# TUCKLESHOLME, STAFFORDSHIRE

## A geophysical survey
## 1990

By A.E. Jones

Birmingham University Field Archaeology Unit (BUFAU) 1990

# T U C K L E S H O L M E, S T A F F O R D S H I R E

## A g e o p h y s i c a l s u r v e y

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## REPORT

### 1.0: INTRODUCTION

In August 1990 Birmingham University Field Archaeology Unit was commissioned by Douglas Concrete Limited to undertake a small geophysical survey on land 1km northwest of Walton-on-Trent, Staffordshire (Centred on NGR. SK 210188), in advance of the submission of proposals for gravel extraction (Figure 1A). The site is located on arable farmland, west of the River Trent, and is bounded to the east by the Birmingham-Derby railway line (Figure 1B). Two circular crop marks (Figure 1C), identified from aerial photographs, were interpreted as representing ring-ditches the ploughed-out remains of barrows, generally dated to the Bronze Age. The southern ring-ditch (Staffordshire SMR no. 1447), was exposed by the Trent Valley Archaeological Rescue Committee in 1975, but was probably only partially excavated. This ring-ditch comprised an outer ditch 28m across, and 1.6m in depth, enclosing two inner, concentric ditches 0.8m across, and 0.25m in depth, and a possible burial slightly off-centre. The northern ring-ditch, a group of crop marks to the southeast, and a further, putative ring-ditch, outside the area of the survey (SMR no. 1451: Figure 1B) have not yet been tested by excavation.

To the south of the site a number of urns containing human bone, associated with a group of metal knives, were recovered during the excavation of a ballast pit in 1851 (V.C.H.,1968, 204) (SMR no 917 :Figure 1B). The discovery of these important finds may suggest the location of an Anglo-Saxon Cemetery east of the modern railway line, within the area proposed for future gravel extraction. It was also intended to carry out a gradiometer scan on farmland east of the ballast pit, to investigate the possible continuation of this cemetery to the east. The field was under crop at the time of survey, and no investigation was possible.

The aims of the present survey were:

(1) To locate the southern ring-ditch previously excavated, and

(2) To define and locate the northern ring-ditch identified by aerial photography. The gradiometer survey was intended to pinpoint the location of the archaeological features and permit the accurate positioning of evaluation trenches in relation to the anomalies located.

## 2.0: PRINCIPLES AND METHODS

### 2.1: Principles

A gradiometer is a precision instrument that measures changes in magnetic field intensity caused by man's activities, or by geological processes. Features such as hearths or kilns acquire a permanent, relatively strong magnetism caused by the conversion of weakly magnetic compounds to strongly magnetic oxides (Clarke 1989). The instrument may also be employed to locate archaeological features such as ditches or pits, detected by measurement of the slighter, localised variations in magnetic field intensity.

Variations in magnetic susceptibility between topsoil and subsoil may enable the recognition of features backfilled with topsoil against a less magnetic subsoil. Localised enhancement of magnetic susceptibility caused by the processes of human occupation may also be identified and located.

A magnetic anomaly may be defined as an instrument reading contrasting with the general 'background' level, which may also vary slightly from place to place (Clark 1989). Positive anomalies are above, and negative anomalies are below the general level. During interpretation the strength of the anomaly is considered, together with its shape, sharpness in outline, and the distribution of both high and low values within each anomaly.

2.2: Methods

Two areas were surveyed in individual squares measuring 20m by 20m (Figures 2-4). Area I, measuring a maximum of 60m by 100m, was located in the plotted position of a cropmark interpreted as the northern ring ditch. Area II, measuring 60m by 40m, was positioned inside the southern field boundary to locate the southern (excavated) ring-ditch. In both areas readings were recorded at 1m intervals, along survey lines spaced 1m apart.

The survey was carried out using a Geoscan FM 18 Fluxgate Gradiometer, with built-in data logger. Before the start of the survey the two instrument directional sensors (N-S and E-W) were adjusted to ensure accurate alignment of the gradiometer in relation to the earth's magnetic field, and their equal sensitivity to magnetic anomalies. The instrument was re-zeroed and balanced after completion of each square, and zero drift was logged. Data was recorded to a resolution of plus or minus 0.5 nano Tesla (nT). The recorded data was transferred from the gradiometer and stored-to-disk on a Toshiba T1000 lap-top computer for post-survey processing.

The computed surveys are reproduced as inverse dot-density plots which highlight the areas of negative anomalies using darker shading: the areas of positive anomalies show as un-shaded areas. Extreme high and low readings have been partly truncated.

3.0: THE RESULTS (Figures 2-4)

The dot-density plots reveal a number of random, and visible single-point anomalies, which should be disregarded. Differences in shading intensity between squares are not archaeologically significant.

3.1: Area 1 (Figure 2, Figure 3)

In Area I, the values recorded during the survey were mostly in the range between -10 to 10 nT: readings of background magnetic field were concentrated between -2 to 3 nT.

A pattern of alternate light and dark lines (Anomaly A1) is visible in the north of the area, following the orientation of the grid. This anomaly is probably caused by modern ploughing in the same direction.

Anomaly A2 in the south of the area comprises an interrupted, slightly flattened circular arc, measuring approximately 20m in diameter, and 2m wide. This anomaly measures between -7 to -4 nT. The northeast segment of the circle is not distinct. A linear anomaly, A3, mostly within A2, extends to a length of 17m. Anomaly A3 is aligned northwest-southeast, and widens to 3m towards the southeast. It contains values between -9 to -7 nT.

A very indistinct, curved anomaly, A4, is located in the centre of the survey area. This anomaly comprises values of between -3 to -5 nT, measuring a length of 7m, but it is difficult to define.

3.2: Area II (Figure 4)

In Area II, the values recorded during the survey were mostly in the range -10 to 10 nT. Within this range, background readings were concentrated within the narrow band between -2 to 2 nT, decreasing slightly, but not uniformly, eastwards.

A rectangular anomaly (A5) in the southeast corner, is caused by the adjoining metal fence. A large rectangular anomaly to the northwest (A6), containing values between -9 to -2 nT, is probably due to modern disturbance.

A roughly circular anomaly (A7) 25m across, in the southwest of the area, is evident as a zone of randomly-scattered high and low values. The highest and lowest readings (-6 to 21 nT) are concentrated around the outside of A7. Slighly off-centre within A7 is a single anomaly (A7a) up to 3m across, measuring between 16 to 66 nT. Anomaly A7 is surrounded by an interrupted roughly circular 'collar' (A8), approximately 2m wide, measuring -1 to 1 nT, extending slightly beyond the surveyed area to the south and west. It is very difficult to distinguish from the surrounding background readings.

## 4.0: DISCUSSION AND INTERPRETATION

Anomaly A1 in Area I and anomalies A5 and A6 in Area II are probably caused by modern disturbance, and do not require further investigation.

Anomalies A3 and A4 in Area I are very difficult to define or interpret, and may merit further investigation.

Anomaly A2 in Area I is similar in size and shape to the cropmark interpreted as the northern ring-ditch.

Anomaly A8 in Area II is similar in size and shape to the partially, excavated, southern ring-ditch. Anomaly A7, enclosed by A8, may be caused by the disturbance resulting from partial excavation of this feature. Neither of the two inner ditches are visible as distinct features because of the coarseness of the survey. However, an apparent concentration of stronger readings towards the outside of A7 may approximate to the area of the two narrow, linear ditches. Of particular interest is the apparent coincidence of the stong anomaly A7a with the position of the (presumed) central burial shown on the plan of the 1975 excavation.

The position of anomalies A7/A8 approximates to the location of the excavated southern ring-ditch shown on a sketch plan of the 1975 excavation, but is displaced by over 20m to the northwest from the plotted position of the cropmark. Similarly, anomaly A2 is displaced by over 20m to the southwest from the plotted cropmark. Some account of this displacement may need to be taken during positioning of the evaluation trenches.

Anomalies A7, A7a and A8, located in the area previously partially excavated are particularly distinct because the ploughsoil above is less compact than elsewhere in the survey area.

## 5.0: IMPLICATIONS AND PROPOSALS

### 5.1: Implications

The definition of two roughly circular anomalies, largely conforming with the form and size (but not location) of the plotted cropmarks suggests that the two ring-ditches may have been located. However, it is possible that anomalies A2 and A7/A8 could be the result of geological processes, or more recent disturbance. The next stage in the examination of the two anomalies A2 and A7/A8 should take the form of an archaeological evaluation to test the results of this geophysical survey. The selective excavation of anomaly A2 will establish its form, and clarify its interpretation. Despite earlier excavation, the southern ring-ditch also requires further examination to broaden our understanding of this complex and important feature. This evaluation will also provide important data for cross-comparison between the two monuments, and will help to set the results within the wider archaeological landscape.

### 5.2: Proposals for archaeological evaluation (Figure 2, Figure 3)

It is proposed that the archaeological evaluation take the following form:

(1) The excavation of two trenches, 2m wide and at least 30m long, intersecting at right angles, to divide each possible ring-ditch into four equal quadrants. The removal of topsoil, using a mechanical excavator under archaeological control, should be followed by systematic hand excavation to define the location and width of each circular ditch from its upper horizon.

(2) The fills of each possible ring-ditch should be sampled in at least one quadrant to establish the depth, sequence, quality and survival of the archaeological deposits, and the potential for the survival of environmental evidence. Sampling of the southern ring-ditch should involve the excavation of a previously unexcavated portion of the outer ditch, and additionally the investigation of the possible central burial.

(3) Evaluation of the northern ring ditch should establish the relationship between anomalies A2 and A3, and examine the anomaly A4.

## 6.0: ACKNOWLEDGEMENTS

The survey was sponsored by Douglas Concrete Limited. The project was supervised by Alex Jones, assisted by Martin Lightfoot and Mike Cooper (Post-Graduate Diploma Student). The text was edited by Peter Leach, and the report was compiled at BUFAU by Liz Hooper. The illustrations were drawn by Caroline Gait.

## 7.0: REFERENCES

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V.C.H. 1968. A History of Staffordshire Volume I

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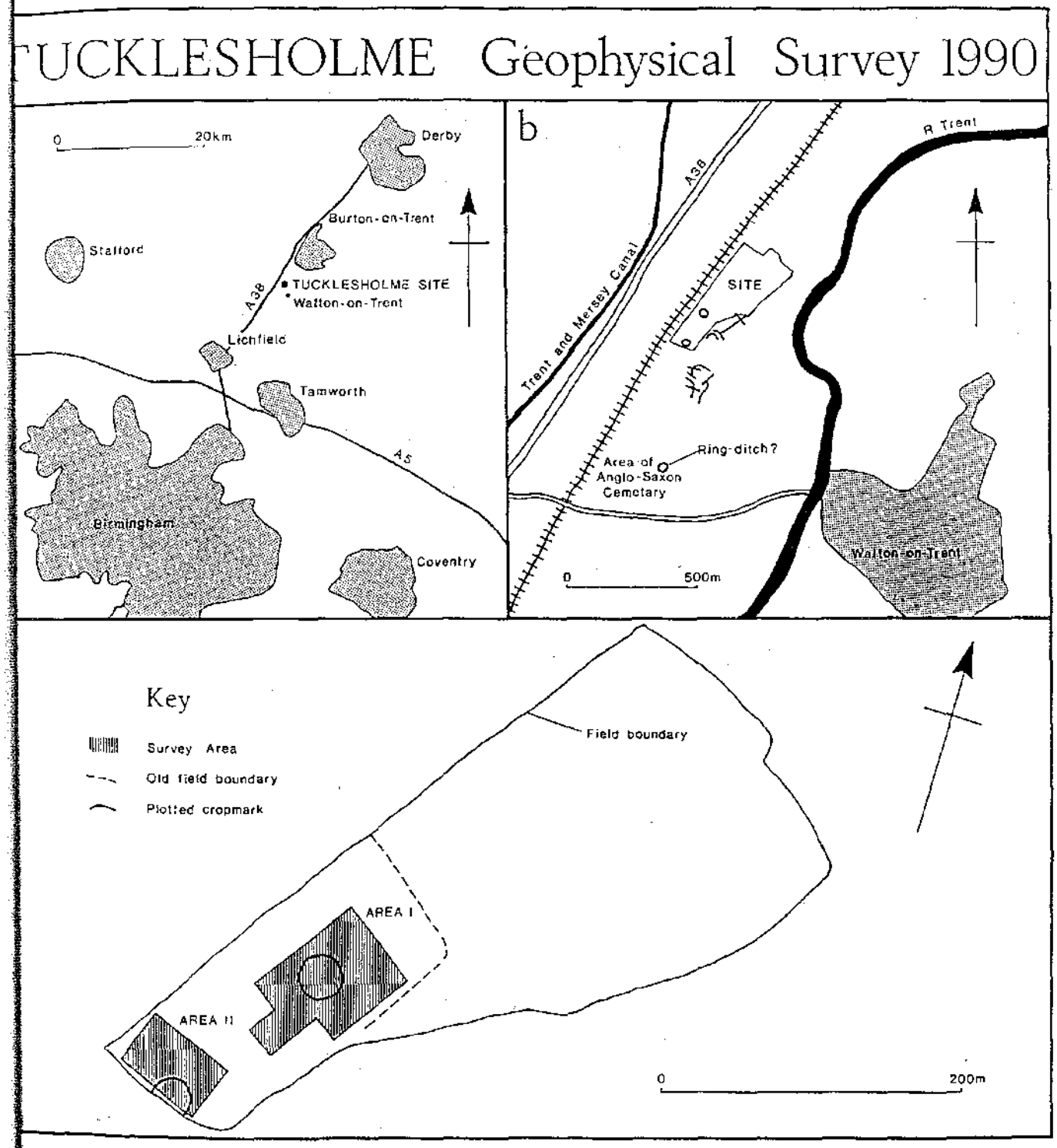
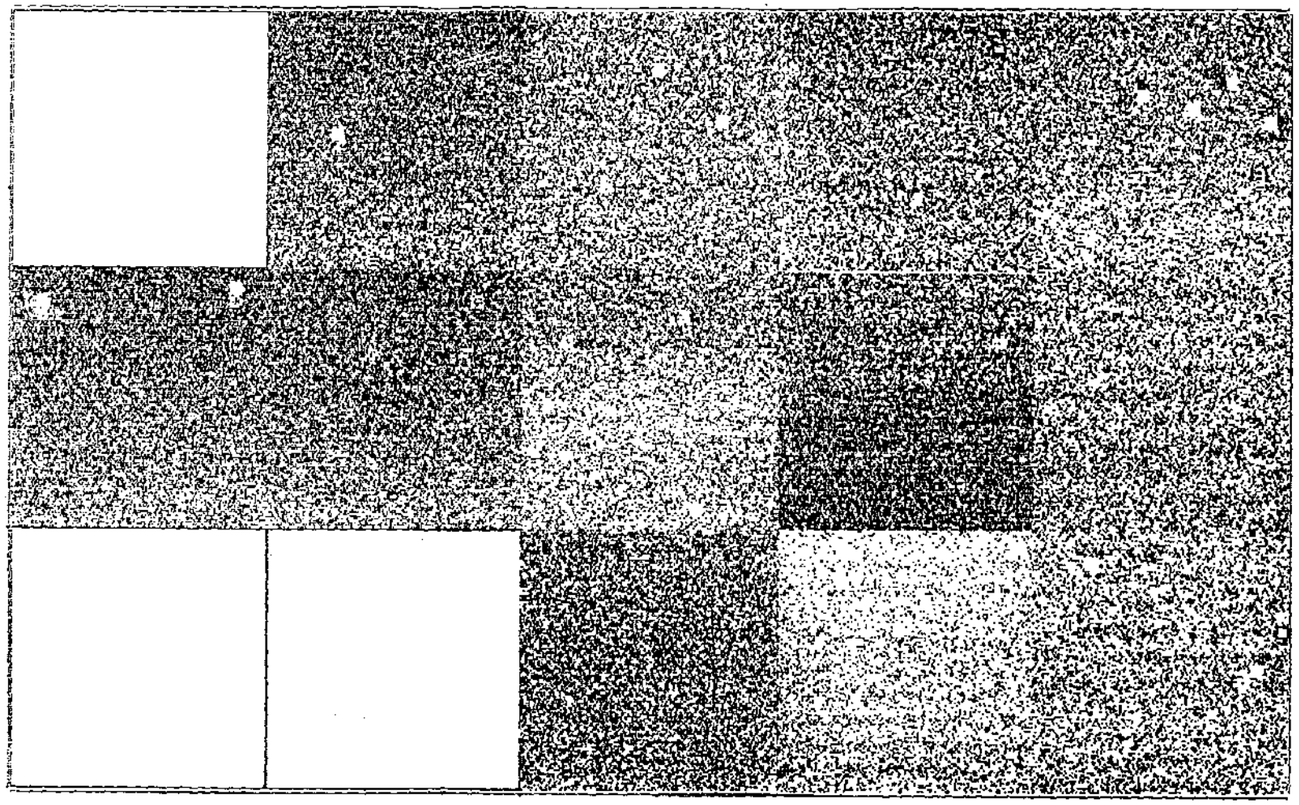

TUCKLESHOLME Geophysical Survey 1990
0
20km
Derby
Burton-on-Trent
Stafford
A38
TUCKLESHOLME SITE
Walton-on-Trent
Lichfield
Tamworth
A5
Birmingham
Coventry
b
A38
R Trent
Trent and Mersey Canal
SITE
Ring-ditch?
Area of Anglo-Saxon Cemetary
0
500m
Walton-on-Trent
Key
Survey Area
Old field boundary
Plotted cropmark
Field boundary
AREA I
AREA II
0
200m

Figure 1

# TUCKLESHOLME 1990 Area I



Plot

| | | | | |
|---|---|---|---|---|
| | K | G | A | D |
| M | L | H | B | E |
| | | J | C | F |

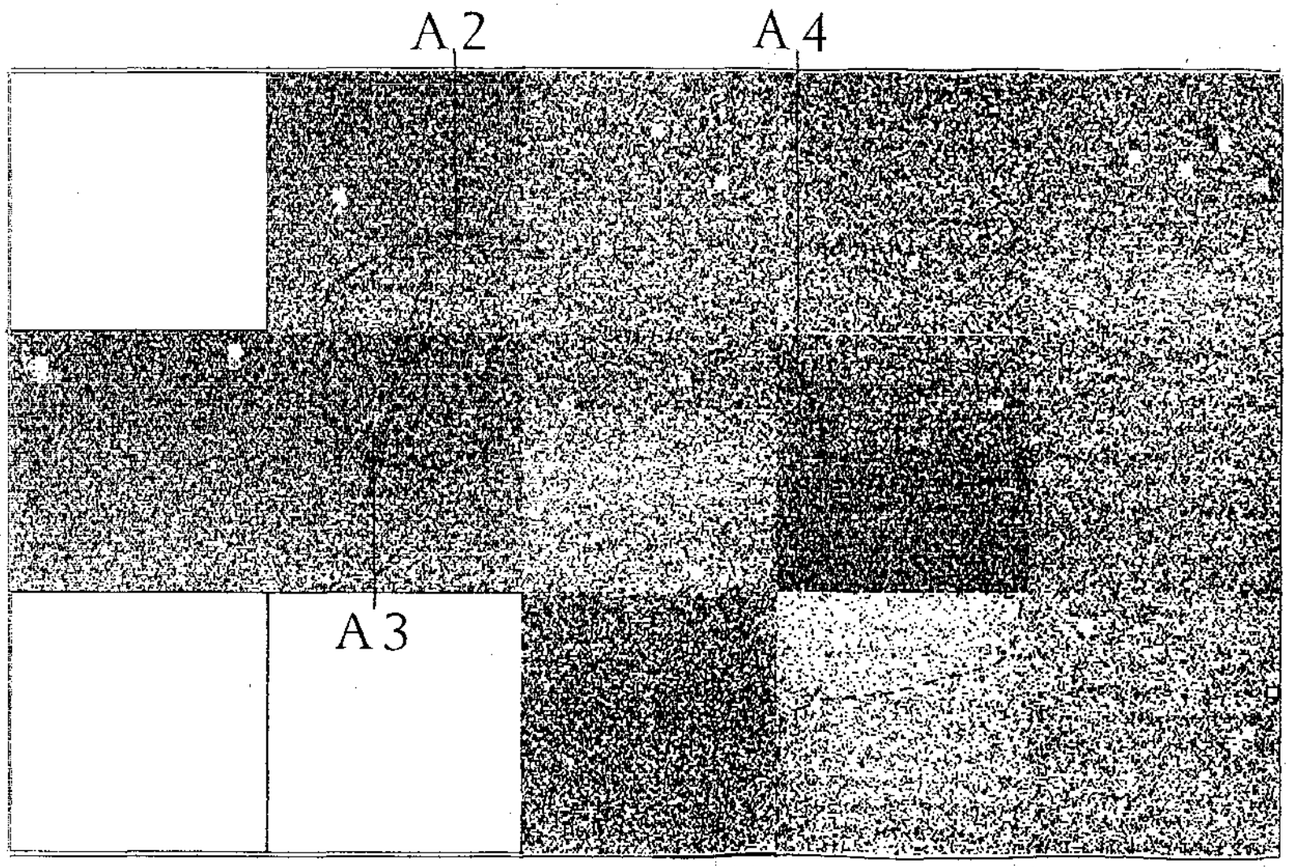
0 20 m

0 20 m

Figure 2

# TUCKLESHOLME 1990 Area I

## Interpretation




0 20 m

Figure 3