

ARCHAEOLOGICAL PROJECT SERVICES



GEOPHYSICAL SURVEY

HIGH ROAD
WESTON
LINCOLNSHIRE

Prepared for
ASHWOOD HOMES LIMITED
by
Archaeological Project Services

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Document Control

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CONTENTS

List of Figures

List of Plates

1.	SUMMARY	5
2.	INTRODUCTION	5
2.1	DEFINITION OF AN EVALUATION.....	5
2.2	PROJECT BACKGROUND.....	5
2.3	TOPOGRAPHY AND GEOLOGY	5
2.4	ARCHAEOLOGICAL SETTING.....	5
3.	GEOPHYSICAL SURVEY.....	6
3.1	METHODS	6
3.2	RESULTS.....	6
4.	DISCUSSION	7
5.	ACKNOWLEDGEMENTS	7
6.	PERSONNEL.....	7
7.	BIBLIOGRAPHY	7
8.	ABBREVIATIONS.....	8

Appendix 1 Technical Information

Appendix 2 Glossary

Appendix 3 The Archive

List of Figures

Figure 1 General location plan

Figure 2 Survey location plan

Figure 3 Site layout

Figure 4 Raw greyscale data

Figure 5 Processed greyscale data

Figure 6 Interpreted data

1. SUMMARY

A detailed magnetic gradiometer survey was undertaken for Ashwood Homes Limited in connection with a proposed residential development on land north of High Road, Weston, Lincolnshire. The survey area totalled c. 3.8h.

The site is in close proximity to a Roman settlement and adjacent to areas where medieval pottery has been recovered.

The survey was constrained by unsuitable condition over much of the Site. A high degree of magnetic disturbance was recorded, potentially the result of alluvial geology. Potential rectangular enclosures were highlighted towards the southwest corner of the site.

2. INTRODUCTION

2.1 Definition of an Evaluation

Geophysical survey is a non-intrusive method of archaeological evaluation. Evaluation is defined as ‘a limited programme of non-intrusive and/or intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site. If such archaeological remains are present Field Evaluation defines their character and extent, quality and preservation, and it enables an assessment of their worth in a local, regional, national or international context as appropriate’ (ClfA 2014a).

2.2 Project Background

Archaeological Project Services (APS) was commissioned by Ashwood Homes Limited to undertake a detailed magnetometer survey totalling some 3.8ha on land to the north of High Road, Weston, Lincolnshire. This was in advance of a proposed residential development. The work was undertaken in accordance with a method statement prepared by APS.

2.3 Topography and Geology

Weston is situated 5km northeast of Spalding, in the administrative district of South Holland, Lincolnshire (Fig. 1). The Site is located at National Grid Reference TF 52867 32481, and lies 575m southwest of the parish church of St Mary (Fig. 2). The total area of the site is 3.8ha. The site is bounded by High Road to the south and Baytree Graden centre to the west.

Local soils are of the Stockwith Series, silty over clayey calcareous alluvial gley soils (Robson 1991). These soils are developed on tidal flat deposit of clay and silt which in turn overlies Oxford Clay Formation mudstone (BGS 2021). 1.8 The Site is flat with heights in the region of c. 4m AOD.

2.4 Archaeological Setting

There are no prehistoric sites or finds from the assessment area. Marine inundation from the Neolithic to Iron Age suggests that little human use of the landscape is likely during this period. A Roman settlement spanning the 1st-4th century was identified 270m to the west of the Site. This was situated on a silted-up channel which was slightly higher than the surrounding landscape (HER MLI92281).

The village of Weston was likely to have been founded in the middle Saxon period. However,

scatters of pottery suggest the original core lay to the east of the assessment area, adjacent to the parish church of St Mary (Wood 2008). Medieval pottery characteristic of a manuring scatter were noted in the fields to the north and east of the Site during an archaeological survey, suggesting this area was part of the open fields surrounding Weston in the medieval period (Albone 2000).

To the east of the site, on the edge of the assessment area, Oakleigh House farmstead was constructed in the early 18th century, followed by the adjacent barn in the late 18th century. Armstong's Map of Lincolnshire 1788 indicates that at this period Weston was confined to the area east of the Site, probably placing Oakleigh House at the nearest limit of the settlement, although the scale is too small to be certain.

A transcription of Weston drainage plans c.1800 presented in Albone 2000 shows that the site was divided into northwest-southeast strip fields. The strip fields were removed in the early 20th century.

3. GEOPHYSICAL SURVEY

3.1 Methods

A magnetic gradiometry survey was carried out with a Bartington Grad 601-2 fluxgate magnetometer. The fields were divided into 40m² grids using a survey grade GPS and each grid was walked systematically in a zigzag pattern, taking readings every 0.25m in traverses 1m apart.

The layout of the survey area is shown in Figure 3. At the time of survey much of the available area was overgrown and could not be traversed.

The survey was undertaken in accordance with Historic England (2008) and ClfA (2014b) guidelines and codes of conduct. A detailed methodology can be found in Appendix 1.

3.2 Results

The presentation of the data for the site comprises a greyscale print-out of the raw data (Fig. 4; clipped for display but otherwise unprocessed) and the processed data (Fig. 5). Magnetic anomalies have been identified and plotted on to an interpretative drawing (Fig. 6). In the following text, the letters in brackets refer to annotations on Figures 6.

Positive anomalies

Two positive anomalies have been highlighted with red hatching (A). These linear features, but broad (up to 4m wide) and weak. They may be fragments of rectilinear features. However, it should be noted that these anomalies are within an area of high magnetic disturbance and may alternatively be unusually regular variations in the background noise.

Weak positive linear anomalies

There are two weak positive linear anomalies which have been highlighted with a dashed red line. One of these is parallel and adjacent to the broader rectilinear feature (B), and the other is slightly to the southwest, on a northwest-southeast alignment (C). Identification of these features is uncertain as they are particularly weak and within an area of magnetic disturbance.

Negative linear anomaly

A Negative linear anomaly (highlighted with a light cyan line) has been identified in the southwest of the survey area. Typically these indicated the presence of banks, but due to the

magnetic interference in this area, such an interpretation is not possible to make.

Bipolar linear anomaly

A bipolar linear anomaly has been highlighted with a blue line towards the east of the survey area (E). It has a northeast-southwest orientation and slightly curves towards the eastern end. Bipolar linear anomalies typically indicate modern features, but too little of the feature has been exposed to interpret it with certainty.

Bipolar disturbance

A large portion of the survey area is covered in bipolar disturbances (highlighted with blue hatching). This pattern of disturbance is usually caused either by modern detritus or underlying variability in the geology, such as is common with alluvial deposits. In the case of the site it is likely to mainly be due to alluvial geology, but patches of modern detritus could also reside within the general pattern of disturbance.

A particularly strong patch of bipolar disturbance (~100nT) has been highlighted (D). This could be the result of a metallic item or a deposit which has been subjected to a high temperature.

4. DISCUSSION

The survey has largely been inconclusive as large areas of the field were not surveyable or have been rendered unintelligible by background geological disturbances. However, it is possible to identify two potential rectilinear enclosures in the southwest of the site. Further features in this area may be masked by the magnetic disturbance. It is not possible to suggest a period or function for these enclosures and, as they have only been partially revealed, it is not absolutely certain that they are the result of human activity rather than unusually regular variations in the geology, which occur from time to time. An additional linear feature with a bipolar nature was identified towards the east of the survey area. This is likely to be caused a ditch with an enriched magnetic fill and similar ditches often prove to be modern in nature, with metallic items, building rubble or services in their fills. A large, strongly bipolar feature towards the northeast of the survey area is likely to be a result of a metallic item in the topsoil, but given the local geology a large heat affected feature like a saltern cannot be discounted.

5. ACKNOWLEDGEMENTS

Archaeological Project Services wish to acknowledge Andrew Riley of Ashwood Homes for commissioning this project. Paul Cope-Faulkner edited this report.

6. PERSONNEL

Project coordinator: Paul Cope-Faulkner
Geophysical Survey: Sean Parker and Ryan Godbold
Survey processing and reporting: Jonathon Smith
Archiving: Denise Buckley

7. BIBLIOGRAPHY

Albone, J, 2000 *Desk-Based Assessment at Land North of High Road, Weston, Lincolnshire (HRW00)*. Archaeological Project Services Report **33/00**

BGS, 2021 *Geology of Britain Viewer*, available at <http://mapapps.bgs.ac.uk/geologyofbritain/home.html> (accessed 15.04.2021)

Robson, JD, 1990 *Soils of the Boston and Spalding District [Sheet 131]*, Memoirs of the Soil Survey of Great Britain

Wood, M, 2008 *Archaeological Investigation along the Weston Bypass, Weston, Lincolnshire (WBP 01)*. Archaeological Project Services Report **145/06**

ClfA, 2014a *Standard and Guidance for Field Evaluation*.

ClfA, 2014b *Standard and Guidance for Geophysical Survey*.

Historic England, 2008 *Geophysical Survey in Archaeological Field Evaluation*.

8. ABBREVIATIONS

AOD Above Ordnance Datum

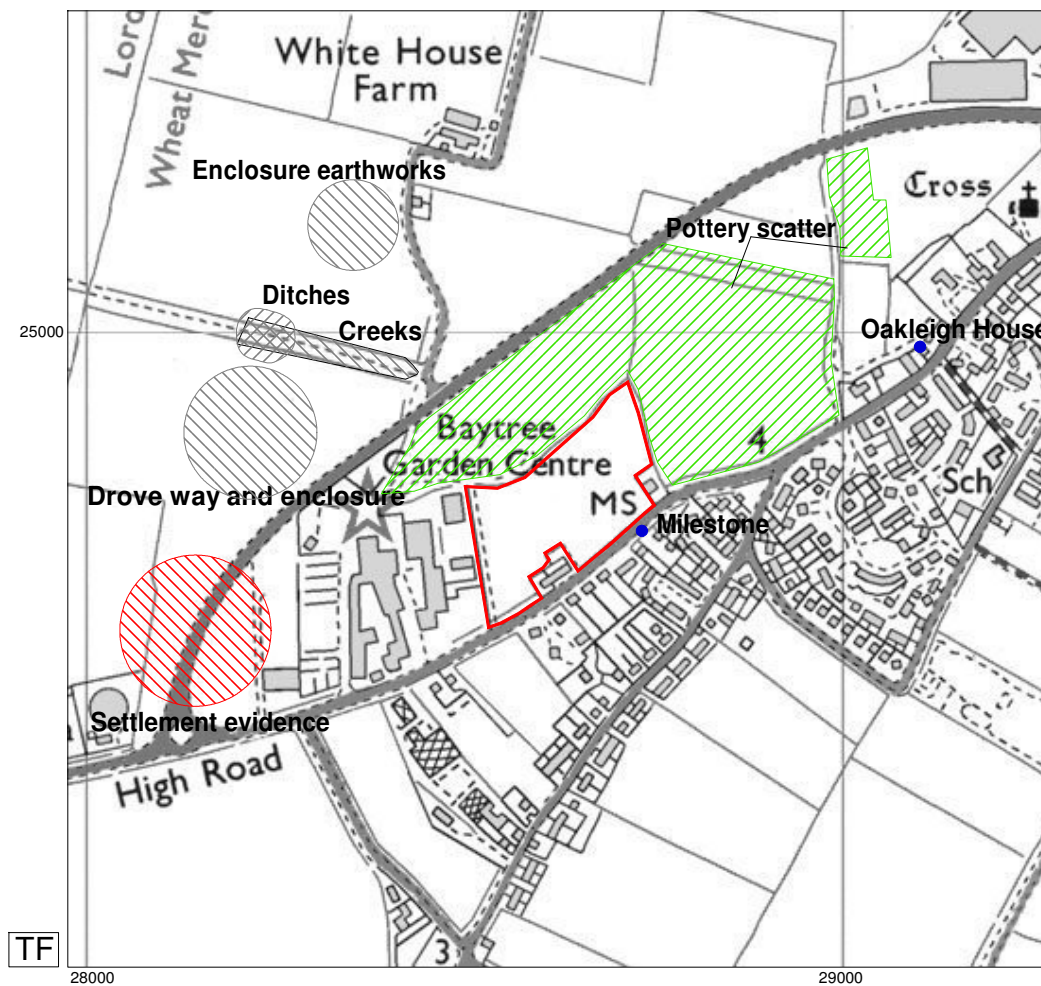
APS Archaeological Project Services

BGS British Geological Survey

ClfA Chartered Institute for Archaeologists



Figure 1: General Location Plan



-  Site boundary
-  Roman settlement
-  Medieval pottery scatter
-  Post-medieval HER entry
-  Undated HER entry

0 500m

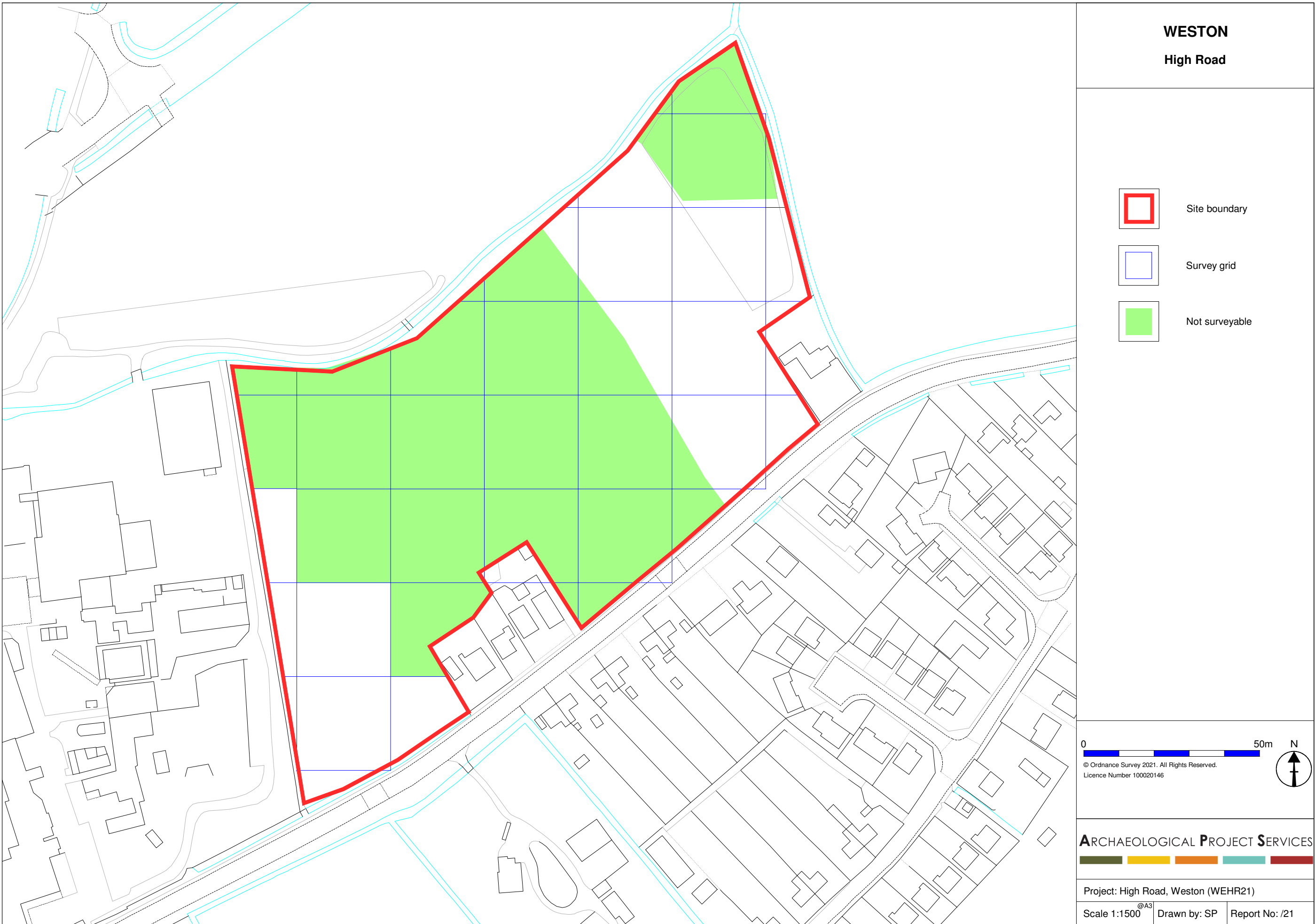
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Scale 1:10,000 Drawn by: JS Report No:

Figure 2 - Site location plan adjacent showing adjacent archaeology



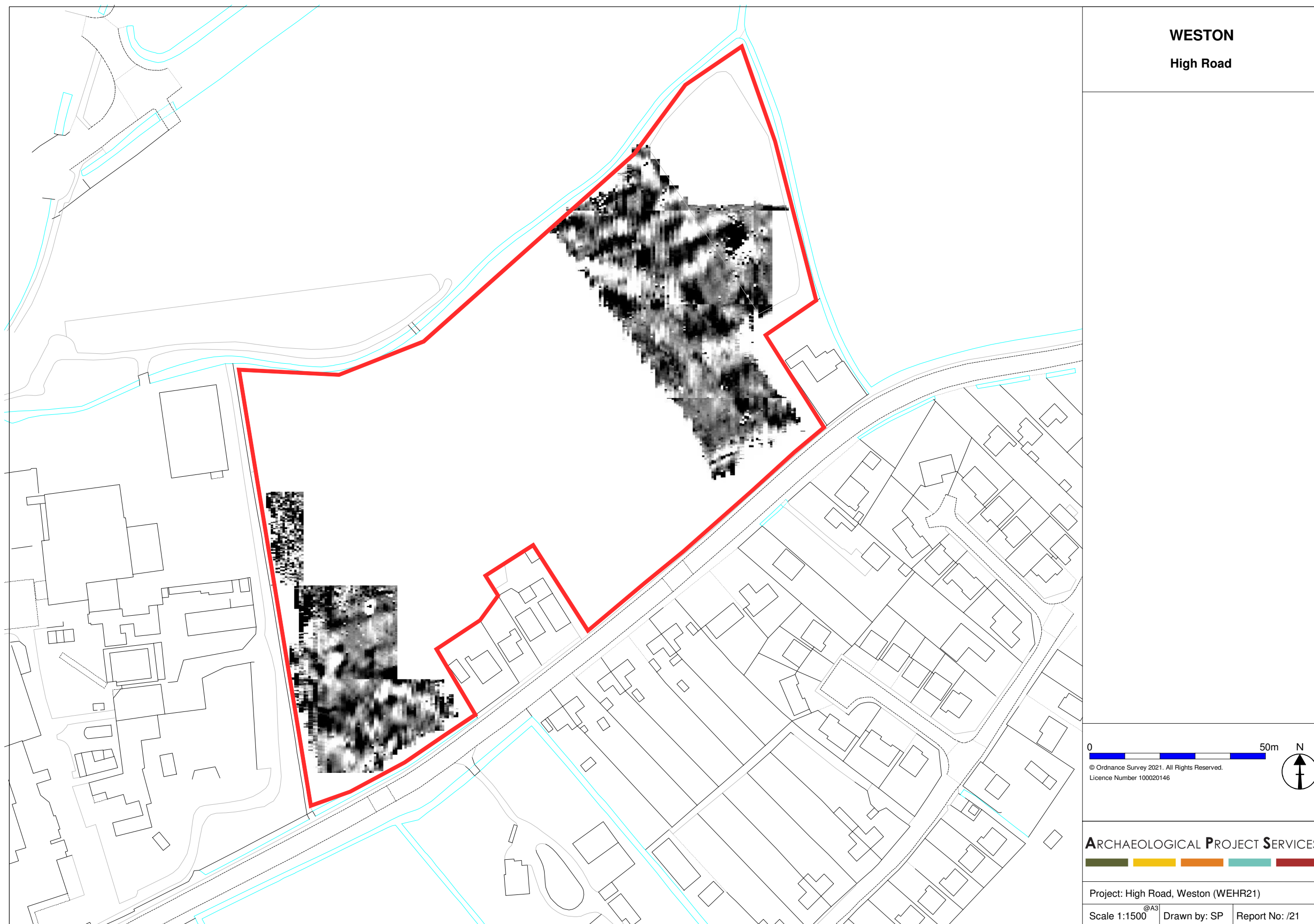


Figure 5 - Processed greyscale data

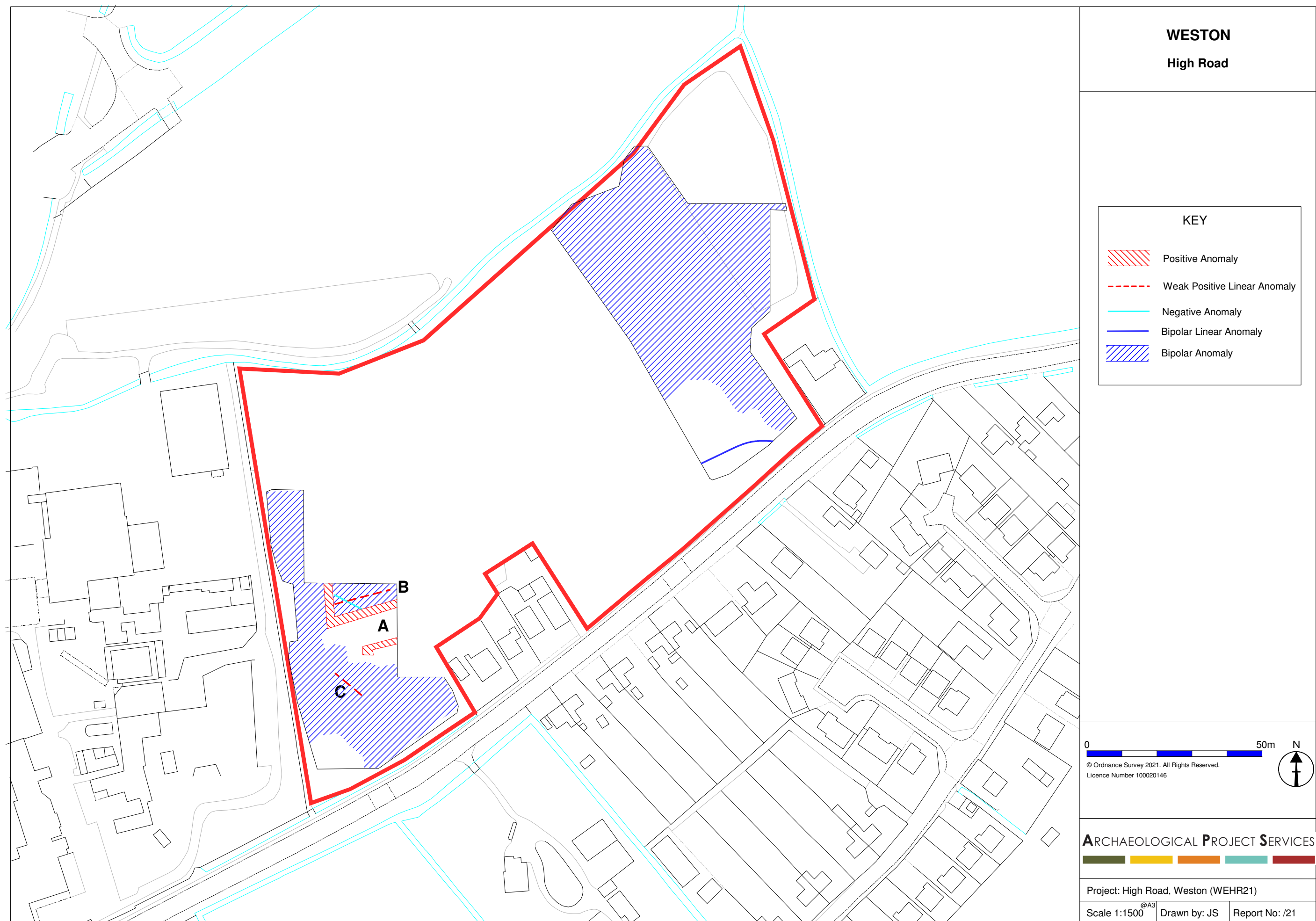


Figure 6 - Interpretation

Appendix 1

TECHNICAL INFORMATION

Principles of magnetometry

Magnetic prospecting is designed to identify concentrations of magnetised iron oxides in the soil. Iron oxides can exist in states of weak or a strong magnetisation (Gaffney and Gater 2003).

Human activities tend to enhance the magnetic properties of iron oxide particles. Where these particles accumulate, such as in cut features like ditches and pits, a weak positive magnetic anomaly is apparent. In cases where very strong heat has been applied, such as furnace and kiln bases, a bipolar magnetic anomaly will be apparent, with one area having a strong positive signature and one area having a strongly negative signature. Where banks have been built up from natural geological material which excludes magnetically enriched sediments, or walls have been made of stone, this may result in a negative anomaly. Modern metallic items and fired bricks cause sharp bipolar spikes. Modern services have a tendency to alternate between positive and negative readings along their length.

It should be noted that not all features will be detectable magnetically and an absence of anomalies does not necessarily indicate absence of archaeological features (Clark 1996).

Bartington Grad 601-2

A gradiometer uses two sensors separated by a fixed distance in order to measure the difference in strength between the earth's magnetic field and the soil. The Bartington Grad 601 uses two fluxgate sensors separated vertically by 1m to take these readings. This reduces natural variations associated with the Earth's magnetic field and deep geology. Changes as small as 0.2 nanoTesla (nT) in an overall field strength of c. 49,000nT can be accurately detected using this instrumentation, although in practice instrument interference and soil noise can limit sensitivity. The instrument has typical penetration of 0.5m-1m, although stronger anomalies can be detected at greater depths. The 601-2 model uses two sets of sensor pairs to take parallel readings 1m apart horizontally.

Methodology

The survey area is divided into grid squares of 40x40m. The grids are set out using a survey grade GPS, accurate to 0.03m. The grids are systematically walked in a zigzag pattern with the gradiometer taking readings every 0.25m along a traverse, and each traverse being separated by 1m. This equates to 6400 sampling points in a full 40m x 40m grid. Readings are automatically recorded on a datalogger which is downloaded at the end of each day. The gradiometer is 'zeroed' at the start of each day and at intervals throughout to ensure consistent results are achieved throughout the survey.

Data Processing

The data is downloaded and processed using TerraSurveyor software (version 3.0.35.10). The raw data is then adjusted to emphasise possible features. At each stage the data is examined as a greyscale image and as a trace plot.

Minimally Processed data

The data is clipped so that the mid-range of readings is most visible. This involves excluding all readings outside of the -20nT to 20nT range.

Processed Data

The following processes are applied to produce the processed greyscale image:

- Destripe: Each traverse is flattened with regard to surrounding traverses by setting the median value of the traverse to 0nT. This produces cleaner images, but may cause bleeding where particularly strong signals are present at one end of a traverse.
- Data Clip: The data is clipped to provide the most suitable contrast for seeing archaeological features. This excludes readings outside of the -5nT to 5nT range.

Data is exported as a JPEG image and georeferenced for use in scale plans of the site. Anomalies are then checked against historical maps, and where available, lidar contour data.

References

Clark, A., 1996 *Seeing Beneath the Soil*, London, 2nd edn.

Gaffney C. and Gater, J., 2006 *Revealing the Buried Past: Geophysics for Archaeologists*, The History Press

Appendix 2

GLOSSARY

Alluvium	Deposits laid down by water. Marine alluvium is deposited by the sea, and fresh water alluvium is laid down by rivers and in lakes.
Drift	Material that has been eroded, transported or deposited by glaciers (or their melt water). The term 'drift' is commonly used to describe any deposits of Quaternary age.
Geophysical Survey	Essentially non-invasive methods of examining below the ground surface by measuring deviations in the physical properties and characteristics of the earth. Techniques include magnetometry and resistivity survey.
Medieval	The Middle Ages, dating from approximately AD 1066-1500.
Modern	The current period, dating from around AD 1900 to the present time.
Natural	Undisturbed deposit(s) of soil or rock which have accumulated without the influence of human activity
Post-medieval	The period following the Middle Ages, dating from approximately AD 1500-1900.
Prehistoric	The period of human history prior to the introduction of writing. In Britain the prehistoric period lasts from the first evidence of human occupation about 500,000 BC, until the Roman invasion in the middle of the 1st century AD.
Roman	Pertaining to the period dating from AD 43-410 when the Romans occupied Britain.
Saxon	Pertaining to the period dating from AD 410-1066 when England was largely settled by tribes from northern Germany, Denmark and adjacent areas.

Appendix 3

THE ARCHIVE

The archive consists of:

- 1 Daily record sheets
- 1 Report text and illustrations
- 1 Digital data

File names	WEHR21.csv
Explanation of codes used in file names	.csv files allow whole composite to be generated and stored easily.
Description of file formats	All files are in csv format where Z= nT reading
List of codes used in files	
Hardware, software and operating systems	TerraSurveyor 3.0.35.10 running under Windows 10
Date of last modification	23/01/220
Indications of known areas of weakness in data	
Survey Technique	Zigzag
Origin	Starts at A1. X axis progresses east. Y axis progresses south
Grid size	40mx40m
Interval	X=1, Y=0.25m
Dummy Value	2047.5
XYZ Separation	Comma

All primary records are currently kept at:

Heritage Lincolnshire/Archaeological Project Services
The Old School
Cameron Street
Heckington
Sleaford
Lincolnshire
NG34 9RW

Final destination of the archive is:

The Collection
Art and Archaeology in Lincolnshire
Danes Terrace
Lincoln
LN2 1LP

OASIS code: to be confirmed