THAMES VALLEY

ARCHAEOLOGICAL

SERVICES

SOUTH WEST

School Site B, West Camel Road, Queen Camel, Somerset

Geophysical (magnetometer) survey

by Marta Buzcek and Tim Dawson

Site Code: WQC12/153

(ST 5944 2437)

School Site B, West Camel Road, Queen Camel, Somerset

Geophysical Survey (Magnetic)

For Somerset County Council

by MartaBuczek andTimDawson

ThamesValleyArchaeologicalServices

Ltd

SiteCode
BQC12/153

September 2012

Summary

Site name: School Site B, West Camel Road, Queen Camel, Somerset

Grid reference: ST 5944 2437

Site activity: Gradiometer survey

Date and duration of project: 17th September 2012

Project manager: Steve Ford

Site supervisor: Tim Dawson

Site code: BQC 12/153

Area of site: 1.47ha

Survey conditions: Overcast and windy but dry.

Summary of results: Three positive anomalies of possible archaeological origin were identified from the survey. Several other anomalies traversing the site are, however, considered to be of agricultural or geological origin with additional anomalies due to electrical/ferrous interference.

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✓ 19.09.12
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School Site B, West Camel Road, Queen Camel, Somerset
A Geophysical Survey (Magnetic)

by Marta Buczek and Tim Dawson

Report 12/153

Introduction

This report documents the results of a magnetic geophysical survey carried out at the proposed School Site B at West Camel Road, Queen Camel, Somerset (ST 5944 2437) (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 a new school on one of two sites in the village in conjunction with a proposed affordable housing scheme. 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 17th September 2012 and the site code is BQC 12/153.

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 an area of 1.47ha within the northern end of a field located immediately to the southwest of the village of Queen Camel, *c*.9km north east of Yeovil, Somerset. The river Cam flows westwards *c*.600m to the north with the site lying near the crest of the hill on ground that gently rises up from the south. The site consists of a well-grazed pasture (Plates 1-2) with an overhead power line running north-south across the site's eastern end. It is bounded ultimately by hedgerows on the northern and western sides and a wire fence to the east although the northern and western boundaries were enclosed by an electric fence inside the hedgerows. To the north is West Camel Road, to the east the A359, and to the south and west further pasture. 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

A field 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. Further information from Somerset Historic Environment Record indicated the presence of earthworks relating to a deserted medieval village adjacent to the site to the east 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. The maps also show a large pond just inside the site's northern boundary while the landowner recalls the presence of ridge and furrow on an east-west orientation across the entire field although these are now ploughed-out (A. Case pers. comm. 2012).

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 irregular shape of the site boundaries it was deemed best to set out the grids aligned to a baseline along to the southern edge of the site (Fig. 2). The grids were surveyed in a zig-zag pattern with the traverses running in a north-south direction.

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.

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

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**
Clip (either to *x* standard deviations or to a specific value in nT)	Enhance the contrast of the image to improve the appearance of possible archaeological anomalies.
Destripe Median Sensors (zero median traverse)	Balances readings along each traverse removing the striping effect and making it easier to trace anomalies.
Despike	Reduces the prominence of magnetic spikes caused by buried ferrous objects, improving clarity of other anomalies.
Edge Match	Matches the range of readings between multiple grids, enabling anomalies to be more uniform in intensity.

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

The results of the gradiometer survey of the site are characterised by the presence of several parallel east-west linear positive anomalies across the whole site (Figs. 3 and 4). These are most likely of agricultural origin and probably represent ridge and furrow strip fields, now ploughed-out. A large area of ground in the south-western corner of the site appears to show a large amount of magnetic disturbance, either the result of subsoil disruption or geologically derived anomalies. The only positive anomalies identified that are likely to be archaeological in origin are two linear features in grids 5 and 7/14 and a large anomaly, possibly an area of burning or ferrous rich soil, also in grid 5. The survey area contains many magnetic spikes caused by ferrous objects within the ground, although it is not known whether these are archaeological or modern in origin.

The readings around the north, east and western edges of the survey area were subject to a large amount of magnetic disturbance due to the close proximity of the electric fence in the north and west and the wire fence in the east. Further disturbance was caused by the metal gates in the northern hedge and an overhead electricity wire post at the northern end of grid 18. Another large area of disturbance was identified in grid 16 and represents the infill of the pond that is plotted on the early edition Ordnance Survey maps.

Conclusion

The survey undertaken successfully identified three possible anomalies, two linear and one subsoil anomaly that may be of archaeological origin. However, the majority of the anomalies recorded represent agricultural features or areas of geological disturbance with a large amount of interference caused by the electric and metal fences that border the site visible to the north, west and east. These anomalies, the latter in particular, may have a masking effect on any archaeological features present in these areas, giving a moderate to low level of confidence in the interpretation.

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

Appendix 1. Survey and data information

Raw data
COMPOSITE
Filename: grids.xcp
Instrument Type: Bartington (Gradiometer)
Units: nT
Surveyed by: on 18/09/2012
Assembled by: on 18/09/2012
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32000

Dimensions
Composite Size (readings): 360 x 210
Survey Size (meters): 90 m x 210 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: 12.85
Mean: -0.88
Median: 0.52
Composite Area: 1.89 ha
Surveyed Area: 1.3703 ha

PROGRAMME
Name: ArcheoSurveyor
Version: 2.5.19.6

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

Processed data
Filename: grids processed.xcp

Stats
Max: 2.00
Min: -2.00
Std Dev: 0.93
Mean: -0.22
Median: -0.12
Composite Area: 1.89 ha
Surveyed Area: 1.3703 ha

Processes: 17
1 Base Layer
2 Clip at 1.00 SD
3 DeStripe Median Sensors: All
4 DeStripe Median Sensors: 16.xgd
5 DeStripe Median Sensors: 18.xgd
6 DeStripe Median Sensors: 12.xgd
7 DeStripe Median Sensors: 19.xgd
8 DeStripe Median Sensors: 06.xgd
9 Clip from -5.00 to 5.00 nT
10 Despike Threshold: 1 Window size: 3x3
11 Edge Match (Area: Top 120, Left 240, Bottom 149, Right 359) to Left edge
12 Edge Match (Area: Top 30, Left 240, Bottom 119, Right 359) to Left edge
13 Edge Match (Area: Top 0, Left 240, Bottom 29, Right 359) to Left edge
14 Edge Match (Area: Top 150, Left 0, Bottom 179, Right 119) to Top edge
15 Edge Match (Area: Top 150, Left 240, Bottom 179, Right 359) to Left edge
16 Edge Match (Area: Top 180, Left 120, Bottom 209, Right 239) to Top edge
17 Clip from -2.00 to 2.00 nT

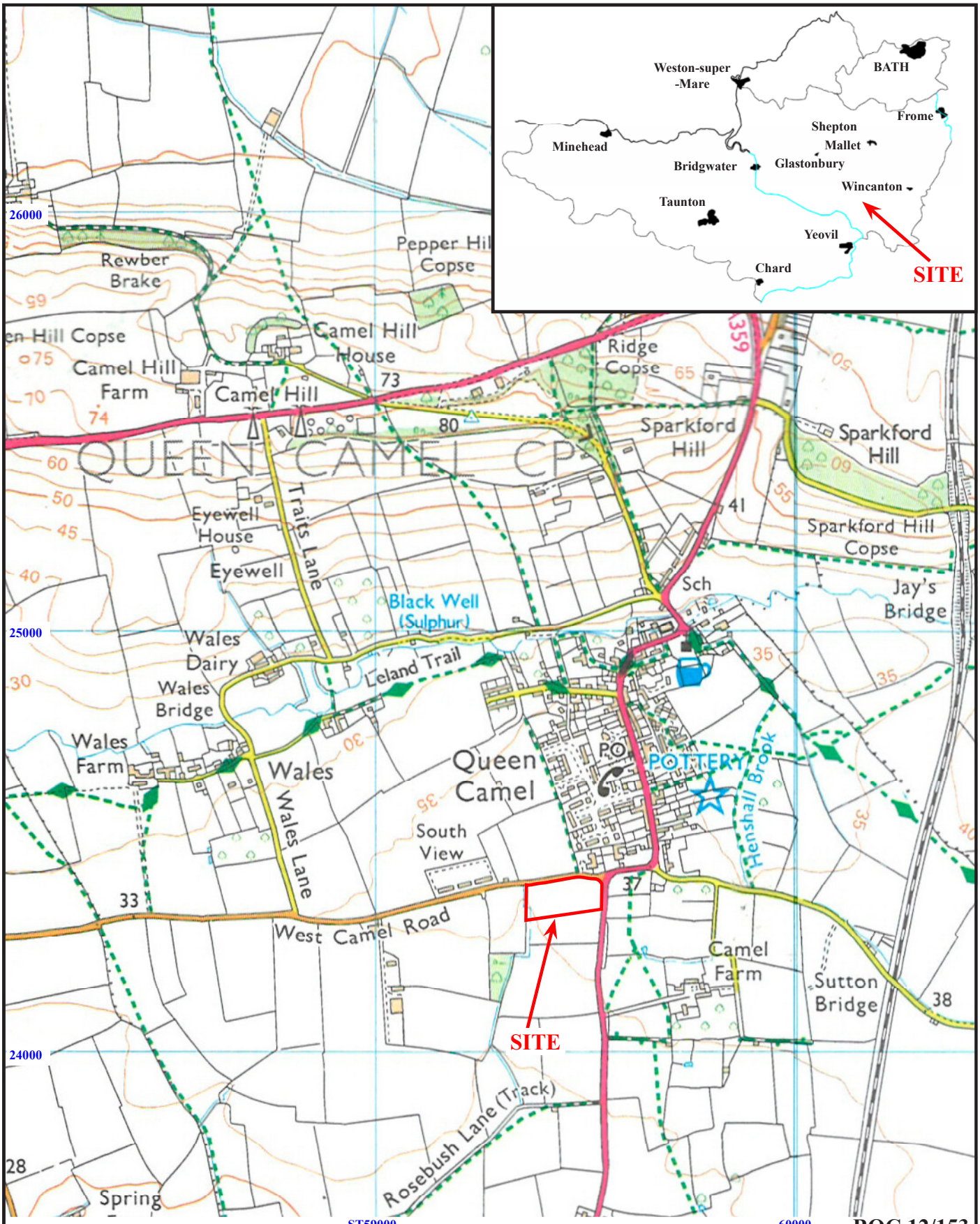

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Figure 1. Location of site within Queen Camel and Somerset.

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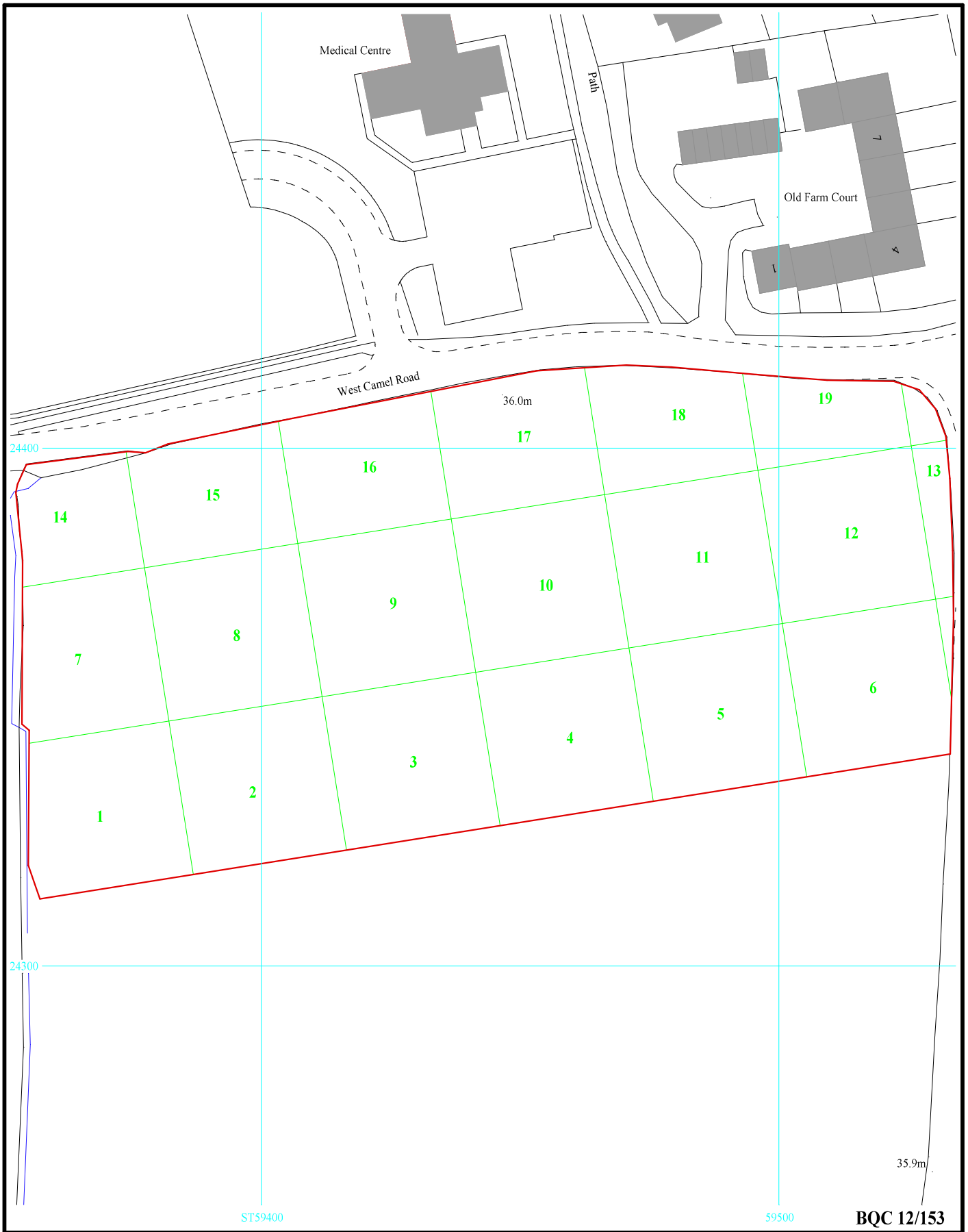

N

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Figure 2. Survey grid layout and georeferencing.

0 50m

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Figure 3. Plot of processed gradiometer data.

0m 50m

+2 nT
-2 nT

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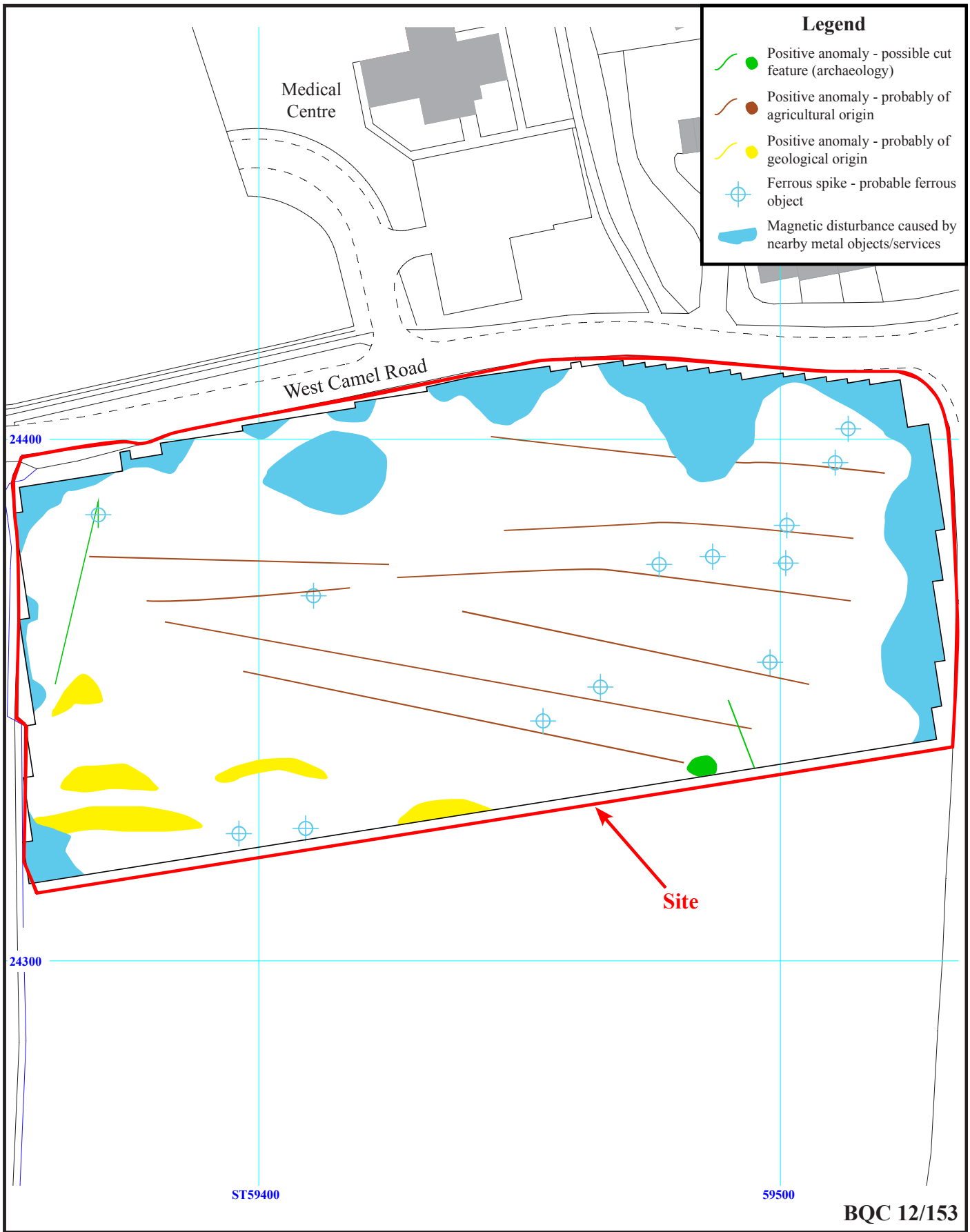

N

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Figure 4. Interpretation of processed gradiometer data.

0m 50m

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Plate 1. The site, looking east along the northern boundary.

Plate 2. The site, looking south along the western boundary.

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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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