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Engineering Archaeological Services Ltd.

Land Off Ash Lane, Tavernspite, Pembrokeshire: Geophysical Surveys

Commissioned by

Trysor

on behalf of

Michael Douglas

Analysis by

I.P. Brooks

Engineering Archaeological Services Ltd

EAS Client Report 2020/03

Engineering Archaeological Services Ltd is

Registered in England No 286978

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Technical Information:

NGR

Centred on: SN17617 12376

Location and Topography (Figures 1 and 2)

The survey area lies to the west of Ash Lane, Tavernspite, Pembrokeshire and is immediately south of the property known as Pendre which faces onto the B4314. At the time of the survey it was basically a flat field under pasture with the grass level at about ankle level.

Virtually all of the main area of the proposed development was covered by the survey, however, the access road and a small triangular area to the south was not covered. The proposed access route runs along the western boundary of Pentre with its fence line and service buildings, and their associated magnetic disturbance adjacent to the proposed route. Also, the area is crossed by a water main which will give an extensive and high magnetic anomaly; thus, this area is not suitable for magnetic survey. Similarly, the triangular area to the south of the survey was considered unsuitable for magnetic survey. Although on the map it measures approximately 37 x 17 m, thick straggly hedges reduce the available area considerably. The area is also separated from the main survey by a wooden fence and the vegetation in this area is straggly rank vegetation. This would therefore require a divorced survey of about 0.02 Ha where the location of magnetic anomalies would be unlikely.

Archaeological Background

It is intended to construct 13 holiday units together with a reception and community shop on the land to the west of Ash Lane, Tavernspite, Pembrokeshire (Planning Application 16/0958/PA). At its closest point the proposed development is within 50 m of the Crug Swllt Round Barrow (Ancient Monument Ref. PE364), thus the Dyfed Archaeological Trust, recommended "No development shall take place until the applicant, or their agents or successors in title, has secured the implementation of a programme of archaeological work in accordance with a written scheme of investigation which has been submitted by the applicant and approved in writing by the local planning authority." The written scheme of investigation was submitted by Trysor and this survey is part of the archaeological mitigation to the planning application.

The survey took place on 17th March 2020

Aims of Survey

1. To investigate, define and record any potentially archaeological features within the survey areas.

SUMMARY OF RESULTS

A series of linear anomalies were located which appear to correspond to features shown on the 1842 Tithe Map for Llampeter Velfrey. Also located, were a curvilinear anomaly crossing the western half of the survey area of unknown origin, and a ferromagnetic response to the watermain which crosses the field.

Methods

The survey was based on a series of twenty, 20 x 20 m squares laid out as in Figure 2. Readings were taken with a Geoscan FM256 Fluxgate Gradiometer at 0.25 m intervals along transects 1 m apart. The survey was downloaded onto a laptop, on site, and processed using Geoscan Research "Geoplot" v.3.00v. The X - Y plot was produced by exporting the data and processing it using Golden Software "Surfer" v. 10.7.972

A limited number of soils samples were taken to access the Magnetic Susceptibility on the site. These were dried on a warming oven, sieved and processed using a Bartington MS2 Magnetic Susceptibility Meter.

Survey Results:

Area

Area of Survey: 0.71 Ha.

Display

The results are displayed as a grey scale image (Figures 3) and as an X-Y trace plot (Figure 4). The interpretation plot is shown as Figure 5and the results are summarised on Figure 7.

Results:

Fluxgate Gradiometer Survey (Figures 3 - 5)

The grey scale plot (Figure 3) show a limited number of magnetic anomalies which seem to form a coherent pattern. Three area of high magnetic disturbance, relating to a ferromagnetic response, have been defined and are shown in blue on Figure 5. Anomaly A is a broad band, approximately 7 m wide, crossing the north western corner of the survey area. This corresponds with a water main known to cross the field. The strength and size of the magnetic disturbance would suggest the main consist of an iron-based pipe. The two other areas of ferromagnetic responses (Anomalies B and C) are where the survey area was closest to the boundaries of the field and therefore relate to metal objects, such as fencing, within the hedges.

Three, roughly parallel linear anomalies (Anomalies D, E and F) run through the middle of the survey area, roughly in NNW – SSE direction and set at right angles are two other linear anomalies (Anomalies G and H) which run to the west. These run parallel to each other at a distance of approximately 3 m. The pattern formed by this group of anomalies (Anomalies D, E, F, G and H) can be related to that seen on the 1842 tithe map for the area (Figure 8). The parallel anomalies, G and H, would therefore suggest that the boundary between Plots 1073 and 1071, on the tithe map (Figure 8) was probably a field bank or thick hedge with a ditch on either side. The extent of the lateral anomalies (Anomalies D, E and F) probably relate to the lane shown on the tithe map, possibly suggesting that it may have moved slightly and extended throughout the length of the field.

To the east of Anomalies D, E and F, and roughly parallel, are a series of feint, linear anomalies (Anomalies I, J and K) which run for approximately 20 m in the southern sector of the survey area. The origins of these anomalies are not certain, however, given that they are parallel to Anomalies D, E and F they may indicate the direction of ploughing in Plot 1070 of the tithe map.

Running along the length of the survey area and crossing Anomalies G and H is a linear anomaly (Anomaly L) which does not appear to relate other anomalies in this area. Anomaly L has a stronger magnetic signature than the other, non-ferromagnetic, anomalies in the survey. Anomaly L is typically 7 nT above the background field, whilst Anomalies D, E, F, G and H have a magnetic signature only

3 nT above the background. The origin of Anomaly L is uncertain; however, it clearly does not relate to field pattern shown on the 1842 tithe map and would appear to have a more consistent magnetic signature. One possibility is that this anomaly may mark the line of a water-pipe for a trough feed, although this interpretation is somewhat speculative and the origins of this anomaly can only be determined by excavation.

Magnetic Susceptibility (Figure 6)

It was possible to take soil samples in order to assess the magnetic susceptibility of the soils. It was not possible, however, to obtain a subsoil sample for comparison. Both volume susceptibility (direct reading of the samples) and mass susceptibility (reading compensated for the varying mass of the samples) is given below. The location of the samples is shown on Figure 2 and the results on Figure 6

Sample	Volume susceptibility χ_v	Mass susceptibility χ_m
Grid 1	39	50.9
Grid 3	22	32.2
Grid 5	20	26.1
Grid 7	28	40.1
Grid 9	30	44.7
Grid 11	26	27.8
Grid 13	32	41.4
Grid 15	39	52.2
Grid 17	49	63.0
Grid 19	24	37.2

The samples as measured are generally of moderate values suggesting that, although not ideal, the conditions were suitable for magnetic survey.

Assuming a consistent geological regime across the survey area the magnetic susceptibility can be used as a proxy for the level of archaeological activity. In general, the values, as measured follow the pattern of the anomalies recorded in the fluxgate gradiometer survey, suggesting the results are a representation of the underlying archaeology. The one possible exception is the sample from Grid 17 which is the highest reading recorded. The origin of this reading is unknown; however, it may be related to disturbance associated with the hedge line to the east of the sample

Conclusions (Figures 7)

It is a fundamental axiom of archaeological geophysics that the absence of features in the survey data does not mean that there is no archaeology present in the survey area only that the techniques used have not detected it.

Apart from ferromagnetic anomalies, caused by modern disturbance, the majority of the anomalies located can be related to the field pattern shown on the 1842 Tithe Map for Llampeter Velfrey. The exception is Anomaly L, whose origin is uncertain, but may relate to a minor service pipe crossing the field, possibly a trough feed.

There is no evidence, within the survey, for prehistoric activity in the survey area.

Acknowledgements

This survey was commissioned by Trysor, on behalf of Michael Douglas.

Techniques of Geophysical Survey:

Magnetometry:

This relies on variations in soil magnetic susceptibility and magnetic remenance which often result from past human activities. Using a Fluxgate Gradiometer these variations can be mapped, or a rapid evaluation of archaeological potential can be made by scanning.

Resistivity:

This relies on variations in the electrical conductivity of the soil and subsoil which in general is related to soil moisture levels. As such, results can be seasonally dependant. Slower than Magnetometry this technique is best suited to locating positive features such as buried walls that give rise to high resistance anomalies.

Resistance Tomography

Builds up a vertical profile or pseudosection through deposits by taking resistivity readings along a transect using a range of different probe spacings.

Magnetic Susceptibility:

Variations in soil magnetic susceptibility occur naturally but can be greatly enhanced by human activity. Information on the enhancement of magnetic susceptibility can be used to ascertain the suitability of a site for magnetic survey and for targeting areas of potential archaeological activity when extensive sites need to be investigated. Very large areas can be rapidly evaluated and specific areas identified for detailed survey by gradiometer.

Instrumentation:

1. Fluxgate Gradiometer - Geoscan FM256

2. Resistance Meter - Geoscan RM4/DL10

3. Magnetic Susceptibility Meter - Bartington MS2

4. Geopulse Imager 25 - Campus

Methodology:

For Gradiometer and Resistivity Survey 20m x 20m or 30m x 30m grids are laid out over the survey area. Gradiometer readings are logged at either 0.5m or 1m intervals along traverses 1m apart. Resistance meter readings are logged at 0.5m or 1m intervals. Data is down-loaded to a laptop computer in the field for initial configuration and analysis. Final analysis is carried out back at base.

For scanning transects are laid out at 10m intervals. Any anomalies noticed are where possible traced and recorded on the location plan.

For Magnetic Susceptibility survey, a large grid is laid out and readings logged at 20m intervals along traverses 20m apart, data is again configured and analysed on a laptop computer.

Copyright:

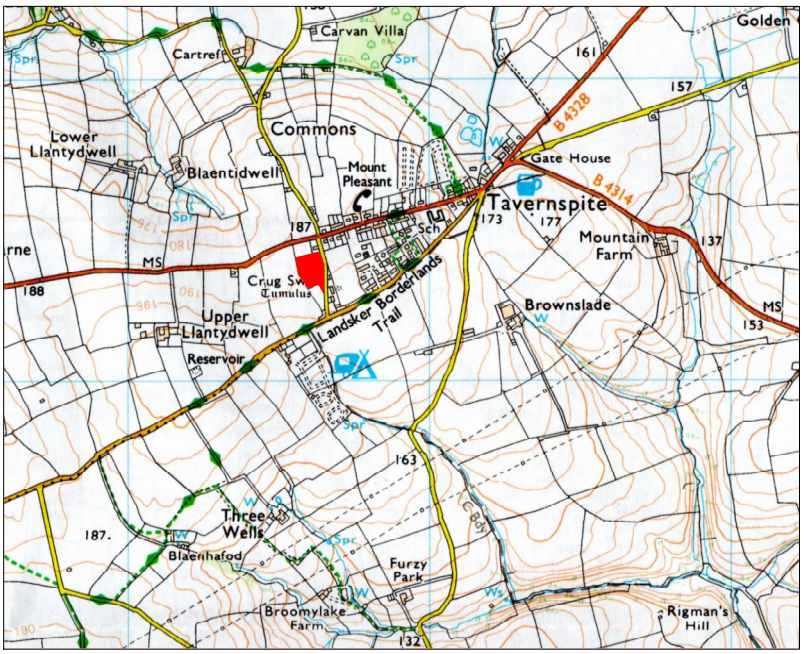

Figure 1: Location
Scale 1:25,000

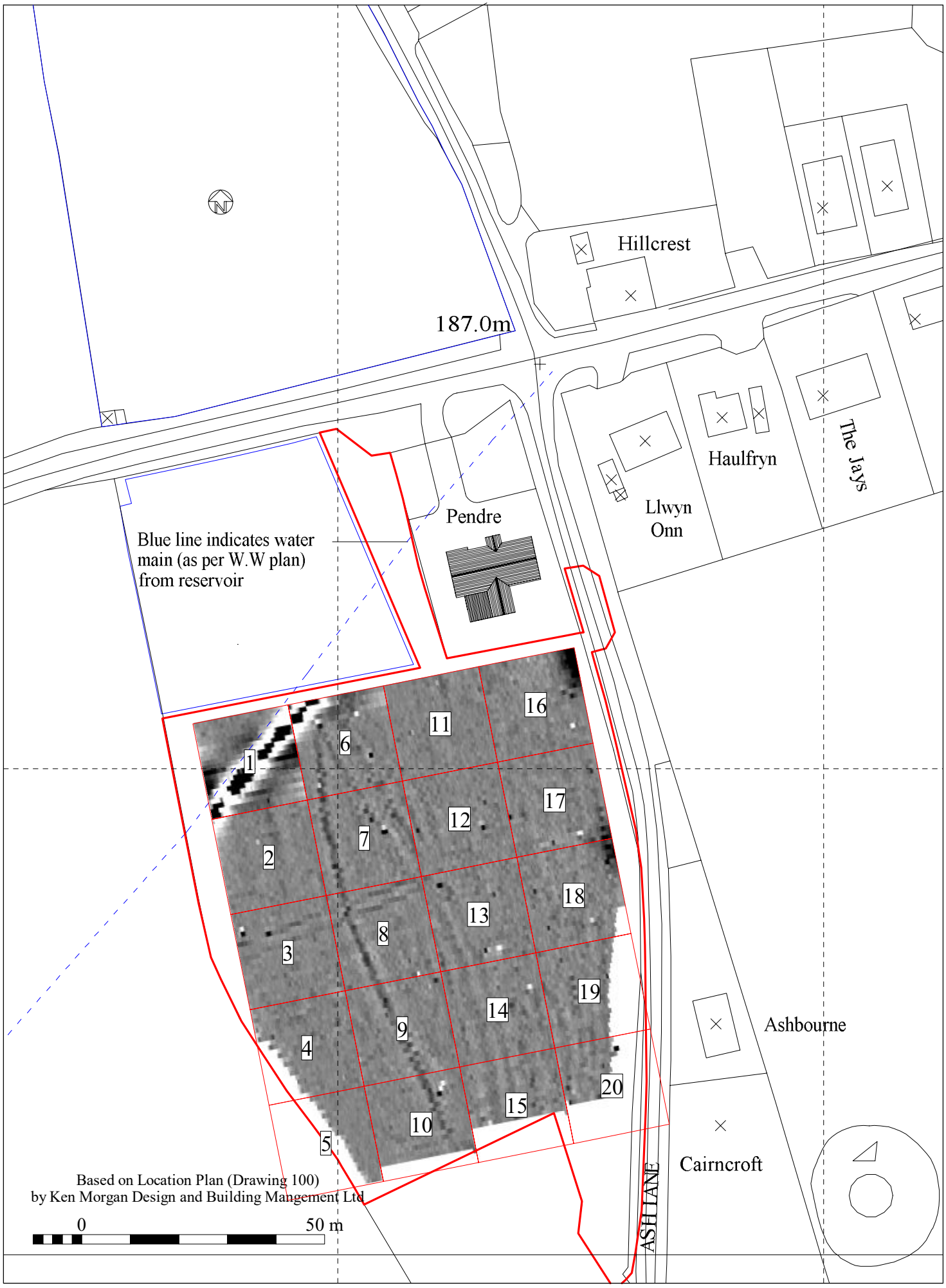

Figure 2: Location of the Survey
Scale 1:1,000

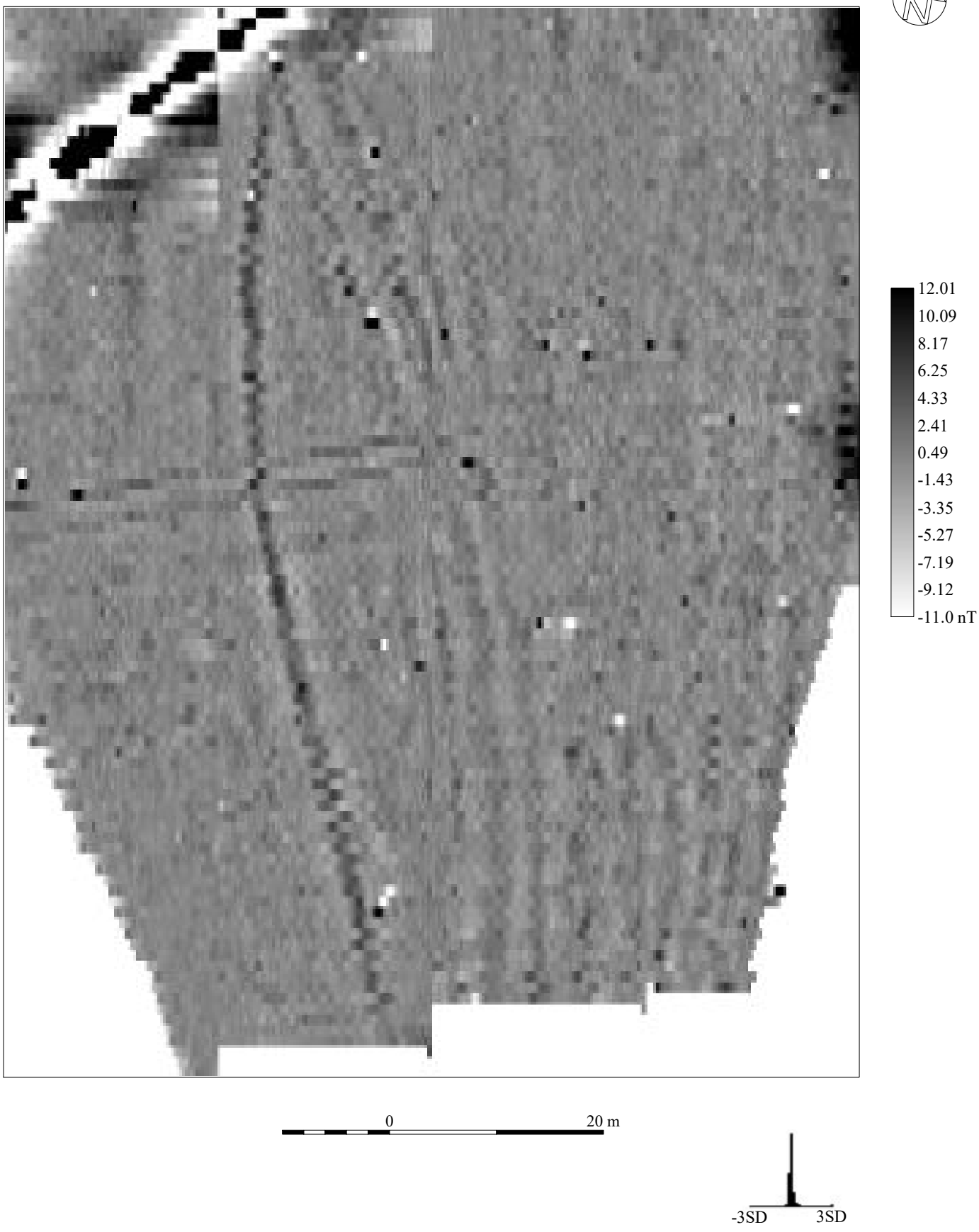

Figure 3: Grey Scale Plot
Scale 1:500

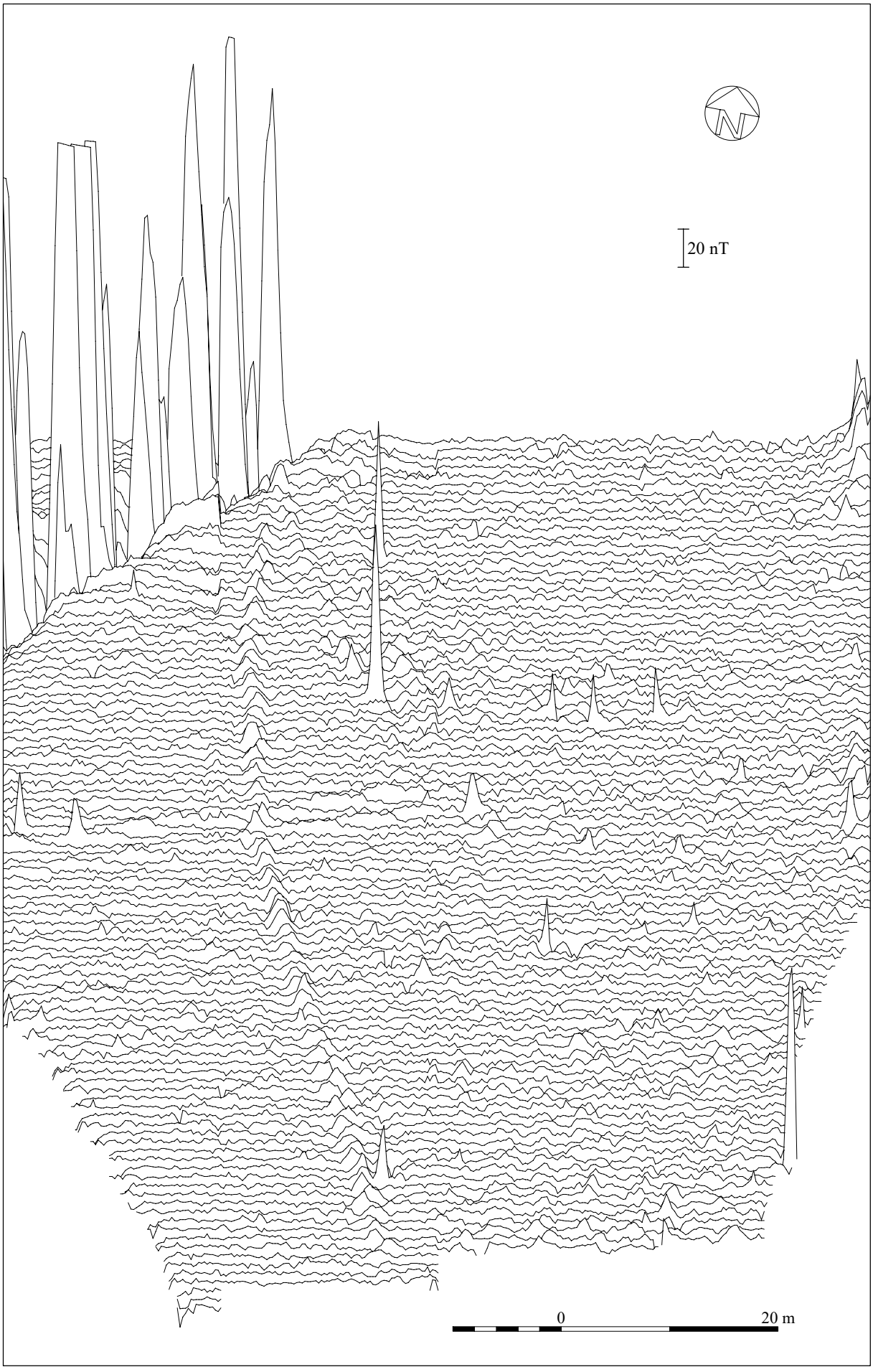

Figure 4: X-Y Plot
Scale 1:500

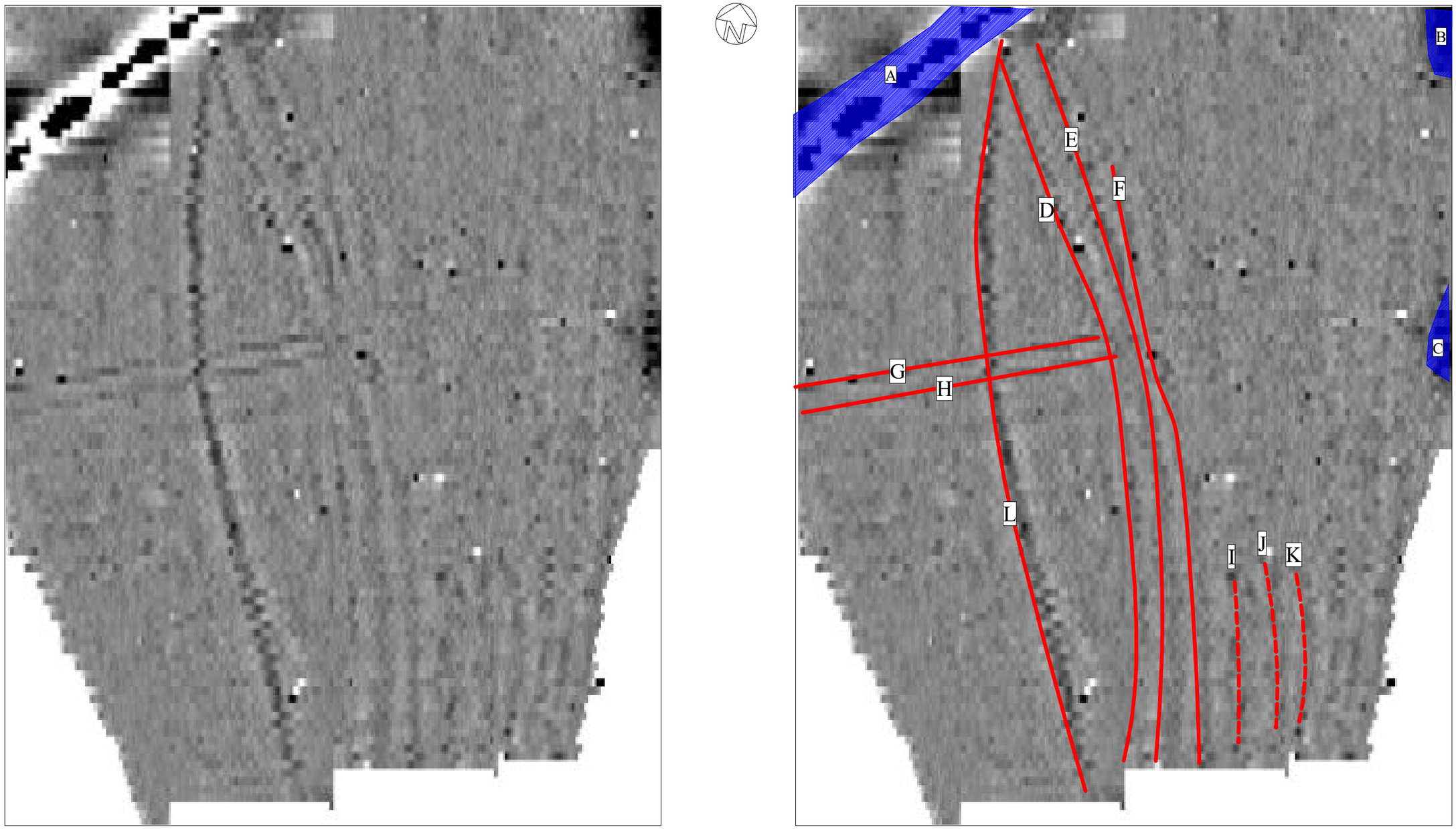

Figure 5: Interprtetation
Scale 1:500

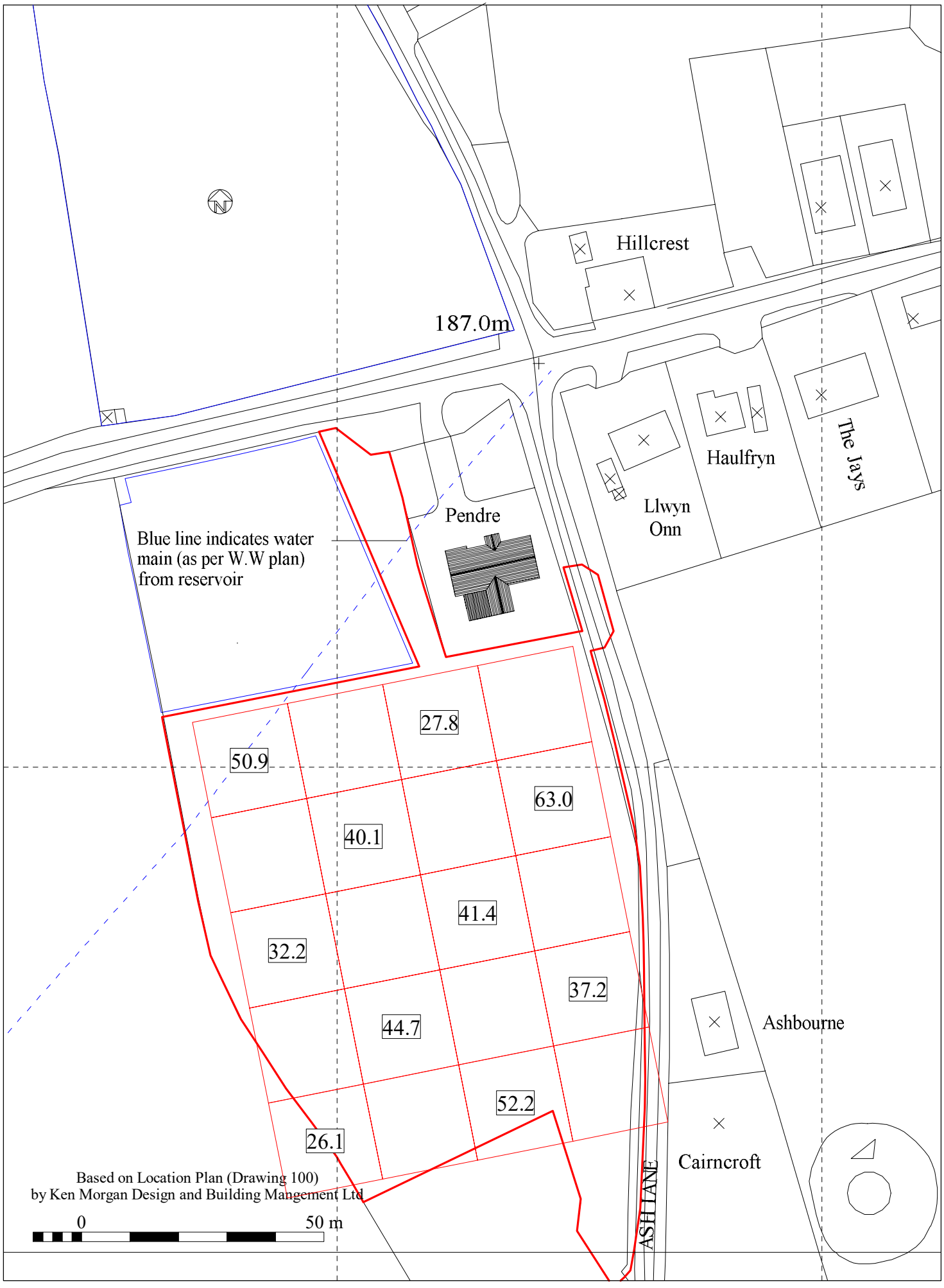

Figure 6: Magnetic Susceptibility Results
Scale 1:1,000

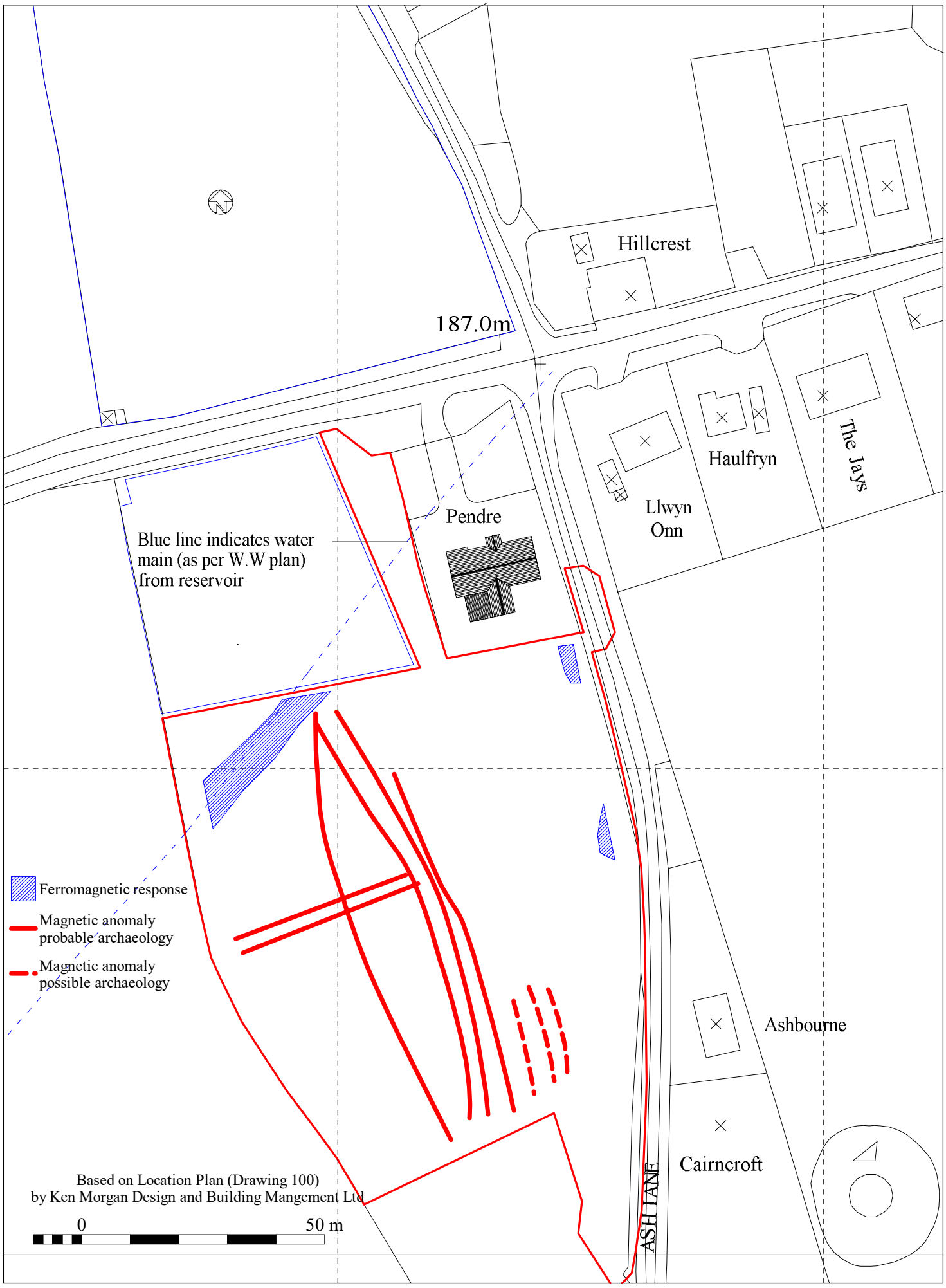

Figure 7: Summary
Scale 1:1,000

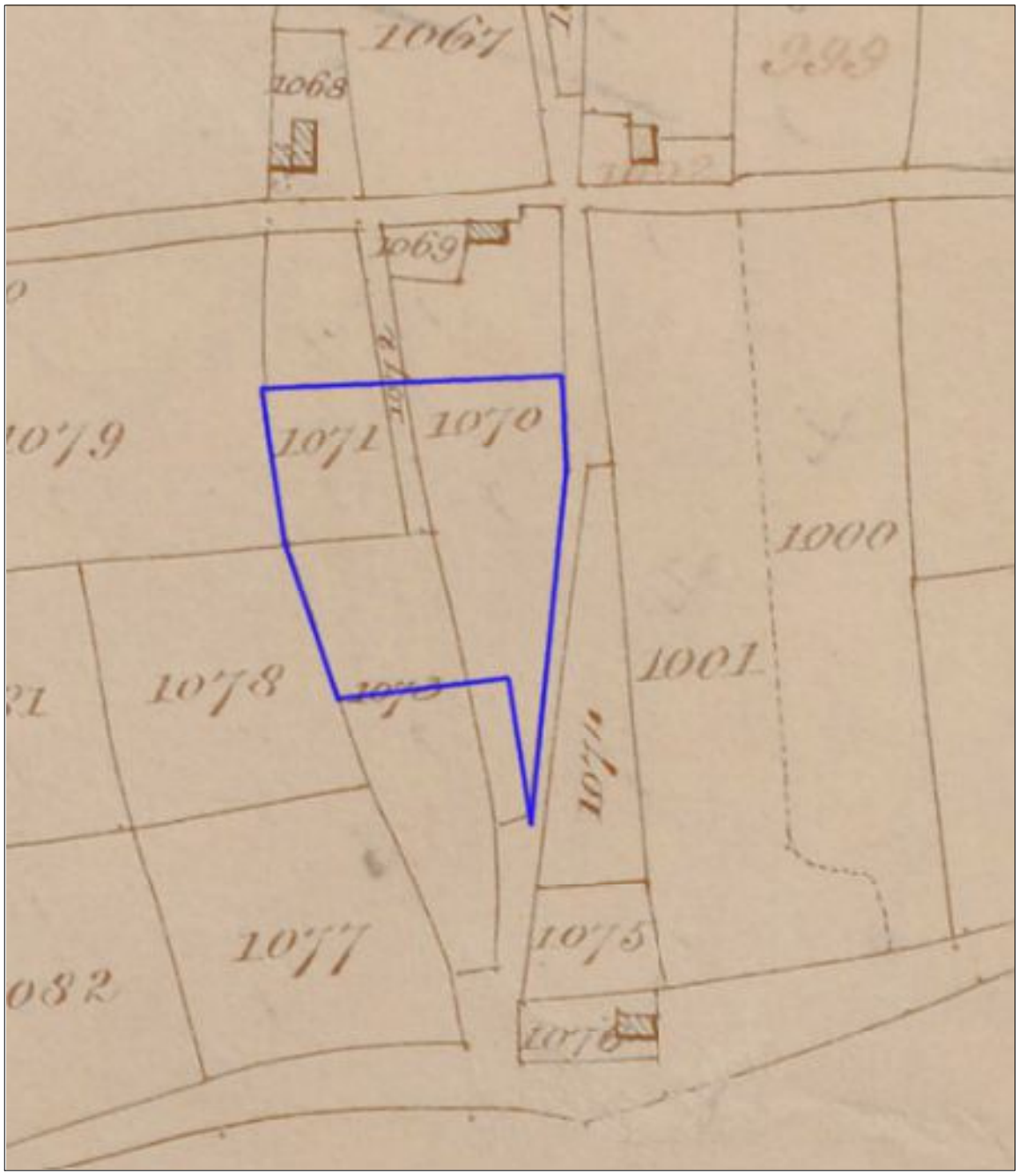

Figure 8: Extract from the 1842 Tithe Map for Llampeter Velfrey
Re-scaled to approximately 1:2,000