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Geophysical Survey at the Thornborough Henge Complex, North Yorkshire (1994-1996)

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Table of Contents

Contents	2
Acknowledgements	3
List of Illustrations	4
1. Introduction	5
2. Location and Background	5
3. Survey Strategy	6
4. Results	6
5. Discussion	7
6. Conclusion	8
Appendix 1	10
Bibliography	14

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List of Illustrations

- Figure 1 Location map of the Thornborough henge complex, North Yorkshire
- Figure 2 The Thornborough study area, showing the location of geophysical survey grids
- Figure 3 Location of geophysical survey Grids 1 and 4 in relation to the southern henge
- Figure 4 Location of geophysical survey Grid 2 in relation to the northern henge
- Figure 5 Location of geophysical survey Grid 3 in relation to the oval enclosure
- Figure 6 Greyscale image of the magnetometer survey at Grid 1
- Figure 7 Labelled greyscale image of the magnetometer survey at Grid 1
- Figure 8 Greyscale image of the resistivity survey at Grid 2
- Figure 9 Labelled greyscale image of the resistivity survey at Grid 2
- Figure 10 Greyscale image of the resistivity survey at Grid 3
- Figure 11 Greyscale image of the magnetometer survey at Grid 3
- Figure 12 Labelled greyscale image of the resistivity survey at Grid 3
- Figure 13 Labelled greyscale image of the magnetometer survey at Grid 3
- Figure 14 Greyscale image of the resistivity survey at Grid 4
- Figure 15 Labelled greyscale image of the resistivity survey at Grid 4

Geophysical Survey at the Thornborough Henge Complex, North Yorkshire (1994-1996)

The purpose of this report is to collate the results of essentially disparate sessions of geophysical survey, which took place at the Thornborough henge complex between 1994 and 1996. The methodology and results of both magnetometric and resistivity surveys are related, and the results are interpreted with reference to their wider archaeological significance. The appendices record the original descriptive and interpretive survey records, together with details of the survey strategy

1. Introduction

Between 1994 and 1996 several geophysical surveys were undertaken at the Thornborough henge complex, near Ripon in North Yorkshire. Utilising magnetometer and resistivity techniques, fieldwork was aimed at answering specific questions prior to excavation. These questions in part dealt with noticeable archaeological remains associated with the substantial earthworks of the southern, central and northern henges, but also focused on less visible traces of human activity, including the cropmark of a double pit alignment and a possible cursus monument.

2. Location and background

The Thornborough henge complex is located in the Vale of Mowbray (SE 7928), situated on a gravel plateau flanked by the river Ure (Fig 1). It comprises three equally spaced henges, all of similar dimensions, and positioned on the same north-west to south-east alignment. They are spaced approximately 550m apart, each with an approximate diameter of 240m, and the complex extends over 1.7km (Thomas 1955; Harding 1998a; Harding 1998b).

Aerial photograph evidence demonstrates that each henge comprises an inner ditch, outer bank and faint traces of an outer ditch. These features are broken by two entrances to each henge, situated in the north-west and south-east quadrants of each monument. A number of related features are located around the henge complex. The central henge overlies a cursus monument (Thomas 1955), and a double pit alignment runs to the west of the southern henge.

3. Survey strategy

Survey grids were located across selected parts of the complex overlying features whose presence was noted from the aerial photographic archive (Fig 2). A grid was positioned at the southern end of the double pit alignment (Site 1; Fig.3), to the north east end of the possible cursus monument (Site 2; Fig 4) over an oval enclosure (Site 3; Fig.5), and across the western edge of the southern henge (Site 4; Fig 3). Both magnetometer and resistivity survey techniques were used. Magnetometry survey was carried out using a Geoscan FM 36 and resistivity survey utilised a Geoscan RM 4.

Grid 1, at the double pit alignment, comprised an area 40m by 60m, surveyed in grids of 20m by 20m (Site 1, Fig. 6) Magnetometer survey was carried out using 1m traverses, taking readings at 1m intervals *Grid 2*, at the terminal of the possible cursus monument, comprised an area 40m by 80m (Site 2) Resistivity survey was carried out, on 1m traverses, with readings taken every 1m. *Grid 3* at the oval enclosure comprised an area 40m by 40m (Site 3) Both resistivity and magnetometry were used, but the magnetometer survey only covered the northern half of the survey area. All surveying was carried out along 1m traverses, with readings every metre *Grid 4* was located across part of the outer ditch of the southern henge (Site 4) Survey was undertaken over a large area 140m by 66m. Readings were taken on 1m traverses at 1m intervals

4. Results

4.1 Thornborough Grid 1: pit alignment (Site 1)

The results of the magnetometer survey (Fig 6) indicated a series of sub-circular anomalies, all with high positive magnetic values, with a difference in general magnetic readings between the western part of the grid (Fig. 7, A) and a strong negative anomaly, around 8m in width but narrowing to the south, running along the east side of the survey area (B) The readings marked a series of eight sub-circular features, 2-3m in diameter, forming a rough double alignment running north to south (C to J) Two areas of higher positive readings were also indicated, one to the south of the other features (K), and the second to the west (L). Whilst the latter of these may show an extension of the rough alignments marked by the preceding features, the former anomaly is somewhat removed from all other features to the west, by approximately 8m.

4.2 Thornborough Grid 2: northern henge (Site 2)

Results of resistivity survey to the east of the northern henge produced a series of anomalies (Fig. 8) The strongest readings were produced by a linear feature running diagonally across the survey grid (Fig. 9, A), with a width of between 2 and 5m, probably marking the line of a modern land drain running to the east of the northern henge Weaker readings to the east and west of this feature may indicate an earlier curvilinear anomaly This feature runs in a curve from the

western half of the grid across to the centre of the survey area (B), forming a band some 4-5m in width. A series of higher resistance readings obscures any definite edge to the curvilinear anomaly to the east of A (C). However, the readings continue to curve around in a band 10m in width. A large sub-circular feature comprising high resistivity readings was observed on the eastern edge of the survey grid (D), some 12m in diameter.

4.3 Thornborough Grid 3: oval enclosure (Site 3)

Both resistivity and magnetometer surveys (Figs 10 and 11) produced a broad variation in readings across the survey grid denoting the existence of large features over the same areas. For the resistivity survey, a truncated oval of lower resistance readings was noted (Fig. 12; A), over 20m north-south by 20m east to west. A secondary area of low readings were also noted to the east (B), and an area of slightly higher readings to the north (C). This pattern was matched by anomalies from the magnetometer survey, with negative readings corresponding to the edge of the oval feature noted from the resistivity plots.

Results of the magnetometer survey indicated high positive readings in the east of the survey area (Fig. 13, A), changing to high negative values further west (B).

4.4 Thornborough Grid 4: Southern Henge (Site 4)

Several low and high resistance anomalies were recorded during the resistivity survey of this area (Fig 14). In particular, a curvilinear band of low resistivity readings stretching from the north of the grid (Fig 15, A) to the south, approximately 12m in width. In two places, the spread of these readings increases in width (B&C), where a series of low readings spreads out from the curvilinear feature to the west. A number of linear features, approximately 2-3m in width, run in an east-west direction from the western edge of the survey grid (D&E), with a wider series of parallel features running in between (F, G & H). A spread of readings similar to B or C was noted on the most southern linear feature (I).

5. Discussion

Results of the magnetometer survey at *Grid 1* indicate the course of the southern end of the double pit alignment, an interpretation which is supported by evidence from excavations undertaken in 1994 and 1995. The alignment runs in a north-south direction to the west of the southern henge, for a distance of over 350m. The change in overall magnetic readings for the survey grid may indicate a change in the thickness and composition of geological materials, particularly of river terrace gravels and silts, running away from the river Ure.

The anomalies present in survey *Grid 2*, to the north east of the northern henge, indicate a number of features. Apart from the field drain running directly north-south past the henge, the large sub-circular anomaly to the east of the grid may

well indicate the existence of a substantial archaeological feature such as a ring ditch. Aerial photographic evidence does not provide any conclusive evidence as to the existence of such a feature alongside the northern henge. The larger curvilinear feature running across the survey area is more ambiguous. It effectively runs a course between the northern henge and the possible ring ditch. However, it is not possible to deduce whether the feature underlies the ring ditch, and whether or not it runs beyond the latter outside of the survey area. The survey results did not indicate any anomaly representing a potential cursus feature running to the east of the northern henge, as depicted on a number of vertical and oblique aerial photographs of the area.

The interpretation of results from survey Grid 3 was more difficult. The changes in resistivity and magnetic values indicate gradual changes in deposits over a relatively large area. However, the survey grid is at maximum only 40 by 40m in size. The roughly oval area of high resistivity readings appears to correspond with the main body of the oval enclosure, and surrounding lower resistivity readings may indicate the course of the ditch of the enclosure. However, differences in drainage from the fluvio-glacial deposits at this site may also have produced the broad change in resistance across the survey grid. Survey over an extended area around the enclosure would produce a contextual relationship between these features and surrounding resistivity readings.

In contrast, the larger survey carried out over Grid 4 at the southern henge clearly shows the line of the concentric outer henge ditch running around the monument. The series of linear anomalies which appear to disturb the deposits demarcating the ditch are probably furrow marks from the extensive plough activity which has occurred outside the bank of the southern henge. The linear bands of low resistivity readings indicate lines of ditch fill material disturbed by cultivation. Traces of the outer henge ditch become less pronounced at the southern edge of the survey grid, perhaps due to the effects on drainage produced by the sloping ground immediately south-west of the southern henge.

6. Conclusion

Both resistivity and magnetometric methods of geophysical survey recognise changes in soil and gravel deposits due to human activity across the Thornborough henge complex. However, the varying nature of the underlying river terrace gravels, the large scale of many of the anomalies, together with the small areas which to a great degree form the basis of the survey grids, all limit the extent to which the recognisable features can be interpreted.

Placed within the context of additional archaeological evidence, in particular that produced from the aerial photographic record, the results of these four surveys serve to illustrate the complexity of the archaeological material surrounding the extant earthworks of the henge complex. They represent an additional dataset of

archaeological features which were previously unrecorded. The array of features to the north east of the northern henge demonstrate the variety of archaeological anomalies which relate to the henge monuments themselves. Although detailed interpretation is difficult, the archaeological potential of all four survey locations is high. Excavated evidence from these areas will produce a more discrete and accurate understanding of the nature and position of the pit alignment, oval enclosure and the outer henge ditch of the southern henge.

Appendix 1 Survey Details

This appendix comprises basic details on the survey strategy and instruments used for geophysical survey at Thornborough, together with site references, descriptions and interpretation as noted by the surveyors between 1994 and 1996

Grid 1 (Site 1)

Reference: Thornsr (gradiometer)

Date of Survey: 14th to 16th September 1994

County: North Yorkshire

Grid reference: SE 286787

Surveyor: Leigh Pollinger

Solid Geology: Lower Magnesian Limestone

Drift Geology: Undifferentiated river terrace deposits

Survey type: Magnetometer

Instrument: FM36

Traverse Intervals: 1m

Reading intervals: 0.5m

Description

Size 40 metres by 60 metres, with dummy grid in south east corner. Western edge is trimmed to run parallel with track. There is some difficulty in matching and comparing grids

Enhancements

None

Site Description

Diagonally from south west to north east are a series of high reference points at approximately 10 metre intervals. The eastern part of the plot shows a noticeable lowering in response in results

Interpretation

As determined by excavation, the positive anomalies appear to be a series of pits

Grid 2 (Site 2)

Reference: Thornh1 and Thornh2

Date of Survey: 12th September to 13th September 1995
County: North Yorkshire
Grid reference: SE 282801
Surveyor: Leigh Pollinger

Solid Geology: Lower Magnesian Limestone
Drift Geology: Undifferentiated Fluvio-Glacial Terrace Deposits

Survey type: Resistivity
Instrument: RM4
Traverse Intervals: 1m
Reading intervals: 0.5m

Description

Thornh1 size 80 metres by 40 metres
Thornh2 size 80 metres by 60 metres with dummy grids in south east and south west corners

Enhancements

Thornh1: edge match and despiked.
Thornh2: Edge matched
For printing clarity, plots clipped (0, -1.5)

Site Description

Diagonally across plot main feature seen is known water pipe/land drain.
On right hand side of plot is possible ring ditch.
Leading in from the west is a feature directed at the ring ditch, which then sweeps to the south of the ditch.
Leading in from the north is a further feature which adjoins west/east feature to the west of ring ditch.
It is possible that this north-south ditch continues as seen at the very south of composite Thornh2, but it is lost in a low resistance background.
There is a slight haze of a further land drain approximately 30 metres to the west and running parallel with the main drain.

Interpretation

Ignoring known land drains/water pipe
It is unlikely that the features coming in from the north and west of the ring ditch are palaeo-channels as they avoid the ring ditch rather than feeding into it.
Suggest that the ring ditch was constructed first.
The west-east feature is approx. 4.5 metres wide and is later than the ring ditch as it deliberately avoids it. Its width and routing around the ring ditch would suggest that this is more likely to be a linear ditch rather than part of a cursus.
The north-south ditch joins the east-west ditch and suggests that was the latest feature. The possible extension of the north-south ditch may amend this view.

Grid 3 (Site 3)

Reference: Thorn1 and Thorn1a

Date of Survey: 22nd September to 26th September 1995

County: North Yorkshire

Grid reference: SE 291795

Surveyor: Leigh Pollinger

Solid Geology: Upper Magnesian Limestone

Drift Geology: Undifferentiated Fluvio-Glacial Terrace Deposits

Survey type: Magnetometer and resistivity

Instrument: FM36 and RM4

Traverse Intervals: 1m

Reading intervals: 0.5m

Description

Thorn1 size 40 by 40 metres

Thorn1a size 40 by 20 metres

Enhancements

Thorn1: Edge matched and despiked

Thorn1a: despiked

For printing clarity plots were clipped (1,-1.5 for Thorn1, 1.5,-1 for Thorn1a)

Site description

The western side of the plot is of high resistance equating to the very stone soil noticed in the area

The eastern and south east corner are of a much lower resistance which runs along the current track and field gateway

The low resistance strip, clearly seen running north from the middle southern sector equates to a water pipe linked between a cattle trough and main road

There is a slight patterning running diagonally away from the south east corner

There is an area of high magnetic response to the north of the above diagonal line and clipped by the water trench.

Interpretation

Aerial photographs revealed a possible enclosure in this corner of the field. However confirmation of this through geophysical survey is elusive as no ditches can be observed with certainty

It is possible that the high magnetic anomalies noted to the right centre of plot Thorn1a indicate the centre of a feature, perhaps a hearth.

Grid 4 (Site 4)

Reference: tsr

Date of Survey: 11th August to 15th August 1996

County: North Yorkshire

Grid reference SE 288788

Surveyor: Leigh Pollinger

Solid Geology: Middle Marl with Evaporites

Dnft Geology: Undifferentiated Fluvio-Glacial Terrace Deposits

Survey type: Resistivity

Instrument: RM4

Traverse Intervals: 1m

Reading intervals: 0.5m

Bibliography

English Heritage 1996, *Geophysical Survey in Archaeological Field Evaluation*
English Heritage

Harding, J 1998a, *Vale of York Neolithic Landscape Project: Interim Report 1997*.
Department of Archaeology, University of Newcastle upon Tyne

Harding, J 1998b, *Recent Fieldwork at the Neolithic Monument Complex of
Thornborough, North Yorkshire*. *Northern Archaeology*, vol 15/16, pp27-38

Thomas, N 1955, *The Thornborough Circles near Ripon, North Riding Yorkshire*
Archaeological Journal 38, 4, pp425-445