

**A Geophysical Survey of Land North of
Witham Road, Woodhall Spa,
Lincolnshire (TF 185 628)**

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1 Summary

1.1 Geophysical survey was carried out over 2ha of land north of Witham Road, Woodhall Spa, Lincolnshire. No magnetic anomalies that suggested buried archaeological features were detected.

2 Introduction

2.1 University of Leicester Archaeological Services (ULAS) were commissioned by Pre-Construct Archaeology (PCA) to carry out a geophysical survey on a land to the north of the village of Woodhall Spa, Lincolnshire. The survey area lies adjacent to the A166 road. In 1998, a series of archaeological features were discovered 800m north of the road. These features were located less than 1km south-east of the site. A geophysical survey was carried out by Oxford Archaeology in 1998. The site is located to the north of the site in question. On 17th November 1998, a geophysical survey was carried out on 17th November 1998.

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3 Site Description

appl. S/215/1445/98
named 'Plots 64 to 118, Wentworth Way, Woodhall Chase'

3.1 The site is situated on the outskirts of the village of Woodhall Spa. The site is the subject of development measures of 2.7ha and has been used for agriculture and gravel.

For

3.2 The site is generally flat and is used for agriculture. It is planted in very young oil seed rape and wheat. The site is bounded by the fences of houses along Witham Road and to the south by a new housing estate. Several electrical pylons are situated within the survey area. The most easterly scarp of the site is a ridge of gravel, which is stripped of topsoil. A triangular area of gravel is situated to the south with hard standing for cabins and a gravel pit.

Pre-Construct Archaeology (Lincoln)

4 Methodology

4.1 On the basis of a site visit, it was decided that the most appropriate method of geophysical prospecting was magnetic susceptibility. Research has shown that archaeological features such as kilns and hearths, ditches and pits are characteristically high magnetic susceptibility. The survey was carried out using a magnetic susceptibility meter (measured in nano-tesla) over the site. The survey was carried out within materials in the presence of the earth's magnetic field. Many types of rock, for example limestone and sandstone, have a lower magnetic susceptibility than the subsoil. These differences (positive and negative) in magnetic susceptibility can be

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1 Summary

1.1 Geophysical survey was carried out over 2ha of land, north of Witham Road, Woodhall Spa, Lincolnshire. No magnetic anomalies that suggested buried archaeological features were detected.

2 Introduction

2.1 University of Leicester Archaeological Services (ULAS) were commissioned by Pre-Construct Archaeology (Lincoln) to carry out a geophysical survey on land to the north of Witham Road, Woodhall Spa, Lincolnshire (TF 185 628). The survey area lies adjacent to the site of Witham Farm (now demolished). Iron Age remains were discovered 800m to the south-west and the Medieval Kirkstead Abbey is situated less than 1km south-east (CPH Palmer-Brown, *pers comm*). A geophysical survey was carried out by Oxford Archaeotechnics in 1994, over 4.8ha of land directly to the east of the site in question. Only anomalies associates with features of the demolished post-medieval farm were detected (Johnson 1994). The survey was carried out on 9-10th November 1998.

3 Site Description, Topography and Geology

3.1 The site is situated *c.*100m north of Witham Road on the south-western outskirts of the village of Woodhall Spa, Lincolnshire (figure 1). The area of the development measures *c.*2.5ha and lies *c.*6m OD. The underlying geology is sands and gravels.

3.2 The site is generally flat and at the time of the survey the ground was covered in very young oil seed rape and weeds. Bounding the site to the south-east are the rear fences of houses along Witham Road and to the north-east the fenced boundary of a new housing estate. Several electrical cable carrying poles are situated within the survey area. The most easterly sector of the site, nearest the housing estate has been disturbed (figure 2). A triangular area of approximately 1300m² has been partially stripped of topsoil and there is evidence of stone deposits of a type often associated with hard standing for cabins and other site buildings.

4 Methodology

4.1 On the basis of common current practice and the results of previous research, it was decided that the most efficient method of survey for this site would be magnetic prospection. Research has shown that fired, or cut and backfilled archaeological features such as kilns and hearths, ditches and pits often have an anomalously higher *magnetic susceptibility* than the surrounding subsoil. Magnetic susceptibility (measured in nano-tesla, nT) is a measure of the magnetisation of the iron oxides within materials in the presence of the earth's magnetic field. Many types of stone, for example limestone and sandstone, have a lower magnetic susceptibility than the subsoil. These differences (positive and negative) in magnetic susceptibility can be

detected as changing magnetic flux by an instrument such as a fluxgate gradiometer. Data from this is then mapped to produce an image which may be interpreted to locate buried archaeological features.

4.2 The detailed survey was carried out over an area totalling 2ha (figure 2), utilising a Geoscan Research FM18 fluxgate gradiometer with ST1 sample trigger. Prospection was carried out in grids of 20m x 20m in a zig-zag pattern along traverses spaced at 1m intervals, recording data points every 1m x 0.5m (a total of 800 points in each grid). At regular intervals, the data were downloaded to a notebook personal computer for storage and assessment.

4.4 Following the completion of the survey, processing and analysis took place using Geoscan Research's Geoplot v.2.01 software. A number of standard operations were carried out to process the data. The data was mathematically adjusted to account for periodic variations caused by the zig-zag surveying style. Isolated outlying values most likely caused by the detection of ferrous debris in the topsoil were cautiously removed from the data set. The grid of data was resampled from 1.0m x 0.5m to 0.5m x 0.5m by non-linear interpolation, improving the appearance of the final image. The data was analysed 'on-screen' using a variety of viewing parameters and styles. The most useful of these was captured from the screen as a *.GIF image and manipulated using Paint Shop Pro v.5 software (©JASC, Inc. 1998). A digital map of the survey area was constructed in TurboCAD v.4 (©IMSI 1997) using mapping data supplied by Hugh Bourn Homes. The greyscale images of the survey results were then overlaid onto the digital map (figure 3). Finally an interpretative diagram was generalised from the results (figure 4).

5 Results

5.1 An area of approximately 2ha was surveyed. The following discussion of results refer to the greyscale image in figure 3 and interpretation in figure 4.

5.2 The majority of the survey area was found to be magnetically 'quiet' with few anomalies and little variation in background levels. As a result, inconsistencies in the data caused by the buffeting of the surveying instrument by high winds, have been emphasised.

5.3 Areas of positive and negative magnetic anomalies along the south-eastern border of the site are a reflection of the ferrous and concrete components of fencing. Intense discrete paired positive and negative anomalies detected randomly over the whole survey area are most likely to be due to ferrous debris located in the topsoil. A group of anomalies detected on the northern margin of the area (**a** on figure 3) are caused by an electrical junction pole and reinforced concrete debris on the boundary.

5.4 An area of positive anomalies measuring *c.* 10m E-W and 5m N-S was detected at the corner of a survey block (**b** on figure 3). Immediately to the east of this area is the site of one of the demolished farm buildings mentioned above (para 2.1) and it is reasonable to suggest that the anomalies detected may reflect brick debris associated with those structures.

5.5 A positive magnetic anomaly was detected in the east of the survey area (c on figure 3) flanked to the west by a number of ferrous-type paired anomalies. Positive anomalies are often indications of cut and backfilled features such as pits, whose magnetic susceptibility has been enhanced through the inclusion of topsoil, burnt material and bacterial fermentation. However, the anomalies referred to here are in the area of disturbed ground mentioned above (para. 3.2). Thus the magnetic enhancement may be due to recent action, such as bonfires. A further positive anomaly (d) detected on the eastern edge of the survey area is a response to a nearby junction box.

6 Conclusions

6.1 A fluxgate gradiometer survey was carried out over 2ha of land north of Witham Road, Woodhall Spa. The area surveyed was magnetically quiet with few anomalies. Those anomalies that were detected are believed to reflect ferrous debris, electricity poles, disturbed ground and brick debris associated with nearby demolished buildings.

6.2 Although no anomalies were detected suggestive of archaeological remains on this site, it is important to consider that the technique used will only detect such features that show a magnetic enhancement and that features without such properties may remain undetected.

7 Acknowledgements

7.1 The geophysical survey was undertaken by Adrian Butler with the assistance of Jennifer Browning of ULAS. The project was managed by Richard Buckley

8 Sources Consulted

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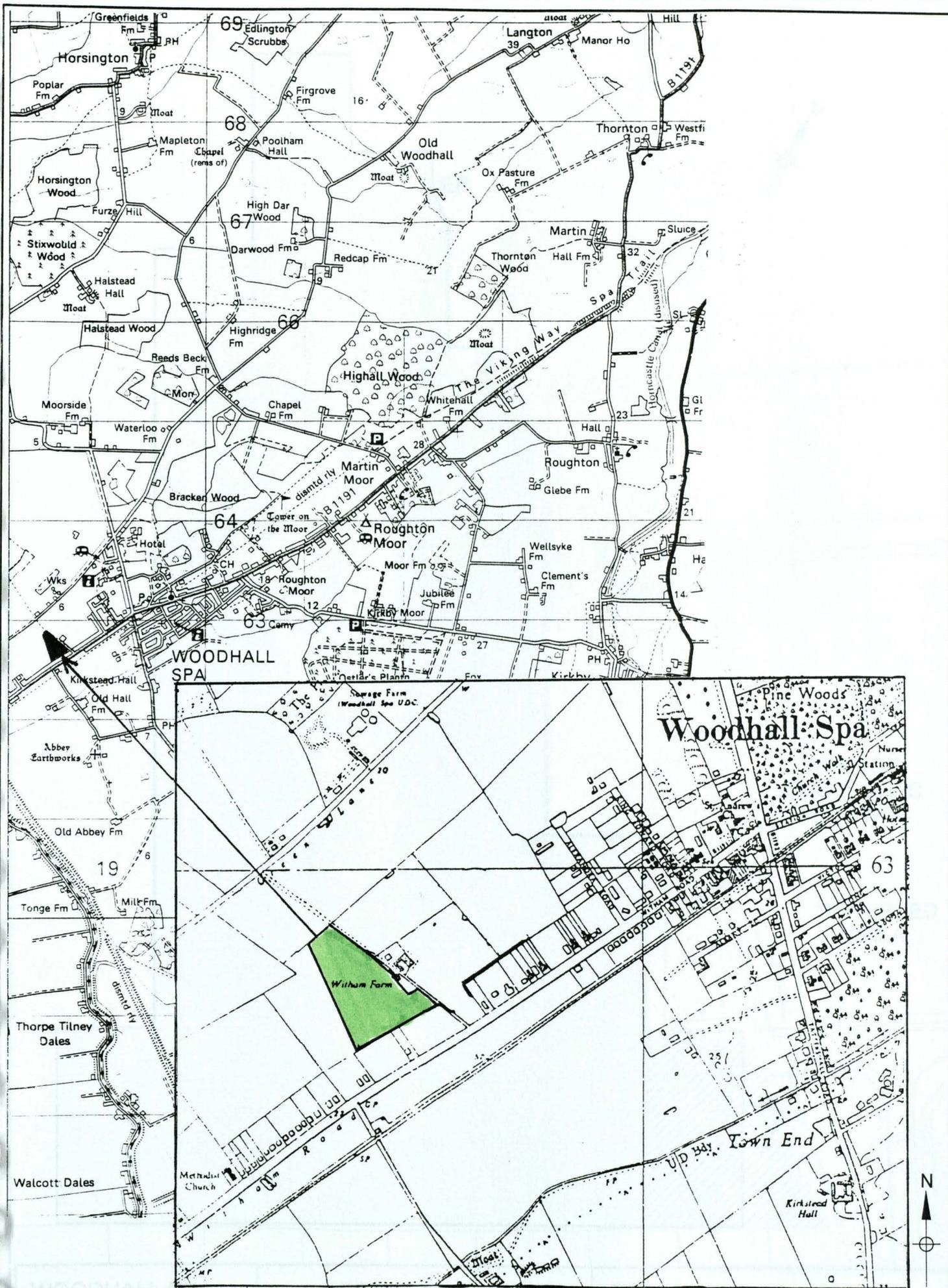
Figures

- 1 Site Location
 - 2 Survey Location
 - 3 Survey Results
 - 4 Interpretation
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13/11/98

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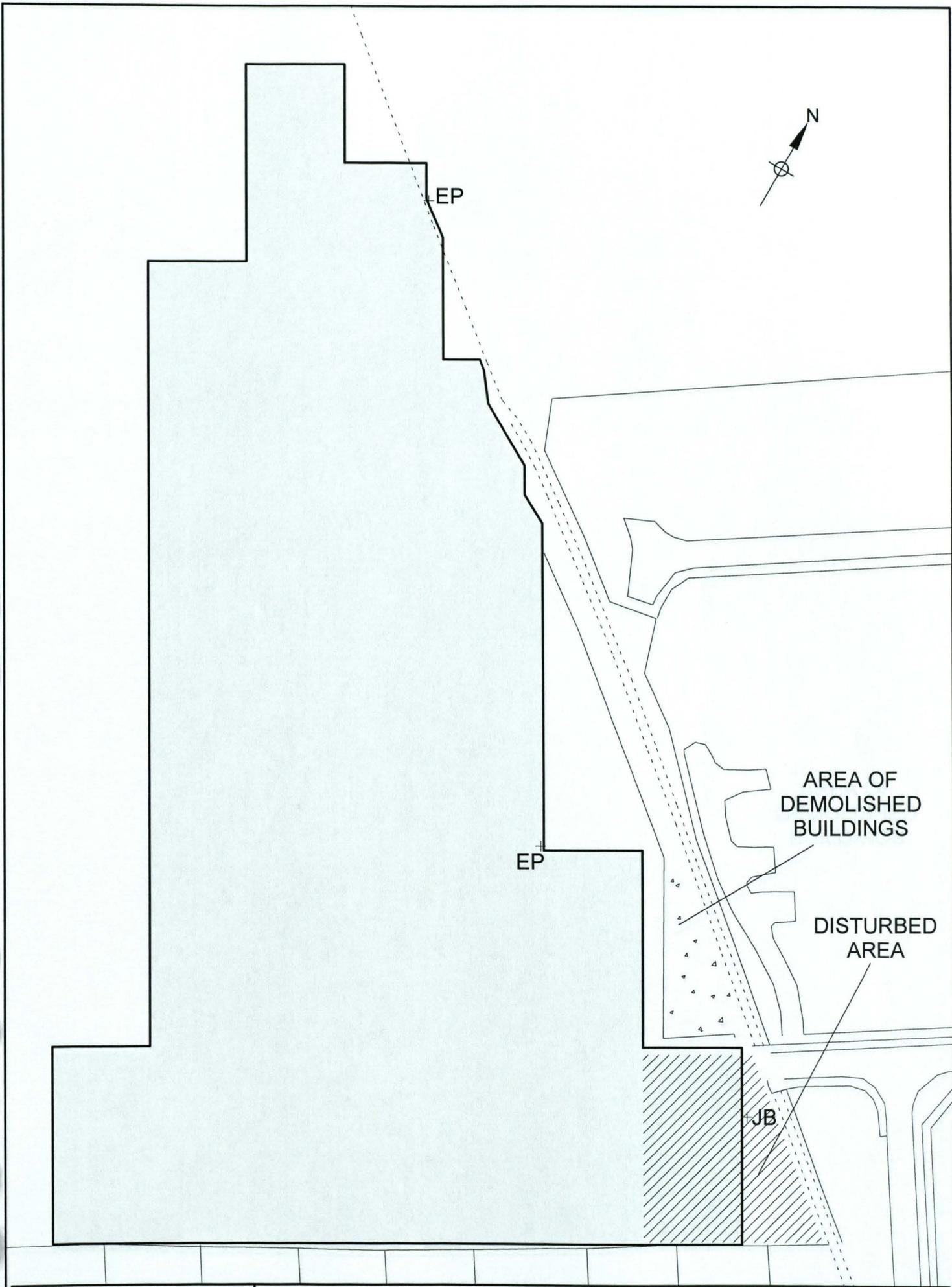
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WOODHALL SPA
 FIGURE 1
 SITE LOCATION

SCALE 1:50,000
 (INSERT 1:10,000)

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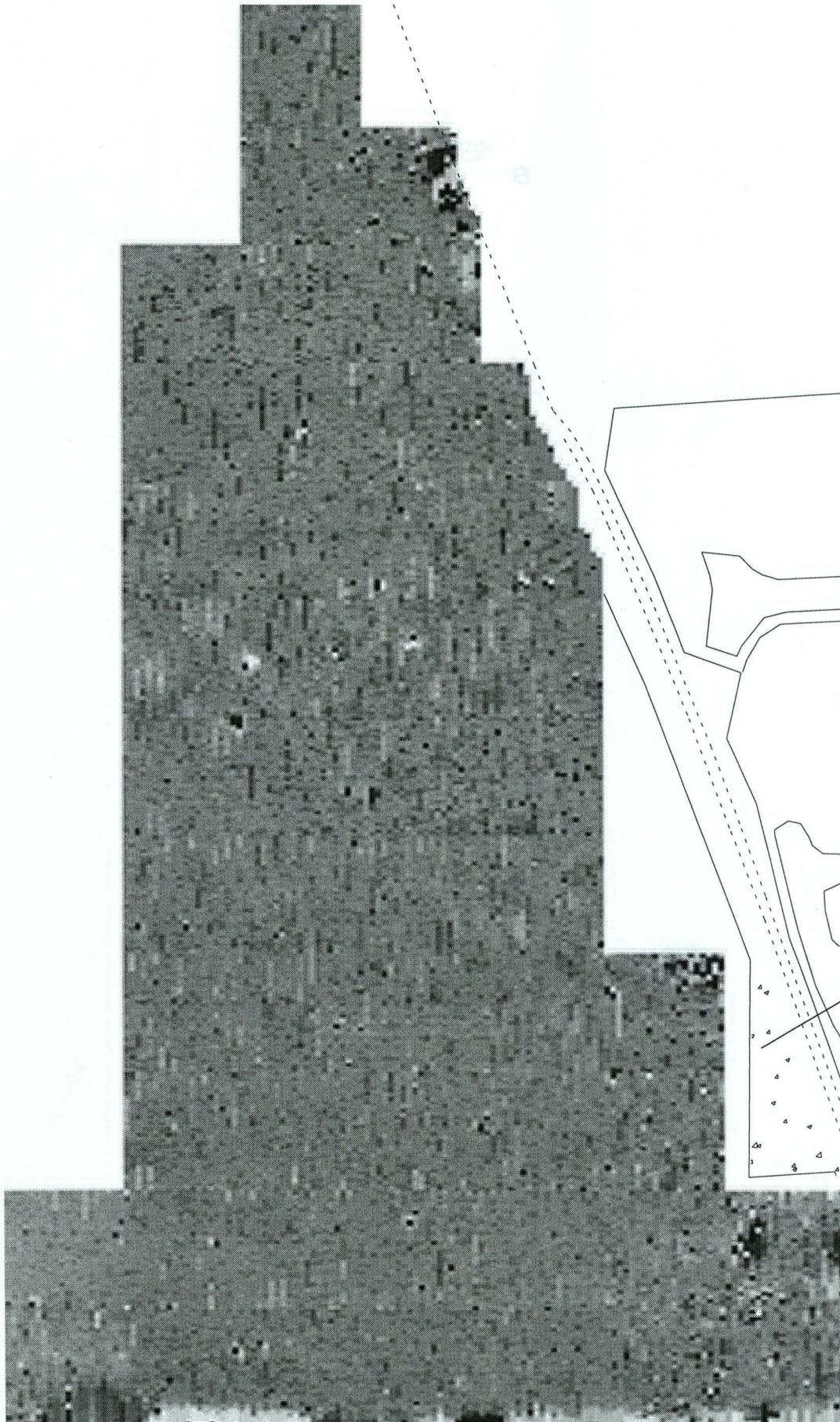


WOODHALL SPA
 FIGURE 2
 SURVEY LOCATION

SCALE 1:1000



	SURVEY AREA
	EP/JB ELECTRICITY POLE / JUNCTION BOX



AREA OF
DEMOLISHED
BUILDINGS

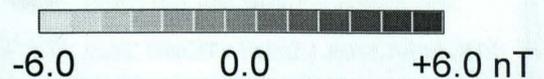
DISTURBED
AREA

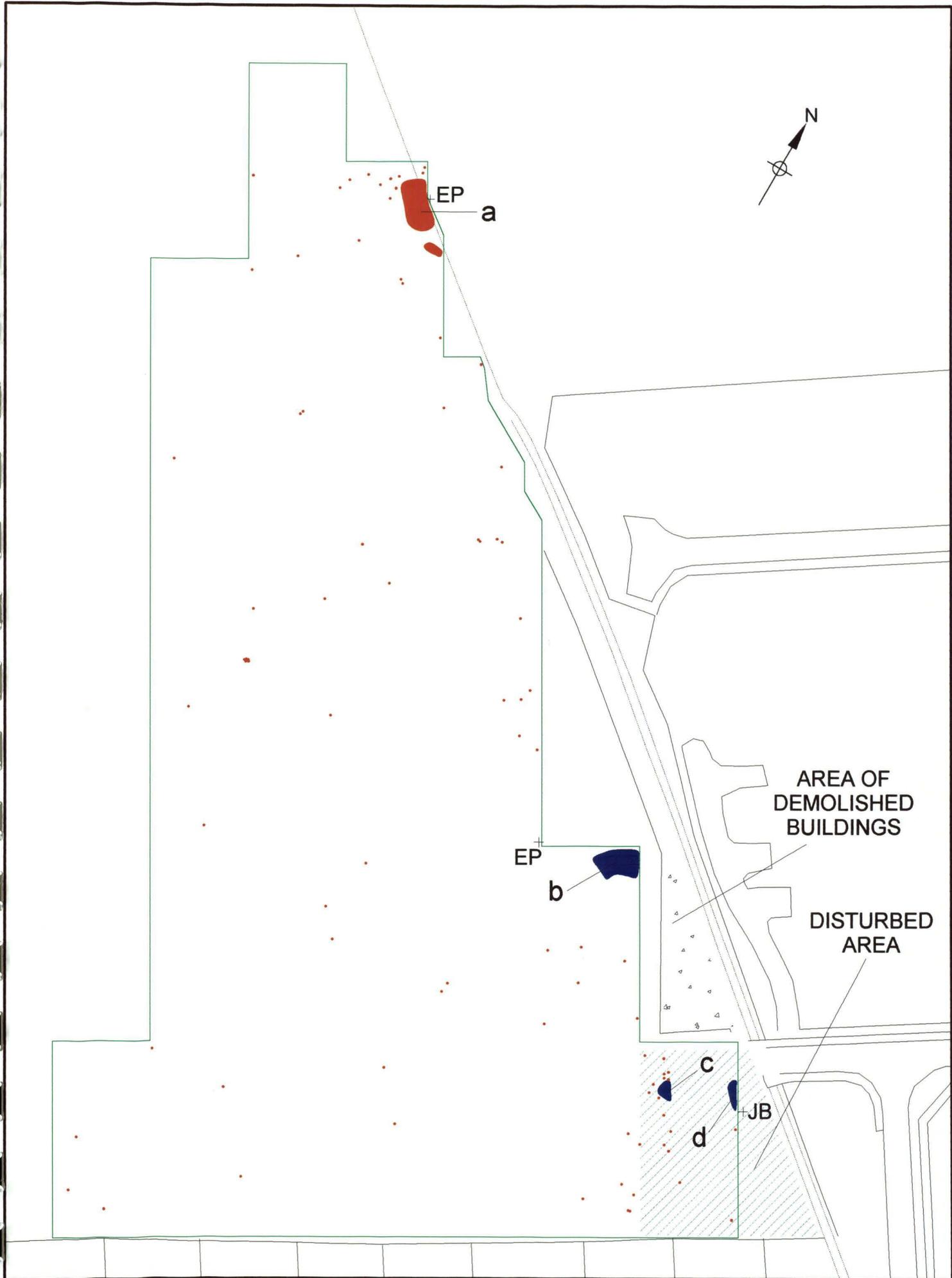
WOODHALL SPA
FIGURE 3
SURVEY RESULTS

SCALE 1:1000



MAGNETIC ANOMALIES





WOODHALL SPA
 FIGURE 4
 INTERPRETATION

SCALE 1:1000



- ● DIPOLAR ANOMALY ~ FERROUS
- POSITIVE ANOMALY ~ BRICK, PIT
- EP/JB ELECTRICITY POLE / JUNCTION BOX