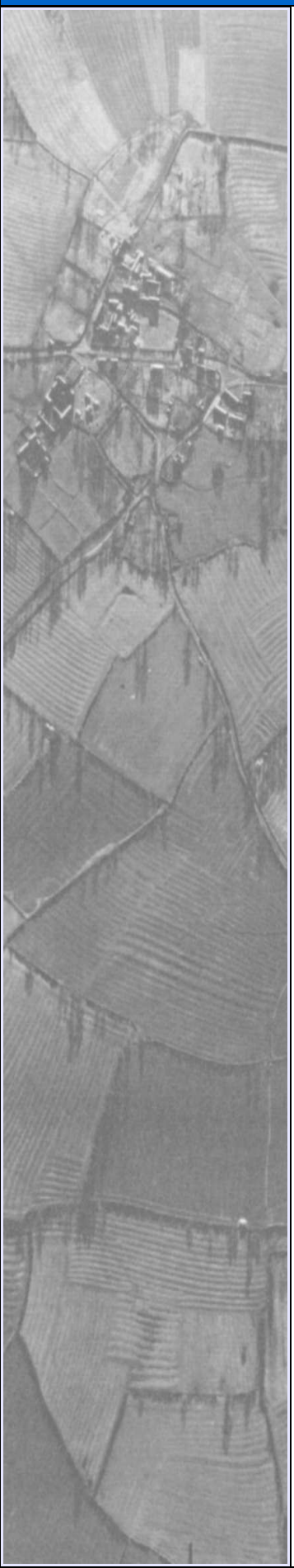

Tredinnick Wind Turbine
Luxulyan
Cornwall

MAGNETOMETER SURVEY REPORT

for

CgMs Consulting

David Sabin and Kerry Donaldson

February 2014

Ref. no. 520

ARCHAEOLOGICAL SURVEYS LTD

Tredinnick Wind Turbine
Luxulyan
Cornwall

Magnetometer Survey Report

for

CgMs Consulting

Fieldwork by David Sabin
Report by David Sabin BSc (Hons) MIFA and Kerry Donaldson BSc (Hons)

Survey date – 7th February 2014
Ordnance Survey Grid Reference – **SX 05219 59934**

Archaeological Surveys Ltd
1 West Nolands, Nolands Road, Yatesbury, Calne, Wiltshire, SN11 8YD
Tel: 01249 814231 Fax: 0871 661 8804
Email: info@archaeological-surveys.co.uk
Web: www.archaeological-surveys.co.uk

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SUMMARY

A detailed magnetometer survey was carried out by Archaeological Surveys Ltd at Tredinnick, Luxulyan, Cornwall. The survey was conducted within an area of land outlined for the development of a single wind turbine and short section of access track. The survey located a number of anomalies that appear to relate to a former unmapped field boundary feature. The site also contained a number of linear anomalies with a regular and parallel trend, many of which appear to relate to agricultural activity. However, it was not possible to determine the origin of several anomalies within the site, due to either a fragmented and/or weak response and lack of clearly defined morphology.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by CgMs Consulting to undertake a magnetometer survey of an area of land at Tredinnick near Luxulyan, Cornwall. The site has been outlined for the proposed development of a single wind turbine and the survey forms part of an archaeological assessment of the site.

1.2 Survey objectives and techniques

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. The methodology is considered an efficient and effective approach to archaeological prospection.

1.2.2 The survey and report generally follow the recommendations set out by: English Heritage (2008) *Geophysical survey in archaeological field evaluation;* and Institute for Archaeologists (2002) *The use of Geophysical Techniques in Archaeological Evaluations*. The work has been carried out to the Institute for Archaeologists (2011) *Standard and Guidance for Archaeological Geophysical Survey.*

1.3 Site location, description and survey conditions

1.3.1 The site is located at Tredinnick, approximately 2km north of Luxulyan in Cornwall. The turbine is centred on Ordnance Survey National Grid Reference (OS NGR) SX 05219 59934, see Figures 01 and 02.

1.3.2 The geophysical survey covers approximately 1.3ha within a single pasture

field that slopes down towards the east. It comprises a 1ha block centred on the turbine location (Area 1) with a 30m wide corridor to the west centred on the proposed access track (Area 2). The access track extends westwards over several fields for approximately 700m and mainly follows an existing rough farm track. The ground conditions and location for the proposed access track were not suitable for geophysical survey beyond the turbine field.

1.3.3 The ground conditions across the site were generally poor due to high levels of rainfall and many parts of the survey area were boggy and waterlogged. Weather conditions during the survey were fine.

1.4 Site history and archaeological potential

1.4.1 A desk-based Heritage Assessment has been carried out by CgMs (2014) and outlines that the site does not contain any designated or undesignated heritage assets. Two possible prehistoric enclosures have been identified from aerial photographs approximately 1km to the west and north west, and the survey area lies within 500m of several sites with early medieval enclosures or place names . Evidence of post-medieval quarrying and stream working is located 500m to the north east. The 1840 Tredinnick Tithe Map shows the survey area as one field, with no changes of boundary mapped since then to the present day.

1.4.2 Although there are no recorded archaeological sites or features within the site, there is potential for the geophysical survey to locate anomalies with an archaeological origin should they exist.

1.5 Geology and soils

1.5.1 The underlying geology is granite from the St Austell Intrusion with overlying alluvial deposits possibly extending into the eastern part of the site (BGS, 2013).

1.5.2 The overlying soils across the site are from the Moretonhampstead association which are typical brown podzolic soils. These consist of well drained, gritty, loamy soils with a humose surface horizon in places. The eastern part of the survey may contain Laploud soils with are typical humic gley soils. These are permeable gritty upland soils affected by groundwater (Soil Survey of England and Wales, 1983).

1.5.3 Igneous geologies can contain naturally formed features which can result in very strong magnetic anomalies. Alluvium and gleyed soils can be associated with low levels of magnetic susceptibility and therefore weak features.

2 METHODOLOGY

2.1 Technical synopsis

2.1.1 Magnetometry survey records localised magnetic fields that can be associated with features formed by human activity. Magnetic susceptibility and magnetic thermoremnance are factors associated with the formation of localised fields. Additional details are set out below and within Appendix A.

2.1.2 Iron minerals within the soil may become altered by burning and the break down of biological material; effectively the magnetic susceptibility of the soil is increased, and the iron minerals become magnetic in the presence of the Earth's magnetic field. Accumulations of magnetically enhanced soils within features, such as pits and ditches, may produce magnetic anomalies that can be mapped by magnetic prospection.

2.1.3 Magnetic thermoremnance can occur when ferrous minerals have been heated to high temperatures such as in a kiln, hearth, oven, etc. On cooling, a permanent magnetisation may be acquired due to the presence of the Earth's magnetic field. Certain natural processes associated with the formation of some igneous and metamorphic rock may also result in magnetic thermoremnance.

2.1.4 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 nano Teslas (nT), which are equivalent to 10^{-9} Tesla (T).

2.2 Equipment configuration, data collection and survey detail

2.2.1 The detailed magnetic survey was carried out using a Bartington Grad 601-2 gradiometer. The 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.

2.2.2 The instrument is extremely sensitive and is able to measure magnetic variation to 0.01nanoTesla (nT), with an effective resolution of 0.03nT. The data are limited to ±100nT when surveying with the highest sensitivity. All readings are saved to an integral data logger for analysis and presentation.

2.2.3 The instrument is operated according to the manufacturer's instructions with consideration given to the local conditions. An adjustment procedure is required, prior to collection of data, in order to balance the sensors and remove the effects of the Earth's magnetic field; further adjustment is required during the survey due to instrument drift often associated with temperature change.

2.2.4 It can be very difficult to obtain optimum balance for the sensors due to localised magnetic vectors that may be associated with large ferrous objects, geological/pedological features, 'magnetic debris' within the topsoil and natural temperature fluctuations. Imperfect balance results in a heading error often visible

as striping within the data; this can be effectively removed by software processing and generally has little effect on the data unless extreme.

2.2.5 The Bartington gradiometer undergoes regular servicing and calibration by the manufacturer. A current assessment of the instrument is shown in Table 1 below.

Sensor type and serial numbers	Bartington Grad - 01 – 1000 Nos. 085 and 396
Date of certified calibration/service	Sensors 085 and 396 – October 2013 (Due Oct 2016)
Bandwidth	12Hz (100nT range) both sensors
Noise	<100pT peak to peak
Adjustable errors	<2nT

Table 1: Bartington fluxgate gradiometer sensor calibration results

The instrument was considered to be in good working order prior to the survey, with no known faults or defects.

2.2.6 Data were collected at 0.25m centres along traverses 1m apart. The survey area was separated into 30m by 30m grids (900m²) 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, 2008).

2.2.7 The survey grids were set out to the Ordnance Survey OSGB36 datum using a Penmap RTK GPS. They were centred on the proposed position of the turbine, and the access track within the field. The GPS is used in conjunction with Leica's SmartNet service, where positional corrections are sent via a mobile telephone link. Positional accuracy of around 10 – 20mm is possible using the system. The instrument is regularly checked against the ETRS89 reference framework using Ordnance Survey ground marker C1ST7784 (Horton).

2.3 Data processing and presentation

2.3.1 Magnetometry data downloaded from the Grad 601-2 data logger are analysed and processed in specialist software known as TerraSurveyor (formerly 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 C contains specific information concerning the survey and data attributes and is derived directly from TerraSurveyor; this should be used in conjunction with information provided by Figure 02.

2.3.2 Only minimal processing is carried out in order to enhance the results of the

survey for display. Raw data are always analysed 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 ±30nT to improve greyscale resolution,
- clipping of processed data at ±3nT to enhance low magnitude anomalies,
- zero median/mean traverse is applied in order to balance readings along each traverse.

Reference should be made to Appendix B for further information on the specific processes carried out on the data. Appendix C metadata includes details on the processing sequence used for each survey area.

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 and objective assessment of features.

2.3.4 The main form of data display prepared for this report is the greyscale plot. . Both 'raw' and 'processed' data have been shown followed by an abstraction and interpretation plot. Anomalies are abstracted using colour coded points, lines and polygons. All plots are scaled to landscape A3 for paper printing.

2.3.5 Graphic raster images in bitmap format (.BMP) are initially prepared in TerraSurveyor. Regardless of survey orientation, data captured along each traverse are displayed and processed by TerraSurveyor from left to right; this corresponds to a direction of south to north in the field. Prior to displaying against base mapping, raster graphics require a rotation of 117° anticlockwise to restore north to the top of the image.

2.3.6 The raster images are combined with base mapping using ProgeCAD Professional 2009 and AutoCAD LT 2007, creating DWG file formats. All images are externally referenced to the CAD drawing in order to maintain good graphical quality. Quality can be 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.

2.3.7 A digital archive is produced with this report, see Appendix D below. The main archive is held at the offices of Archaeological Surveys Ltd.

3 RESULTS

3.1 General assessment of survey results

3.1.1 The detailed magnetic survey was carried out over a total of two survey areas covering approximately 1.3ha.

3.1.2 Magnetic anomalies located can be generally classified as anomalies relating to land management, positive and negative anomalies of an uncertain origin, linear anomalies of an agricultural origin, areas of magnetic debris and strong discrete dipolar anomalies relating to ferrous objects.

3.2 Statement of data quality

3.2.1 Data are considered representative of the magnetic anomalies present within the site. There are no significant defects within the dataset. Survey was limited by extremely waterlogged and boggy conditions at the western end of Area 2.

3.3 Data interpretation

3.3.1 The list 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, a basic key is indicated to allow cross referencing to the abstraction and interpretation plot. CAD layer names are included to aid reference to associated digital files (.dwg/.dxf). Sub-headings are then used to group anomalies with similar characteristics for each survey area.

Report sub-heading CAD layer names and plot colour	**Description and origin of anomalies**
Anomalies relating to land management AS-ABST MAG BOUNDARY	Anomalies are mainly linear and may be indicative of the magnetically enhanced fill of cut features (i.e. ditches). The anomalies may be long and/or form rectilinear elements and they may relate to topographic features or be visible on early mapping. Associated agricultural anomalies (e.g. headlands, plough marks and former ridge and furrow) may support the interpretation.
Anomalies with an uncertain origin AS-ABST MAG POS LINEAR UNCERTAIN AS-ABST MAG POS DISCRETE UNCERTAIN AS-ABST MAG POS UNCERTAIN AS-ABST MAG NEG UNCERTAIN	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 features and agricultural features should be considered. Positive anomalies are indicative of magnetically enhanced soils that may form the fill of 'cut' features or may be produced by accumulation within layers or 'earthwork' features; soils subject to burning may also produce positive anomalies. Negative anomalies are produced by material of comparatively low magnetic susceptibility such as stone and subsoil.
Anomalies with an agricultural origin AS-ABST MAG AGRICULTURAL	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 modern ploughing.
Anomalies associated with magnetic debris AS-ABST MAG DEBRIS AS-ABST MAG STRONG DIPOLAR	Magnetic debris often appears as areas containing many small dipolar anomalies that may range from weak to very strong in magnitude. It 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 and fragments of igneous or metamorphic rock. Strong discrete dipolar anomalies are responses to ferrous objects within the topsoil.

Table 2: List and description of interpretation categories

3.4 List of anomalies

Turbine centred on OS NGR 205219 59934, see Figures 04 & 05.

Anomalies associated with land management

(1) – A zone of negative response is defined on the eastern side by a positive linear anomaly, with a response of between ±3 to 5nT. These anomalies correlate with a low linear bank in the field that extends from the northern to the southern field boundaries. It also defines the edge of the solid geology to the west and the alluvial deposits to the east as it extends along the contour. There appears to be some complexity and association with anomalies (2), but it is likely the the anomalies relate to a former unmapped land boundary.

Anomalies with an uncertain origin

(2) – Positive and negative anomalies located immediately west of anomaly (1) appear to be associated with it. They have a similar response to anomaly (1) and it is possible that that they relate to a former track or removed boundary.

(3) – Short positive linear anomalies extend north eastwards from the eastern edge of anomaly (1). Although it is possible that they are directly associated with (1), they may have an association with agricultural activity and anomalies (5).

(4) – A fragmented positive linear anomaly extends across the survey area with a north east to south west orientation. It does not appear to be parallel with any other anomaly within the site and its origin is uncertain.

(5) – Several positive linear anomalies are parallel with the northern field boundary. Although these have a different orientation to anomalies (6) and (9), it is possible that they are associated with agricultural activity or wheel rutting.

(6) – Two broad positive linear anomalies are located in the southern part of the survey area. They are parallel with anomalies (9) to the north and it is possible that they also relate to agricultural activity.

(7) – A number of short positive linear anomalies have been located with a general north west to south east orientation. Their short and fragmented responses prevent

confident interpretation.

(8) – Located in the eastern part of the survey area are a number of weakly positive anomalies. The response is generally less than 1nT, which is likely to indicate either burial by possible alluvial deposits or low levels of magnetic susceptibility due to waterlogged soils.

Anomalies with an agricultural origin

(9) – The survey area contains a number of parallel linear anomalies that appear to relate to agricultural activity. These are clear throughout the majority of the survey area, and although they extend across anomaly (1), they are less well defined as they extend towards the eastern edge.

Anomalies associated with magnetic debris

(10) – Two patches of magnetic debris are located at the north east and south east corners of the survey area. This is likely to be a response to ferrous and other magnetically thermoremnant material that has been used to consolidate an area prone to waterlogging.

(11) – Strong, discrete, dipolar anomalies are a response to ferrous objects within the topsoil.

4 CONCLUSION

4.1.1 The magnetometer survey located a number of positive and negative anomalies that appear to be associated with a former land boundary. This could relate to an unmapped feature that is a continuation of the curving field boundary within the field to the north west linking to a junction of field boundaries to the south of the survey area. A number of other positive and negative anomalies are located immediately to the west of it and they may be associated, possibly indicating a reposition of the former field boundary or the location of a former track.

4.1.2 Several other anomalies of uncertain origin were located and a series of linear anomalies indicative of agricultural activity. A patch of magnetic debris at the north eastern corner of the survey area appears to be associated with relatively modern ferrous material visible in the adjacent field boundary.

5 REFERENCES

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Soil Survey of England and Wales, 1983. *Soils of England and Wales, Sheet 5 South West 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 upon 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 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 the 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 the 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 – data processing notes

Clipping

Minimum and maximum values are set and replace data outside of the range with those values. Extreme values are removed improving colour or greyscale contrast associated with data values that may be archaeologically significant. It has been found that clipping data to ranges between ±5nT and ±1nT often improves the appearance of features associated with archaeology. Different ranges are applied to data in order to determine the most suitable for anomaly abstraction and display.

Zero Median/Mean Traverse

The median (or mean) of each traverse is calculated ignoring data outside a threshold value, the median (or mean) is then subtracted from the traverse. The process is used to equalise slight differences between the set-up and stability of gradiometer sensors and can remove striping. The process can remove archaeological features that run along a traverse so data analysis is also carried out prior its application.

De-stagger

Compensates for small positional errors within data collection by shifting the position of the readings along each traverse by a specified amount. Data lost at the end of each traverse are extrapolated from adjacent value in the same row.

Deslope

Corrects for striping and distortion caused by metal objects/services etc.. The process calculates a curve based on a polynomial best fit mathematical function for each traverse. This curve is then subtracted from the actual data.

Edge Match

Calculates the mean of the 2 lines (rows or columns) of data either side of the edge to match. It then subtracts the difference between the means from all datapoints in the selected area.

FFT (Fast Fourier Transform) spectral filtering

A mathematical process used to determine the frequency components of a traverse. Repetitive features, such as plough marks, produce characteristic spectral zones that can be suppressed allowing greyscale images to appear clearer.

Appendix C – survey and data information

Area 1 raw magnetometer data

COMPOSITE
Filename: J520-mag-Area1-raw.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Direction of 1st Traverse: 315 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 480 x 120
Survey Size (meters): 120 m x 120 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 2.75
Mean: 0.43
Median: 0.24
Composite Area: 1.44 ha
Surveyed Area: 0.9672 ha

PROGRAM
Name: TerraSurveyor
Version: 3.0.23.0

Processes: 2
1 Base Layer
2 Clip from -30.00 to 30.00 nT

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

Area 1 processed magnetometer data

COMPOSITE
Filename: J520-mag-Area1-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 1.37
Mean: -0.02
Median: -0.07
Composite Area: 1.44 ha
Surveyed Area: 0.9672 ha

Processes: 3
1 Base Layer
2 DeStripe Mean Traverse: Grids: All Threshold: 2.5 SDs
3 Clip from -3.00 to 3.00 nT

Area 2 raw magnetometer data

COMPOSITE
Filename: J520-mag-Area2-raw.xcp
Description:
Instrument Type: Bartington (Gradiometer)
Units: nT
Direction of 1st Traverse: 315 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 120 x 150
Survey Size (meters): 30 m x 150 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 2.23
Mean: 0.25
Median: 0.21
Composite Area: 0.45 ha
Surveyed Area: 0.3048 ha

Processes: 2
1 Base Layer
2 Clip from -30.00 to 30.00 nT

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

Area 2 processed magnetometer data

COMPOSITE
Filename: J520-mag-Area2-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 1.54
Mean: 0.02
Median: 0.00
Composite Area: 0.45 ha
Surveyed Area: 0.3048 ha

Processes: 3
1 Base Layer
2 DeStripe Median Traverse: Grids: All Threshold: 2 SDs
3 Clip from -3.00 to 3.00 nT

Appendix D – digital archive

Archaeological Surveys Ltd hold the primary digital archive at their offices in Wiltshire (see inside cover for address). Data are backed-up onto an on-site data storage drive and at the earliest opportunity data are copied to CD ROM for storage on-site and off-site.

Surveys are reported on in hardcopy (recycled paper) using A4 for text and A3 for plots (all plots are scaled for A3). The distribution of both hardcopy report and digital data is considered the responsibility of the Client unless explicitly stated in the survey Brief, Written Scheme of Investigation or other contractual agreement.

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

- TerraSurveyor version 3.0.23.0 (geophysical data analysis),
- ProgeCAD Professional 2009 (report graphics),
- AutoCAD LT 2007 (report figures),
- OpenOffice.org 3.0.1 Writer (document text),
- PDF Creator version 0.9 (PDF archive).

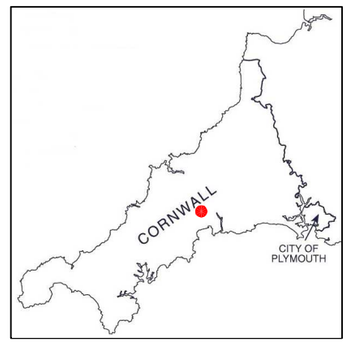
Digital data produced by the survey and report include the following files:

- TerraSurveyor grid and composite files for all geophysical data,
- CSV files for raw and processed composites,
- geophysical composite file graphics as Bitmap images,
- AutoCAD DWG files in 2000 and 2007 versions,
- report text as OpenOffice.org ODT file,
- report text as Word 2000 doc file,
- report text as rich text format (RTF),
- report text as PDF.

Archaeological Surveys Ltd

Geophysical Survey
Tredinnick Wind Turbine
Luxulyan
Cornwall

Map of survey area



● Survey location

Turbine centred on OS NGR
SX 05219 55534

SCALE 1:25 000

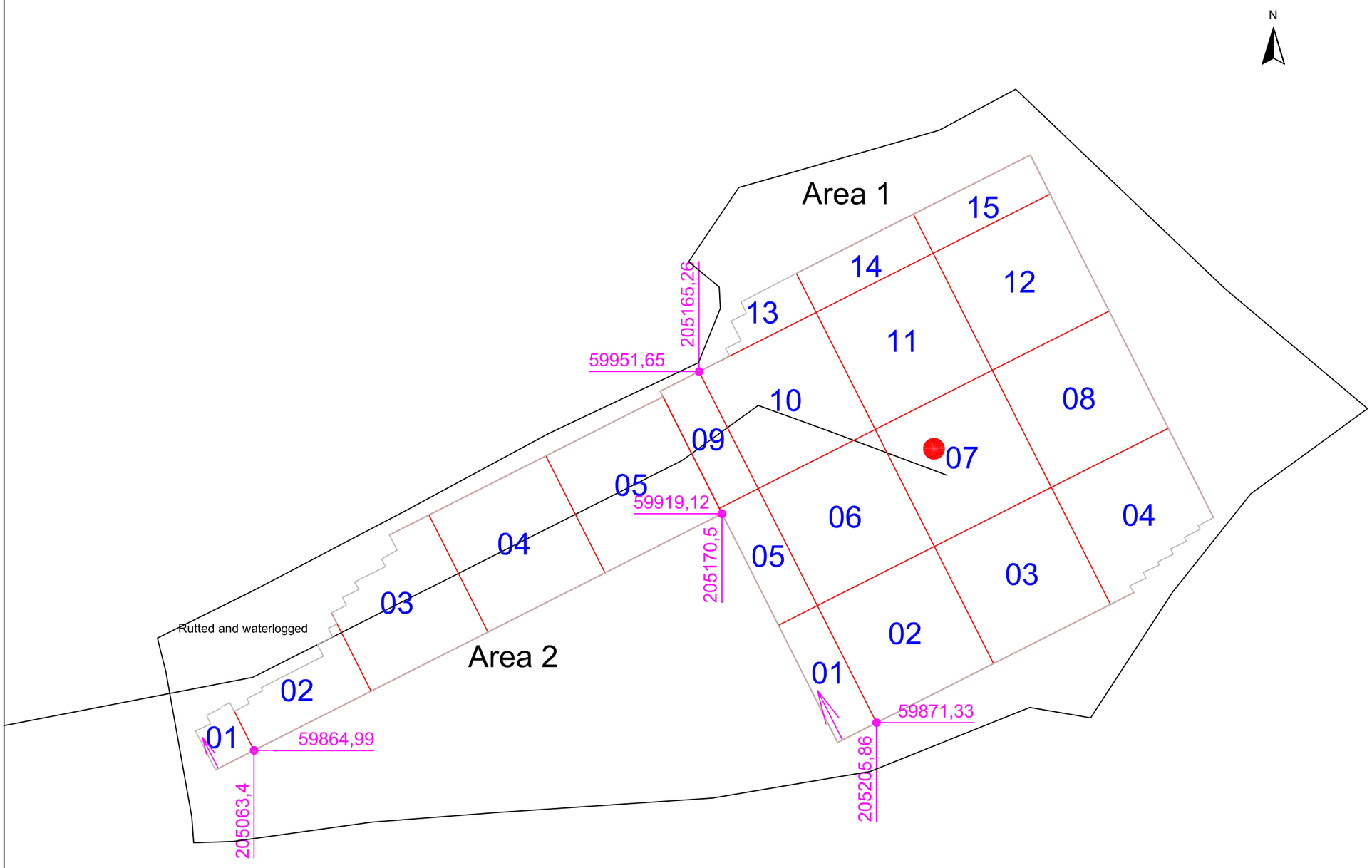
0m 500m 1000m

SCALE TRUE AT A3

FIG 01

Archaeological Surveys Ltd

Geophysical Survey
Tredinnick Wind Turbine
Luxulyan
Cornwall



Referencing information

Grid coordinates based on Ordnance Survey OSGB36 datum

Grids set out using RTK GPS with Leica SmartNet correction data RTCMv2 format OSTN02 transformation

Survey grid size = 30m

Survey start and traverse direction

01 Grid reference number and filename

Turbine centred on 205219 59934

Proposed access track

SCALE 1:1000

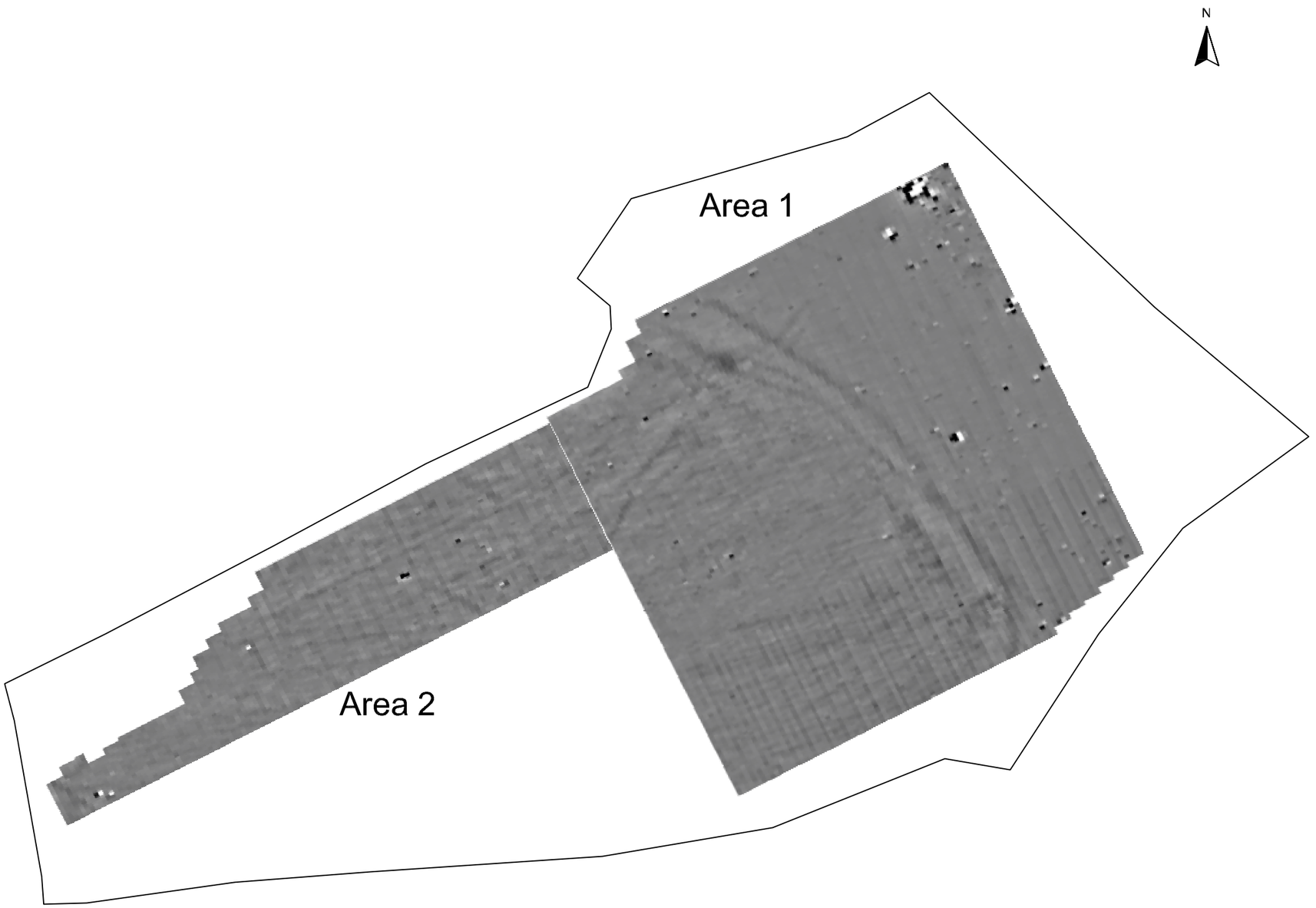
0m 10 20 30 40 50m

SCALE TRUE AT A3

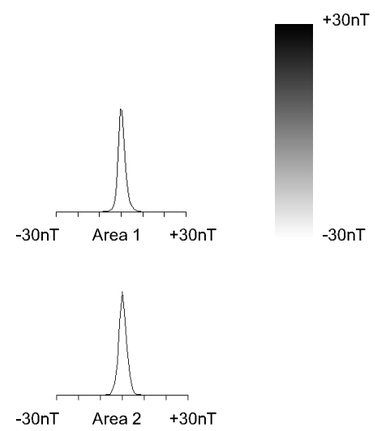
FIG 02

Archaeological Surveys Ltd

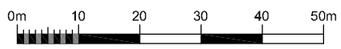
Geophysical Survey
Tredinnick Wind Turbine
Luxulyan
Cornwall



Greyscale plot of raw magnetometer data



SCALE 1:1000



SCALE TRUE AT A3

FIG 03

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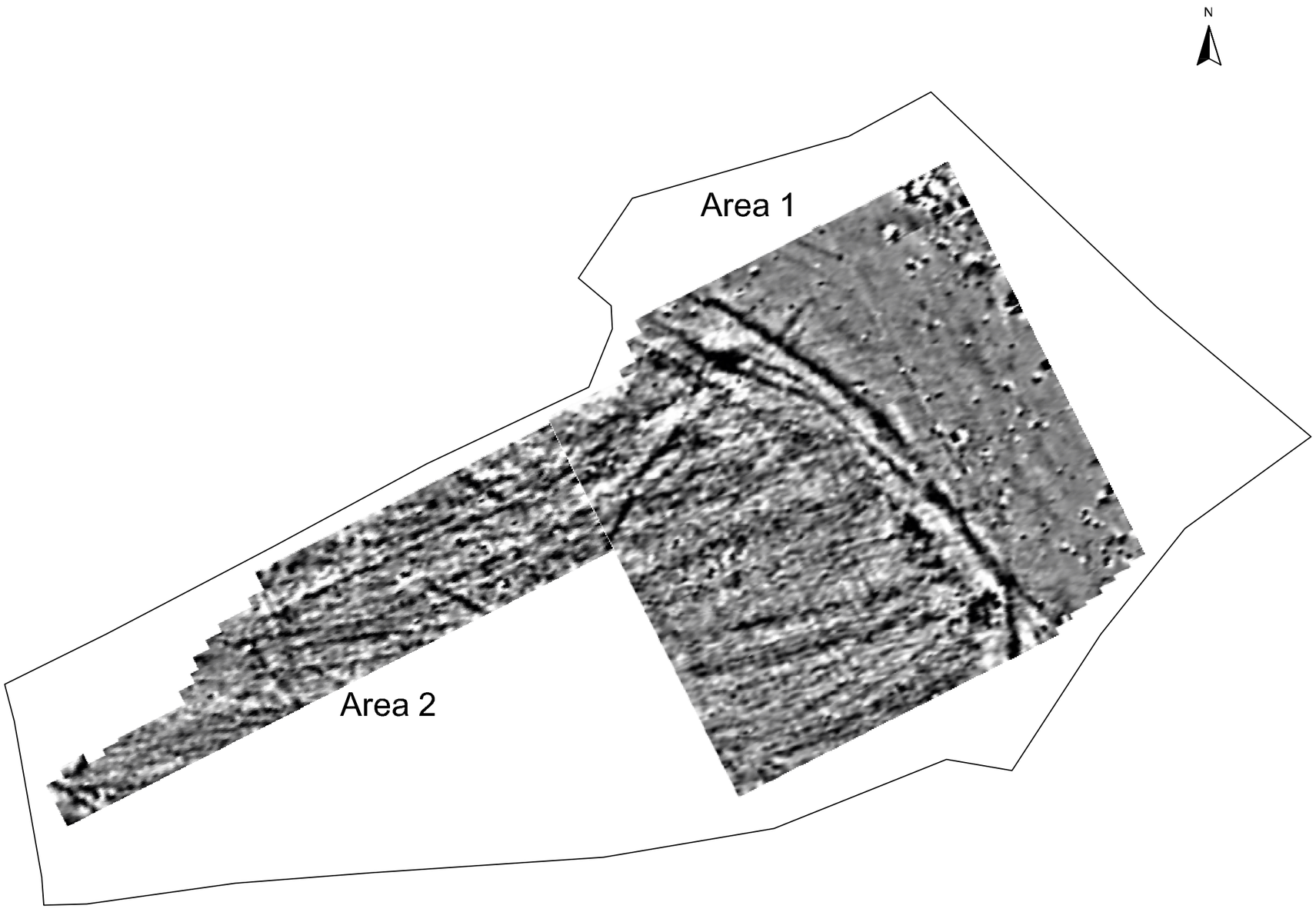
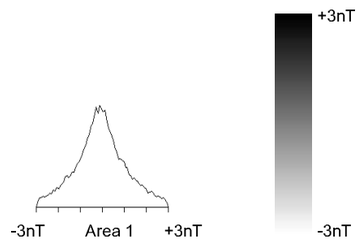
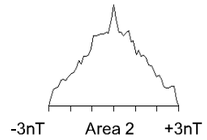
Greyscale plot of processed magnetometer data







SCALE 1:1000

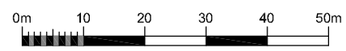


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FIG 04

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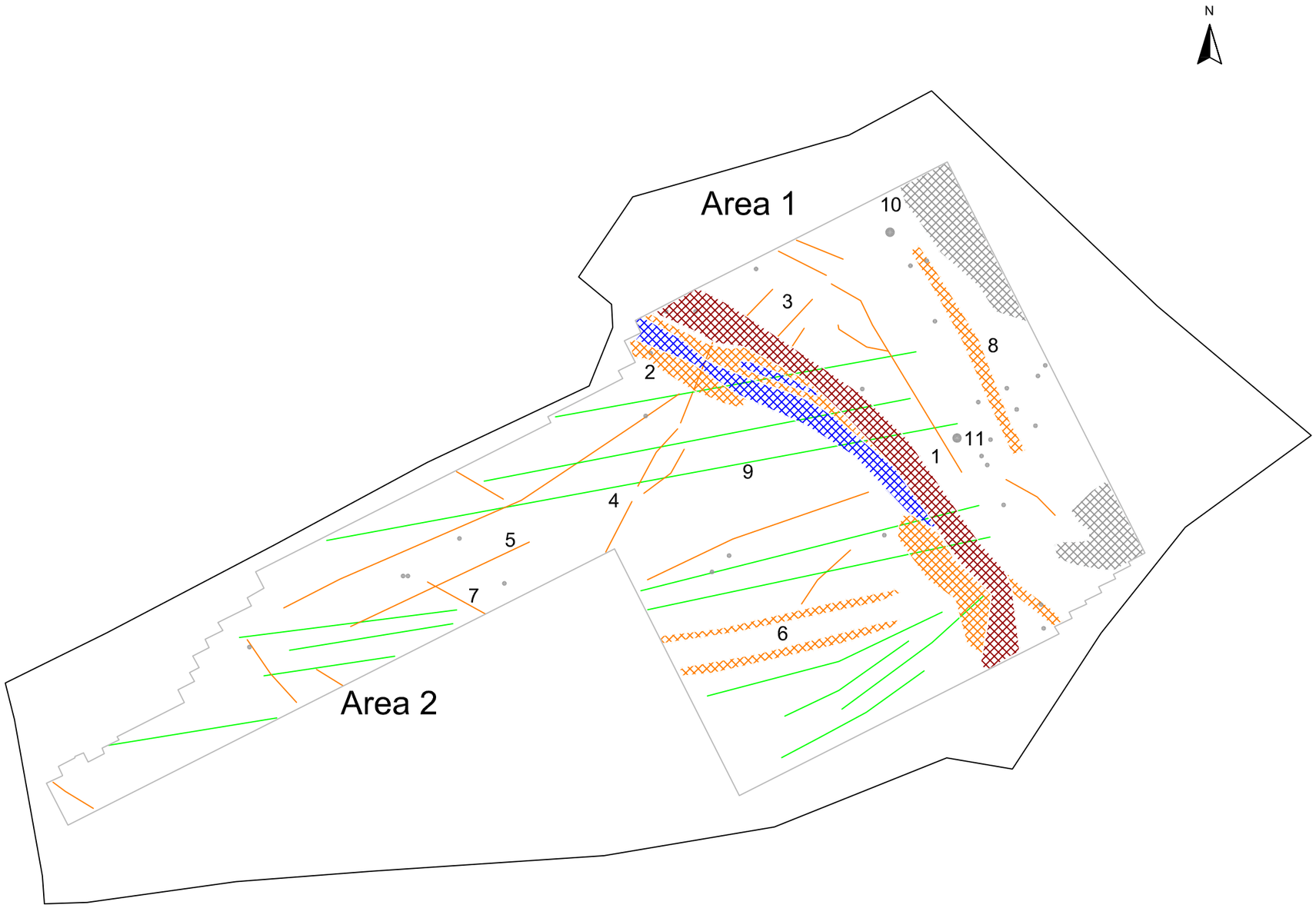
Abstraction and interpretation of magnetometer anomalies



- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - of agricultural origin
- Positive/negative anomaly - possible former field boundary
- Positive anomaly - magnetically enhanced material
- Negative anomaly - material with low magnetic susceptibility
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 05