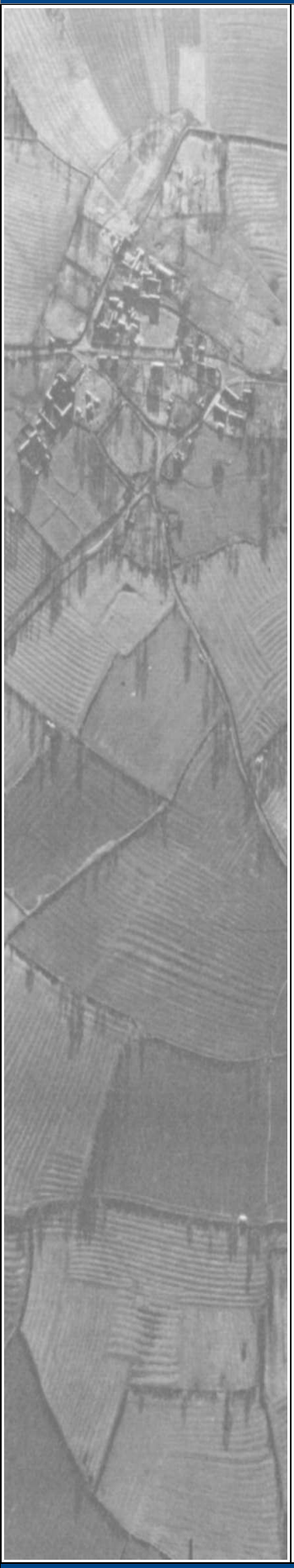

Land North of Bancombe Road
Somerton
Somerset

MAGNETOMETER SURVEY REPORT

for

Cotswold Archaeology

Kerry Donaldson & David Sabin

September 2019

Ref. no. J801

ARCHAEOLOGICAL SURVEYS LTD

Land North of Bancombe Road
Somerton
Somerset

MAGNETOMETER SURVEY REPORT

for

Cotswold Archaeology

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

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Ordnance Survey Grid Reference – **ST 47950 28950**

Somerset HER no. 39522

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SUMMARY

A geophysical survey, comprising detailed magnetometry, was undertaken by Archaeological Surveys Ltd on land at Somerton at the request of Cotswold Archaeology. The results indicate the presence of a number of rectilinear enclosures separated by a trackway in the northern part of the site, with some evidence for potential structural remains in the north eastern corner. A number of pit-like responses have also been located, and it is possible that there is an association with burials. To the south west is a single ring ditch feature, and although a number of positive linear, discrete and rectilinear anomalies have been located further south, it is not clear if they relate to former cut features or if some relate to soil-filled geological features.

1 INTRODUCTION

1.1 Survey background

1.1.1 Archaeological Surveys Ltd was commissioned by Cotswold Archaeology to undertake a magnetometer survey of an area of land to the north of Bancombe Road in Somerton, Somerset. The site has been outlined for a proposed residential development and the survey forms part of an archaeological assessment.

1.1.2 The geophysical survey was carried out in accordance with a Written Scheme of Investigation (WSI) produced by Archaeological Surveys (2019). Somerset Historic Environment Record has also issued the HER number 39522 for the survey.

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 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 The survey and report generally 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) *Standard and Guidance for Archaeological Geophysical Survey.* Note: currently Historic England (2018) no longer support the guidelines set out in English Heritage (2008) *Geophysical survey in archaeological field evaluation* and there are currently no plans to update the document. As a consequence other sources of written guidance referring to this document may be out of date and/or contain unsupported information (e.g. Chartered Institute for Archaeologists, 2014).

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 to the north of Bancombe Road and south of Bradley Hill Lane on the north western edge of Somerton in Somerset. It is centred on Ordnance Survey National Grid Reference (OS NGR) ST 47950 28950, see Figs 01 and 02.

1.4.2 The geophysical survey covers approximately 4.5ha within two arable fields. The southern edge of Area 1 in the southern part of the site was unsurveyable due to the presence of overgrown vegetation. The land is generally flat with field boundaries formed by hedgerows. A new housing development is located to the south east of the site and an electricity substation is located to the east of the northern part of the site. A soil bank bounds the western side of the northern field. Areas of localised ground disturbance within the site appear to be associated with removal of electricity poles, with new poles constructed close to the northern boundary along with some undergrounding of cables.

Plate 1: Area 1 looking south west

1.4.3 The ground cover across the site was mainly stubble and generally considered to be favourable for the collection of magnetometry data with the exception of the overgrown area at the southern end of the site. Sources of magnetic disturbance were noted in the form of steel cable stays close to the northern boundary and steel gates. Weather conditions during the survey were mainly wet after a dry start.

1.5 Site history and archaeological potential

1.5.1 An Archaeological Desk-Based Assessment has been carried out for the site by Archaeology South East (Stephenson, 2018). It outlines that there are no known sites or findspots within the survey area; however, it has not been subject to any archaeological investigations. In the immediate and surrounding area there have been several which have located a Late Iron Age and Romano-British settlement and evidence for medieval occupation at St Cleers Farm, c400m to the south west. Evidence of Early to Middle Bronze Age ditches were also located to the west of St Cleers. Situated approximately 650m to the north west of the site is the location of a probable Roman villa and surrounding complex of ditches, enclosures, pits and industrial features. A geophysical survey carried out on land immediately to the east of the site, at Northfield Farm, located a number of possible ditch-like and pit-like responses, but upon evaluation no features of archaeological origin could be identified. The land immediately west of the southern part of the site has also undergone recent geophysical survey which located a number of possible ditch-like features (Lefort Geophysics, 2019).

1.5.2 The land just to the north east of the survey area has also been subject to recent archaeological investigation prior to construction of a new primary school. This included a geophysical survey which identified a number of rectilinear enclosures and six ring ditches (Wessex Archaeology, 2019a). Evaluation confirmed the presence of the ring ditches dating them to the Iron Age with later Romano-British enclosures. Two shallow circular graves were also identified (Wessex Archaeology, 2019b).

1.6 Geology and soils

1.6.1 The underlying solid geology across the site is interbedded Jurassic limestone and mudstone from the Langport Member, Blue Lias Formation and Charmouth Mudstone Formation (BGS, 2017). Limestone fragments were frequently visible on the field surface and a recently constructed drainage ditch bounding the south eastern part of the site indicated bands of stone and clay underlying a very shallow topsoil.

1.6.2 The overlying soil across the survey area is from the Sherborne association and is a brown rendzina. It consists of a shallow, well drained, brashy, calcareous, clayey soil over limestone (Soil Survey of England and Wales, 1983).

1.6.3 Magnetometry carried out over similar geology and soil has produced good results. The site is, therefore, considered suitable for magnetic survey.

2 METHODOLOGY

2.1 Technical synopsis

2.1.1 Magnetometry survey records localised magnetic fields that can be associated with features formed by human activity. Magnetic susceptibility and magnetic thermoremnance (also known as thermoremanence) are factors associated with the formation of localised 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 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). 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®MXPDA 5 channel cart-based system. The instrument has 5 fluxgate gradiometers (FGM650) spaced 0.5m apart with readings recorded at 20Hz. 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 ±8000nT. They are linked to a Leica GS10 RTK GNSS 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 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 <60s.

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 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 ±8000nT 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 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.

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

2.3.6 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 GNSS, resection method, etc.

2.3.7 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.

2.3.8 A brief summary of each anomaly, with an appropriate reference number, is set out in list form within the results (Section 3) to allow a rapid and objective assessment of features within each survey area. Where further interpretation is possible, or where a number of possible origins should be considered, more subjective discussion is set out in Section 4.

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

3 RESULTS

3.1 General assessment of survey results

3.1.1 The detailed magnetic survey was carried out over a total of two survey areas covering approximately 4.5ha.

3.1.2 Magnetic anomalies located can be generally classified as positive and negative responses of archaeological potential, positive and negative anomalies of an uncertain origin, linear anomalies of an agricultural origin, areas of magnetic debris and disturbance, strong discrete dipolar anomalies relating to ferrous objects and anomalies with a natural origin.

3.1.3 Anomalies located within each survey area have been numbered and are described in 3.4 below with subsequent discussion in Section 4.

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. There are no significant defects within the dataset.

3.2.2 Localised magnetic disturbance located along the southern edge of Area 2 has the the potential to obscure weak anomalies of archaeological potential should they be present. Data were not collected adjacent to electricity pole stays adjacent to the northern boundary of Area 2 due to high levels of magnetic disturbance. A narrow zone at the southern end of Area 1 was

unsurveyable due to rough vegetation

3.2.3 The results demonstrate moderately strong magnetic contrast typical of similar geology in other parts of the UK, particularly where soils are naturally well drained. Anomalies of archaeological potential generally appear well defined. However, it should be noted that some linear anomalies may relate to fissures in the underlying geology, and occasionally it may be difficult to separate these from archaeological features.

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 archaeological potential	Anomalies have the characteristics (mainly morphological) of a range of archaeological features such as pits, ring ditches, enclosures, etc. The category is used where there is a high level of confidence which may be due to additional supporting information where morphology is unclear or uncharacteristic.
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 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.
Anomalies with a natural origin	Naturally formed magnetic anomalies are caused by localised variability in the magnetic susceptibility of soils, subsoils and other drift or solid geologies. Anomalies may be amorphous, linear or curvilinear and may appear 'fluvial' or discrete; the latter are almost impossible to distinguish from pit-like anomalies with an anthropogenic origin. Fluvial, glacial and periglacial processes may be responsible for their formation within drift material and subsoil. Igneous and metamorphic activity can lead to anomalies within more solid geology.

Table 1: List and description of interpretation categories

3.4 List of anomalies - Area 1

Area centred on OS NGR 347900 128895, see Figs 03 – 06.

Anomalies of archaeological potential

(1) - Located close to the north western corner of Area 1 is a single positive curvilinear anomaly. It relates to a penannular ring ditch with a c10m diameter, and it appears to have an entrance on the north western side. At least 6 similar ring ditches have been located through geophysical survey between 250m and 325m to the north east, although these appear to have a south east facing entrance. Although isolated and not clearly associated with other cut features, it is also likely to relate to an Iron Age round house.

Anomalies with an uncertain origin

(2) - A positive rectilinear anomaly is located in the south western part of the survey area. Although it is possible that it is associated with the underlying geology, it does not have the general north west to south east orientation of the majority of geological features in the surrounding vicinity (26) and an archaeological origin is possible.

(3 & 4) - A fragmented positive linear anomaly (3) appears to have been truncated by anomaly (7). This could relate to a former field boundary recorded on the 1840 Tithe Map. Another positive linear anomaly (4) crosses the centre of the survey area on a similar orientation to, and 45m south west of (3), although no boundary feature is recorded on any early mapping in this position. However, they have a west north west to east south east orientation, which is also similar to ditches (15 & 16) seen in Area 2 to the north and an association cannot be ruled out.

(5) - A positive linear anomaly appears to extend south eastwards from ring ditch (1). However, it is on the same north west to south east orientation as the main geological trend seen within Area 2 to the north (26) and also on aerial photographs of the site and may therefore be natural in origin.

(6) - A number of positive linear and discrete anomalies can be seen in the vicinity of the ring ditch (1). While it is possible that some relate to ditch-like and pit-like features with archaeological potential, this is not clear and many of the linear anomalies are on the same north west to south east geological trend (26) and an association is likely.

(7 & 8) - A small area with positive linear, discrete and amorphous responses (7) appears to have truncated linear anomaly (3). It is possible that this relates to former quarrying, although there is no existing depression in the field and it is not recorded on any former mapping. An amorphous positive response (8) is located 70m south west of anomaly (7) and appears to have been cut by a negative linear anomaly. This could also relate to former infilled quarrying.

(9) - The survey areas contain a number of weak, discrete, positive anomalies with a response of 3-7nT. These appear pit-like, and while an anthropogenic origin should be considered, a natural origin is also possible.

(10) - Within the southern part of the survey area are a number of strong, discrete anomalies with a response of 20-50nT. This type of response is indicative of intense burning and although not clearly associated with any other archaeological features, an archaeological origin should be considered.

Anomalies with an agricultural origin

(11) - A series of linear anomalies, parallel with the long axis of the field relate to agricultural activity.

Anomalies associated with magnetic debris

(12) - Two small patches of magnetic debris can be seen in the northern part of the field. Although this type of response can be associated with bonfires or dumped material, a modern origin is not certain.

(13) - Strong, discrete, dipolar anomalies are a response to buried ferrous objects.

3.5 List of anomalies - Area 2

Area centred on OS NGR 348015 129030, see Figs 03, 04, 07 & 08.

Anomalies of archaeological potential

(14) - Rectilinear anomalies relate to a number of enclosures bounded and separated by linear ditches (15 & 16). Although on a slightly different orientation to the north east to south west and north west to south east aligned enclosures located some 70m to the north west through geophysical survey by Wessex Archaeology, the are very likely to be a continuation of these features.

(15 & 16) - Two parallel positive linear anomalies extend along the northern part of Area 2. Although parallel with the current field layout and orientation of Bradley Hill Lane to the north, these anomalies relate to linear ditches spaced 19-24m apart. They separate and form part of the rectilinear enclosures (14) and there is some complexity, with the northernmost anomaly (16) being in places either a double or triple ditch. They appear to relate to trackway boundary ditches.

(17) - A positive response relates to a large pit at the junction of several linear and rectilinear ditches.

(18) - Located in the far north eastern corner of Area 2 is a group of positive and negative anomalies. There are several rectilinear elements to the negative anomalies, which may indicate that they relate structural remains with other debris in the vicinity.

(19) - The survey area contains a large number of discrete positive responses. Several are clustered around anomaly (18), with many lying between linear ditches (15 & 16). They appear to relate to pits with archaeological potential with several having an elongated form which could suggest an association with burials.

Anomalies with an uncertain origin

(20 & 21) - A positive linear anomaly extends across the western part of the survey area. It is is not clear if it continues into Area 1 to the south. It could relate to a geological feature; however, it is on a slightly different orientation to the main trend (26). A fragmented positive linear anomaly (21) appears to extend at right angles towards (20) and this may have been truncated by anomaly (16). While a geological origin is possible, an archaeological origin should also be considered.

(22) - Weak, discrete, positive responses appear to relate to pit-like features. It is not clear if they have a natural origin, or if they have archaeological potential.

(23) - A small number of very weakly positive possible curvilinear anomalies are located in the south west corner of the survey area. Their origin is uncertain.

(24 & 25) - A negative linear anomaly is oriented north to south and located in the eastern part of the survey area. This type of response could relate to a plastic pipe, but this is uncertain. Another fragmented negative linear anomaly is oriented north east to south west, this does not look like a buried service or pipe and its origin is uncertain.

Anomalies with a natural origin

(26) - The survey area contains a series of positive linear anomalies with a north west to south east orientation. These relate to the soil-filled cracks and joints within the underlying geology. Several other linear anomalies within the site could relate to further geological features.

4 DISCUSSION

4.1.1 Area 1 contains evidence for a single ring ditch feature (1). While there are a number of positive linear and discrete anomalies in the close vicinity (5 & 6), none can be clearly attributed to archaeological features and several could relate to geological features. In the south western part of Area 1 is an L-shaped rectilinear anomaly (2), which could relate to a cut feature. Also in the southern part of the site there are a number of strong, discrete positive responses that could relate to intense burning (10) although they are not clearly associated with other archaeological features. Two positive linear anomalies (3 & 4) extend across the centre of the survey area, with anomaly (3) possibly being truncated by former quarrying. It is not clear if they relate to former land boundaries or if they have a geological origin.

4.1.2 In the northern part of the site, Area 2 contains a number of rectilinear enclosures (14) in the east which appear to be bounded and separated by trackway ditches (15 & 16). Although on a slightly different orientation to the rectilinear anomalies identified through geophysical survey and evaluation 70m to the north west (Wessex Archaeology, 2019a & 2019b), they are likely to be a continuation of them. In the far north eastern corner of the survey area, although adjacent to the field entrance, which can be subject to ground disturbance and consolidation, there is a group of positive and negative anomalies (18). The negative anomalies have a rectilinear morphology and this type of response can relate to former structural remains. Much of the eastern half of Area 2 contains numerous and widespread discrete positive responses. Several of the anomalies have an elongated form of 2-3m long by 0.8-1.5m wide. While pit-like responses can be natural in origin, the form could suggest an association with burials.

5 CONCLUSION

5.1.1 The geophysical survey located a number of rectilinear enclosures, a trackway, pits and possible structural remains in the northern part of the site. A number of discrete positive anomalies were also located in the vicinity, and it is possible that several with an elongated form could be associated with burials. To the south west an isolated ring ditch feature with a c10m diameter has also been located. Further south a L-shaped rectilinear anomaly could relate to a further cut feature, but the majority of the linear anomalies cannot be clearly attributed to archaeological features. Two parallel linear anomalies could relate to former boundary ditches and there is some evidence of former quarrying. Several of the linear anomalies in the site could relate to soil-filled geological features.

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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.

Despike

Removal of data points that exceed the mean/median/threshold by selecting a window size of data points and replace by mean/median/threshold. Magnetic spikes can be caused iron objects on the surface or within the topsoil. Despike can improve the appearance of data and remove extreme readings that may affect further processing.

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.

Low Pass Filter

Removes high frequency anomalies or 'noise' within datasets and provides a smoother output. A window passes over the data, the mean of all the data within the window is used to replace the centre value. The size of the window is adjusted as is the weighting. 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: J801-mag-Area1-proc.xcp
Description: Imported as Composite from: J801-mag-Area1.asc
Instrument Type: Sensys DLMGPS
Units: nT
UTM Zone: 30U
Survey corner coordinates (X/Y):OSGB36
Northwest corner: 347820.95, 129017.85 m
Southeast corner: 347999.30, 128772.30m
Collection Method: Randomised
Sensors: 5
Dummy Value: 32702
Source GPS Points: 693600
Dimensions
Composite Size (readings): 1189 x 1637
Survey Size (meters): 178 m x 246 m
Grid Size: 178 m x 246 m
X Interval: 0.15 m
Y Interval: 0.15 m
Stats
Max: 3.32
Min: -3.30
Std Dev: 1.10
Mean: 0.04
Median: 0.01
Composite Area: 4.3794 ha
Surveyed Area: 2.3152 ha
PROGRAM
Name: TerraSurveyor
Version: 3.0.23.0
GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 Clip from -3.00 to 3.00 nT

Area 2 minimally processed data

Filename: J801-mag-Area2-proc.xcp
Description: Imported as Composite from: J801-mag-Area2.asc
Northwest corner: 347911.44, 129130.45 m
Southeast corner: 348112.74, 128938.30 m
Source GPS Points: 663800
Dimensions
Composite Size (readings): 1342 x 1281
Survey Size (meters): 201 m x 192 m
Grid Size: 201 m x 192 m
X Interval: 0.15 m
Y Interval: 0.15 m

Stats
Max: 3.32
Min: -3.30
Std Dev: 1.35
Mean: 0.07
Median: 0.03
Composite Area: 3.868 ha
Surveyed Area: 2.075 ha
GPS based Proce4
1 Base Layer.
2 Unit Conversion Layer (Lat/Long to OSGB36).
3 DeStripe Median Traverse:
4 Clip from -3.00 to 3.00 nT

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 printed copies on request. The report will also be uploaded to the Online AccesS to the Index of archaeological investigationS (OASIS).

Archive contents:

File type	Naming scheme	Description
Data	J801-mag-**[area number/name]**.asc J801-mag-**[area number/name]**.xcp J801-mag-**[area number/name]**-proc.xcp	Raw data as ASCII CSV TerraSurveyor raw data TerraSurveyor minimally processed data
Graphics	J801-mag-**[area number/name]**-proc.tif	Image in TIF format
Drawing	J801-**[version number]**.dwg	CAD file in 2010 dwg format
Report	J801 report.odt	Report text in Open Office 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 with archaeological potential		
AS-ABST MAG POS DISCRETE ARCHAEOLOGY	Red 255,0,0	Solid donut, point or polygon (solid)
AS-ABST MAG POS CURVILINEAR RING DITCH	Magenta 255,0,255	Polyline or polygon (solid)
AS-ABST MAG NEG STRUCTURAL ARCHAEOLOGY	0,38, 76	Line, polyline or polygon (solid)
AS-ABST MAG NEG LINEAR ARCHAEOLOGY	127,0,255	Line, polyline or polygon (solid)
AS-ABST MAG POS ENCLOSURE DITCH	127,0,255	Line, polyline or polygon (solid)
Anomalies with an uncertain origin		
AS-ABST MAG POS LINEAR UNCERTAIN	255,127,0	Line, polyline or polygon (solid)
AS-ABST MAG NEG LINEAR UNCERTAIN	Blue 0,0,255	Line, polyline or polygon (solid)
AS-ABST MAG POS DISCRETE UNCERTAIN	255,127,0	Solid donut, point or polygon (solid)
AS-ABST MAG POS UNCERTAIN	255,127,0	Polygon (cross hatched ANSI37)
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)
Anomalies with a natural origin		
AS-ABST MAG NATURAL FEATURES	Yellow 255,255,0	Polygon (cross hatched ANSI37)

Table 3: CAD layering

Appendix F – copyright and intellectual property

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Tel: 01249 814 231

Survey location

N

Archaeological Surveys
Specialist Geophysical Surveyors

Geophysical Survey
Land North of Bancombe Road
Somerton
Somerset

Map of survey area

● Survey location

Site centred on OS NGR
ST 47950 28950

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

347850 128800

Survey tracks

Survey track start

Survey track stop

SCALE 1:2000

0m 50 100m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 02

347650 347700 347750 347800 347850 347900 347950 348000 348050 348100 348150 348200

129200 129150 129100 129050 129000 128950 128900 128850 128800 128750 128700

N

Area 1

Area 2

Unsurveyable - overgrown vegetation

Refuse Disposal Point

Wessex Park Nursery

Camelot Court

El Sub Sta

Northfield

BRADLEY VIEW

WAVERLEY CLOSE

RUSSET ROAD

Bancombe House

Highlands

The Cottage

Northfield Farmhouse

Sunnyside

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Somerset

Greyscale plot of minimally processed magnetometer data

+3nT
-3nT

-3nT Area 1 +3nT

-3nT Area 2 +3nT

SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 03

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Abstraction and interpretation of magnetic anomalies

- Positive curvilinear anomaly - ring ditch
- Positive rectilinear anomaly - enclosure ditch
- Positive linear anomaly - cut feature of archaeological potential
- Negative linear anomaly - possible structural remains
- Positive linear anomaly - possible ditch-like feature
- Negative linear anomaly - material of low magnetic susceptibility
- Linear anomaly - of agricultural origin
- Linear anomaly - of natural origin
- Discrete positive response - cut feature of archaeological potential
- Discrete positive response - possible pit-like feature
- Strong discrete positive response - of uncertain origin
- Negative anomaly - material of low magnetic susceptibility of archaeological potential
- Positive anomaly - magnetically enhanced material
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

SCALE 1:1500

0m 10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 04

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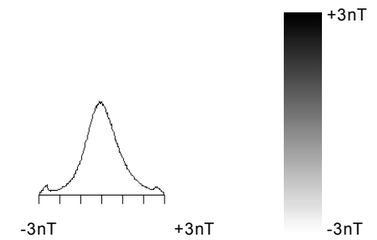
Greyscale plot of minimally processed magnetometer data - Area 1



SCALE 1:1000

0m 10 20 30 40 50m

SCALE TRUE AT A3

DRAWN BY	CHECKED BY	
KTD	DJS	FIG 05

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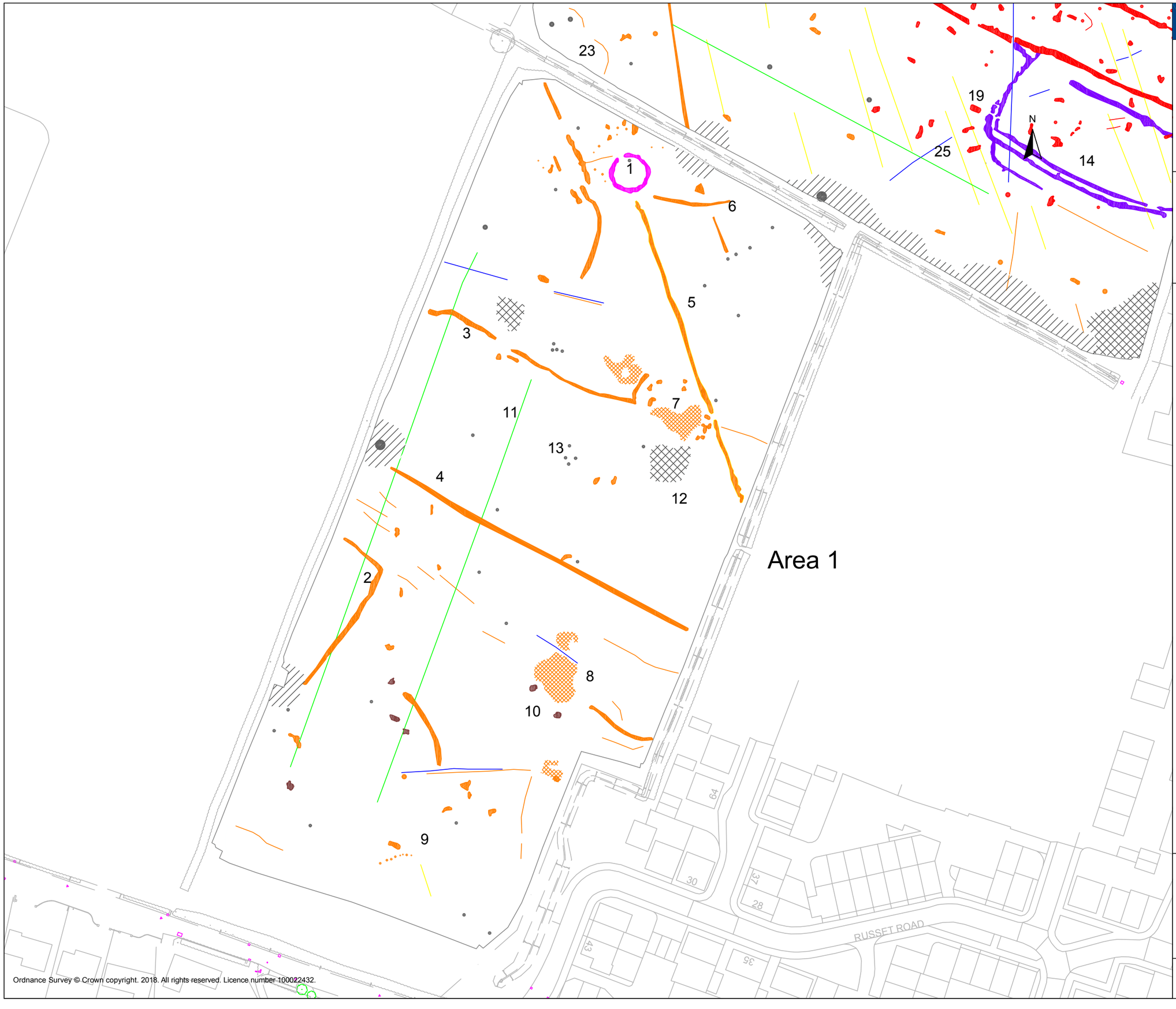
Abstraction and interpretation of magnetic anomalies - Area 1



- Positive curvilinear anomaly - ring ditch
- Positive linear anomaly - possible ditch-like feature
- Negative linear anomaly - material of low magnetic susceptibility
- Linear anomaly - of agricultural origin
- Strong discrete positive response - of uncertain origin
- Discrete positive response - possible pit-like feature
- Positive anomaly - magnetically enhanced material
- Magnetic debris - spread of magnetically thermoremnant/ferrous material
- Magnetic disturbance from ferrous material
- Strong dipolar anomaly - ferrous object

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 minimally processed magnetometer data - Area 2

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

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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Somerset

Abstraction and interpretation of magnetic anomalies - Area 2

Area 2

N

El Sub Sta

Camelot Court

Home Ground Rockstone

BRADLEY VIEW

St Cecilia's

Florissant

1 2 3 4 5 6 7 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26

- Positive rectilinear anomaly - enclosure ditch
- Positive linear anomaly - cut feature of archaeological potential
- Negative linear anomaly - possible structural remains
- Positive linear anomaly - possible ditch-like feature
- Negative linear anomaly - material of low magnetic susceptibility
- Linear anomaly - of agricultural origin
- Linear anomaly - of natural origin
- Discrete positive response - cut feature of archaeological potential
- Discrete positive response - possible pit-like feature
- Negative anomaly - material of low magnetic susceptibility of archaeological potential
- 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 08