eas

Engineering Archaeological Services Ltd.

Land Opposite Detona, Llanegwad, Carmarthenshire SA32 7NJ:

Geophysical Survey

Commissioned by

Trysor

Analysis by

I.P. Brooks

Engineering Archaeological Services Ltd

EAS Client Report 2023/09

Engineering Archaeological Services Ltd is

Registered in England No 286978

CONTENTS

List of Illustrations

NGR

Centred on: SN 52002 21387

Location and Topography (Figures 1 and 2)

The survey was located at the northern end of a field which runs along the eastern and southern side of the churchyard in Llanegwad, Carmarthenshire. At the time of the survey the field was under pasture which had been close cropped by sheep and had recently been "topped". The churchyard wall formed the western side of the survey area, whilst the northern and eastern sides are defined by metal fences. The southern side of the survey was defined by a temporary electric fence which had been erected to separate the sheep from survey.

The survey took place on 14/07/2023.

Archaeological Background

It is planned to construct a new house on the plot opposite Datona, Llanegwad, Carmarthenshire SA32 7NJ (Planning refernce PL/03110). The plot is immediately adjacent to the churchyard of St Egwad's church, a grade II listed building (21461, PRN 7370, 17392) a Tudor-Gothic style church constructed in 1848 on the site of an earlier church (https://cadwpublic-pi.azurewebsites.net/reports/listedbuilding/FullReport?lang=&id=21461).

The survey is located within a Registered Historic Landscape: Tywi Valley HLW(D)5, as defined by Cadw (1998). In 2007, archaeological excavation (Dyfed Archaeological Trust report no.2008/70) in advance of residential development to the west of the church revealed evidence for medieval industrial activity, as well as evidence of prehistoric and possible Romano-British activities (Dyfed Archaeological Trust, 2021)

The underlying geology consists of Ashgill Series, silty mudstones with some thin sandstones and conglomerates laid down between 449 and 443.8 million years ago during the Ordovician period. The drift geology of the area is not recorded by the British Geological Survey (http://mapapps.bgs.ac.uk/geologyofbritain/home.html?).

Aims of Survey

1. To record any geophysical anomalies within the survey area which may be related to archaeological activity.

SUMMARY OF RESULTS

Engineering Archaeological Services Ltd were commissioned by Trysor to carry out a Fluxgate Gradiometer survey on a proposed development opposite Datona, Llanegwad, Carmarthenshire SA32 7NJ. Only two anomalies of potentially archaeological nature were recorded, a broad, arcing, linear anomaly and an area of magnetic disturbance covering an area 9.5 x 6.5 m in size. The origin of these anomalies is not known. The fieldwork took place on 14/07/2023.

Comisiynwyd Engineering Archaeological Services Ltd gan Trysor i gynnal arolwg Fluxgate Gradiometer ar ddatblygiad arfaethedig gyferbyn â Datona, Llanegwad, Sir Gaerfyrddin SA32 7NJ. Dim ond dau anomaledd o natur archeolegol bosibl a gofnodwyd, sef anomaledd

llinol bras, bwaog ac ardal o aflonyddwch magnetig yn gorchuddio ardal 9.5 x 6.5 m o ran maint. Nid yw tarddiad yr anomaleddau hyn yn hysbys. Cynhaliwyd y gwaith maes ar 14/07/2023

Methods

The survey was based on a series of four, 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 surveys were downloaded onto a laptop, on site, and processed using Geoscan Research "Geoplot" v.4.00. The X - Y plots were 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 (Figure 7). These were dried out in a warming oven, sieved and processed using a Bartington MS2 Magnetic Susceptibility Meter.

Survey Results:

Area

0.1 Ha

Display

The results are displayed as grey scale images (Figures 3), a colour scale image (Figure 4) and as a X-Y trace plot (Figure 5). The interpretation plot is shown as Figures 6. The Magnetic Susceptibility results are summarised on Figure 8 and the survey, as a whole, is summarised on Figure 9.

Results:

Fluxgate Gradiometer Survey (Figure 6)

Only a relatively small area of approximately 0.1 Ha was investigated, however; a limited number of magnetic anomalies have been defined from the survey. There are a number of ferromagnetic responses which are the effect of modern features which are shown in blue on Figures 6 and 9. Anomalies A and B reflect the present of metal fencing along the northern and eastern sides of the survey area, whilst Anomaly C can be associated with a water trough in the field. It is noticeable that Anomaly A is more developed in the corner of the field, probably indicating the dumping of rubbish in this corner. The only ferromagnetic response which could not be related to modern features is Anomaly D. The origins of this anomaly are unknown, however, its relationship to a broad, arcing, linear anomaly (Anomaly E) may be significant. Anomaly E is approximately 21.5 m long and up to 3.5 m wide forming an arc with its open face to the west. Within this anomaly is a large area of magnetic disturbance (Anomaly F) which is 9.5 x 6.5 m in size. Only up to 6 nT above the background this anomaly appears to have an uneven distribution of the magnetic signal, with areas of higher magnetic responses within an area of only slightly enhanced responses. The origins of this anomaly are unknown.

Magnetic Susceptibility (Figure 7 - 8)

Four, small, soil samples were taken for Magnetic Susceptibility analysis. 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 7 and the results on Figure 8.

Sample	Volume susceptibility χ_v	Mass susceptibility χ_m
1	40	56.3
2	24	38.7
3	39	54.2
4	31	37.8

The readings recorded are of moderate values suggesting the area is suitable for magnetic survey, however it was not possible to take a subsoil sample to compare the comparative values.

Assuming a consistent geological regime across the survey area the magnetic susceptibility can be used as a proxy for the level of archaeological activity (Clark, 1996, 99). It is noticeable that both of the northern squares had slightly elevated readings possibly suggesting possible enhanced archaeological activity at this end of the field.

Conclusions (Figure 9)

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.

Only two anomalies of archaeological origins have been defined in the survey. Anomaly E appears to form an arc with its open face to the church and within this arc is an area of magnetic disturbance 9.5 x 6.5 m in size (Anomaly F). There is, also, some correlation between the Fluxgate Gradiometer survey and the results of the Magnetic Susceptibility samples with indications of increased archaeological activity in the northern half of the survey area.

References

Clark, A. 1996. *Seeing beneath the soil prospecting methods in archaeology.* Routledge, London

Acknowledgements

This survey was commissioned by Trysor. Permission for access to the field was given by Heledd Llwyn.

Techniques of Geophysical Survey:

Magnetometry:

This relies on variations in soil magnetic susceptibility and magnetic remanence 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 pseudo-section 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 RM15

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 between 0.25m and 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

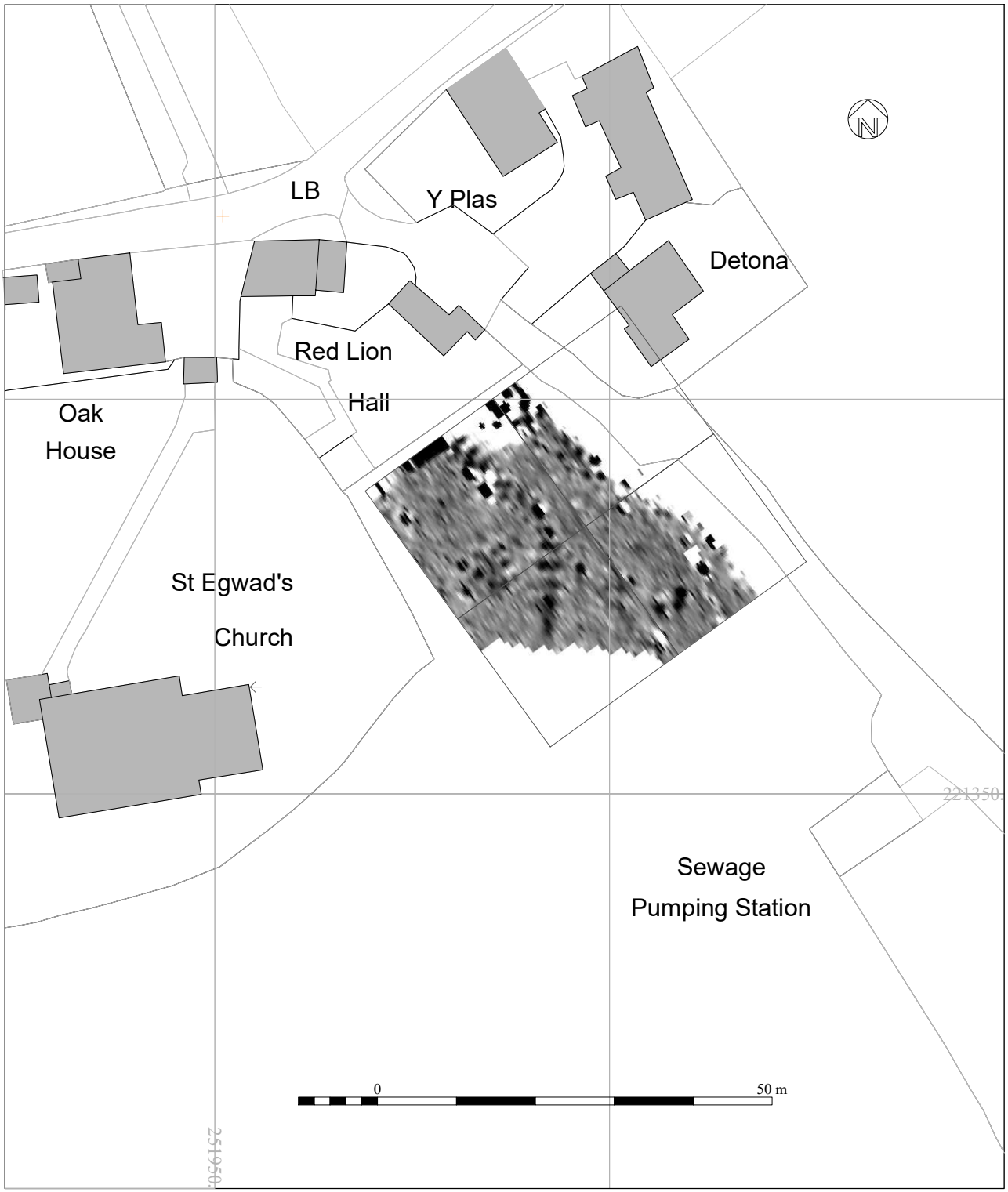

Figure 2: Location of the Survey
Scale 1:750

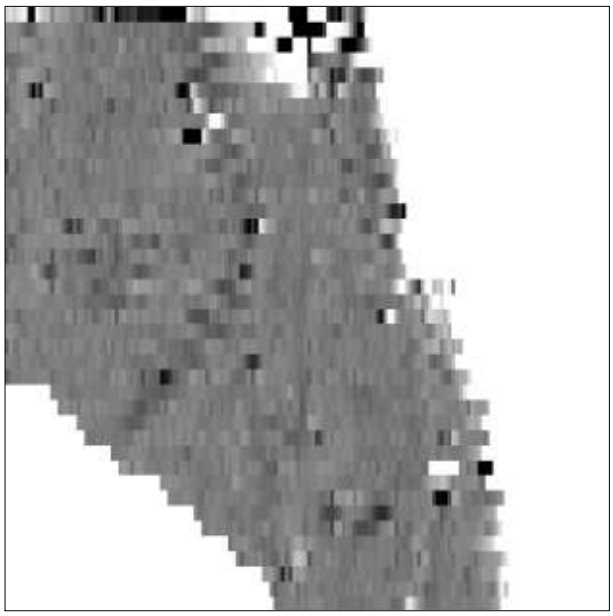

Figure 3.1: Grey scale plot at ± 1σ

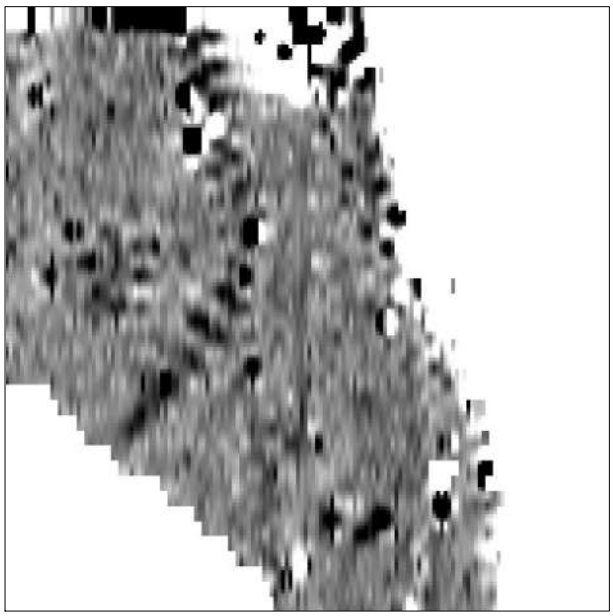

Figure 3.2: Grey scale plot at ± 5 nT

0 20 m

Figure 3: Grey Scale Plots
Scale 1:500

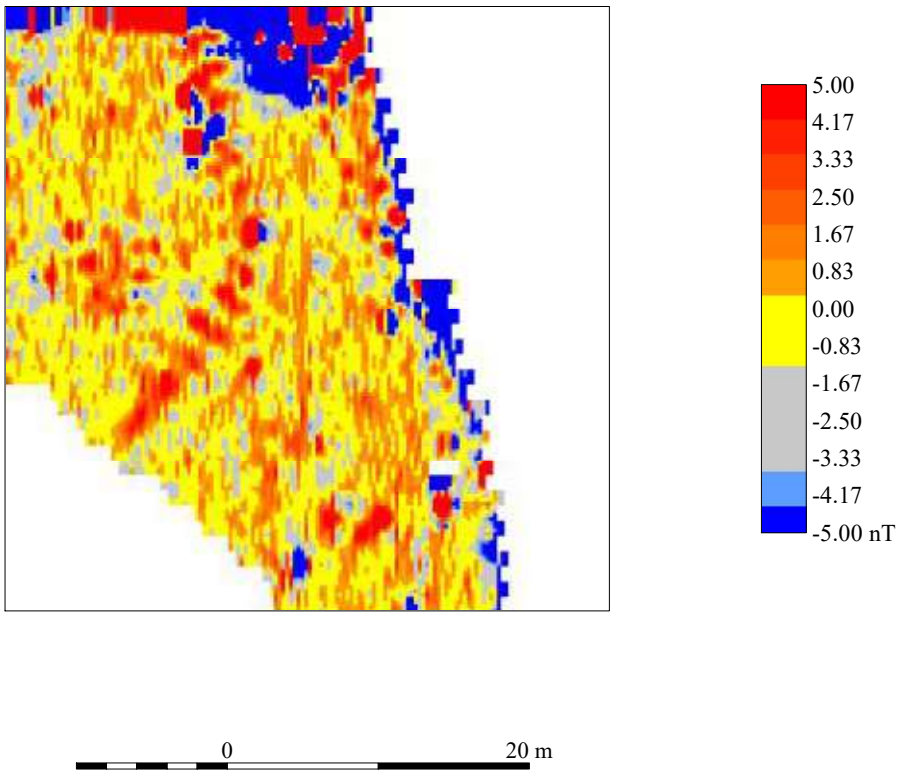

Figure 4: Colour Scale Plot
Scale 1:500

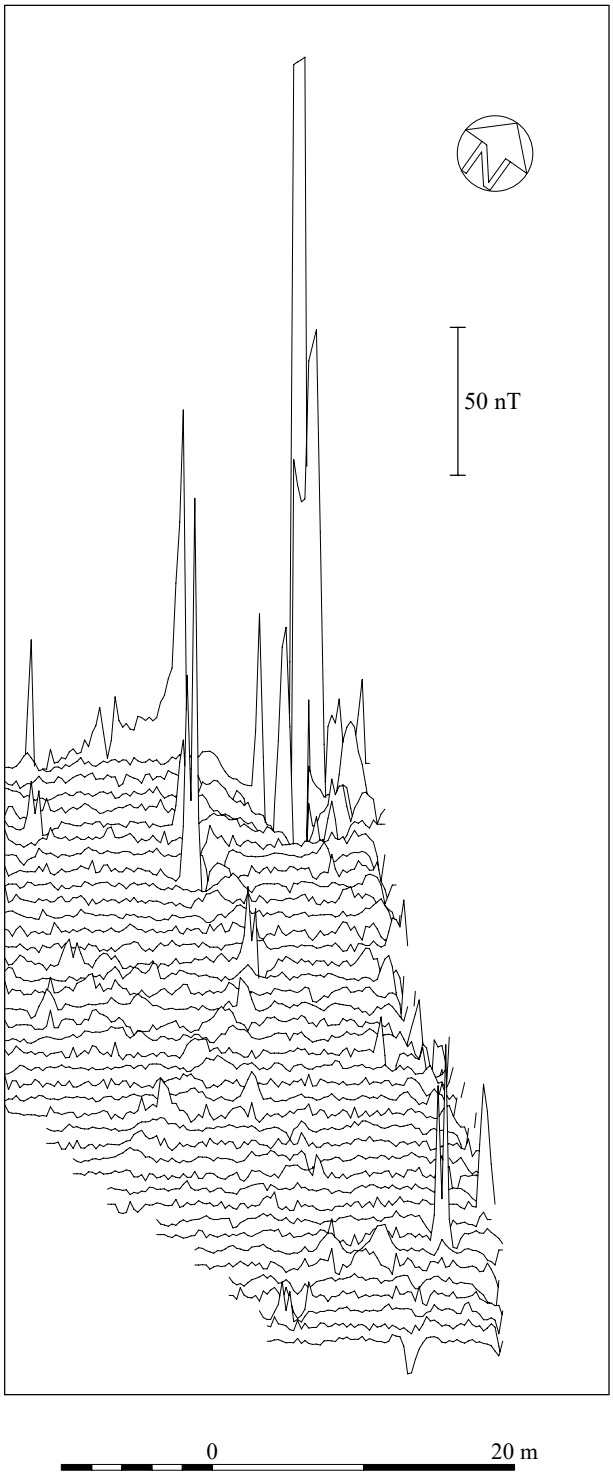

Figure 5: X-Y Plot
Scale 1:500

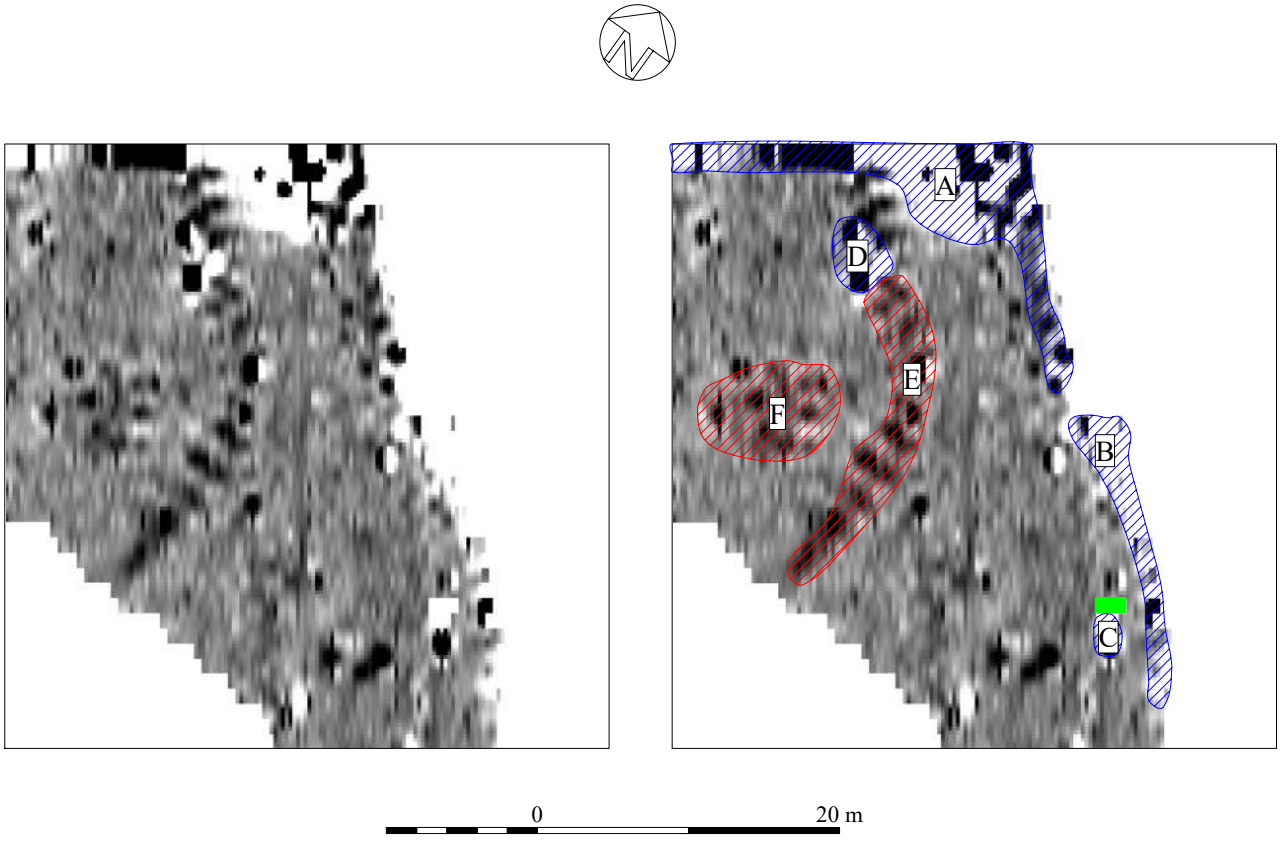

Figure 6: Interpretation
Scale 1:500

Figure 7: Location of the Magnetic Susceptibility Samples
Scale 1:750

Figure 8: Magnetic Susceptibility Results
Scale 1:750

Magnetic anomaly, possible archaeology

Ferromagnetic response

Water trough

Figure 9: Summary
Scale 1:750