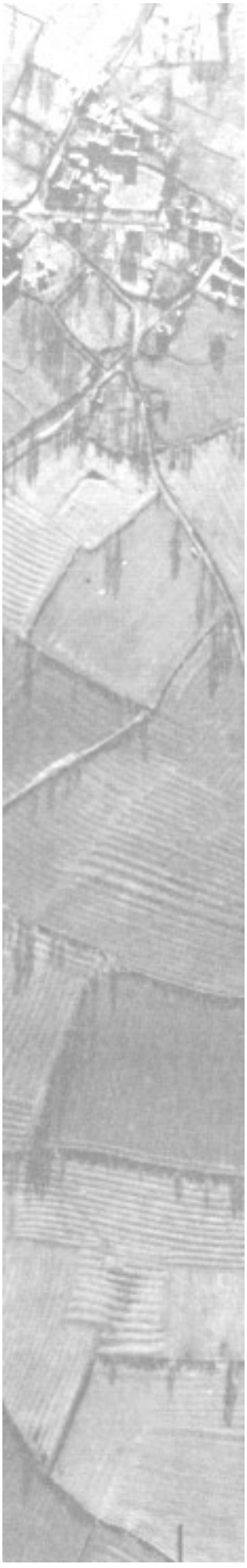

ARCHAEOLOGICAL SURVEYS

GEOPHYSICAL SURVEY REPORT

A3 Hindhead Improvements

Magnetometer Survey

for

Wessex Archaeology

David Sabin and Kerry Donaldson

December 2006

Ref no. 167

ARCHAEOLOGICAL SURVEYS

A3 Hindhead Improvements

Magnetometer Survey

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Report and fieldwork by David Sabin and Kerry Donaldson

Survey date – **14th & 15th December 2006**

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SUMMARY

Detailed magnetometry survey was carried out across two sites at either end of the A3 Hindhead road improvement scheme in Surrey. The survey formed a trial of magnetic survey across geology and soils that are known to often produce poor results. Within Site 1, at the northern end of the scheme, linear anomalies caused by former ploughing suggest a sufficient contrast between topsoil and subsoil magnetic susceptibilities exists for useful magnetic survey. Site 2, at the southern end of the scheme, revealed positive linear anomalies that may relate to former cut features and again suggest a useful contrast in soil magnetic susceptibility.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys was commissioned by Wessex Archaeology on behalf of their client Mott Macdonald to undertake a geophysical survey of two trial areas of land that are liable to be affected by construction operations associated with improvements to the A3 close to Hindhead in Surrey.

1.1.2 This survey forms part of an assessment of any potential archaeology that may be affected by the development and indicates the effectivity of magnetometry ahead of further survey works to be carried out within other areas liable to be affected by the road improvement scheme.

1.2 Survey objectives

1.2.1 The objective of the survey was to use magnetometry to locate geophysical anomalies within two trial areas close to either end of the road improvement scheme so as to assess the technique over the underlying soil and geology. It is known that certain areas within the region produce very poor magnetic contrast which may have implications for the use of magnetic survey as a form of archaeological prospection along the route. Poor magnetic contrast can occur where the mineral structure of the soil and subsoil are not conducive to the formation of enhanced magnetic susceptibilities by anthropogenic activities.

1.2.2 Magnetic anomalies located within the trial survey areas are used to assess the archaeological potential of the two trial areas in addition to providing information on the suitability of magnetometry.

1.3 Site location

1.3.1 The survey areas are referred to as Sites 1 and 2. Site 1 lies at the northern end of the road improvement scheme – OS Grid Reference SU 905 385, Site

2 lies southwest of Hindhead at the southern end of the scheme – OS Grid Reference SU 873 340.

1.4 Site description

1.4.1 Site 1 is a grass field of approximately 2.2ha, see Plate 1 below. A dual carriageway section of the A3 lies immediately adjacent to the north western boundary with a disused farmyard to the northeast and farmhouse to the east. The south western field boundary is formed by a low earthen bank and contains mature trees. The area is generally flat but begins to slope down abruptly at the south eastern boundary.

1.4.2 Site 2 is a grass field of approximately 2ha currently used for pasture, see Plate 2 below. A single carriageway section of A3 lies immediately adjacent to the north western boundary. Residential dwellings lie beyond the south western boundary with an access track and barns to the northeast. Mature hedgerows are located to the southwest and form part of the north eastern boundary. The field slopes down to the southeast into a shallow 'dry' valley with the lowest areas adjacent to the south eastern boundary. Parts of the valley base were waterlogged preventing survey and areas adjacent to the barns were also unsurveyable due to deep mud formed by ground disturbance caused by cattle. The area has a number of long, shallow linear depressions that would be consistent with poorly backfilled trenches.

Plate 1 Site 1 looking NE

Plate 2 Site 2 looking NE

1.5 Site history and archaeological potential

1.5.1 No specific information was made available to Archaeological Surveys. No Scheduled Monuments lie within or immediately adjacent to the survey areas.

1.6 Geology and soils

1.6.1 The underlying geology is Lower Greensand (BGS 2001), no overlying Quaternary deposits are mapped (BGS 1977).

1.6.2 The overlying soils across the survey areas are from the Shirrell Heath 1 association and are humo-ferric podzols. These consist of free draining acid sandy and loamy soils (Soil Survey of England and Wales 1983). These soils are often associated with poor results from magnetometry although local conditions and former land use may produce variations in magnetic susceptibility that allow useful detailed magnetometry to be carried out.

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, survey layout

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 30m by 30m grids giving 3600 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 GTS802R total station and orientated in order to give coverage of target areas whilst minimising partial grids. This was achieved by setting out either parallel to or perpendicular to topographic features such as land boundaries. Baseline points were referenced to appropriate topographic features, see Figure 02.

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:

- 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 is used to enhance linear anomalies
- Zero 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 Median Traverse

The median of each traverse is calculated ignoring data outside a threshold value, the 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.

2.3.2 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. Where further interpretation is possible or where a number of possible origins should be considered, further more detailed discussion is set out in Section 4.

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 J167 Hindhead – CD. Directory titles include Data, Documentation, CAD, PDFs and Photos. Multiple directories exist under Data – 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 two sites covering an area of approximately 4ha. Geophysical anomalies located can be generally classified as positive and negative linear anomalies of an uncertain origin, linear anomalies of an agricultural origin, areas of magnetic debris, areas of magnetic disturbance and strong dipolar anomalies relating to ferrous objects in the topsoil. Anomalies located within each survey area have been numbered and will be outlined below with subsequent discussion in Section 4.

3.1.2 The listing of sub-headings below attempts to define a number of separate categories that reflect the range and type of features located during the survey. A basic explanation of the characteristics of the magnetic anomalies is set out for each category in order to justify interpretation. Sub-headings are then used to group anomalies with similar characteristics for each survey area.

Anomalies with an uncertain origin

Negative anomalies
Positive anomalies 

The category applies to a range of anomalies where there is not enough evidence to confidently suggest an origin. 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 an agricultural origin

Agricultural anomalies

Where confidence is high that anomalies have been caused by agricultural features this category is applied. The anomalies are often linear and form a series of parallel responses or are parallel to extant land boundaries. Where the response is broad, former ridge and furrow is likely; narrow response is often related to more modern ploughing.

Anomalies with a modern origin

Magnetic disturbance 

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.

Anomalies associated with magnetic debris

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. This type of response is occasionally associated with kilns, furnace structures or hearths and may therefore be archaeologically significant. It is also possible that the response may be caused by natural material such as certain gravels.

3.2 Site 1

Area located at SU 905 385, see Figures 04-07.

Anomalies with an uncertain origin

(1) – Several very low magnitude positive linear anomalies were located within the area. It is possible that these may relate to agricultural and/or geological/ pedological features.

(2) – A negative linear anomaly crosses the survey area and is parallel to the north western field boundary. This may relate to a former land boundary, drain or other agricultural feature.

Anomalies with an agricultural origin

(3) – A series of linear anomalies can be observed across much of the survey area. These have been formed by ploughing and are likely to be relatively recent.

Anomalies with a modern origin

(4) – A region of magnetic disturbance close to the north western field boundary may have been caused by standing traffic on the A3 immediately adjacent to the survey area.

(5) – Areas of magnetic disturbance around the periphery of the site are associated with modern above surface material such as wire fencing.

Anomalies associated with magnetic debris

Low magnitude and widespread magnetic debris can be seen across the survey area (increasing towards the western corner) but has not been added to the abstraction plot. The response appears as small speckled black and white dots within the greyscale plots. This may be a response to fragments of magnetically thermoremnant material introduced into the field during manuring, see Section 4.1.3 below.

3.3 Site 2

Area located at SU 873 340

Anomalies with an uncertain origin

(6) – Several positive linear anomalies were located across the survey area and although they are of low magnitude (less than 2nT), they clearly indicate the presence of linear features.

(7) – Negative linear anomalies of uncertain origin may represent drainage or other services.

Anomalies associated with magnetic debris

(8) – Zones of magnetic debris occur across the survey area and are likely to be related to relatively modern dumping. Many of the zones area associated with linear depressions suggesting trenches backfilled with rubbish.

4 DISCUSSION

4.1 Site 1

4.1.1 No archaeologically significant anomalies were located by the magnetometry survey within the area, however, a number of very weak linear anomalies may be associated with cut features although an agricultural or natural origin is also likely.

4.1.2 There is clear evidence for linear anomalies relating to agricultural activity, most likely ploughing, across the survey area. Although these are not archaeologically significant, they do indicate a measurable contrast and variation within the magnetic susceptibility of the soil. Typically, periodic ploughing can introduce subsoil material into the topsoil through mechanical action and the subsoil magnetic susceptibility may contrast against that of the topsoil unit. The most common scenario is for material of low magnetic susceptibility to be introduced into the topsoil through soil inversion or partial inversion, however the subsoil material may have a comparatively enhanced magnetic susceptibility (for instance if enhanced material has moved down through the soil profile) and this would result in the opposite effect.

4.1.3 Widespread magnetic debris may indicate small fragments of magnetically thermoremnant material introduced into the field during manuring for example. This type of material can be associated with intensive burning such as would be found within a kiln or furnace and any associated structure subsequently broken up and distributed across a wide area by agricultural activity may cause such a response. It should also be considered that the past storage of certain road construction materials within the field may leave a residue capable of creating magnetic debris.

4.2 Site 2

4.2.1 Positive linear anomalies were located within the area that may relate to former cut features although no confident interpretation is possible as the anomalies do not form any recognisable pattern. Although these anomalies are formed by a relatively weak positive magnetic response, less than 2nT, they contrast well against the surrounding soil and form easily recognised features.

4.2.2 Zones of magnetic debris and strong dipolar anomalies are located across much of the survey area. A number of the zones appear to correlate with shallow linear depressions that are orientated parallel to the north western field boundary. These magnetic responses are typical of ferrous material having a relatively recent origin and may represent backfilling of trenches or other depressions with waste material. It is tentatively suggested that these may be associated with 20th century military activities as the area was heavily utilised within the 1st and 2nd World War periods.

5 CONCLUSION

1.1 Magnetometry carried out within the two trial survey areas has indicated that there is likely to be some potential for further magnetic survey within other sections of the road scheme. Indicators of useful magnetic contrast exist in the form of linear anomalies formed by ploughing within the northern site and positive linear anomalies that may represent former cut features at the southern site.

6 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 6 South East 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

Site 1 raw magnetometry data

COMPOSITE

Filename: Site1-raw.xcp
Instrument Type: Grad 601 (Magnetometer)
Units: nT
Surveyed by: on 14/12/2006
Assembled by: on 14/12/2006
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Origin: One

Dimensions
Composite Size (readings): 480 x 210
Survey Size (feet): 120 ft x 210 ft
Grid Size: 30 x 30
X Interval: 0.25
Y Interval: 1

Stats
Max: 10.00
Min: -10.00
Std Dev: 2.70
Mean: -0.31

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

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

Site 1 processed magnetometry data

Stats
Max: 3.00
Min: -3.00
Std Dev: 1.68
Mean: 0.01

Processes: 7
1 Base Layer
2 Clip from -10 to 10
3 DeStripe Median Traverse: Grids: All
4 Clip from -3 to 3
5 De Stagger: Grids: All Mode: Both By: -1 intervals
6 Clip from -3 to 3
7 Search & Replace From: -10000000 To: 1000000000 With: 32702 (Area: Top 30, Left 345, Bottom 34, Right 428)

Site 2 raw magnetometry data

COMPOSITE

Filename: Site2-raw.xcp
Instrument Type: Grad 601 (Magnetometer)
Units: nT
Surveyed by: on 15/12/2006
Assembled by: on 15/12/2006
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Origin: One

Dimensions
Composite Size (readings): 600 x 210
Survey Size (feet): 150 ft x 210 ft
Grid Size: 30 x 30
X Interval: 0.25
Y Interval: 1

Stats
Max: 35.23
Min: -16.31
Std Dev: 2.94
Mean: -0.99

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

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

Site 2 processed magnetometry data

Stats
Max: 3.00
Min: -3.00
Std Dev: 1.34
Mean: -0.27

Processes: 8
1 Base Layer
2 Clip from -10 to 10
3 Search & Replace From: -1000000000 To: 100000000 With: 32702 (Area: Top 0, Left 378, Bottom 21, Right 512)
4 Search & Replace From: -1000000000 To: 100000000 With: 32702 (Area: Top 27, Left 566, Bottom 205, Right 599)
5 Search & Replace From: -1000000000 To: 100000000 With: 32702 (Area: Top 157, Left 326, Bottom 203, Right 444)
6 DeStripe Mean Traverse: Grids: All Threshold: 1 SDs
7 De Stagger: Grids: All Mode: Both By: -2 intervals
8 Clip from -3 to 3

Archaeological Surveys

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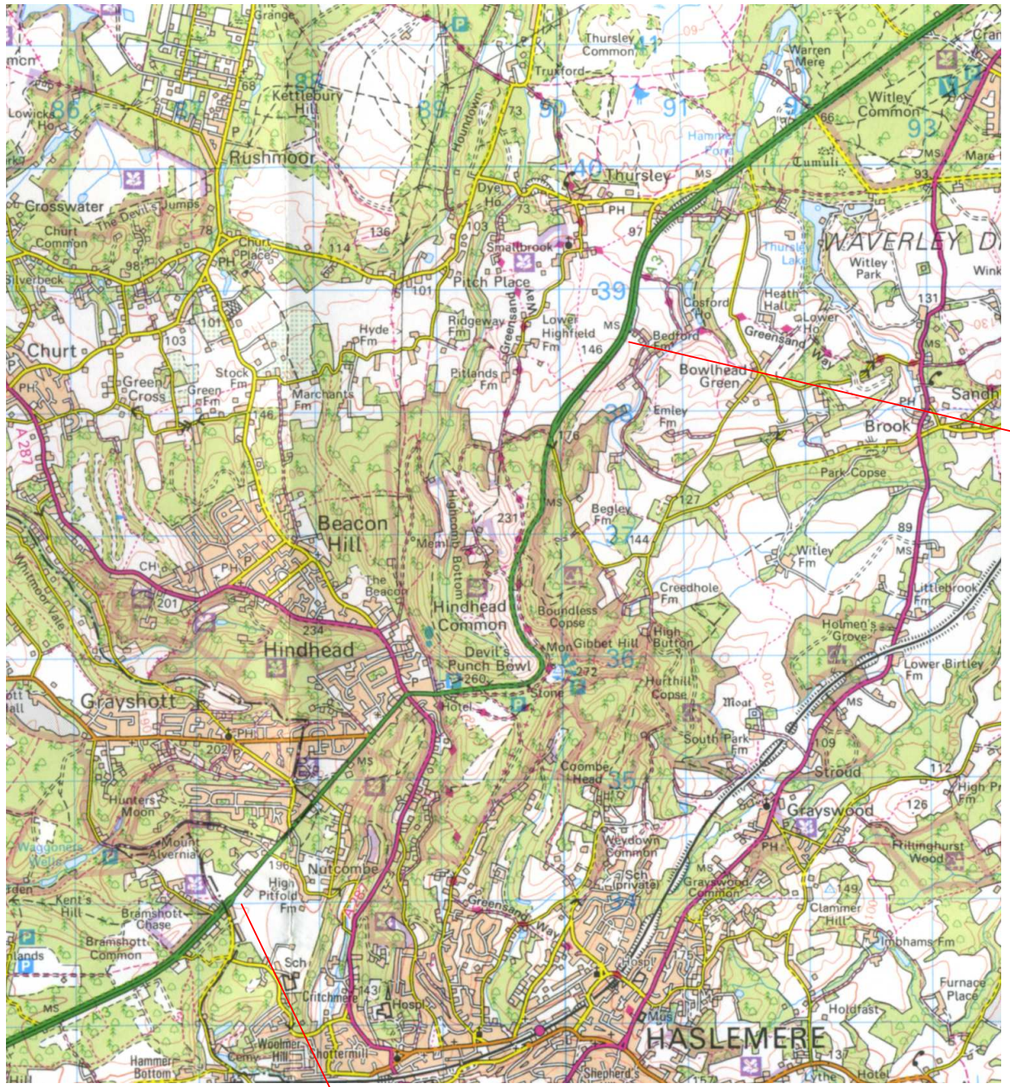
Map of survey area

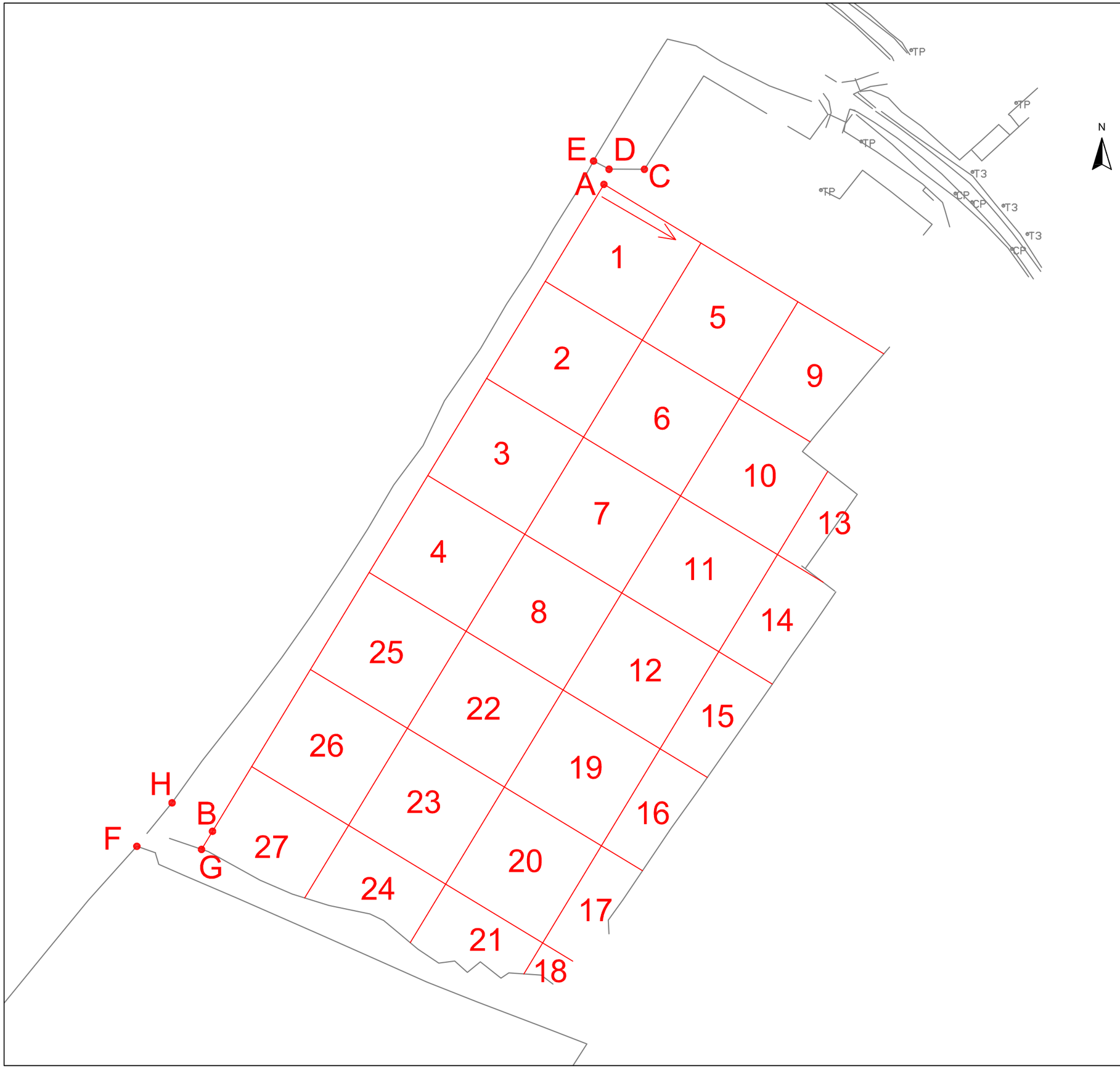


Survey location

SCALE 1:50 000

0km 1 2km

FIG 01



Archaeological Surveys

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Referencing information - Site 1

A - B 200m A - C 12.36m A - D 4.8m

A - E 7.9m B - F 20m B - G 5.9m

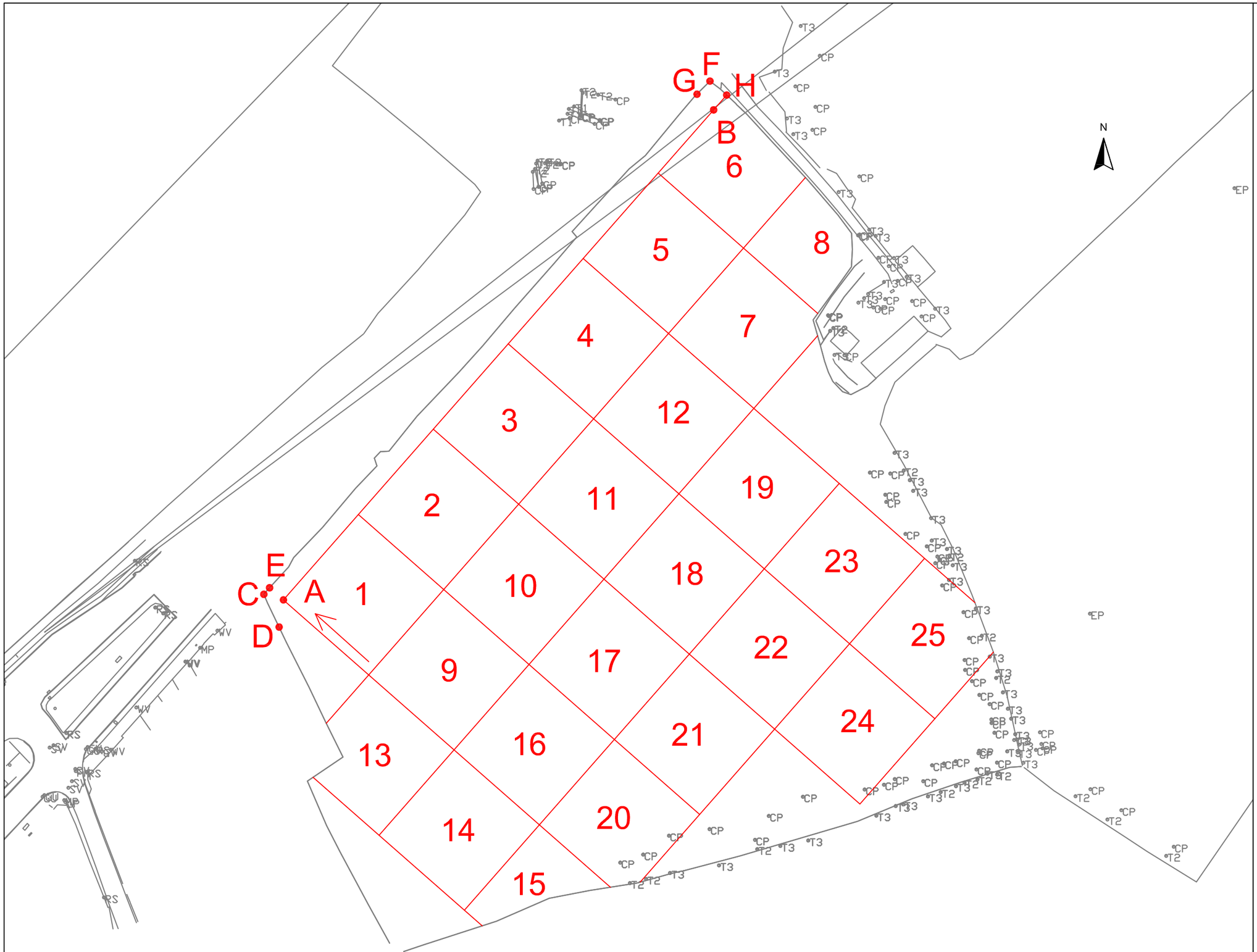
B - H 13.7m

A - B	Baseline
C, D, E	Referencing points on fence
F	Gatepost
G, H	Points orthogonal to B
→	Start point and traverse direction

SCALE 1:1000

0m 20 40 60 80 100m

FIG 02



Archaeological Surveys

Geophysical Survey
A3 Hindhead Improvements

Referencing information - Site 2

A - C 5.28m A - D 7.68m A - E 5m

B - E 7.7m B - G 6.18m B - H 5.3m

C - D 9.6m

A - B Baseline

C, D, F Referencing points on fenceline

E, G, H Points orthogonal to A and B

→ Start point and traverse direction

SCALE 1:1000

0m 20 40 60 80 100m

FIG 03

Archaeological Surveys

Geophysical Survey
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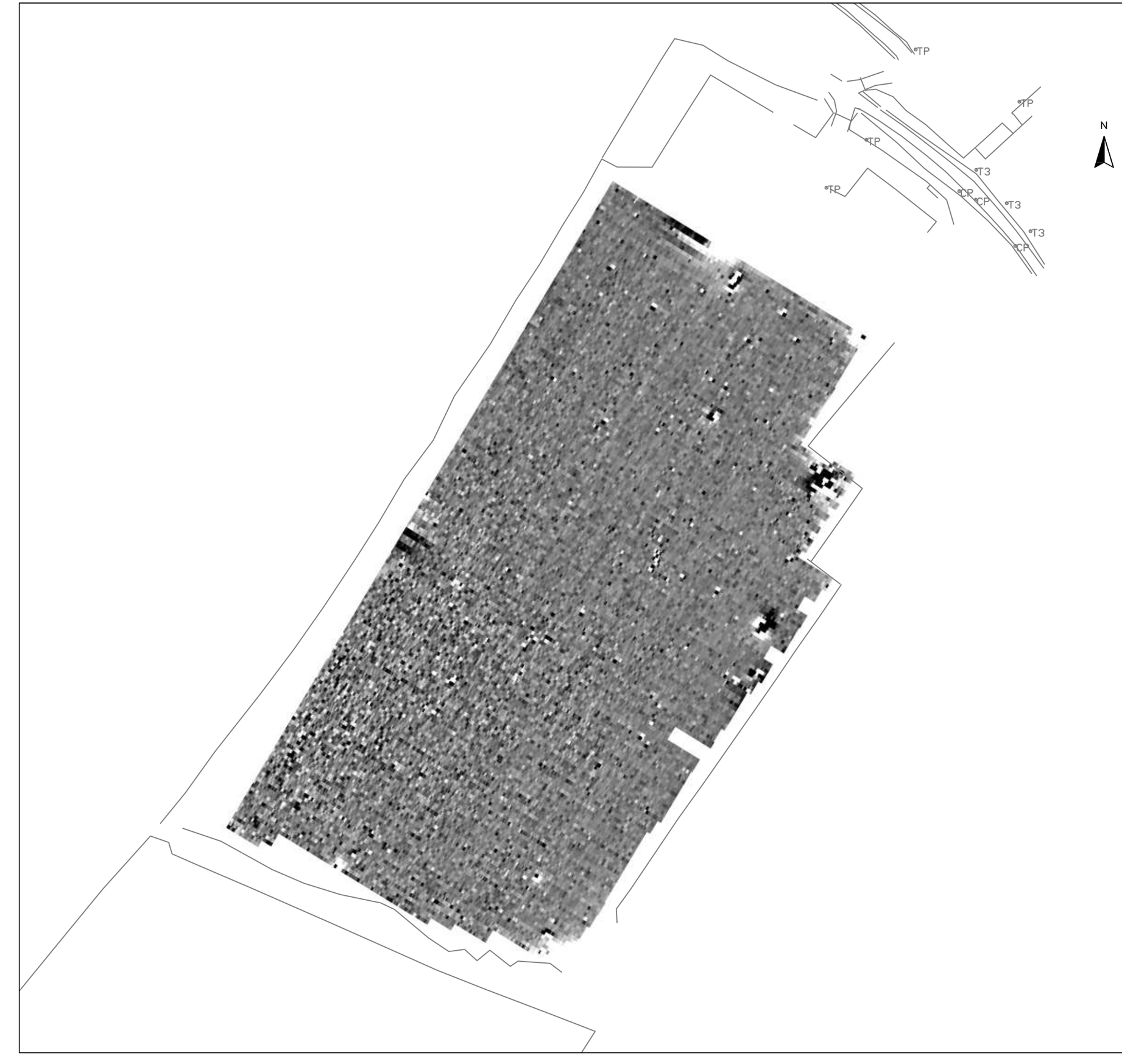
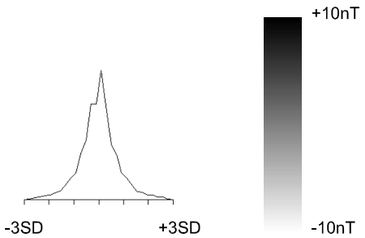
Greyscale plot of raw magnetometer data - Site 1





SCALE 1:1000

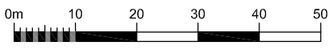
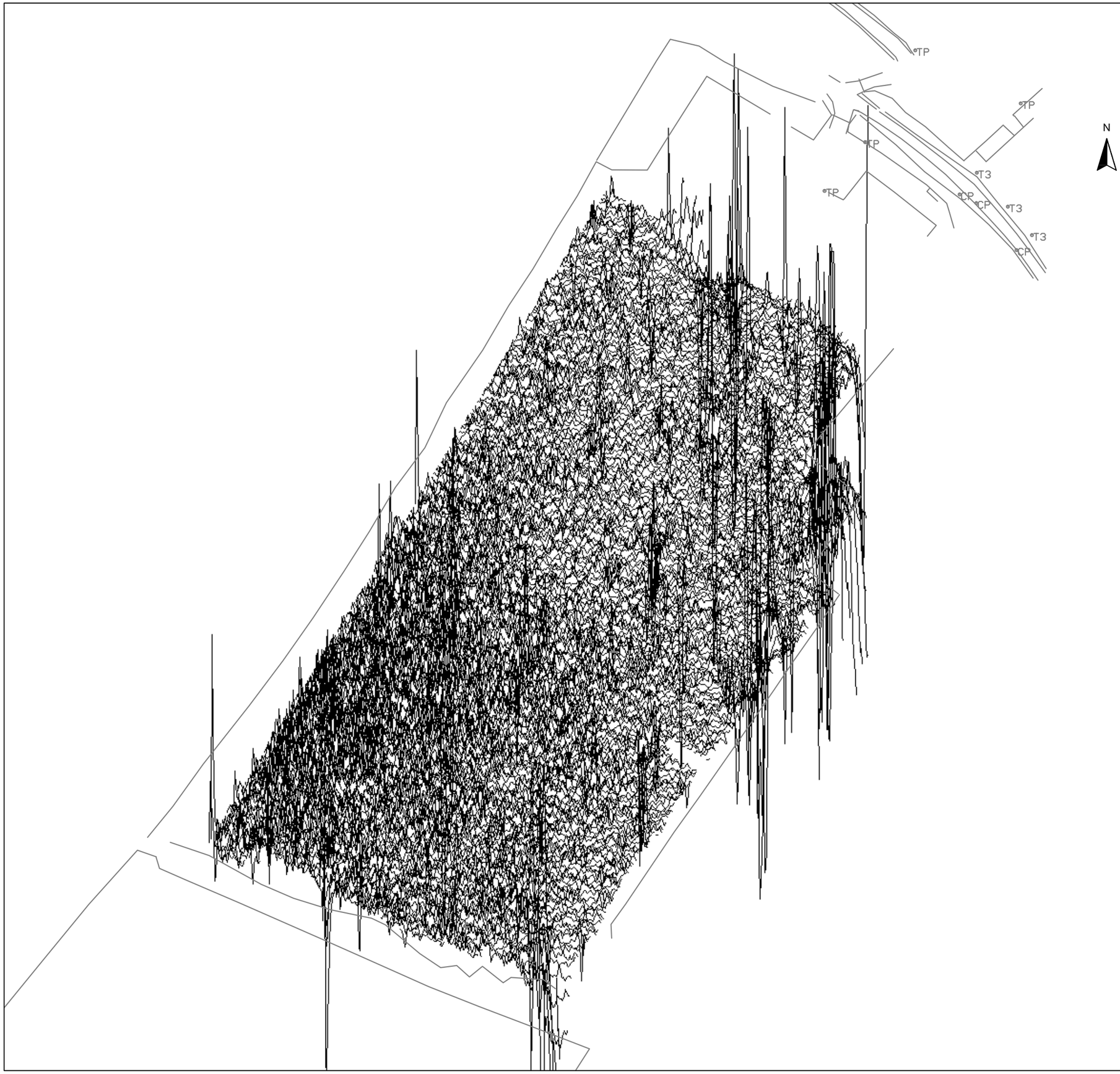


FIG 04



Archaeological Surveys

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Traceplot of raw magnetometer data - Site 1

+34nT
+17nT
0nT
-17nT
-34nT

Approximately 17nT/ cm vertical displacement.

Data has been clipped at ± 100nT.

SCALE 1:1000

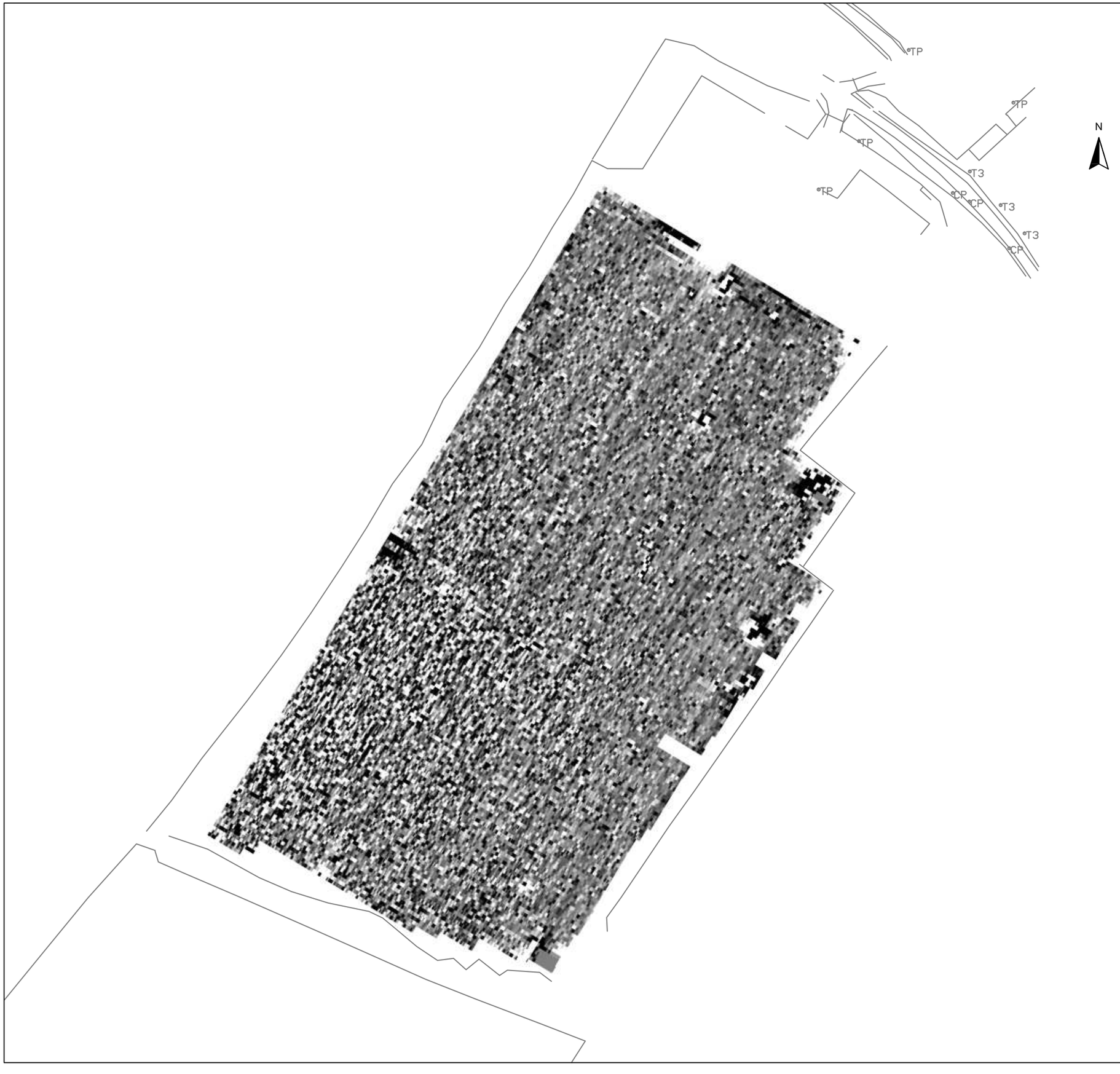
0m 10 20 30 40 50m

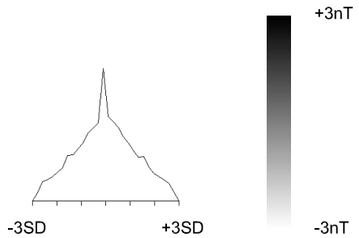
FIG 05

Archaeological Surveys

Geophysical Survey
A3 Hindhead Improvements

Greyscale plot of processed magnetometer data - Site 1





SCALE 1:1000

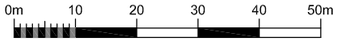


FIG 06

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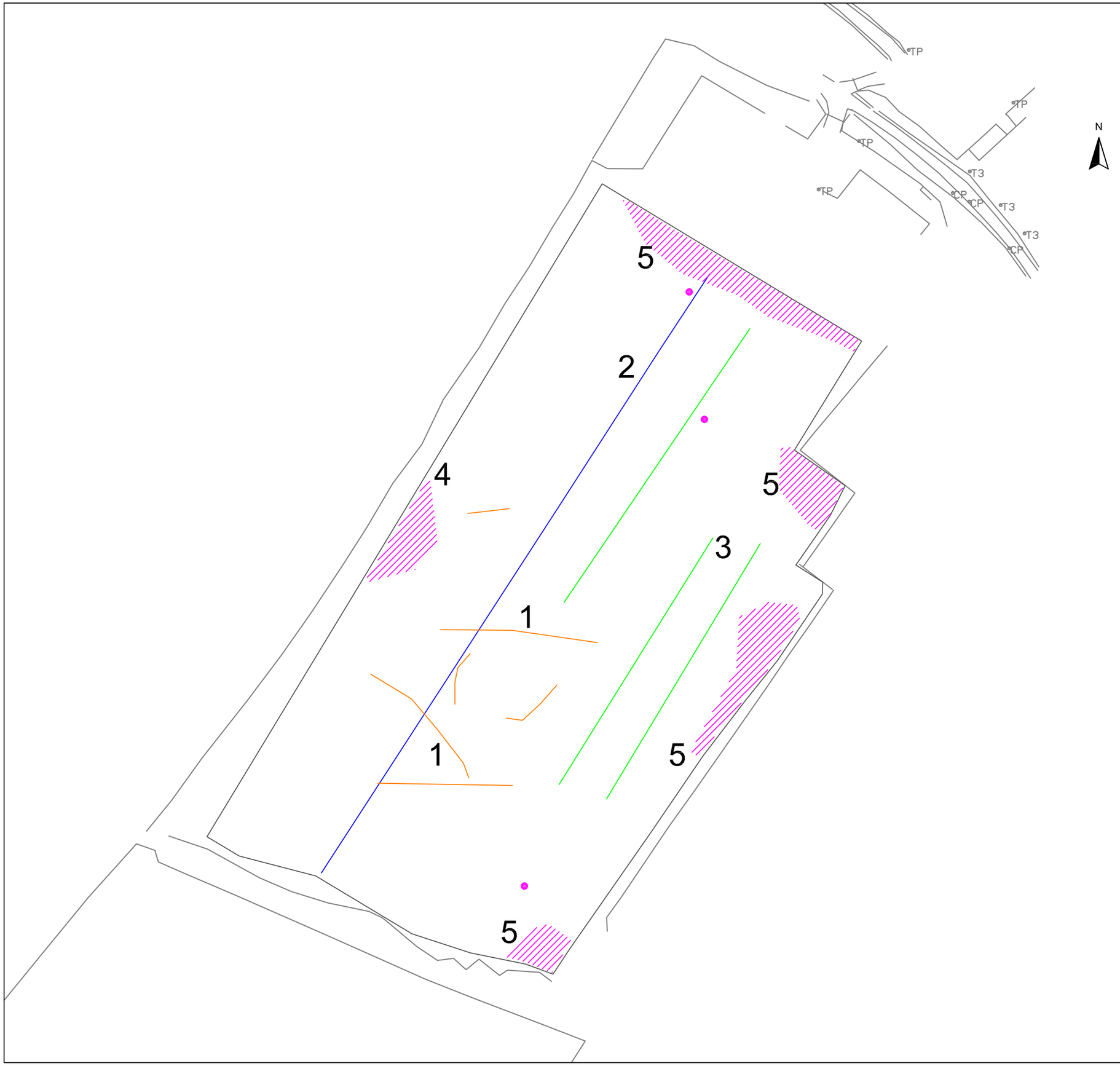
Abstraction and interpretation of magnetometer anomalies - Site 1



- Positive linear anomaly - of uncertain origin
- Positive linear anomaly - of agricultural origin
- Negative linear anomaly - of uncertain origin
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object in topsoil

SCALE 1:1000

0m 10 20 30 40 50m

FIG 07

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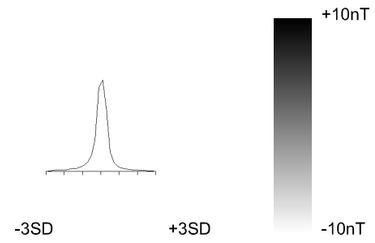
Greyscale plot of raw magnetometer data - Site 2



SCALE 1:1000

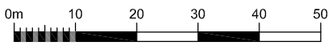


FIG 08

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Traceplot of raw magnetometer data - Site 2

+34nT
+17nT
0nT
-17nT
-34nT

Approximately 17nT/ cm vertical displacement.

Data has been clipped at ± 100nT.

N

SCALE 1:1000

0m 10 20 30 40 50m

FIG 09

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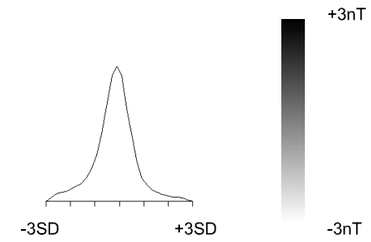
Greyscale plot of processed magnetometer data - Site 2



SCALE 1:1000

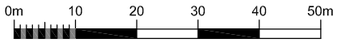


FIG 10

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Abstraction and interpretation of magnetometer anomalies - Site 2

N

8
8
8
6
6
7
7

- Positive linear anomaly - of uncertain origin
- Negative linear anomaly - of uncertain origin
- Magnetic debris - spread of magnetically thermoremnant/ ferrous material
- Strong dipolar anomaly - ferrous object in topsoil

SCALE 1:1000

0m 10 20 30 40 50m

FIG 11