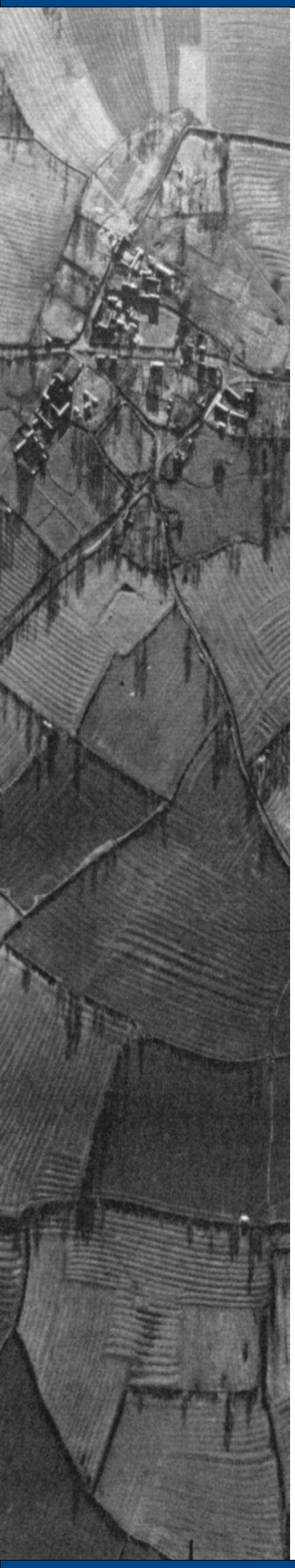

Land to the east of Maidenbrook Farm Taunton

MAGNETOMETER SURVEY REPORT

for

Tarker Ltd

David Sabin and Kerry Donaldson

November 2009

Ref. no. 293

ARCHAEOLOGICAL SURVEYS LTD

Land to the east of Maidenbrook Farm Taunton

Magnetometer Survey

for

Tarker Ltd

Fieldwork by David Sabin, Francis Sabin and Jack Cousins
Report by David Sabin BSc (Hons) MIFA and Kerry Donaldson BSc (Hons)

Survey date - **from the 7th to the 10th November 2009**
Ordnance Survey Grid Reference – **ST 24930 26388**

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SUMMARY

Magnetometry was carried out across three fields totalling approximately 8ha to the east of Maidenbrook Farm near Taunton. The survey forms part of an archaeological assessment of the site prior to a proposed housing development.

The survey located very low magnitude positive anomalies across the site and it is considered most likely that the poor levels of magnetic enhancement are associated with certain properties of the soils and geology of the area. The low magnitude magnetic response produced poor contrast and definition of anomalies hindering confident interpretation.

A number of linear, rectilinear, curvilinear and discrete positive anomalies were abstracted from data collected across the site. These anomalies are considered likely to relate to former cut features, and it is suggested that some may be associated with features of archaeological potential.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by Archaeology & Planning Solutions on behalf of Tarker Ltd, to undertake a magnetometer survey of an area of land to the east of Maidenbrook Farm near Taunton. The site has been outlined for a proposed housing development. 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.

1.2.2 The methodology is considered an efficient and effective approach to archaeological prospection. The survey and report generally follow the recommendations set out by: English Heritage, 2008, *Geophysical survey in archaeological field evaluation;* Institute for Archaeologists, 2002, *The use of Geophysical Techniques in Archaeological Evaluations*.

1.3 Site location, description and survey conditions

1.3.1 The site covers four conjoined fields, three of which lie to the east of Maidenbrook Farm in the parish of Cheddon Fitzpaine, with the most south easterly field located adjacent to Aginghill's Farm in the parish of West Monkton, see Figures 01 and 02. The two parishes are located immediately to the north east of Taunton, Somerset. The central Ordnance Survey National Grid Reference is 324930 126388.

1.3.2 The site is approximately 10.3ha of agricultural land with mainly grass cover. The smallest of the 4 fields could not be surveyed due to extensive bramble cover and tall wild plant growth; for the purposes of this report the fields have therefore been labelled Areas 1 – 3, see Figure 02. The south westerly field of the group (Area 3) contained tall grass cover that had died back to some degree allowing survey to be carried out. The area also contained an open trench or ditch with associated earth bank towards the south western corner (possibly trench E of the 1990 evaluation excavation, see 1.4.1 below) and a separate overgrown earth bank along the eastern side.

1.3.3 The ground conditions across the site were generally considered to be favourable for the collection of magnetometry data although difficult conditions were encountered within Area 3 due to thick vegetation and other relatively recently constructed features, see above. Weather conditions during the survey were variable with periods of heavy rain and high winds.

Plate 1: Survey Area 1 looking north west

1.4 Site history and archaeological potential

1.4.1 Less than 100m to the south of Area 3, an evaluation followed by an excavation carried out in 1990, located an Iron Age and Romano-British site. An evaluation trench located within Area 3 (trench F) is reported to have contained a number of slight ditches or gullies associated with the site (Ferris and Bevan, 1993).

1.4.2 Evaluation trenches E, F and H were orientated north south with part of E and

H crossing into the southern part of Area 3 and all of trench F located within the eastern half of the area. Trenches I and J were orientated east west and located in the unsurveyable north western part of the site.

1.5 Geology and soils

1.5.1 The underlying geology is Permian and Triassic mudstones and marls of the Mercia Mudstone Group (BGS, 2001), River Terrace Deposits and alluvium may also extend into the survey area (BGS, 1977).

1.5.2 The overlying soils within the northern part of the site are from the Whimple 3 association, whilst those within the southern part are mapped as from the Compton association. The former are stagnogleyic argillic brown earths that form over Permo-Triassic mudstones, the latter are pelo-alluvial gley soils that form from reddish river alluvium (Soil Survey of England and Wales, 1983).

1.5.3 The Permian and Triassic mudstone series are known to be associated with relatively poor conditions for magnetic survey. Magnetic contrast can be sufficient to locate cut archaeological features although it should be considered that some features may not be sufficiently enhanced to be revealed by magnetometry. Magnetometry survey carried out less than 1km to the north east of the site (Archaeological Surveys, 2007) successfully located anomalies of archaeological potential, though contrast was notably low.

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 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 0.01nanoTesla (nT), with an effective resolution of 0.03nT. All readings are saved to an integral data logger for analysis and presentation

2.2.2 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. It may be very difficult to obtain optimum balance for the sensors due to localised magnetic vectors that can 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.

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

Date of calibration/service	16th May 2009
Sensor type	Bartington Grad - 01 – 1000 Nos. 084 and 085
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.

2.2.4 Data were collected at 0.25m centres along traverses 1m apart. The survey area was separated into 40m by 40m grids (1600m²) giving 6400 measurements per grid. This sampling interval is very effective at locating archaeological features and is the recommended methodology for archaeological prospection (English Heritage, 2008).

2.2.5 The survey grids were set out to the Ordnance Survey OSGB36 datum using a Penmap RTK GPS. The GPS is used in conjunction with Topcon's TopNet 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).

2.2.6 The fixed orientation of survey grids based on the OSGB36 datum was considered appropriate given that the orientation of land boundaries was variable and consequently partial survey grids were unavoidable. In addition there is an optimum north – south traverse direction for magnetic survey (English Heritage, 2008). Survey in this direction can produce anomalies with a higher contrast when compared to other orientations; this is a function of their presence within the Earth's magnetic field. A fixed grid across the site also simplifies its relocation should that be required.

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 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 ArcheoSurveyor; 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,
- clipping of processed data at ±0.5nT to further enhance very low magnitude anomalies,
- de-stagger is used to enhance linear 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 assessment of features within each survey area. Where further

interpretation is possible, or where a number of possible origins should be considered, 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. Both 'raw' and 'processed' data have been shown followed by an abstraction and interpretation plot.

2.3.5 Graphic raster images in bitmap format (.BMP) are initially prepared in ArcheoSurveyor. Regardless of survey orientation, data captured along each traverse are displayed and processed by ArcheoSurveyor 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 90° anticlockwise to restore north to the top of the image.

2.3.6 The raster images are combined with base mapping using 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.. A digital archive, including raster images is produced with this report, allowing separate analysis if necessary, see Appendix D below.

3 RESULTS

3.1 General overview

3.1.1 The detailed magnetic survey was carried out over a total of 3 survey areas covering an area of approximately 8ha. Geophysical anomalies located can be generally classified as positive linear anomalies possibly representing ditch-like features, negative linear anomalies of uncertain origin, discrete positive anomalies possibly indicating pit-like features, 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. Anomalies located within each survey area have been numbered and will be outlined below with subsequent discussion in Section 4.

3.1.2 Data quality is considered good for all survey areas with no significant defects. Magnetic disturbance, caused by modern ferrous objects, is apparent around the boundaries of the survey areas. Severe magnetic disturbance was encountered adjacent to an electricity pylon in the southern part of Area 2. Poor ground conditions in Area 3 have not resulted in data problems although no data were collected over relatively modern soil dumps and along an open trench.

3.1.3 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, a basic key is indicated to allow cross reference to the abstraction and interpretation plot. Sub-headings are then used to group anomalies with similar characteristics for each survey area.

Anomalies with an uncertain origin

Positive anomalies
Negative 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 features and agricultural features should be considered.

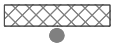
Anomalies with an agricultural origin

Agricultural anomalies
Former ridge and furrow

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 modern ploughing.

Anomalies associated with magnetic debris

Magnetic debris
Strong discrete dipolar anomaly



The response often appears as areas containing many small dipolar anomalies that may range from weak to very 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 and fragments of igneous or metamorphic rock. Strong discrete dipolar anomalies are responses to ferrous objects within the topsoil.

Anomalies with a modern origin

Magnetic disturbance
Strong multiple dipolar linear anomaly - pipeline/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.

3.2 Area 1

Area centred on Ordnance Survey National Grid Reference 324910 126487. See Figures 03, 05, 06, 08, 09 and 11.

Anomalies with an uncertain origin

(1) – Several long linear positive anomalies were located across the survey area. The anomalies may form rectilinear elements and probably indicate the presence of ditch-like features. There is no clear relationship with extant field boundaries although orientations are similar. The anomalies may indicate former field systems or enclosure boundaries and may potentially be of archaeological significance.

(2) – Positive curvilinear anomalies close to the northern boundary of the survey area that may extend beyond the limit of the survey. The anomalies may be associated with weak discrete positive responses that could indicate the presence of pit-like features. The morphology of the anomalies, their weak response and fragmented nature does not allow for confident interpretation; however, the anomalies may indicate features of some archaeological potential.

(3) – Several poorly defined, weak, positive curvilinear anomalies were located across the survey area. These responses may indicate ditch-like features although they are too weak and fragmented for a confident interpretation to be made.

(4) – A positive linear anomaly crossing the central part of the survey area with a north south orientation. It is unclear as to whether the anomaly relates to other agricultural features with a similar orientation or whether it is part of the eastern side of a rectilinear feature.

(5) – Weak, positive linear anomalies located across the survey area are of uncertain origin but may indicate ditch-like features.

(6) – A discrete positive anomaly approximately 3m in diameter may indicate the presence of a former pit-like feature or infilled depression.

(7) – Discrete positive anomalies that may indicate pit-like features.

(8) – A negative linear anomaly of uncertain origin. The response indicates the presence of material of low magnetic susceptibility such as subsoil.

Anomalies with an agricultural origin

(9) – Parallel linear anomalies located across the survey area are related to agricultural marks or land drains.

Anomalies with a modern origin

(10) – Zones of magnetic disturbance around the periphery of the survey area have been caused by ferrous material used in fencing and/or adjacent services.

3.3 Area 2

Area centred on Ordnance Survey National Grid Reference 324994 126305. See Figures 04, 07, 08, 10 and 11.

Anomalies with an uncertain origin

(11) – Very weak positive linear, curvilinear and rectilinear anomalies located in the central western part of the survey area may represent ditch-like features. The morphology of the anomalies, their weak response and fragmented nature does not allow for confident interpretation; however, the anomalies may indicate features of some archaeological potential.

(12) – Weak positive linear anomalies located across the survey area cannot be confidently interpreted although may represent ditch-like features.

Anomalies with an agricultural origin

(13) – Parallel linear anomalies with an east west orientation indicate former agricultural marks or land drains. A series of linear depressions with a similar orientation were visible within the field.

Anomalies associated with magnetic debris

(14) – A zone of magnetic debris was located adjacent to Aginghill's Farm. The response is likely to be related to magnetically thermoremnant material associated with the farm.

(15) – A patch of magnetic debris within the central part of the survey area may indicated dumped magnetically thermoremnant material although could be associated with burning.

(16) – Magnetic debris close to the southern end of the survey area is probably associated with magnetically thermoremnant material originating from the nearby canal and marina.

Anomalies with a modern origin

(17) – A zone of magnetic disturbance surrounds an electricity pylon at the southern end of the survey area. The response may have obscured other low magnitude anomalies in the vicinity.

(18) – Multiple dipolar linear anomalies within the northern part of the survey area are related to services or land drains.

3.4 Area 3

Area centred on Ordnance Survey National Grid Reference 324841 126343. See Figures 04, 07, 08, 10 and 11.

Anomalies with an uncertain origin

(19) – A linear or slightly curvilinear positive anomaly crosses the central part of the survey area. The anomaly may indicate a ditch-like feature.

(20) – Parallel positive and negative linear anomalies are of uncertain origin although may represent an agricultural mark or land drain.

(21) – A weak negative linear anomaly that may be similar in origin to (20).

(22) – Very weak positive linear anomalies with a north south orientation may indicate ditch-like features although could be of agricultural origin.

(23) – A negative linear anomaly that appears to correlate with an infilled trench. This is likely to be trench F of the 1990 evaluation excavations.

Anomalies with a modern origin

(24) – A zone of magnetic disturbance at the southern end of the survey area may be related to services within the southern field boundary.

4 DISCUSSION

4.1 Area 1

4.1.1 Several long linear anomalies, potentially forming rectilinear features, were located in the survey area. The orientation of some of the linear elements forming the anomalies is to some degree reflected in extant field boundaries although there is a clear difference when compared to linear anomalies classified as agricultural in origin. Although these features may indicate former ditches associated with former field boundaries dating from the post medieval period, no boundaries are visible on Ordnance Survey mapping from the later 19th century, and it is considered possible that the features are much earlier.

4.1.2 A number of weak curvilinear anomalies were located within the survey area. Most convincing is anomaly group (2), located close to the northern boundary, which may also contain pit-like anomalies. Due to the weak and fragmented nature of these anomalies, interpretation is limited; however, their archaeological potential should be considered as they may be associated with prehistoric and early Romano-British settlement features. The potential enclosure boundaries discussed above may be associated with the curvilinear anomalies.

4.1.3 A number of other linear and discrete anomalies of uncertain origin have been located within the survey area. Potentially these may relate to ditch-like and pit-like features although it has not been possible to determine their archaeological potential.

4.2 Area 2

4.2.1 Similar to Area 1, very weak positive linear and possible rectilinear or curvilinear anomalies were located. The strength of the anomalies is generally weaker than those in Area 1 and of even poorer contrast producing very difficult data for abstraction and interpretation. It is possible that the alluvial content of the soil profile increases to the south and this may be responsible for poorer magnetic contrast in this area.

4.2.2 Confident interpretation of anomalies has again not been possible within Area 2. However, given the location of Romano-British features within excavations approximately 100m to the west (see 1.4.1), the archaeological potential of anomalies, particularly within the central western part of Area 2, should be considered.

4.3 Area 3

4.3.1 Several very low magnitude linear anomalies were located by the survey and, as for Areas 1 and 2, interpretation is limited. Some of the anomalies may relate to relatively recent agricultural marks or land drainage. Anomaly (19) is very poorly defined but tends to differ from the other anomalies in that it is not orientated parallel to extant field boundaries.

5 CONCLUSION

5.1.1 The magnetometer survey has demonstrated the presence of weakly enhanced magnetic anomalies across the site, and despite less than optimum geological and pedological conditions, a useful assessment of archaeological potential is possible. The weak, low contrast anomalies were often well below 1nT in magnitude which has resulted in limited interpretation. There may be a tendency for a slight increase in the magnitude of anomalies from south to north with the weaker anomalies in the southern part of the site related to an increased alluvial content within the soil.

5.1.2 Area 1, forming the northern part of the site, contains several positive linear, rectilinear and curvilinear anomalies. The low contrast and lack of clarity associated with many of the anomalies has prevented confident categorisation of features based on their morphology. However, the rectilinear and curvilinear elements display no clear relationships to extant features (field boundaries, drains, etc.) and could indicate ditch-like features of archaeological potential. Similarly, a small number of discrete positive anomalies may relate to pit-like features of archaeological potential.

5.1.3 Magnetometry within Area 2 also indicated very weak linear, rectilinear and curvilinear anomalies and confident interpretation was not possible. The archaeological potential of the anomalies should be considered given the evidence of Romano-British activity approximately 100m to the west.

5.1.4 Survey conditions within Area 3 were poor due to tall ground cover although it is considered unlikely that this has severely disrupted the dataset. A small number of linear anomalies were apparent although these have been categorised as uncertain in origin.

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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.

Appendix C – survey and data information

Area 1 raw

COMPOSITE
Filename: Area1-raw.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 07/11/2009
Assembled by: on 07/11/2009
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Origin: Zero

Dimensions
Composite Size (readings): 960 x 320
Survey Size (meters): 240 m x 320 m
Grid Size: 40 m x 40 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 3.09
Mean: -0.37
Median: 0.03
Composite Area: 7.68 ha
Surveyed Area: 3.5315 ha

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

Source Grids: 33
1 Col:0 Row:0 01.xgd
2 Col:0 Row:1 15.xgd
3 Col:1 Row:0 02.xgd
4 Col:1 Row:1 12.xgd
5 Col:1 Row:2 13.xgd
6 Col:1 Row:3 14.xgd
7 Col:1 Row:4 16.xgd
8 Col:1 Row:5 17.xgd
9 Col:1 Row:6 18.xgd
10 Col:1 Row:7 33.xgd
11 Col:2 Row:0 03.xgd
12 Col:2 Row:1 09.xgd
13 Col:2 Row:2 10.xgd
14 Col:2 Row:3 11.xgd
15 Col:2 Row:4 19.xgd
16 Col:2 Row:5 20.xgd
17 Col:2 Row:6 21.xgd
18 Col:2 Row:7 32.xgd
19 Col:3 Row:0 04.xgd
20 Col:3 Row:1 05.xgd
21 Col:3 Row:2 06.xgd
22 Col:3 Row:3 07.xgd
23 Col:3 Row:4 22.xgd
24 Col:3 Row:5 23.xgd
25 Col:3 Row:6 24.xgd
26 Col:3 Row:7 31.xgd
27 Col:4 Row:3 08.xgd
28 Col:4 Row:4 25.xgd
29 Col:4 Row:5 26.xgd
30 Col:4 Row:6 27.xgd
31 Col:4 Row:7 30.xgd
32 Col:5 Row:5 28.xgd
33 Col:5 Row:6 29.xgd

Area 1 processed (3nT)

COMPOSITE
Filename: Area1-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 0.84
Mean: -0.10
Median: -0.08

Processes: 36
1 Base Layer
2 Clip from -30.00 to 30.00 nT
3 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 291, Left 481, Bottom 310, Right 570)
4 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 280, Left 569, Bottom 297, Right 706)
5 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 274, Left 642, Bottom 290, Right 778)
6 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 268, Left 700, Bottom 278, Right 872)
7 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 261, Left 798, Bottom 273, Right 912)
8 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 247, Left 861, Bottom 263, Right 910)
9 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 302, Left 398, Bottom 314, Right 514)
10 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 298, Left 460, Bottom 303, Right 496)
11 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 308, Left 346, Bottom 318, Right 413)
12 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 315, Left 200, Bottom 319, Right 421)
13 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 311, Left 308, Bottom 318, Right 361)
14 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 207, Left 780, Bottom 228, Right 828)
15 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 173, Left 710, Bottom 187, Right 748)
16 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 187, Left 737, Bottom 199, Right 782)
17 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 118, Left 613, Bottom 138, Right 649)
18 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 138, Left 638, Bottom 155, Right 686)
19 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 13, Left 518, Bottom 39, Right 549)
20 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 101, Left 593, Bottom 117, Right 632)
21 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 47, Left 540, Bottom 60, Right 557)
22 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 158, Left 677, Bottom 176, Right 733)
23 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 197, Left 756, Bottom 208, Right 793)
24 DeStripe Mean Traverse: Grids: All Threshold: 2 SDs
25 Clip from -3.00 to 3.00 nT
26 Edge Match (Area: Top 160, Left 640, Bottom 199, Right 799) to Left edge
27 Edge Match (Area: Top 200, Left 640, Bottom 239, Right 799) to Left edge
28 Edge Match (Area: Top 200, Left 800, Bottom 239, Right 959) to Left edge
29 Edge Match (Area: Top 240, Left 800, Bottom 279, Right 959) to Left edge
30 Edge Match (Area: Top 0, Left 480, Bottom 39, Right 639) to Left edge
31 Edge Match (Area: Top 40, Left 480, Bottom 79, Right 639) to Left edge
32 Edge Match (Area: Top 80, Left 480, Bottom 119, Right 639) to Left edge
33 Edge Match (Area: Top 120, Left 480, Bottom 159, Right 639) to Left edge
34 Edge Match (Area: Top 120, Left 640, Bottom 159, Right 799) to Left edge
35 Clip from -3.00 to 3.00 nT (Area: Top 120, Left 640, Bottom 159, Right 799)
36 Clip from -3.00 to 3.00 nT

Area 1 processed (0.5nT)

COMPOSITE
Filename: Area1-proc2.xcp

Stats
Max: 0.50
Min: -0.50
Std Dev: 0.37
Mean: -0.05
Median: -0.08

Processes: 41
1 Base Layer
2 Clip from -30.00 to 30.00 nT
3 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 291, Left 481, Bottom 310, Right 570)
4 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 280, Left 569, Bottom 297, Right 706)
5 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 274, Left 642, Bottom 290, Right 778)
6 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 268, Left 700, Bottom 278, Right 872)
7 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 261, Left 798, Bottom 273, Right 912)
8 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 247, Left 861, Bottom 263, Right 910)
9 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 302, Left 398, Bottom 314, Right 514)
10 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 298, Left 460, Bottom 303, Right 496)
11 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 308, Left 346, Bottom 318, Right 413)
12 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 315, Left 200, Bottom 319, Right 421)
13 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 311, Left 308, Bottom 318, Right 361)
14 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 207, Left 780, Bottom 228, Right 828)
15 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 173, Left 710, Bottom 187, Right 748)

16 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 187, Left 737, Bottom 199, Right 782)
17 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 118, Left 613, Bottom 138, Right 649)
18 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 138, Left 638, Bottom 155, Right 686)
19 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 13, Left 518, Bottom 39, Right 549)
20 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 101, Left 593, Bottom 117, Right 632)
21 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 47, Left 540, Bottom 60, Right 557)
22 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 158, Left 677, Bottom 176, Right 733)
23 Search & Replace From: -100 To: 100 With: 32702 (Area: Top 197, Left 756, Bottom 208, Right 793)
24 DeStripe Mean Traverse: Grids: All Threshold: 2 SDs
25 Clip from -3.00 to 3.00 nT
26 Edge Match (Area: Top 160, Left 640, Bottom 199, Right 799) to Left edge
27 Edge Match (Area: Top 200, Left 640, Bottom 239, Right 799) to Left edge
28 Edge Match (Area: Top 200, Left 800, Bottom 239, Right 959) to Left edge
29 Edge Match (Area: Top 240, Left 800, Bottom 279, Right 959) to Left edge
30 Edge Match (Area: Top 0, Left 480, Bottom 39, Right 639) to Left edge
31 Edge Match (Area: Top 40, Left 480, Bottom 79, Right 639) to Left edge
32 Edge Match (Area: Top 80, Left 480, Bottom 119, Right 639) to Left edge
33 Edge Match (Area: Top 120, Left 480, Bottom 159, Right 639) to Left edge
34 Edge Match (Area: Top 120, Left 640, Bottom 159, Right 799) to Left edge
35 Clip from -3.00 to 3.00 nT (Area: Top 120, Left 640, Bottom 159, Right 799)
36 Clip from -3.00 to 3.00 nT
37 Clip from -1.00 to 1.00 nT
38 Clip from -0.50 to 0.50 nT
39 De Stagger: Grids: All Mode: Outbound By: 1 intervals
40 Clip from -0.78 to 0.83 nT
41 Clip from -0.50 to 0.50 nT

Area 2 raw

COMPOSITE
Filename: Area2-raw.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 08/11/2009
Assembled by: on 08/11/2009
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Origin: Zero

Dimensions
Composite Size (readings): 1120 x 240
Survey Size (meters): 280 m x 240 m
Grid Size: 40 m x 40 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 2.99
Mean: -0.04
Median: -0.15
Composite Area: 6.72 ha
Surveyed Area: 3.1009 ha

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

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

Area 2 processed

COMPOSITE

Filename: Area2-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 1.13
Mean: 0.06
Median: 0.01

Processes: 7
1 Base Layer
2 Clip from -30.00 to 30.00 nT
3 DeStripe Median Traverse: Grids: 06.xgd 07.xgd 08.xgd 09.xgd 10.xgd 11.xgd 12.xgd 13.xgd 14.xgd 15.xgd 16.xgd 18.xgd 19.xgd 20.xgd 21.xgd 17.xgd 22.xgd 23.xgd 24.xgd 25.xgd 26.xgd 27.xgd 28.xgd 29.xgd
4 DeStripe Mean Traverse: Grids: 01.xgd 02.xgd 03.xgd 04.xgd 05.xgd Threshold: 1 SDs
5 Clip from -3.00 to 3.00 nT
6 De Stagger: Grids: All Mode: Outbound By: 1 intervals
7 Clip from -3.00 to 3.00 nT

Area 3 raw

COMPOSITE
Filename: Area3-raw.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 10/11/2009
Assembled by: on 10/11/2009
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702
Origin: Zero

Dimensions
Composite Size (readings): 640 x 120
Survey Size (meters): 160 m x 120 m
Grid Size: 40 m x 40 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 30.00
Min: -30.00
Std Dev: 2.51
Mean: -0.39
Median: -0.42
Composite Area: 1.92 ha
Surveyed Area: 1.3097 ha

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

Source Grids: 12
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:1 Row:0 grids\04.xgd
5 Col:1 Row:1 grids\05.xgd
6 Col:1 Row:2 grids\06.xgd
7 Col:2 Row:0 grids\07.xgd
8 Col:2 Row:1 grids\08.xgd
9 Col:2 Row:2 grids\09.xgd
10 Col:3 Row:0 grids\10.xgd
11 Col:3 Row:1 grids\11.xgd
12 Col:3 Row:2 grids\12.xgd

Area 3 processed

COMPOSITE
Filename: Area3-proc.xcp

Stats
Max: 3.00
Min: -3.00
Std Dev: 0.78
Mean: 0.01
Median: 0.00

Processes: 4
1 Base Layer
2 Clip from -30.00 to 30.00 nT
3 DeStripe Median Traverse: Grids: All
4 Clip from -3.00 to 3.00 nT

Appendix D – digital archive

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 are supplied on CD. Further information on the production of the report and the digital formats involved in its creation are set out below.

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

- ArcheoSurveyor version 2.5.0.2 (geophysical data analysis),
- AutoCAD LT 2007 (report figures),
- OpenOffice.org 3.1.0 Writer (document text),
- PDF Creator version 0.9 (PDF archive).

Digital data are supplied on CD ROM which includes the following files:

- ArcheoSurveyor 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,
- PDFs of all figures,
- photographic record in JPEG format.

The CD ROM structure is formed from a tree of directories under the title J293 Maidenbrook – CD. Directory titles include Data, Documentation, CAD, PDFs and Photos. Multiple directories exist under Data and hold Grid, Composite and Graphic files with CSV composite data held in Export.

The CAD file contains externally referenced graphics that are rotated with separate A3 size layouts for each figure. Layouts are fixed using frozen layers and named views allowing straightforward plotting or analysis on screen. (Note – CAD files are prepared using AutoCAD's e Transmit function to produce a directory containing the digital drawing along with any externally referenced graphics which may need reloading).

N

Survey location

Archaeological Surveys Ltd

Geophysical Survey
Land to the east of Maidenbrook Farm Taunton

Map of survey area

Survey location

Site centred on OS NGR ST 249 263

SCALE 1:50 000

0m 1000m 2000m

SCALE TRUE AT A3

Reproduced from OS Landranger map no.193 1:50 000 by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office.

FIG 01

Archaeological Surveys Ltd

Geophysical Survey
Land to the east of Maidenbrook Farm
Taunton

Referencing information

Grid coordinates based on Ordnance Survey OSGB36 datum

Grids set out using RTK GPS with Leica Smartnet correction data RTCMv2 format

Survey grid size = 40M

→ Survey start and traverse direction

01 Grid reference number and filename

SCALE 1:2000

0m 20 40 60 80 100m

SCALE TRUE AT A3

FIG 02

N

Area 1

Area 2

Area 3

Unsurveyable

IronAge/Roman site (1990 evaluation and excavation)

A 3259

15.9m

15.0m

20.3m

0.91m RH

0.91m FF

324790

325030

126500

126380

126260

Pond

Allen's Brook

Aginghill's Farm

Brook House

Overlands

Bronkeome

Joybird

Sandalphia

The Gatehouse

The Wagon House

TUDOR PARK

Maidenbrook Farmhouse

Mill Leat

Meade Barn

Brook Barn

The Georgian

The Coach House

Mill Court

Brock Hollow Barn

Sunnybrook Barn

Sluice

Drain

Play Area

WATERLEAZE

CLOSE

Path

Towing Path

Canal

MS

Electricity Poles

Slipway

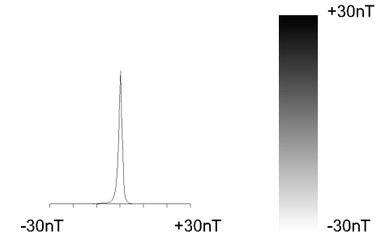
Sinks

Issues

Archaeological Surveys Ltd

Geophysical Survey
Land to the east of Maidenbrook Farm
Taunton

Greyscale plot of raw magnetometer data - Area 1



SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 03

Area 3

Area 2

0.91m RH

0.91m RH

N

Pond

97

87

101

128

122

110

124

IronAge/Roman site (1990 evaluation and excavation)

Path

ETL

Path

Slipway

Drain

Archaeological Surveys Ltd

Geophysical Survey
Land to the east of Maidenbrook Farm
Taunton

Greyscale plot of raw magnetometer data - Areas 2 and 3

+30nT

-30nT

-30nT Area 2 +30nT

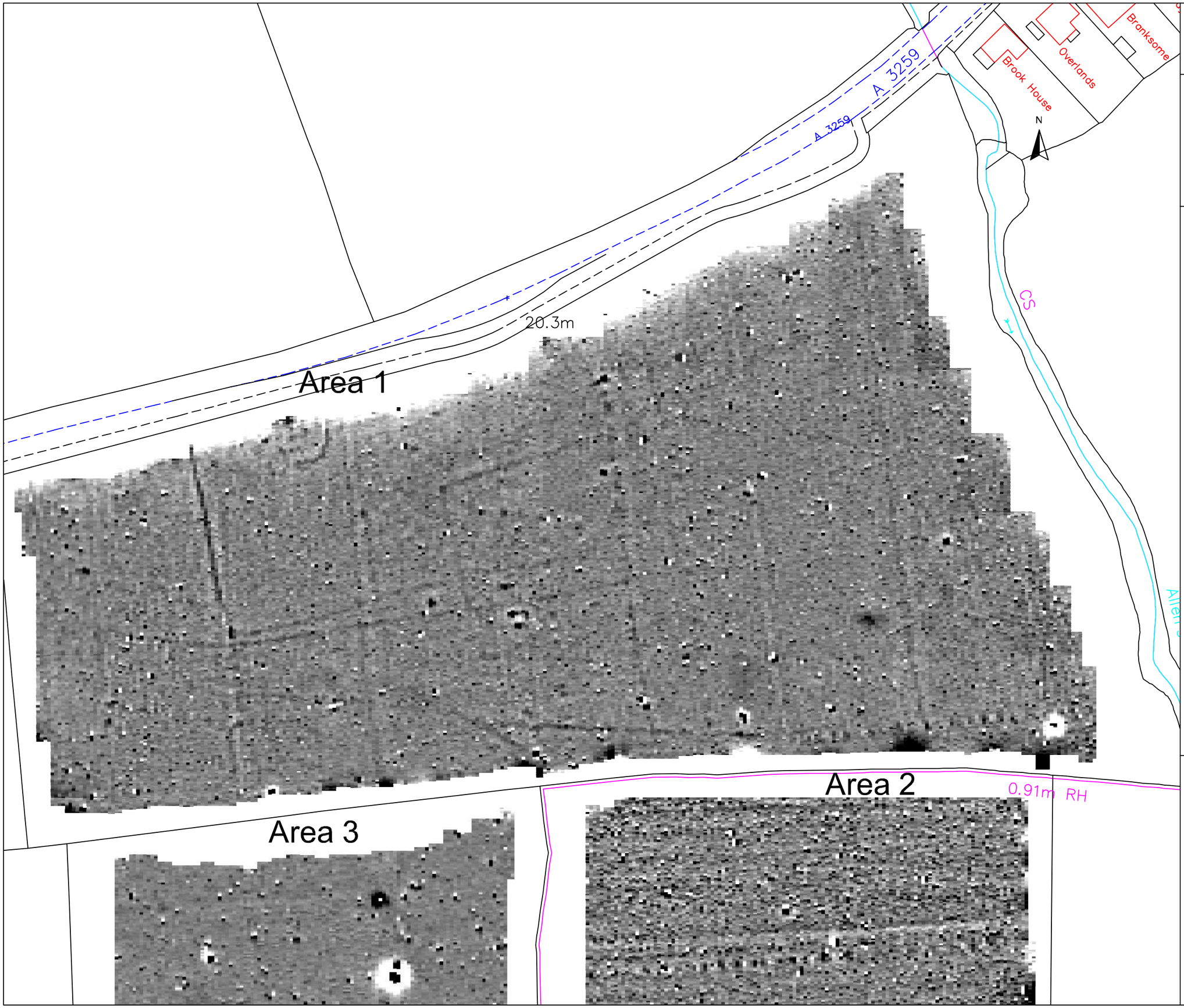
-30nT Area 3 +30nT

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 04



Archaeological Surveys Ltd

Geophysical Survey
Land to the east of
Maidenbrook Farm
Taunton

Greyscale plot of processed magnetometer data - Area 1

+3nT
-3nT
+3nT
-3nT

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 05

Archaeological Surveys Ltd

Geophysical Survey
Land to the east of Maidenbrook Farm
Taunton

Greyscale plot of processed magnetometer data - Area 1 enhanced contrast

+0.5nT

-0.5nT +0.5nT -0.5nT

A 3259

A 3259

Brook House

Overlands

Branksome

N

CS

20.3m

Area 1

Area 2

0.91m RH

Area 3

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 06

Area 2

Area 3

0.91m RH

0.91m RH

N

Pond

97

87

101

128

122

110

124

IronAge/Roman site
(1990 evaluation and
excavation)

Path

Slipway

Path

E'L

Drain

Archaeological Surveys Ltd

Geophysical Survey
Land to the east of
Maidenbrook Farm
Taunton

Greyscale plot of processed magnetometer data - Areas 2 and 3

+3nT

-3nT

-3nT Area 2 +3nT

-3nT Area 3 +3nT

SCALE 1:1000

0m 10 20 30 40 50m

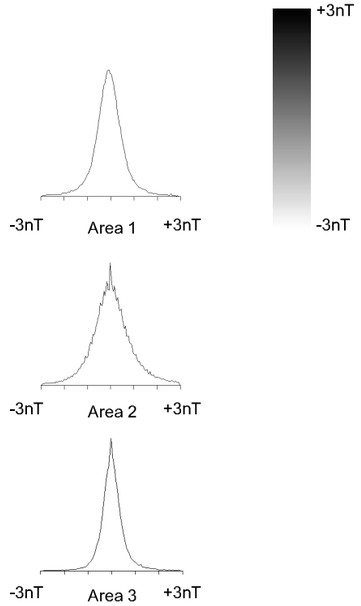
SCALE TRUE AT A3

FIG 07

Archaeological Surveys Ltd

Geophysical Survey
Land to the east of Maidenbrook Farm
Taunton

Greyscale plot of processed magnetometer data - Areas 1, 2 and 3



Area 1

Area 2

Area 3

Unsurveyable

20.3m

N

CS

Allen's Brook

Pond

0.91m RH

0.91m RH

Aginghill's Farm

Play Area

Drain

IronAge/Roman site (1990 evaluation and excavation)

Path

Slipway

Sinks

Issues

Drain

ETL

Path

SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 08

Archaeological Surveys Ltd

Geophysical Survey
Land to the east of Maidenbrook Farm
Taunton

Abstraction and interpretation of magnetometer anomalies - Area 1

- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - of agricultural origin
- Negative linear anomaly - material of low magnetic susceptibility
- Discrete positive response - possible pit-like feature
- 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 09

A 3259

Brook House

Overlands

Branksome

N

CS

20.3m

Area 1

Area 2

Area 3

0.91m RH

Archaeological Surveys Ltd

Geophysical Survey Land to the east of Maidenbrook Farm Taunton

Abstraction and interpretation of magnetometer anomalies - Areas 2 and 3

- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - of agricultural origin
- Negative linear anomaly - material of low magnetic susceptibility
- Discrete positive response - possible pit-like feature
- 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 10

Area 2

Area 3

0.91m RH

0.91m RH

N

IronAge/Roman site (1990 evaluation and excavation)

Path

Slipway

Path

Drain

ETL

Pond

7 5 3 5

21 19 22 23 22 20 24

13 18 12 12 18 14 15 11 13 12 12 16 17

97 87 101 128 122 110 124

Archaeological Surveys Ltd

Geophysical Survey Land to the east of Maidenbrook Farm Taunton

Abstraction and interpretation of magnetometer anomalies

Area 1

Unsurveyable

Area 2

Area 3

0.91m RH

0.91m RH

Aginghill's Farm

Pond

Allen's Brook

Drain

Drain

Issues

Sinks

IronAge/Roman site (1990 evaluation and excavation)

N

- Positive linear anomaly - possible ditch-like feature
- Linear anomaly - of agricultural origin
- Negative linear anomaly - material of low magnetic susceptibility
- Discrete positive response - possible pit-like feature
- 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 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 11