THAMES VALLEY

ARCHAEOLOGICAL

SERVICES

SOUTH WEST

Land at West Camel Road, Queen Camel, Somerset

Geophysical Survey (Magnetic)

by Marta Buczek and Tim Dawson

Site Code: WQC 12/151

(ST 5928 2447)

Land at West Camel Road, Queen Camel, Somerset

Geophysical Survey (Magnetic)

For Hastoe Homes

by Marta Buczek and Tim Dawson

Thames Valley Archaeological Services Ltd

Site Code
WQC 12/151

September 2012

Summary

Site name: Land at West Camel Road, Queen Camel, Somerset

Grid reference: ST 59285 24470

Site activity: Gradiometer survey

Date and duration of project: 10th September 2012

Project manager: Steve Ford

Site supervisor: Tim Dawson

Site code: WQC 12/151

Area of site: 0.69ha

Summary of results: Several strong positive linear anomalies aligned on the same axis as the previously-recorded Roman villa to the north were identified in the northern half of the site and possibly extending down its eastern edge. Anomalies representing ridge and furrow ploughing are also recorded for the majority of the site. Magnetic interference affected the site to the south, caused by the proximity of a standing barn. The ground conditions were conductive, due to recent light rain, though the ground was not saturated. The survey was carried out in overcast conditions.

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✓ 12.09.12
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Land at West Camel Road, Queen Camel, Somerset
A Geophysical Survey (Magnetic)

by Marta Buczek and Tim Dawson

Report 12/151

Introduction

This report documents the results of a magnetic geophysical survey carried out at land at West Camel Road, Queen Camel, Somerset (ST 59285 24470) (Fig. 1). The work was commissioned by Mr Peter Friend, Senior Development Officer at Hastoe Homes, Fleur de Lis, Middlemarsh Street, Poundbury, Dorchester, Dorset DT1 3GX. A planning application is to be made to South Somerset District Council for the construction of affordable housing on the site. A geophysical gradiometer survey was requested to enable subsequent trenching to target areas of archaeologically derived anomalies. The fieldwork was undertaken by Marta Buczek and Tim Dawson on 10th, September 2012 and the site code is WQC 12/151.

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 a 0.69ha field located immediately to the west of the village of Queen Camel, *c*.9km north east of Yeovil, Somerset. The river Cam flows westwards *c*.500m to the north with the site lying near the crest of the hill on ground that gently rises up to the south. The site consists of a grassy paddock (Plates 1-2) with a metal clad barn at its southern end. It is bounded by hedgerows with those on the east and west edges incorporating wire fences. To the south is West Camel Road, to the west, houses and gardens, to the north, farmland and to the east, a playing field. The underlying geology is described as Langport Member, Blue Lias Formation and Charmouth Mudstone Formation (BGS 1973). The site is at a height of *c*.36m above Ordnance Datum.

Site history and archaeological background

The field immediately to the north of the site was the subject of a geophysical survey (Payne 2008) after metal detectorists noted a concentration of Roman coins, fragments of building stone and mosaic tesserae at its southern end. Subsequent exploratory excavation uncovered part of a well-preserved mosaic pavement *c*.0.20m below the ground surface and was interpreted as indicative of a previously-unknown Roman villa site. The geophysical (magnetic and resistance) surveys mapped the outline of a large aisled hall building set within an

extensive system of angular ditched enclosures (Figs. 5 and 6). This information was not known at the outset of the survey detailed in this report with the documentation only being released once the survey had been completed. Further information from Somerset Historic Environment Record indicated the presence of earthworks relating to a deserted medieval village *c*.200m to the southeast while the First and Second Edition Ordnance Survey maps (1880s and late 1890s respectively) indicate that the field in which the site is located has been in existence since this period. Satellite photographs and a recent ecological survey of the site (Slade 2012) noted the presence of prominent ridge and furrow earthworks aligned with the long axis of the present field.

Methodology

Sample interval

Data collection required a temporary grid to be established across the survey area using wooden pegs at 30m intervals with further subdivision where necessary (Fig.2). Readings were taken at 0.25m intervals along traverses 1m apart. This provides 3600 sampling points across a full 30m × 30m grid (English Heritage 2008), providing an appropriate methodology balancing cost and time with resolution. Due to the small size and irregular shape of the site and obstructions such as the barn it was easier to set out a series of incomplete grids (Fig. 2). These were surveyed in a zig-zag pattern along the long axis of the field.

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 nanoTesla (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 set out by both English Heritage (2008) and the Institute for Archaeologists (2002).

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 seem from their infilling soils containing higher proportions of humic material, rich in ferrous oxides, compared to the undisturbed subsoil. This would give a more subtle, weaker response, but again should stand out in relation to the back ground magnetic readings, and appear in plan, following the course of a linear feature, or within a discrete area.

A Trimble GeoXH 2008 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 (Fig. 2).

Data gathered in the field was processed using the ArcheoSurveyorLite 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.

Processing data and presentation

Process	**Effect**
Despike Threshold: 1 Window size: 3x3	Reduces the prominence of magnetic spikes caused by buried ferrous objects, improving clarity of other anomalies.
De Stagger: Grids: 02.xgd Mode: Both By: -2 intervals	Corrects for changes in sensor orientation due to obstruction by long grass or terrain changes. Shifts data points by *x* intervals (1 interval = 0.25m) correctly aligning disjointed appearance of linear features.
De Stagger: Grids: 03.xgd Mode: Both By: -1 intervals	
Clip from -5.00 to 5.00 nT	Enhance the contrast of the image to improve the appearance of possible archaeological anomalies.

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 ArcheoSurveyorLite 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 large number of positive (possible cut features) and negative (possible earthwork) anomalies have been identified within survey area (Figs. 2 and 3). The survey has also recorded magnetic disturbance from the modern ferrous barn and wire fences located in southern part of field and along its western and eastern edges. This disturbance may mask any features of possible archaeological origin. Further patches of magnetic disturbance are caused by trees (western edges of grids 9 and 10). Several ferrous spikes have also been identified; these appear to be a relatively sparse scatter of iron objects, either archaeological or modern in origin.

Two positive linear anomalies with strong magnetic signatures, likely to be of archaeological origin, extend east-west across the northern part of survey area through the site's eastern and western boundaries (Fig. 2; grids 8, 2, 9, 3). These are parallel to those found during the English Heritage survey to the north in 2008 (Payne 2008) (Figs. 5 and 6) and suggest ditch-type features representing the southern edges of a series of enclosures. To the south of these are two more weak linear anomalies on the same alignment may be corresponding (grids 9, 10 and 4). Other anomalies with strong positive magnetic responses are aligned north-south and also suggest ditch-type anomalies along the eastern edge of the site (grids 3 and 4).

Two sets of curvilinear positive anomalies appear in grids 2 and 4 and are possibly of archaeological origin. They both form corners and may represent enclosures or structural remains. A scatter of strong positive anomalies can be seen in grids 3 and 4, the largest of which may be indicative of fired structure such as a hearth or kiln.

Aside from the anomalies described above, the distinctive feature of the survey is the ridge and furrow which is represented by the broad positive and negative stripes aligned to the long axis of the field.

Conclusion

The survey undertaken successfully identified several cut features that are likely to be of archaeological origin and which probably relate to the villa complex in the neighbouring field (Figs. 5 and 6). Other anomalies include those caused by the ridge and furrow system and the metal barn and fences to the south, west and east. The anomalies caused by these may all have had a masking effect on any underlying archaeological features. This may explain why the north-south aligned linear features visible in the English Heritage survey do not appear in the northern end of the site although it is equally possible that they turn eastwards and lie along the unsurveyed zone adjacent to the modern fence.

References

BGS, 1973, *British Geological Survey*, 1:50,000, Sheet 196, 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

Payne, A, 2008, 'Queen Camel, Somerset: Embargoed Letter Report on Geophysical Survey, November 2008', English Heritage report 000-2008, Portsmouth

Slade, A, 2012, 'West Camel Road, Queen Camel: Ecological Appraisal', GreenEcology report 12/07/361/AS, Exeter

Appendix 1. Survey and data information

Raw data
COMPOSITE
Filename: grids.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 11/09/2012
Assembled by: on 11/09/2012
Direction of 1st Traverse: 315 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32000

Dimensions
Composite Size (readings): 720 x 60
Survey Size (meters): 180 m x 60 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 100.00
Min: -100.00
Std Dev: 14.48
Mean: 2.89
Median: 0.29
Composite Area: 1.08 ha
Surveyed Area: 0.55545 ha

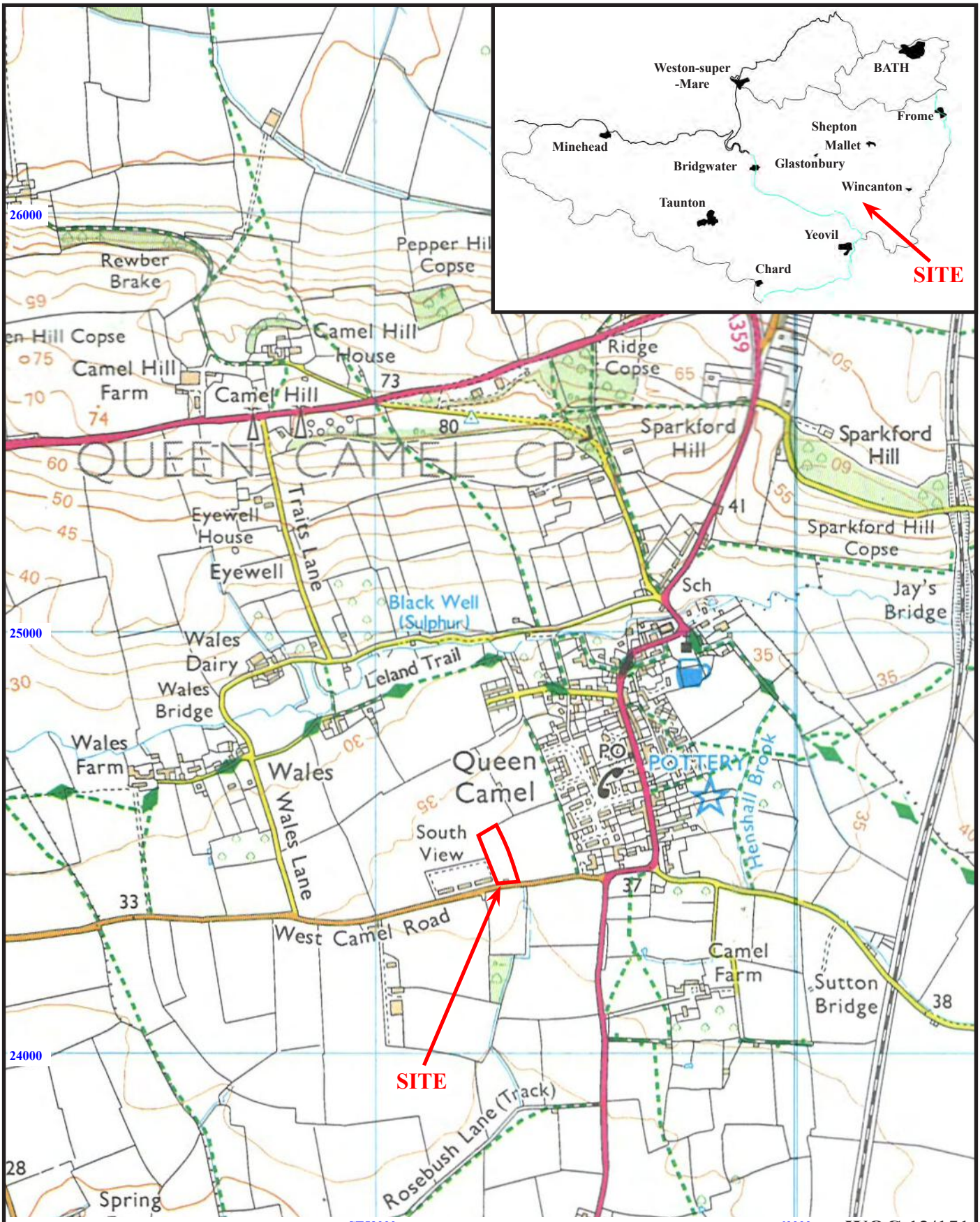
Source Grids: 11
1 Col:0 Row:1 grids\06.xgd
2 Col:1 Row:0 grids\11.xgd
3 Col:1 Row:1 grids\05.xgd
4 Col:2 Row:0 grids\10.xgd
5 Col:2 Row:1 grids\04.xgd
6 Col:3 Row:0 grids\09.xgd
7 Col:3 Row:1 grids\03.xgd
8 Col:4 Row:0 grids\08.xgd
9 Col:4 Row:1 grids\02.xgd
10 Col:5 Row:0 grids\07.xgd
11 Col:5 Row:1 grids\01.xgd

PROGRAMME
Name: ArcheoSurveyor
Version: 2.5.19.6

Processed data
Filename: grids processed.xcp

Stats
Max: 5.00
Min: -5.00
Std Dev: 2.54
Mean: 0.51
Median: 0.28
Composite Area: 1.08 ha
Surveyed Area: 0.55525 ha

Processes: 5
1 Base Layer
2 Despike Threshold: 1 Window size: 3x3
3 De Stagger: Grids: 02.xgd Mode: Both By: -2 intervals
4 De Stagger: Grids: 03.xgd Mode: Both By: -1 intervals
5 Clip from -5.00 to 5.00 nT



Land at West Camel Road, Queen Camel,
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Figure 1. Location of site within Queen Camel and Somerset.

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Figure 2. Survey grid layout and georeferencing.

0 50m

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Figure 3. Plot of minimally processed gradiometer data.

0m 50m

+5 nT

-5 nT

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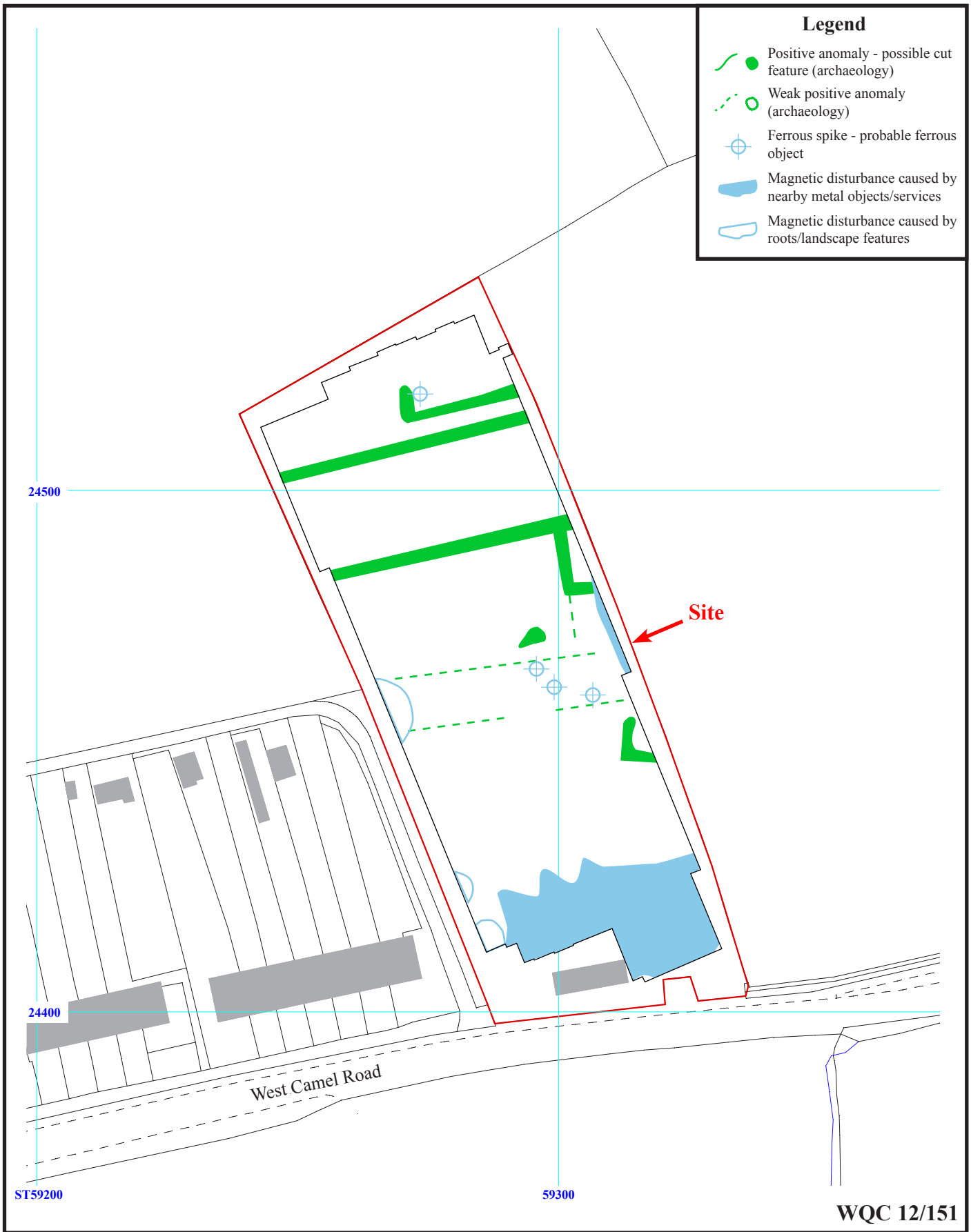

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Figure 4. Interpretation plot of processed gradiometer data (excluding ridge and furrow for clarity).

0m 50m

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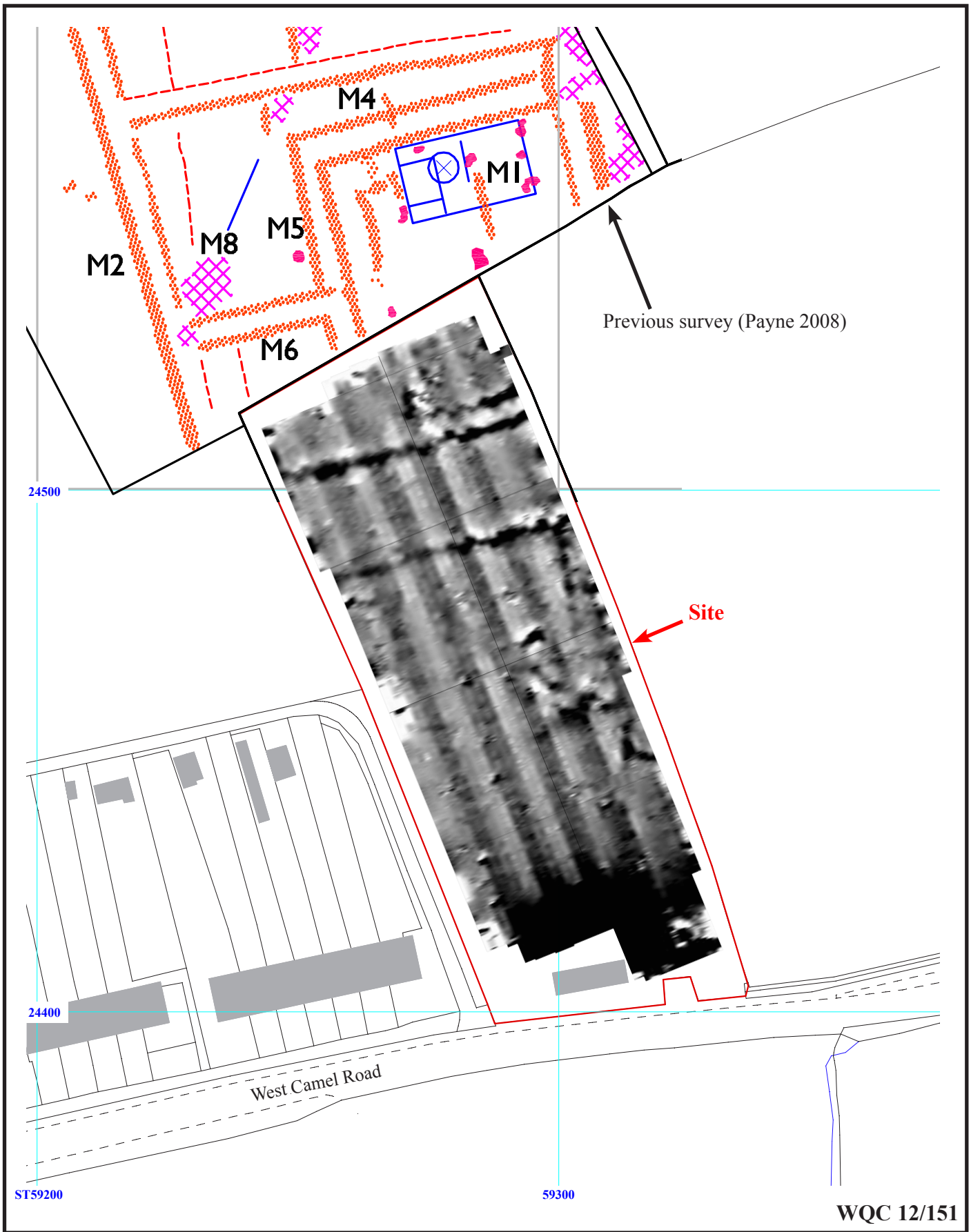

N

Land at West Camel Road, Queen Camel, Somerset, 2012
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Figure 5. Plot of minimally processed gradiometer data in relation to survey of the villa area to the north.

0m 50m

+5 nT
-5 nT

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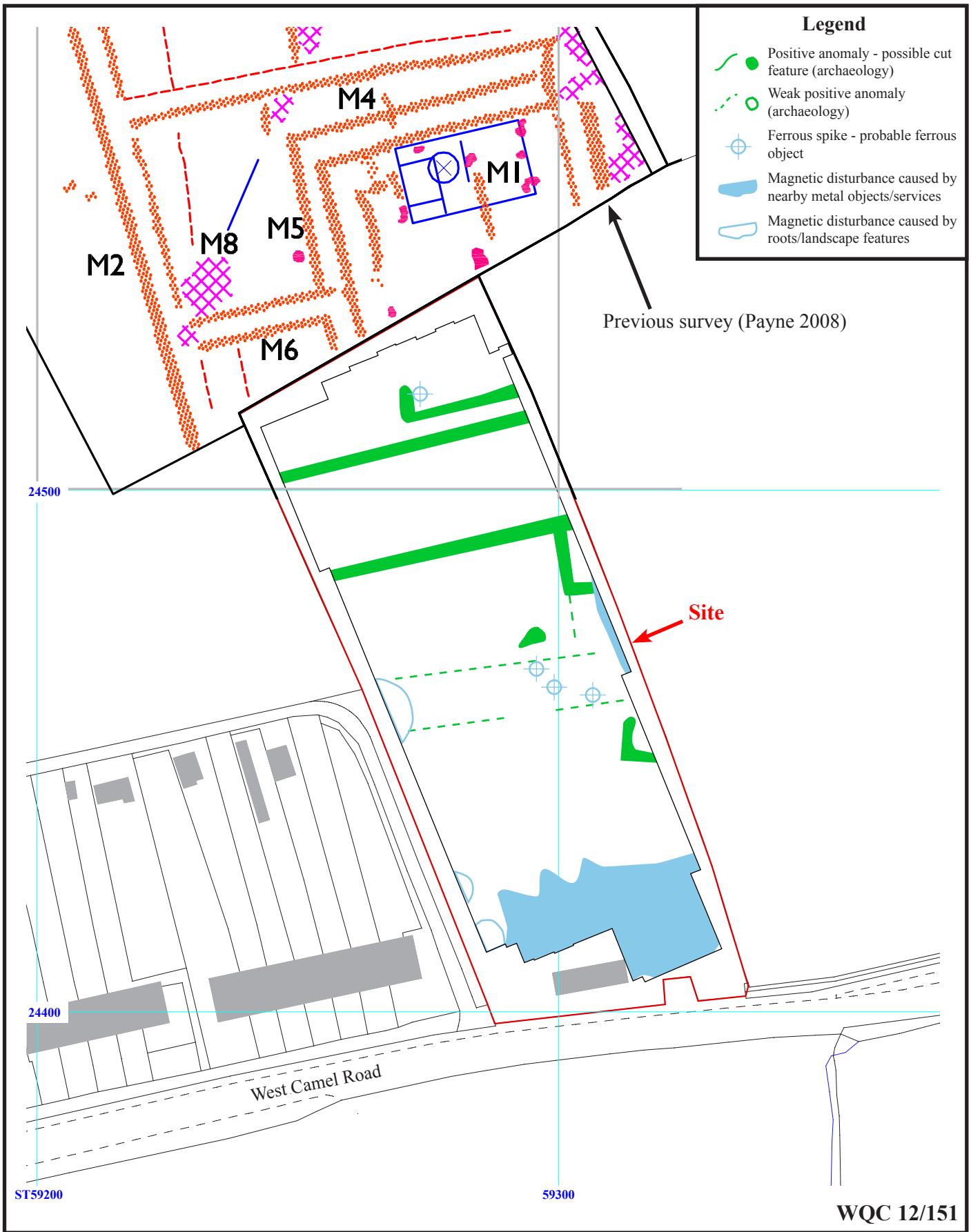

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Figure 6. Interpretation plot of processed gradiometer data in relation to the villa to the north.

0m 50m

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Plate 1. The site, looking northwest towards the villa site. The ridge and furrow can be clearly seen along the length of the field.

Plate 2. The southwest corner of the site, looking southwest, showing the metal-clad barn, one of the trees and other sources of magnetic interference.

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Plates 1 and 2.

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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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