RGSH14-001

GEOPHYSICAL SURVEY,ROWE DITCH, HEREFORD

Geophysical Investigation

March 2014

HEADLAND ARCHAEOLOGY Ltd

REGISTERED ORGANISATION IfA

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Abstract

Headland Archaeology Ltd was commissioned to undertake a Geophysical Survey along the line of Row Ditch in Bartonsham Meadows, Hereford (SAM 1001780. The geophysical survey work was conducted to assist with planning a future community trenching project within the area of the Scheduled Ancient Monument.

The geophysical work was conducted during March 2014 and comprised the use of both earth resistance and fluxgate gradiometer survey.

The survey has successfully located the line of a low resistivity feature approximately 13m in width and consistent with the expected location of the line of Row Ditch. It would appear that this feature has at least in part been straddled by the bottom end of the gardens here. The survey has also identified areas of filling and indicates that more homogeneous material occurs within the eastern half of the feature than to the west.

1 INTRODUCTION

Headland Archaeology Ltd was commissioned by English Heritage, to undertake a Geophysical Survey of the area of the line of Row Ditch, Bartonsham, Hereford (HSM).

The geophysical survey work was conducted to assist with planning a future community trenching project within the area of the Scheduled Ancient Monument.

1.1 Location

The monument is located on the east side of Hereford city.

2 SITE TOPOGRAPHY AND GEOLOGY

The site is located on highest section of a group of fields that gradually slope down to the level alluvial flood plain of the River Wye.

The solid geology of the wider area including that of the site consists of Raglan Mudstone formation, a siltstone and mudstone formed approximately 417 to 419 million years ago in the Silurian Period. The area of the survey itself lies at the boundary of older fluvio-glacial deposits and the first river terrace of the river Wye. The monument follows the line of the mapped junction between these two deposits. To the south of the survey area (within 100m of the site) lies the alluvial flood plain of the Wye.

2.1 Background History

Row Ditch is designated as a Scheduled Monument, and recently assessed as being at Risk (SAM 1001780). It is locally thought of as a feature associated with the second siege of Hereford in 1646 during the English Civil war. As such it is viewed that a ditch and bank were thrown up across a meander of the river Wye to form a fully defended camp where the Parliamentarian forces could station themselves during the siege. Other scholars consider there is a much earlier origin to the feature and associate it with the site of a “rough” ditch referred to in relation to one of the medieval courts held outside the city, with the feature having an even earlier origin than this (possibly relating to Offa and his dyke building even). Whatever the ancient history of the site, it is known that in the middle of the 19th century material excavated to level the ground where the Wiggins factory was built on the north side of the city was brought to this site and used to fill in the hollow of the ditch. The line of the ditch follows that of the rear boundary of properties fronting the south side of Park Street.

3 AIMS AND OBJECTIVES

The aims and objectives of the archaeological geophysical survey were to:

- identify any geophysical anomalies of possible archaeological origin within the specified survey area
- accurately locate these anomalies and present the findings in map form
- describe the anomalies and discuss their likely provenance in a written report
- recommend any further work (including other forms of geophysical survey if appropriate) likely to contribute to the mitigation of the impacts of the development on these features

4 METHODS

The survey was conducted in accordance with *Geophysical Survey in Archaeological Field Evaluation*, English Heritage Research and Professional Services Guideline No. 1, 2nd ed (English Heritage 2008) and *The Use of Geophysical Techniques in Archaeological Evaluations*, Institute of Field Archaeologists Paper, No. 6 (IfA 2002) and the *DRAFT Standards and Guidance for Geophysical Survey*, IfA Technical Paper (IfA, Pending Ratification).

All data provided by Headland Archaeology (UK) Ltd., has been treated in accordance with the guidelines laid out in *Geophysical Data in Archaeology: A Guide to Good Practice* (AHDS Guides to Good Practice; Schmidt 2001).

4.1 Survey layout

All data was collected in 20m blocks with dummy readings being inserted where obstructions or the edge of the survey area cross these. Grids were aligned to the existing timber fence, so some degree of overlap occurs between the three data blocks. Survey grids were tied to measurements along the fence. Specific survey control points were mapped to c.0.01m accuracy using a Trimble R6 GPS. All traverses were at approximate right angles to the alignment of the monument.

4.2 Gradiometer survey

This was undertaken using a Bartington 601 fluxgate gradiometer. Originally it was proposed to use the shorter tubed FM36 to minimize the effects of overhead cables in part of the survey area, however, this did not provide acceptable data and so the survey was undertaken with the slightly

deeper seeking Bartington. A single tube was used collecting four readings per meter on 1m spaced traverses.

4.3 Resistivity survey

An RM15 (advanced) resistivity meter with twin probe array was used. Mobile electrode spacing was 0.5m with readings taken across a regular grid at 1m centers within 20m x 20m blocks. Remote electrode spacing was >15m resulting in readings where the earth resistance can be estimated and compared to other results across Hereford, as well as removing the need for edge matching between data blocks. A multiplexer was not used as given the amount of unevenness across parts of the site data quality would be improved and there is no need for additional filtering. Consideration had been given to undertaking the work with a dual 0.5m + 1.5m mobile spacing, but the unevenness of parts of the site weighed against this.

4.4 Processing and presentation

Resistivity and gradiometer data have been presented as either colour tonal plots, grey scale plots and in the case of gradiometer data X-Y plots in line with English Heritage requirements (2008). Interpretations have been produced in AutoCAD and geo-referenced so that there is a file that can be used in the future to locate trenches. This includes tie in points that are identified on the fence using the existing layout of fence posts.

Copies of the report and the data archive created during the course of the survey will be made available to the curator, English Heritage and OASIS

5 RESULTS

5.1 Gradiometry

The full extent of the gradiometer survey is show in Illustration 1. Through reference to this and Illustration 2 it is clear that the data can be divided into two distinct bands. The northern side of the survey contains highly disturbed magnetic anomalies associated with ferrous material. The southern half of the area demonstrates much more subdued responses and a lower level of magnetic activity from iron. Cutting across this southern area at a slight angle in the eastern half of the survey, a line of anomalies is visible. This is most likely associated with an electric cable that connects a substation at the rear of the properties backing onto the field to a larger electric distribution station on the east side of the field containing the survey. A keyed interpretation of the results is provided in Illustration 3.

5.2 Resistivity

The resistivity data is plotted in Illustration 4 as a colour contour plot. The readings demonstrating the highest levels of resistivity predominantly occupy the southern side of the survey area with the exception of a tiny triangle of high resistance near Crozens Lane at the east end of the survey. To the north of this is a clearly defined band of lower resistivity whose southern boundary runs parallel with the boundary for the back gardens. At the eastern end of the survey there appears to be a northern boundary to this linear zone of low resistivity. The distance between the northern and southern edges of this low resistance area at the east end of the survey is 13m.

Background mapping includes Ordnance Survey Digital Data. Crown Copyright Reserved. Licence No. 100024900.

357800E

239300N

N

8.0nT

-6.0

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Geophysical Survey 2014

Illustration 1: Magnetometer survey (grey scale plot)

1:1000 @ A3

0 50m

Surveyed by: Headland Archaeology (UK) Ltd

-351800E

N

239300N

140 nT

magnetic disturbances on line of former ditch

other strong (recent) magnetic disturbances

pipe ?

non- ferrous pipe

magnetic anomalies (ferrous)

magnetic anomalies (natural / non-archaeological)

Surveyed by: Headland Archaeology (UK) Ltd

ROW DITCH, BARTONSHAM, HEREFORD

Geophysical Survey 2014

Illustration 2: Magnetometer survey (with interpretation)

1:1000 @ A3

0 50m

351800E

N

239300N

magnetic disturbances on line of former ditch

other strong (recent) magnetic disturbances

pipe ?

non- ferrous pipe

magnetic anomalies (ferrous)

magnetic anomalies (natural / non-archaeological)

ROW DITCH, BARTONSHAM, HEREFORD

Geophysical Survey 2014

Illustration 3: Summary of findings

1:1000 @ A3

0 50m

Surveyed by: Headland Archaeology (UK) Ltd

Background mapping includes Ordnance Survey Digital Data .
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351800E

N

239300N

130Ω/m

30Ω/m

ROW DITCH, BARTONSHAM,
HEREFORD
Geophysical Survey 2014
Illustration 4:
(Resitivity plot)

1:1000 @ A3

0 50m

Surveyed by: Headland Archaeology (UK) Ltd

Background mapping includes Ordnance Survey Digital Data.
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351800E

N

239300N

A

Line of Ditch

High resistance-possible bank

Low resistance- tipping

ROW DITCH, BARTONSHAM,
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Illustration 5:
(Interpretation plot)

1:1000 @ A3

0 50m

Surveyed by: Headland Archaeology (UK) Ltd

6 DISCUSSION

Prior to undertaking any interpretation of the data collection the nature of the buried materials expected across the site and their likely geophysical properties and influence on the results of the data will be considered. It is likely that the Raglan Musdsone, whilst it lies beneath the site and most of the rest of the county, will be too deeply buried to have an influence on the methods employed here (c. 3-6m below fluvio-glacial deposits over most of Hereford). Therefore the two main groups of deposits affecting the survey will relate to drift deposits. The northern part of the survey area, and slightly higher ground in that direction, relates to older glacial sands and gravels. In general this is quite a compact deposit that is made up from a wide range of material much of which has been transported considerable distances by glaciers. The other, slightly lower lying deposit, comprises river terrace gravels. Although this latter deposit will be derived from a smaller catchment than the glacial gravel to its north, much of the material will have been eroded out of this deposit. Therefore the main differences that might be anticipated between the two deposits are a greater degree of compaction of the gravel to the north. Otherwise they are likely to contain much the same mix of sands and gravels. As a result there could be some distinction between the two in the results of the resistivity survey, but they are unlikely to be distinguishable through gradiometry.

The gradiometry results indicate considerable magnetic disturbance along the line of the ditch in the northern half of the area surveyed. Where these disturbed responses occur on the ditch line they are much more dense than those clusters of responses that lie off the line of the ditch. These have been keyed accordingly in Illustration 3. These disturbed responses will relate to small items of iron that have become mixed in with other material either used to fill the ditch earthwork in the mid-20th century or later accumulations of material to the rear of the gardens. The only other feature of note is the line of a modern service carrying an electric cable to a raised sub-station halfway along the length of the survey.

The resistivity results show a band of response that is likely to be caused by the presence of the remains of a bank along the south side of the survey area. This appears to be sporadically preserved with some areas giving responses in excess of 130 ohm/m. The responses associated with the ditch to the north of this are for the most part below 60 ohm/m. However, some areas show slightly higher resistivity than this and it is possible that these either contain parts of the bank pushed back into the ditch (such as at A, Illustration 5), or represent filling and tipping within and over the ditch with denser or better drained material. The higher resistance responses near Crozens Lane at the east end of the survey could relate to the denser glacial gravel that might be expected at this location rather than being a remnant of bank. There is not sufficient of the ground surveyed on this side of the feature to be sure of such an interpretation. It does, however, appear that the original extent of the ditch is at least in part to the north of the southern garden boundary and therefore not fully within the survey area except at its very east end. It would also therefore appear that any change in ground level between the bottom of gardens and field is not related to the feature and part of a wider landscaping of the rear of garden plots after the boundary was established. Filling of the feature and tipping across it appears to be made up of a mixture of materials, some with magnetic waste others less so. Combining the information from the two surveys tends to suggest that more inert material is filling the feature at its eastern end than along the western half of its length. This is not arrived at without reservation though. Due to the lack of an accompanying topographic survey it is difficult to

be sure that the more inert nature of the material recorded at the east end of the feature is not also a symptom of greater volumes of latter material having built up over the initial filling of the ditch a the bottoms of gardens here.

7 CONCLUSION

The survey has successfully located the line of a low resistivity feature approximately 13m in width and consistent with the expected location of the line of Row Ditch. It would appear that this feature has at least in part been straddled by the bottom end of the gardens here. The survey has also identified areas of filling and indicates that more homogeneous material occurs within the eastern half of the feature than to its west.

8 ACKNOWLEDGMENTS

Headland Archaeology would like to acknowledge the work conducted by students from the Hereford 6th Form College, Clare Metcalf, Dan Moule, Ollie Jones and the 1st Hereford (YMCA) Scout Group, without whose valiant efforts the geophysical survey would not have been conducted.

9 ARCHIVE

The archive is to be deposited with Herefordshire Archaeology HER

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