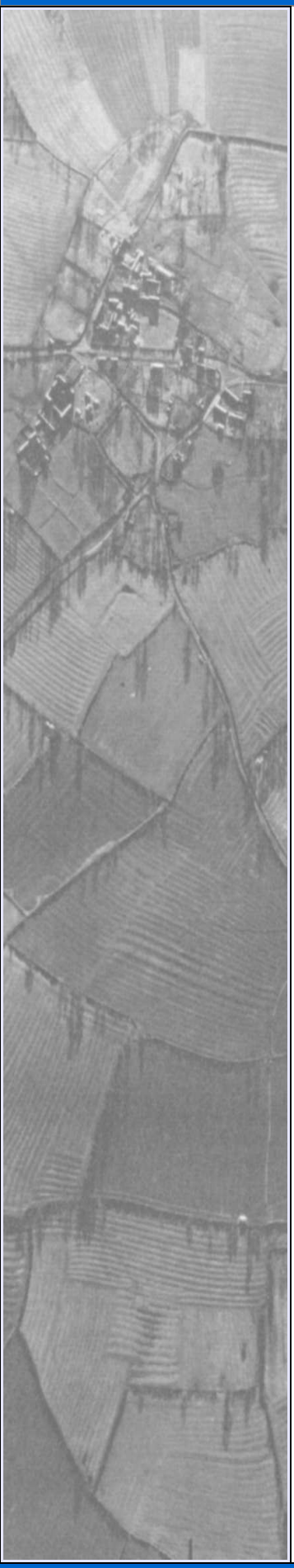


Land north of Cliffsend Road
Cliffsend, Ramsgate
Kent

MAGNETOMETER SURVEY REPORT

for

Millwood Designer Homes

Kerry Donaldson & David Sabin

April 2016

Ref. no. 654

ARCHAEOLOGICAL SURVEYS LTD

Land north of Cliffsend Road
Cliffsend, Ramsgate
Kent

Magnetometer Survey Report

for

Millwood Designer Homes

Fieldwork by David Sabin (Hons) MCIfA
Report by Kerry Donaldson BSc (Hons)
Report checked by David Sabin
Primary archive location - Archaeological Surveys Ltd, Yatesbury, Wiltshire

Survey date – 23rd March 2016
Ordnance Survey Grid Reference – **TR 34720 64485**

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

CONTENTS

LIST OF FIGURES

LIST OF PLATES

LIST OF TABLES

SUMMARY

A magnetometer survey was undertaken by Archaeological Surveys Ltd over 2.3ha of land at Cliffsend, near Ramsgate in Kent. Cropmarks and excavations have demonstrated a large number of archaeological features in the immediate and wider vicinity, although none have been recorded directly within the survey area. The results of the survey indicate that the western part of the site contains a number of archaeological features, including at least one enclosure, linear ditches, pits and a possible trackway. In the eastern part of the site there are a number of very weakly positive, short linear and discrete anomalies. They are poorly defined and partially obscured by strongly magnetic debris; however, given the location of excavated linear ditches and pits immediately to the east, an archaeological origin should also be considered.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by Millwood Designer Homes to undertake a magnetometer survey of an area of land to the north of Cliffsend Road, Cliffsend near Ramsgate in Kent. Outline planning permission has been granted for the construction of 31 dwellings and a retail unit with associated access and open space in the south western corner of the site (Planning ref: OL/TH/0537). The survey forms part of an archaeological assessment of the site to include later trial trenching informed by the results.

1.1.2 The survey has been carried out in accordance with a specification for archaeological evaluation by geophysical survey and trial trenching produced by the Trust for Thanet Archaeology (2016). A desk-based assessment also carried out by the Trust for Thanet Archaeology (2014) identified that there was significant archaeological potential on the site, partly demonstrated by the work carried out on the East Kent Access road in 2010, which is located less than 100m north 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 in order to determine the presence or absence of archaeological remains within the development site and the extent of the effect that previous land uses have had on the archaeological potential of the site. The aim of the archaeological evaluation is to assess the archaeological potential of the whole site so that consideration of the potential impact on the archaeology can be taken into account when developing a final site layout, allowing for potential preservation of significant features in situ within open spaces.

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 Chartered Institute for Archaeologists (2014) *Standard and Guidance for Archaeological Geophysical Survey.*

1.3 Site location, description and survey conditions

1.3.1 The site is located to the north of Cliffsend Road, Cliffsend, near Ramsgate in Kent. It is centred on Ordnance Survey National Grid Reference (OS NGR) TR 34720 64485, see Figures 01 and 02.

1.3.2 The geophysical survey covers approximately 2.3ha within two land parcels that form an L shape. Area 1 covered 1.75ha in the southern part of a field containing asparagus beds, see Plate 1. Area 2 is situated immediately to the east and covered 0.55ha within part of an arable field.

Plate 1: Area 1 looking to the south east

1.3.3 The ground conditions across the site were generally considered to be acceptable for the collection of magnetometry data. However, the asparagus beds were formed by a series of parallel ridges separated by narrow, deep furrows and these determined the location of survey traverses. Some of the furrows contained standing water. It was considered highly likely that any anomalies were going to be affected by the presence of the beds. Weather conditions during the survey were fine.

1.4 Site history and archaeological potential

1.4.1 An Archaeological Desk-Based Assessment has been prepared by the Trust for Thanet Archaeology (2014). It outlines that although the site does not contain any designated or undesignated heritage assets, there are many in the immediate and wider vicinity recorded from cropmark evidence, metal detecting finds and archaeological investigations. This includes the Oxford-Wessex Archaeology Joint Venture carried out in 2010 in advance of construction of the A256 East Kent Access Road, which lies less than 100m to the north of the site. A narrow strip at the eastern edge of the site was also subject to excavation along the route of a sewer outfall.

1.4.2 The archaeological evidence gathered from excavations and cropmarks indicate that there are a number of Late Neolithic to Early Bronze Age ring ditches in the vicinity and there is a high potential for the site to contain further ring ditches. A number of Middle Bronze Age pits, urned and unurned cremations have been identified to the north with a number of Middle or Late Bronze Age ditches located 5m to the east. There is a medium to high potential for such features to extend into the site. A large number of Iron Age enclosures, pits, trackways, hut circles and ditches have been recorded in the area surrounding the site and there is a high potential for similar features to be located within it. Roman pits, ditches and enclosures are also recorded in the vicinity and there is a medium to high potential for a continuation of such features. Anglo-Saxon pits and burial sites have been located to the north, and there is a medium potential for similar features. There is a low potential for medieval, post-medieval and modern features within the site.

1.5 Geology and soils

1.5.1 The underlying geology is sand, silt and clay from the Thanet Formation with overlying Head deposits. Margate Chalk Member is located immediately to the north (BGS, 2015).

1.5.2 The overlying soil across the site is from the Hamble 1 association and is a typical argillic brown earth. It consists of a deep, well drained, often stoneless, fine silty soil (Soil Survey of England and Wales, 1983).

1.5.3 The underlying geology and soils are frequently associated with low magnetic contrast and low levels of magnetic susceptibility. However, cut features of archaeological potential may be located where human activity has altered the magnetic characteristics of the soil sufficiently. The underlying geology and soils are therefore considered acceptable for magnetic survey.

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 SENSYS MAGNETO®MXPDA 5 channel cart-based system. The instrument has 5 fluxgate gradiometers spaced 0.5m apart with readings recorded at 20Hz. The gradiometers have a range of recording data between 0.1nT and 10,000nT. The sensors are not zeroed in the field, as the vertical axis alignment is fixed using a tension band system. In order to produce visible, useful greyscale images a zero median traverse process is undertaken in TerraSurveyor. The system is linked to a Leica GS10 RTK GPS with data recorded by SENSYS MAGNETO®MXPDA software on a rugged computer.

2.2.2 Data are collected along a series of parallel survey tracks wherever possible. The length of each track is variable and relates to the size of the survey area and other factors including ground conditions. A visual display aids accurate placing of tracks and their separation.

2.2.3 Data are not collected within fixed grids and data points are considered to be random even though the data are collected in a systematic manner covering all accessible areas (Aspinall, Gaffney and Schmidt, 2009).

2.3 Data processing and presentation

2.3.1 Magnetic data collected by the MAGNETO®MXPDA cart-based system are initially prepared and automatically compensated using SENSYS MAGNETO®DLMGPS software. Survey tracks are analysed and georeferenced compensated data (UTM Z30N) are then exported in ASCII format for further analysis and display using TerraSurveyor. The data are collected between limits of ±10000nT and clipped for display at ±5nT. Data are interpolated to a resolution of effectively 0.5m between tracks and 0.15m along each survey track.

2.3.2 Magnetic data collected by the MAGNETO®MXPDA cart-based system are initially prepared using SENSYS MAGNETO®DLMGPS software. Survey tracks are analysed and georeferenced raw data (UTM Z30N) are then exported in ASCII format for further analysis and display using TerraSurveyor.

2.3.3 The data are collected between limits of ±10000nT and clipped for display at between ±2nT and ±5nT. Data are interpolated to a resolution of effectively 0.5m between tracks and 0.15m along each survey track. A zero median traverse function is required in order to remove fixed offset values present within the sensors which do not undergo a zeroing procedure in the field. The approach ensures that the gradiometer sensors are very accurately aligned and fixed to the vertical magnetic field and are not influenced by localised magnetic fields or disturbed by vibration. Although a zero median traverse algorithm can remove anomalies aligned with the survey tracks, in practice this rarely occurs due to the use of long traverses, high resolution measurement and variability within the magnetic susceptibility of long linear features.

2.3.4 Appendix C contains metadata concerning the survey and data attributes and is derived directly from TerraSurveyor. Reference should be made to Appendix B for further information on any processes, such as clipping, carried out on the data. A filtered image for Area 1 is also displayed in Fig 04 where a low pass filter has been applied to smooth data and remove slight variations along survey tracks.

2.3.5 A TIF file is produced by TerraSurveyor software along with an associated world file (.TFW) that allows automatic georeferencing (OSGB36 datum) when using GIS or CAD software. The main form of data display used in the report is the minimally processed greyscale plot.

2.3.6 The raster images are combined with base mapping using ProgeCAD Professional 2014, creating DWG (2010) file formats. All images are externally referenced to the CAD drawing in order to maintain good graphical quality. The CAD plots are effectively georeferenced facilitating relocation of features using GPS, resection method, etc.

2.3.7 An abstraction and interpretation is also drawn and plotted for all geophysical anomalies located by the survey. Anomalies are abstracted using colour

coded points, lines and polygons. All plots are scaled to landscape A3 for paper printing.

2.3.8 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 within each survey area.

2.3.9 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 two survey areas covering approximately 2.3ha.

3.1.2 Magnetic anomalies located can be generally classified as positive responses of archaeological potential, positive anomalies of an uncertain origin, linear anomalies of an agricultural origin, areas of magnetic debris and disturbance, strong discrete dipolar anomalies relating to ferrous objects and strong multiple dipolar linear anomalies relating to buried services or pipelines.

3.1.3 Anomalies located within each survey area have been numbered and are described in 3.4 and 3.5 below.

3.2 Statement of data quality

3.2.1 Data are considered representative of the magnetic anomalies present within the site. The ridges and furrows associated with asparagus beds caused a series of linear anomalies. The majority of the data were collected from traverses orientated parallel with the beds in order to minimise the effect. Some additional filtering was used to suppress the linear responses. In addition, both survey areas contained zones of magnetic disturbance caused by services and agricultural equipment. The disturbance has the potential to obscure features of archaeological potential.

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 with archaeological potential AS-ABST MAG POS LINEAR ARCHAEOLOGY AS-ABST MAG POS DISCRETE ARCHAEOLOGY AS-ABST MAG ENCLOSURE DITCH 	Anomalies have the characteristics (mainly morphological) of a range of archaeological features such as pits, ring ditches, enclosures, etc..
Anomalies with an uncertain origin AS-ABST MAG POS LINEAR UNCERTAIN AS-ABST MAG POS DISCRETE UNCERTAIN AS-ABST MAG POS 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 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 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.
Anomalies with a modern origin AS-ABST MAG DISTURBANCE AS-ABST MAG SERVICE 	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, pylons 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. Fluxgate sensors may respond erratically and with hysteresis adjacent to strong magnetic sources. Buried services may produce characteristic multiple dipolar anomalies dependant upon their construction.

Table 1: List and description of interpretation categories

3.4 List of anomalies - Area 1

Area centred on OS NGR 634680 164487, see Figures 03 & 04.

Anomalies of archaeological potential

(1) - A positive curvilinear anomaly appears to be bounded to the north by linear anomaly (7) and to the east by anomaly (2), forming an enclosure with dimensions of at least 30m by 27m. It also appears to have a 2.1m gap or entrance facing south-west, with two possible linear anomalies projecting externally from it. The response is very weak at generally 1nT.

(2) - Two parallel positive linear anomalies are spaced between 1.7m and 6m apart and are fragmented or complex in places. The response ranges between <0.5nT and 6nT as it extends southwards. The westernmost linear appears to bound anomaly (1) but it is not possible to determine if it is contemporary. It appears to relate to a linear trackway extending to the north and south of the site.

(3) - Positive linear anomalies relate to linear ditches, possibly joining, although this is not clear. These may relate to former land division and are parallel/orthogonal with anomaly (7) to the north. A sub-rectangular or trapezoidal enclosure, dating to the Middle Iron Age, has been recorded from cropmarks and excavations on the same orientation, 190m to the north-east.

(4) - A number of positive linear and discrete anomalies are clustered towards the southern end of anomaly (2). They relate to cut linear ditches and pits, and it is possible that there is some truncation of anomaly (2); however, their date is uncertain.

(5) - At the southern edge of the survey area is a positive curvilinear anomaly. Due to the presence of strongly magnetic disturbance near the edge of the site the anomaly is poorly defined but is considered to be of archaeological potential.

(6) - Towards the northern edge of the survey area are a number of positive linear and a discrete response. These appear to relate to cut features.

(7) - A weakly positive linear anomaly appears to bound the northern edge of anomaly (1). It is parallel with anomaly (3) to the south and an excavated Middle Iron Age enclosure 155m to the north-east.

Anomalies with an uncertain origin

(8) - The survey area contains a number of positive linear anomalies that are either weak (<0.5nT), indistinct, short, fragmented or parallel with the asparagus beds (9) and therefore it is not possible to determine their origin.

Anomalies with an agricultural origin

(9) - The survey area contains parallel linear anomalies extending north-south which relate to the alternate ridges and furrows associated with the asparagus beds. At times the sensors are very close to the ground surface, resulting in a stronger, positive response and at times further away resulting in a weaker or negative response. They may have obscured and/or truncated the underlying archaeological features.

Anomalies associated with magnetic debris

(10) - A zone of magnetic debris is evident close to the south-western corner of the site, this relates to dumped ferrous and other magnetically thermoremnant material.

(11) - Strong, discrete, dipolar responses relate to ferrous and other magnetically thermoremnant objects in the topsoil.

Anomalies with a modern origin

(12) - Magnetic disturbance has been caused by buried services and other highly magnetic material within and adjacent to the survey area. These have obscured weaker anomalies.

3.5 List of anomalies - Area 2

Area centred on OS NGR 634802 164510, see Figures 03 & 04.

Anomalies with an uncertain origin

(13) - The survey area contains a small number of weakly positive linear and discrete responses. Due partly to the lack of definable morphology and the widespread and very strongly magnetic debris, it is not possible to determine the origin of these features. In the western half of the survey area, 18th and 19th century maps indicate that there was an orchard. However, given the location of a large number of excavated prehistoric linear ditches and pits immediately to the east, an archaeological origin should be considered, although none appear to be on a similar orientation.

Anomalies associated with land management

(14) - A positive linear anomaly is associated with a linear zone of magnetic debris extending northwards within the centre of the survey area. This relates to a removed and infilled formerly mapped field boundary.

Anomalies associated with magnetic debris

(15) - Very strongly magnetic debris is located along the eastern edge of the survey

area.

Anomalies with a modern origin

(16) - A negative linear anomaly is located in the eastern part of the survey area. This type of response indicates a buried service.

4 CONCLUSION

4.1.1 The geophysical survey was carried out within the southern half of a field containing asparagus beds (Area 1) and part of an arable field to the east (Area 2). Cropmarks and excavations have recorded mulit-phase land use and occupation to the north, east and south, although none have been previously recorded within the survey area.

4.1.2 The results of the magnetometry reveal a number of archaeological features, including at least one enclosure, a number of linear ditches, pits and a possible trackway within Area 1. The majority of the anomalies are very weak, poorly defined and/or fragmented, with truncation through agricultural practices.

4.1.3 Within Area 2, several very weakly positive linear and discrete anomalies have been located, and although they lack a coherent morphology, the presence of archaeology immediately to the east may indicate that they have archaeological potential.

5 REFERENCES

Aspinall, A., Gaffney, C. and Schmidt, A. 2009. *Magnetometry for Archaeologists*. Lanham (US), AltaMira Press.

British Geological Survey, 2016. *Geology of Britain viewer, 1:50 000 scale [online]* available from http://mapapps.bgs.ac.uk/geologyofbritain/home.html [accessed 06/04/2016].

Chartered Institute for Archaeologists, 2014. *Standard and Guidance for archaeological geophysical survey*. IfA, University of Reading.

English Heritage, 2008. *Geophysical survey in archaeological field evaluation. Research and Professional Service Guideline No.1.* 2nd ed. Swindon: English Heritage.

Institute for Archaeologists, 2002. *The use of Geophysical Techniques in Archaeological Evaluations*. IfA Paper No. 6. IfA, University of Reading.

Soil Survey of England and Wales, 1983. *Soils of England and Wales, Sheet 5 South West England.*

Trust for Thanet Archaeology, 2014. *Land north of Cliffsend Road, Cliffsend, Ramsgate, Kent, Archaeological Desk-Based Assessment.*

Trust for Thanet Archaeology, 2016. *Specification for an archaeological evaluation by geophysical survey and trial trenching at Cliffsend Farm Cottages, Cliffsend Farm, Ramsgate, Thanet.*

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 SENSYS gradiometer is a passive instrument consisting of two fluxgate sensors mounted vertically 65cm apart. The instrument is carried about 10-20cm 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.

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 ±3nT 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 (destripe) 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 differences between the baseline value of gradiometer sensors.

High Pass Filtering

A mathematical process used to remove low frequency anomalies relating to survey tracks and modern agricultural features.

Low Pass Filtering

A mathematical process used to remove high frequency anomalies relating to survey tracks and modern agricultural features.

Appendix C – survey and data information

Area 1 - unfiltered data

COMPOSITE
Path: C:\Business\Jobs\J654 Cliffsend\Area 1\comps\
Filename: J654-mag-Area1-proc.xcp
Description: Imported as Composite from: J654-mag-Area1.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 31U
Survey corner coordinates (X/Y):
Northwest corner: 634606.126599636, 164550.684094683 m
Southeast corner: 634751.026599636, 164422.524094683 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 1
Dummy Value: 32702
Source GPS Points: 493700
Dimensions
Composite Size (readings): 805 x 712
Survey Size (meters): 145 m x 128 m
Grid Size: 145 m x 128 m
X Interval: 0.18 m
Y Interval: 0.18 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.56
Mean: 0.02
Median: 0.07
Composite Area: 1.857 ha
Surveyed Area: 1.7371 ha
PROGRAM
Name: TerraSurveyor
Version: 3.0.29.1
Processes: 1
1 Base Layer

GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 Clip from -3.00 to 3.00 nT

Area 1 - filtered data

COMPOSITE
Path: C:\Business\Jobs\J654 Cliffsend\Area 1\comps\
Filename: J654-mag-Area1-proc-lpf.xcp
Description: Imported as Composite from: J654-mag-Area1.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 31U
Survey corner coordinates (X/Y):
Northwest corner: 634606.22659966, 164550.584094659 m
Southeast corner: 634750.97659966, 164422.634094659 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 1
Dummy Value: 32702
Source GPS Points: 493700
Dimensions
Composite Size (readings): 965 x 853
Survey Size (meters): 145 m x 128 m
Grid Size: 145 m x 128 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 2.00
Min: -2.00
Std Dev: 1.08
Mean: 0.02
Median: 0.09
Composite Area: 1.8521 ha
Surveyed Area: 1.7395 ha
Processes: 3
1 Base Layer
2 Clip from -3.00 to 3.00 nT
3 Clip from -2.00 to 2.00 nT

GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 Clip from -3.00 to 3.00 nT
5 Low pass Gaussian filter: Window dia: 30

Area 2

COMPOSITE
Path: C:\Business\Jobs\J654 Cliffsend\Area 2\comps\
Filename: J654-mag-Area2-proc.xcp
Description: Imported as Composite from: J654-mag-Area2.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 31U
Survey corner coordinates (X/Y):
Northwest corner: 634757.003254379, 164547.491557171 m
Southeast corner: 634850.603254379, 164480.141557171 m
Direction of 1st Traverse: 90 deg
Collection Method: Parallel
Sensors: 1
Dummy Value: 32702

Source GPS Points: 151900

Dimensions
Composite Size (readings): 624 x 449
Survey Size (meters): 93.6 m x 67.4 m
Grid Size: 93.6 m x 67.4 m
X Interval: 0.15 m
Y Interval: 0.15 m

Stats
Max: 5.53
Min: -5.50
Std Dev: 2.96
Mean: -0.12
Median: 0.03
Composite Area: 0.6304 ha
Surveyed Area: 0.53855 ha

Processes: 1
1 Base Layer

GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 Clip from -10.00 to 10.00 nT
5 Clip from -5.00 to 5.00 nT

Appendix D – digital archive

Archaeological Surveys Ltd hold the primary digital archive at their offices in Wiltshire. 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.

A PDF copy will be supplied to the Kent Historic Environment Record, with printed copies on request The report will also be uploaded to the Online AccesS to the Index of archaeological investigationS (OASIS).

Archive contents:

Geophysical data Area 1 - path: J654 Cliffsend\Data				
Path and Filename	**Software**	**Description**	**Date**	**Creator**
cliffsend1\MX\ .prm .dgb .disp	Sensys MXPDA	Proprietary data formats representing magnetometer survey traverses logged to a PDA.	23/03/16	D.J.Sabin
cliffsend1\MX\J654-mag-Area1.asc	Sensys DLMGPS	ASCII CSV (tab) file representing survey Area 1 in eastings, northings (UTM Z30N), magnetic measurement, traverse file and sensor number.	30/03/16	K.T.Donaldson
Area1\comps\J654-mag-Area1.xcp	TerraSurveyor 3.0.23.0	Composite data file derived from ASCII CSV.	30/03/16	K.T.Donaldson
Area1\comps\J654-mag-Area1-proc.xcp	TerraSurveyor 3.0.23.0	Processed composite data file (zmt and clipping to ±3nT).	30/03/16	K.T.Donaldson
Area1\comps\J654-mag-Area1-proc-lpf.xcp	TerraSurveyor 3.0.23.0	Processed composite data file (zmt, low pass filter and clipping to ±2nT).	30/03/16	K.T.Donaldson
Geophysical data Area 2 - path: J654 Cliffsend\Data				
cliffsend2\MX\ .prm .dgb .disp	Sensys MXPDA	Proprietary data formats representing magnetometer survey traverses logged to a PDA at.	23/03/16	D.J.Sabin
cliffsend2\MX\J654-mag-Area2.asc	Sensys DLMGPS	ASCII CSV (tab) file representing survey Area 2 in eastings, northings (UTM Z30N), magnetic measurement, traverse file and sensor number.	30/03/16	K.T.Donaldson
Area2\comps\J654-mag-Area2.xcp	TerraSurveyor 3.0.23.0	Composite data file derived from ASCII CSV.	30/03/16	K.T.Donaldson
Area2\comps\J654-mag-Area2-proc.xcp	TerraSurveyor 3.0.23.0	Processed composite data file (zmt and clipping to ±5nT).	30/03/16	K.T.Donaldson
Graphic data - path: J654 Cliffsend\Data				
Area1\graphics\ J654-mag-Area1-proc.tif	TerraSurveyor 3.0.23.0	TIF file showing a minimally processed greyscale plot clipped to ±3nT.	30/03/16	K.T.Donaldson
Area1\graphics\ J654-mag-Area1-proc.tfw	TerraSurveyor 3.0.23.0	World file for georeferencing TIF to OSGB36.	30/03/16	K.T.Donaldson
Area1\graphics\ J654-mag-Area1-proc-lpf.tif	TerraSurveyor 3.0.23.0	TIF file showing a minimally processed greyscale plot clipped to ±2nT.	30/03/16	K.T.Donaldson
Area1\graphics\ J654-mag-Area1-proc-lpf.tfw	TerraSurveyor 3.0.23.0	World file for georeferencing TIF to OSGB36.	30/03/16	K.T.Donaldson
Area2\graphics\ J654-mag-Area2-proc.tif	TerraSurveyor 3.0.23.0	TIF file showing a minimally processed greyscale plot clipped to ±5nT.	30/03/16	K.T.Donaldson
Area2\graphics\ J654-mag-Area2-proc.tfw	TerraSurveyor 3.0.23.0	World file for georeferencing TIF to OSGB36.	30/03/16	K.T.Donaldson
CAD data - path: J654 Cliffsend\\CAD				
J654 version 1.dwg	ProgeCAD 2016	CAD file for creating plots of greyscales, abstraction, interpretation and mapping. Grid coordinates as OSGB. AutoCAD 2010 format.	30/03/16	K.T.Donaldson
Text data - path: J654 Cliffsend\\Documentation				
J654 report.odt	OpenOffice.org 3.0.1 Writer	Report text as an Open Office document.	04/04/16	K.T.Donaldson

Appendix E – copyright and intellectual property

This report may contain material that is non-Archaeological Surveys Ltd copyright (eg Ordnance Survey, Crown Copyright) or the intellectual property of third parties, which we are able to provide for limited reproduction under the terms of our own copyright licences, but for which copyright itself is non-transferable by Archaeological Surveys Ltd. Users remain bound by the conditions of the Copyright, Design and Patents Act 1988 with regard to multiple copying and electronic dissemination of this report.

Archaeological Surveys Ltd shall retain intellectual property rights for the materials and records created as part of this project. A non-exclusive, transferable, sub-licensable, perpetual and royalty-free licence shall be granted to the client on full payment of works in order for them to use, reproduce and enhance the reports, documentation, graphics and illustrations produced as part of this project for the purpose for which they were commissioned. Copyright licence will also be granted to the local authority for planning use and within in the Historic Environment Record for public dissemination upon payment by the client. Any document produced to meet planning requirements may be freely copied for planning, development control, research and outreach purposes without recourse to the originator, subject to all due and appropriate acknowledgements being provided and to the terms of the original contract with the client. Archaeological Surveys Ltd shall retain the right to be identified as the author and originator of the material.

The report, data and any associated material produced by Archaeological surveys Ltd cannot be freely used for any commercial activity other than those set out above. Any unauthorised use will be considered to be in breach of copyright.

Title of Goods remains with Archaeological Surveys Ltd until payment has cleared. Late payment may jeopardise any planning decision as there will be no transfer of title, licensing or any other right of copy or use of this report. Archaeological Surveys Ltd do not give permission for use of the report and associated data in cases of late payment. Any such use will be considered to be in breach of copyright. Late payment may also incur interest at 8% over the Bank of England base rate. Non-payment will be pursued by legal action.

Archaeological Surveys Ltd

Geophysical Survey
Land north of Cliffsend Road
Cliffsend
Kent

Map of survey area

● Survey location

Site centred on OS NGR
TR 34720 64485

SCALE 1:25 000

0m 500m 1000m

SCALE TRUE AT A3

FIG 01

Archaeological Surveys Ltd

Geophysical Survey
Land north of Cliffsend Road
Cliffsend
Kent

Referencing information

Referencing grid to OSGB36 datum at 50m intervals

Data collected at 20Hz and georeferenced to ETRS89 zone 30 with conversion to OSGB36 using OSTN02

634650 164550

N

634600 634650 634700 634750 634800 634850

164550 164500 164450 164400

Area 1

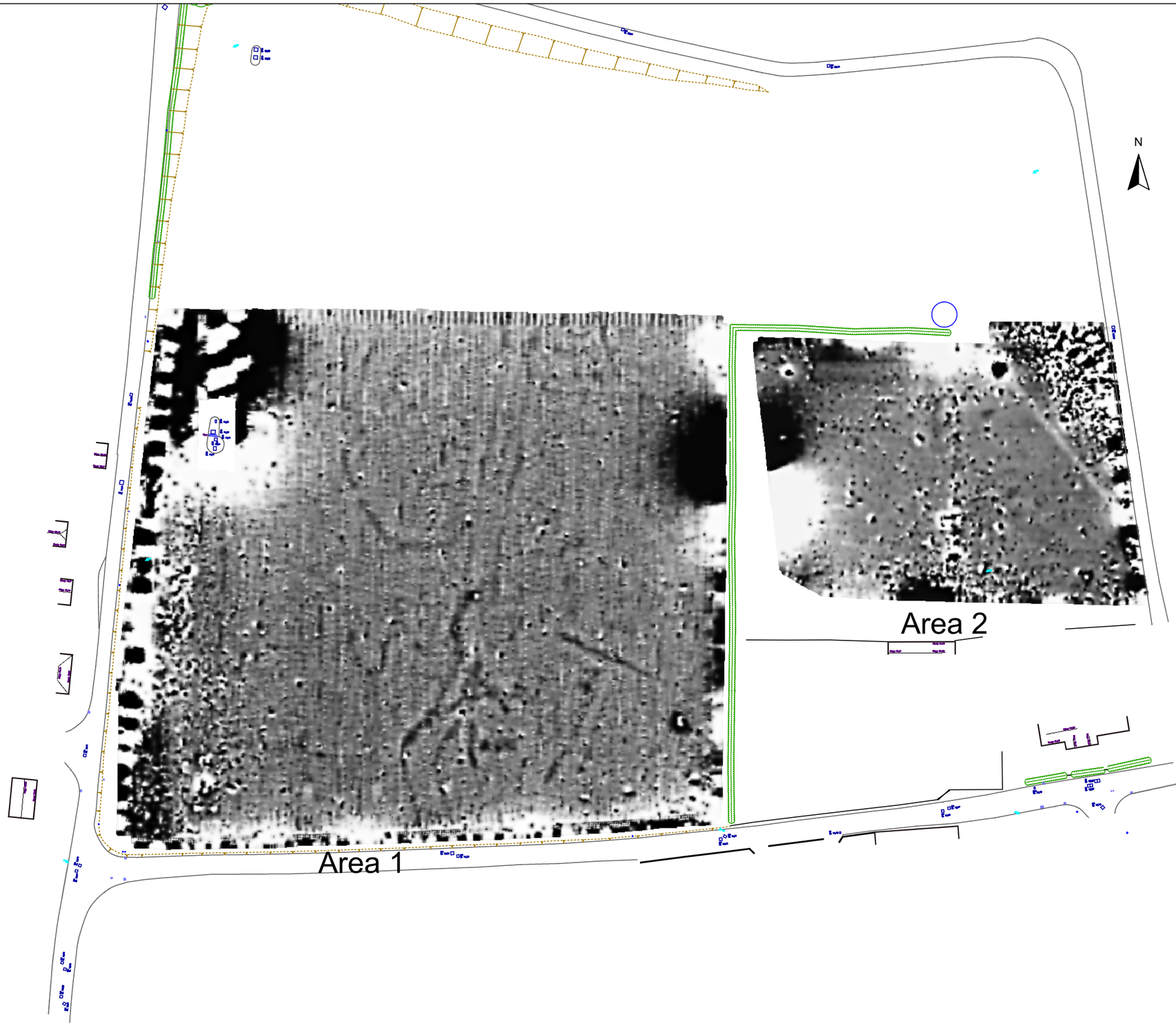
Area 2

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

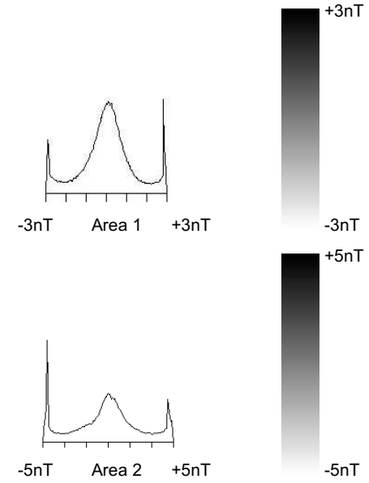
FIG 02



Archaeological Surveys Ltd

Geophysical Survey
Land north of Cliffsend Road
Cliffsend
Kent

Greyscale plot of minimally processed magnetometer data



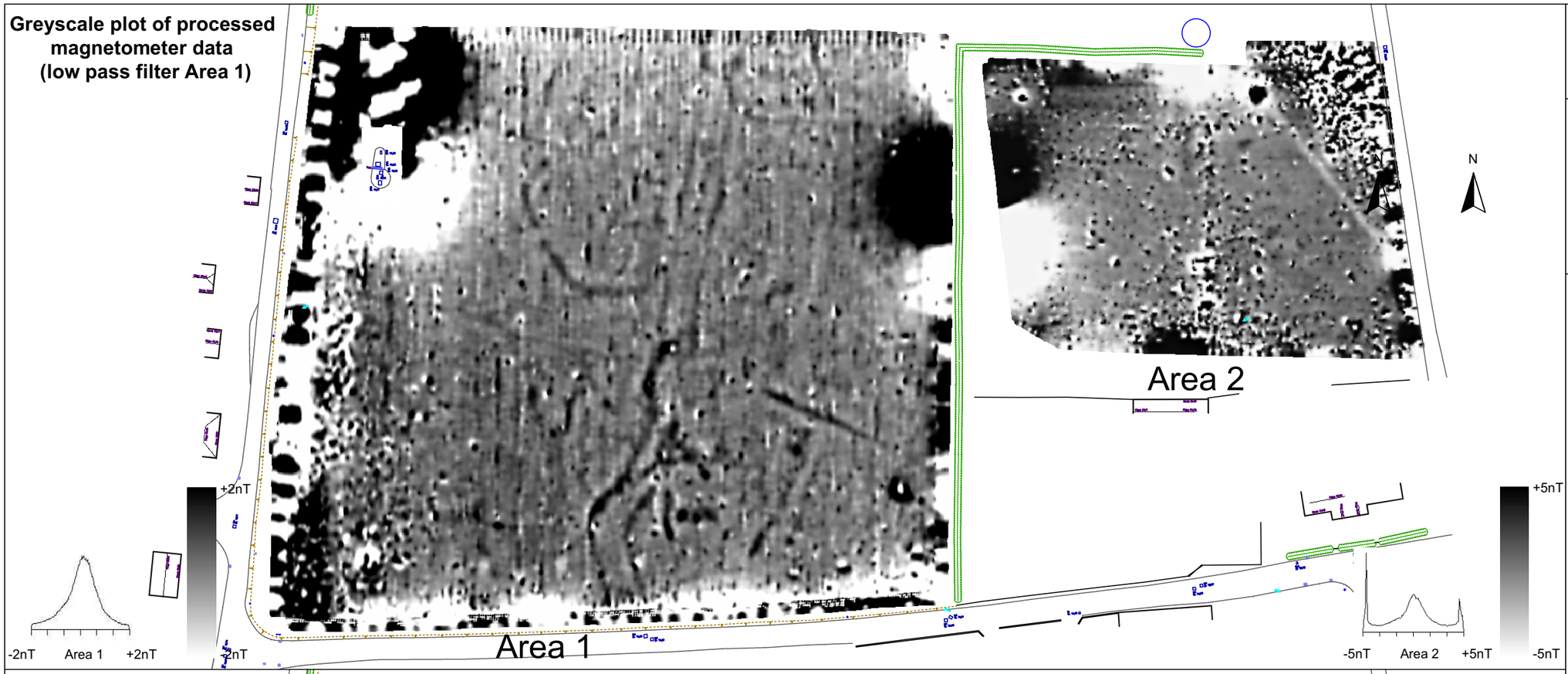
SCALE 1:1000

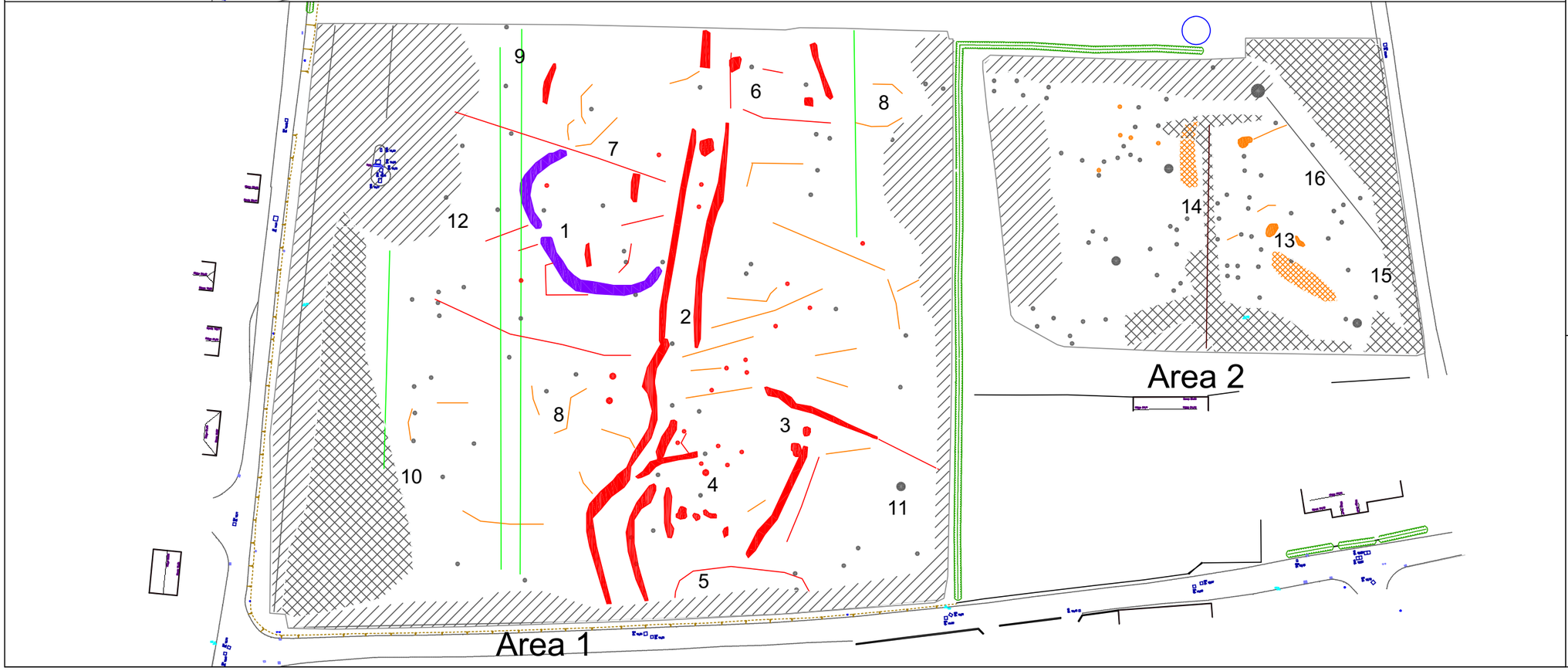
0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 03

Greyscale plot of processed magnetometer data (low pass filter Area 1)





Archaeological Surveys Ltd

Geophysical Survey
Land north of Cliffsend Road
Cliffsend
Kent

Abstraction and interpretation of magnetometer anomalies

- Positive linear anomaly - cut feature of archaeological potential
- Positive curvilinear anomaly - enclosure ditch
- Weakly positive linear anomaly - possible ditch-like feature
- Linear anomaly - of agricultural origin
- Positive linear anomaly - former field boundary
- Discrete positive response - cut feature of archaeological potential
- Discrete positive response - possible pit-like feature
- Positive anomaly - magnetically enhanced material
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong multiple dipolar linear anomaly - pipeline / cable / service
- Strong dipolar anomaly - ferrous object

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 04