

SG-SMR 18236



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**Land at Harry Stoke
South Gloucestershire**

Geophysical Survey

May 2005

Report No. 1394

CLIENT
Crest Nicholson Properties Ltd

Land at Harry Stoke

South Gloucestershire

Geophysical Survey

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Summary.

A geophysical evaluation comprising, magnetic scanning followed by selected detailed survey, was undertaken at a site north of Bristol covering a total area of approximately 25 hectares. The scanning did not identify any areas indicative of major occupational activity. However, areas of potential were identified for further investigation by detailed magnetic survey. The detailed survey confirmed the results of the scanning, with no probable areas of occupational activity identified. Anomalies caused by recent agricultural activity have been identified in many of the blocks. Other anomalies are interpreted as being caused by recent intrusive activity, some probably associated with a former nursery. A number of localised areas of enhanced magnetic responses have also been noted. Whilst an archaeological origin cannot be discounted, it is considered more likely that these anomalies are due to variations in the composition of the topsoil. Consequently, on the basis of the geophysical survey and the previous archaeological assessment, the archaeological potential of the survey area is deemed to be low.

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1. Introduction and Archaeological Background

- 1.1 Archaeological Services WYAS was commissioned by Andrew Crutchley of CPM Environmental Planning and Design on behalf of their clients, Crest Nicholson Properties Ltd, to carry out a geophysical evaluation of land south-east of Harry Stoke, on the northern outskirts of Bristol (see Fig. 1), in advance of a proposed residential development. The site is centred at ST 623 788.
- 1.2 The area under evaluation comprised eleven fields in three adjacent blocks, being bounded to the north and east by existing property and field boundaries and to the south by the A4174 road (see Fig. 2). Ham Brook, a tributary of the River Frome, bisects the site. Most of the fields were under permanent pasture at the time of the survey, although it was learned that fields in the central part of the site had previously been used as a nursery. An orchard was excluded from the survey area (see Fig. 2), as too was an area to the west that had previously been evaluated by trial trenching (see Section 1.5 below).
- 1.3 The evaluation comprised magnetic scanning of the site (17.5 hectares) followed by selected detailed survey covering 4 hectares. The scanning was carried out between May 9th and May 11th 2005, with the detailed survey commencing on May 11th 2005 and concluding on May 13th 2005. No problems were encountered during the fieldwork once the outstanding access arrangements had been resolved.
- 1.4 Topographically, the site lies on high land that undulates between 50m and 63m Above Ordnance Datum (AOD). The underlying geology comprises drift of Jurassic and Cretaceous Clays overlain by pelostagnogley soils of the Denchworth Association that can be seasonally waterlogged clayey soils. To the east, the geology is Permo-Triassic reddish mudstone overlain by Typical Argillic Pelosols.
- 1.5 An archaeological evaluation was undertaken in 1996 by Avon Archaeology in fields to the south-west of the current survey area. This land is included within the overall development area but is outside the current evaluation. Over forty trial trenches were opened, with significant archaeological features and deposits being recorded in seventeen. The archaeological activity ranged from Bronze Age artefacts and ditch type features to late 12th and early 13th century buildings and post-medieval field boundaries and ridge and furrow earthworks. These earthworks are thought to be part of the medieval hamlet of Harry Stoke.
- 1.6 An archaeological assessment (CPM 2003) identified five entries on the South Gloucestershire Sites and Monument Record within the overall proposal area, which included an occupation site of the late 17th century and an 'ancient' road, as well as the features recorded during the earlier evaluation.

2. Objectives, Methodology and Presentation

- 2.1 The general objectives of the geophysical evaluation were:
 - to identify any areas of archaeological potential
 - to establish the extent of any areas of archaeological potential

- to determine the nature of any archaeological magnetic anomalies.
- 2.2 The primary objective was to be achieved by scanning all of the site that was suitable for survey. Magnetic scanning requires the operator to visually identify anomalous responses on the instrument display panel whilst covering the site in widely spaced traverses, typically 10m apart. The instrument logger is not used and there is therefore no data collection. Once anomalous responses are identified they are marked in the field with bamboo canes and approximately located on a base plan. This method is usually employed as a means of selecting areas for detailed survey when only a percentage sample of the whole site is to be subject to detailed survey, as in this case.
 - 2.3 The disadvantages of magnetic scanning are that features that produce weak anomalies (less than 2nT) are unlikely to stand out from the magnetic background and so will be difficult to identify. The relatively coarse sampling interval also means that discrete features, or linear features that are parallel or broadly oblique to the direction of traverse, may not be detected. The drawbacks mentioned above mean that 'negative' results from magnetic scanning should always be checked by an agreed amount of detailed survey.
 - 2.4 The secondary objective was to be achieved by detailed magnetic survey, the extent of which would be determined based on the results of the scanning and any other pertinent information. Consequently at the conclusion of the scanning, nine survey blocks were positioned to target areas of archaeological potential identified through scanning.
 - 2.5 Detailed survey employs the use of a sample trigger to automatically take readings at predetermined points, typically at 0.25m intervals, on zig-zag traverses 1m apart. These readings are stored in the memory of the instrument and are later dumped to computer for processing and interpretation. Detailed survey therefore allows the visualisation of weaker anomalies that may not have been identified during scanning.
 - 2.6 During the geophysical survey, a team of two geophysicists used Geoscan FM36 and FM256 fluxgate gradiometers and a Bartington Grad601 magnetic gradiometer. The instruments were checked for electronic and mechanical drift at a common point and calibrated as necessary. Readings were taken on the 0.1nT range, at 0.25m intervals on zig-zag traverses 1m apart within 20m by 20m square grids during the detailed survey.
 - 2.7 The survey methodology, report and any recommendations comply with guidelines outlined by English Heritage (David 1995) and by the IFA (Gaffney, Gater and Ovenden 2002). All figures reproduced from Ordnance Survey mapping are done so with the permission of the controller of Her Majesty's Stationery Office. © Crown copyright.
 - 2.8 A general site location plan, incorporating the 1:50000 Ordnance Survey mapping, is shown in Figure 1. Figure 2 shows the location for the detailed survey blocks at a scale of 1:2500 superimposed onto a digital base map supplied by the client. The processed (greyscale) and unprocessed (XY trace plot) data, together with accompanying interpretation diagrams, are presented in Figures 3 to 14 inclusive at a scale of 1:1000.

- 2.9 Technical information on the equipment used, data processing and magnetic survey methodology is given in Appendix 1. Appendix 2 details the survey location information and Appendix 3 describes the composition and location of the archive.

The figures in this report have been produced following analysis of the data in 'raw' and processed formats and over a range of different display levels. All figures are presented to most suitably display and interpret the data from this site based on the experience and knowledge of Archaeological Services staff.

3. Results: Magnetometer Scanning

- 3.1 During scanning it was observed that the background soil noise varied dramatically across the site. To the north and north-west the background was very 'flat' varying by only about +/- 1nT. In other parts, particularly in the centre of the site, the background was much more variable. This variation is thought to relate primarily to current and past land usage.
- 3.2 The areas for detailed survey were selected to evaluate apparently 'blank' areas and on topographically favourable locations, to investigate isolated and linear anomalies identified during scanning and to evaluate upstanding earthworks and determine the possible extent of previously identified archaeological activity. The rationale for the individual blocks is detailed below.
- 3.3 Block 1 was positioned over extant earthworks to assess the strength of response and to determine whether there were any associated sub-surface features, whilst Block 2 was located to evaluate the flatter ground to the south-east of the earthworks where a number of scanning 'hits' had been recorded.
- 3.4 The aim of Block 3 was to establish whether any of the archaeological features identified during the trenching in the adjoining field in 1996 continued into the current evaluation area and to ascertain whether there was any underlying cause or pattern to the frequent 'iron spikes' noted during the scanning.
- 3.5 Block 4 was positioned to encompass a number of scanning 'hits' on a flat area near to the top of a rise and Block 5 was located to evaluate a series of linear anomalies.
- 3.6 Blocks 6 and 7 were located to evaluate a series of scanning 'hits', the latter also located in an area of very high and variable background noise. Block 8 sought to locate a cropmark (SMR No. 10276).
- 3.7 The aim of Block 9 was to sample at the northern end of the site in an area assessed as 'quiet' during the scanning.

4. Results: Detailed Survey

- 4.1 Isolated dipolar anomalies ('iron spikes' - see Appendix 1) have been identified across all parts of the site. These 'iron spike' anomalies are indicative of ferrous objects or other magnetic material in the topsoil/subsoil and, although archaeological artefacts may cause them, they are more often caused by modern cultural debris that has been introduced into the topsoil. When 'iron spike' anomalies were found clustered together, or in close

proximity to other magnetic anomalies, a cane was placed in the field establishing a possible target area.

- 4.2 Consistent with the scanning phase of the survey, a plethora of isolated dipolar ('iron spike') responses have been identified within all survey blocks with the exception of Blocks 8 and 9. There was no apparent clustering to these anomalies and they are consequently not considered to have an archaeological origin.

4.3 Block 1 and Block 2 (see Figs 3, 4 and 5)

- 4.3.1 Block 1 was positioned over extant earthworks in an attempt to identify additional features associated with the medieval hamlet of Harry Stoke. Parallel linear areas of magnetic enhancement aligned from south-west to north-east can be clearly seen in the greyscale image (see Fig 3), these anomalies being indicative of the banks either side of a trackway. Another linear area of enhancement can be seen in the south-east corner of the block which also correlates with an earthwork.

- 4.3.2 Two short parallel linear trend anomalies of unknown origin have been identified to the north of the earthworks. There were no discernable earthworks near to the recorded position of these anomalies and a modern cause is presumed.

- 4.3.3 A large isolated dipolar ('iron spike') anomaly to the north of the earthwork trackway is due to a drain cover.

- 4.3.4 Three large 'iron spike' anomalies are prominent in the data in Block 2. The strongest anomaly was caused by a telegraph pole. There was no obvious above ground cause for the other two responses.

- 4.3.5 In the northern corner of the block adjacent to two of the 'iron spike' anomalies are three parallel linear trend anomalies. A modern origin is considered probable and they may be associated with the cause of the 'spikes'.

- 4.3.6 Perpendicular to these trends in the north-east corner of the block are three much weaker linear trend anomalies. These anomalies are interpreted as agricultural in origin.

4.4 Block 3 and Block 4 (see Figs 6, 7 and 8)

- 4.4.1 The area of magnetic disturbance in the south-west corner of the block is caused by infill material tipped around the gated entrance to the field. Some of the ferrous responses are probably due to horseshoes, as the field is currently used as a paddock. A service pipe has been detected in the northern part of the block.

- 4.4.2 A series of linear trend anomalies aligned from north-west to south-east are interpreted as having an agricultural origin, being either due to ploughing or, more probably, to a system of field drains.

- 4.4.3 Block 4 is relatively quiet. Numerous 'iron spikes' have been located, particularly in the southern half of the block. The magnetic disturbance in the eastern corner is due to the proximity of an electricity pylon.

4.5 Block 5 and Block 6 (see Figs 9, 10 and 11)

- 4.5.1 A series of linear trend anomalies aligned from south-west to north-east in Block 5 are probably of agricultural origin and are likely to be caused by extensive ploughing.
- 4.5.2 There is a possible vague curvilinear anomaly in the southern corner of Block 5. The cause of this possible anomaly is unknown, but given that this part of the site was previously part of the nursery, a modern cause is considered likely.
- 4.5.3 There is again no above ground cause for the two strong ferrous anomalies in Block 6 or for the horseshoe shaped area of magnetic enhancement located in the southern half of the block. Although a modern origin is again considered more likely, the enhancement could be due to a sub-surface archaeological feature.
- 4.6 Block 7, Block 8 and Block 9 (see Figs 12, 13 and 14)**
- 4.6.1 The magnetic readings from Block 7 vary more in this block than in any other parts of the site. This variation is almost certainly due to the presence of magnetic material incorporated into the topsoil during the lifetime of the nursery. A single linear trend anomaly is also considered to be associated with activity in the nursery.
- 4.6.2 Some extremely faint linear anomalies and two small areas of very slight magnetic enhancement have been identified at the northern end of Block 8. The area where these anomalies are located is one of the lowest lying parts of the site and at the time of survey the ground was extremely dry with cracked mud and little or no crop growth. The anomalies may be weak due to the prevailing clay soils. A non-archaeological cause is considered likely.
- 4.6.3 Three areas of slightly enhanced magnetic readings have also been identified in Block 9. Although an archaeological origin cannot be discounted, a modern or geological cause is considered probable. Several strong ferrous responses are also present in this block.

5. Discussion and Conclusions

- 5.1 Although anomalies, linear or discrete, have been identified in most of the sample blocks, none are interpreted as being probably caused by underlying archaeological features or deposits, with the majority being interpreted as agricultural in origin. In the centre of the site, activity associated with the former nursery has resulted in variable data quality due to the intensive nature of the ground disturbance.
- 5.2 Small areas of magnetic enhancement have been identified in Blocks 6, 8 and 9. The majority of the enhancement appears at the lowest part of the site where possible periodic flooding takes place. Whilst it is possible that these anomalies could have an archaeological origin, it is considered much more likely that they are due to localised variations in the topsoil, or to recent ground disturbance.
- 5.3 The block located over and around the upstanding earthworks has not identified any anomalies likely to be indicative of previously unidentified sub-surface features, although the earthworks themselves are visible as weak magnetic anomalies. Similarly, there is no evidence in the data from Block 3 for the continuation of any of the archaeological features previously identified

in the field to the west. This is probably not particularly surprising, as this activity was restricted to the trenches furthest from the edge of the current evaluation area with no archaeology recorded in the trenches nearest the field edge.

- 5.4 In general when clay is the predominant component of the topsoil/subsoil the successful identification of archaeological features by magnetic survey can sometimes be difficult, as the resulting anomalies tend to be fairly weak due to a poor magnetic contrast between the fill of the features and the surrounding topsoil. Nevertheless, it would be expected that any major occupation or settlement activity should still be identifiable by magnetic survey. No major areas of archaeological potential have been identified as a result of the magnetic scanning or subsequent detailed survey and, on the basis of the geophysical survey and the earlier desk-based assessment, the archaeological potential of this site is considered to be low.

The results and subsequent interpretation of data from geophysical surveys should not be treated as an absolute representation of the underlying archaeological and non-archaeological remains. Confirmation of the presence or absence of archaeological remains can only be achieved by direct investigation of sub-surface deposits.

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Acknowledgements

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Report

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- Figure 4 Interpretation of magnetometer data; Block 1 and Block 2 (1:1000)
- Figure 5 X-Y trace plot of magnetometer data; Block 1 and Block 2 (1:1000)
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- Figure 12 Greyscale plot of magnetometer data; Block 7, Block 8 and Block 9 (1:1000)
- Figure 13 Interpretation of magnetometer data; Block 7, Block 8 and Block 9 (1:1000)
- Figure 14 X-Y trace plot of magnetometer data; Block 7, Block 8 and Block 9 (1:1000)

Appendices

- Appendix 1** Magnetic Survey: Technical Information
- Appendix 2** Survey Location Information
- Appendix 3** Geophysical Archive

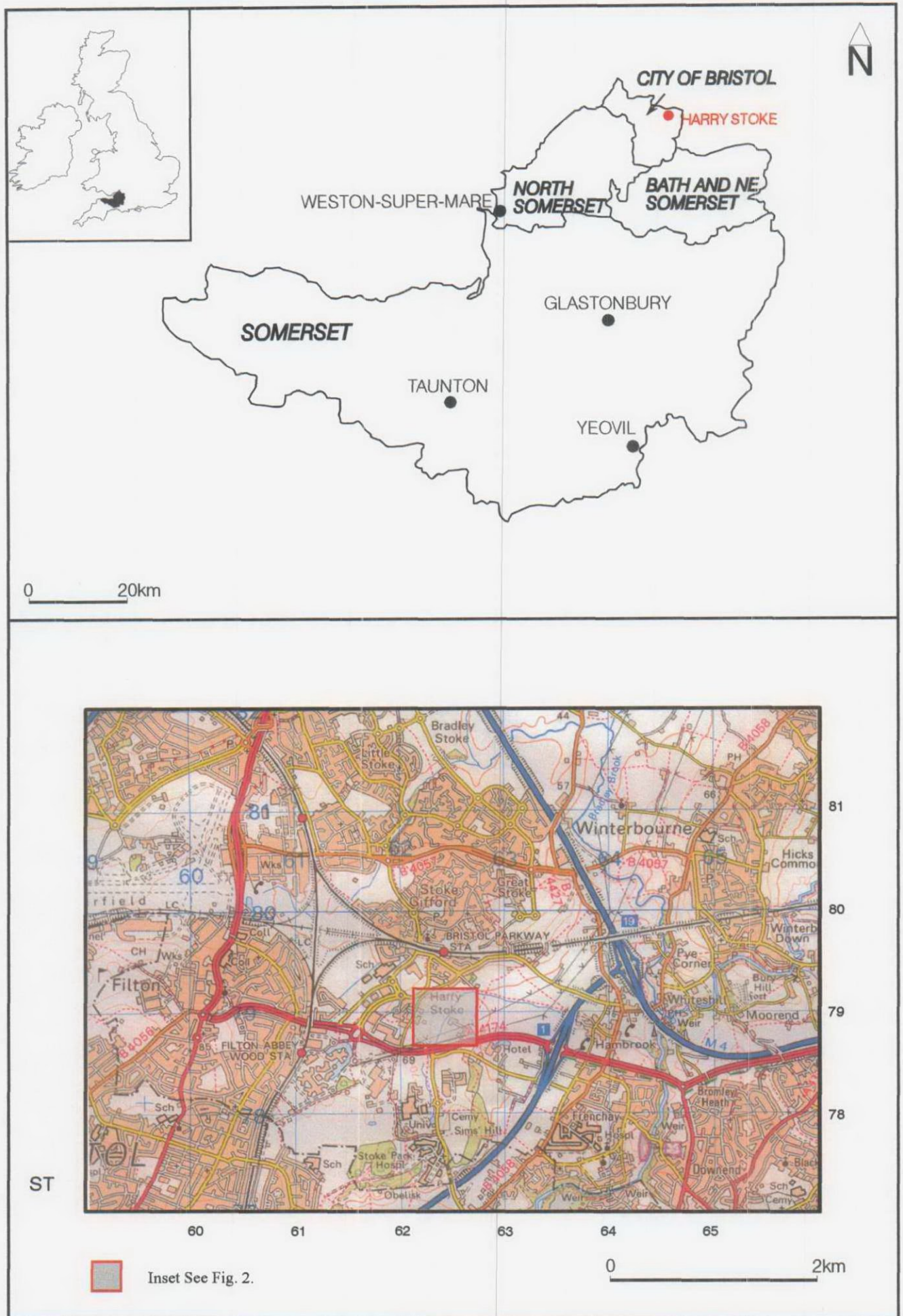


Fig. 1. Site Location