

T H A M E S V A L L E Y

ARCHAEOLOGICAL

S E R V I C E S

**Land at Ashchurch Road, Ashchurch,
Tewkesbury, Gloucestershire**

Geophysical Survey (Magnetic)

by Aiji Castle and Tim Dawson

Site Code: ATG14/138

(SO 9270 3310)

Land at Ashchurch Road, Ashchurch, Tewkesbury, Gloucestershire

Geophysical Survey (Magnetic) Report

For Pye Homes Group

by Aiji Castle and Tim Dawson

Thames Valley Archaeological Services Ltd

Site Code ATG
14/138

August 2014

Summary

Site name: Land at Ashchurch Road, Ashchurch, Tewkesbury, Gloucestershire

Grid reference: SO 9270 3310

Site activity: Magnetometer survey

Date and duration of project: 24th July 2014

Project manager: Steve Ford

Site supervisor: Aiji Castle

Site code: ATG 14/138

Area of site: 1.51ha

Summary of results: Several magnetic anomalies were recorded during the survey. These include four linear anomalies - three positive representing ditch-type features and one negative representing an earthwork - which may be archaeological in origin. The remaining anomalies were the result of magnetic debris, near-by metallic objects such as fencing, a buried service pipe and previous agricultural activity.

Location of archive: The archive is presently held at Thames Valley Archaeological Services, Reading in accordance with TVAS digital archiving policies.

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Report edited/checked by: Steve Ford ✓ 05.08.14

Andrew Munding ✓ 06.08.14

Land at Ashchurch Road, Ashchurch, Tewkesbury, Gloucestershire A Geophysical Survey (Magnetic)

by Aiji Castle and Tim Dawson

Report 14/138

Introduction

This report documents the results of a geophysical survey (magnetic) carried out on a parcel of land to the south of Ashchurch Road, Ashchurch, near Tewkesbury, Gloucestershire GL20 8JX (SO 9270 3310) (Fig. 1). The work was commissioned by Mr Stuart Wright, of Pye Homes Group, Langford Locks, Kidlington, Oxfordshire OX5 1HZ.

An application for planning permission has been made to Tewkesbury Borough Council (14/00343/OUT) for the construction of 45 dwellings and open space and it has been recommended that a field evaluation consisting of a geophysical survey and subsequent trenching be undertaken in advance of its determination. This is in accordance with the Department for Communities and Local Government's *National Planning Policy Framework* (NPPF 2012), and the Borough's policies on archaeology. The field investigation was carried out to a specification approved by Mr Charles Parry, Archaeologist at Gloucestershire County Council. The fieldwork was undertaken by Aiji Castle and Anna Ginger on 24th July 2014 and the site code is ATG 14/138.

The archive is presently held at Thames Valley Archaeological Services, Reading in accordance with TVAS digital archiving policies.

Location, topography and geology

The site is located on the western edge of Ashchurch, a small hamlet on the A36 some 3km east of Tewkesbury in northern Gloucestershire (Fig. 1). The site itself consists of an irregular 1.51ha plot of land, the majority of which consists of a paddock which had recently been mown for hay at the time of survey. The southern boundary of the site the 16.5m contour line, crossing a hedgerow and continuing into the field to the south while on all other sides the boundary is formed by hedgerows (Fig. 2). The land slopes downhill from 21.4m above Ordnance Datum (aOD) at the northern end of the site to the 16.5m contour line at the southern end. The field continues to slope downhill to a height of 15.1m aOD at Tirl Brook to the south. Immediately to the west of the site is the main north-south railway line, to the north is housing and the A36 and to the east a school playing field. The underlying geology is recorded as Lower Lias clay with alluvium immediately down-slope of the site (BGS 1988).

Conditions during the survey were fine with high temperatures resulting in firm, but not parched, ground. The recently cut hay was arranged in lines primarily on a north-south orientation across the area (Pls 1-2).

Site history and archaeological background

The archaeological potential of the site derives from its proximity to a range of site and finds recorded in the county Historic Environment Record. The site lies to the south of the historic core of Ashchurch with the parish church of St Nicholas having 12th century elements in its fabric. The village is not mentioned in Domesday Book (Williams and Martin 2002). The medieval hamlet of Natton lies to the south and a settlement at Pannington somewhere to the south-east is documented in Domesday Book and thus has late Saxon origins.

Of more significance, however, is the discovery of a multi-period site just to the north-west during reconstruction works for a new road bridge across the railway. Watching brief, trial trenching and excavation have recorded a Roman settlement along with a small cemetery but with Iron Age features also present as well as a post-medieval building. Pottery finds also indicate earlier prehistoric and Saxon activity in the vicinity. It is possible that the main road has Roman origins.

Methodology

Sample interval

Data collection required a temporary grid to be established across the survey area using wooden pegs at 20m intervals with further subdivision where necessary. Readings were taken at 0.25m intervals along traverses 1m apart. This provides 1600 sampling points across a full 20m × 20m grid (English Heritage 2008), providing an appropriate methodology balancing cost and time with resolution. A grid plan was drawn up to cover the entire proposal site area but the thickness of the hedgerows, particularly the one dividing the two fields, dramatically reduced the area available to survey resulting in the small southern corner of the site being left unsurveyed. The south-eastern survey area was extended beyond the site boundary in order to reduce the number of partial survey grids and thereby increase the survey rate.

The Grad 601-2 has a typical depth of penetration of 0.5m to 1.0m. This would be increased if strongly magnetic objects have been buried in the site. Under normal operating conditions it can be expected to identify buried features >0.5m in diameter. Features which can be detected include disturbed soil, such as the fill of a ditch, structures that have been heated to high temperatures (magnetic thermoremnance) and objects made from

ferro-magnetic materials. The strength of the magnetic field is measured in nano Tesla (nT), equivalent to 10^{-9} Tesla, the SI unit of magnetic flux density.

Equipment

The purpose of the survey was to identify geophysical anomalies that may be archaeological in origin in order to inform a targeted archaeological investigation of the site prior to development. The survey and report generally follow the recommendations and standards set out by both English Heritage (2008) and the Institute for Archaeologists (2002, 2011).

Magnetometry was chosen as a survey method as it offers the most rapid ground coverage and responds to a wide range of anomalies caused by past human activity. These properties make it ideal for fast yet detailed survey of an area.

The detailed magnetometry survey was carried out using a dual sensor Bartington Instruments Grad 601-2 fluxgate gradiometer. The instrument consists of two fluxgates mounted 1m vertically apart with a second set positioned at 1m horizontal distance. This enables readings to be taken of both the general background magnetic field and any localised anomalies with the difference being plotted as either positive or negative buried features. All sensors are calibrated to cancel out the local magnetic field and react only to anomalies above or below this base line. On this basis, strong magnetic anomalies such as burnt features (kilns and hearths) will give a high response as will buried ferrous objects. More subtle anomalies such as pits and ditches, can be seen from their infilling soils containing higher proportions of humic material, rich in ferrous oxides, compared to the undisturbed subsoil. This will stand out in relation to the background magnetic readings and appear in plan following the course of a linear feature or within a discrete area.

A Trimble GeoXH 6000 handheld GPS system with sub-decimetre accuracy was used to tie the site grid into the Ordnance Survey national grid. This unit offers both real-time correction and post-survey processing; enabling a high level of accuracy to be obtained both in the field and in the final post-processed data.

Data gathered in the field was processed using the TerraSurveyorLite software package. This allows the survey data to be collated and manipulated to enhance the visibility of anomalies, particularly those likely to be of archaeological origin. The table below lists the processes applied to this survey, full survey and data information is recorded in Appendix 1.

Process

Clip from -3.00 to 3.00 nT

Effect

Enhance the contrast of the image to improve the appearance of possible archaeological anomalies.

De-stripe: median, all sensors

Removes the striping effect caused by differences in sensor calibration, enhancing the visibility of potential archaeological anomalies.

De-spike: threshold 1, window size 3×3

Compresses outlying magnetic points caused by interference of metal objects within the survey area.

Once processed, the results are presented as a greyscale plot shown in relation to the site (Fig. 3), followed by a second plan to present the abstraction and interpretation of the magnetic anomalies (Fig. 4). Anomalies are shown as colour-coded lines, points and polygons. The grid layout and georeferencing information (Fig. 2) is prepared in EasyCAD v.7.22.01, producing a .FC7 file format, and printed as a .PDF for inclusion in the final report.

The greyscale plot of the processed data is exported from TerraSurveyorLite in portable network graphics (.PNG) format, a raster image format chosen for its lossless data compression and support for transparent pixels, enabling it to easily be overlaid onto an existing site plan. The data plot is rotated to orientate it to north and combined with grid and site plans in Adobe InDesign CS5.5, creating .INDD file formats. Once the figures are finalised they are exported in .PDF format for inclusion within the finished report.

Results

A number of magnetic anomalies were recorded across the survey area. Of particular interest from an archaeological point of view are a group of positive linear anomalies, indicating the presence of in-filled linear features, in the eastern half of the site and a negative linear anomaly, representing a buried earthwork, to the west. The first of the positive linear anomalies runs almost north-south from the north-eastern site boundary [Fig. 4: 1] where it ends in an area of magnetic disturbance, possibly caused by a buried metal object [7]. A weaker positive anomaly, possibly a much less substantially defined ditch, appears to extend westwards from this patch of disturbance before it too peters out [2] while a much stronger positive linear anomaly appears running eastwards after a break of *c.*20m [3] perpendicular to the first anomaly ([1]). The negative linear anomaly appears to be unrelated to alignment of the positive ones, extending *c.*35m WSW-ENE in the centre of the western half of the field [4].

The remaining anomalies recorded by the survey are patches of magnetic disturbance or debris or discreet ferrous spikes, caused by either buried ferromagnetic objects of unknown date or the close proximity of metal fencing or buried services. A large area of disturbance with a bipolar anomaly at its centre is located in the northern part of the field [5] while a pair of large dipolar spike anomalies can be seen further towards the centre of the field [6] and there is the previously noted patch of magnetic disturbance in the eastern area [7]. A linear

bipolar anomaly in the southern corner of the site most likely represents a buried service pipeline [8] with the larger anomaly at its centre being a manhole noted in the surface during the survey. A dense patch of magnetic spikes towards the northern end of the site probably indicates the presence of buried ferromagnetic debris [9] while the magnetic disturbance around the all sides of the site is caused by the close proximity of wire fencing within the hedgerows that form the site boundaries. A high density of magnetic spikes were also recorded across the site area, these are most likely caused by buried ferrous objects.

In addition to the magnetic spikes and areas of disturbance, a series of 11 positive linear anomalies were recorded running parallel on a north-south orientation in the south-eastern part of the field [10]. Because of their alignment and regular spacing these anomalies most likely represent agricultural activity of a relatively recent date.

Conclusion

The survey south of Ashchurch Road revealed several magnetic anomalies within the site including four of potential archaeological origin. These four liner anomalies most likely represent buried banks and ditches with two of them possibly forming the corner of a ditched enclosure. The other anomalies are the result of magnetic debris, near-by metallic objects such as fencing, a buried service pipe and previous agricultural activity. Any of these may have a masking affect on weaker underlying anomalies of archaeological origin. The survey was undertaken in as much of the site as was accessible with only an area in the south-western corner left unsurveyed due to the thickness of the hedgerows.

References

- BGS, 1988, *British Geological Survey*, 1:50,000, Sheet 216, Solid and Drift Edition, Keyworth
- English Heritage, 2008, *Geophysical Survey in Archaeological Field Evaluation*, English Heritage, Portsmouth (2nd edn)
- IFA, 2002, *The Use of Geophysical Techniques in Archaeological Evaluation*, IFA Paper No. 6, Reading
- IFA, 2011, *Standard and Guidance: for archaeological geophysical survey*, Reading
- NPPF, 2012, *National Planning Policy Framework*, Dept Communities and Local Government, London
- Williams, A and Martin, G H, 2002, *Domesday Book: A Complete Translation*, London

Appendix 1. Survey and data information

Raw data

COMPOSITE
Instrument Type: Bartington (Gradiometer)
Units: nT
Direction of 1st Traverse: 260.33278 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 2047.5

Dimensions

Composite Size (readings): 720 x 160
Survey Size (meters): 180 m x 160 m
Grid Size: 20 m x 20 m
X Interval: 0.25 m
Y Interval: 1 m

Stats

Max: 100.00
Min: -100.00
Std Dev: 8.49
Mean: -0.93
Median: 0.06
Composite Area: 2.88 ha
Surveyed Area: 1.3088 ha

PROGRAMME

Name: TerraSurveyor
Version: 3.0.25.1

Source Grids: 42

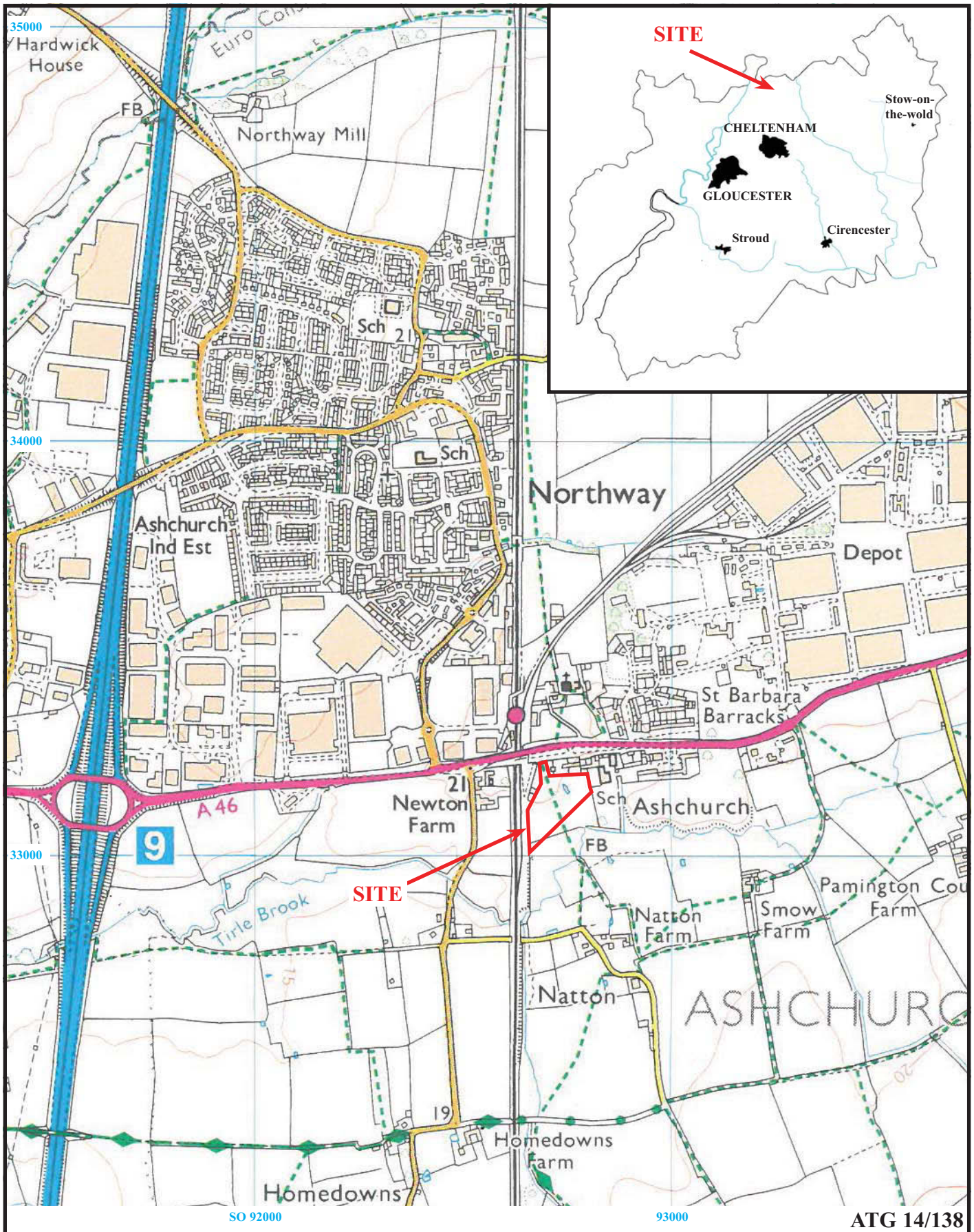
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2 Col:0 Row:4 grids\42.xgd
3 Col:1 Row:3 grids\39.xgd
4 Col:1 Row:4 grids\40.xgd
5 Col:2 Row:2 grids\36.xgd
6 Col:2 Row:3 grids\37.xgd
7 Col:2 Row:4 grids\38.xgd
8 Col:3 Row:0 grids\31.xgd
9 Col:3 Row:1 grids\32.xgd
10 Col:3 Row:2 grids\33.xgd
11 Col:3 Row:3 grids\34.xgd
12 Col:3 Row:4 grids\35.xgd
13 Col:4 Row:0 grids\24.xgd
14 Col:4 Row:1 grids\25.xgd
15 Col:4 Row:2 grids\26.xgd
16 Col:4 Row:3 grids\27.xgd
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18 Col:4 Row:5 grids\29.xgd
19 Col:4 Row:6 grids\30.xgd
20 Col:5 Row:0 grids\16.xgd
21 Col:5 Row:1 grids\17.xgd
22 Col:5 Row:2 grids\18.xgd
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29 Col:6 Row:1 grids\10.xgd
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37 Col:7 Row:2 grids\06.xgd
38 Col:7 Row:3 grids\07.xgd
39 Col:7 Row:4 grids\08.xgd
40 Col:8 Row:0 grids\01.xgd
41 Col:8 Row:1 grids\02.xgd
42 Col:8 Row:2 grids\03.xgd

Processed data

Stats
Max: 3.00
Min: -3.00
Std Dev: 1.15
Mean: -0.12
Median: 0.00

Processes: 4

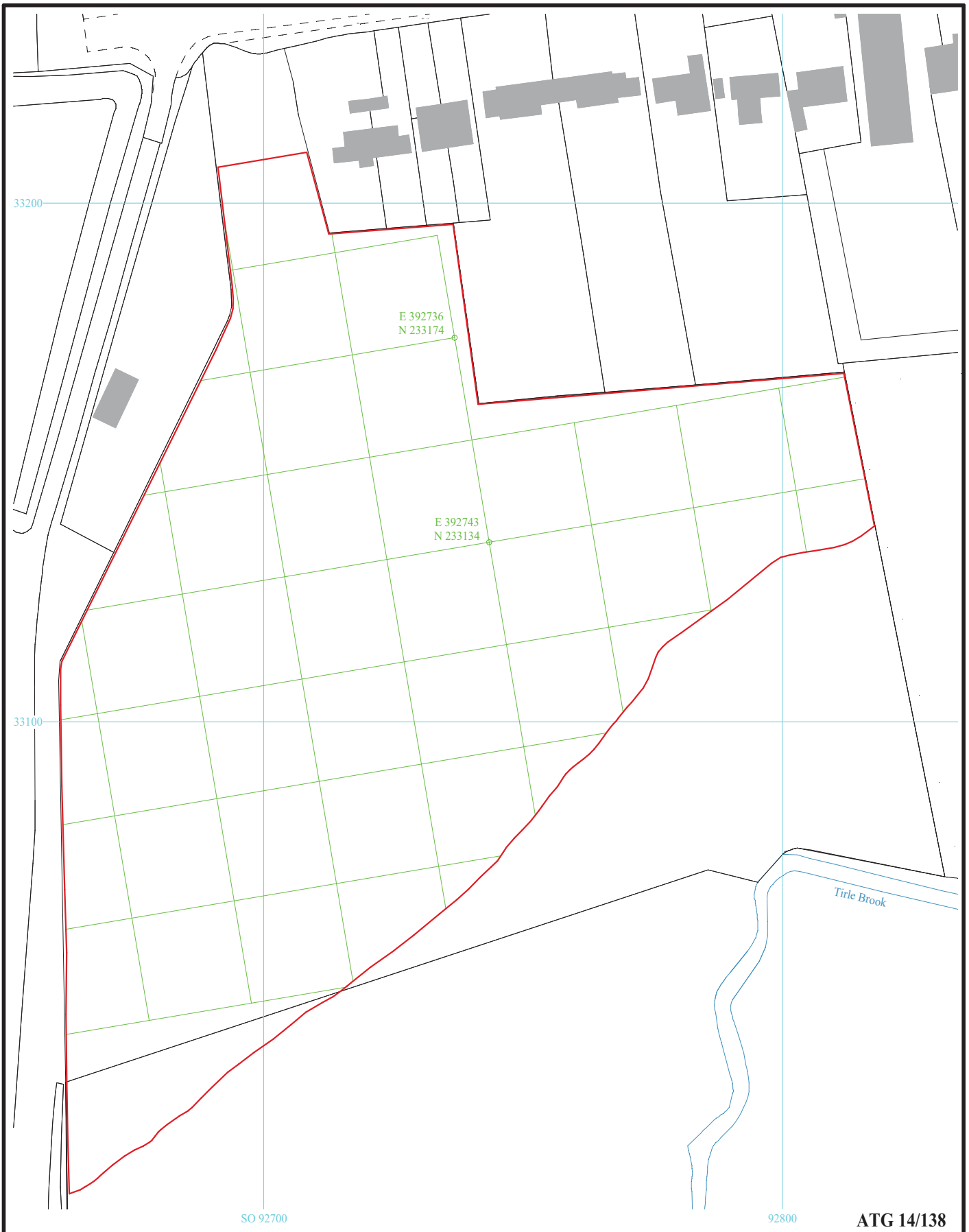
- 1 Base Layer
- 2 DeStripe Median Sensors: All
- 3 Despike Threshold: 1 Window size: 3x3
- 4 Clip from -3.00 to 3.00 nT



**Land at Ashchurch Road, Ashchurch,
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Geophysical Survey (Magneitc)**

Figure 1. Location of site within Ashchurch and Gloucestershire.

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Figure 2. Survey grid layout.



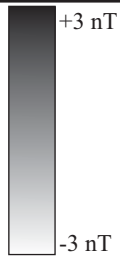


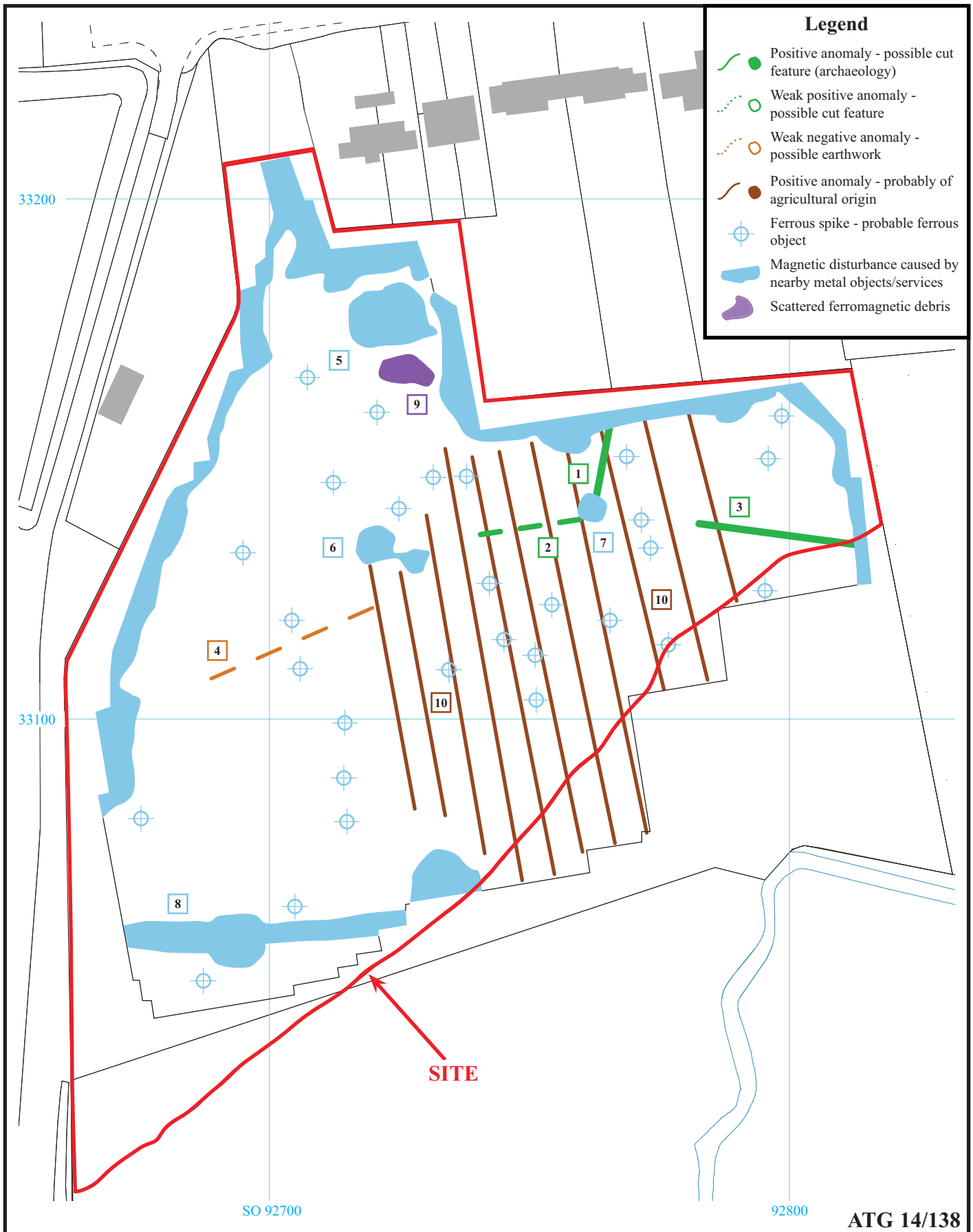
ATG 14/138



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Figure 3. Plot of minimally processed gradiometer data.





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Figure 4. Interpretation plot.





Plate 1. The northern part of the site, looking east.



Plate 2. The site looking north-east from the south-western corner. The patch of green grass in the centre-right marks the position of a manhole cover.

ATG 14/138

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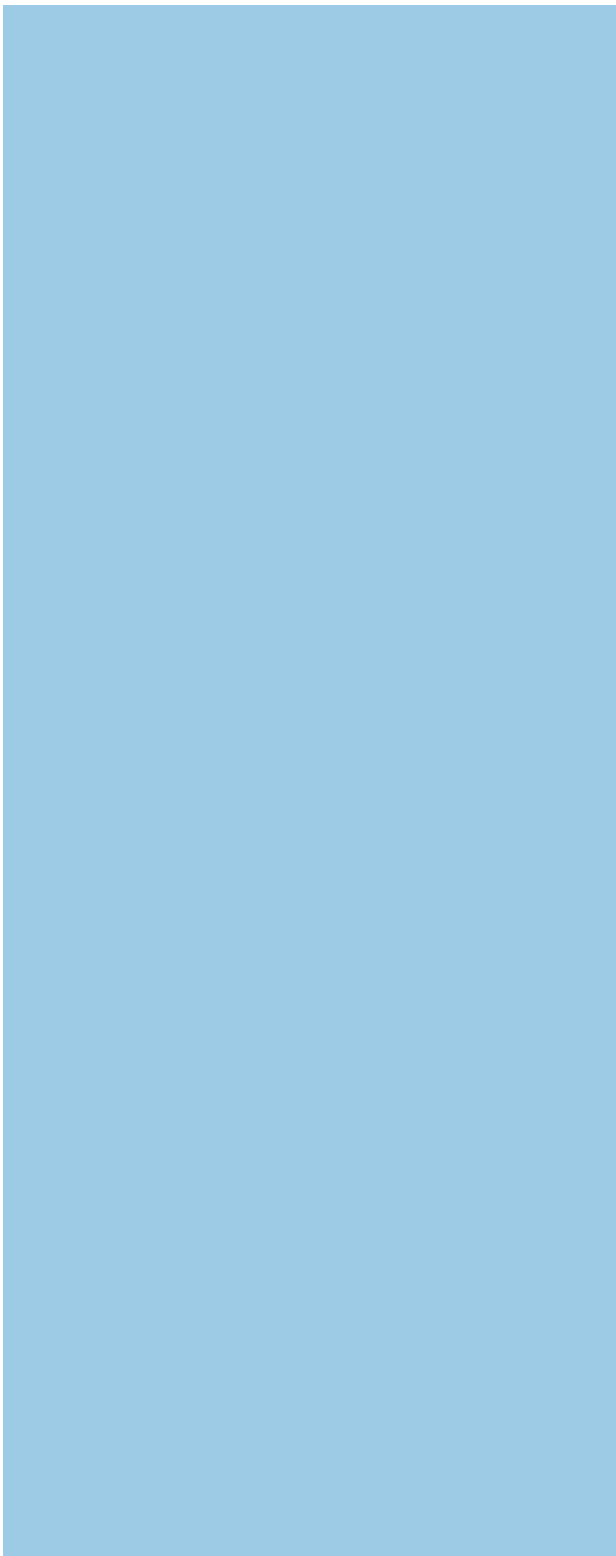
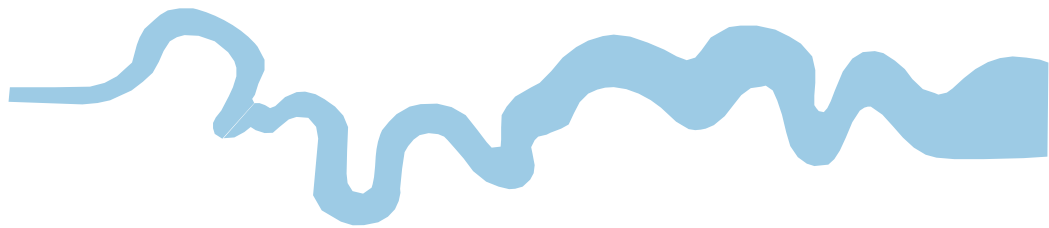
Plates 1 - 2.

THAMES VALLEY
ARCHAEOLOGICAL
SERVICES

TIME CHART

	Calendar Years
Modern _____	AD 1901
Victorian _____	AD 1837
Post Medieval _____	AD 1500
Medieval _____	AD 1066
Saxon _____	AD 410
Roman _____	AD 43
Iron Age _____	BC/AD 750 BC
Bronze Age: Late -----	1300 BC
Bronze Age: Middle -----	1700 BC
Bronze Age: Early -----	2100 BC
Neolithic: Late	3300 BC
Neolithic: Early	4300 BC
Mesolithic: Late	6000 BC
Mesolithic: Early	10000 BC
Palaeolithic: Upper	30000 BC
Palaeolithic: Middle	70000 BC
Palaeolithic: Lower	2,000,000 BC





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