THAMES VALLEY

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Land at Lambourn Road, Speen, Newbury, West Berkshire

Geophysical Survey (Magnetic)

by Tim Dawson and David Sanchez

Site Code: BRS13/06
(SU 4545 6843)

Land at Lambourn Road, Speen, Newbury, West Berkshire

Geophysical Survey (Magnetic) Report

For Sir Richard Sutton Ltd

by Tim Dawson and David Sanchez

Thames Valley Archaeological Services Ltd

Site Code BRS 13/06

October 2016

Summary

Site name: Land at Lambourn Road, Speen, Newbury, West Berkshire

Grid reference: SU 4545 6843

Site activity: Magnetometer survey

Date and duration of project: 15th - 21st September 2016

Project manager: Steve Ford

Site supervisor: David Sanchez

Site code: BRS 13/06

Area of site: 5.38ha (4.72ha surveyed)

Summary of results: While several magnetic anomalies were identified by the survey only two are likely to be of archaeological interest with the remainder either being modern or geological in origin. A large area along the northern edge of the main survey field was obscured by the strong magnetic response of a modern pipe, possibly hiding weaker anomalies of archaeological origin.

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

Report edited/checked by: Steve Ford✓ 11.10.16

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Land at Lambourn Road, Speen, Newbury, West Berkshire
A Geophysical Survey (Magnetic)

by Tim Dawson and David Sanchez

Report 13/06b

Introduction

This report documents the results of a geophysical survey (magnetic) carried out at two areas of land to the south of Lambourn Road, Speen, Newbury, West Berkshire (SU 4545 6543) (Fig. 1). The work was commissioned by Mr Steven Smallman of Provision Planning & Design, Grosvenor Court, Winchester Road, Ampfield, Winchester SO51 9BD on behalf of Sir Richard Sutton Ltd, 14 Bolton Street, London W1J 8BF.

A planning application is to be made for the development of the site for housing. It has been agreed with the local planning authority that field evaluation consisting of geophysical survey, metal detector survey and trial trenching should be undertaken prior to determining a planning application. This is in accordance with the Department for Communities and Local Government's National Planning Policy Framework (NPPF 2012), and the District's policies on archaeology. The field investigation was carried out to a specification approved by Mr Alex Godden, Archaeological Officer at West Berkshire Council. The fieldwork was undertaken by Kyle Beaverstock, David Sanchez, Benadict Tebbit, Rebecca Constable and Jesse Coxey between the 15th and 21st of September 2016 and the site code is BRS 13/06.

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

Location, topography and geology

Speen occupies the steep ridge between the rivers Lambourn to the north and Kennet to the south, on the western outskirts of Newbury. The area is bounded by The Sydings and houses along Lambourn Road to the north, the A34 bypass and sliproad to the west (with tree screen), Station Road and buildings along it to the east and by buildings fronting Bath Road along the south side. The site currently consists of two grassed fields, heavily overgrown in places. There is quite a pronounced rise towards the centre of the site to a height of *c.*105m above Ordnance Datum (aOD), dropping off markedly to north and west to a height of *c.*91m aOD. A footpath crosses the site from north to south along the western side and another across the middle. Some areas are quite uneven but there is no sense that these irregularities form earthworks. There is a small stream in the western part of the area and several overhead telephone lines cross this area. The underlying geology is mapped as Seaford Chalk

Formation, an Upper Chalk in the north, and clay, silt and sand of the Lambeth Group in the south (BGS 2006). Donnington Castle, on the north bank of the Lambourn, is visible from the site despite intervening houses on Lambourn Road and the Sydings, which are markedly below the level of the higher part of the site.

Ground conditions during the survey were mostly dry; though occasional showers created damp conditions on the grassed surface.

Site history and archaeological background

A desk-based assessment has been undertaken to assess the archaeological potential of the site (Preston, 2013). In summary, this noted that fieldwork on a small part of the site has already recorded the presence of ditches and artefacts of Roman and prehistoric date and which are likely to be part of a larger zone of activity. The site also lies in an area which may contain specific undesignated heritage assets, in particular a major Roman road and the lost Roman settlement of *Spinae*. Beyond this specific potential, the site is in an area of generally high archaeological potential and its size indicates generically moderate to high potential for almost every other period. The medieval Donnington Castle is located on the opposite side of the Lambourn valley and was besieged several times during the Civil Wars of the 17th century. The Second Battle of Newbury is known to have been fought on ground between Donnington and Speen and ranged widely across the area, including the survey site itself.

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. The survey grids were laid out following the long axes of both fields with only thick vegetation around the borders causing obstructions.

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 Chartered Institute *for* Archaeologists (2002, 2011, 2014).

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 the fast yet detailed surveying 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 Geo7x handheld GPS system with sub-decimetre real-time 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 TerraSurveyor 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	**Effect**
Clip from -1.80 to 2.20 nT	Enhance the contrast of the image to improve the appearance of possible archaeological anomalies.

Interpolate: *y* doubled	Increases the resolution of the readings in the *y* axis, enhancing the shape of 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.
De-stagger: all grids, both by -1 intervals	Cancels out effects of site's topography on irregularities in the traverse speed.

The raw data plot is presented as a greyscale plot shown in relation to the site (Fig. 3) with the processed data then presented as a second figure (Fig. 4), followed by a third plan to present the abstraction and interpretation of the magnetic anomalies (Fig. 5). Anomalies are shown as colour-coded lines, points and polygons. The grid layout and georeferencing information (Fig. 2) is prepared in EasyCAD v.7.58.00, 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 TerraSurveyor in a georeferenced 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 combined with grid and site plans in QGIS 2.16.2 and exported again in .PNG format in order to present them in figure templates 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 range of magnetic anomalies were recorded by the survey across both areas of the site (Fig. 4), a small number of which may represent buried archaeological features. Three short strong positive linear anomalies can be seen towards the eastern end of the large field, forming an H shape **[Fig. 5: 1]**. These may represent buried cut features, i.e. ditches, and maybe of archaeological interest. A second set of anomalies of potential archaeological origin were located further to the south and on a similar orientation but of weaker strength **[2]**.

The remaining anomalies are all likely the result of modern disturbance or changes in the site's underlying geology. A linear positive anomaly runs across the site on a north-south orientation and corresponds directly to the public footpath which traverses the site **[3]** while a negative anomaly, usually indicating a buried built-up feature, was noted at the western end of the site **[4]**, again following the line of a heavily used footpath. Across the centre of the site the survey recorded a wide area of general magnetic variation with several patches of positive readings **[5, 6]**. These are probably too large to represent buried archaeological pit-type features so they

most likely indicate geological variation. This is supported by the geology map (BGS, 2006 Sheet 267) which records a change from Lambeth Group sand, silt and clay along the top of the hill (south-western half of the main field) to Upper Chalk further down the slope (north-eastern half of the site). Bipolar anomaly **[7]** is most likely the result of subsurface strong readings derived from buried ferromagnetic material, most probably from the route of the former railway line, as noted in historic mapping (Preston 2013; Fig.6) and bipolar anomaly **[8]** was the result of interference form grounding wires from the overhead power cables.

Conclusion

The results of the geophysical survey show only two anomalies of potential archaeological interest, all of which are located around the central area of the southern field. These anomalies consist of a double linear running north-west to south-east and a 'T' shaped ditch to the north which may represent a former field system. Part of the site has been obscured by interference from modern intrusions although this is unlikely to have greatly effect the overall character of the site.

References

BGS, 2006, *British Geological Survey*, 1:50000, Sheet 267, Drift Edition, Keyworth

CI*f*A, 2002, *The Use of Geophysical Techniques in Archaeological Evaluation*, IFA Paper No. 6, Reading

CI*f*A, 2011, *Standard and Guidance: for archaeological geophysical survey*, Reading

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NPPF, 2012, *National Planning Policy Framework*, Dept Communities and Local Government, London

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Appendix 1. Survey and data information

Programme:
Name: TerraSurveyor
Version: 3.0.25.0

Raw data

Northern Field
Direction of 1st Traverse: 272.63929 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 2047.5

Dimensions
Composite Size (readings): 400 x 100
Survey Size (meters): 100 m x 100 m
Grid Size: 20 m x 20 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 96.87
Min: -98.83
Std Dev: 6.71
Mean: -0.48
Median: 0.23
Composite Area: 1 ha
Surveyed Area: 0.43775 ha

Source Grids: 21
1 Col:0 Row:0 grids\01.xgd
2 Col:0 Row:1 grids\02.xgd
3 Col:0 Row:2 grids\03.xgd
4 Col:0 Row:3 grids\04.xgd
5 Col:0 Row:4 grids\05.xgd
6 Col:1 Row:0 grids\06.xgd
7 Col:1 Row:1 grids\07.xgd
8 Col:1 Row:2 grids\08.xgd
9 Col:1 Row:3 grids\09.xgd
10 Col:1 Row:4 grids\10.xgd
11 Col:2 Row:0 grids\11.xgd
12 Col:2 Row:1 grids\12.xgd
13 Col:2 Row:2 grids\13.xgd
14 Col:2 Row:3 grids\14.xgd
15 Col:2 Row:4 grids\15.xgd
16 Col:3 Row:0 grids\16.xgd
17 Col:3 Row:1 grids\17.xgd
18 Col:3 Row:2 grids\18.xgd
19 Col:3 Row:3 grids\19.xgd
20 Col:4 Row:1 grids\20.xgd
21 Col:4 Row:2 grids\21.xgd

Southern Field
Direction of 1st Traverse: 30.01965 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 2047.5

Dimensions
Composite Size (readings): 800 x 360
Survey Size (meters): 200 m x 360 m
Grid Size: 20 m x 20 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 97.25
Min: -100.00
Std Dev: 19.67
Mean: -1.41
Median: 0.24
Composite Area: 7.2 ha
Surveyed Area: 4.2844 ha

Source Grids: 133
1 Col:0 Row:9 grids\Grids 2\98.xgd
2 Col:0 Row:10 grids\Grids 2\99.xgd
3 Col:1 Row:7 grids\Grids 2\93.xgd
4 Col:1 Row:8 grids\Grids 2\94.xgd
5 Col:1 Row:9 grids\Grids 2\95.xgd
6 Col:1 Row:10 grids\Grids 2\96.xgd
7 Col:1 Row:11 grids\Grids 2\97.xgd
8 Col:2 Row:2 grids\Grids 2\80.xgd
9 Col:2 Row:3 grids\Grids 2\81.xgd
10 Col:2 Row:4 grids\Grids 2\82.xgd
11 Col:2 Row:5 grids\Grids 2\83.xgd
12 Col:2 Row:6 grids\Grids 2\84.xgd
13 Col:2 Row:7 grids\Grids 2\85.xgd
14 Col:2 Row:8 grids\Grids 2\86.xgd
15 Col:2 Row:9 grids\Grids 2\87.xgd
16 Col:2 Row:10 grids\Grids 2\88.xgd
17 Col:2 Row:11 grids\Grids 2\89.xgd
18 Col:2 Row:12 grids\Grids 2\90.xgd
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23 Col:3 Row:3 grids\Grids 2\65.xgd
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25 Col:3 Row:5 grids\Grids 2\67.xgd
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131 Col:9 Row:6 grids\Grids 2\24.xgd
132 Col:9 Row:7 grids\Grids 2\25.xgd
133 Col:9 Row:8 grids\Grids 2\26.xgd

Processed data

Northern Field

Stats

Max:	2.20
Min:	-1.80
Std Dev:	0.98
Mean:	0.00
Median:	0.02
Composite Area:	1 ha
Surveyed Area:	0.4354 ha

Processes: 6

1 Base Layer
2 DeStripe Median Sensors: All
3 De Stagger: Grids: All Mode: Both By: -1 intervals
4 Despike Threshold: 1 Window size: 3x3
5 Interpolate: Y Doubled.
6 Clip from -1.80 to 2.20 nT

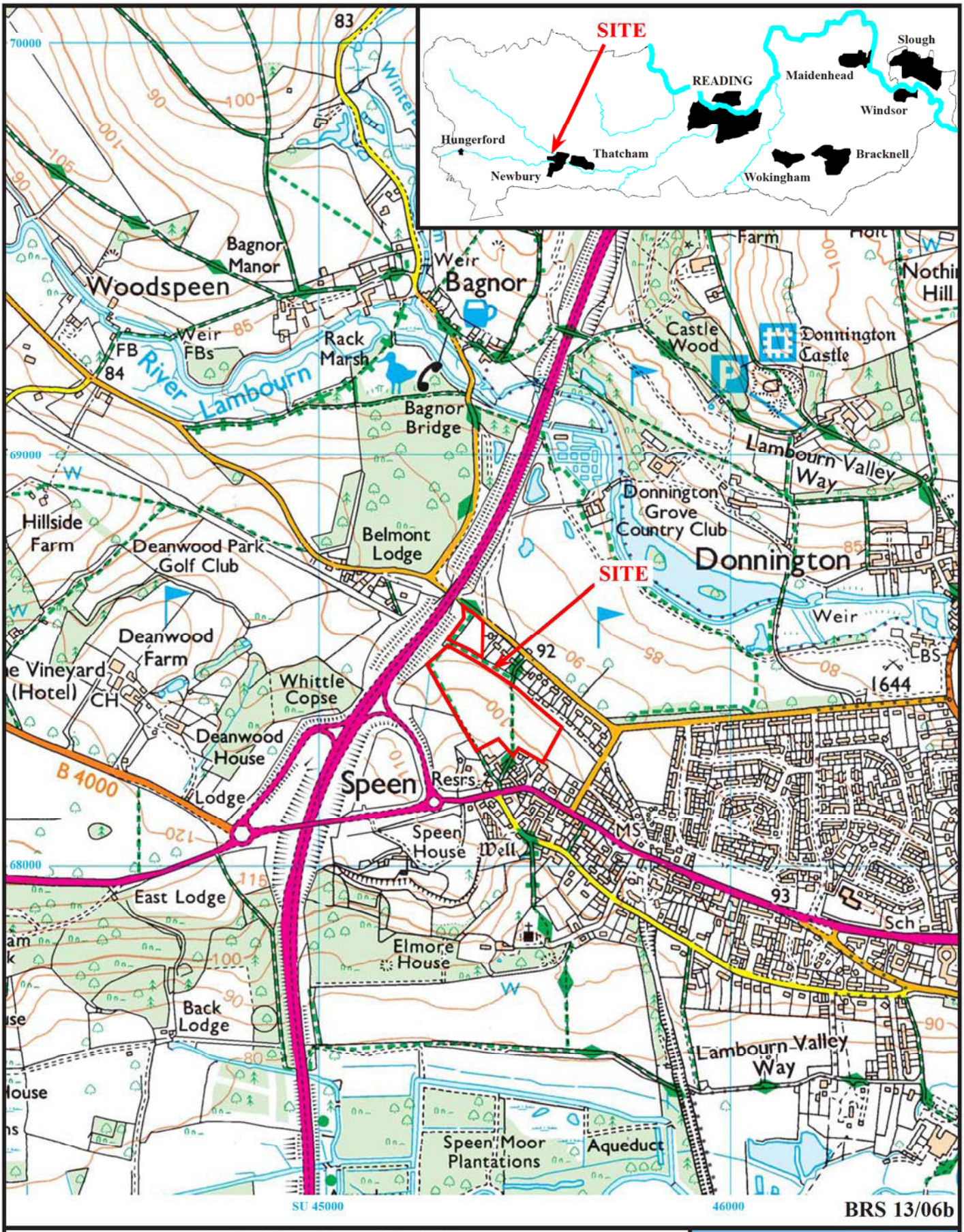
Southern Field

Stats

Max:	2.20
Min:	-1.80
Std Dev:	1.14
Mean:	0.06
Median:	0.01
Composite Area:	7.2 ha
Surveyed Area:	4.2763 ha

Processes: 6

1 Base Layer
2 DeStripe Median Sensors: All
3 De Stagger: Grids: All Mode: Both By: -1 intervals
4 Despike Threshold: 1 Window size: 3x3
5 Interpolate: Y Doubled.
6 Clip from -1.80 to 2.20 nT



Land at Lambourn Road, Speen
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Figure 1. Location of site within Speen and Berkshire.

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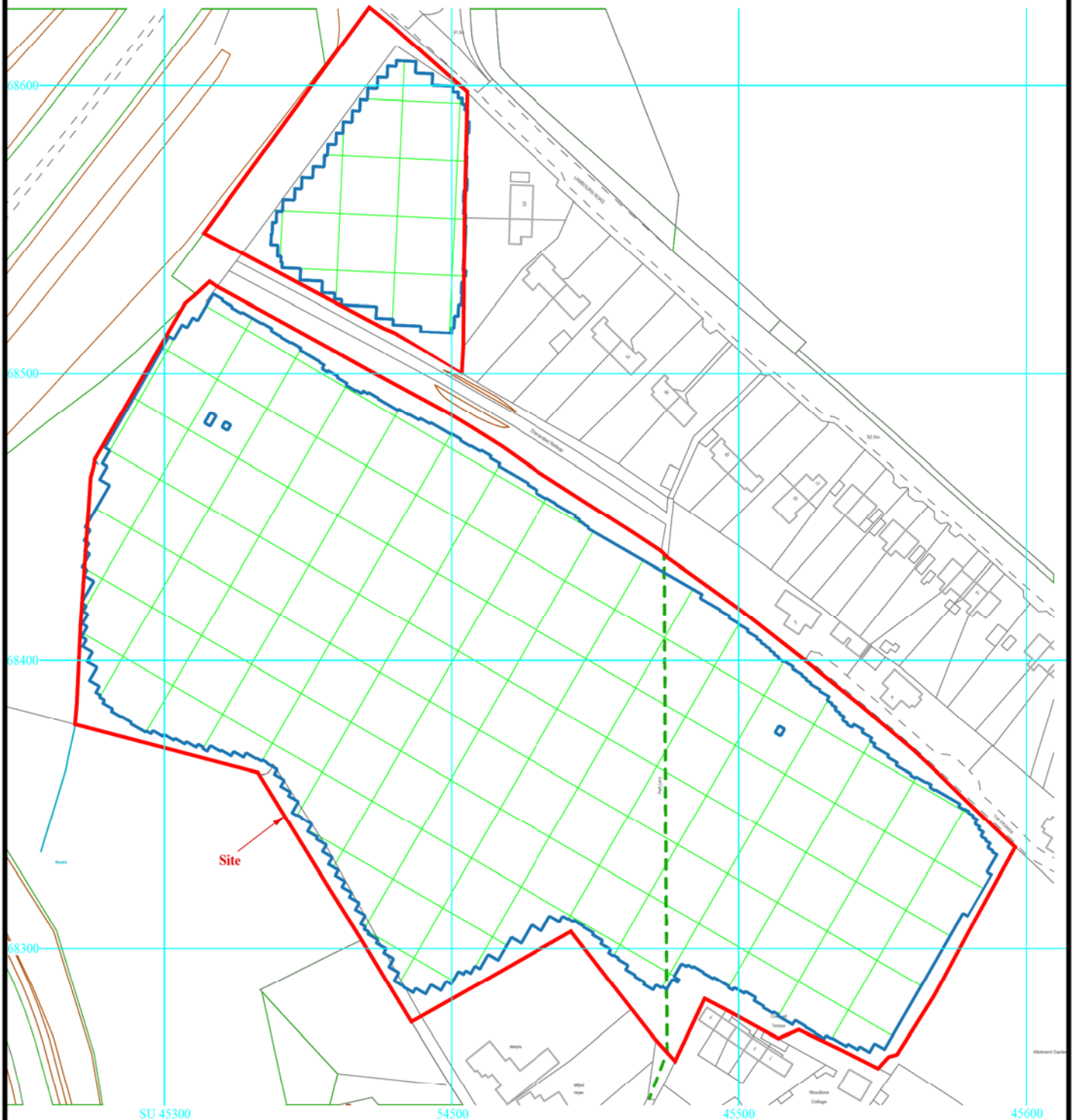

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Land at Lambourn Road, Speen, Newbury, West Berkshire, 2016 Geophysical Survey (Magnetic)

Figure 2. Survey grid layout.

0 100m

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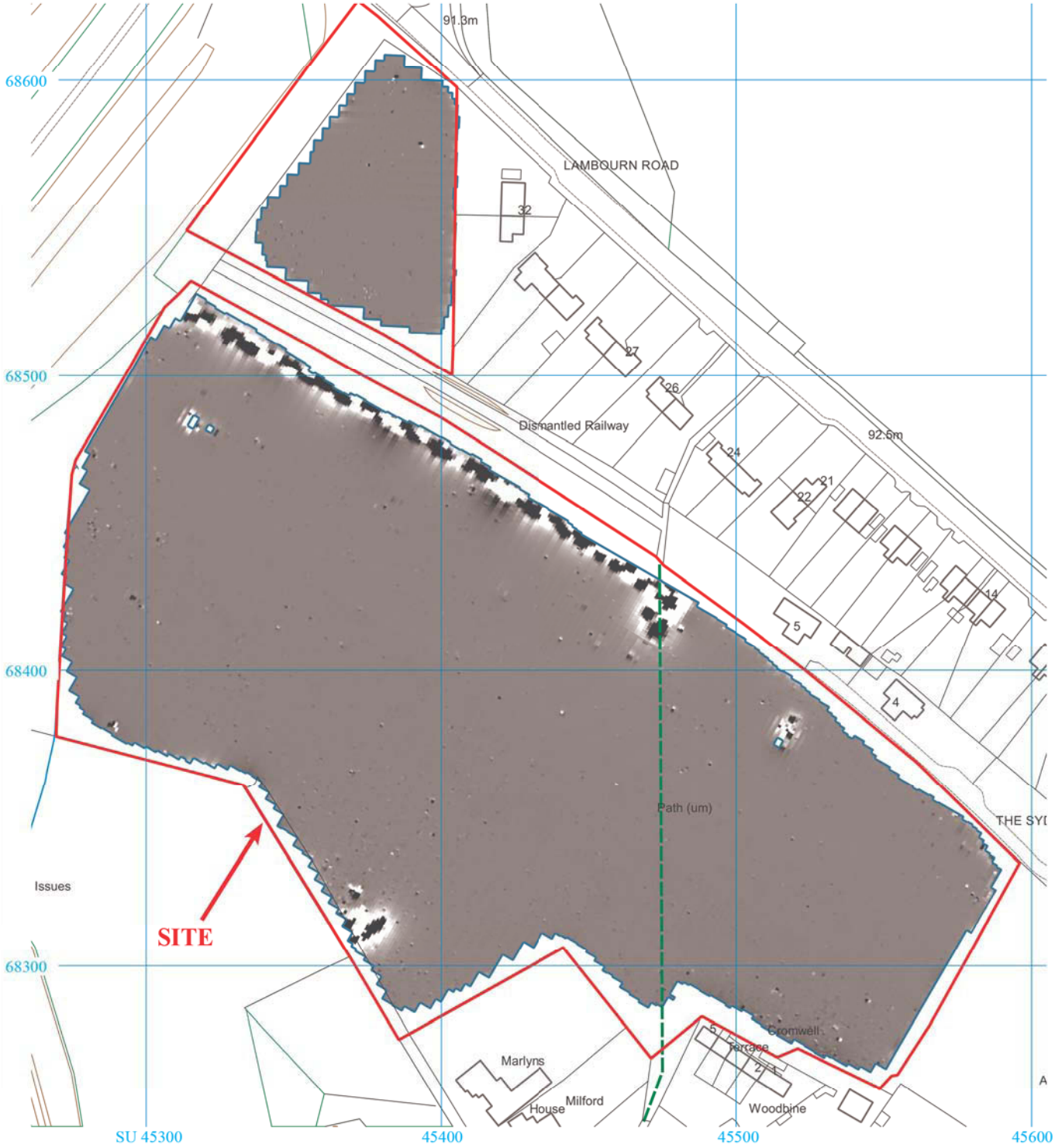

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Figure 3. Plot of raw gradiometer data.

+100 nT

-100 nT

0m 100m

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Figure 4. Plot of minimally processed gradiometer data.

+2.2 nT

-1.8 nT

0m 100m

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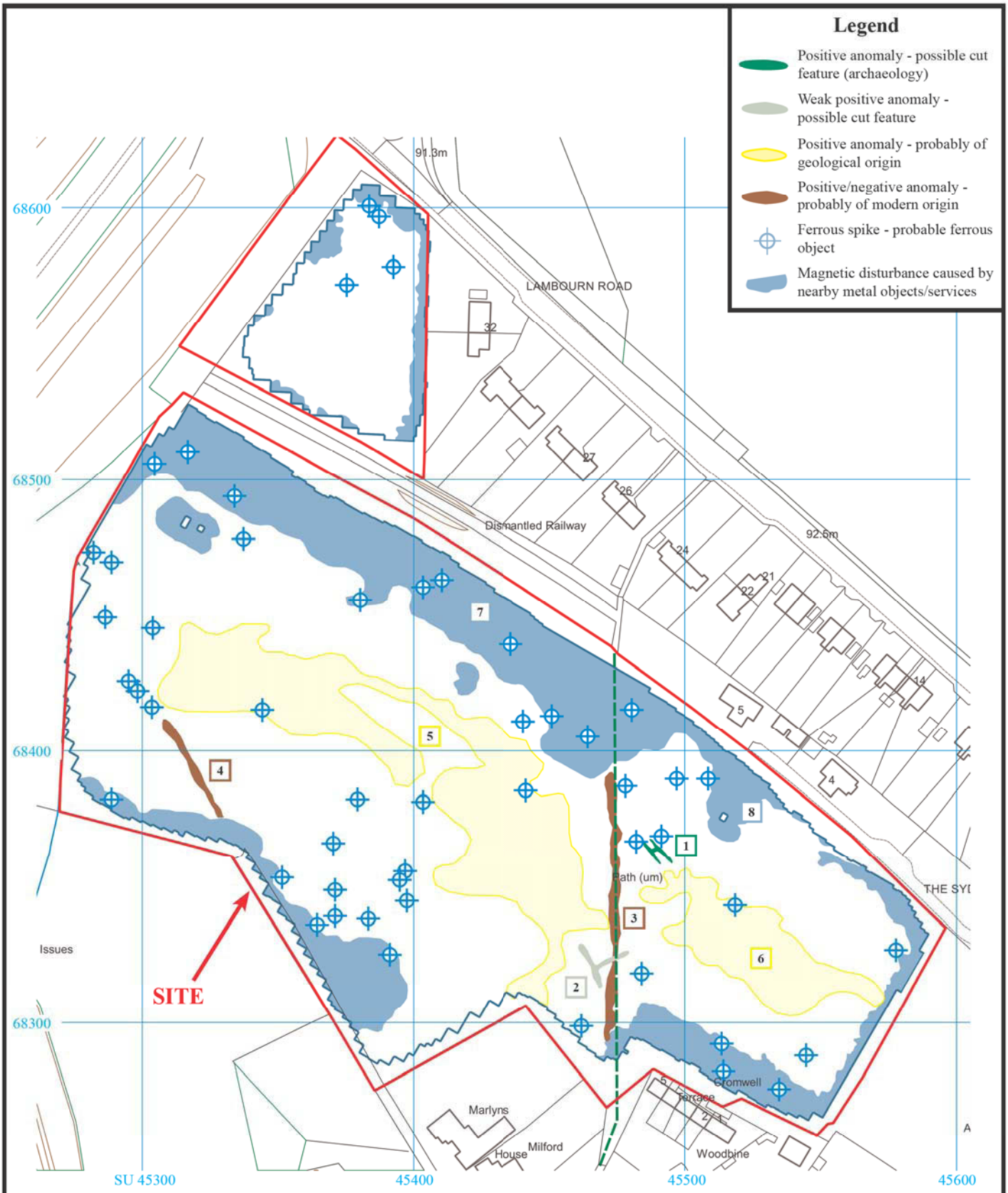

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Figure 5. Interpretation plot.

0m 100m

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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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