

T H A M E S V A L L E Y

ARCHAEOLOGICAL

S E R V I C E S

**Highwood Copse Primary School, Sandford Park,
Newbury, West Berkshire**

Geophysical Survey (Magnetic)

by David Sanchez

Site Code: HCN16/32

(SU 4720 6470)

Highwood Copse Primary School, Sandleford Park, Newbury, West Berkshire

Geophysical Survey (Magnetic) Report

For Kier Construction Ltd

by David Sanchez

Thames Valley Archaeological Services Ltd

Site Code HCS 16/32

April 2017

Summary

Site name: Highwood Copse Primary School, Sandleford Park, Newbury, West Berkshire

Grid reference: SU 4720 6470

Site activity: Magnetometer survey

Date and duration of project: 30th – 31st March 2017

Project manager: Steve Ford

Site supervisor: David Sanchez

Site code: HCN 16/32

Area of site: 2.5ha (2.3ha surveyed)

Summary of results: A range of magnetic anomalies were recorded across the survey areas. These appear to have been primarily caused by buried services and disturbed ground around the tracks which cross the site and along the edge of the road to the east. Two faint linear anomalies may be of archaeological origin but are just as likely to indicate agricultural activity.

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

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Report edited/checked by: Steve Ford✓ 05.04.17 Tim Dawson✓ 05.04.17
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Highwood Copse Primary School, Sandleford Park, Newbury, West Berkshire A Geophysical Survey (Magnetic)

by David Sanchez

Report 16/32b

Introduction

This report documents the results of a geophysical survey (magnetic) carried out on an irregular plot of land off Newtown Road, Sandleford Park, Newbury, West Berkshire (SU 4720 6470) (Fig. 1). The work was commissioned by Mr Peter Stephens of Hunters South Architects, Sussex Business Village, Lake Lane, Barnham, PO22 0AA, on behalf of Kier Construction Ltd.

West Berkshire Council proposes to build a new primary school on the southern edge of Newbury College. A planning application has been made (17/00158/COMIND) and further archaeological field evaluation, consisting of geophysical survey and trial trenching, has been requested in order to inform any further mitigation strategy. 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 Ms Sarah Orr, Historic Environment Record Officer at West Berkshire Council. The fieldwork was undertaken by David Sanchez and Rebecca Constable on 30th and 31st March 2017 and the site code is HCN 16/32.

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 the southern outskirts of Newbury, west of the A339, on the northern slopes of the Enbourne Valley, in West Berkshire but close to the county boundary with Hampshire (Fig. 1). The site comprises a sub-rectangular parcel of land bounded on the west by woodland, to the south by a large pond and by farmland to the east and north (Fig. 2). The main development area measures approximately 1.82ha. Newbury College lies to the north and a footpath to the college runs along the eastern edge of the proposed development site. The area currently consists of rough pasture that slopes gently down to the south towards the pond (Pls 1–4). The site area including the access roads measures approximately 2.5ha and is centred on NGR SU 4720 6470, lying at approximately 120m above Ordnance Datum. According to the British Geological Survey the underlying

geology consists of Silchester Gravel (Sixth Terrace) (BGS 2006). Conditions during the survey period were sunny turning to overcast but dry.

Site history and archaeological background

A desk-based assessment has been undertaken for the proposal site (Taylor 2016). This notes that the area of the Kennet Valley around Newbury, close to the confluence of the Rivers Lambourn and Kennet, is a particularly rich and well-studied archaeological landscape. However, there is limited evidence of prehistoric activity in the area of Sandleford Park, with a small number of pieces of struck flint from the Mesolithic, Neolithic and Bronze Age having been recovered during fieldwalking and other archaeological investigations. Of particular note is the recovery of flints from within the field that is proposed for development (Ford 1997), although not in sufficient density to suggest settlement in this location. There is also limited evidence of Roman agricultural field systems across this hillside and it is possible that the proposal site may contain similar field ditches. The development site lies within the medieval estate of Sandleford Priory but there is no evidence to suggest that it was used for anything other than agriculture during this period, or indeed since.

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 grid was laid out across the main development area and the access road leading eastwards to the A339. The only obstructions encountered were the existing paths along the eastern edge of the main development area and running along the path of the proposed northern access.

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

Clip from -1.80 to 2.20 nT

Interpolate: y doubled

De-stripe: median, all sensors

Effect

Enhance the contrast of the image to improve the appearance of possible archaeological anomalies.

Increases the resolution of the readings in the y axis, enhancing the shape of anomalies.

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.

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

The survey recorded a range of magnetic anomalies across the whole survey area (Figs. 3 and 4). Of these only two are of potential archaeological interest [**Fig. 5: 1**]. They consist of two linear weak positive anomalies located at the southern end of the survey area which appear to form a right-angled corner. Positive anomalies usually represent buried cut features, most likely ditches in this case, and their orientation to one another suggest they might form the corner of an enclosure. They are, however, very weak compared to background magnetic levels and are also aligned to the long axis of the field and the pond to the south, which may indicate that they are a result of relatively recent agricultural or landscaping work. This interpretation is supported by the presence of strong magnetic readings immediately to the east which suggest the presence of buried ferromagnetic debris or heavily disturbed ground.

The remaining magnetic anomalies consist of a large number of dipolar spikes, which usually indicate the presence of buried ferrous objects of unknown date, and areas of strong magnetic disturbance. The latter are particularly seen along the western edge of the main survey area [**2**] where it probably indicates the presence of a buried service pipe or cable, and along the eastern end of the access route, where the close proximity of the road and associated fencing will have affected the magnetic readings.

Conclusion

The geophysical survey was successfully completed across the majority of the proposed development area. A range of magnetic anomalies were recorded across the survey areas. These appear to have been primarily caused by buried services and disturbed ground around the tracks which cross the site and along the edge of the road to the east. Two faint linear anomalies may be of archaeological origin but are just as likely to indicate agricultural activity.

References

- BGS, 2006, *British Geological Survey*, 1:50,000, Sheet 267, Solid and Drift Edition, Keyworth
- 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)
- Ford, S, 1997, 'Sandleford Park, Newbury, Berkshire: An archaeological evaluation,' Thames Valley Archaeological Services report 97/16
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- IfA, 2011, *Standard and Guidance: for archaeological geophysical survey*, Reading
- NPPF, 2012, *National Planning Policy Framework*, Dept Communities and Local Government, London
- Taylor, K, 2016, 'Highwood Copse Primary School, Sandleford Park, Newbury, West Berkshire: An archaeological desk-based assessment', Thames Valley Archaeological Services report 16/32, Reading

Appendix 1. Survey and data information

Programme:

Name: TerraSurveyor
Version: 3.0.29.3

Main area

Raw data

Survey corner coordinates (X/Y):
Northwest corner: 447325.03, 164845.92 m
Southeast corner: 447485.03, 164645.92 m
Direction of 1st Traverse: 175.43 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 2047.5

Dimensions

Composite Size (readings): 640 x 200
Survey Size (meters): 160 m x 200 m
Grid Size: 20 m x 20 m
X Interval: 0.25 m
Y Interval: 1 m

Stats

Max: 96.49
Min: -100.00
Std Dev: 8.49
Mean: 0.25
Median: 0.10
Composite Area: 3.2 ha
Surveyed Area: 1.891 ha

Source Grids: 60

1 Col:0 Row:1 grids\16.xgd
2 Col:1 Row:1 grids\17.xgd
3 Col:1 Row:2 grids\18.xgd
4 Col:1 Row:3 grids\19.xgd
5 Col:1 Row:4 grids\20.xgd
6 Col:1 Row:5 grids\21.xgd
7 Col:1 Row:6 grids\22.xgd
8 Col:1 Row:7 grids\23.xgd
9 Col:1 Row:8 grids\24.xgd
10 Col:1 Row:9 grids\25.xgd
11 Col:2 Row:1 grids\26.xgd
12 Col:2 Row:2 grids\27.xgd
13 Col:2 Row:3 grids\28.xgd
14 Col:2 Row:4 grids\29.xgd
15 Col:2 Row:5 grids\30.xgd
16 Col:2 Row:6 grids\31.xgd
17 Col:2 Row:7 grids\32.xgd
18 Col:2 Row:8 grids\33.xgd
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57 Col:7 Row:4 grids\72.xgd
58 Col:7 Row:5 grids\73.xgd
59 Col:7 Row:6 grids\74.xgd
60 Col:7 Row:7 grids\75.xgd

Processed data

Stats

Max: 2.20
Min: -1.80
Std Dev: 0.87
Mean: 0.02
Median: 0.01

Processes: 5

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

Access route

Raw data

Survey corner coordinates (X/Y):
Northwest corner: 447441.36, 164932.81 m
Southeast corner: 447481.36, 164772.81 m
Direction of 1st Traverse: 151.7 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 2047.5

Dimensions

Composite Size (readings): 160 x 160
Survey Size (meters): 40 m x 160 m
Grid Size: 20 m x 20 m
X Interval: 0.25 m
Y Interval: 1 m

Stats

Max: 96.27
Min: -100.00
Std Dev: 7.25
Mean: 0.01
Median: 0.53
Composite Area: 0.64 ha
Surveyed Area: 0.41285 ha

Source Grids: 15

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:1 Row:0 grids\09.xgd
10 Col:1 Row:1 grids\10.xgd
11 Col:1 Row:2 grids\11.xgd
12 Col:1 Row:3 grids\12.xgd

13 Col:1 Row:4 grids\13.xgd
14 Col:1 Row:5 grids\14.xgd
15 Col:1 Row:6 grids\15.xgd

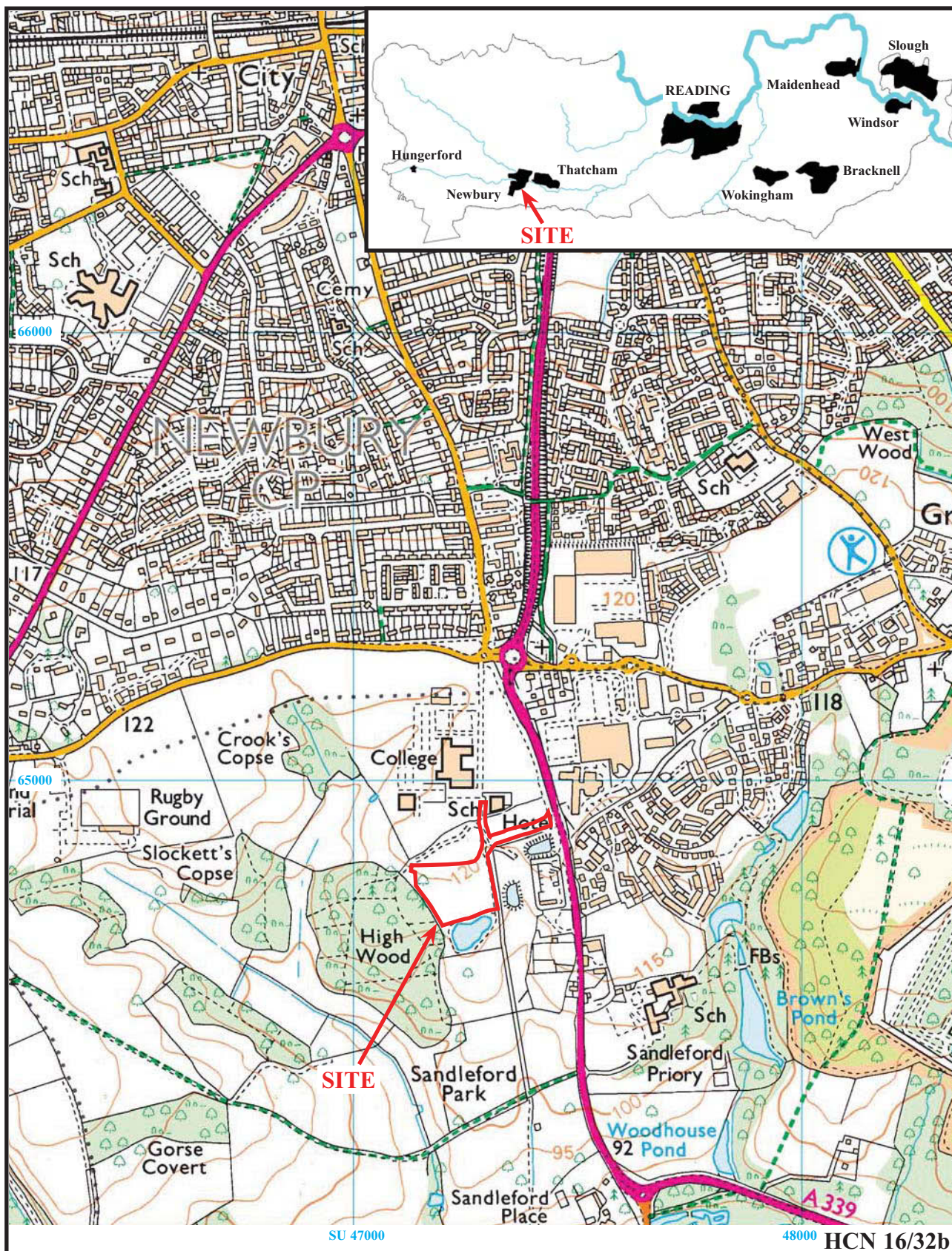
Processed data

Stats

Max: 2.20
Min: -1.80
Std Dev: 0.93
Mean: 0.06
Median: 0.01

Processes: 5

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

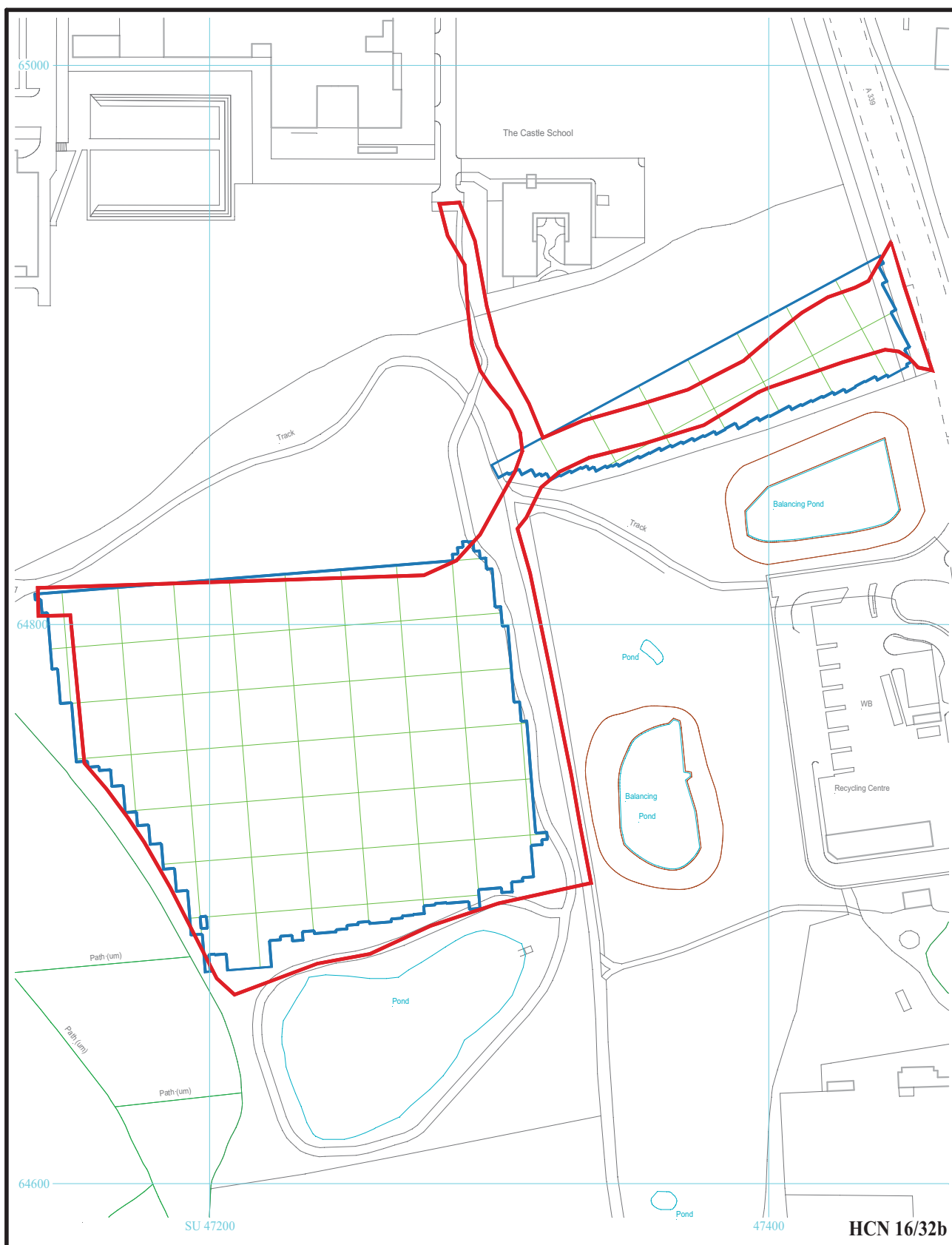


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Newbury, West Berkshire, 2017
Geophysical Survey (Magnetic)**

**Figure 1. Location of site within Newbury and
West Berkshire.**

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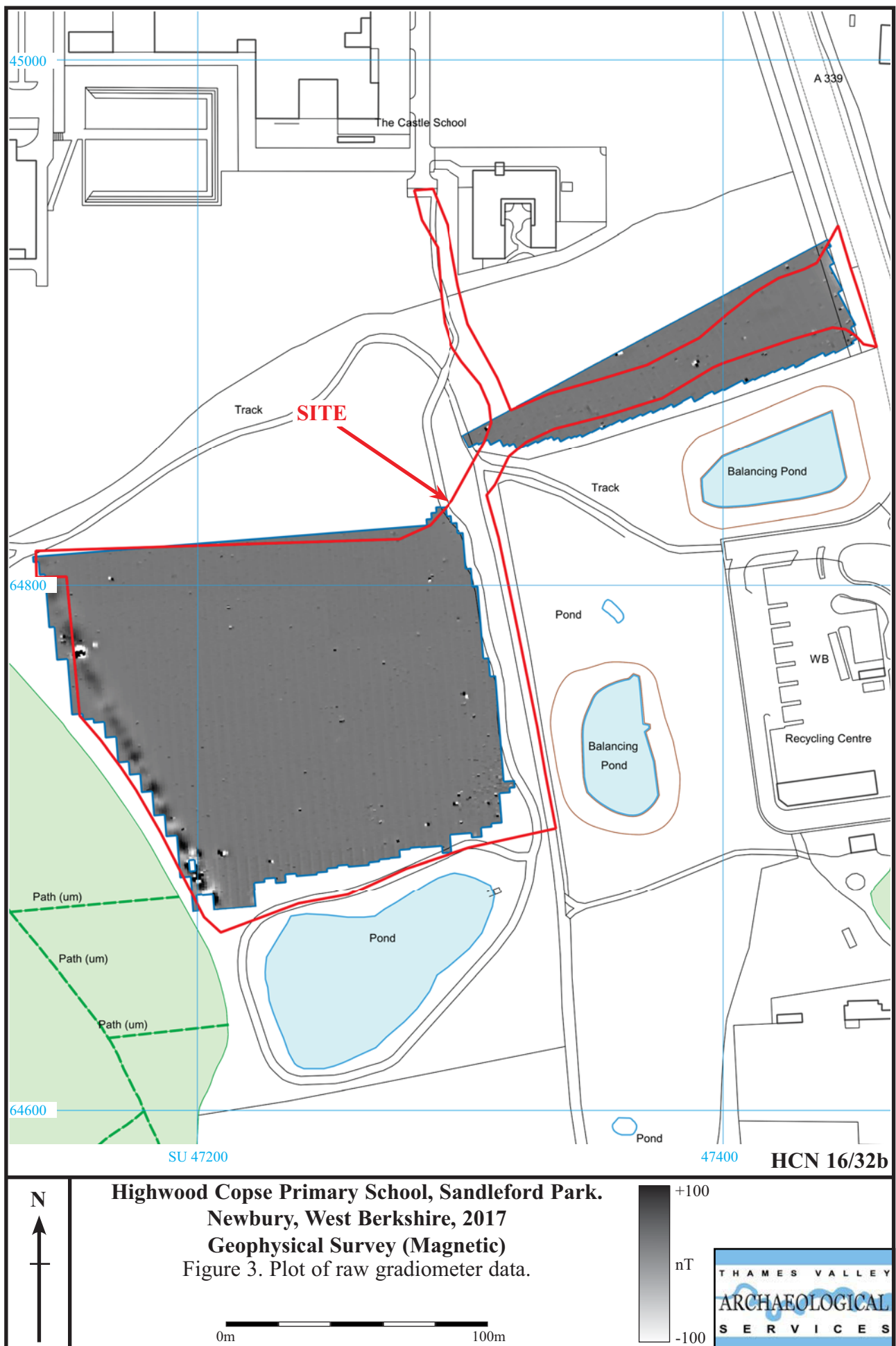


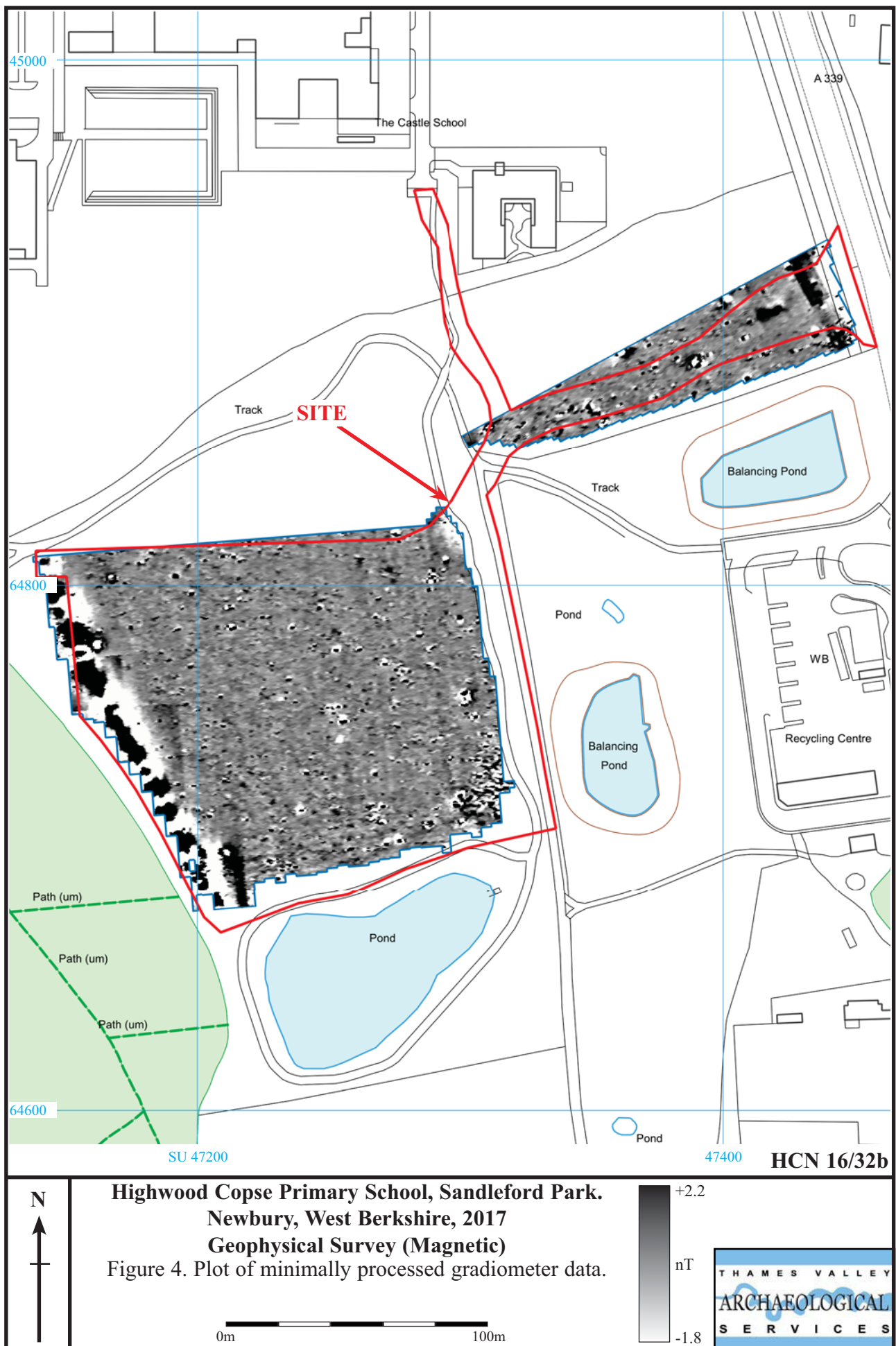
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Figure 2. Survey grid layout.



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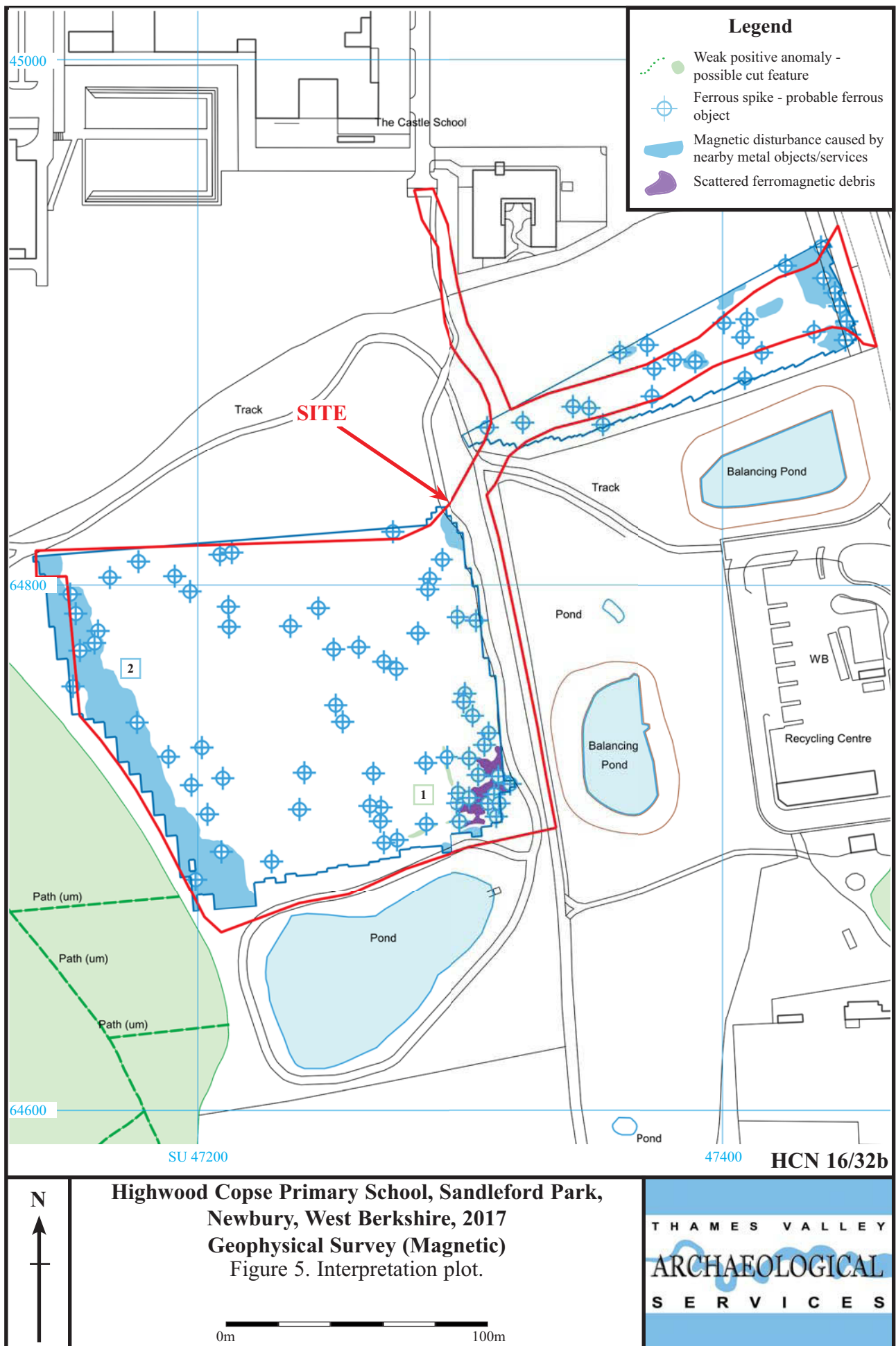




Plate 1. The main survey area, looking south-east from the north-western corner.



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



Plate 3. The main survey area, looking south along the eastern edge.



Plate 4. The access route survey area, looking east.

HCN 16/32b

**Highwood Copse Primary School, Sandleford Park,
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Geophysical Survey (Magnetic)
Plates 1 to 4.**

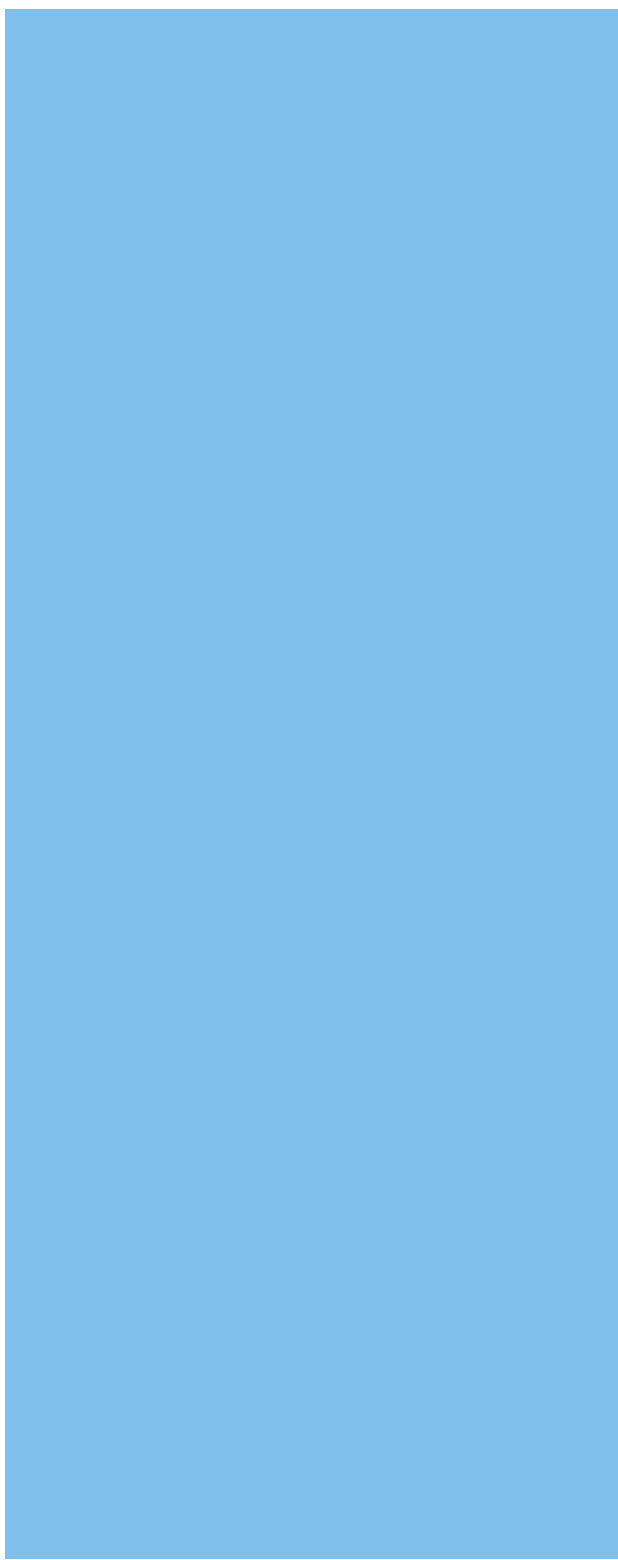
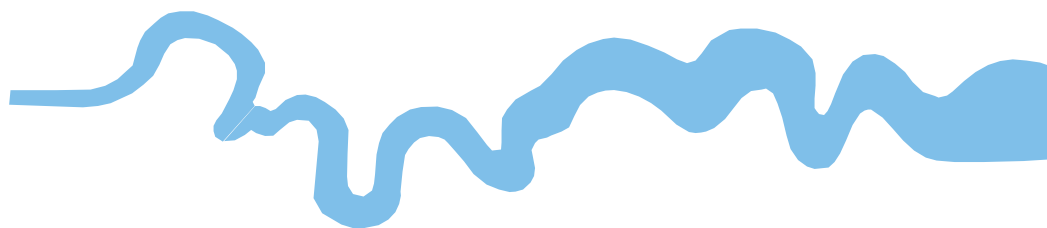
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TIME CHART

Calendar Years

Modern _____	AD 1901
Victorian _____	AD 1837
Post Medieval _____	AD 1500
Medieval _____	AD 1066
Saxon _____	AD 410
Roman _____	AD 43
	AD 0 BC
Iron Age _____	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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