
**LAND AT
FORMER FLAX FARM,
METHERINGHAM HEATH LANE,
METHERINGHAM,
LINCOLNSHIRE**

GEOPHYSICAL SURVEY

**Work undertaken for
Cornerstone Planning Ltd. &
Future Biogas Ltd.**

March 2015

**Report produced by
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OASIS Ref: archaeol1-206636
National Grid Reference: TF 0220 6066
Planning No: 13/1426/FUL
Accession No: LCNCC:2015.35

APS Report No: **28/15**

**ARCHAEOLOGICAL
PROJECT
SERVICES**



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1. SUMMARY

Detailed magnetic gradiometer survey was undertaken for Cornerstone Planning Ltd. and Future Biogas Ltd. in connection with proposed development on land at Flax Farm, Metherringham Heath, North Kesteven, Lincolnshire. The survey totalled c. 2.3ha.

Research has indicated that there is a medieval grange to the west of the site and prehistoric cropmarks to the east.

The geophysical survey detected three ditches, a possible bank and an area with a concentration of possible pits.

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*’ (CIfA 2014).

2.2 Background

Archaeological Project Services was commissioned by Cornerstone Planning Ltd. and Future Biogas Ltd. to undertake a detailed magnetometer survey totalling some 7.8ha, although only 2.3ha proved suitable, on land at Flax Farm, Metherringham Heath, North Kesteven, Lincolnshire. This was in advance of

proposed development of the area. The survey was carried out on 5th and 6th March 2015.

To the west of the site, some 300m away, is a medieval grange which belonged to Kirkstead Abbey. To the east of the site, approximately 200m away, a series of prehistoric ditches have been identified by aerial photography (Cope-Faulkner 2013).

2.3 Topography and Geology

Metherringham is located 14km southeast of Lincoln and 15km north of Sleaford in the administrative district of North Kesteven, Lincolnshire (Fig. 1).

The proposed development site is on the north side of Metherringham Heath Lane at National Grid Reference TF 0220 6066, located 4.7km west of the centre of Metherringham, as defined by the parish church of St Wilfrid (Fig. 2).

Local soils are of the Elmton 1 Association, typically shallow brown rendzinas (Hodge *et al.* 1984, 179). These soils are developed on a solid geology of Jurassic Lincolnshire Limestone (GSGB 1973). The site lies at a height of c. 45m on land that slopes gently down to the east, towards the fens of the Witham valley.

3. GEOPHYSICAL SURVEY

3.1 Methods

Location and layout of the survey area is shown in Figure 3. The original proposed area for the survey was some 7.8ha, but the majority was covered by buildings and concrete, which made it unsuitable for magnetometry. The remaining area, 2.3ha, was a flat harrowed field and presented ideal conditions for surveying.

The survey was undertaken in accordance with English Heritage (2008) and CIfA (2014) guidelines and codes of conduct.

The magnetic survey was carried out using a dual sensor Grad601-2 Magnetic Gradiometer manufactured by Bartington Instruments Ltd. This records subtle changes in the magnetic field resulting from differing features in the soil. 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 mapping of anomalies in a systematic manner allows interpretation of the type of material present beneath the surface. Strong magnetic anomalies are generated by buried iron-based objects or by kilns or hearths, usually resulting in a bipolar (positive/negative) response. More subtle positive anomalies representing pits and ditches can be seen where these contain more topsoil which is normally richer in magnetic iron oxides and provides a contrast with the natural subsoil (but this can vary depending on the nature of the underlying deposits). A negative anomaly may result from upcast bank material. Wall foundations can also show as negative anomalies where the stone is less magnetic than the surrounding soil, or as stronger positive and negative anomalies if of brick, but are not always responsive to the technique. It should be noted that not all features will be responsive and absence of anomalies does not necessarily indicate absence of archaeological features.

Magnetometers measure changes in the Earth's magnetic field. With two sensors configured as a gradiometer the recorded values indicate the difference between two magnetic measurements separated by a fixed distance. The Grad601-2 consists of

two high stability fluxgate gradiometers suspended on a single frame with a 1m separation between the sensing elements giving a strong response to deep anomalies.

Sampling interval and data capture

Readings were taken at 0.25m intervals along traverses 1m apart. This equates to 6400 sampling points in a full 40m x 40m grid. The Grad 601 has a typical depth of penetration of 0.5m to 1.0m although a greater range is possible where strongly magnetic objects have been buried in the site.

Readings are logged consecutively into the data logger which is downloaded daily either into a portable computer whilst on site or directly to the office computer. At the end of each job, data is transferred to the office for processing and presentation.

Processing and presentation of results

Processing is performed using specialist TerraSurveyor software. This can emphasise various aspects contained within the data but which are often not easily seen in the raw data. Basic processing of the magnetic data involves flattening the background levels with respect to adjacent traverses and adjacent grids (Destripe or zero median traverse). Despiking is also performed to reduce the effect of the anomalies resulting from small iron objects often found on agricultural land. Further processing can then be carried out which may include low pass filtering to reduce 'noise' in the data and hence emphasise the archaeological or man-made anomalies.

The following are the processing techniques carried out on the processed gradiometer data used in this report:

1. DeStripe (sets the background median of each traverse within a grid to zero and is

useful for removing striping effects)

2. Despiking (useful for display and allows further processing functions to be carried out more effectively by removing extreme data values)

Parameters: X radius = 2; Y radius = 2; Threshold = 3SD; Spike replacement = mean

3. Clip (excludes extreme values allowing better representation of detail in the mid range): -3 to 3nT.

3.2 Results

The presentation of the data for the site involves a print-out of the raw or minimally processed data as greyscale plots (Fig 4; clipped for display but otherwise unprocessed) and a greyscale plot of the processed data (Fig 5). Magnetic anomalies have been identified and plotted onto an interpretative drawing (Fig 6) and overlain onto the site map (Fig 7).

Positive linear anomalies

There are five positive linear anomalies. Two of these (shown in green) are parallel to the field edge and are characteristic of modern agricultural features. The remaining three positive linears (shown in red) are likely to be ditches of historic origin.

Bi-polar linear anomalies

There is one bi-polar linear anomaly (shown in blue), running roughly north-south along the west of the surveyed area. These strong bi-polar readings are usually caused by rubble or metallic debris in modern ditches. Given this ditch does not appear on any map from the earliest available edition in 1779, it suggests the feature dates from the 16th to mid 18th century.

Negative linear anomalies

There is one negative linear at the south of the site (shown in yellow). Negative anomalies are quite rare and usually result from an upcast feature, such as a bank, wall foundation or stone culvert.

Discrete positive anomalies

Examples of discrete positive anomalies are highlighted with red circles and possibly represent pit features. There is a distinct concentration of these features in the southeast corner of the site. However, similar anomalies can result from geological features, such as sinkholes in the limestone bedrock.

Discrete bipolar anomalies

Iron items within the topsoil give a distinctive localised bipolar (strong positive with associated strong negative) response. Such items usually derive from relatively recent management or agricultural use of the land – broken or discarded pieces of agricultural machinery or other modern debris.

4. DISCUSSION

On the west of the survey there is a likely post-medieval ditch defined by a bi-polar response, with a small length of a probable ditch 5m to the east of it, running in parallel. This could represent a change in land boundary in medieval or post-medieval times.

To the south there is a negative feature – perhaps a bank, wall foundation or stone filled drain – which runs parallel to Metheringham Heath Lane, at a distance of 12m. Just to the north of the negative feature are two ditches that seem to respect it and a cluster of possible postholes. Taken together these features suggest the possibility of some kind of settlement a few metres back from the road.

5. ACKNOWLEDGEMENTS

Archaeological Project Services wishes to acknowledge Cornerstone Planning Ltd. and Future Biogas Ltd who commissioned the project. Gary Taylor and Denise Drury (APS) edited the report.

6. PERSONNEL

Project coordinator: Neil Jefferson
Geophysical Survey: Neil Jefferson and Ryan Godbold.
Survey processing and reporting: Jonathon Smith.

7. BIBLIOGRAPHY

CIfA, 2014 *Standard and Guidance for Field Evaluation*.

CIfA, 2014 *Standard and Guidance for Geophysical Survey*.

Cope-Faulkner, P., 2013 *Archaeological Desk Based Assessment of Land North of Metheringham Heath Lane, Metheringham, Lincolnshire*. Heckington: Archaeological Project Services Report No. 131/13

English Heritage, 2008 *Geophysical Survey in Archaeological Field Evaluation*.

GSGB, 1973 *Lincoln. Solid and drift edition*, 1:50 000 map sheet **114**

Hodge, C.A.H., Burton, R.G.O., Corbett, W.M., Evans, R. and Seale, R.S., 1984 *Soils and their use in Eastern England*, Soil Survey of England and Wales **13**

8. ABBREVIATIONS

GSGB Geological Survey of Great Britain

CIfA Chartered Institute for Archaeologists



Figure 1 - General location plan

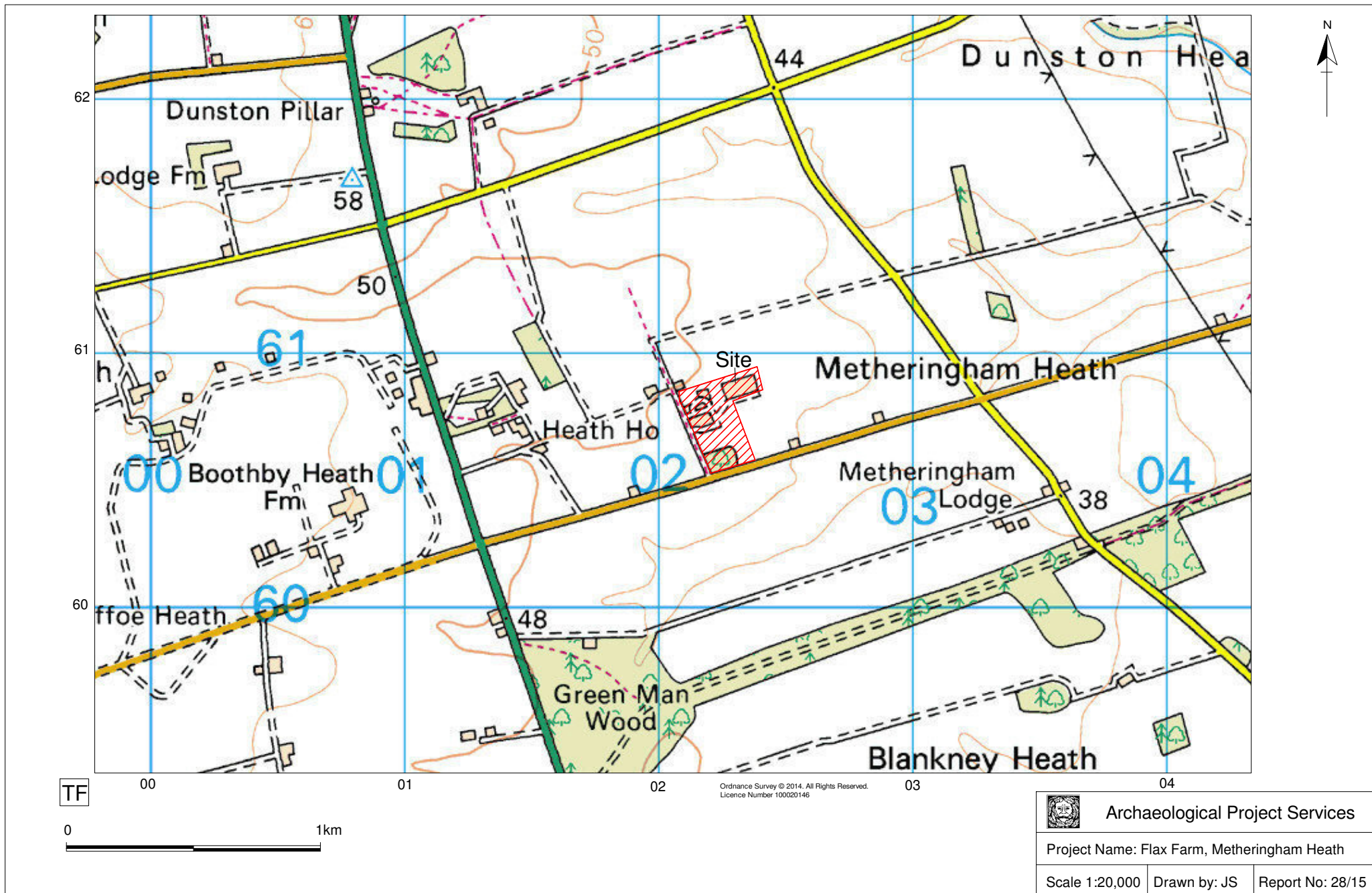


Figure 2 - Site location

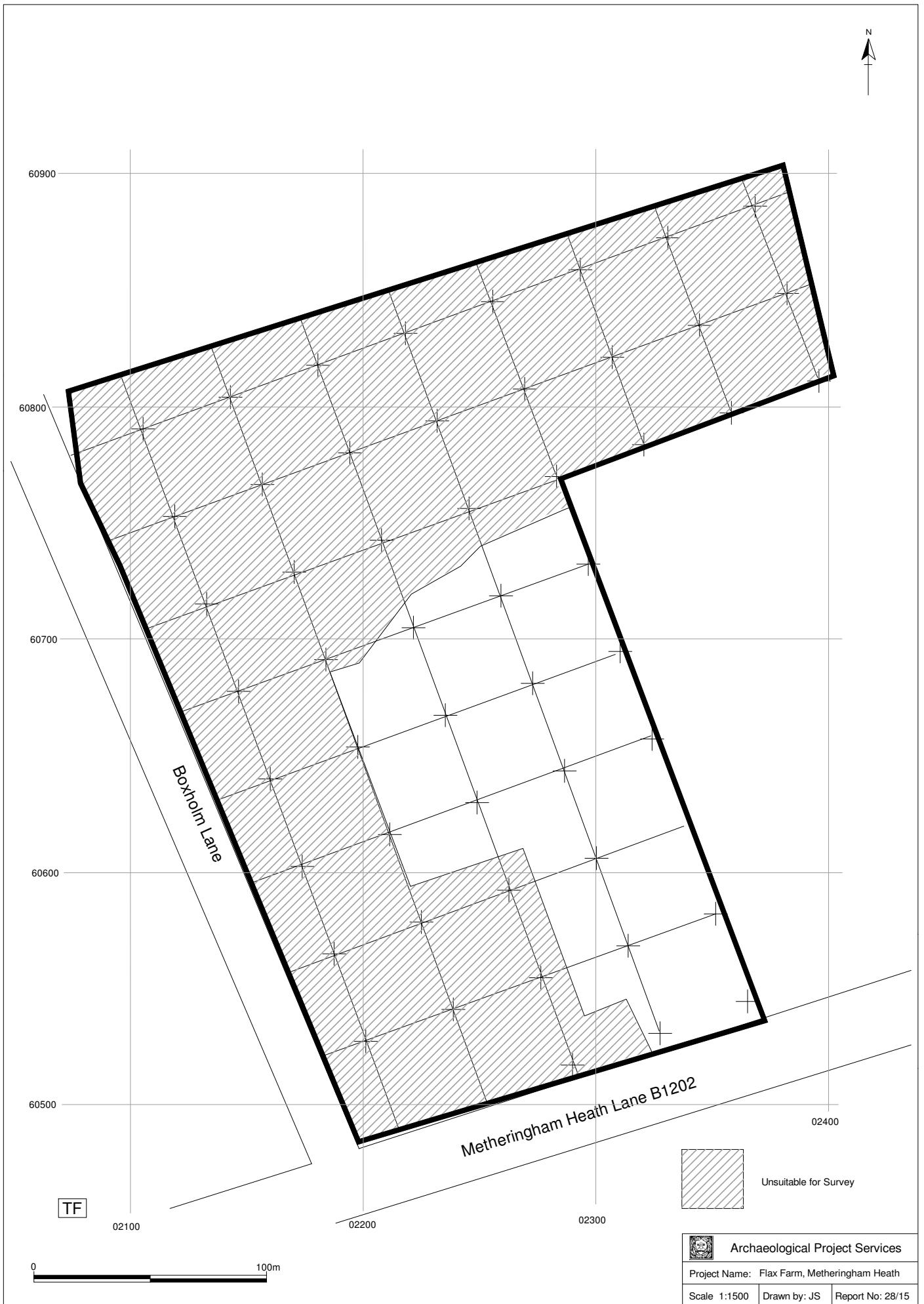


Figure 3 - Site layout

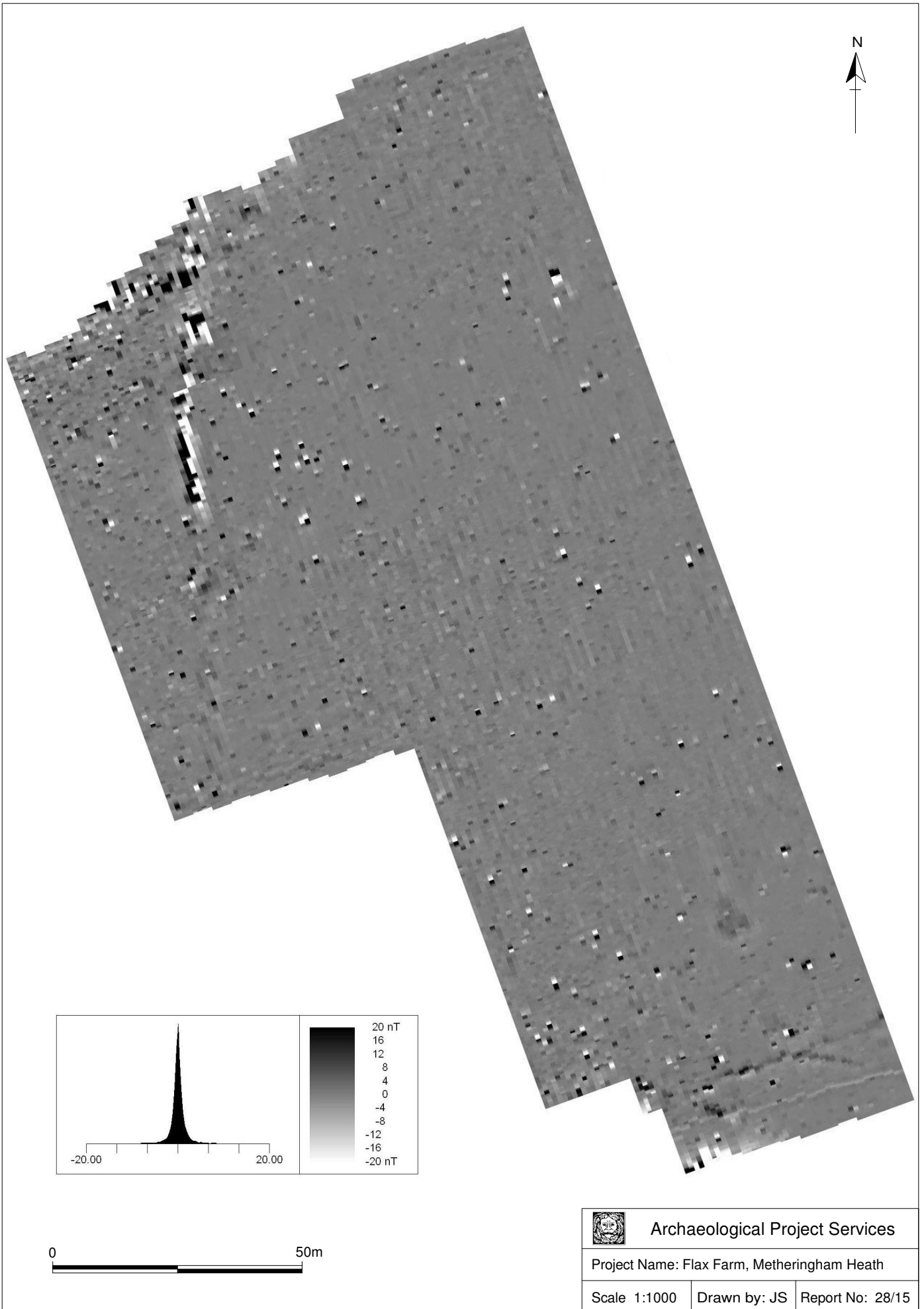
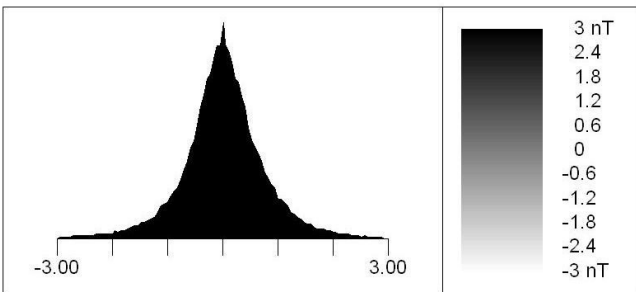
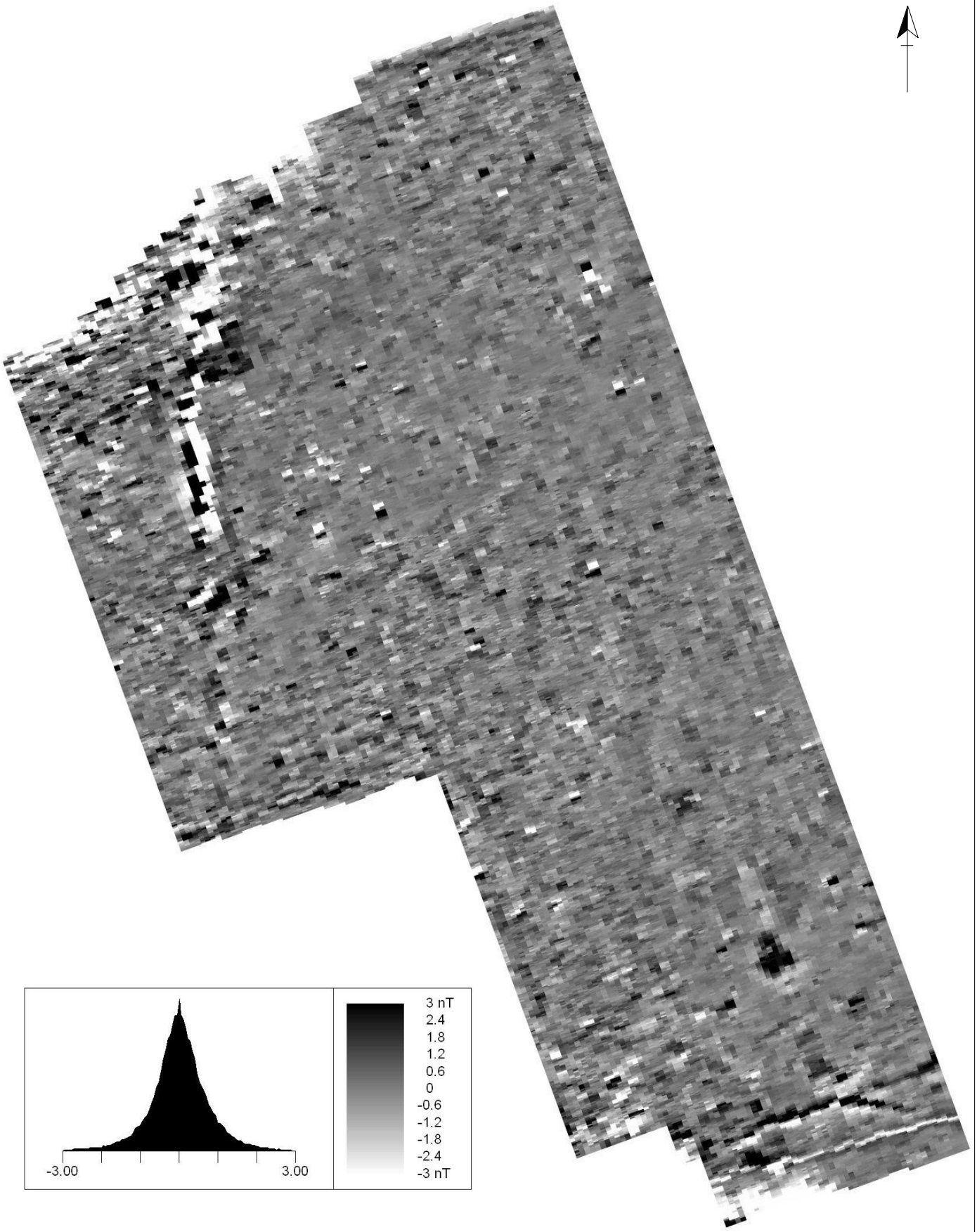


Figure 4 - Minimally processed greyscale plot




	Archaeological Project Services	
Project Name: Flax Farm, Metheringham Heath		
Scale 1:1000	Drawn by: JS	Report No: 28/15

Figure 5 - Processed greyscale plot

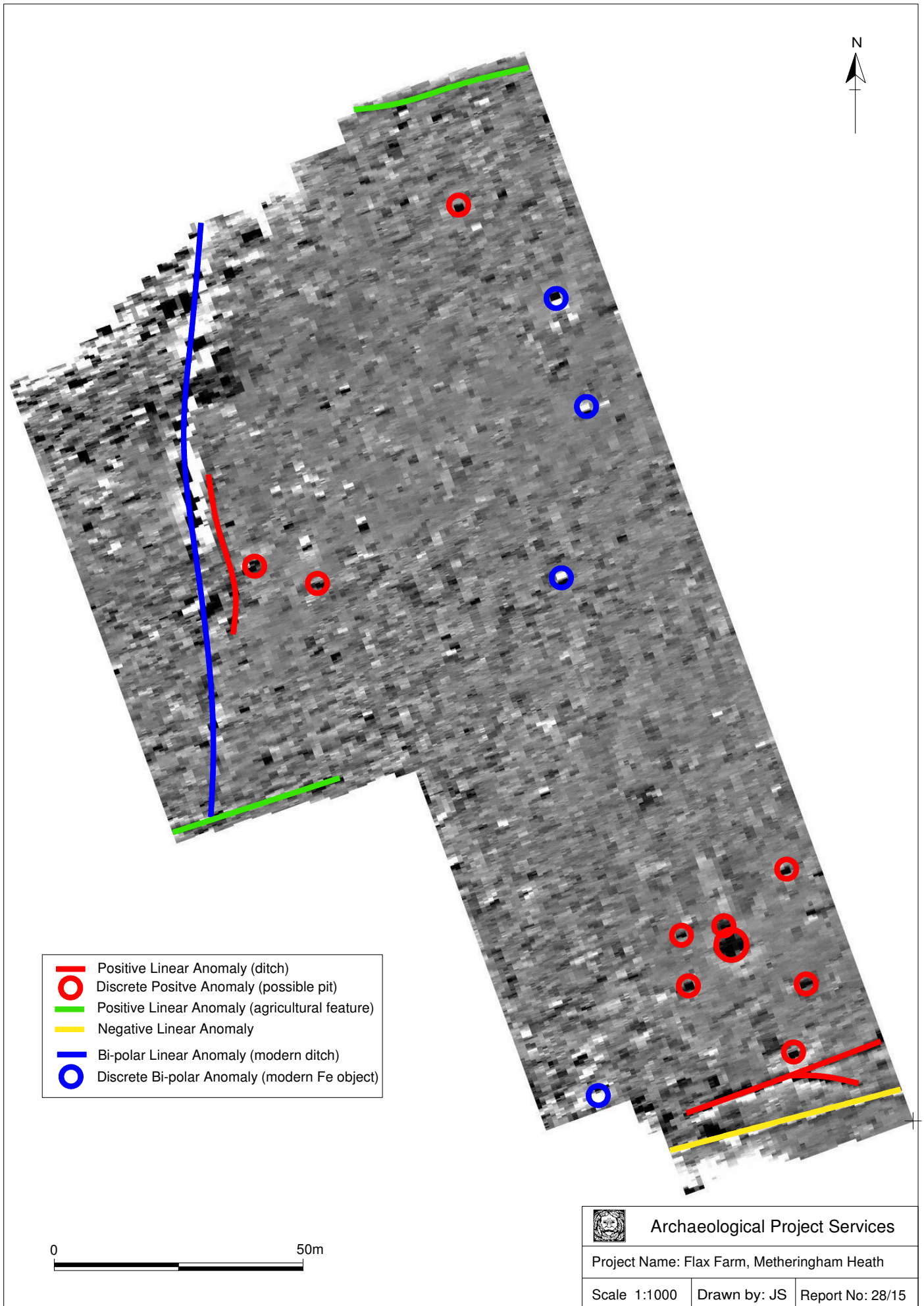


Figure 6 - Interpretive greyscale plot

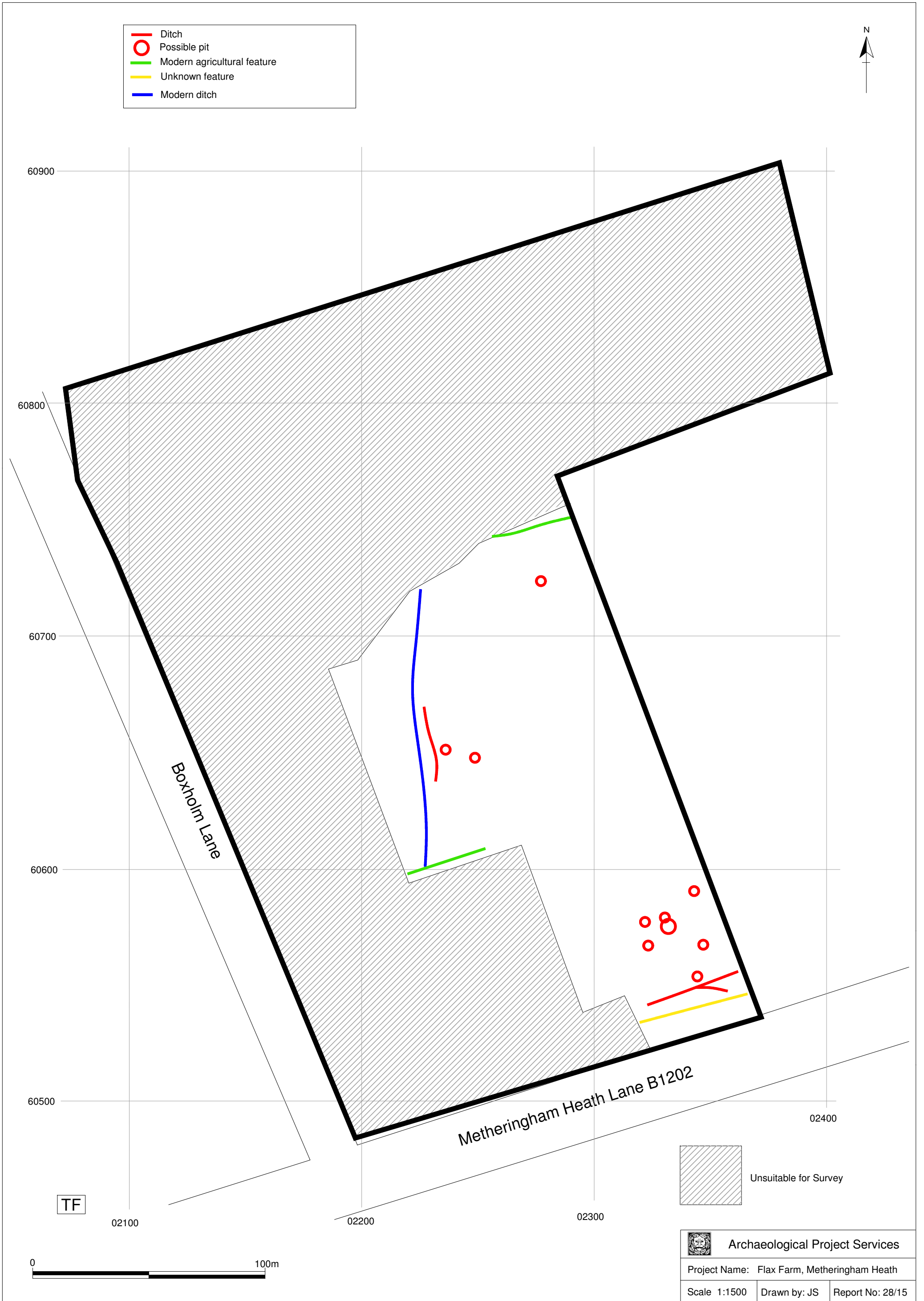


Figure 7 - Identified features and site layout

Appendix 1 THE ARCHIVE

The archive consists of:

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

File names	MHFF15 01.xgd to MHFF15 03.xgd MHFF15 W01.xgd to MHFF15 W15.xgd MHFF15.xcp
Explanation of codes used in file names	xgd files are magnetometer grids, named with site code and number in the order surveyed. Grids suffixed with '-a' are re-orientated copies. xcp files are composites containing record of all the data and processes used to produce the end product
Description of file formats	All files are in plain text xml format with header data defining survey and processing parameters
List of codes used in files	D indicates a "dummy" value within the composite data
Hardware, software and operating systems	TerraSurveyor 3.0.25.1 running under Windows 7
Date of last modification	06/03/15
Indications of known areas of weakness in data	

All primary records are currently kept at:

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

The ultimate destination of the project archive is:

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

Accession Number: LCNCC:2015.35
OASIS code: archaeo11-206636
Site Code: MHFF15

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OASIS ID: archaeol1-206636

Project details

Project name	Geophysical survey at Flax Farm, Metherringham Heath, Lincolnshire
Short description of the project	A 2.3ha magnetometry survey at Flax Farm, Metherringham Heath, Lincolnshire. The survey revealed 3 ditches of probable historic origin, several possible pits and a negative linear of unknown character.
Project dates	Start: 05-03-2015 End: 06-03-2015
Previous/future work	Yes / Not known
Any associated project reference codes	MHFF15 - Sitecode
Any associated project reference codes	13/1426/FUL - Planning Application No.
Any associated project reference codes	LCNCC:2015.35 - HER event no.
Type of project	Field evaluation
Site status	None
Current Land use	Cultivated Land 4 - Character Undetermined
Monument type	DITCH Uncertain
Monument type	PIT Uncertain
Significant Finds	NONE None
Methods & techniques	"Geophysical Survey"
Development type	Not recorded
Prompt	Planning condition
Position in the planning process	Not known / Not recorded
Solid geology (other)	Jurassic Lincolnshire Limestone
Drift geology (other)	Elmton 1 Association, typically shallow brown rendzinas