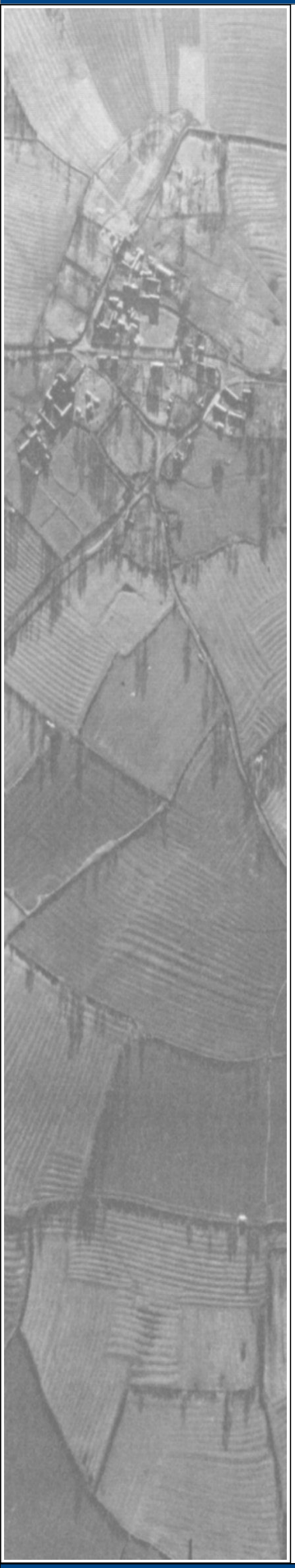

Staplegrove East ICW
Taunton
Somerset

MAGNETOMETER SURVEY REPORT

for

Stantec UK Limited

Kerry Donaldson & David Sabin

October 2023

Ref. no. J985

ARCHAEOLOGICAL SURVEYS LTD

Staplegrove East ICW
Taunton
Somerset

MAGNETOMETER SURVEY REPORT

for

Stantec UK Limited

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

Survey date – 2nd & 3rd October 2023
Ordnance Survey Grid Reference – **ST 21950 26495**

Somerset HER PRN: 48592

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SUMMARY

Detailed magnetometry was carried out by Archaeological Surveys Ltd within two fields at Staplegrove ahead of a proposed Integrated Constructed Wetland scheme. The results indicate a group of anomalies that relate to former features mapped in the 1840s and associated with Pinkhurst Farm. A zone of magnetic debris to the north is also related to the demolished farm buildings. Linear zones of magnetic debris to the south could be associated with material spread through modern agricultural activity and flooding. In the southern part of the site there are a number of weakly positive linear anomalies, and while one could relate to a formerly mapped field boundary, the others do not have a coherent morphology or layout and cannot be confidently interpreted as cut features.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by Stantec UK Limited to undertake a magnetometer survey of an area of land to the south of Corkscrew Lane, Staplegrove near Taunton. The site has been outlined for a proposed Integrated Constructed Wetland (ICW) scheme aimed to mitigate nutrients in water.

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

1.2.2 Geophysical survey can provide useful information on the archaeological potential of a site; however, the outcome of any survey relies on a number of factors and as a consequence results can vary. The success in meeting the aims and objectives of a survey is, therefore, often impossible to predetermine.

1.3 Standards, guidance and recommendations for the use of this report

1.3.1 Archaeological Surveys Ltd is a Registered Organisation with the Chartered Institute for Archaeologists (CIfA) and both company directors are Members of the Chartered Institute for Archaeologists (MCIfA) and have therefore been assessed for their technical competence and ethical suitability and abide by the CIfA Codes of Conduct. The survey and report follow the recommendations set out by: European Archaeological Council (2015) Guidelines for the Use of Geophysics in Archaeology; 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, updated 2020) Standard and Guidance for Archaeological Geophysical Survey.

1.3.2 Archaeological Surveys Ltd provide a detailed geophysical survey report and it is recommended that where possible the contents should be considered in full. The Summary provides a brief overview of the results with more detail available in the Discussion and/or Conclusion. The *List of anomalies* within the Results provides a detailed assessment of the anomalies within separate categories which can be useful in inferring a level of confidence to the interpretation. Quality and factors influencing the interpretation of anomalies is also set out within the results.

1.3.3 It is recommended that the full report should always be considered when using data and interpretation plots; where this is not possible, in the field for example, the abstraction and interpretation plots should retain their colour coding and be used with a corresponding legend.

1.3.4 Where targeting of anomalies by excavation is to be carried out, care should be taken to place trenches over solid lines or features visible on the abstraction and interpretation plots. Archaeological Surveys abstraction and interpretation avoids the use of dashed or dotted line formats, and broken or fragmented lines used in interpretive plots may well correspond closely with truncation of archaeological features.

1.4 Site location, description and survey conditions

1.4.1 The site is located on land to the south of Corkscrew Lane, Staplegrove on the north western edge of Taunton, Somerset. It is centred on Ordnance Survey National Grid Reference (OS NGR) ST 21950 26515, see Figs 01 and 02.

1.4.2 The geophysical survey covers approximately 5ha within two fields of miscanthus that had been recently cut. It is bounded to the north by Corkscrew Lane, to the east by the Mill Lease Stream, to the west by the Taunton Vale Sports Club and to the south by Taunton School playing fields. Field boundaries are mainly hedgerows with mature trees and adjacent drainage ditches. The site is located on level ground at approximately 30m AODN.

1.4.3 The ground conditions across the site were variable due to the presence of ruts and rough vegetation with consequent difficulty in traversing. During the course of the survey steel inspection chamber covers were noted within the site, these were considered likely to produce high magnitude magnetic disturbance and were avoided where possible. Wet weather prevailed throughout the survey.

Plate 1: Survey Area 2 looking north

1.5 Site history and archaeological potential

1.5.1 The 1840s tithe map indicates that the site was once separated into nine land parcels, including a farmstead in the north western corner, known as Pinkhurst or Pinkers Farm. By the early 20th century the site contained four main fields and the farmstead, with the northernmost field containing an orchard. The site is bounded along the eastern edge by Mill Lease Stream and to the west by the former parkland associated with Staplegrove Manor. An area of approximately 80ha immediately north, north east and north west of the site has been subject to a number of geophysical surveys and evaluations which recorded former activity and features including field systems, enclosures, ring ditches and a number of Bronze Age burials.

1.5.2 The surface conditions within the site were unsuitable for the observation of cultural material during the course of the survey.

1.6 Geology and soils

1.6.1 The underlying geology is mudstone and halite-stone from the Mercia Mudstone Group (BGS, 2023).

1.6.2 The overlying soil across the site is from the Newnham association (541w) and is a typical brown earth. It consists of a well drained, reddish, coarse and fine loamy soil over gravel (Soil Survey of England and Wales, 1983). However, this is associated with the river terrace gravels which are mapped either side of the site, soils over mudstone geologies are usually associated with impeded drainage.

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 (also known as thermoremanence) are factors associated with the formation of localised magnetic fields.

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 positive magnetic anomalies that can be mapped by magnetic prospection. In addition, where soil is displaced by material of comparatively low magnetic susceptibility, such as many types of sedimentary rock, anomalies of negative value may occur which could be indicative of structural remains.

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). Additional details are set out in 2.2 below and within Appendix A.

2.2 Equipment configuration, data collection and survey detail

2.2.1 The detailed magnetic survey was carried out using a SENSYS MAGNETO® MX V3 6 channel cart-based system. The instrument has 6 fluxgate gradiometers (FGM650) spaced 0.5m apart with readings recorded at 20Hz which equates to a survey resolution of 0.5m by 0.15m. Each sensor is not zeroed in the field as the vertical axis alignment is precisely fixed leaving sensor offsets that are removed during data processing. The fixing of the vertical alignment ensures the sensors are not unduly influenced by localised magnetic fields and that the vertical component of a magnetic anomaly is measured. The gradiometers have a recorded range of ±3000nT, and resolution is approximately 0.1nT. They are linked to a Leica GS10 RTK GNSS with data recorded by SENSYS MonMX software on a rugged notebook computer system.

2.2.2 Due to the fixed offsets within the fluxgate sensors, as a result of the manufacturing and tensioning process, the survey data do not provide a visually useful dataset

until a zero median traverse algorithm is applied. It is recognised that this has the potential to affect some anomalies detrimentally by removing linear features orientated parallel to survey transects. However, this has not been noted as a particular problem with the system due to the high resolution data collection, generally long length of traverses and variability within the magnetic characteristics of a linear anomaly.

2.2.3 Data are collected along a series of parallel survey transects to achieve 100% coverage of the surveyable land. The length of each transect is variable and relates to the size of the survey area and other factors including ground conditions. A visual display allows accurate placing of transects and helps maintain the correct separation between adjacent traverses. 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).

2.2.4 Fluxgate sensors are highly sensitive to temperature change and this manifests as drift during the course of a survey. This can be particularly noticeable during the morning as temperatures rise and the equipment warms or cools. Sensor drift within the course of a traverse will appear as a line trending from negative to positive after processing with a zero median traverse algorithm. To remove the potential for temperature drift, data were collected after a 20 minute stabilisation period and traverses were limited to a time of generally <100s.

2.3 Data processing and presentation

2.3.1 Magnetic data collected by the MAGNETO® MX V3 cart-based system are initially prepared using SENSYS MAGNETO® DLMGPS software. The software effectively allocates a geographic position for each data point and can compensate for fixed offsets present within the FGM650 sensors. The offsets are positive or negative values present on all fluxgate gradiometer sensors. Some systems use manual or electronic balancing to effectively zero the sensors; however, this is a short term measure that is prone to drift through temperature changes and vibration and can easily be incorrectly set due to localised magnetic fields. The FGM650 sensors are very accurately aligned to the vertical magnetic gradient and are highly stable showing negligible drift on long traverses. The offset values are removed using TerraSurveyor software.

2.3.2 Survey tracks are analysed and georeferenced raw data (UTM Z30N) are then exported in ASCII format for further analysis and display within TerraSurveyor. The removal of the offset values (compensation) of the sensors is also carried out in TerraSurveyor using a zero median traverse function. Data are then considered to be minimally processed. Note: without the zero median traverse function it is not possible to create a meaningful data plot as all sensors have a different offset value. 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.

2.3.3 The minimally processed data are collected between limits of ±3000nT and clipped for display at ±3nT. Data are interpolated to a resolution of effectively 0.5m between tracks and 0.15m along each survey track.

2.3.4 Additional data processing has been carried out in the form of high pass filtering. This effectively removes low frequency variation along a traverse that has been caused by large magnetic bodies, cultivation or rapid temperature change. Data treated to additional processing have been compared to unprocessed data to ensure that no significant anomalies have been removed.

2.3.5 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 processing.

2.3.6 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. Minimally processed data are considered by the manufacturer to be data that are compensated by SENSYS MAGNETO DLMGPS software, see 2.3.1 and 2.3.2. Note: traceplots are not considered to be appropriate as they do not provide an accurate or useful assessment of the magnetic anomalies due to the very high density of data collection. In addition, traceplots cannot be meaningfully plotted against base mapping and in areas of complexity traces may be lost or highly confused. Traceplots may be used to demonstrate characteristic magnetic profiles across discrete features where it is considered beneficial.

2.3.7 The raster images are combined with base mapping using ProgeCAD Professional 2021, creating DWG (2018) 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 GNSS, resection method, etc.

2.3.8 An abstraction and interpretation is 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. Appendix E sets out CAD layer names with colour and graphic content for each interpretation category, see 3.3.

2.3.9 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.

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

2.4 Supplementary measurement of magnetic susceptibility

2.4.1 Magnetic susceptibility is an important factor in the formation of magnetic anomalies located by a magnetometry survey, see 2.1. Accurate measurement of the magnetic susceptibility of soil, subsoil and underlying geology may enhance the results of the magnetometry survey by providing an assessment of magnetic contrast within a site. Where sampling of topsoil only is possible, measurement may assist in understanding whether the soil is likely to be associated with strong, moderate or weak anomalies, which may be a result of low levels of iron minerals, waterlogging, etc. Accurate measurement may also assist in determining industrial activity and the presence of layers or features not visually or texturally apparent on excavation.

2.4.2 Supplementary measurement of soil magnetic susceptibility is not considered part of the main objective of the survey and is discussed in section 3.2 below as a factor influencing the formation of anomalies.

2.4.3 Measurements are achieved using a Bartington MS2 Magnetic Susceptibility Meter with MS2B sensor. Small soil samples are measured in 10 cubic centimetre plastic pots after accurately weighing, generally each sample is subdivided and at least 3 separate measurements are made in order to provide a mean value, or assess variability due to ferrous contamination and other factors. Measurement can be made at low or high frequency, generally low frequency measurements are made but occasionally high frequency measurements are also recorded as the frequency dependence of a soil may be informative.

2.4.4 The measurements are converted to mass specific readings using SI units for bulk density. Archaeological Surveys express the measurements as X_{lf} or X_{hf} for low frequency or high frequency magnetic susceptibility respectively with units of $10^{-8}m^3kg^{-1.}$

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 5ha.

3.1.2 Magnetic anomalies located can be generally classified as positive and negative linear anomalies associated with Pinkhurst Farm, anomalies with 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 & 3.5 below.

3.2 Data quality and factors affecting the interpretation or formation of anomalies

3.2.1 Data are considered representative of the magnetic anomalies present within the site. High magnitude magnetic disturbance has been caused by an underground service crossing the southern half of the site and modern steel objects within and adjacent to the north western corner. Dense spreads of magnetic debris are also present along the western side and within the northern part of Area 2, the most northerly field. This area also contains very strong linear anomalies probably related to spreads of magnetic material within ruts. Both magnetic disturbance and debris have the potential to obscure more significant anomalies.

3.2.2 The survey has located several anomalies that probably relate to the fill of former ditch-like features. However, the anomalies are weak which may be indicative of poor magnetic contrast between the fills and the surrounding subsoil. A group of anomalies in the northern part of the site relate to a former farm; however, others cannot be confidently interpreted.

3.2.3 In order to provide further understanding of the magnetic characteristics of the soil, a single topsoil sample was taken from the western side of Area 2 and its mass specific magnetic susceptibility was measured, see 2.4. The sample produced an average low frequency mass specific magnetic susceptibility (X_{lf}) of 11.22 $10^{-8}m^3kg^{-1}$. This is consistent with clay loam soils that are capable of producing magnetic anomalies where former human activity has been sufficiently intensive; however, high levels of ground water can suppress the formation of strong anomalies. The single sample may not be representative of the site conditions, although magnetometry undertaken on other sites within the wider area have produced useful results suggesting soils are suitable for archaeological prospection.

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 general explanation of the characteristics of the magnetic anomalies is set out for each category in order to justify interpretation, see Table 1.

Interpretation category	Description and origin of anomalies
Anomalies with an uncertain origin	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. Morphology may be unclear or uncharacteristic and there may be a lack of additional supporting information. 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 former farmstead	Anomalies are mainly linear and may be indicative of the magnetically enhanced fill of cut features (i.e. ditches) or walling/banks. The anomalies may be long and/or form rectilinear elements and they may relate to topographic features or be visible on early mapping.
Anomalies relating to land management	Land drains can appear in a classic herringbone pattern of interconnected multiple dipolar linear anomalies, or as parallel linear anomalies. The multiple dipolar response indicates ceramic land drains.
Anomalies with an agricultural origin	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. This category does not include agricultural features of early date or considered to be of archaeological potential (e.g. animal stockades, enclosures, farmsteads, etc).
Anomalies associated with magnetic debris	Magnetic debris often appears as areas containing many small dipolar anomalies that may range from weak to very strong in magnitude. They often occur where there has been dumping or ground make-up and are 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, hearths and nail spreads from former wooden structures or rooves 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	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 these 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 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 321935 126360, see Figs 03 – 08.

Anomalies with an uncertain origin

(1) – A positive linear anomaly extends across the centre of Area 1. This may relate to a former field boundary, mapped on the 1840s tithe map, but at a slightly different orientation.

(2) – Two weakly positive linear anomalies are broadly parallel but not oriented with existing or former boundaries. Other short linear anomalies are located nearby. It is not possible to determine if they relate to cut features, or if they are associated with modern agricultural activity.

(3) – A positive linear anomaly extends across the north eastern corner of Area 1. It appears fragmented and has an associated partial negative response. It is possible that it relates to a cut feature, but its origin is uncertain.

(4) – Area 1 contains a small number of discrete, positive responses, with the majority situated in the north eastern part of the field. It is not possible to determine if they relate to cut, pit-like features with an anthropogenic origin, or natural features.

Anomalies associated with land management

(5) – A series of weakly dipolar linear anomalies is located close to the southern edge of the survey area. The response is indicative of land drains.

Anomalies with an agricultural origin

(6) – The survey area contains parallel linear anomalies on two orientations that relate to cultivation.

Anomalies associated with magnetic debris

(7) – Strong, discrete, dipolar anomalies are a response to ferrous and other magnetically thermoremnant objects, such as brick and tile, within the topsoil.

Anomalies with a modern origin

(8) – A strongly magnetic linear anomaly extends through the western part of the site and relates to a buried service.

3.5 List of anomalies - Area 2

Area centred on OS NGR 321945 126600, see Figs 03 – 14.

Anomalies associated with Pinkhurst Farm

(9) – A series of positive and negative linear anomalies relate to linear boundaries associated with Pinkhurst Farm, mapped on the 1840s Tithe Map with the eastern part removed by the 1904 1st Edition Ordnance Survey map. The negative anomaly would suggest a response to possible walling or a boundary bank, while the positive response indicates a cut, ditch-like feature either side.

Anomalies with an uncertain origin

(10) – A number of positive and negative linear and curvilinear anomalies are located within the confines of anomalies (9). They appear to be associated with the former farmstead, although two positive linear anomalies appear to cut across those features.

(11) – A number of short, positive linear anomalies are located at the edge of a large zone of magnetic debris (13) that relates to demolition material derived from Pinkhurst Farm. It is not clear if they indicate actual features, or are just associated with the magnetic debris. A discrete positive anomaly lies just to the east, but again it is not possible to determine its origin.

(12) – A short, positive linear anomaly in the central, southern part of Area 2 could relate to a formerly mapped field boundary.

Anomalies associated with magnetic debris

(13) – A zone of strongly magnetic debris is located in the north western corner of the survey area and relates to demolition material associated with the former Pinkhurst Farm. Similar material has been spread along the western edge of the field.

(14) – Linear areas of magnetic debris are evident within the survey area. They relate to magnetically enhanced material that has been spread throughout the field. It is possible that fine magnetic material has been deposited in ruts by water action.

4 CONCLUSION

4.1.1 The geophysical survey located a group of anomalies relating to former features associated with Pinkhurst Farm in the northern part of the site. A widespread zone of magnetic debris is related to demolition material associated with the former farmstead. Further linear zones of magnetic debris in the northern part of the site relate to magnetically enhanced material that has been spread through modern agricultural activity with some fine magnetic material possibly spread by water action.

4.1.2 In the southern part of the site there are a number of positive linear and discrete anomalies. While it is possible that one linear anomaly is associated with a formerly mapped field boundary, the others do not have a coherent morphology and cannot be confidently interpreted.

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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 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 magnetic field. The difference between the two sensors will relate to the strength of 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. Different ranges are applied to data in order to determine the most suitable for anomaly abstraction and display.

High Pass Filter

Removes low frequency anomalies within the data that are not considered to be archaeologically significant and may be natural in origin. A window passes over the data, the mean of all the data within the window is subtracted from the centre value. The size of the window is adjusted as is the weighting which may be uniform or Gaussian. The process is used to improve the visibility of anomalies of interest.

Zero Median/Mean Traverse

The median (or mean) of data from 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 offset values of the gradiometer sensors. The process can remove archaeological features that run along a traverse but with the high resolution datasets created by the Sensys FGM650 sensors and the method of data collection this has not been a notable problem. In fact, the removal of offsets using software avoids carrying out a balancing procedure on site, which inevitably can never be done in magnetically clean conditions and results in improperly aligned fluxgate sensors and/or electronic adjustment values.

Appendix C – survey and data information

Area 1 minimally processed data

Filename: J985-mag-Area1-proc.xcp
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 321828.27, 126446.49 m
Southeast corner: 322019.67, 126264.09m
Collection Method: Randomised
Sensors: 6
Dummy Value: 32702
Dimensions
Survey Size (meters): 191 m x 182 m
X&Y Interval: 0.15 m
Source GPS Points: Active: 765842, Recorded: 765848
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.39
Mean: -0.10
Median: 0.04
Composite Area: 3.4911 ha
Surveyed Area: 2.5403 ha
PROGRAM
Name: TerraSurveyor
Version: 3.0.37.0
GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (UTM to OSGB36).
3 DeStripe Median Traverse:
4 Clip from -3.00 to 3.00 nT

Area 1 filtered data
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.23
Mean: -0.09
Median: 0.00
GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (UTM to OSGB36).
3 DeStripe Median Traverse:
4 High pass Uniform (median) filter: Window dia: 201
5 Clip from -3.00 to 3.00 nT

Area 2 minimally processed data
Filename: J985-mag-Area2-proc.xcp
Northwest corner: 321896.36, 126765.82m
Southeast corner: 322016.66, 126451.42 m
Dimensions
Survey Size (meters): 120 m x 314 m
X&Y Interval: 0.15 m
Source GPS Points: Active: 861761, Recorded: 861767
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.66
Mean: 0.00
Median: 0.05
Composite Area: 3.7822 ha
Surveyed Area: 2.4991 ha
GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (UTM to OSGB36).
3 DeStripe Median Traverse:
4 Clip from -3.00 to 3.00 nT

Area 2 filtered data
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.58
Mean: 0.02
Median: 0.00
GPS based Proce6
1 Base Layer.
2 Unit Conversion Layer (UTM to OSGB36).
3 DeStripe Median Traverse:
4 High pass Uniform (median) filter: Window dia: 201
5 Clip from -5.00 to 5.00 nT
6 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. 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 Somerset Historic Environment Record with greyscale images and abstraction layers made available on request. The report will also be uploaded to OASIS, the online system for reporting archaeological investigations and linking research outputs and archives. The digital data will be archived with the Archaeology Data Service (ADS).

Archive contents:

File type	Naming scheme	Description
Data	J985-mag-**[area number/name]**.asc J985-mag-**[area number/name]**.xcp J985-mag-**[area number/name]**-proc.xcp J985-mag-**[area number/name]**-proc-hpf.xcp	Raw data as ASCII CSV TerraSurveyor raw data TerraSurveyor minimally processed TerraSurveyor filtered data
Graphics	J985-mag-**[area number/name]**-proc.tif J985-mag-**[area number/name]**-proc-hpf.tif	Image in TIF format
Drawing	J985-**[version number]**.dwg	CAD file in 2018 dwg format
Report	J985 report.odt	Report text in LibreOffice odt format

Table 2: Archive metadata

Appendix E – CAD layers for abstraction and interpretation plots

The table below sets out Archaeological Surveys Ltd CAD layer names with associated colours and graphical content. Where CAD files are available layers may be extracted for further CAD/GIS use. Note: hatched polygon boundaries are contained within layers with the RGB colour code 254, 255, 255 (near white) in order to prevent their visibility.

Report sub-heading and associated CAD layer names	Colour with RGB index	Layer content
Anomalies associated with Pinkhurst Farm		
AS-ABST MAG NEG BOUNDARY	0,78,36	Line, polyline or polygon (solid)
AS-ABST MAG BOUNDARY	127,0,0	Line, polyline or polygon (solid or cross hatched ANSI37)
Anomalies with an uncertain origin		
AS-ABST MAG POS LINEAR UNCERTAIN	255,127,0	Line, polyline or polygon (solid)
AS-ABST MAG POS DISCRETE UNCERTAIN	255,127,0	Solid donut, point or polygon (solid)
Anomalies with an agricultural origin		
AS-ABST MAG AGRICULTURAL	Green 0,255,0	Line or polyline
Anomalies associated with magnetic debris		
AS-ABST MAG DEBRIS	132, 132, 132	Polygon (cross hatched ANSI37)
AS-ABST MAG STRONG DIPOLAR	132, 132, 132	Solid donut, point or polygon (solid)
Anomalies with a modern origin		
AS-ABST MAG DISTURBANCE	132, 132, 132	Polygon (hatched ANSI31)
AS-ABST MAG SERVICE	132, 132, 132	Line or polyline

Table 3: CAD layering

Appendix F – copyright and intellectual property

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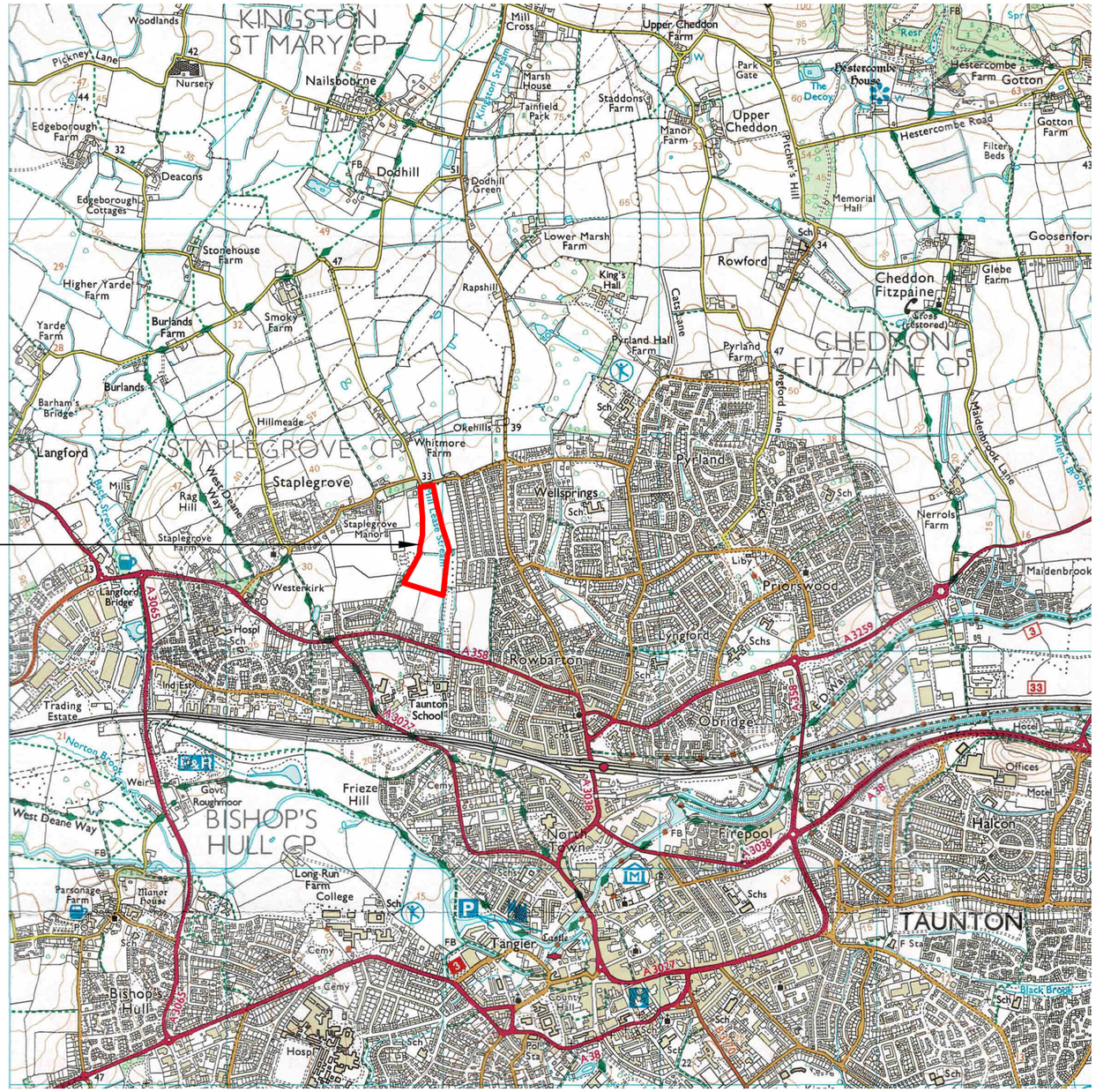
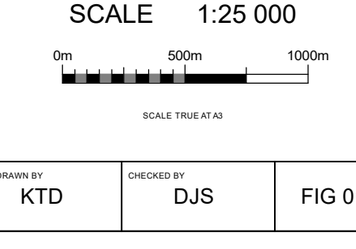
Tel: 01249 814 231

Archaeological Surveys
Specialist Geophysical Surveyors

Geophysical Survey
Staplegrove East ICW
Taunton
Somerset

Map of survey area





Survey location

Site centred on OS NGR
ST 21950 26515

SCALE 1:25 000

0m 500m 1000m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 01

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Referencing information

Referencing grid to OSGB36 datum at 50m intervals

- 321950 126500
- Survey tracks
- Survey track start
- Survey track stop

SCALE 1:2000

0m 20 40 60 80 100m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 02

Area 1

Area 2

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Greyscale plot of minimally processed magnetometer data

+3nT
-3nT

-3nT Area 1 +3nT

-3nT Area 2 +3nT

SCALE 1:2000

0m 20 40 60 80 100m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 03

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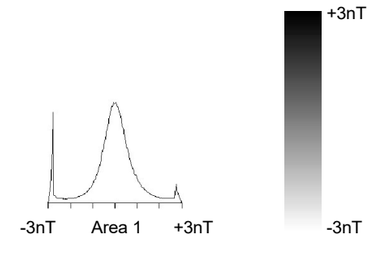
Taunton
Somerset

Greyscale plot of filtered magnetometer data



SCALE 1:2000

0m 20 40 60 80 100m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 04

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Abstraction and interpretation of magnetic anomalies

Area 1

Area 2

- Negative linear anomaly - boundary wall/bank
- Positive linear anomaly - boundary ditch
- Positive linear anomaly - possible ditch-like feature
- Negative linear anomaly - material of low magnetic susceptibility
- Positive/weak multiple dipolar linear anomaly - possible land drain
- Linear anomaly - of agricultural origin
- 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 1:2000

0m 20 40 60 80 100m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 05

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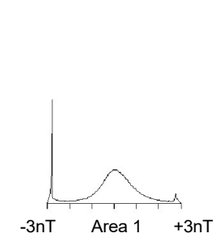
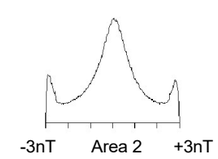
Greyscale plot of minimally processed magnetometer data - Area 1 & Area 2 south





SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 06

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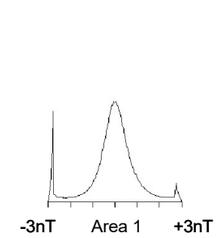
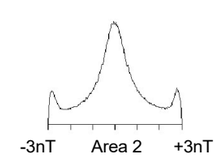
Greyscale plot of filtered magnetometer data - Area 1 & Area 2 south





SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 07

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Abstraction and interpretation of magnetic anomalies - Area 1 & Area 2 south

Area 1

Area 2

1

2

3

4

5

6

7

8

14

L Twr

L Twr

L Twr

Lighting Columns

Pond

Drain

Pond

S Pond

Drain

FB

Mill Lease Stream

Ward Bdy

14

23

Path

31.7m

Cycle Track

Drain

CB

N

- Positive linear anomaly - possible ditch-like feature
- Negative linear anomaly - material of low magnetic susceptibility
- Positive/weak multiple dipolar linear anomaly - possible land drain
- Linear anomaly - of agricultural origin
- 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

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 08

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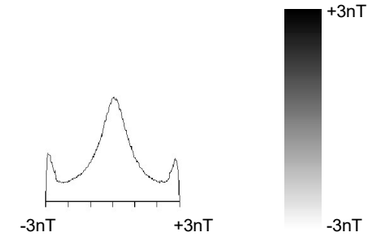
Greyscale plot of minimally processed magnetometer data - Area 2 north



SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 09

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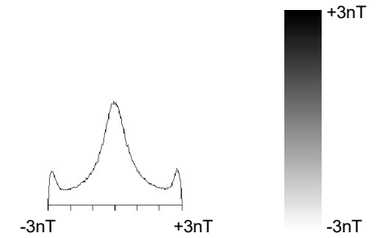
Greyscale plot of filtered magnetometer data - Area 2 north



Area 2

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 10

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Abstraction and interpretation of magnetic anomalies - Area 2 north

Negative linear anomaly - walling /structural remains

Positive linear anomaly - possible ditch-like feature

Negative linear anomaly - material of low magnetic susceptibility

Linear anomaly - of agricultural origin

Discrete positive response - possible pit-like feature

Magnetic debris - spread of magnetically thermoremnant/ferrous material

Magnetic disturbance from ferrous material

Strong dipolar anomaly - ferrous object

SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 11

Area 2

13
11
9
10
12
14

Track
Mill Lease Stream
Ward Bdy
0.91m RH
Brethrens Meeting Rooms
N
19
Track
Drain
Drain
Whitmore Allotments
Drain
Playing Field
32.7m
Path
Cycle Track
L Twr
Mast
Lighting Columns
L Twr
L Twr
L Twr
Lighting Columns
L Twr