THAMES VALLEY

ARCHAEOLOGICAL

SERVICES

Land at Nayles Barn, Cutsdean, Gloucestershire

Geophysical Survey (Magnetic)

by Daniel Bray and Tim Dawson

Site Code: NBC14/166

(SP 1266 3110)

Land at Nayles Barn, Cutsdean, Gloucestershire

Geophysical Survey (Magnetic) Report

For Lord Wemyss

by Daniel Bray and Tim Dawson

Thames Valley Archaeological Services Ltd

Site Code NBC 14/166

September 2014

Summary

Site name: Land at Nayles Barn, Cutsdean, Gloucestershire

Grid reference: SP 1266 3110

Site activity: Magnetometer survey

Date and duration of project: 3rd-4th September 2014

Project manager: Steve Ford

Site supervisor: Daniel Bray

Site code: NBC 14/166

Area of site: *c*.3.9ha

Summary of results: The survey has revealed a small number of anomalies which are likely to be man-made features of later Post-medieval date.

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✓ 26.09.14
	Steve Preston✓ 26.09.14

Thames Valley Archaeological Services Ltd, 47–49 De Beauvoir Road, Reading RG1 5NR
Tel. (0118) 926 0552; Fax (0118) 926 0553; email tvas@tvas.co.uk; *website: www.tvas.co.uk*

Land at Nayles Barn, Cutsdean, Gloucestershire
A Geophysical Survey (Magnetic)

by Daniel Bray and Tim Dawson

Report 14/166

Introduction

This report documents the results of a geophysical survey (magnetic) carried out at land at Nayles Barn, Cutsdean, Gloucestershire (SP 1266 3110) (Fig. 1). The work was commissioned by Ms Lucy Binnie of Land and Mineral Management Ltd, Suite 1, 82c Chesterton Lane, Cirecester, GL7 1WD on behalf of Lord Wemyss of Stanway House, Stanway, Cheltenham, GL54 5PQ.

An application for mineral extraction is to be made to Gloucestershire County Council for a site comprising an area of *c*.4ha of farmland. It is an extension to the existing quarry at this location. As a consequence of the possibility of archaeological deposits on the site which may be damaged or destroyed by extraction, phased evaluation was proposed comprising geophysical survey followed by trial trenching. This is in accordance with the Department for Communities and Local Government's *National Planning Policy Framework* (NPPF 2012) and the County's policies on archaeology. The field investigation was carried out to a specification approved by Mr Charles Parry, Archaeologist at Gloucester County Council. The fieldwork was undertaken by Kyle Beaverstock, Daniel Bray, Rebecca Constable and Anna Ginger on 3rd and 4th September 2014 and the site code is NBC 14/166.

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 within a field to the east of Nayles Barn, a in the Cotswold Hills *c*.8 west of the small town of Moreton-in-Marsh (Fig. 1). At present the site is open pasture surrounded by post-and-wire fencing with woodland to the north and south, further pasture to the west and active quarry workings to the east. In the vicinity are a number of small disused quarries. The underlying natural geology is recorded as mainly Jurassic Chipping Norton Limestone (flaggy to massive oolithic and sandy limestones) with some Jurassic Inferior Oolite (limestones) to the south (BGS 1981). The site is at a height of *c*.236m above Ordnance Datum and slopes gently upwards from south-east to north-west.

Conditions during the survey were dry and warm but overcast (Pls 1 and 2).

Site history and archaeological background

The archaeological potential of the site had been highlighted in a desk-based assessment for an adjacent parcel of the client's land (APS 2008). In summary there are few sites or finds recorded in the county Historic Environment Record for the environs of the site, and none particularly close by. A round barrow is located over 1km to the south-west and cropmarks including a circular enclosure are located to the north-west. Stray finds comprise an Early Bronze Age barbed and tanged arrowhead and Roman pottery to the south-west and a stone macehead (Mesolithic/Neolithic?) to the north-west. More recently geophysical survey (Haddrell 2009) and trenching (Hopkins 2009) of land immediately to the east revealed nothing of archaeological interest.

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 site grid was laid out following the axis of the field with a fenced-off access track to the south being the only obstruction within the field area (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 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 seem 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	**Effect**
Clip from -5.00 to 5.00 nT	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.
De-stagger: all grids, both by -1 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.7.22.01, producing a .FC7 file format, and printed as a .PDF for the final report.

The greyscale plot of the processed data is exported from TerraSurveyor 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 magnetic anomalies were recorded spread across the entire survey area (Fig. 3), some of which may represent buried archaeological features (Fig. 4). Of the potential archaeological ditch-type features, positive anomalies **[Fig. 4: 1 and 2]** appear to form a sub-rectangular enclosure with an internal dividing ditch which extends southwards beyond the southern edge of the enclosure. These anomalies appear to correspond with a series of linear scatters of stones noted on the surface of the field at this point. Immediately to the north-west of the enclosure a linear positive anomaly that extends west-south-west from the northern site boundary towards the centre of the field **[3]**. This and **[4]**, another linear positive anomaly which almost bisects the field across its centre, may represent buried ditches, possibly, particularly in the case of **[4]**, previous field boundaries.

In addition to the linear anomalies a series of large discrete positive patches were recorded across the middle portion of the survey area **[5-8]**. These could be caused by buried features such as pits or quarries but may also be natural hollows in the underlying geology. A series of negative anomalies represent further potential buried archaeological earthwork features. These consist of three linear anomalies, with **[9]** and **[10]** crossing the survey area in a north-south orientation, parallel to negative anomaly **[4]**, and **[11]** cutting across them almost at right-angles and being recorded for most of the length of the field.

The remaining anomalies recorded during the survey consist of a strong pattern of linear positive anomalies across the whole area, the regular parallel layout of which suggests that they are the result of ploughing **[12]**, a large amorphous patch of positive anomaly which may be caused by a change in the underlying geology **[13]**, a strong magnetic spike **[14]** which probably indicates the presence of a buried ferrous object, and a large area of magnetic disturbance in the southern corner **[15]** caused by the close proximity of the wire fencing which separates the site from the track to the south.

Conclusion

The survey has revealed a number of geophysical anomalies certainly or probably of man-made origin. One of these anomalies appears to be no more than an old field boundary which was formerly a part of the enclosed late post-medieval landscape. A second rectilinear group may represent the presence of a small enclosure though again, its orientation and position seem to show that it relates to the late post-medieval landscape. It also corresponds with a cluster of stonework still visible on the surface, which suggests no great antiquity. There are no anomalies that are easily interpretable as representing deposits of high archaeological interest.

References

APS 2008, Scarborough Pits, Cutsdean, Gloucestershire, a desk-based assessment, Archaeology and Planning Services report APS132-08, Cirencester

BGS, 1981, *British Geological Survey*, 1:50,000, Sheet 217, Solid and Drift Edition, Keyworth

English Heritage, 2008, *Geophysical Survey in Archaeological Field Evaluation*, English Heritage, Portsmouth (2nd edn)

Haddrell, S, 2009, 'Geophysical Survey Report, Nayles Barn, Cutsdean, Gloucestershire,' Stratascan report J2644, Upton on Severn

Hopkins, H, 2009, 'Land at Nayles Barn, Cutsdean, Gloucestershire: An archaeological evaluation', Thames Valley Archaeological Services report 09/85, Reading

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

Appendix 1: Survey information and data

PROGRAMME

Name: TerraSurveyor
Version: 3.0.25.1

Raw data

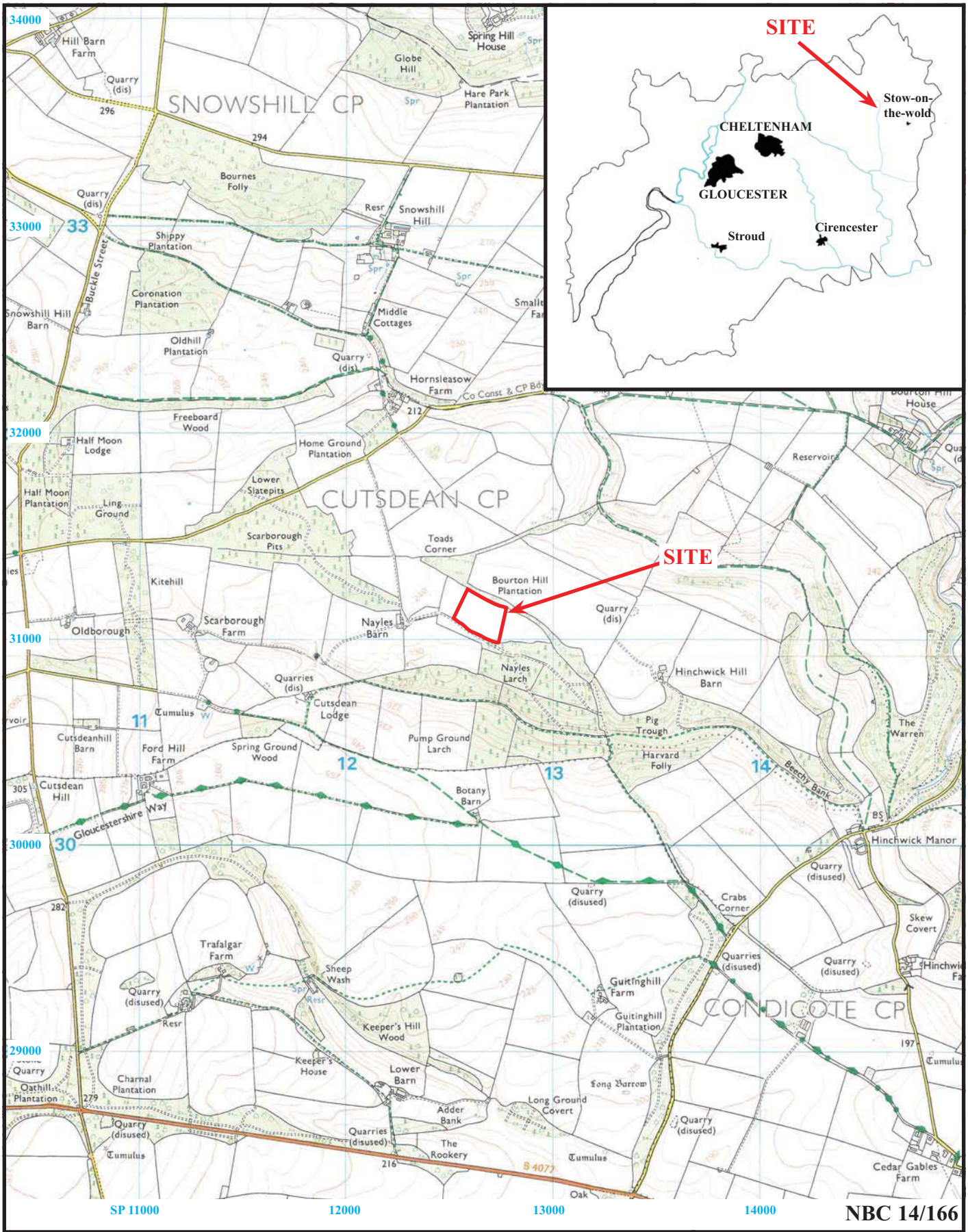
Instrument Type: Grad 601 (Magnetometer)
Units: nT
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 2047.5

Dimensions
Composite Size (readings): 880 x 260
Survey Size (meters): 220 m x 260 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: 8.92
Mean: -0.06
Median: 0.55
Composite Area: 5.72 ha
Surveyed Area: 3.8446 ha

Source Grids: 118
1 Col:0 Row:6 grids\101.xgd
2 Col:0 Row:7 grids\102.xgd
3 Col:0 Row:8 grids\103.xgd
4 Col:1 Row:1 grids\89.xgd
5 Col:1 Row:2 grids\90.xgd
6 Col:1 Row:3 grids\91.xgd
7 Col:1 Row:4 grids\92.xgd
8 Col:1 Row:5 grids\93.xgd
9 Col:1 Row:6 grids\94.xgd
10 Col:1 Row:7 grids\95.xgd
11 Col:1 Row:8 grids\96.xgd
12 Col:1 Row:9 grids\97.xgd
13 Col:1 Row:10 grids\98.xgd
14 Col:1 Row:11 grids\99.xgd
15 Col:1 Row:12 grids\100.xgd
16 Col:2 Row:0 grids\64.xgd
17 Col:2 Row:1 grids\65.xgd
18 Col:2 Row:2 grids\66.xgd
19 Col:2 Row:3 grids\67.xgd
20 Col:2 Row:4 grids\68.xgd
21 Col:2 Row:5 grids\81.xgd
22 Col:2 Row:6 grids\82.xgd
23 Col:2 Row:7 grids\83.xgd
24 Col:2 Row:8 grids\84.xgd
25 Col:2 Row:9 grids\85.xgd
26 Col:2 Row:10 grids\86.xgd
27 Col:2 Row:11 grids\87.xgd
28 Col:2 Row:12 grids\88.xgd
29 Col:3 Row:0 grids\40.xgd
30 Col:3 Row:1 grids\69.xgd
31 Col:3 Row:2 grids\70.xgd
32 Col:3 Row:3 grids\71.xgd
33 Col:3 Row:4 grids\72.xgd
34 Col:3 Row:5 grids\73.xgd
35 Col:3 Row:6 grids\74.xgd
36 Col:3 Row:7 grids\75.xgd
37 Col:3 Row:8 grids\76.xgd
38 Col:3 Row:9 grids\77.xgd
39 Col:3 Row:10 grids\78.xgd
40 Col:3 Row:11 grids\79.xgd
41 Col:3 Row:12 grids\80.xgd
42 Col:4 Row:0 grids\27.xgd
43 Col:4 Row:1 grids\28.xgd
44 Col:4 Row:2 grids\29.xgd
45 Col:4 Row:3 grids\30.xgd
46 Col:4 Row:4 grids\31.xgd
47 Col:4 Row:5 grids\32.xgd
48 Col:4 Row:6 grids\33.xgd
49 Col:4 Row:7 grids\34.xgd
50 Col:4 Row:8 grids\35.xgd
51 Col:4 Row:9 grids\36.xgd
52 Col:4 Row:10 grids\37.xgd
53 Col:4 Row:11 grids\38.xgd
54 Col:4 Row:12 grids\39.xgd
55 Col:5 Row:0 grids\51.xgd
56 Col:5 Row:1 grids\52.xgd
57 Col:5 Row:2 grids\53.xgd
58 Col:5 Row:3 grids\54.xgd
59 Col:5 Row:4 grids\55.xgd
60 Col:5 Row:5 grids\56.xgd
61 Col:5 Row:6 grids\57.xgd
62 Col:5 Row:7 grids\58.xgd
63 Col:5 Row:8 grids\59.xgd
64 Col:5 Row:9 grids\60.xgd
65 Col:5 Row:10 grids\61.xgd
66 Col:5 Row:11 grids\62.xgd
67 Col:5 Row:12 grids\63.xgd
68 Col:6 Row:0 grids\289.xgd
69 Col:6 Row:1 grids\290.xgd
70 Col:6 Row:2 grids\291.xgd
71 Col:6 Row:3 grids\41.xgd
72 Col:6 Row:4 grids\42.xgd
73 Col:6 Row:5 grids\43.xgd
74 Col:6 Row:6 grids\44.xgd
75 Col:6 Row:7 grids\45.xgd
76 Col:6 Row:8 grids\46.xgd
77 Col:6 Row:9 grids\47.xgd
78 Col:6 Row:10 grids\48.xgd
79 Col:6 Row:11 grids\49.xgd
80 Col:6 Row:12 grids\50.xgd
81 Col:7 Row:1 grids\277.xgd
82 Col:7 Row:2 grids\278.xgd
83 Col:7 Row:3 grids\279.xgd
84 Col:7 Row:4 grids\280.xgd
85 Col:7 Row:5 grids\281.xgd
86 Col:7 Row:6 grids\282.xgd
87 Col:7 Row:7 grids\283.xgd
88 Col:7 Row:8 grids\284.xgd
89 Col:7 Row:9 grids\285.xgd
90 Col:7 Row:10 grids\286.xgd
91 Col:7 Row:11 grids\287.xgd
92 Col:7 Row:12 grids\288.xgd
93 Col:8 Row:1 grids\15.xgd
94 Col:8 Row:2 grids\16.xgd
95 Col:8 Row:3 grids\17.xgd
96 Col:8 Row:4 grids\18.xgd
97 Col:8 Row:5 grids\19.xgd
98 Col:8 Row:6 grids\20.xgd
99 Col:8 Row:7 grids\21.xgd
100 Col:8 Row:8 grids\22.xgd
101 Col:8 Row:9 grids\23.xgd
102 Col:8 Row:10 grids\24.xgd
103 Col:8 Row:11 grids\25.xgd
104 Col:8 Row:12 grids\26.xgd
105 Col:9 Row:1 grids\03.xgd
106 Col:9 Row:2 grids\04.xgd
107 Col:9 Row:3 grids\05.xgd
108 Col:9 Row:4 grids\06.xgd
109 Col:9 Row:5 grids\07.xgd
110 Col:9 Row:6 grids\08.xgd
111 Col:9 Row:7 grids\09.xgd
112 Col:9 Row:8 grids\10.xgd
113 Col:9 Row:9 grids\11.xgd
114 Col:9 Row:10 grids\12.xgd
115 Col:9 Row:11 grids\13.xgd
116 Col:9 Row:12 grids\14.xgd
117 Col:10 Row:1 grids\01.xgd
118 Col:10 Row:2 grids\02.xgd

Processed data

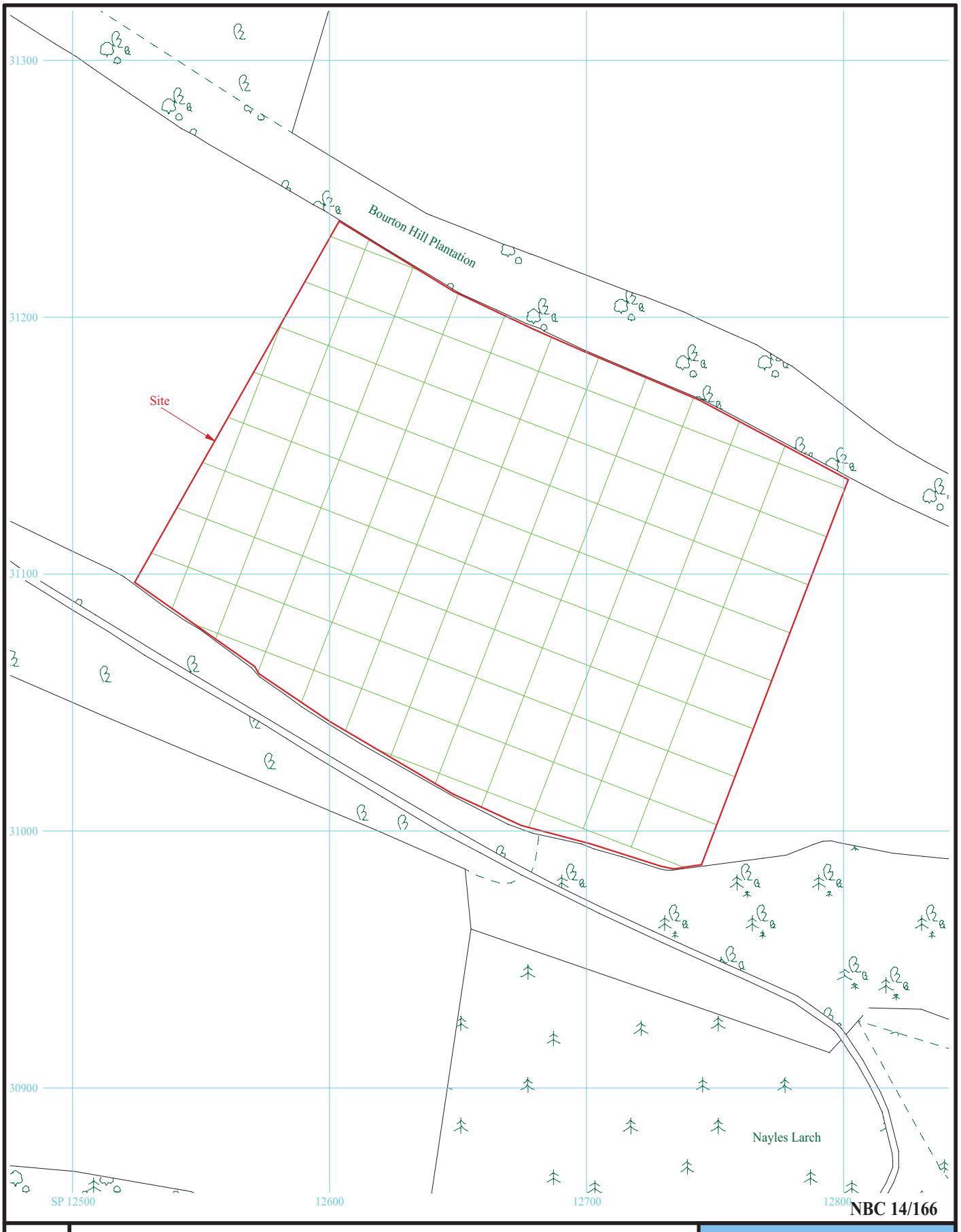


NBC 14/166

Land at Nayles Barn, Cutsdean, Gloucestershire, 2014
Geophysical Survey (Magnetic)

Figure 1. Location of site within Cutsdean and Gloucestershire.

THAMES VALLEY ARCHAEOLOGICAL SERVICES



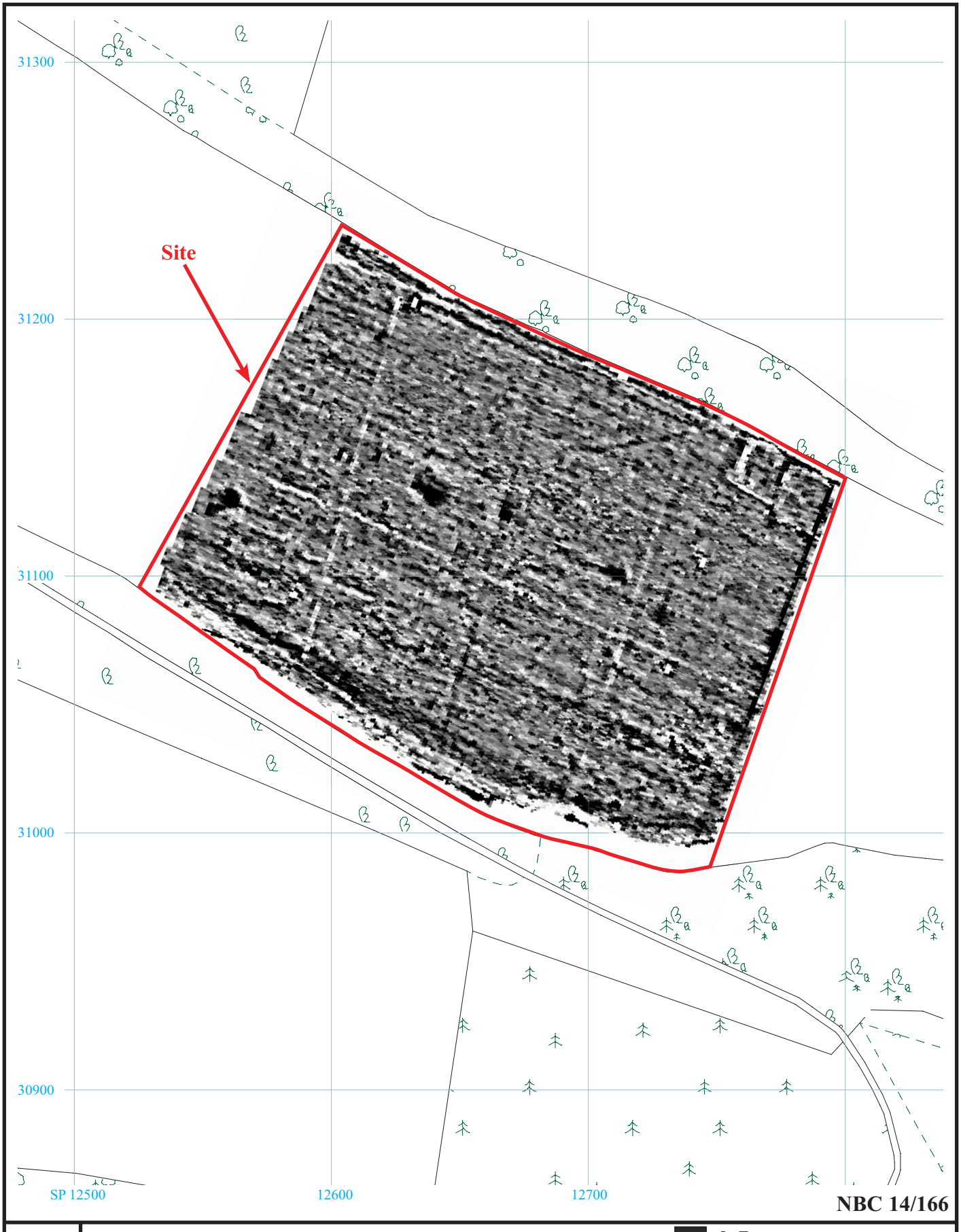
N

Land at Nayles Barn, Cutsdean, Gloucestershire, 2014 Geophysical Survey (Magnetic)

Figure 2. Survey grid layout.

0 100m

THAMES VALLEY ARCHAEOLOGICAL SERVICES



N

Land at Nayles Barn, Cutsdean,
Gloucestershire, 2014
Geophysical Survey (Magnetic)

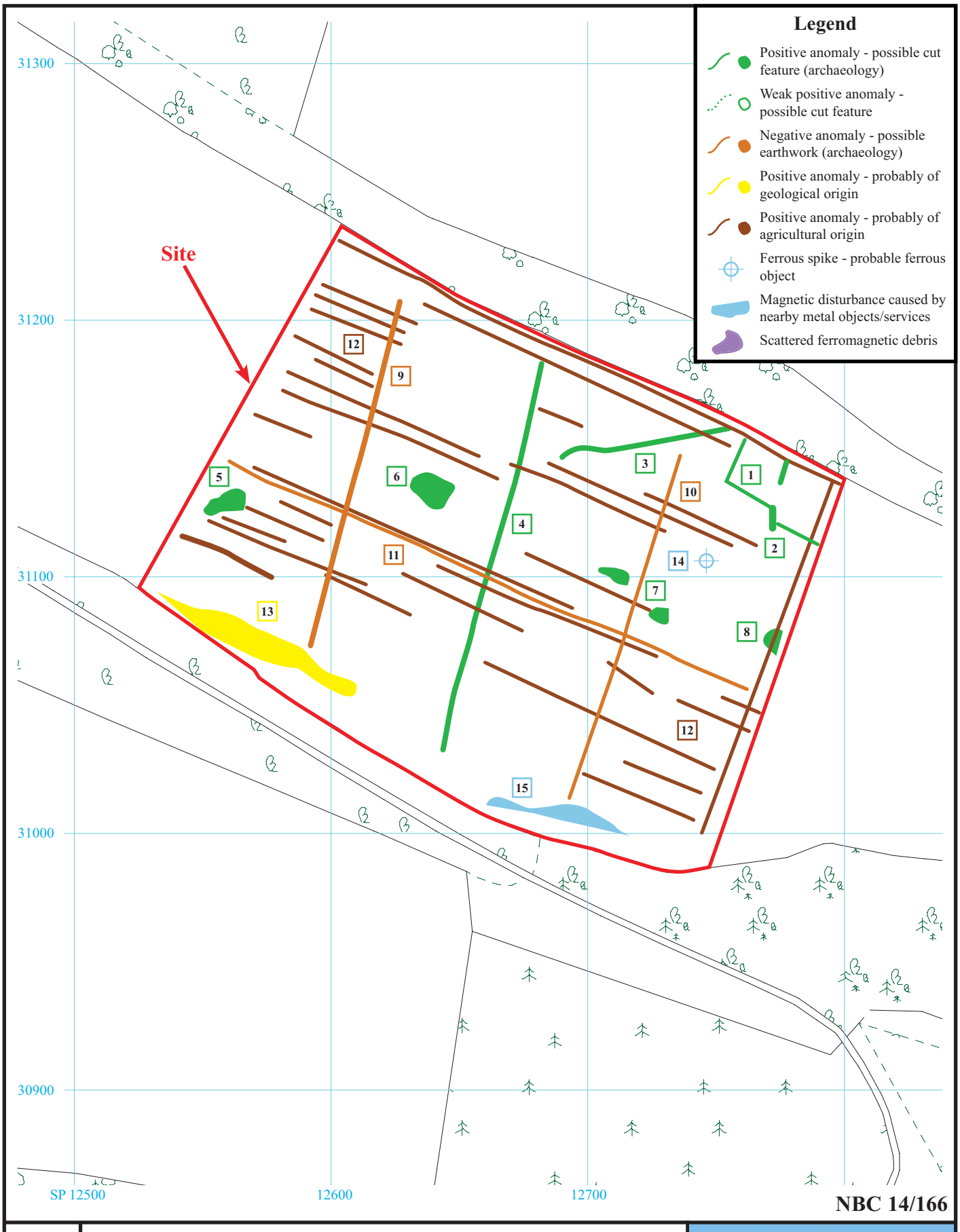
Figure 3. Plot of minimally processed gradiometer data.

0m 100m

+5 nT

-5 nT

THAMES VALLEY ARCHAEOLOGICAL SERVICES



N

Land at Nayles Barn, Cutsdean
Gloucestershire, 2014
Geophysical Survey (Magnetic)

Figure 4. Interpretation plot.

0m 100m

THAMES VALLEY ARCHAEOLOGICAL SERVICES

Plate 1: View of site looking east towards existing quarry

Plate 2: View of site looking north west

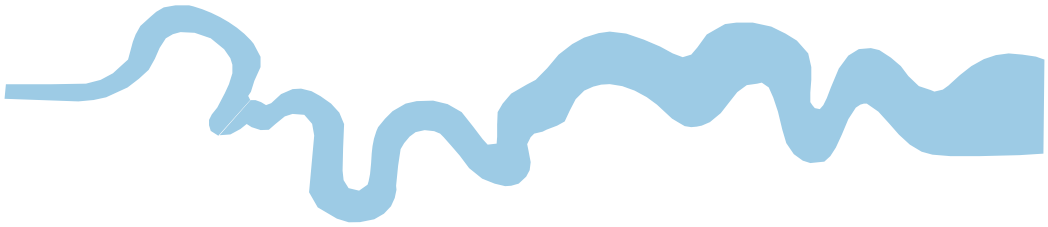
NBC 14/166

Land at Nayles Barn, Cutsdean,
Gloucestershire, 2014
Geophysical Survey (Magnetic)
Plates 1 and 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



Thames Valley Archaeological Services Ltd,
47-49 De Beauvoir Road, Reading,
Berkshire, RG1 5NR

Tel: 0118 9260552
Fax: 0118 9260553
Email: tvas@tvas.co.uk
Web: www.tvas.co.uk