

T H A M E S      V A L L E Y

ARCHAEOLOGICAL

S E R V I C E S

S O U T H

**Former Thomas Bennett Community College,  
Crawley, West Sussex**

**Geophysical Survey (Magnetic)**

**by Kyle Beaverstock and Tim Dawson**

Site Code: TSC15/153

(TQ 2701 3464)

**Former Thomas Bennett Community College,  
Crawley, West Sussex**

**Geophysical Survey (Magnetic) Report**

**For West Sussex County Council**

by Kyle Beaverstock and Tim Dawson

Thames Valley Archaeological Services Ltd

Site Code TSC  
15/153

**August 2015**

## Summary

**Site name:** Former Thomas Bennett Community College, Crawley, West Sussex

**Grid reference:** TQ 2701 3464

**Site activity:** Magnetometer survey

**Date and duration of project:** 20th July 2015

**Project manager:** Steve Ford

**Site supervisor:** Kyle Beaverstock

**Site code:** TSC 15/153

**Area of site:** 0.99ha (1.17ha surveyed)

**Summary of results:** Several strong magnetic anomalies were identified which are probably associated with the demolished buildings of the former community college. A small number of weak positive anomalies, possibly indicating buried cut archaeological deposits, were also recorded in the southern half of the site.

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

*This report may be copied for bona fide research or planning purposes without the explicit permission of the copyright holder. All TVAS unpublished fieldwork reports are available on our website: [www.tvas.co.uk/reports/reports.asp](http://www.tvas.co.uk/reports/reports.asp).*

Report edited/checked by: Steve Ford✓ 11.08.15
--

Andrew Muddin✓ 11.08.15
-------------------------

# Former Thomas Bennett Community College, Crawley, West Sussex A Geophysical Survey (Magnetic)

by Kyle Beaverstock and Tim Dawson

**Report 15/153**

## **Introduction**

This report documents the results of a geophysical survey (magnetic) carried out on the site of the former Thomas Bennett Community College, Anderson Road, Crawley, West Sussex (TQ 2701 3164) (Fig. 1). The work was commissioned by Mr John Mills of West Sussex County Council, County Hall, Chichester, West Sussex PO19 1RH.

A planning application to construct new housing on the site of the former Thomas Bennett Community College is to be made to Crawley District Council. As a consequence of the possibility of archaeological deposits on the site which may be damaged or destroyed by development, a geophysical survey has been requested in order to inform any future work. 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 prepared according to the brief provided by West Sussex County Council (Mills 2015) and approved by Mr John Mills, Senior Archaeologist at West Sussex County Council. The fieldwork was undertaken by Kyle Beaverstock and Rebecca Constable on 20th July 2015 and the site code is TSC 15/153.

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 located on playing fields immediately to the south of the now demolished buildings of the former Thomas Bennett Community College (Fig. 2). The college was situated on the southern edge of Crawley, c.1.5km south of the centre of the town in the north-eastern corner of West Sussex. The site itself gently slopes uphill towards the south with a narrow earth bund forming its southern border. To the west are a sports centre playing fields, to the north is Desmond Anderson Primary School, to the east is housing and Tilgate Forest lies to the south. The underlying geology is recorded as Weald Clay Formation mudstone (BGS 1972) and it is at a height of 84m above Ordnance Datum.

The conditions during the survey were dry and warm but overcast. The ground was dry and firm (Pl. 1-2).

## **Site history and archaeological background**

A detailed brief for the project prepared by John Mills of West Sussex County Council has highlighted the archaeological potential of the site (Mills 2015). In summary, archaeological evidence points to the area being a centre for the extraction of iron ore nodules during the Roman, medieval and early post-medieval periods. To the west and north of the site clusters of “minepits” (iron ore extraction sites) and evidence of Roman settlement and iron working have been identified. A small hearth pit, which was radiocarbon dated to the medieval period and found to contain hammer scale, was identified during archaeological investigations in advance of the construction of the present Thomas Bennett Community College to the north-west of the survey site, but nothing of archaeological interest was recorded during a watching brief which was undertaken during the construction of the Desmond Anderson Primary School to the north of the site.

## **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 0.5m apart. This provides 3200 sampling points across a full 20m × 20m grid (English Heritage 2008), providing an appropriate methodology balancing cost and time while providing a high resolution plot. The survey grid was aligned approximately to the southern boundary of the survey area in order to produce as many complete grid squares as possible (Fig. 2).

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.

<b>Process</b>	<b>Effect</b>
Clip from -9.80 to 10.20 nT	Enhance the contrast of the image to improve the appearance of possible archaeological anomalies.
Interpolate: <i>y</i> doubled	Increases the resolution of the readings in the <i>y</i> 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 -2 intervals	Cancels out effects of site's topography on irregularities in the traverse speed.

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.7.58.00, 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 2.6.1 Brighton 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

While the survey identified several magnetic anomalies across the study area, only a small handful have the potential to be archaeological in origin (Fig. 3). At the eastern end of the area is a linear weak positive anomaly [Fig. 4: 1] which may represent a buried ditch-type feature that runs west to east for *c.*38m before turning to run north-east for *c.*6m. Further to the south the survey picked up a stronger discrete positive anomaly [2], possibly a buried pit-type feature. At the western end of the survey area a pair of very weak positive linear anomalies were identified [3], again potentially indicating the presence of linear features of archaeological origin.

The remaining magnetic anomalies plotted by the survey most likely reflect features and activity associated with the site's previous use as a college and playing fields. Strong positive anomalies [4] and [5] are visible as two short linear sections which appear to be aligned with a very weak horizontal stripe pattern that covers the majority of the survey plot. It is possible therefore that these represent features formed by the landscaping or upkeep of the playing field area. The area of strong positive and negative readings along the survey area's northern edge [6] most likely represent ground disturbance caused during the construction of the original college buildings while the strong positive/negative linear anomaly that runs to the south of this [7] is probably a former boundary or service run, again associated with the college. The survey also recorded several other areas of strong magnetic disturbance. Those along the southern boundary are most likely caused by material contained within the bund that borders the site at this point whereas the area along the northern boundary is probably the result of the construction and/or demolition of the college buildings. The other patches of magnetic disturbance and

magnetic spikes which are visible across the survey area probably represent ferrous objects of unknown date buried within the soil.

## **Conclusion**

While several magnetic anomalies were plotted across the survey area only a small number of these are of potential archaeological origin. These are located in the south-western and south-eastern corners of the survey area and may represent both linear and discrete cut features. The remaining anomalies are most likely associated with the site's former use as a college and playing fields. This is particularly evident along the northern boundary but several other patches of magnetic disturbance across the site may be the result of landscaping works for the creation of the playing field. The majority of these anomalies are strong enough to potentially mask any weaker signatures which may represent buried archaeological features.

## **References**

- BGS, 1972, *British Geological Survey*, 1:50,000, Sheet 302, Solid and Drift Edition, Keyworth
- CI/A, 2002, *The Use of Geophysical Techniques in Archaeological Evaluation*, IFA Paper No. 6, Reading
- CI/A, 2011, *Standard and Guidance: for archaeological geophysical survey*, Reading
- CI/A, 2014, *Standard and Guidance: for archaeological geophysical survey*, Reading
- English Heritage, 2008, *Geophysical Survey in Archaeological Field Evaluation*, English Heritage, Portsmouth (2nd edn)
- Mills, J, 2015, 'Former Thomas Bennett Community College Site, Anderson Road, Crawley, West Sussex: Brief for carrying out a geophysical survey', West Sussex County Council, Chichester
- NPPF, 2012, *National Planning Policy Framework*, Dept Communities and Local Government, London



## Appendix 1. Survey and data information

### Programme:

Name: TerraSurveyor  
Version: 3.0.25.0

### Raw data

Survey corner coordinates (X/Y):  
Northwest corner: 526923.26, 134584.17 m  
Southeast corner: 527023.26, 134404.17 m  
Direction of 1st Traverse: 357.16 deg  
Collection Method: ZigZag  
Sensors: 2 @ 1.00 m spacing.  
Dummy Value: 2047.5

### Dimensions

Composite Size (readings): 400 x 360  
Survey Size (meters): 100 m x 180 m  
Grid Size: 20 m x 20 m  
X Interval: 0.25 m  
Y Interval: 0.5 m

### Stats

Max: 100.00  
Min: -100.00  
Std Dev: 17.81  
Mean: -1.01  
Median: 0.83

Composite Area: 1.8 ha  
Surveyed Area: 1.167 ha

### Source Grids: 33

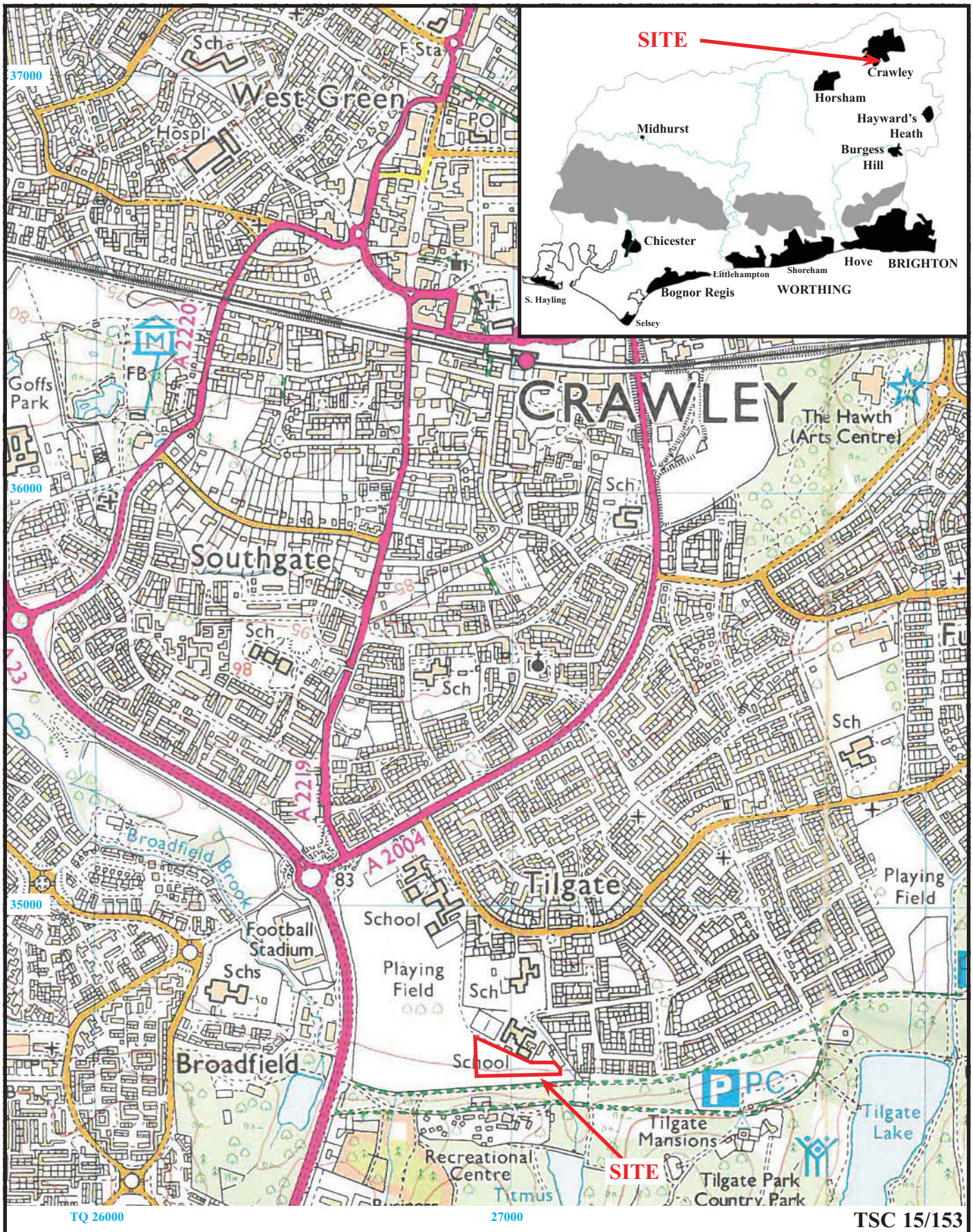
1 Col:0 Row:0 grids\01.xgd  
2 Col:0 Row:1 grids\02.xgd  
3 Col:0 Row:2 grids\03.xgd  
4 Col:0 Row:3 grids\04.xgd  
5 Col:0 Row:4 grids\05.xgd  
6 Col:0 Row:5 grids\06.xgd  
7 Col:0 Row:6 grids\07.xgd  
8 Col:0 Row:7 grids\08.xgd  
9 Col:0 Row:8 grids\09.xgd  
10 Col:1 Row:0 grids\10.xgd  
11 Col:1 Row:1 grids\11.xgd  
12 Col:1 Row:2 grids\12.xgd  
13 Col:1 Row:3 grids\13.xgd  
14 Col:1 Row:4 grids\14.xgd  
15 Col:1 Row:5 grids\15.xgd  
16 Col:1 Row:6 grids\16.xgd  
17 Col:1 Row:7 grids\17.xgd  
18 Col:1 Row:8 grids\18.xgd  
19 Col:2 Row:0 grids\19.xgd  
20 Col:2 Row:1 grids\20.xgd  
21 Col:2 Row:2 grids\21.xgd  
22 Col:2 Row:3 grids\22.xgd  
23 Col:2 Row:4 grids\23.xgd  
24 Col:2 Row:5 grids\24.xgd  
25 Col:3 Row:0 grids\25.xgd  
26 Col:3 Row:1 grids\26.xgd  
27 Col:3 Row:2 grids\27.xgd  
28 Col:3 Row:3 grids\28.xgd  
29 Col:3 Row:4 grids\29.xgd  
30 Col:4 Row:0 grids\30.xgd  
31 Col:4 Row:1 grids\31.xgd  
32 Col:4 Row:2 grids\32.xgd  
33 Col:4 Row:3 grids\33.xgd

### Processed data

Stats  
Max: 10.20  
Min: -9.80  
Std Dev: 4.60  
Mean: -0.15  
Median: 0.02

### Processes: 6

- 1 Base Layer
- 2 DeStripe Median Sensors: All
- 3 De Stagger: Grids: All Mode: Both By: -2 intervals
- 4 Despike Threshold: 1 Window size: 3x3
- 5 Interpolate: Y Doubled.
- 6 Clip from -9.80 to 10.20 nT



**Former Thomas Bennett Community College,  
Crawley, West Sussex, 2015  
Geophysical Survey (Magnetic)**

Figure 1. Location of site within Crawley and West Sussex.

Reproduced from Ordnance Survey Explorer 134 at 1:12500  
Ordnance Survey Licence 100025880



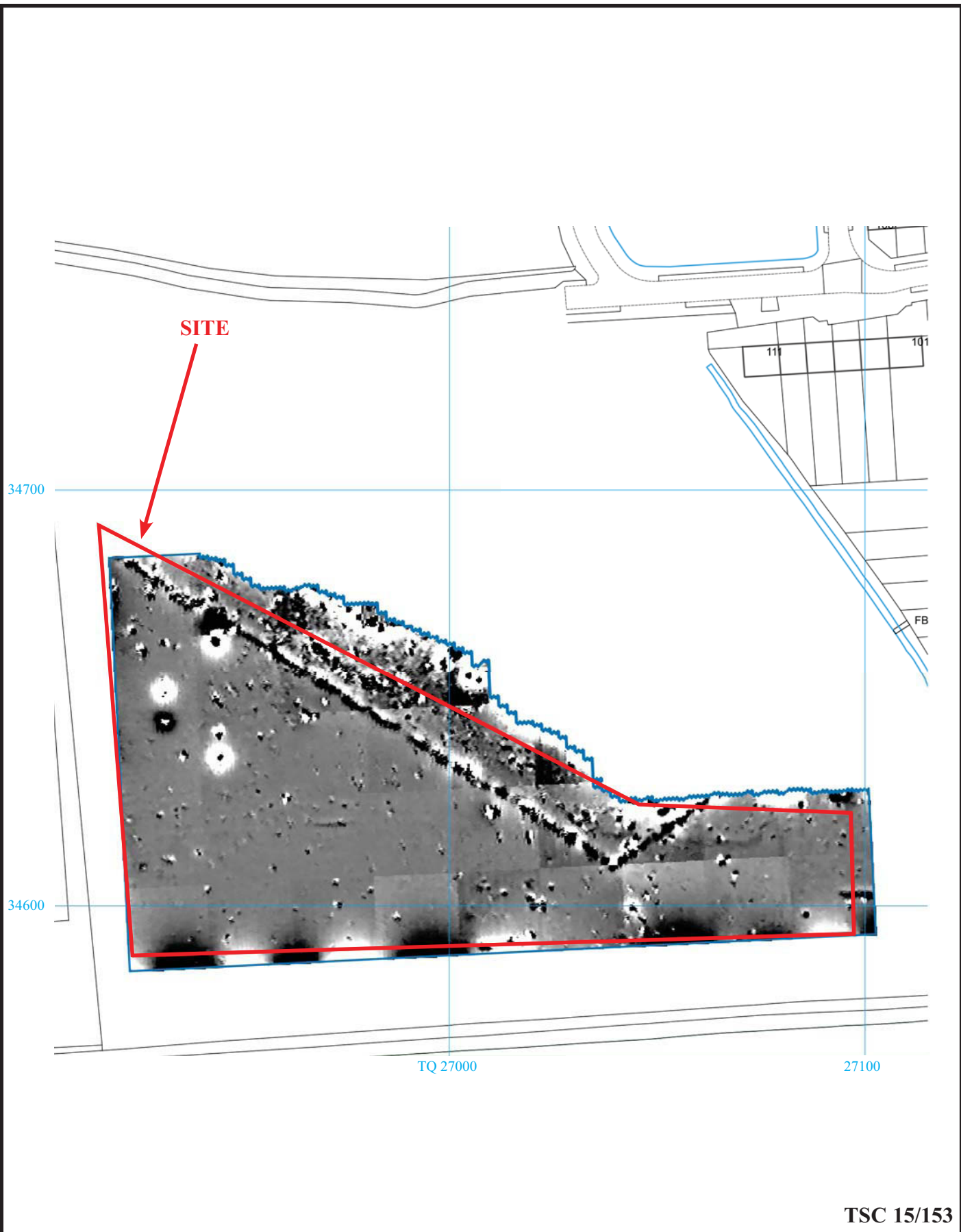
TSC 15/153

**Former Thomas Bennett Community College,  
Crawley, West Sussex, 2015  
Geophysical Survey (Magnetic)**

Figure 2. Survey grid layout.



THAMES VALLEY  
ARCHAEOLOGICAL  
SERVICES  
SOUTH

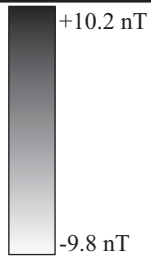


TSC 15/153



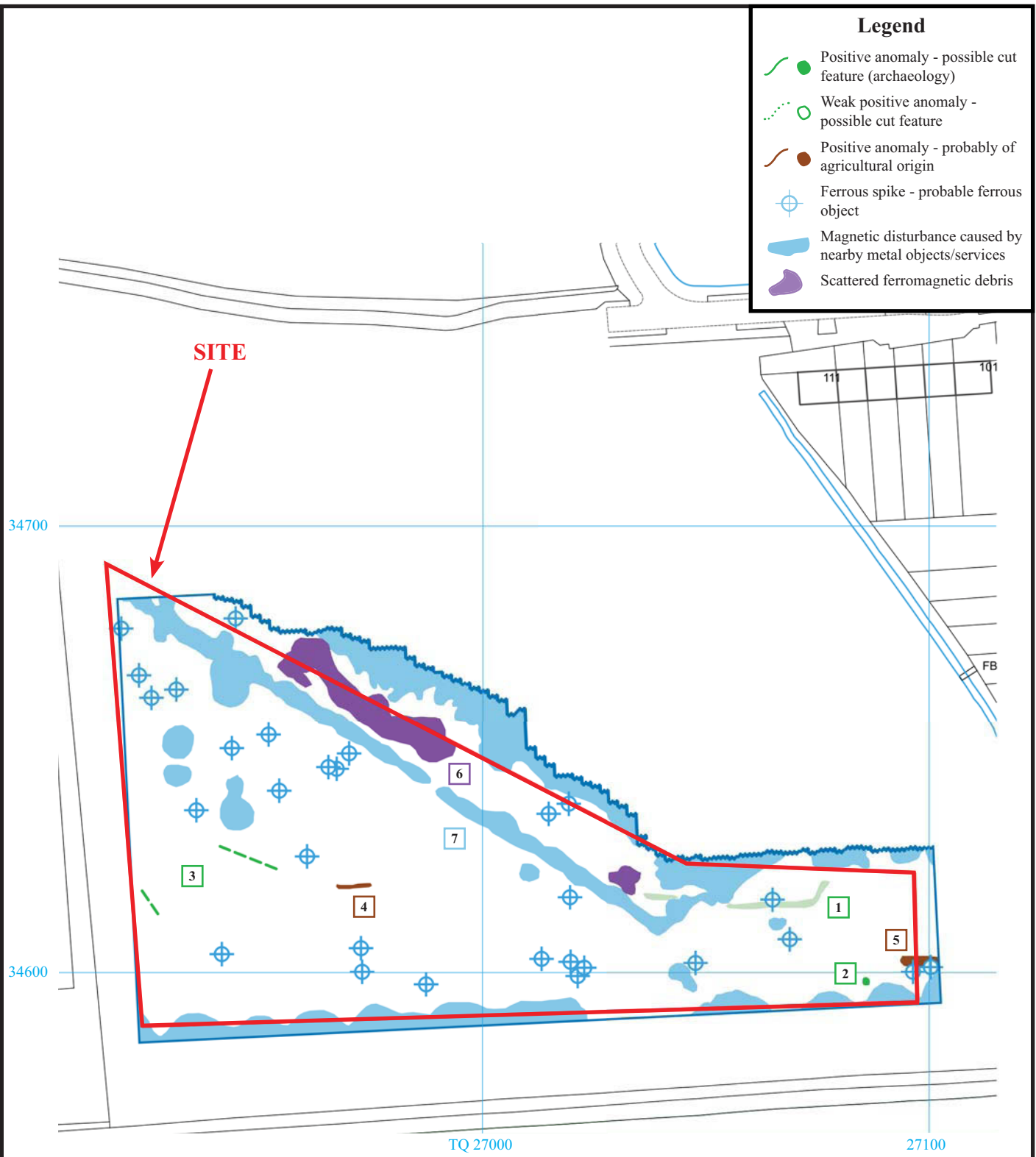
**Former Thomas Bennett Community College,  
Crawley, West Sussex, 2015  
Geophysical Survey (Magnetic)**

Figure 3. Plot of minimally processed gradiometer data.



### Legend

- Positive anomaly - possible cut feature (archaeology)
- Weak positive anomaly - possible cut feature
- Positive anomaly - probably of agricultural origin
- Ferrous spike - probable ferrous object
- Magnetic disturbance caused by nearby metal objects/services
- Scattered ferromagnetic debris



TSC 15/153



**Former Thomas Bennett Community College,  
Crawley, West Sussex, 2015  
Geophysical Survey (Magnetic)**  
Figure 4. Interpretation plot.

0m 100m

THAMES VALLEY  
ARCHAEOLOGICAL  
SERVICES  
SOUTH



Plate 1. The survey area, looking north-east from the south-western corner.



Plate 2. The survey area, looking east from the south-western corner.

TSC 15/153

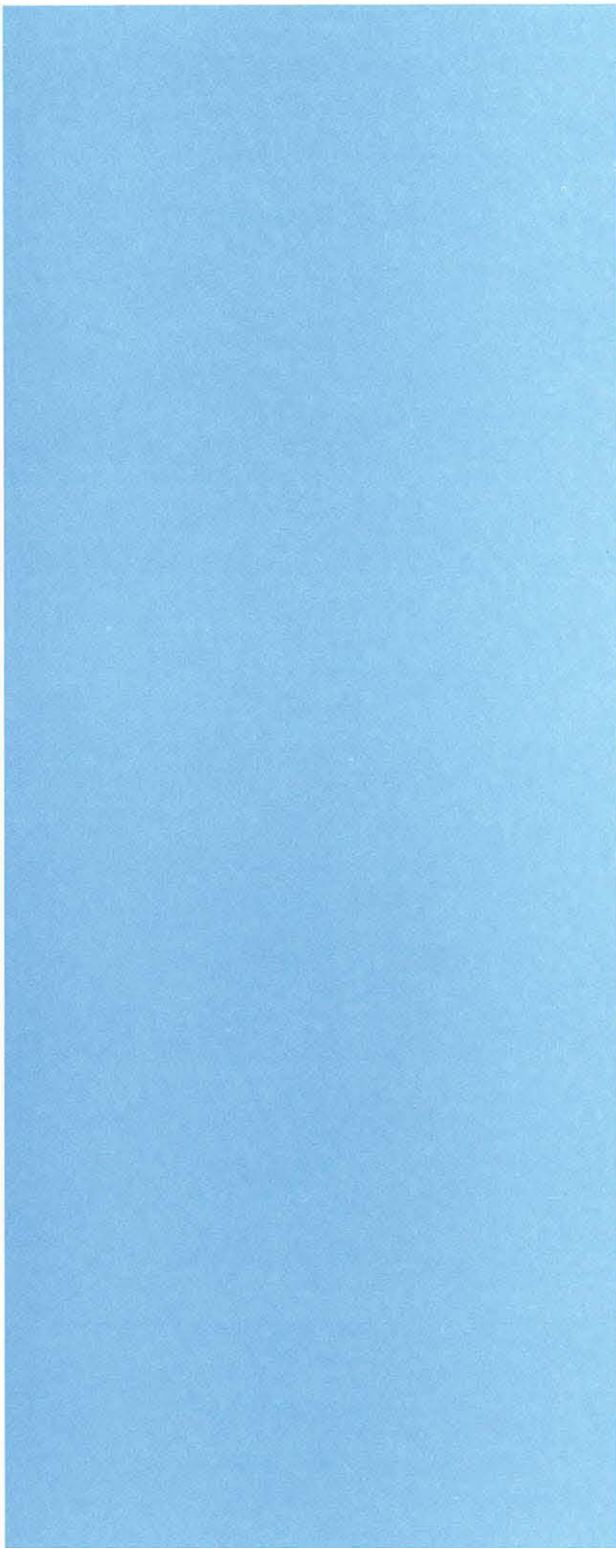
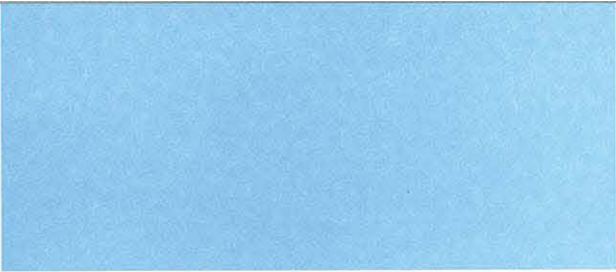
**Former Thomas Bennett Community College,  
Crawley, West Sussex, 2015  
Geophysical Survey (Magnetic)**  
Plates 1 - 2.

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





**TVAS (South)**  
**77a Hollingdean Terrace, Brighton**  
**Sussex, BN1 7HB**

**Tel: 01273 554198**  
**Fax: 01273 564043**  
**Email: [south@tvas.co.uk](mailto:south@tvas.co.uk)**  
**Web: [www.tvas.co.uk](http://www.tvas.co.uk)**