LAND AT
ILAM HALL
STAFFORDSHIRE

GEOPHYSICAL SURVEY

Work undertaken for
The National Trust

June 2011

Report produced by
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National Grid Reference: **SK 1323 5063**

APS Report No: **73/11**

ARCHAEOLOGICAL
PROJECT
SERVICES

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1. SUMMARY

Detailed magnetic gradiometer survey, was undertaken on behalf of The National Trust on 1.25ha of land adjacent to the Church of the Holy Cross at Ilam Hall, Staffordshire.

The area between the Church and the Hall has been terraced in the past and has seen considerable modern disturbance. The routes of a number of modern services are evident – some leading to or from the site of a sceptic tank, others probably representing routes of other services.

Little of clear archaeological origin can be distinguished, but the area immediately south of the church, close to St Bertram's Well, shows a marked concentration of elevated readings (in particular contrast to the area west of the church). These show some regularity in form and might reflect the location of earlier structures, although some of the responses here are almost as strong as those produced by the recent services which could lead to suspicion of a more recent origin.

2. INTRODUCTION

2.1 Definition of an Evaluation

Geophysical survey is a non-intrusive method of archaeological evaluation which 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'* (IFA 2008).

2.2 Background

Archaeological Project Services was commissioned by the National Trust to undertake detailed magnetometer survey on some 1.25ha of land at Ilam Hall, Staffordshire. The survey was carried out between the 28th and 3rd July 2011.

2.3 Topography and Geology

Ilam is located 6km northwest of Ashbourne in the Staffordshire Moorlands District within the Peak District National Park (Fig. 1). Ilam Hall lies west of the village at National Grid Reference SK 1323 5063 and is owned and maintained by the National Trust.

The Hall and village lie in the valley of the River Manifold at *c*. 150m O.D. Local soils are well drained silty soils of the Malham 1 Association (Mackney et al. 1983) developed on carboniferous limestone.

The survey area lay between the Hall and the Church of the Holy Cross on the north side of the River Manifold (Fig. 2). The Hall and outbuildings sit at a higher level than the Church and the ground rises on a series of terraces from east to west. The majority of the survey area lay on the ground below the terraces, sloping from north to south down towards the river, but also rising onto the terrace in front of the Hall at the northwestern edge.

2.4 Archaeological Setting

The village of Ilam (*Hilum*) is mentioned in Anglo-Saxon wills and charters dating back to at least the early 11th century (Ekwall 1960, 262). Two Anglo-Scandinavian cross shafts are located in the churchyard (SM 21604, 21605; the later have been previously embedded in a cottage wall in the village). The Church of

the Holy Cross has a probable 11th century core, partly rebuilt in the 13th century and extended in 1618 and 1831. The church underwent major restoration in 1855-6 under the direction of Sir George Gilbert Scott (HER 06484). Originally belonging to a Benedictine Abbey, Ilam was sold to the Port family during the dissolution of the monastries under Henry VIII. After 250 years in the family, it was sold to David Pike-Watts. The current hall was built between 1821 and 1826 replacing the earlier hall on the site.

The church is clearly much older than the hall and the estate village buildings and there is a possibility that remains of the earlier village and/or earlier hall survive in the vicinity of the church.

3. AIMS

The aim of the surveys was to locate any features of possible archaeological significance within the area west and south of the church and below the terracing of the hall in order to inform management of the archaeological resource at the site.

4. GEOPHYSICAL SURVEY

4.1 Methods

Location and layout of survey areas are shown in Figure 1. Weather and ground conditions during the survey were dry. The survey area was under grass and in good condition for survey, although trees and areas of denser vegetation precluded survey in some areas.

Survey was undertaken in accordance with English Heritage (2008) and IfA (2010) guidelines and codes of conduct.

The magnetic survey was carried out using a dual sensor Grad601-2 Magnetic Gradiometer manufactured by Bartington Instruments Ltd. Although the changes in the magnetic field resulting from differing features in the soil are usually weak, 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 an estimate of the type of material present beneath the surface. Strong magnetic anomalies will be generated by buried iron-based objects or by kilns or hearths. More subtle anomalies representing pits and ditches can be seen where they 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). Wall foundations can 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.

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 centres along traverses 1m apart. This equates to 3600 sampling points in a full 30m x 30m 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 ArchaeoSurveyor 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. 'Despiking' is also performed to remove the anomalies resulting from small iron objects often found on agricultural land. Once the basic processing has flattened the background it is then possible to carry out further processing which may include low pass filtering to reduce 'noise' in the data and hence emphasise the archaeological or man-made anomalies.

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

1. DeStripe (sets the background mean of each traverse within a grid to zero and is useful for removing striping effects)

2. Despike (useful for display and allows further processing functions to be carried out more effectively by removing extreme data values)
Parameters: X radius = 1; Y radius = 1; Threshold = 3SD; Spike replacement = mean

3. Clip (excludes extreme values allowing better representation of detail in the mid range): -30 to 30nT.

4.2 Results

The presentation of the data for the site involves a print-out of the raw data as greyscale and trace plots (Figs 3, 4; clipped to +/-100nT for display but otherwise unprocessed), together with greyscale plots of the processed data (Figs 5, 6. Magnetic anomalies have been identified and plotted onto an interpretative drawing (Fig. 7) and are described below.

Positive area anomalies of possible archaeological origin
Strong bipolar anomalies are conspicuous across the survey area. Most appear to relate to relatively recent services, including drainage/ sewerage (see below). However, a particular concentration of higher responses, **A**, can be seen in the area south of the church. This is in marked contrast to the rest of the survey area, and to the west of the church particularly.

Linear positive anomalies
Few positive linear anomalies can be seen: two short lengths **B** and **C**, running approximately NW-SE, may have an archaeological origin, but these short disconnected lengths are difficult to interpret.

Discrete positive anomalies
A number of small discrete positive responses (**D**, **E**) within the southern part the area may indicate isolated pit features. These show elevated responses but not so strong as the more widespread bipolar responses suggestive of relatively recent disturbance.

Iron spikes (discrete bipolar anomalies)
Iron items within the topsoil give a distinctive localised bipolar (strong

negative and positive) 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. These are fairly widely scattered across the survey area.

Modern/magnetic disturbance
Elevated positive and negative readings are evident along the margins of the survey particularly along the northern and eastern boundaries where there are metal railings. A strong bipolar response is evident over the location of the sceptic tank, **F**, and at **G** and **H** the location of tanks/wells marked on modern mapping and evident as capped areas on the ground.

The strong linear bipolar anomalies clearly relate to routes of modern services – some leading to or from the site of the sceptic tank, others probably representing routes of other services running along the path north of the church and crossing the area below the terraces towards the river by St Bertam's Bridge.

5. DISCUSSION

Magnetic survey between Ilam Hall and the Church of the Holy Cross recorded a large number of strong magnetic responses, most relating to modern services and drainage/sewerage.

Few features can be confidently ascribed an archaeological origin. One or two short linear anomalies and perhaps a few discrete positive anomalies might be highlighted but more weakly magnetic features are swamped by the very strong responses to the modern services. Of most note is the area south of the church where there is a particular concentration of higher readings (in marked contrast to the area west of the church). These show some regularity in form and might reflect the location of earlier structures, although some of the responses here are almost as strong as those produced by the recent services which could lead to suspicion of a more recent origin.

6. ACKNOWLEDGEMENTS

Archaeological Project Services wishes to acknowledge the assistance of Rachael Hall at the National Trust who commissioned the project and Paul Mortimer who facilitated access. Rachel Bush assisted in setting out and movement of guide ropes on site. Tom Lane edited the report.

7. PERSONNEL

Project coordinator: Steve Malone
Geophysical Survey: Steve Malone, Bryn Leadbetter, Katie Green
Survey processing and reporting: Steve Malone

8. BIBLIOGRAPHY

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IfA, 2010 *Draft Standard and Guidance for Geophysical Survey*

9. ABBREVIATIONS

APS Archaeological Project Services

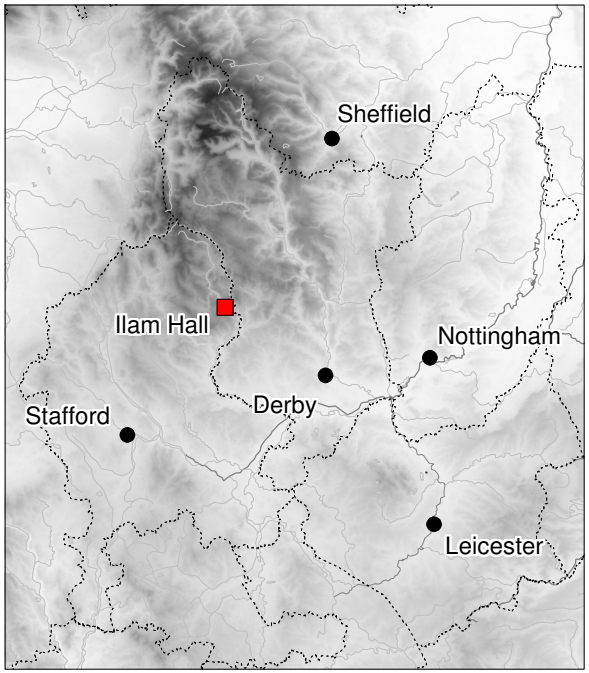
BGS British Geological Survey

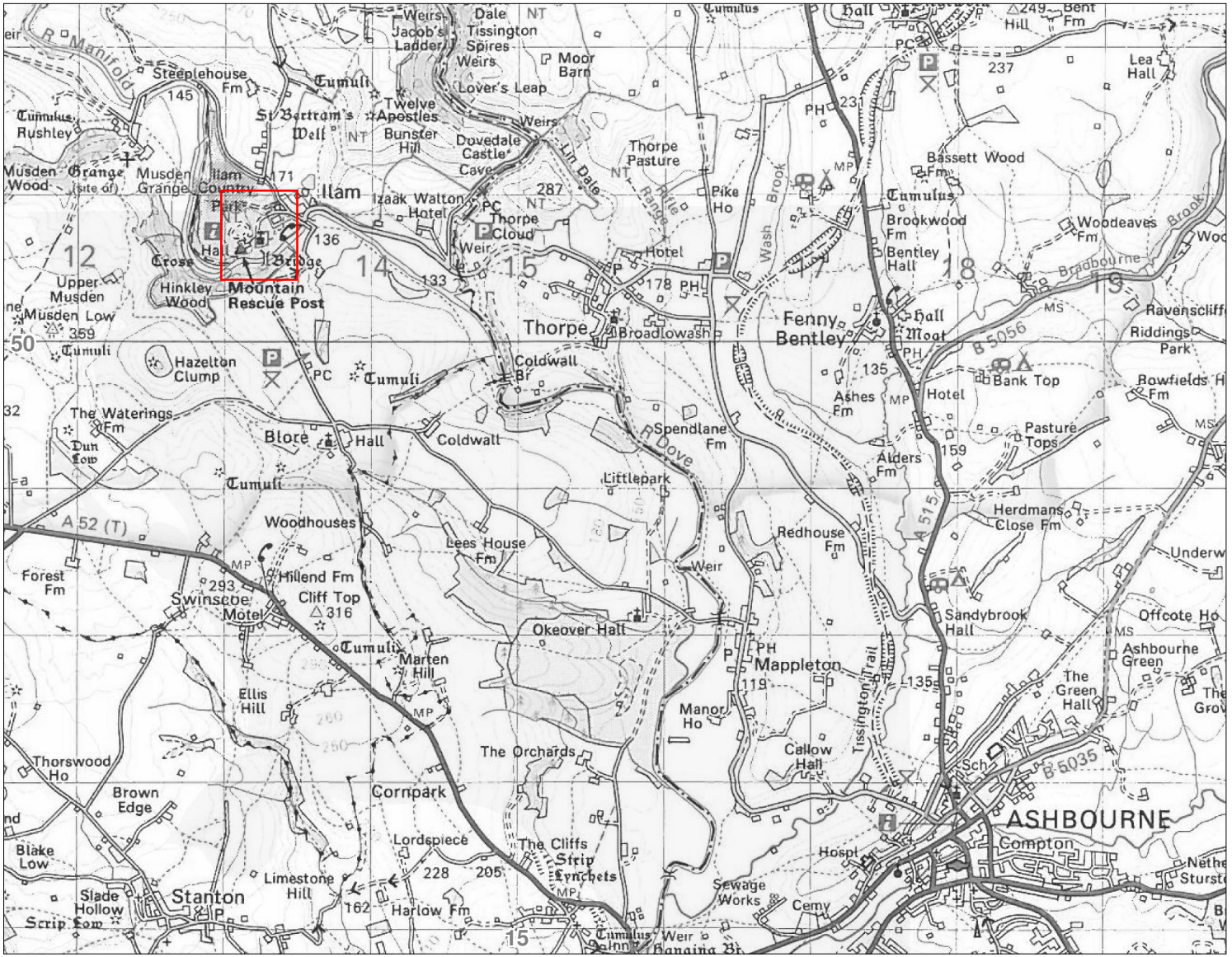
EH English Heritage

IfA Institute for Archaeologists

HER Historic Environment Record

SM Scheduled Monument





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Scale: varies	Drawn by: SJM	Report No: 73/11

Figure 1 Site location map

Figure 2 Location map showing layout of survey area

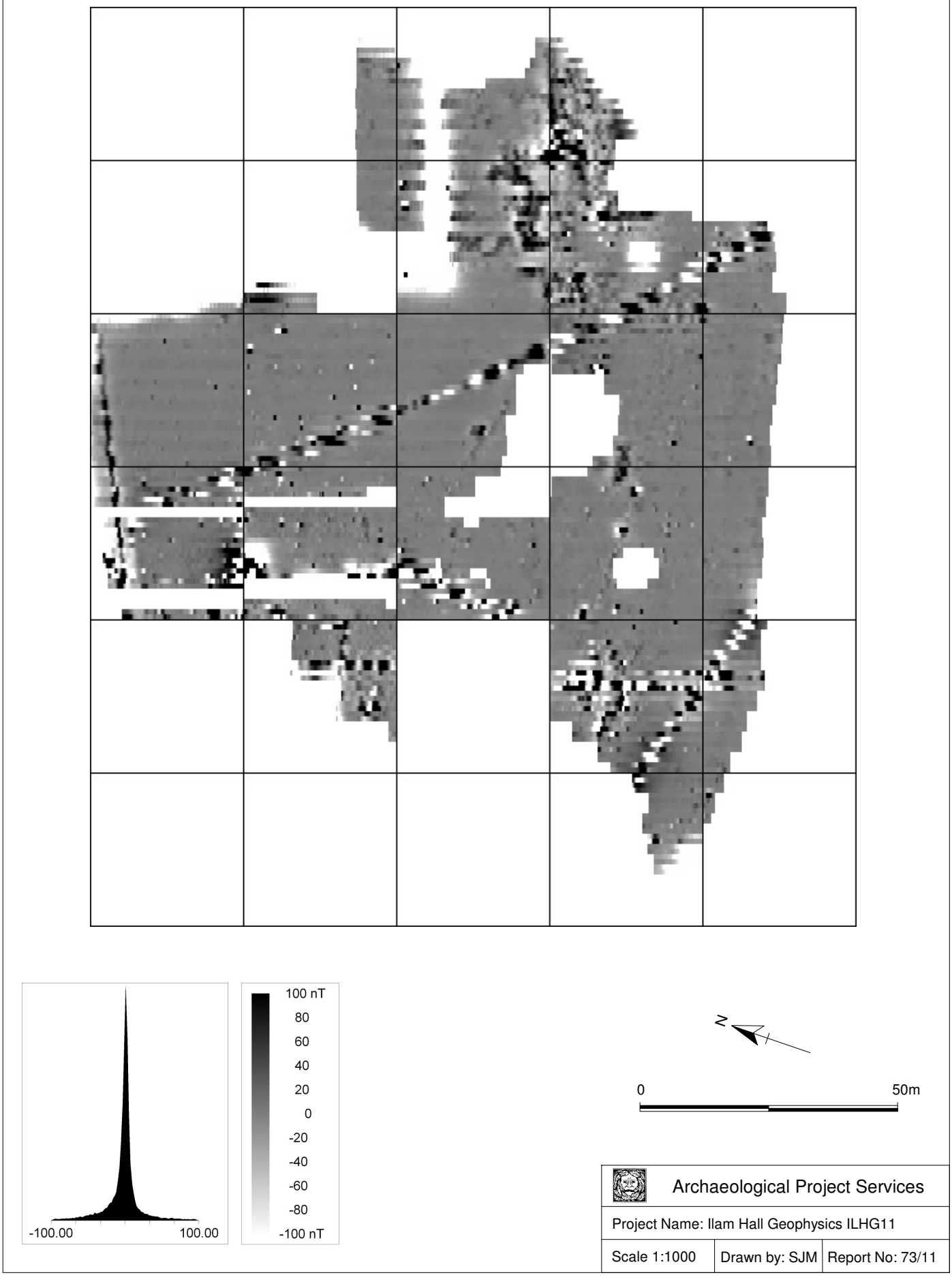


Figure 3 Unprocessed data greyscale plot (clip +/-100nT)

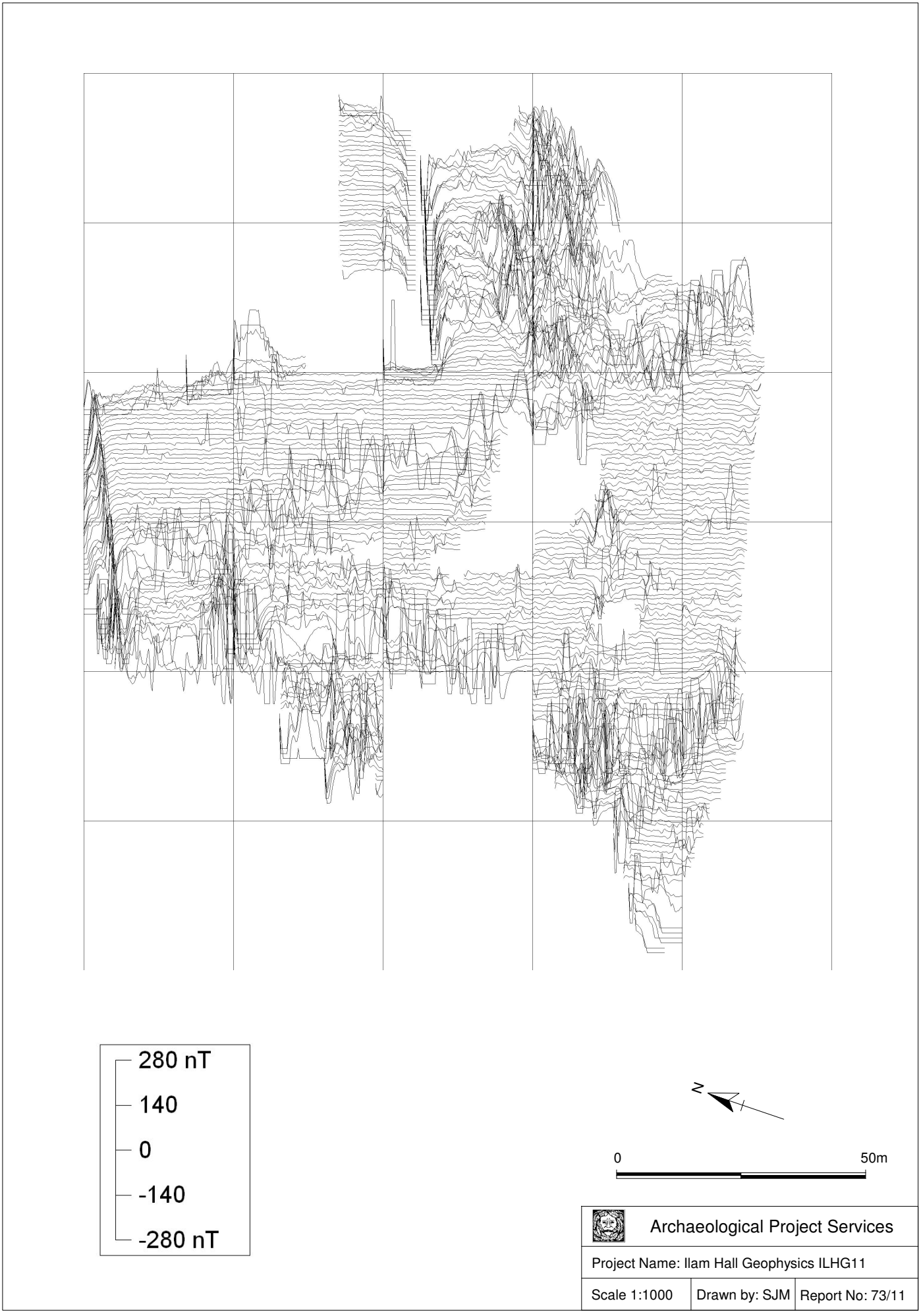
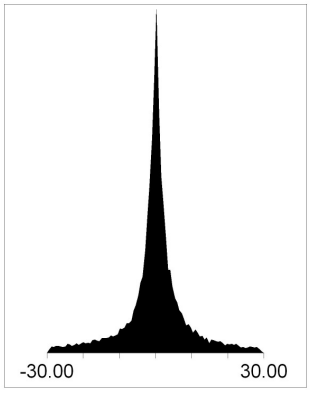
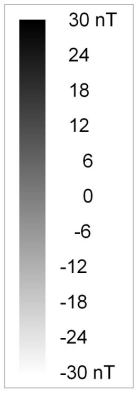
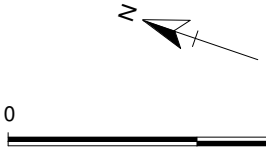


Figure 4 Unprocessed data trace plot (clip +/-100nT)







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Project Name: Ilam Hall Geophysics ILHG11		
Scale 1:1000	Drawn by: SJM	Report No: 73/11

Figure 5 Processed data greyscale plot (clip +/-30nT)

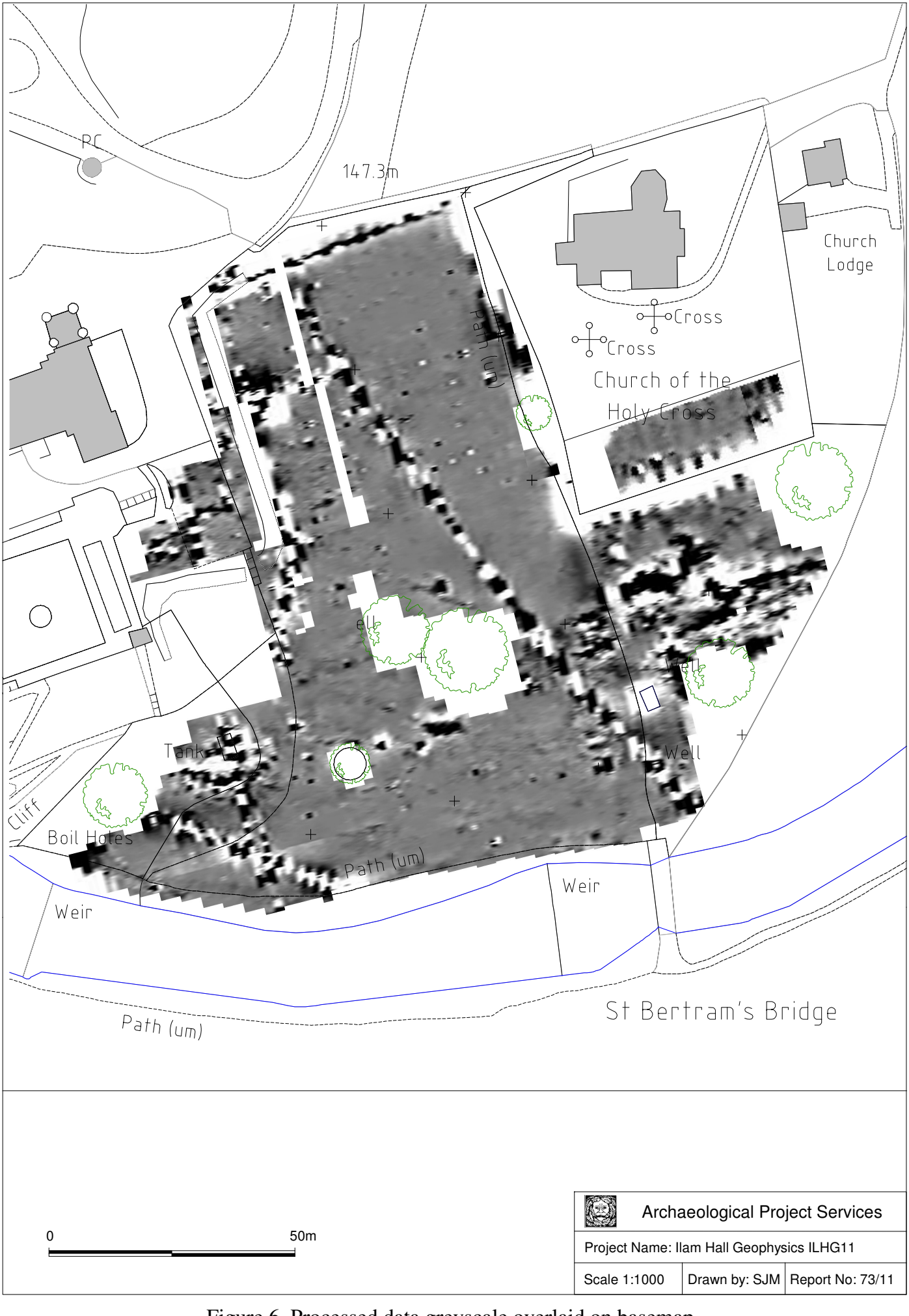

Figure 6 Processed data greyscale overlaid on basemap

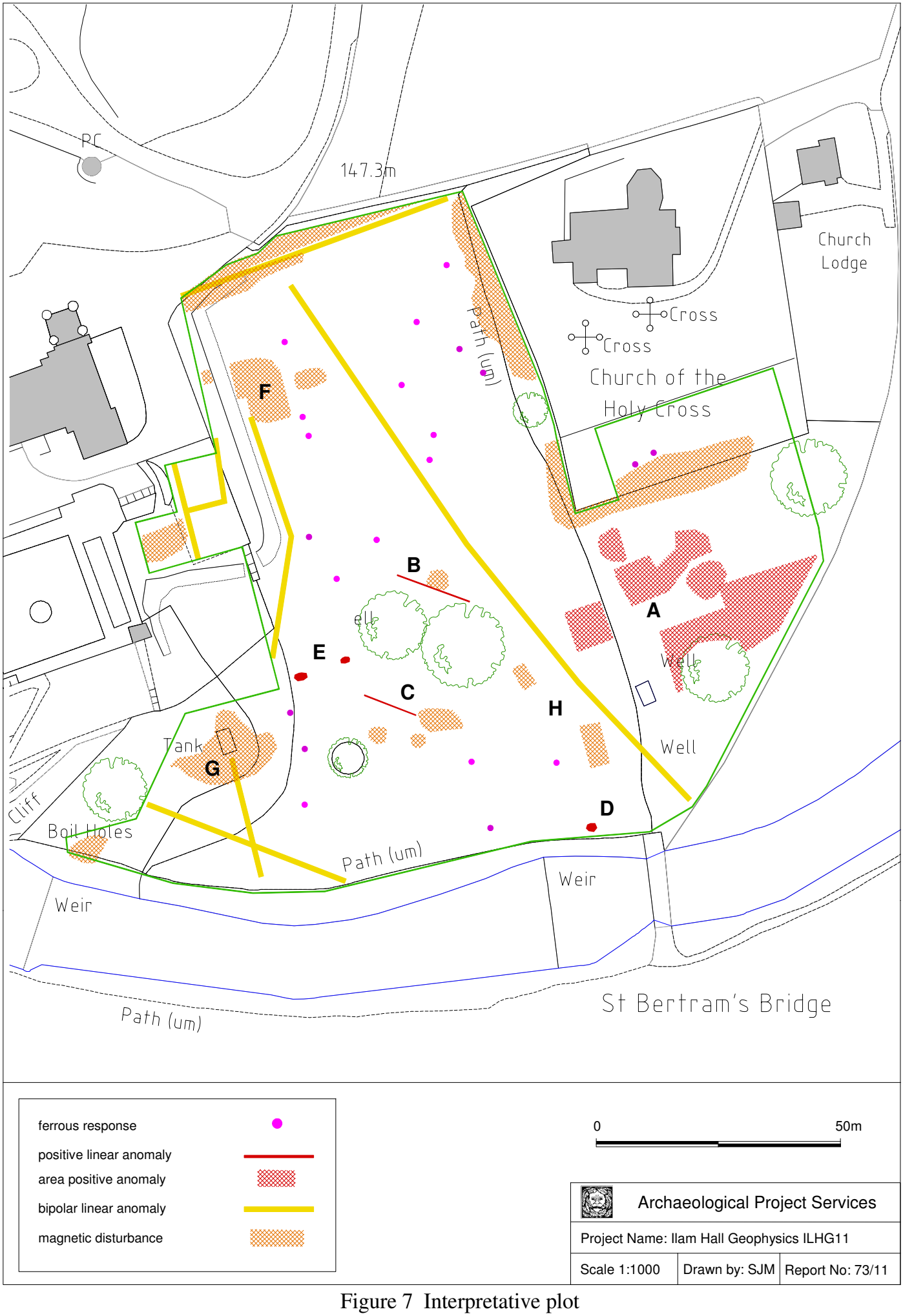

Figure 7 Interpretative plot

Appendix 1
THE ARCHIVE

The archive consists of:

1 Daily record sheets
1 Report text and illustrations
Digital data

File names	ihlg11-01.xgd ihlg11-02.xgd ihlg11-03.xgd ihlg11-04.xgd ihlg11-05.xgd ihlg11-06.xgd ihlg11-07.xgd ihlg11-08.xgd ihlg11-09.xgd ihlg11-10.xgd	ihlg11-11.xgd ihlg11-12.xgd ihlg11-13.xgd ihlg11-14.xgd ihlg11-15.xgd ihlg11-16.xgd ihlg11-17.xgd ihlg11-18.xgd ihlg11-19.xgd ihlg11-20.xgd	ihlg11-21.xgd ihlg11-22.xgd ihlg11-23.xgd ihlg11-24.xgd ihlg11-25.xgd ihlg11-26.xgd ihlg11-c1.xcp ihlg11-c2.xcp
Explanation of codes used in file names	xgd files are magnetometer grids, named with site code and number in the order surveyed. Suffix "-a" indicates rotation to consistent orientation of first line (south from northeast corner). 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	ArchaeSurveyor 2.54 running under Windows XP Service Pack 3		
Date of last modification	04/07/11		
Indications of known areas of weakness in data	None		

All primary records are currently kept at:

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

The ultimate destination of the project archive is:

The National Trust
Archaeological Project Services Site Code: IHLG11