 1st Traverse: 180 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Origin: One

Dimensions
Composite Size (readings): 160 x 260
Survey Size (meters): 40 m x 260 m
Grid Size: 20 m x 20 m
X Interval: 0.25m
Y Interval: 1m

Stats
Max: 10.00
Min: -10.00
Std Dev: 2.76
Mean: -0.77

Processes: 2
1 Base Layer
2 Clip from -10 to 10

Source Grids: 26
1 Col:0 Row:0 grids\07.asg
2 Col:0 Row:1 grids\08.asg
3 Col:0 Row:2 grids\09.asg
4 Col:0 Row:3 grids\10.asg
5 Col:0 Row:4 grids\11.asg
6 Col:0 Row:5 grids\12.asg
7 Col:0 Row:6 grids\13.asg
8 Col:0 Row:7 grids\14.asg
9 Col:0 Row:8 grids\15.asg
10 Col:0 Row:9 grids\16.asg
11 Col:0 Row:10 grids\17.asg
12 Col:0 Row:11 grids\18.asg
13 Col:0 Row:12 grids\26.asg
14 Col:1 Row:0 grids\01.asg
15 Col:1 Row:1 grids\02.asg
16 Col:1 Row:2 grids\03.asg
17 Col:1 Row:3 grids\04.asg
18 Col:1 Row:4 grids\05.asg
19 Col:1 Row:5 grids\06.asg
20 Col:1 Row:6 grids\19.asg
21 Col:1 Row:7 grids\20.asg
22 Col:1 Row:8 grids\21.asg
23 Col:1 Row:9 grids\22.asg
24 Col:1 Row:10 grids\23.asg
25 Col:1 Row:11 grids\24.asg
26 Col:1 Row:12 grids\25.asg

Area 2 processed

COMPOSITE
Filename: Area2-proc.xcp
Stats
Max: 3.00
Min: -3.00
Std Dev: 1.36
Mean: -0.01

Processes: 5
1 Base Layer
2 Clip from -10 to 10
3 DeStripe Median Traverse: Grids: All
4 De Stagger: Grids: All Mode: Both By: -1 intervals
5 Clip from -3 to 3

Area 3 raw

COMPOSITE
Filename: Area3-raw.xcp
Instrument Type: Grad 601
(Magnetometer)
Units: nT
Surveyed by: on 03/12/2006
Assembled by: on 03/12/2006
Direction of 1st Traverse: 180 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Origin: One

Dimensions
Composite Size (readings): 240 x 80
Survey Size (meters): 60 m x 80 m
Grid Size: 20 m x 20 m
X Interval: 0.25m
Y Interval: 1m

Stats
Max: 10.00
Min: -10.00
Std Dev: 5.05
Mean: 0.59

Processes: 2
1 Base Layer
2 Clip from -10 to 10

Source Grids: 9
1 Col:0 Row:0 grids\05.asg
2 Col:0 Row:1 grids\06.asg
3 Col:1 Row:0 grids\01.asg
4 Col:1 Row:1 grids\02.asg
5 Col:1 Row:2 grids\03.asg
6 Col:1 Row:3 grids\04.asg
7 Col:2 Row:0 grids\07.asg
8 Col:2 Row:1 grids\08.asg
9 Col:2 Row:2 grids\09.asg

Area 3 processed

COMPOSITE
Filename: Area3-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 2.05
Mean: 0.03

Processes: 5
1 Base Layer
2 Clip from -10 to 10
3 DeStripe Mean Traverse: Grids: All Threshold: 1 SDs
4 De Stagger: Grids: All Mode: Both By: -1 intervals
5 Clip from -3 to 3

Area 4 raw

COMPOSITE
Filename: Area4-raw.xcp
Instrument Type: Grad 601
(Magnetometer)
Units: nT
Surveyed by: on 03/12/2006
Assembled by: on 03/12/2006
Direction of 1st Traverse: 180 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Origin: One

Dimensions
Composite Size (readings): 320 x 100
Survey Size (meters): 80 m x 100 m
Grid Size: 20 m x 20 m
X Interval: 0.25m
Y Interval: 1m

Stats
Max: 100.00
Min: -100.00
Std Dev: 32.18
Mean: 2.00

Processes: 2
1 Base Layer
2 Clip from -100 to 100

Source Grids: 19
1 Col:0 Row:0 grids\01.asg
2 Col:0 Row:1 grids\02.asg
3 Col:0 Row:2 grids\03.asg
4 Col:0 Row:3 grids\04.asg
5 Col:1 Row:0 grids\05.asg
6 Col:1 Row:1 grids\06.asg
7 Col:1 Row:2 grids\07.asg
8 Col:1 Row:3 grids\08.asg
9 Col:1 Row:4 grids\09.asg
10 Col:2 Row:0 grids\10.asg
11 Col:2 Row:1 grids\11.asg
12 Col:2 Row:2 grids\12.asg
13 Col:2 Row:3 grids\13.asg
14 Col:2 Row:4 grids\14.asg
15 Col:3 Row:0 grids\15.asg
16 Col:3 Row:1 grids\16.asg
17 Col:3 Row:2 grids\17.asg
18 Col:3 Row:3 grids\18.asg
19 Col:3 Row:4 grids\19.asg

Area 4 processed

COMPOSITE
Filename: Area4-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 2.48
Mean: 0.09

Processes: 6
1 Base Layer
2 Clip from -10 to 10
3 DeStripe Mean Traverse: Grids: All Threshold: 1 SDs
4 Clip from -3 to 3
5 De Stagger: Grids: All Mode: Both By: -1 intervals
6 Clip from -3 to 3

Area 5 raw

COMPOSITE
Filename: Area5-raw.xcp
Instrument Type: Grad 601
(Magnetometer)
Units: nT
Surveyed by: on 03/12/2006
Assembled by: on 03/12/2006
Direction of 1st Traverse: 180 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Origin: One

Dimensions
Composite Size (readings): 160 x 40
Survey Size (meters): 40 m x 40 m
Grid Size: 20 m x 20 m
X Interval: 0.25m
Y Interval: 1m

Stats
Max: 100.00
Min: -100.00
Std Dev: 57.03
Mean: 4.59

Processes: 2
1 Base Layer
2 Clip from -100 to 100

Source Grids: 4
1 Col:0 Row:0 grids\01.asg
2 Col:0 Row:1 grids\02.asg
3 Col:1 Row:0 grids\03.asg
4 Col:1 Row:1 grids\04.asg

Area 5 processed

COMPOSITE
Filename: Area5-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 2.85
Mean: -0.11

Processes: 3
1 Base Layer
2 Clip from -10 to 10
3 Clip from -3 to 3

Area 6 raw

COMPOSITE
Filename: Area6-raw.xcp
Instrument Type: Grad 601
(Magnetometer)
Units: nT
Surveyed by: on 04/12/2006
Assembled by: on 04/12/2006
Direction of 1st Traverse: 180 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Origin: One

Dimensions
Composite Size (readings): 240 x 280
Survey Size (meters): 60 m x 280 m
Grid Size: 20 m x 20 m
X Interval: 0.25m
Y Interval: 1m

Stats
Max: 10.00
Min: -10.00
Std Dev: 6.15
Mean: -1.47

Processes: 2
1 Base Layer
2 Clip from -10 to 10

Source Grids: 30
1 Col:0 Row:0 grids\01.asg
2 Col:0 Row:1 grids\02.asg
3 Col:0 Row:2 grids\03.asg
4 Col:0 Row:3 grids\04.asg
5 Col:0 Row:4 grids\05.asg
6 Col:0 Row:5 grids\06.asg
7 Col:0 Row:6 grids\23.asg
8 Col:0 Row:7 grids\24.asg
9 Col:0 Row:8 grids\25.asg
10 Col:0 Row:9 grids\26.asg
11 Col:0 Row:10 grids\27.asg
12 Col:0 Row:11 grids\28.asg
13 Col:0 Row:12 grids\29.asg
14 Col:0 Row:13 grids\30.asg
15 Col:1 Row:0 grids\07.asg
16 Col:1 Row:1 grids\08.asg
17 Col:1 Row:2 grids\09.asg
18 Col:1 Row:3 grids\10.asg
19 Col:1 Row:4 grids\11.asg
20 Col:1 Row:5 grids\12.asg
21 Col:1 Row:6 grids\19.asg
22 Col:1 Row:7 grids\20.asg
23 Col:1 Row:8 grids\21.asg
24 Col:1 Row:9 grids\22.asg
25 Col:2 Row:0 grids\13.asg
26 Col:2 Row:1 grids\14.asg
27 Col:2 Row:2 grids\15.asg
28 Col:2 Row:3 grids\16.asg
29 Col:2 Row:4 grids\17.asg
30 Col:2 Row:5 grids\18.asg

Area 6 processed

COMPOSITE
Filename: Area6-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 2.24
Mean: -0.55

Processes: 7
1 Base Layer
2 Clip from -10 to 10
3 De Stagger: Grids: All Mode: Both By: -1 intervals
4 Clip from -10 to 10
5 DeStripe Mean Traverse: Grids: All Threshold: 0.5 SDs
6 Clip from -10 to 10
7 Clip from -3 to 3

Area 7 raw

COMPOSITE
Filename: Area7-raw.xcp
Instrument Type: Grad 601
(Magnetometer)
Units: nT
Surveyed by: on 04/12/2006
Assembled by: on 04/12/2006
Direction of 1st Traverse: 180 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Origin: One

Dimensions
Composite Size (readings): 160 x 280
Survey Size (meters): 40 m x 280 m
Grid Size: 20 m x 20 m
X Interval: 0.25m
Y Interval: 1m

Stats
Max: 10.00
Min: -10.00
Std Dev: 5.17
Mean: -1.19

Processes: 4
1 Base Layer
2 Clip from -10 to 10
3 De Stagger: Grids: All Mode: Both By: -1 intervals
4 Clip from -10 to 10

Source Grids: 23
1 Col:0 Row:0 grids\01.asg
2 Col:0 Row:1 grids\02.asg
3 Col:0 Row:2 grids\03.asg
4 Col:0 Row:3 grids\04.asg
5 Col:0 Row:4 grids\05.asg
6 Col:0 Row:5 grids\06.asg
7 Col:0 Row:6 grids\13.asg
8 Col:0 Row:7 grids\14.asg
9 Col:0 Row:8 grids\15.asg
10 Col:1 Row:0 grids\07.asg
11 Col:1 Row:1 grids\08.asg
12 Col:1 Row:2 grids\09.asg
13 Col:1 Row:3 grids\10.asg
14 Col:1 Row:4 grids\11.asg
15 Col:1 Row:5 grids\12.asg
16 Col:1 Row:6 grids\16.asg
17 Col:1 Row:7 grids\17.asg
18 Col:1 Row:8 grids\18.asg
19 Col:1 Row:9 grids\19.asg
20 Col:1 Row:10 grids\20.asg
21 Col:1 Row:11 grids\21.asg
22 Col:1 Row:12 grids\22.asg
23 Col:1 Row:13 grids\23.asg

Area 7 processed

COMPOSITE
Filename: Area7-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 2.06
Mean: -0.31

Processes: 6
1 Base Layer
2 Clip from -10 to 10
3 De Stagger: Grids: All Mode: Both By: -1 intervals
4 Clip from -10 to 10
5 DeStripe Mean Traverse: Grids: All Threshold: 1 SDs
6 Clip from -3 to 3

Area 8 raw

COMPOSITE
Filename: Area8-raw.xcp
Instrument Type: Grad 601
(Magnetometer)
Units: nT
Surveyed by: on 04/12/2006
Assembled by: on 04/12/2006
Direction of 1st Traverse: 180 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Origin: One

Dimensions
Composite Size (readings): 160 x 80
Survey Size (meters): 40 m x 80 m
Grid Size: 20 m x 20 m
X Interval: 0.25m
Y Interval: 1m

Stats
Max: 10.00
Min: -10.00
Std Dev: 3.69
Mean: -0.76

Processes: 2
1 Base Layer
2 Clip from -10 to 10

Source Grids: 7
1 Col:0 Row:0 grids\01.asg
2 Col:0 Row:1 grids\02.asg
3 Col:0 Row:2 grids\03.asg
4 Col:0 Row:3 grids\04.asg
5 Col:1 Row:1 grids\05.asg
6 Col:1 Row:2 grids\06.asg
7 Col:1 Row:3 grids\07.asg

Area 8 processed
COMPOSITE
Filename: Area8-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 1.62
Mean: -0.09

Processes: 6
1 Base Layer
2 Clip from -10 to 10
3 De Stagger: Grids: All Mode: Both By: -1 intervals
4 DeStripe Median Traverse: Grids: 05.asg 06.asg 07.asg
5 DeStripe Mean Traverse: Grids: 01.asg 02.asg 03.asg 04.asg Threshold: 1 SDs
6 Clip from -3 to 3

Area 9 raw

COMPOSITE
Filename: Area9-raw.xcp
Instrument Type: Grad 601
(Magnetometer)
Units: nT
Surveyed by: on 04/12/2006
Assembled by: on 04/12/2006
Direction of 1st Traverse: 180 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Origin: One

Dimensions
Composite Size (readings): 160 x 80
Survey Size (meters): 40 m x 80 m

Grid Size: 20 m x 20 m
X Interval: 0.25m
Y Interval: 1m

Stats
Max: 10.00
Min: -10.00
Std Dev: 3.41
Mean: -0.89

Processes: 4
1 Base Layer
2 Clip from -10 to 10
3 De Stagger: Grids: All Mode: Both By: -2 intervals
4 Clip from -10 to 10

Source Grids: 7
1 Col:0 Row:1 grids\01.asg
2 Col:0 Row:2 grids\02.asg
3 Col:0 Row:3 grids\03.asg
4 Col:1 Row:0 grids\04.asg
5 Col:1 Row:1 grids\05.asg
6 Col:1 Row:2 grids\06.asg
7 Col:1 Row:3 grids\07.asg

Area 9 processed

COMPOSITE
Filename: Area9-proc.xcp
Stats
Max: 3.00
Min: -3.00
Std Dev: 1.58
Mean: -0.22

Processes: 5
1 Base Layer
2 Clip from -10 to 10
3 De Stagger: Grids: All Mode: Both By: -1 intervals
4 DeStripe Mean Traverse: Grids: All Threshold: 1 SDs
5 Clip from -3 to 3

Area 10 raw

COMPOSITE
Filename: Area10-raw.xcp
Instrument Type: Grad 601 (Magnetometer)
Units: nT
Surveyed by: on 05/12/2006
Assembled by: on 05/12/2006
Direction of 1st Traverse: 180 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Origin: One

Dimensions
Composite Size (readings): 80 x 20
Survey Size (meters): 20 m x 20 m
Grid Size: 20 m x 20 m
X Interval: 0.25m
Y Interval: 1m

Stats
Max: 10.00
Min: -10.00
Std Dev: 8.66
Mean: 2.99

Processes: 2
1 Base Layer
2 Clip from -10 to 10

Source Grids: 1
1 Col:0 Row:0 grids\01.asg

Area 10 processed

COMPOSITE
Filename: Area10-proc.xcp

Stats
Max: 10.00
Min: -10.00
Std Dev: 8.66
Mean: 2.99

Processes: 2
1 Base Layer
2 Clip from -10 to 10

Area 11 raw
COMPOSITE
Filename: Area11-raw.xcp
Description:
Instrument Type: Grad 601 (Magnetometer)
Units: nT
Surveyed by: on 05/12/2006
Assembled by: on 05/12/2006
Direction of 1st Traverse: 180 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Origin: One

Dimensions
Composite Size (readings): 80 x 40
Survey Size (meters): 20 m x 40 m
Grid Size: 20 m x 20 m
X Interval: 0.25m
Y Interval: 1m

Stats
Max: 10.00
Min: -10.00
Std Dev: 8.98
Mean: -2.21

Processes: 2
1 Base Layer
2 Clip from -10 to 10

Source Grids: 2
1 Col:0 Row:0 grids\01.asg
2 Col:0 Row:1 grids\02.asg

Area 11 processed

COMPOSITE
Filename: Area11-proc.xcp

Stats
Max: 10.00
Min: -10.00
Std Dev: 8.98
Mean: -2.21

Processes: 2
1 Base Layer
2 Clip from -10 to 10

Area 12 raw

COMPOSITE
Filename: Area12-raw.xcp
Description:
Instrument Type: Grad 601 (Magnetometer)
Units: nT
Surveyed by: on 05/12/2006
Assembled by: on 05/12/2006
Direction of 1st Traverse: 180 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Origin: One

Dimensions
Composite Size (readings): 80 x 100
Survey Size (meters): 20 m x 100 m
Grid Size: 20 m x 20 m
X Interval: 0.25m
Y Interval: 1m

Stats
Max: 10.00
Min: -10.00
Std Dev: 7.18
Mean: -1.58

Processes: 3
1 Base Layer
2 De Stagger: Grids: All Mode: Both By: -2 intervals
3 Clip from -10 to 10

Source Grids: 5
1 Col:0 Row:0 grids\01.asg
2 Col:0 Row:1 grids\02.asg
3 Col:0 Row:2 grids\03.asg
4 Col:0 Row:3 grids\04.asg
5 Col:0 Row:4 grids\05.asg

Area 12 processed

COMPOSITE
Filename: Area12-proc.xcp

Stats
Max: 10.00
Min: -10.00
Std Dev: 7.17
Mean: -1.62

Processes: 4
1 Base Layer
2 Clip from -10 to 10
3 De Stagger: Grids: All Mode: Both By: -1 intervals
4 Clip from -10 to 10

Area 13 raw

COMPOSITE
Filename: Area13-raw.xcp
escription:
Instrument Type: Grad 601 (Magnetometer)
Units: nT
Surveyed by: on 05/12/2006
Assembled by: on 05/12/2006
Direction of 1st Traverse: 180 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Origin: One

Dimensions
Composite Size (readings): 160 x 100
Survey Size (meters): 40 m x 100 m
Grid Size: 20 m x 20 m
X Interval: 0.25m
Y Interval: 1m

Stats
Max: 10.00
Min: -10.00
Std Dev: 5.60
Mean: -0.35

Processes: 3
1 Base Layer
2 De Stagger: Grids: All Mode: Both By: -2 intervals
3 Clip from -10 to 10

Source Grids: 10
1 Col:0 Row:0 grids\01.asg
2 Col:0 Row:1 grids\02.asg
3 Col:0 Row:2 grids\03.asg
4 Col:0 Row:3 grids\04.asg
5 Col:0 Row:4 grids\05.asg
6 Col:1 Row:0 grids\06.asg
7 Col:1 Row:1 grids\07.asg
8 Col:1 Row:2 grids\08.asg
9 Col:1 Row:3 grids\09.asg
10 Col:1 Row:4 grids\10.asg

Area 13 processed

COMPOSITE
Filename: Area13-proc.xcp

Stats
Max: 10.00
Min: -10.00
Std Dev: 5.25
Mean: -0.37

Processes: 6
1 Base Layer
2 Clip from -10 to 10
3 De Stagger: Grids: All Mode: Both By: -1 intervals
4 Clip from -10 to 10
5 DeStripe Mean Traverse: Grids: All Threshold: 1 SDs
6 Clip from -10 to 10

Area 14 raw

COMPOSITE
Filename: Area14-raw.xcp
Instrument Type: Grad 601 (Magnetometer)
Units: nT
Surveyed by: on 05/12/2006
Assembled by: on 05/12/2006
Direction of 1st Traverse: 180 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Origin: One

Dimensions
Composite Size (readings): 80 x 60
Survey Size (meters): 20 m x 60 m
Grid Size: 20 m x 20 m
X Interval: 0.25m
Y Interval: 1m

Stats
Max: 10.00
Min: -10.00
Std Dev: 3.16

Mean: 1.01

Processes: 3
1 Base Layer
2 De Stagger: Grids: All Mode: Both By: -2 intervals
3 Clip from -10 to 10

Source Grids: 3
1 Col:0 Row:0 grids\01.asg
2 Col:0 Row:1 grids\02.asg
3 Col:0 Row:2 grids\03.asg

Area 14 processed

COMPOSITE
Stats
Max: 3.00
Min: -3.00
Std Dev: 1.68
Mean: -0.10

Processes: 6
1 Base Layer
2 Clip from -10 to 10
3 De Stagger: Grids: All Mode: Both By: -1 intervals
4 DeStripe Median Traverse: Grids: All
5 Clip from -10 to 10
6 Clip from -3 to 3

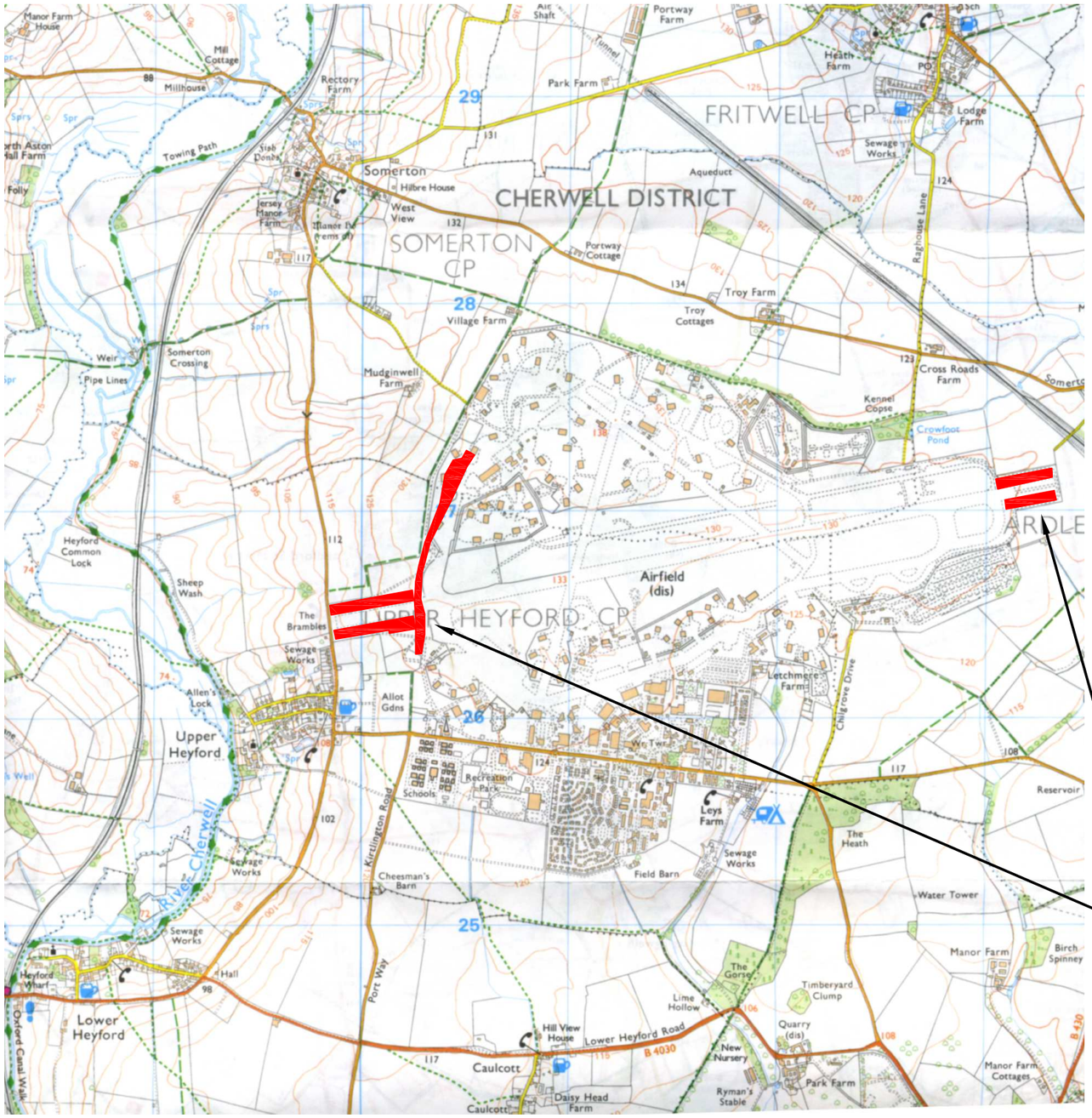
Source Grids: 3
1 Col:0 Row:0 grids\01.asg
2 Col:0 Row:1 grids\02.asg
3 Col:0 Row:2 grids\03.asg

Archaeological Surveys

Geophysical Survey
Upper Heyford Park

Map of survey area

Reproduced from OS Explorer map no.191 1:25 000 by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office. © Crown copyright. All rights reserved. Licence number 100043739.



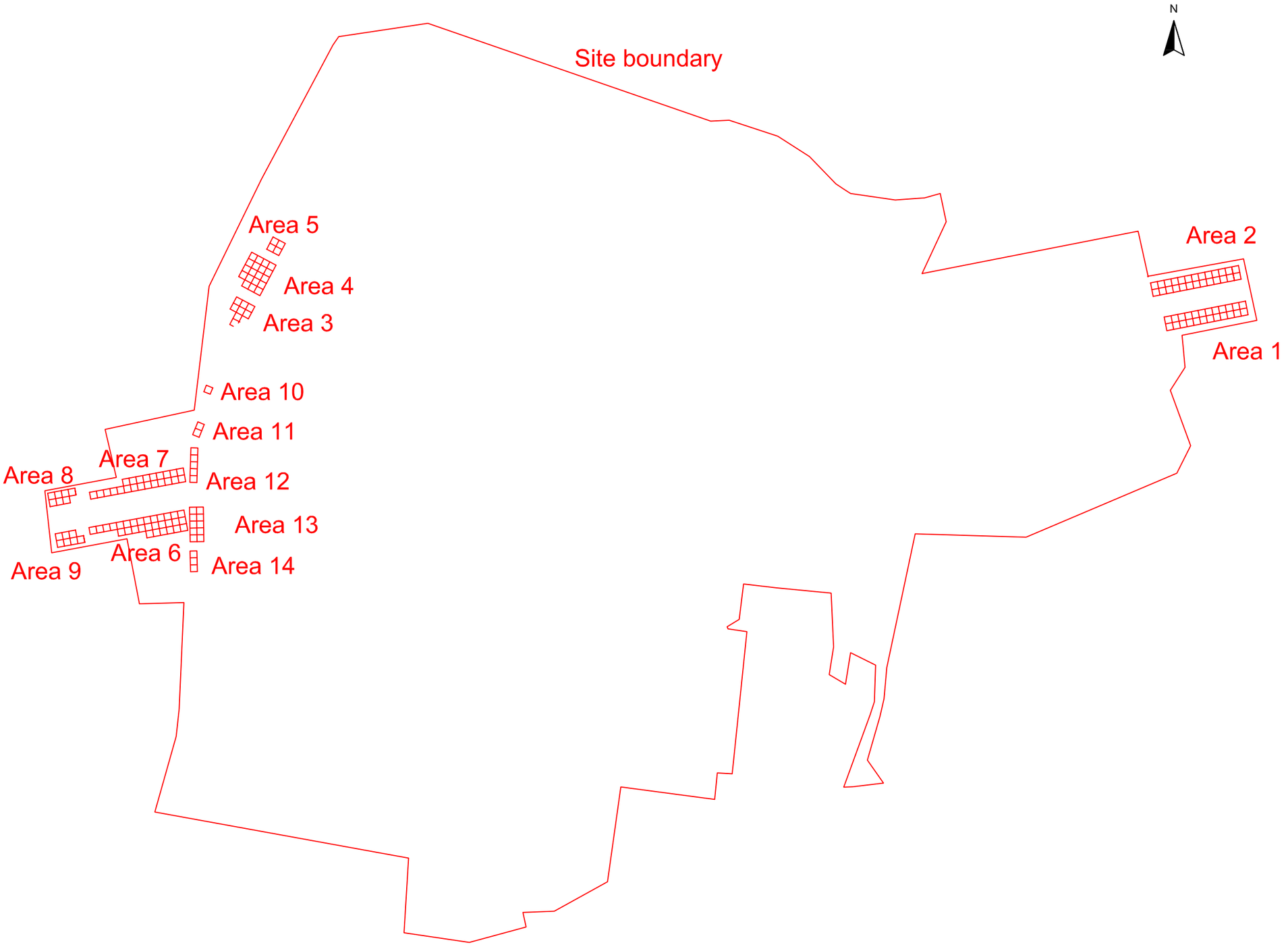
● Survey location

Site centred on OS NGR
SP 515 266

SCALE 1:25 000

0km 500m 1km

FIG 01



Archaeological Surveys

Geophysical Survey
Upper Heyford Park

Location of Survey Areas

SCALE 1:12 000

0m 120 240 360 480 600m

FIG 02

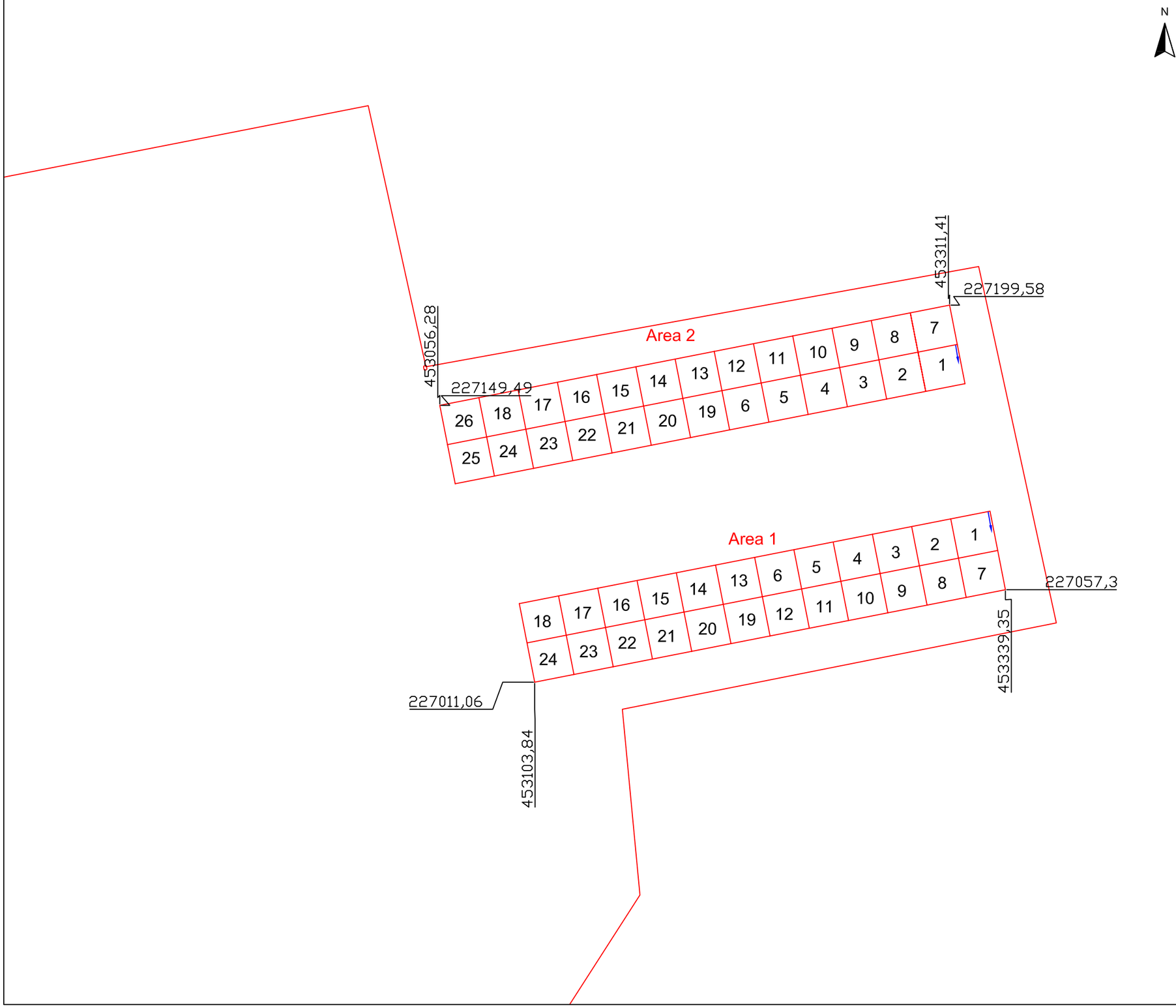
Archaeological Surveys

Geophysical Survey
Upper Heyford Park

Referencing information - Areas 1 & 2

Based on OS coordinates (OS GB 36)

Survey start and traverse direction



SCALE 1:2000

0m 20 40 60 80 100m

FIG 03

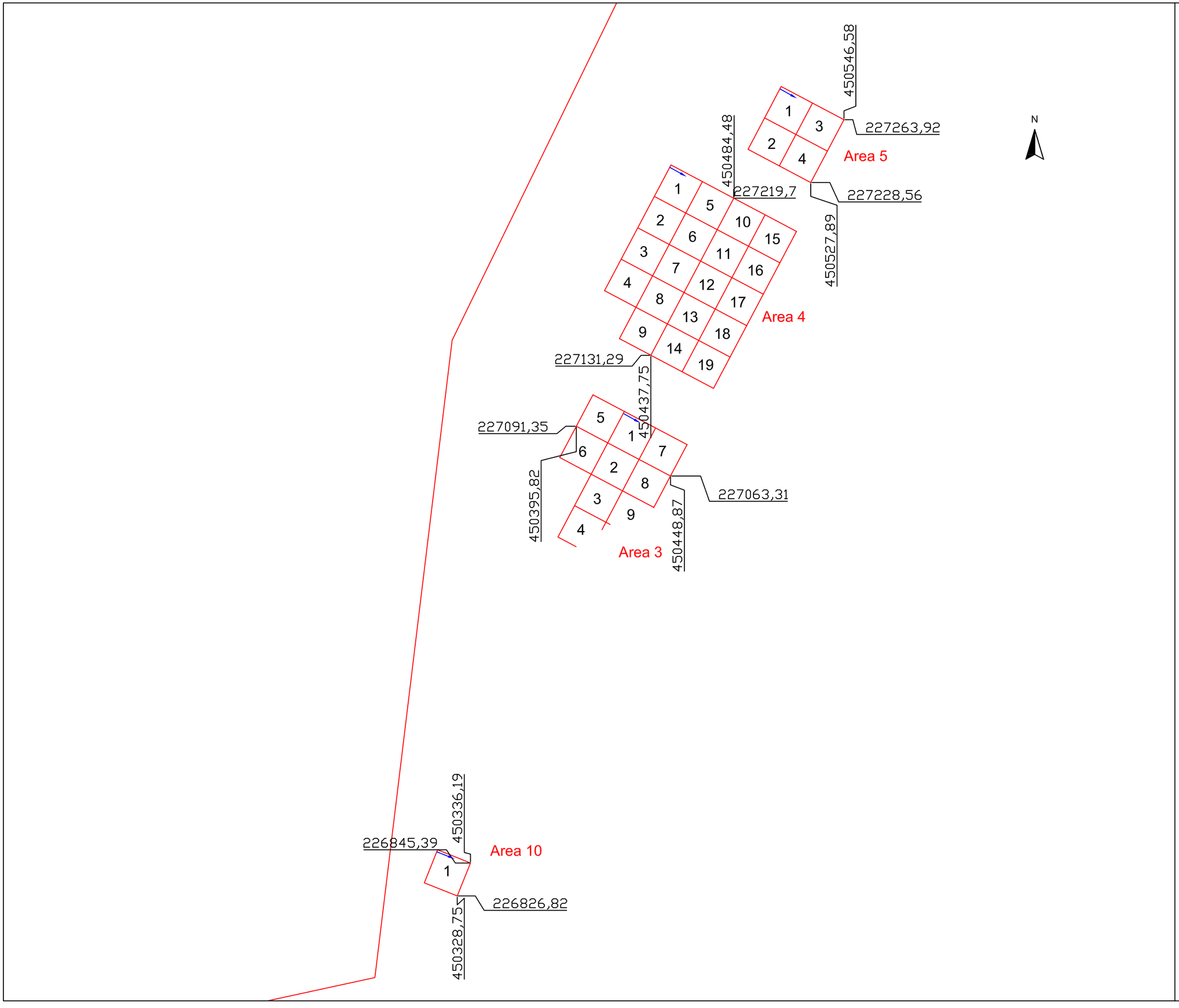
Archaeological Surveys

Geophysical Survey
Upper Heyford Park

Referencing information - Area 3, 4, 5 and 10

Based on OS coordinates (OSGB36)

Survey start and traverse direction



SCALE 1:2000

0m 20 40 60 80 100m

FIG 04

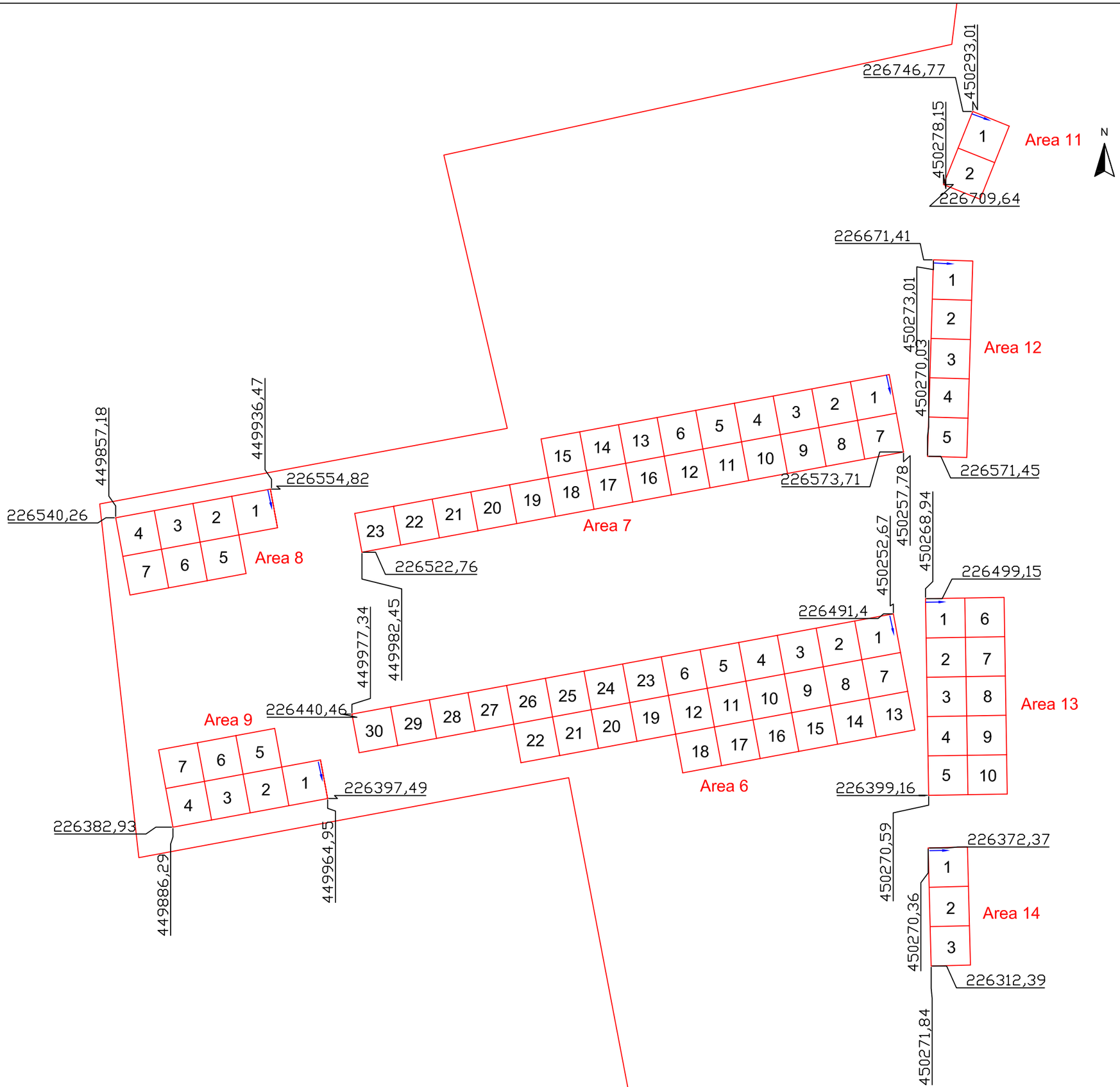
Archaeological Surveys

Geophysical Survey
Upper Heyford Park

Referencing information -
Areas 6, 7, 8, 9, 11, 12, 13 & 14

Based on OS coordinates (OSGB36)

Survey start and traverse direction



SCALE 1:2000

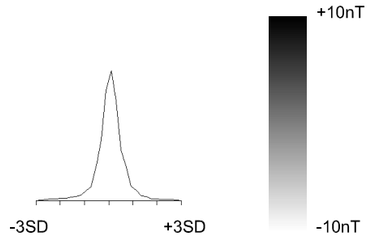
0m 20 40 60 80 100m

FIG 05

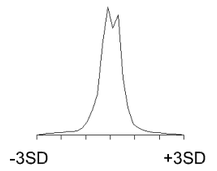
Archaeological Surveys

Geophysical Survey
Upper Heyford Airbase

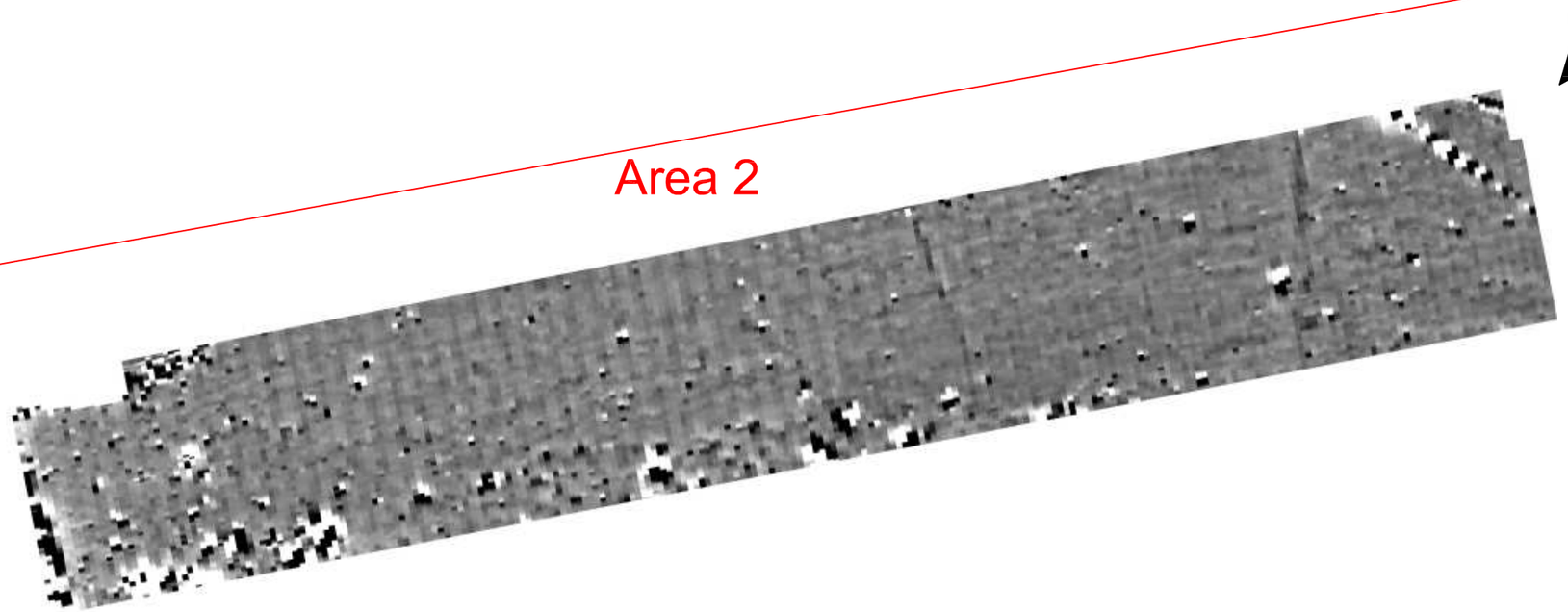
Greyscale plot of raw magnetometer data - Areas 1 and 2

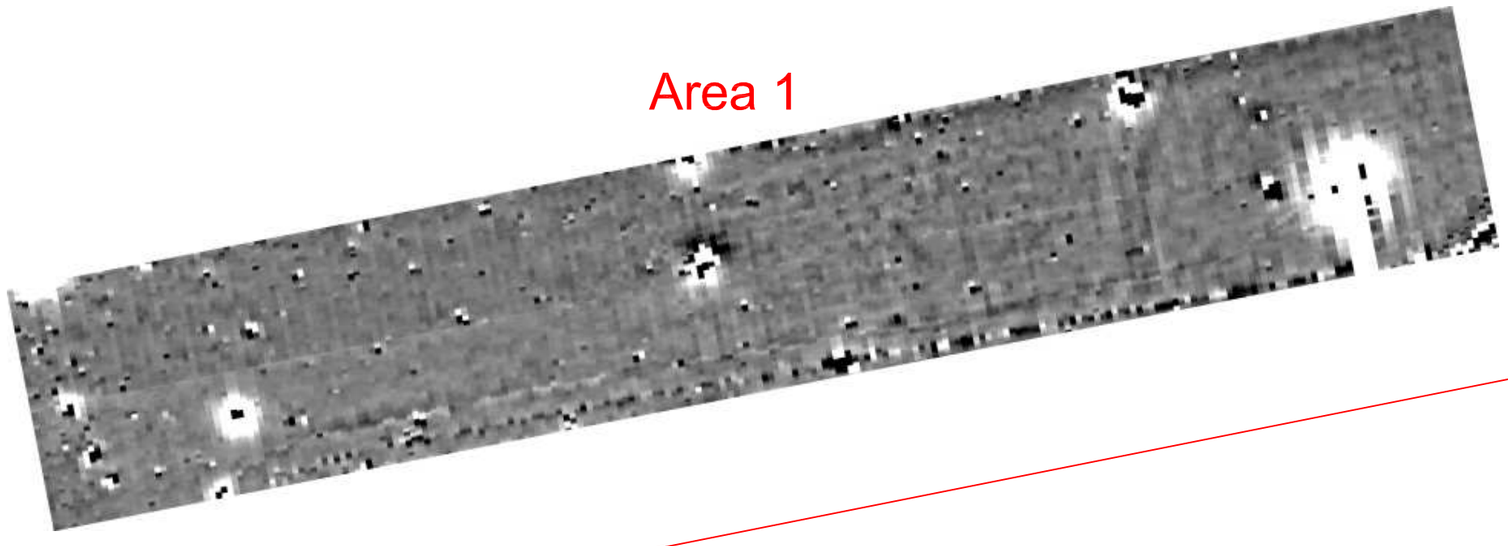


Area 1



Area 2





SCALE 1:1000

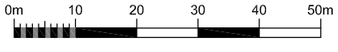
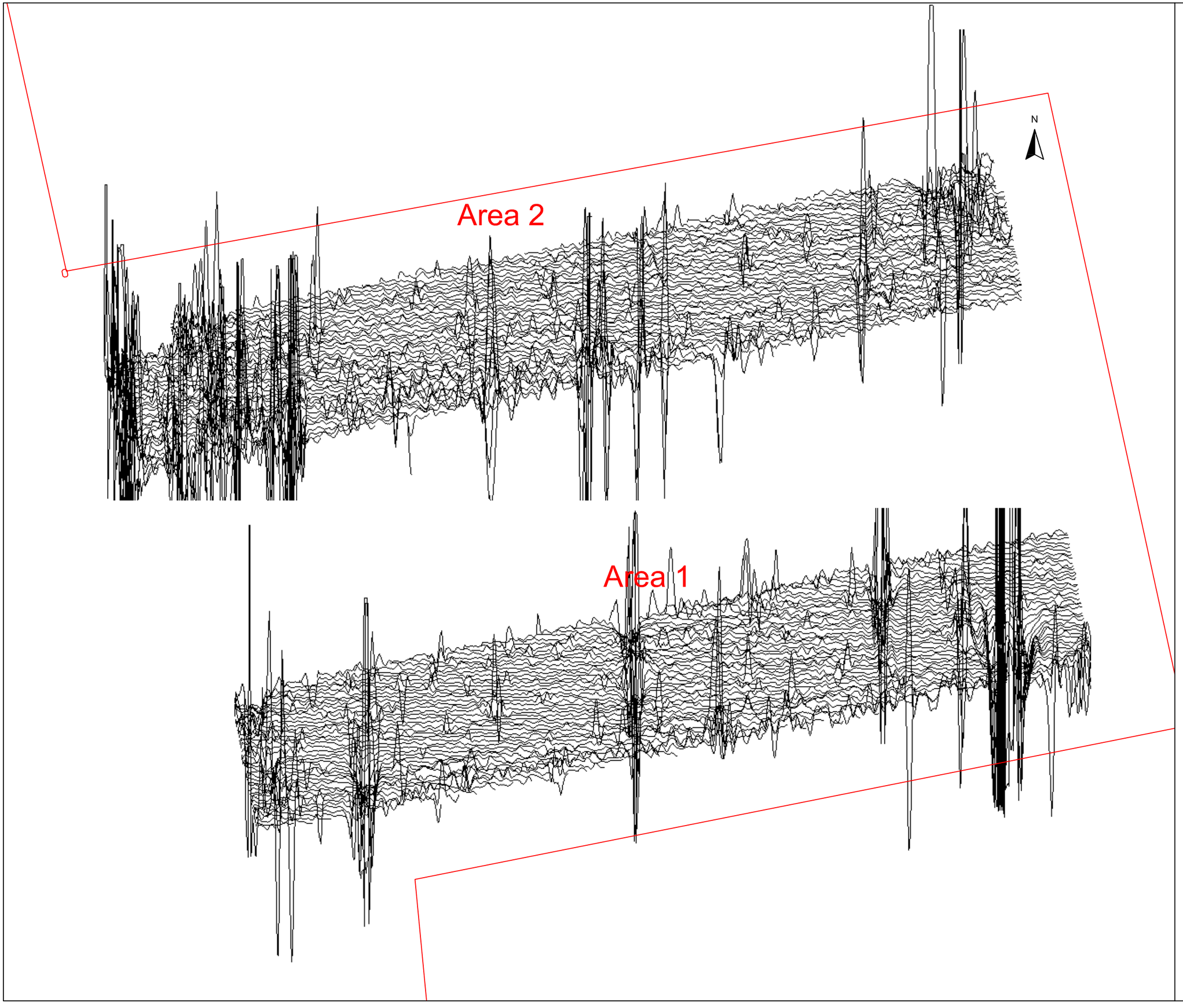


FIG 06

Archaeological Surveys

Geophysical Survey
Upper Heyford Park

Traceplot of raw magnetometer data - Areas 1 and 2



+40nT
+20nT
0nT
-20nT
-40nT

Approximately 20nT/ cm vertical displacement.

Data has been clipped at ± 100nT.

SCALE 1:1000

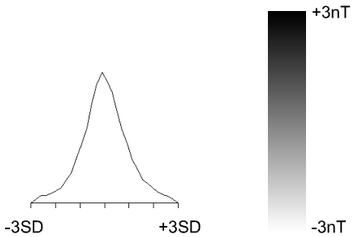
0m 10 20 30 40 50m

FIG 07

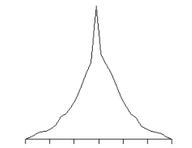
Archaeological Surveys

Geophysical Survey
Upper Heyford Park

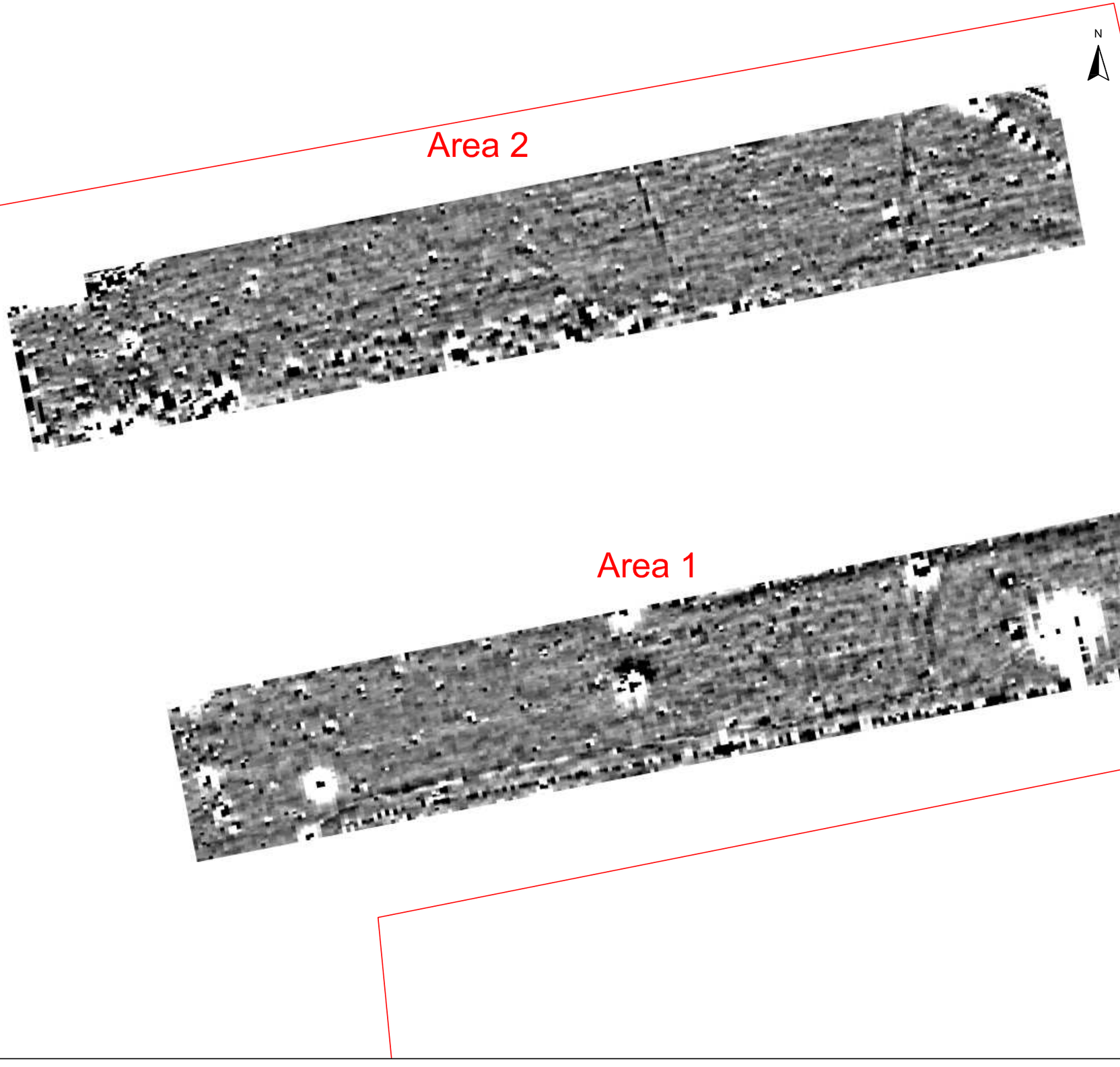
Greyscale plot of processed magnetometer data - Area 1 and 2



Area 1



Area 2



SCALE 1:1000

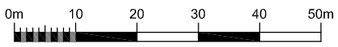
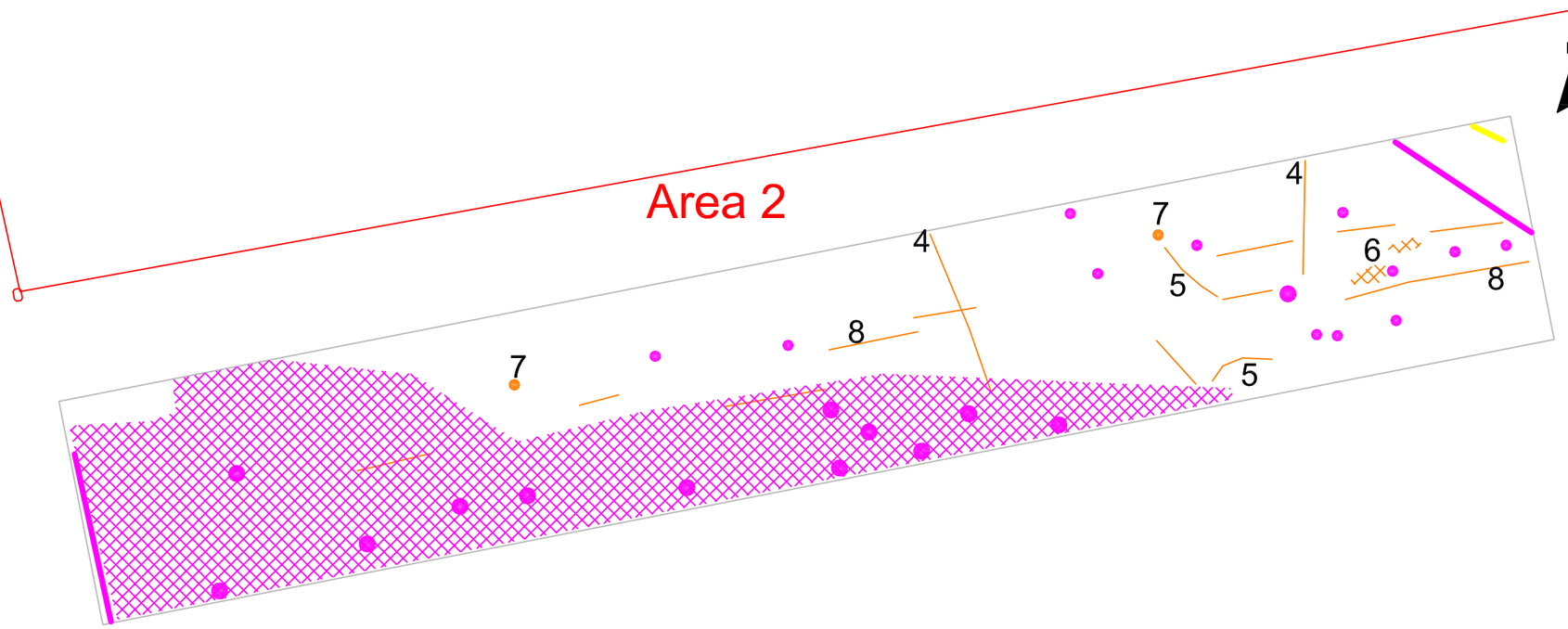


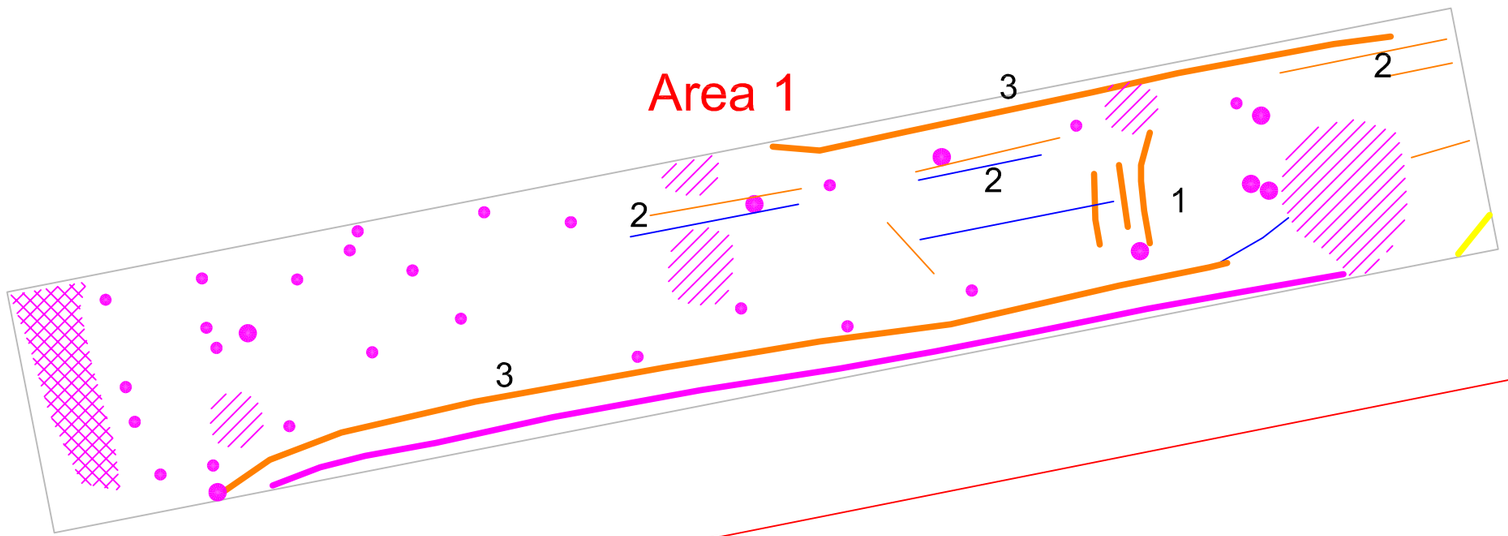
FIG 08

Archaeological Surveys

Geophysical Survey
Upper Heyford Park

Abstraction and interpretation of magnetometer anomalies - Areas 1 and 2





- Positive linear anomaly - of uncertain origin
- Perimeter road edge
- Negative linear anomaly - of uncertain origin
- Discrete positive response - uncertain origin
- Positive anomaly - uncertain origin
- Magnetic debris - spread of magnetically thermoremnant/ ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

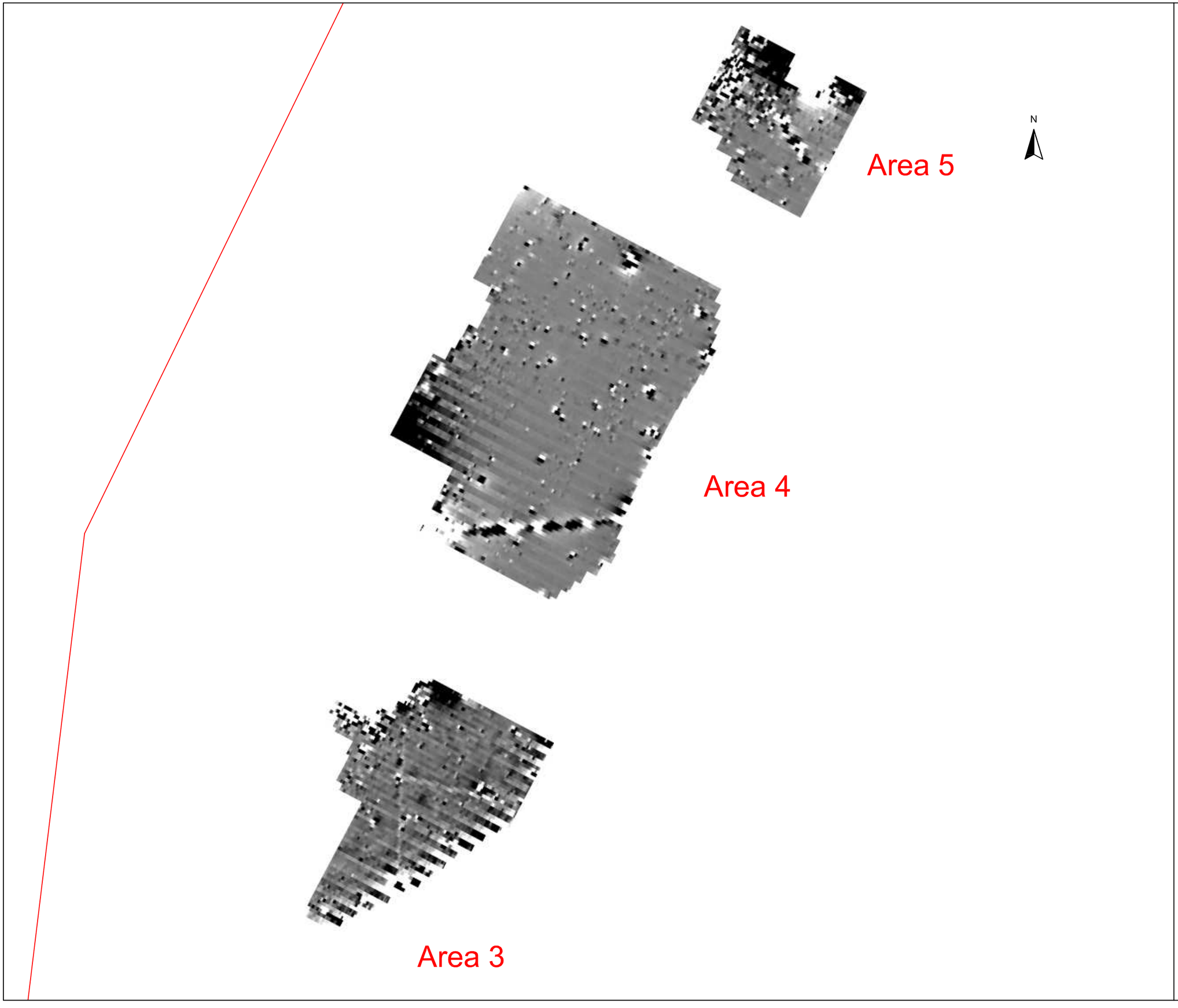
SCALE 1:1000

0m 10 20 30 40 50m

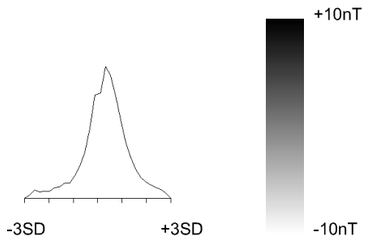
FIG 09

Archaeological Surveys

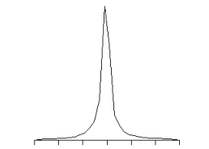
Geophysical Survey
Upper Heyford Park



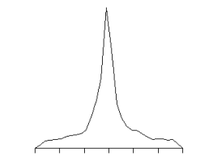
Greyscale plot of raw magnetometer data - Areas 3, 4 and 5



Area 3



Area 4



Area 5

SCALE 1:1000

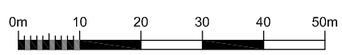
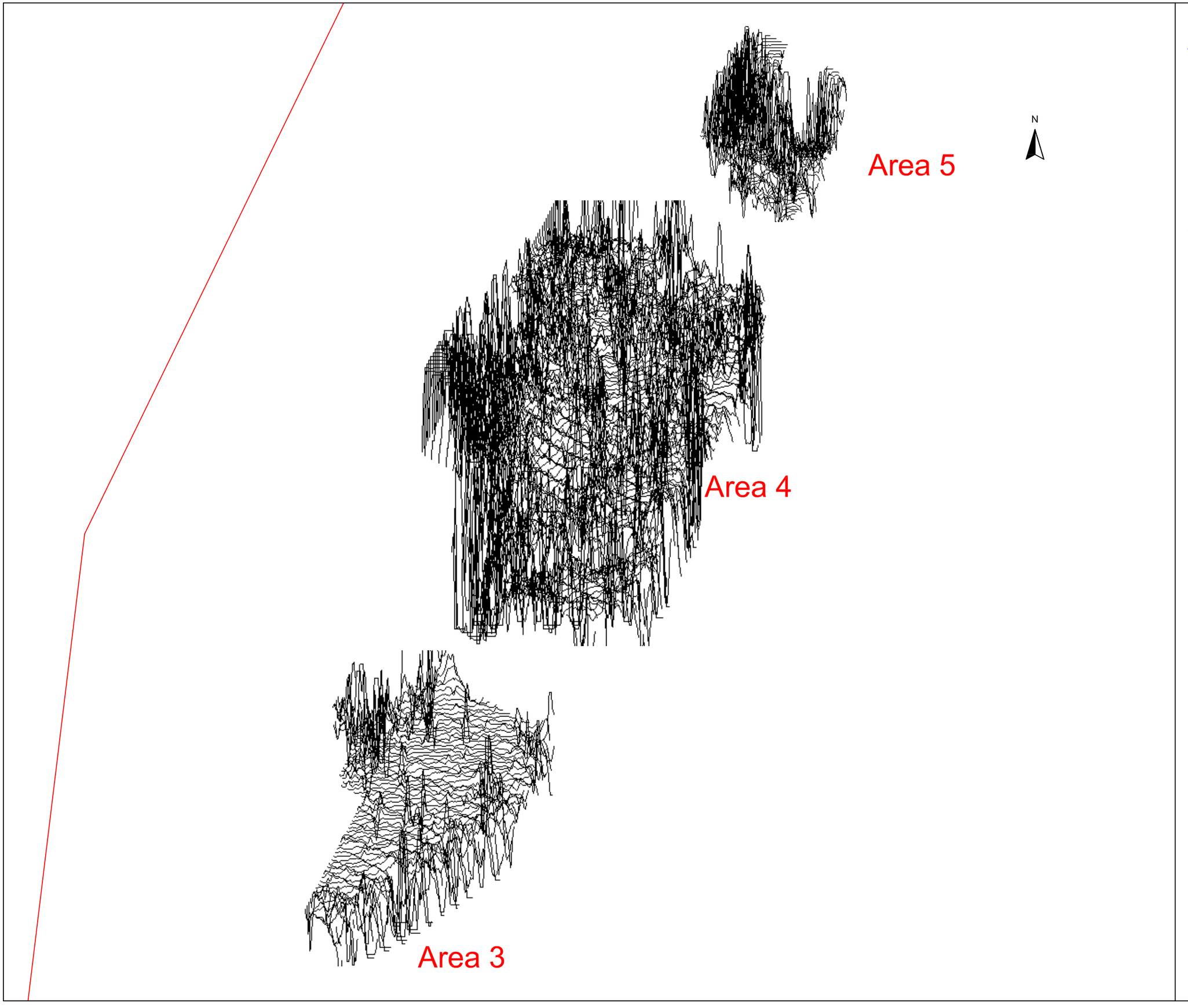


FIG 10



Archaeological Surveys

Geophysical Survey
Upper Heyford Park

Traceplot of raw magnetometer data - Areas 3, 4 and 5

+100nT
+50nT
0nT
-50nT
-100nT

Approximately 50nT/ cm vertical displacement.

Data has been clipped at ± 100nT.

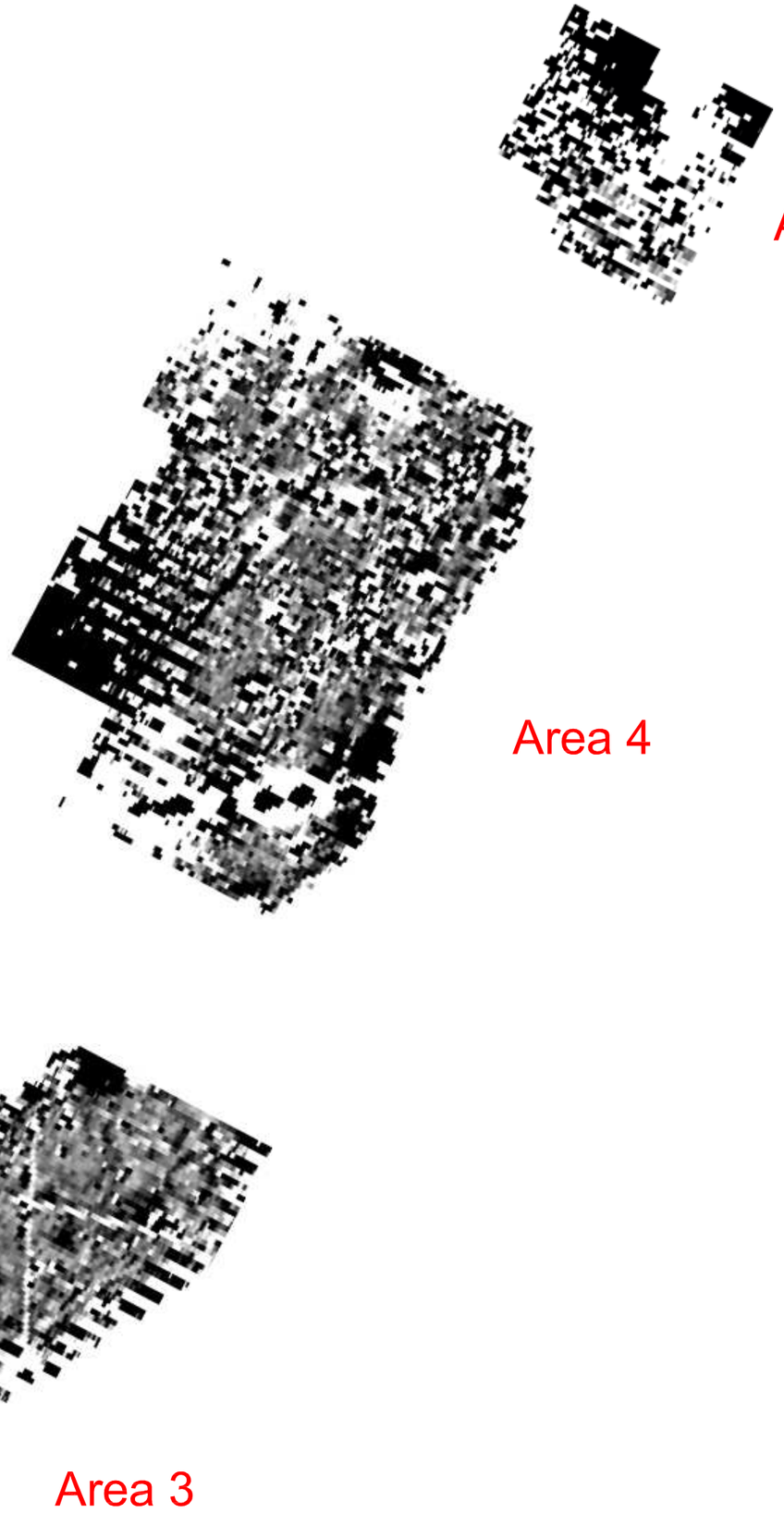
SCALE 1:1000

0m 10 20 30 40 50m

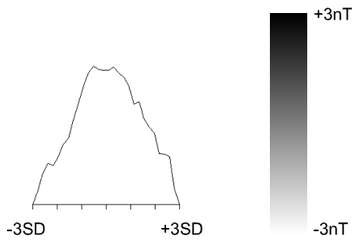
FIG 11

Archaeological Surveys

Geophysical Survey
Upper Heyford Park

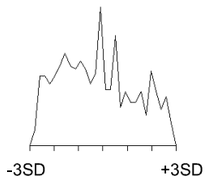


Greyscale plot of processed magnetometer data - Areas 3, 4 and 5



Area 3

Area 4



Area 5

SCALE 1:1000

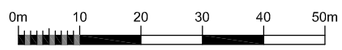


FIG 12

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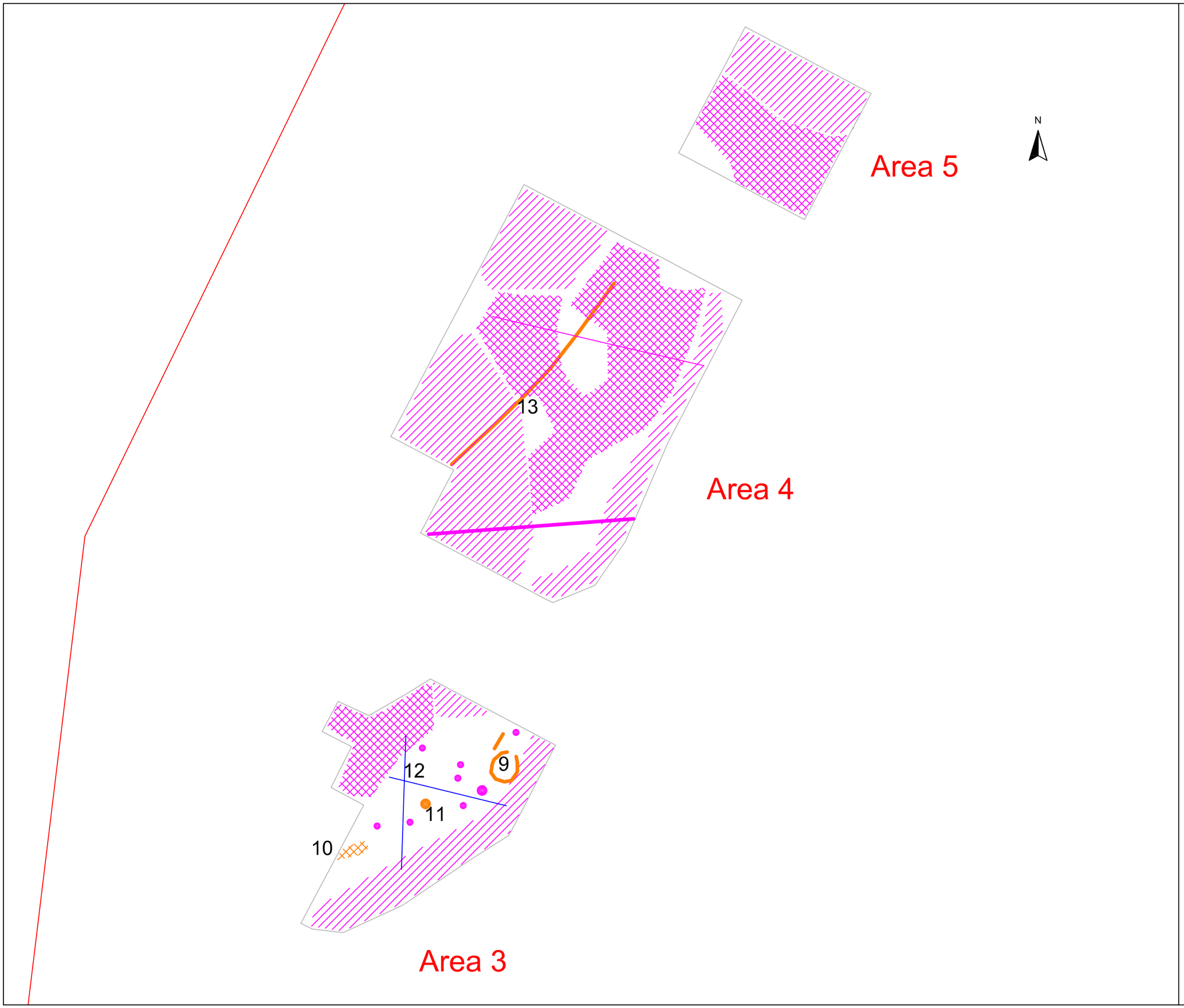
Upper Heyford Park

Abstraction and interpretation of magnetometer anomalies - Areas 3, 4 and 5



- Positive linear anomaly - of uncertain origin
- Negative linear anomaly - of uncertain origin
- Discrete positive response - uncertain origin
- Positive response - of uncertain origin
- Magnetic debris - spread of magnetically thermoremnant/ ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

SCALE 1:1000

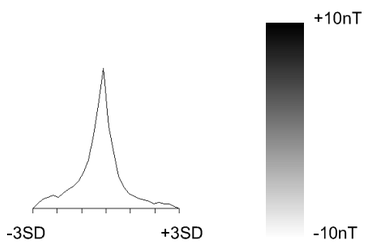
0m 10 20 30 40 50m

FIG 13

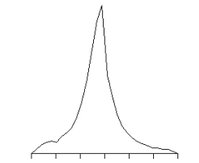
Archaeological Surveys

Geophysical Survey
Upper Heyford Park

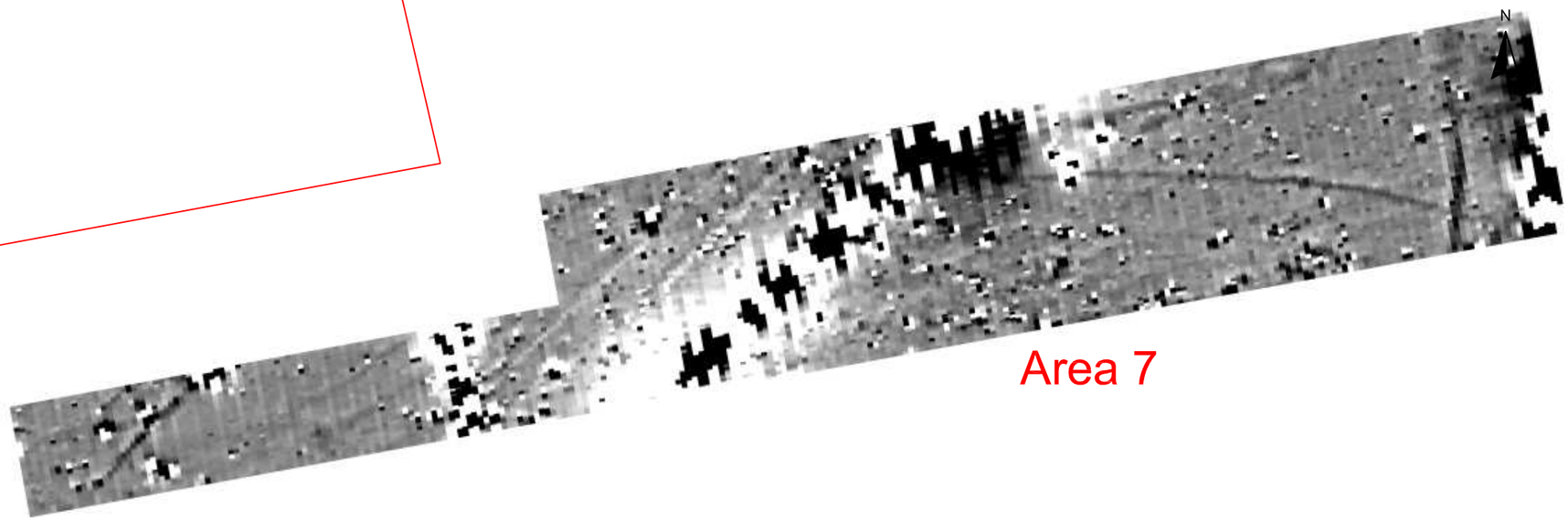
Greyscale plot of raw magnetometer data - Areas 6 and 7

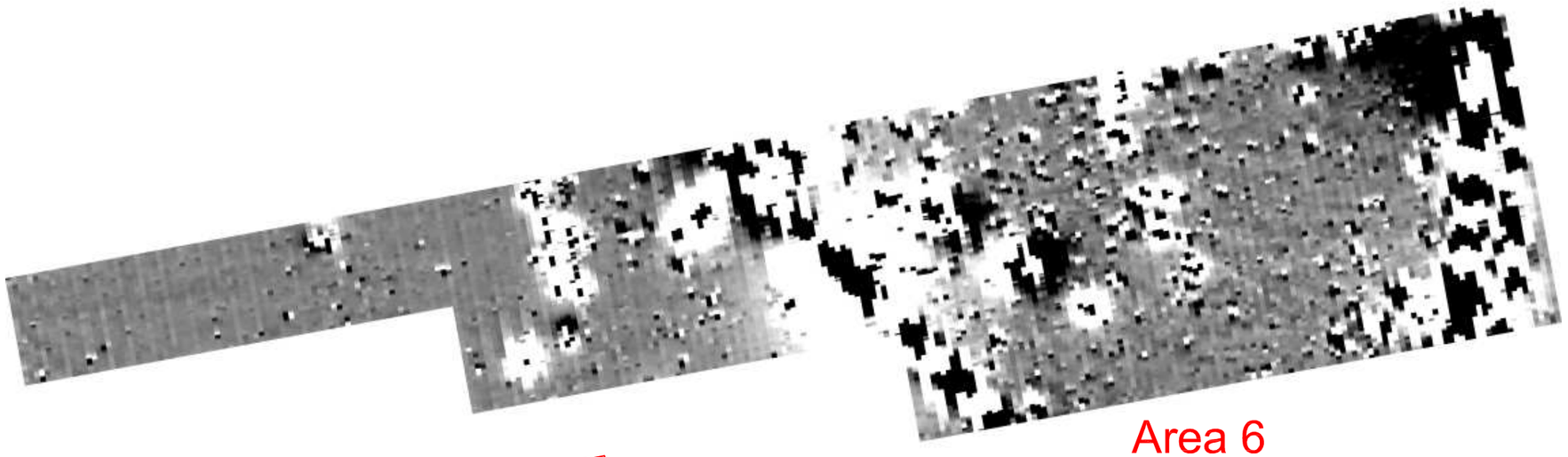


Area 6



Area 7





SCALE 1:1000

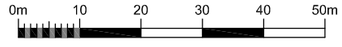


FIG 14

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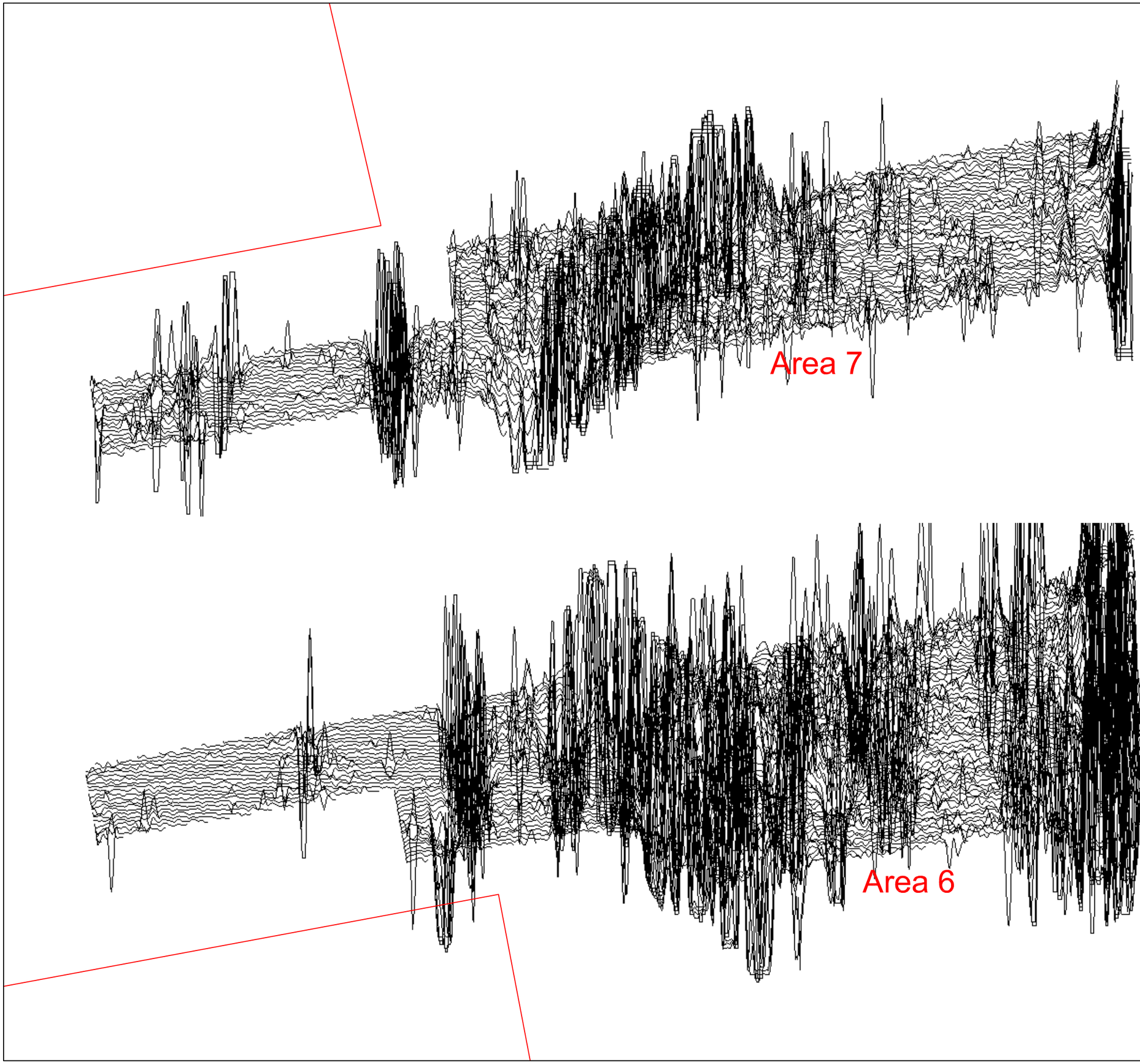
Geophysical Survey
Upper Heyford Park

Traceplot of raw magnetometer data - Areas 6 and 7



+70nT
+35nT
0nT
-35nT
-70nT

Approximately 35nT/ cm vertical displacement.

Data has been clipped at ± 100nT.

SCALE 1:1000

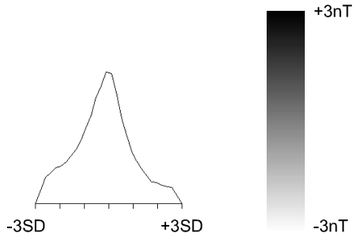
0m 10 20 30 40 50m

FIG 15

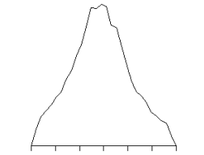
Archaeological Surveys

Geophysical Survey
Upper Heyford Park

Greyscale plot of processed magnetometer data - Areas 6 and 7



Area 6



Area 7

SCALE 1:1000

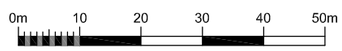


FIG 16

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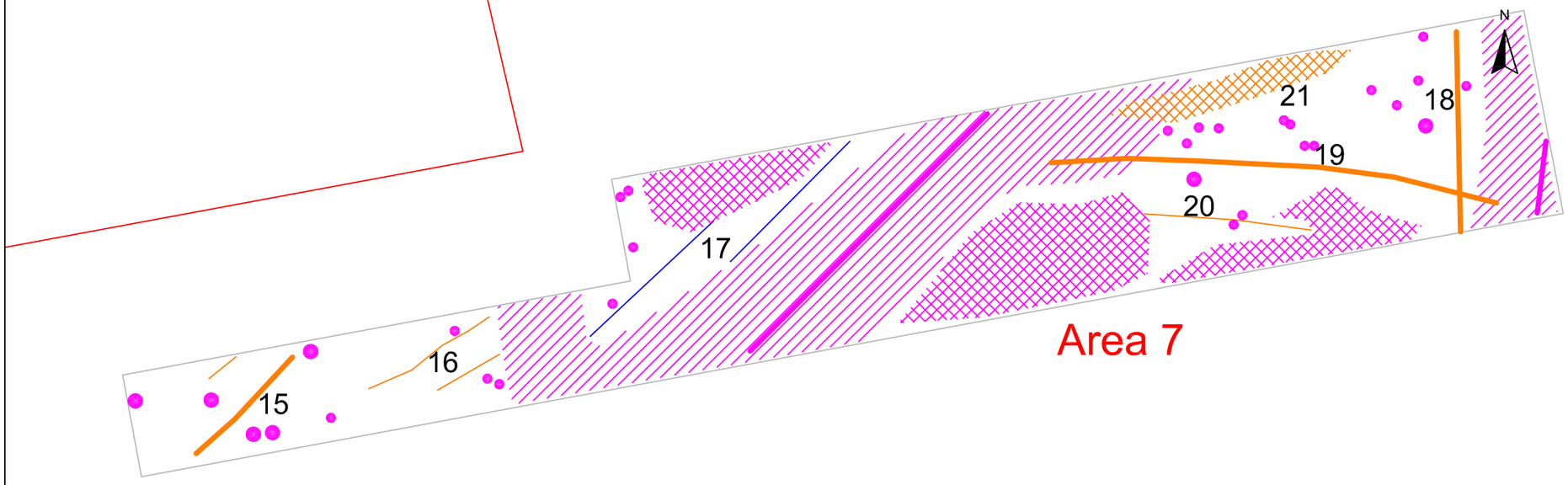
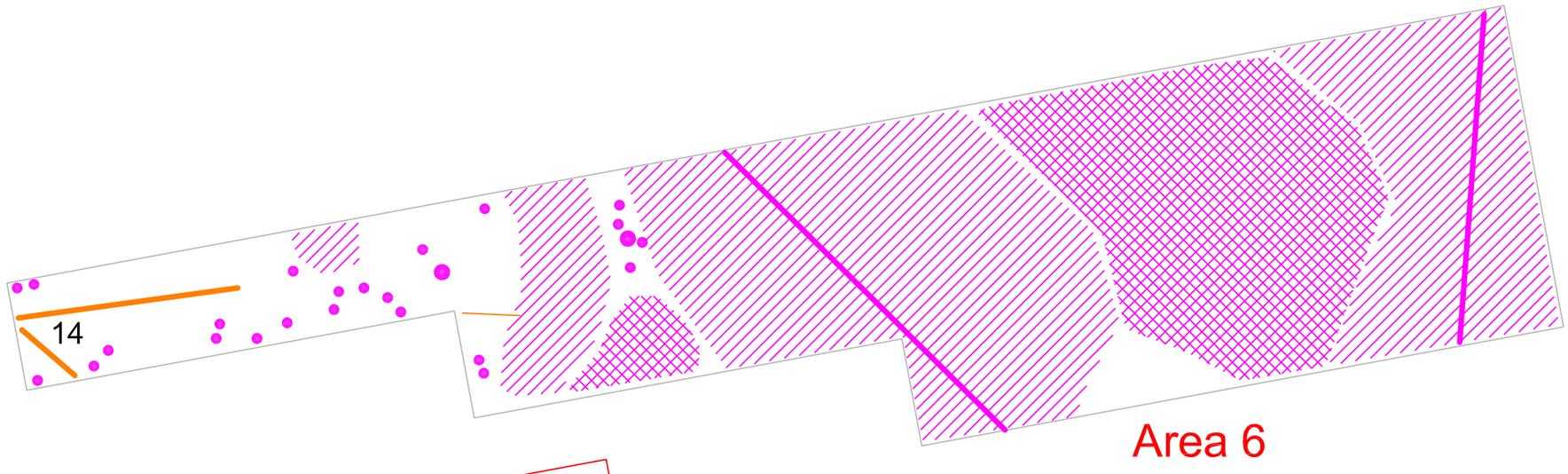
Abstraction and interpretation of magnetometer anomalies - Areas 6 and 7





- Positive linear anomaly - of uncertain origin
- Negative linear anomaly - of uncertain origin
- Positive area - uncertain origin
- Magnetic debris - spread of magnetically thermoremnant/ ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

SCALE 1:1000

0m 10 20 30 40 50m

FIG 17

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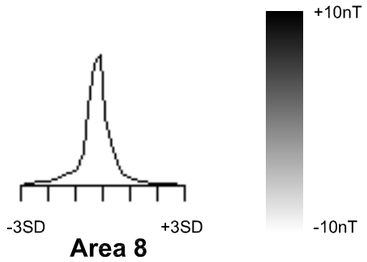
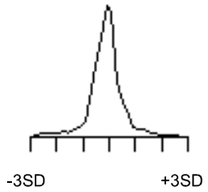
Geophysical Survey
Upper Heyford Park

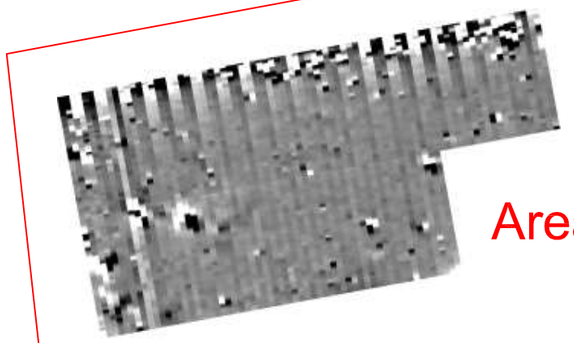
Greyscale plot of raw magnetometer data - Areas 8 and 9



Area 8



Area 9



SCALE 1:1000

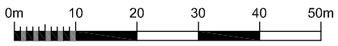
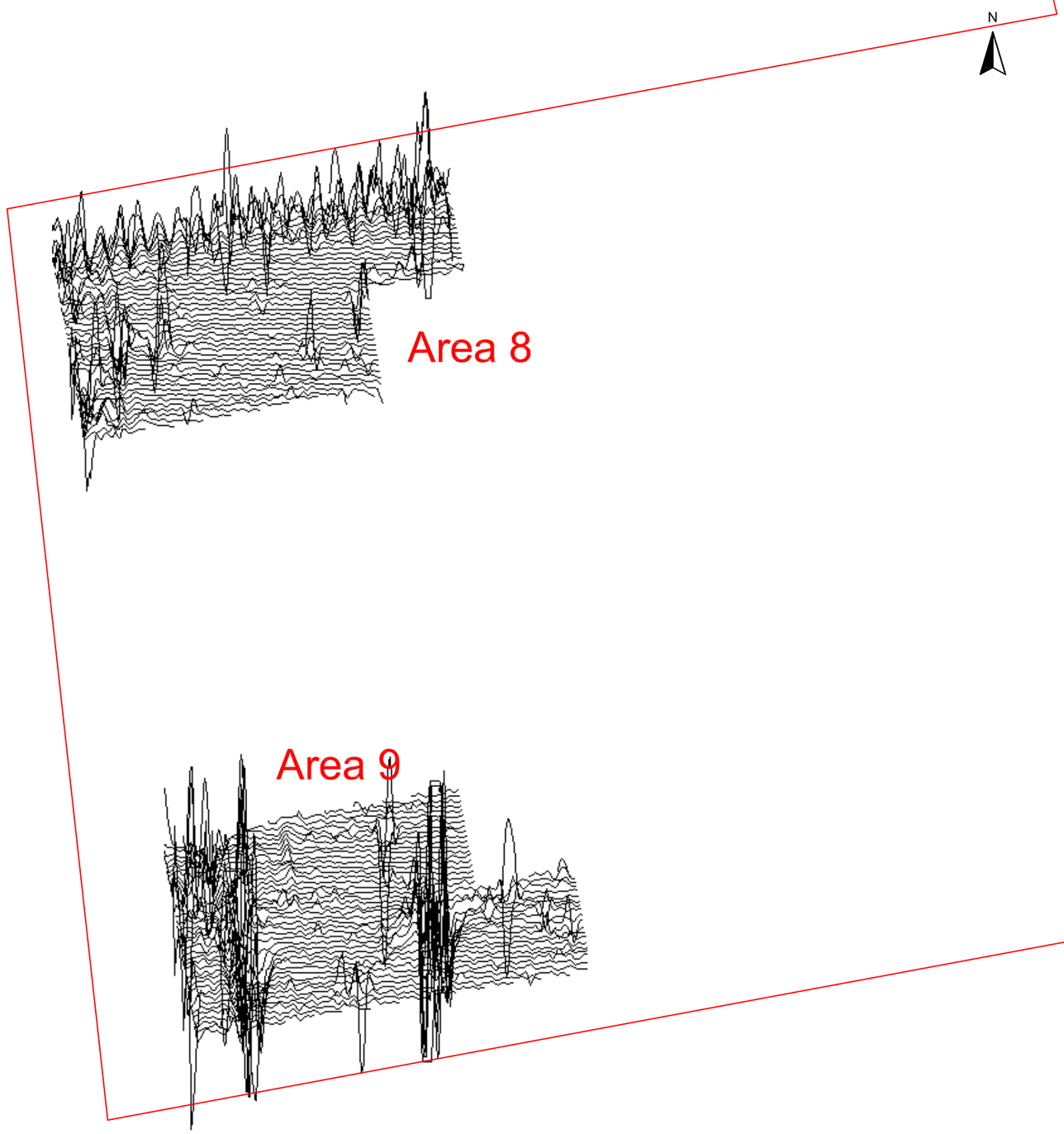


FIG 18

Archaeological Surveys

Geophysical Survey
Upper Heyford Park

Traceplot of raw magnetometer data - Areas 8 and 9



+80nT
+40nT
0nT
-40nT
80nT

Approximately 40nT/ cm vertical displacement.

Data has been clipped at ± 100nT.

SCALE 1:1000

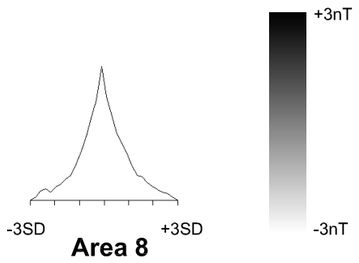
0m 10 20 30 40 50m

FIG 19

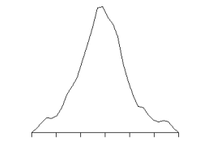
Archaeological Surveys

Geophysical Survey
Upper Heyford Park

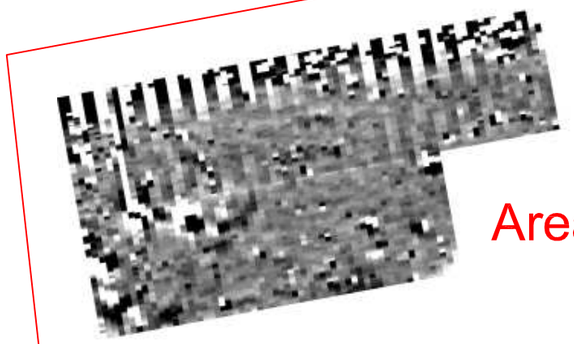
Greyscale plot of processed magnetometer data - Areas 8 and 9

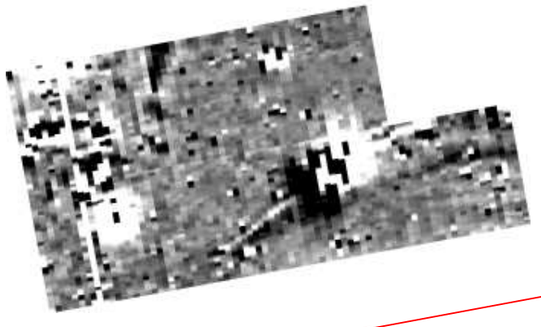


Area 8



Area 9





SCALE 1:1000

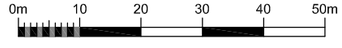
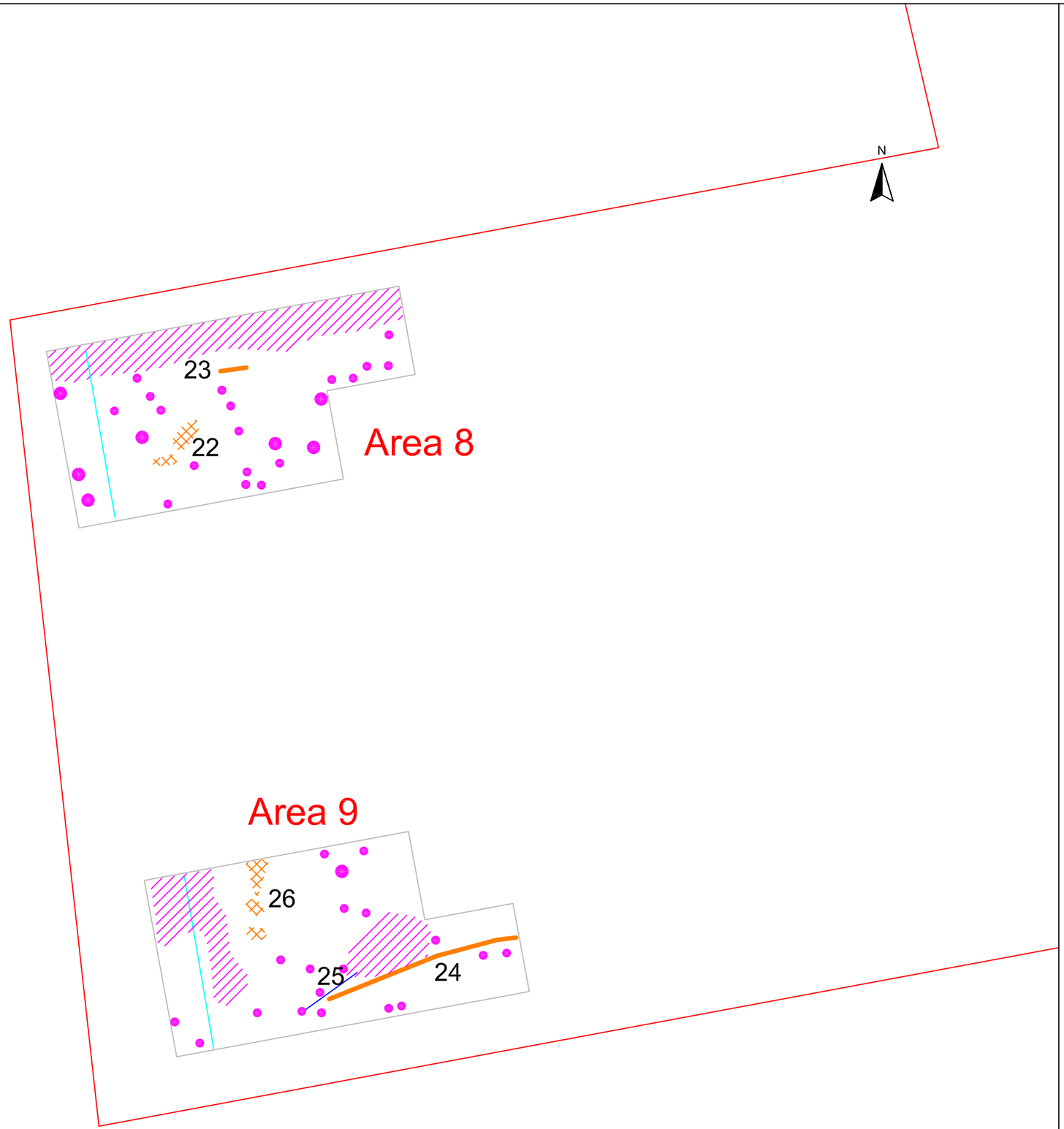


FIG 20

Archaeological Surveys

Geophysical Survey
Upper Heyford Park

Abstraction and interpretation of magnetometer anomalies - Areas 8 and 9



- Positive linear anomaly - of uncertain origin
- Linear anomaly - drain
- Negative linear anomaly - of uncertain origin
- Positive area - uncertain origin
- Magnetic debris - spread of magnetically thermoremnant/ ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

SCALE 1:1000

0m 10 20 30 40 50m

FIG 21

Archaeological Surveys

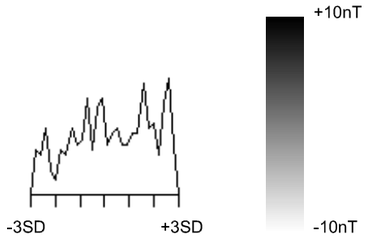
Geophysical Survey
Upper Heyford Park

N

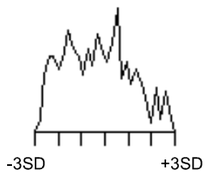
Area 10

Area 11

Greyscale plot of raw magnetometer data - Areas 10 and 11



Area 10



Area 11

SCALE 1:1000

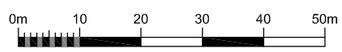
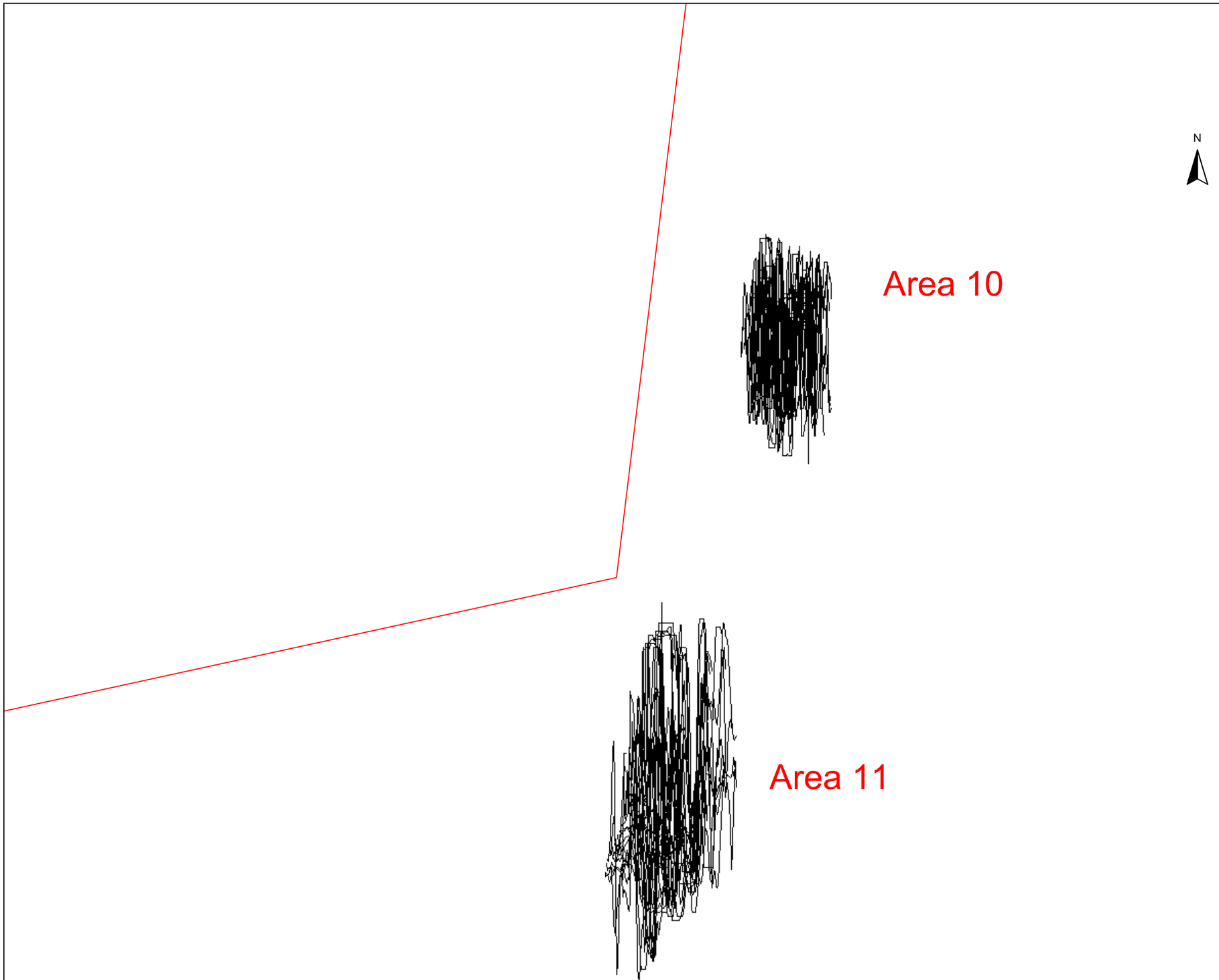


FIG 22



Archaeological Surveys

Geophysical Survey
Upper Heyford Park

Traceplot of raw magnetometer data - Areas 10 and 11

+100nT
+50nT
0nT
-50nT
-100nT

Approximately 50nT/ cm vertical displacement.

Data has been clipped at ± 100nT.

SCALE 1:1000

0m 10 20 30 40 50m

FIG 23

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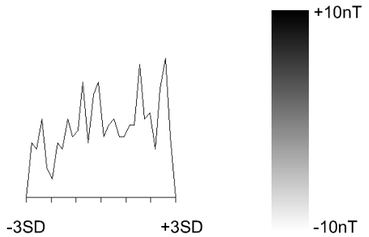
Geophysical Survey
Upper Heyford Park

Area 10

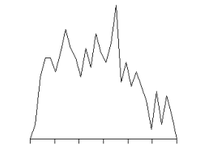
Area 11

N

Greyscale plot of processed magnetometer data - Areas 10 and 11



Area 10



Area 11

SCALE 1:1000

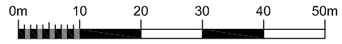


FIG 24

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Geophysical Survey
Upper Heyford Park

Abstraction and interpretation of magnetometer anomalies - Areas 10 and 11

Magnetic disturbance from ferrous material

N

Area 10

Area 11

SCALE 1:1000

0m 10 20 30 40 50m

FIG 25

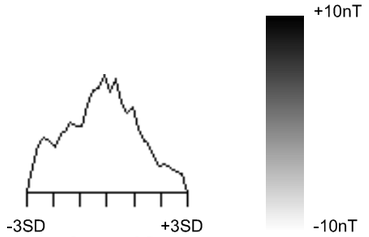
Area 12

N

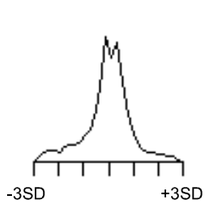
Archaeological Surveys

Geophysical Survey
Upper Heyford Park

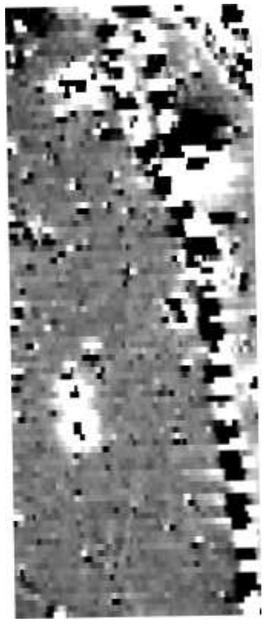
Greyscale plot of raw magnetometer data - Areas 12 and 13



Area 12



Area 13



Area 13

SCALE 1:1000

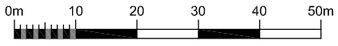
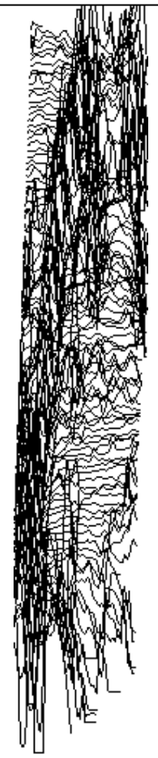
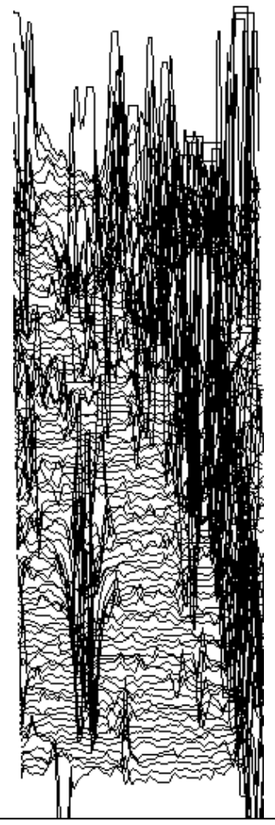


FIG 26



Area 12

N



Area 13

Archaeological Surveys

Geophysical Survey
Upper Heyford Park

Traceplot of raw magnetometer data - Areas 12 and 13

+70nT
+35nT
0nT
-35nT
-70nT

Approximately 35nT/ cm vertical displacement.

Data has been clipped at ± 100nT.

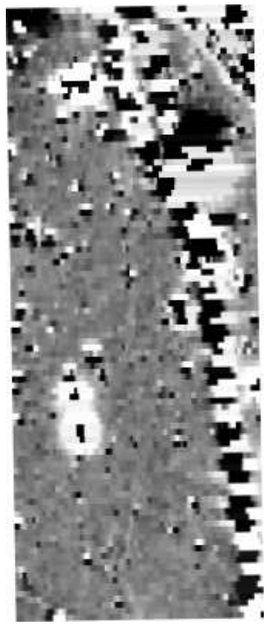
SCALE 1:1000

0m 10 20 30 40 50m

FIG 27

Area 12

N

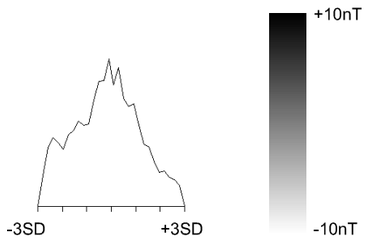


Area 13

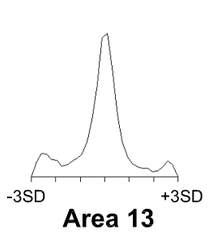
Archaeological Surveys

Geophysical Survey
Upper Heyford Park

Greyscale plot of processed magnetometer data - Areas 12 and 13



Area 12



Area 13

SCALE 1:1000

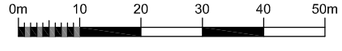
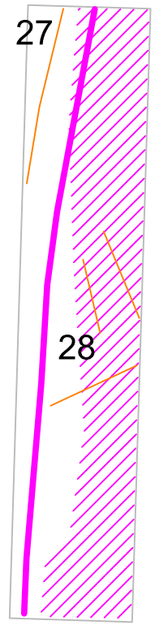
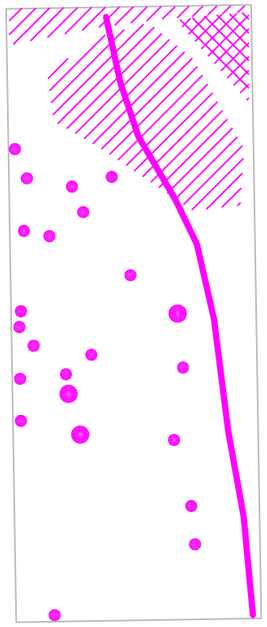


FIG 28



Area 12



Area 13

N

Archaeological Surveys

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Abstraction and interpretation of magnetometer anomalies - Areas 12 and 13

- Positive linear anomaly - of uncertain origin
- Magnetic debris - spread ofmagnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object in topsoil

SCALE 1:1000

0m 10 20 30 40 50m

FIG 29

Area 13

Area 6

Area 14

N

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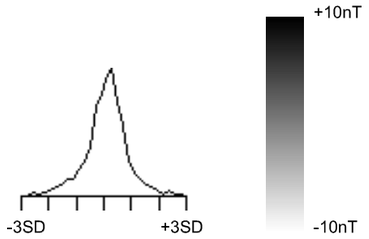
Greyscale plot of raw magnetometer data - Area 14



SCALE 1:1000

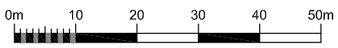
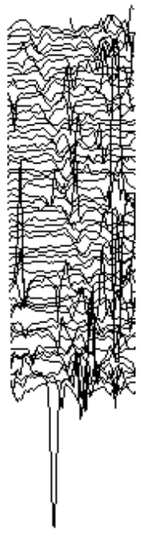


FIG 30

Area 13

N

Area 6



Area 14

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Traceplot of raw magnetometer data - Area 14

+80nT
+40nT
0nT
-40nT
-80nT

Approximately 40nT/ cm vertical displacement.

Data has been clipped at ± 100nT.

SCALE 1:1000

0m 10 20 30 40 50m

FIG 31

Area 13

N

Area 6

Area 14

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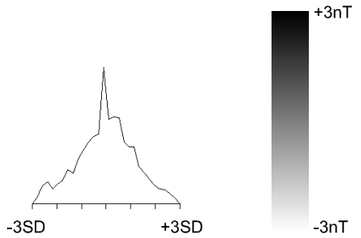
Upper Heyford Park

Greyscale plot of processed magnetometer data - Area 14



SCALE 1:1000

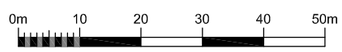


FIG 32

Area 13

N

Area 6

29

Area 14

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Abstraction and interpretation of magnetometer anomalies - Area 14

- Negative linear anomaly - of uncertain origin
- Magnetic debris - spread of magnetically thermoremnant/ ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

SCALE 1:1000

0m 10 20 30 40 50m

FIG 33