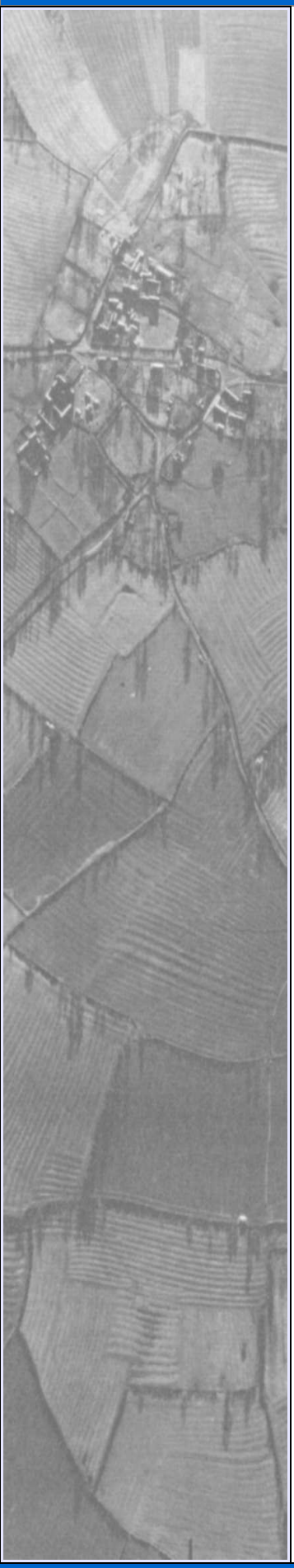

Stowell Concrete Extension
Yatton
North Somerset

MAGNETOMETER SURVEY REPORT

for

Stowell Concrete Ltd

Kerry Donaldson & David Sabin

March 2017

Ref. no. J706

ARCHAEOLOGICAL SURVEYS LTD

Stowell Concrete Extension
Yatton
North Somerset

Magnetometer Survey Report

for

Stowell Concrete Ltd

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

Survey date – 2nd March 2017
Ordnance Survey Grid Reference – **ST 41750 66030 & ST 42028 65892**

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SUMMARY

A detailed magnetometer survey was carried out by Archaeological Surveys Ltd within land outlined for an extension to the Stowell Concrete works in Yatton. The results revealed evidence for extant drainage gullies and also a zone of magnetically variable responses that are likely to relate to natural features. However, there are strongly negative sinuous linear features and a curvilinear response that appear to have truncated other anomalies. While these may also relate to a sequence of naturally formed features, an anthropogenic origin or association is possible. Survey over an area of a proposed new office revealed only a response to magnetic debris, likely to relate to material associated with Holly Lodge Farm which was demolished in the early 20th century.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by Stowell Concrete Ltd to undertake a magnetometer survey of two areas of land adjacent to the concrete works on the western edge of Yatton in North Somerset. A planning application has been made to North Somerset Council (16/P/2725/F) for the erection of a new single storey production warehouse, batching plant, stock area, single storey ancillary product development office and part retrospective planning for retention of an access road. As part of this, Cat Lodge, Archaeologist for North Somerset Council, has requested a geophysical survey in order to assess the archaeological potential of the site.

1.1.2 The geophysical survey was carried out in accordance with a Written Scheme of Investigation (WSI) produced by Archaeological Surveys (2017) and approved by Cat Lodge prior to commencing the fieldwork.

1.2 Survey objectives and techniques

1.2.1 The objective of the survey was to use magnetometry to locate geophysical anomalies that may be archaeological in origin so that they may be assessed prior to development of the site. The methodology is considered an efficient and effective approach to archaeological prospection.

1.2.2 The survey and report generally follow the recommendations set out by: English Heritage (2008) *Geophysical survey in archaeological field evaluation;* 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) *Standard and Guidance for Archaeological Geophysical Survey.*

1.3 Site location, description and survey conditions

1.3.1 The site comprises of two blocks of land, the larger located to the west of Arnold's Way with a smaller separate area located 230m to the south east immediately north of Wemberham Lane. The larger area is centred on Ordnance Survey National Grid Reference (OS NGR) ST 41750 66030 while the smaller area, outlined to contain the proposed product development office, is at OS NGR ST 42028 65892, see Figs 01 and 02.

Plate 1: Survey Area 1 looking north west

1.3.2 For the purposes of the geophysical survey and report, the larger part of the development site is split into Areas 1 – 4 representing separate survey zones within small parcels of land. Area 5 represents a separate land parcel for the proposed product development office. Areas 1, 3 and 4 contained grass and were probably utilised for agriculture. Area 2 had been stripped of grass recently and was defined by Heras fencing. Area 5 contained rough vegetation that had been recently cut.

1.3.3 The survey covers a total of approximately 2.5ha. Several zones were unsuitable for survey either being overgrown or covered by the extension to Arnold's Way. The road extension was tested by the magnetometer but proved to be highly magnetic as it contained a substrate that included recycled reinforced concrete and other magnetically themoremnant material.

1.3.4 The ground conditions across the site were variable but generally considered

to be suitable for the collection of magnetometry data. Areas 1, 3 and 4 contained linear drainage ditches which were partly flooded during the survey. Area 2 contained shallow water that had pooled due to the removal of the topsoil and some modern ferrous material related to ground consolidation or dumping was also visible. Area 5 contained evidence of modern rubbish. Weather conditions during the survey were overcast.

1.4 Site history and archaeological potential

1.4.1 The site lies to the south west of an area of land that has been subject to two geophysical surveys (GSB, 2013 and Archaeological Surveys, 2014). Two parallel linear anomalies indicating a possible former trackway were located within both surveys situated 600m to the north west. A number of enclosures, ditches and pits were also located 800m north of the site. The south western edge of the GSB survey area was within 200m of the site but contained a spread of magnetic debris associated with the line of the disused Yatton to Clevedon Branch Railway.

1.4.2 The nearest Scheduled Monuments are a *Minor Romano-British villa 650m north-east of Hewish Farm* (List entry no. 1011262) (Wemberham Villa) situated 1.4km to the south west and *Cadbury Camp, a small multivallate hillfort on Cadbury Hill* (List entry no. 1008295) situated 2.4km to the south east. A large number of geophysical surveys have been carried out by local group YCCCART (Yatton, Congresbury, Claverham and Cleeve Archaeological Research Team) in the wider area with a number of archaeological sites located (YCCART, 2017).

1.4.3 Area 5, the small parcel of land in the eastern part of the site, is shown to contain Holly Lodge Farm which was built in the 18th century and demolished in the early 20th century on early Ordnance Survey mapping. The old town gas works are also recorded nearby.

1.4.4 The survey is likely to locate magnetic debris associated with Holly Lodge Farm in Area 5. Despite the lack of recorded archaeological sites and findspots within the main site, there is always potential for the survey to locate previously unrecorded archaeological features should they exist within the site.

1.4.5 Observations within recently cleared drainage ditches bounding Areas 1 and 4 and of stripped soil within Area 2 failed to reveal any significant cultural material.

1.5 Geology and soils

1.5.1 The underlying solid geology across the site is Mercia Mudstone with overlying tidal flats deposits (BGS, 2017).

1.5.2 The overlying soil across the survey area is from the Newchurch 2 association

and is a pelo-calcareous alluvial gley soil. It consists of a deep, stoneless, mainly calcareous, clayey soil (Soil Survey of England and Wales, 1983).

1.5.3 Magnetic surveys over similar soils and geology can have variable results; however, where there has been long term occupation or industrial activity there is generally sufficient magnetic contrast between cut features and the material into which they are cut for their location using magnetometry. Should overlying alluvium be present, this may obscure deeply buried features and other natural features such as palaeochannels can be evident. At times these can be difficult to distinguish from anomalies with an anthropogenic origin.

2 METHODOLOGY

2.1 Technical synopsis

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

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

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

2.1.4 The localised variations in magnetism are measured as sub-units of the Tesla, which is a SI unit of magnetic flux density. These sub-units are nano Teslas (nT), which are equivalent to 10^{-9} Tesla (T).

2.2 Equipment configuration, data collection and survey detail

2.2.1 The detailed magnetic survey was carried out using a SENSYS MAGNETO®MXPDA 5 channel cart-based system. The instrument has 5 fluxgate gradiometers (FGM650) spaced 0.5m apart with readings recorded at 20 Hz. The cart is pushed at walking speed and not towed. 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 range of recording data between ±0.1nT and ±10,000nT. They are linked to a Leica GS10 RTK GPS with data recorded by SENSYS MAGNETO®MXPDA software on a rugged PDA 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 is manifest 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®MXPDA 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 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 ±10000nT and clipped for display at ±5nT for Areas 1 to 4 and at ±30nT for Area 5. 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 for Areas 1 & 4 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, rapid temperature change. Data treated to additional processing has 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. With regard to the Sensys MXPDA, minimally processed data is considered by the manufacturer to be data that is 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 very high density of data collection.

2.3.7 The raster images are combined with base mapping using ProgeCAD Professional 2016, creating DWG (2010) file formats. All images are externally referenced to the CAD drawing in order to maintain good graphical quality. The CAD plots are effectively georeferenced facilitating relocation of features using GPS, resection method, etc.

2.3.8 An abstraction and interpretation is also drawn and plotted for all geophysical anomalies located by the survey. Anomalies are abstracted using colour coded points, lines and polygons. All plots are scaled to landscape A3 for paper printing.

2.3.9 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 The abstraction and interpretation procedure has been supported by analysis of a digital terrain model derived from the Environment Agency's LiDAR data. Shaded relief plots are created using Surfer 10.

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

3 RESULTS

3.1 General assessment of survey results

3.1.1 The detailed magnetic survey was carried out over a total of five survey areas covering approximately 2.5ha.

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

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

3.2 Statement of data quality and factors influencing the interpretation of anomalies

3.2.1 Data are considered representative of the magnetic anomalies present within the site. Localised zones of magnetic debris are present in parts of the site, and it is considered likely that the majority is of modern origin. Modern magnetic material was observed within Areas 2 and 5. A fragment of magnetic material within sticky clay may be responsible for a multiple dipolar linear response within Area 2 but there is no evidence that it has obscured any significant features.

3.2.2 Low magnitude variable magnetic response has created a mottled effect within the greyscale plots of data from Areas 1 – 4. It is typical of former alluvial and marshy environments but occasionally cannot be confidently separated from anomalies of anthropogenic origin. Data from Area 3 indicates the presence of more linear and curvilinear features that also cannot be confidently interpreted as both naturally and anthropogenically formed features are possible.

3.3 Data interpretation

3.3.1 The list of sub-headings below attempts to define a number of separate categories that reflect the range and type of features located during the survey. A basic explanation of the characteristics of the magnetic anomalies is

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

Report sub-heading CAD layer names and plot colour	Description and origin of anomalies
Anomalies with an uncertain origin AS-ABST MAG POS LINEAR UNCERTAIN AS-ABST MAG POS UNCERTAIN AS-ABST MAG NEG UNCERTAIN	The category applies to a range of anomalies where there is not enough evidence to confidently suggest an origin. Anomalies in this category may well be related to archaeologically significant features, but equally relatively modern features, geological/pedological features and agricultural features should be considered. Positive anomalies are indicative of magnetically enhanced soils that may form the fill of 'cut' features or may be produced by accumulation within layers or 'earthwork' features; soils subject to burning may also produce positive anomalies. Negative anomalies are produced by material of comparatively low magnetic susceptibility such as stone and subsoil.
Anomalies relating to land management AS-ABST MAG LAND DRAIN	Anomalies may be negative and associated with extant drainage channels visible as linear ditches in the ground surface. A positive response may relate to infill material within the drainage ditch.
Anomalies associated with magnetic debris AS-ABST MAG DEBRIS AS-ABST MAG STRONG DIPOLAR	Magnetic debris often appears as areas containing many small dipolar anomalies that may range from weak to very strong in magnitude. It often occurs where there has been dumping or ground make-up and is related to magnetically thermoremnant materials such as brick or tile or other small fragments of ferrous material. This type of response is occasionally associated with kilns, furnace structures, or hearths and may therefore be archaeologically significant. It is also possible that the response may be caused by natural material such as certain gravels and fragments of igneous or metamorphic rock. Strong discrete dipolar anomalies are responses to ferrous objects within the topsoil.

Table 1: List and description of interpretation categories

3.4 List of anomalies - Areas 1 to 4

Area centred on OS NGR 341750 166030, see Figs 03 & 04.

Anomalies with an uncertain origin

(1) - A fragmented positive linear anomaly appears to have been truncated by drainage gullies (5) in the southern part of Area 1. It is not possible to determine if this relates to the magnetically enhanced fill of a cut feature, or if it relates to a natural feature.

(2) - Located predominantly within Area 3, but also continuing into Areas 2 and 4 are a number of amorphous, broad linear and sinuous positive and negative responses (2). They appear to relate to naturally formed features, likely to be

associated with former channels within the tidal flat deposits.

(3 & 4) - A broad negative linear response (3) that appears to have truncated several of the anomalies (2), and a negative curvilinear response located within Areas 2 and 3. The response indicates material with a lower magnetic susceptibility than the surrounding soil, possibly indicating alluvium or peat deposits. While these may also relate to naturally formed features, an anthropogenic origin should also be considered.

Anomalies associated with land management

(5) - Linear anomalies relating to extant drainage gullies within the site.

Anomalies associated with magnetic debris

(6) - Zones of magnetic debris relate to ferrous and other magnetically thermoremnant material (eg brick/tile) that has been dumped on site or used as ground consolidation/infill. A zone at the north western corner of Area 2 contained exposed ferrous material and this has attached to the wheel of the cart in sticky clay to cause a linear multiple dipolar response.

(7) - Strong, discrete, dipolar responses are evident throughout each survey area and relate to ferrous and other magnetically thermoremnant objects within the topsoil.

3.5 List of anomalies - Area 5

Area centred on OS NGR 342028 165892, see Fig 05.

Area 5 contains only magnetic debris and strong dipolar responses. The site once contained Holly Lodge Farm and the response is likely to relate to the demolition material. Some modern rubbish was also visible within the area.

4 CONCLUSION

4.1.1 The detailed magnetometry survey located a number of positive and negative amorphous responses of natural origin within the site. Several positive and negative linear anomalies of uncertain origin were also located, and although these are likely to be naturally formed features such as paleochannels, an anthropogenic origin is possible.

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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 field. The difference between the two sensors will relate to the strength the magnetic field created by the buried feature.

There are a number of factors that may affect the magnetic survey and these include soil type, local geology and previous human activity. Situations arise where magnetic disturbance associated with modern services, metal fencing, dumped waste material etc., obscures low magnitude fields associated with archaeological features.

Appendix B – data processing notes

Clipping

Minimum and maximum values are set and replace data outside of the range with those values. Extreme values are removed improving colour or greyscale contrast associated with data values that may be archaeologically significant. It has been found that clipping data to ranges between ±5nT and ±3nT often improves the appearance of features associated with archaeology. Different ranges are applied to data in order to determine the most suitable for anomaly abstraction and display.

Zero (destripe) Median/Mean Traverse

The median (or mean) of each traverse is calculated ignoring data outside a threshold value, the median (or mean) is then subtracted from the traverse. The process is used to equalise differences between the baseline value of gradiometer sensors.

High Pass Filtering

A mathematical process used to remove low frequency anomalies relating to survey tracks, modern agricultural features and other large magnetic bodies within or adjacent to survey areas.

Low Pass Filtering

A mathematical process used to remove high frequency anomalies relating to uneven ground, vibration, etc.

Appendix C – survey and data information

Area 1 - minimally processed magnetometer data

Filename: J706-mag-Area1-proc.xcp
Description: Imported as Composite from: J706-mag-Area1.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 341655.55627455, 166022.565625776 m
Southeast corner: 341793.70627455, 165896.115625776 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702
Source GPS Points: 241500
Dimensions
Composite Size (readings): 921 x 843
Survey Size (meters): 138 m x 126 m
Grid Size: 138 m x 126 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 5.53
Min: -5.50
Std Dev: 1.73
Mean: 0.06
Median: -0.03
Composite Area: 1.7469 ha
Surveyed Area: 0.86948 ha
PROGRAM
Name: TerraSurveyor
Version: 3.0.23.0Processes: 1
1 Base Layer
GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (to OSGB36).
3 DeStripe Median Traverse:
4 Clip from -5.00 to 5.00 nT

Area 1 - filtered magnetometer data

Filename: J706-mag-Area1-proc-hpf.xcp
Description: Imported as Composite from: J706-mag-Area1.asc
Stats
Max: 5.53
Min: -5.50
Std Dev: 1.43
Mean: 0.04
Median: 0.00
Composite Area: 1.7469 ha
Surveyed Area: 0.86948 ha
Processes: 1
1 Base Layer
GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 High pass Uniform (median) filter: Window dia: 300
5 Clip from -5.00 to 5.00 nT

Area 2 - minimally processed magnetometer data

Filename: J706-mag-Area2-proc.xcp
Description: Imported as Composite from: J706-mag-Area2.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 341632.101510549, 166056.186528387 m
Southeast corner: 341681.901510549, 166010.286528387 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702
Source GPS Points: 48500
Dimensions
Composite Size (readings): 332 x 306
Survey Size (meters): 49.8 m x 45.9 m
Grid Size: 49.8 m x 45.9 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 5.53
Min: -5.50
Std Dev: 2.08
Mean: 0.03
Median: 0.05
Composite Area: 0.22858 ha
Surveyed Area: 0.13906 ha
Processes: 1
1 Base Layer
GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 Clip from -5.00 to 5.00 nT

Area 3 - minimally processed magnetometer data

Filename: J706-mag-Area3-proc.xcp
Description: Imported as Composite from: J706-mag-Area3.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 341679.63562233, 166154.488492384 m
Southeast corner: 341816.88562233, 165993.688492384 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32000
Source GPS Points: 293600
Dimensions
Composite Size (readings): 915 x 1072
Survey Size (meters): 137 m x 161 m
Grid Size: 137 m x 161 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 5.53
Min: -5.50
Std Dev: 1.83
Mean: -0.04
Median: 0.00
Composite Area: 2.207 ha
Surveyed Area: 1.0767 ha
Processes: 1
1 Base Layer
GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (to OSGB36).
3 DeStripe Median Traverse:
4 Clip from -5.00 to 5.00 nT

Area 3 - filtered magnetometer data

Filename: J706-mag-Area3-proc-hpf.xcp
Description: Imported as Composite from: J706-mag-Area3.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 341679.63562233, 166154.488492384 m
Southeast corner: 341816.88562233, 165993.688492384 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32000
Source GPS Points: 293600
Dimensions
Composite Size (readings): 915 x 1072
Survey Size (meters): 137 m x 161 m
Grid Size: 137 m x 161 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 5.53
Min: -5.50
Std Dev: 1.56
Mean: -0.01
Median: 0.00
Composite Area: 2.207 ha
Surveyed Area: 1.0767 ha
Processes: 1
1 Base Layer
GPS based Proce5
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 High pass Uniform (median) filter: Window dia: 300
5 Clip from -5.00 to 5.00 nT

Area 4 - minimally processed magnetometer data

Filename: J706-mag-Area4-proc.xcp
Description: Imported as Composite from: J706-mag-Area4.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 341766.073681904, 166035.163438033 m
Southeast corner: 341794.273681904, 165975.463438033 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702
Source GPS Points: 39000
Dimensions
Composite Size (readings): 188 x 398
Survey Size (meters): 28.2 m x 59.7 m
Grid Size: 28.2 m x 59.7 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 5.53
Min: -5.50
Std Dev: 1.62
Mean: 0.02
Median: 0.02
Composite Area: 0.16835 ha
Surveyed Area: 0.10807 ha
Processes: 1
1 Base Layer
GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 Clip from -5.00 to 5.00 nT

Area 5 - minimally processed magnetometer data

Filename: J706-mag-Area5-proc.xcp
Description: Imported as Composite from: J706-mag-Area5.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 342005.990837474, 165903.774951915 m
Southeast corner: 342047.540837474, 165881.274951915 m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702
Source GPS Points: 15200
Dimensions
Composite Size (readings): 277 x 150
Survey Size (meters): 41.6 m x 22.5 m
Grid Size: 41.6 m x 22.5 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 33.15
Min: -33.00
Std Dev: 17.87
Mean: -0.60
Median: 0.49
Composite Area: 0.093488 ha
Surveyed Area: 0.051192 ha
Processes: 1
1 Base Layer
GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 Clip from -30.00 to 30.00 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 North Somerset Historic Environment Record with printed copies on request. The report will also be uploaded to the Online AccesS to the Index of archaeological investigationS (OASIS).

Archive contents:

Geophysical data - path: J706 Yatton\Data				
Path and Filename	**Software**	**Description**	**Date**	**Creator**
stowell1\MX\.prm,.dgb,.disp stowell2\MX\.prm,.dgb,.disp stowell3\MX\.prm,.dgb,.disp stowell4\MX\.prm,.dgb,.disp stowell5\MX\.prm,.dgb,.disp	Sensys MXPDA	Proprietary data formats representing magnetometer survey traverses logged to a PDA.	13/12/16 13/12/16 14/12/16	D.J.Sabin
stowell1\MX\J706-mag-Area1.asc stowell2\MX\J706-mag-Area2.asc stowell3\MX\J706-mag-Area3.asc stowell4\MX\J706-mag-Area4.asc stowell5\MX\J706-mag-Area5.asc	Sensys DLMGPS	ASCII CSV (tab) file representing survey area in eastings, northings (UTM Z30N), magnetic measurement, traverse file and sensor number.	02/03/17	K.T. Donaldson
Area1\comps\J706-mag-Area1.xcp Area2\comps\J706-mag-Area2.xcp Area3\comps\J706-mag-Area3.xcp Area4\comps\J706-mag-Area4.xcp Area5\comps\J706-mag-Area5.xcp	TerraSurveyor 3.0.23.0	Composite data file derived from ASCII CSV.	02/03/17	K.T. Donaldson
Area1\comps\J706-mag-Area1-proc.xcp Area2\comps\J706-mag-Area2-proc.xcp Area3\comps\J706-mag-Area3-proc.xcp Area4\comps\J706-mag-Area4-proc.xcp Area5\comps\J706-mag-Area5-proc.xcp	TerraSurveyor 3.0.23.0	Processed composite data file (zmt and clipping to ±5nT). Processed composite data file (zmt and clipping to ±5nT). Processed composite data file (zmt and clipping to ±5nT). Processed composite data file (zmt and clipping to ±5nT). Processed composite data file (zmt and clipping to ±30nT).	02/03/17	K.T. Donaldson
Area1\comps\J706-mag-Area1-proc-hpf.xcp Area3\comps\J706-mag-Area3-proc-hpf.xcp	TerraSurveyor 3.0.23.0	Processed composite data file (zmt, high pass filter and clipping to ±5nT).	02/03/17	K.T. Donaldson
Graphic data - path: J706 Yatton\Data				
Area1\comps\J706-mag-Area1-proc.tif Area2\comps\J706-mag-Area2-proc.tif Area3\comps\J706-mag-Area3-proc.tif Area4\comps\J706-mag-Area4-proc.tif Area5\comps\J706-mag-Area5-proc.tif	TerraSurveyor 3.0.23.0	TIF file showing a minimally processed greyscale plot clipped to ±3nT.	02/03/17	K.T.Donaldson
Area1\comps\J706-mag-Area1-proc.tfw Area2\comps\J706-mag-Area2-proc.tfw Area3\comps\J706-mag-Area3-proc.tfw Area4\comps\J706-mag-Area4-proc.tfw Area5\comps\J706-mag-Area5-proc.tfw	TerraSurveyor 3.0.23.0	World file for georeferencing TIF to OSGB36.	02/03/17	K.T.Donaldson
Area1\comps\J706-mag-Area1-proc-hpf.tif Area3\comps\J706-mag-Area3-proc-hpf.tif	TerraSurveyor 3.0.23.0	TIF file showing a filtered greyscale plot clipped to ±5nT.	02/03/17	K.T.Donaldson
Area1\comps\J706-mag-Area1-proc-hpf.tfw Area3\comps\J706-mag-Area3-proc-hpf.tfw	TerraSurveyor 3.0.23.0	World file for georeferencing TIF to OSGB36.	02/03/17	K.T.Donaldson
CAD data - path: J706 Yatton\CAD				
J706 version 1.dwg	ProgeCAD 2016	CAD file for creating plots of greyscales, abstraction, interpretation and mapping. Grid coordinates as OSGB. AutoCAD 2010 format.	27/02/17	K.T.Donaldson
Text data - path: J706 Yatton\Documentation				
J706 report.odt	OpenOffice.org 3.0.1 Writer	Report text as an Open Office document.	02/03/17	K.T.Donaldson

Appendix E – copyright and intellectual property

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Archaeological Surveys Ltd

Geophysical Survey
Stowell Concrete Extension
Yatton
North Somerset

Map of survey area

Survey location

Reproduced from OS Explorer map no.154 1:25 000 by permission of Ordnance Survey on behalf of The Controller of Her Majesty's Stationery Office. © Crown copyright. All rights reserved. Licence number 100043739.

Survey location

Site centred on OS NGR
ST 41750 66030 &
ST 42028 65892

SCALE 1:25 000

0m 500m 1000m

SCALE TRUE AT A3

FIG 01

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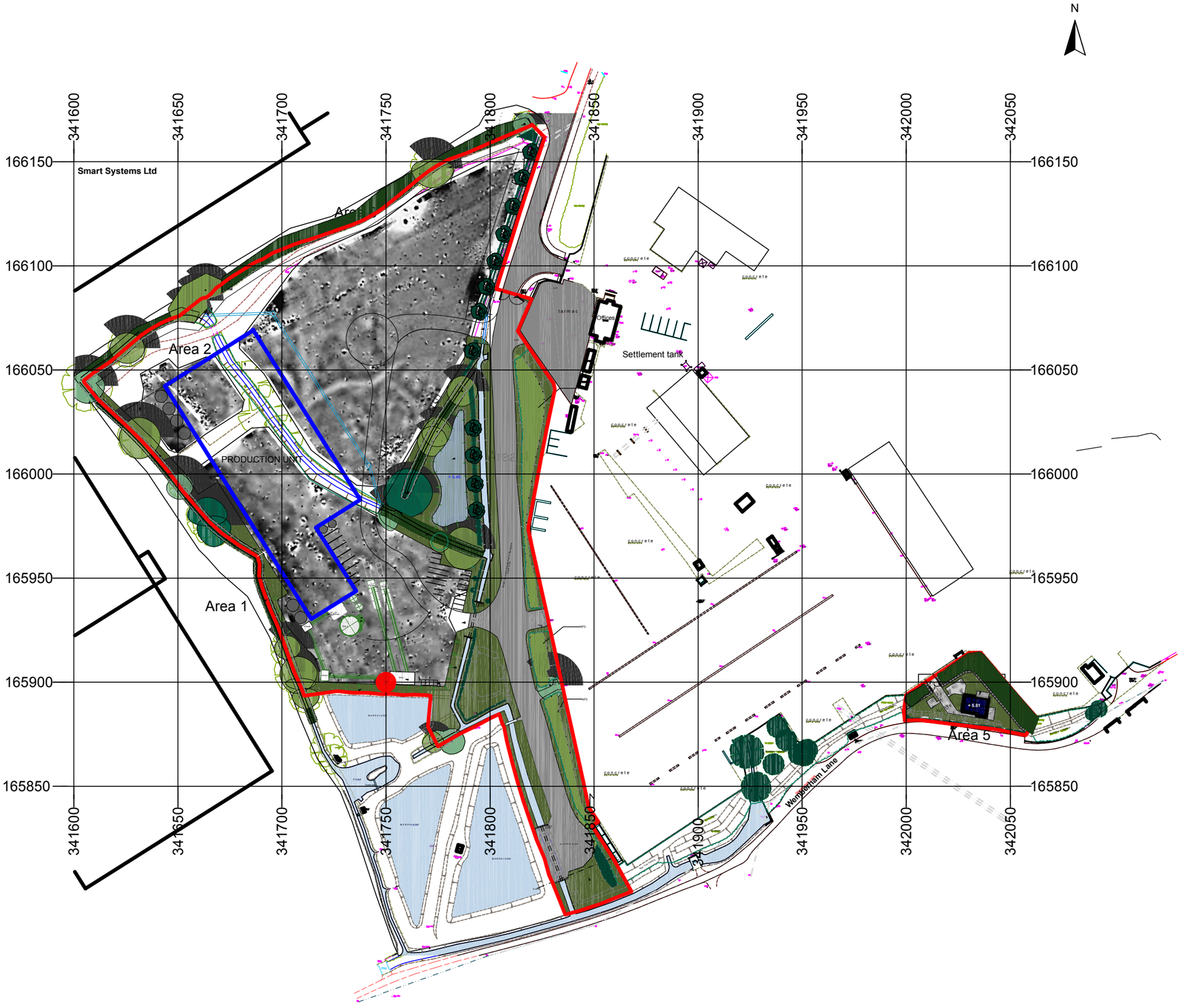
Geophysical Survey
Stowell Concrete Extension
Yatton
North Somerset

Referencing information

Referencing grid to OSGB36 datum at 50m intervals

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

341750 165900



SCALE 1:2000

0m 20 40 60 80 100m

SCALE TRUE AT A3

FIG 02

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Geophysical Survey
Stowell Concrete Extension
Yatton
North Somerset

Area 3

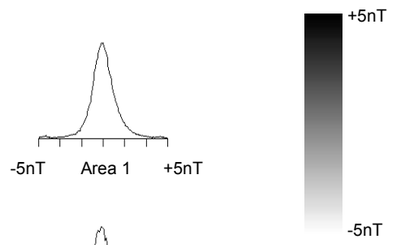
Area 2

Area 4

Area 1

N

Greyscale plot of minimally processed magnetometer data



SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

FIG 03

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Geophysical Survey
Stowell Concrete Extension
Yatton
North Somerset

Abstraction and interpretation of magnetic anomalies - Areas 1 to 4

- Positive linear anomaly - possible ditch-like feature
- Negative/positive linear anomaly - drainage channel
- Positive response - of uncertain/possible natural origin
- Negative response - of uncertain/possible natural origin
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Strong dipolar anomaly - ferrous object

Area 1

Area 2

Area 3

Area 4

N

SCALE 1:1000

0m 10 20 30 40 50m

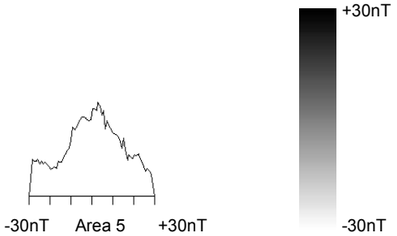
SCALE TRUE AT A3

FIG 04

Archaeological Surveys Ltd

Geophysical Survey
Stowell Concrete Extension
Yatton
North Somerset

Greyscale plot of processed magnetometer data - Area 5



Abstraction and interpretation of magnetic anomalies

Magnetic debris - spread of magnetically thermoremnant/ferrous material

Strong dipolar anomaly - ferrous object

SCALE 1:500

0m 5 10 15 20 25m

SCALE TRUE AT A3

FIG 05

Archaeological Surveys Ltd

Geophysical Survey
Stowell Concrete Extension
Yatton
North Somerset

Shaded relief model derived from Environment Agency LiDAR data 1m DTM

SCALE 1:2000

0m 20 40 60 80 100m

SCALE TRUE AT A3

FIG 06