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Engineering Archaeological Services Ltd.

Field Adjacent to Treffgarne, Robeston Wathen, Narberth, Pembrokeshire, SA67 8EL:

Geophysical Survey

Commissioned by

Trysor

Analysis by

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Engineering Archaeological Services Ltd

EAS Client Report 2021/06

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NGR

Centred on: SN 08525 15679

Location and Topography (Figures 1 and 2)

The survey area lies south of the B4314, between the properties of Treffgarne and Chiselhurst, within the village of Robeston Wathen, and is located in the north west corner of the field. This field slopes moderately down towards the south and east and is bounded by mature hedges on significant earthen banks. At the time of the survey the field was under pasture with the vegetation generally ankle deep, although there were some patches of docks which were higher.

The underlying geology is the Ordovician mudstones of the Slade and Redhill Formation

The survey took place on 29th June 2021.

Archaeological Background

It is intended to construct eight, two-storey dwellings and the associated infrastructure within the development area (Pembrokeshire County Council planning application number: 20/0037/PA).

Trysor were commissioned to carry out an archaeological desk-based study on the proposed development (Hall and Sambrook, 2021). Although no, previously recorded, archaeological features were located directly within the survey area, Robeston Wathen lies within a landscape with moderate archaeological potential with prehistoric and medieval features know to exist within 1 km of the development site. Indeed Robeston Wathen, itself is thought to be a planted settlement of Anglo-Norman settlers. Trysor also located a possible linear feature on the LIDAR image of the area which crosses the proposed development area and recovered a single sherd of medieval or early post-medieval Dyfed Gravel Tempered Ware pottery.

As a result of the desk-top study an archaeological geophysical survey was recommended.

Aims of Survey

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

SUMMARY OF RESULTS

A Fluxgate Gradiometer Survey was undertaken in the field adjacent to Treffgarne, Robeston Wathen, Narberth, Pembrokeshire, SA67 8EL on 29th June 2021. Only limited number of significant magnetic anomalies were located within the survey area; however, two parallel linear anomalies appear to correlate with a linear feature located in the LIDAR images of the area.

Gwnaed Arolwg Graddiomedr Fluxgate yn y cae ger Trefgarn, Robeston Wathen, Arberth, Sir Benfro, SA67 8EL ar 29 Mehefin 2021. Dim ond nifer gyfyngedig o anomaleddau magnetig sylweddol a leolwyd yn ardal yr arolwg; fodd bynnag, ymddengys bod dau anghysondeb llinol cyfochrog yn cydfynd â nodwedd linellol sydd wedi'i lleoli yn nelweddau LIDAR o'r ardal.

Methods

The survey was based on a series of twelve, 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. These were dried out in a warming oven, sieved and processed using a Bartington MS2 Magnetic Susceptibility Meter.

Area

0.42 Ha.

Display

The results are displayed as a grey scale image (Figures 3) and as a X-Y trace plot (Figures 4). The interpretation plot is shown as Figure 5. The Magnetic Susceptibility results are summarised on Figure 7 and the survey, as a whole, is summarised on Figure 8.

Results:

Fluxgate Gradiometer Survey (Figures 3 – 5)

There is a limited amount of ferromagnetic disturbance within the grey scale plot (Anomaly A, Figure 5), which is related to modern disturbance associated with the gateway into the field. The plot, however, is dominated by two, parallel, linear anomalies (Anomalies B and C) which cross the survey area in a NE – SE direction. These are approximately 8 m apart and contain two areas of magnetic disturbance (Anomalies D and E) between them. The location of this anomaly group appears to correlate with the features seen on the LIDAR image seen by Hall and Sambrook (2021).

Also, within the space defined by Anomalies B and C, is a possible rectilinear anomaly (Anomaly F) which appears to be set at right angles to Anomaly C. It covers an area of approximately 5 x 5 m in size. The origins of this anomaly are not known, whilst it may be a separate archaeological feature it could also be part of the complex of anomalies running NE – SW across the survey area.

The only other anomaly which may be archaeological in origins (Anomaly G) forms a rectilinear area 8 x 10 m in size. Its orientation would suggest it may not be contemporary with the complex of anomalies (Anomalies B – D), indeed it appears to aligned on a similar alignment to a grid of feint linear anomalies (shown in green on Figure 5) which are thought to be the result of modern ploughing or drainage. It may, therefore, be that Anomaly G be part of this group but with a higher magnetic signal.

Magnetic Susceptibility (Figure 7)

Twelve, small, soil samples were taken for Magnetic Susceptibility analysis. It was also possible to obtain a subsoil sample for comparison from a rabbit burrow in the field bank running through Grid 12. 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 6 and the results on Figure 7.

Sample	Volume susceptibility χ_v	Mass susceptibility χ_m
Grid 1	143	179.4
Grid 2	111	144.9
Grid 3	81	103.3
Grid 4	60	75.6
Grid 5	50	80.4
Grid 6	79	86.1
Grid 7	99	114.2
Grid 8	62	78.9
Grid 9	100	121.5
Grid 10	80	104.2
Grid 11	67	79.5
Grid 12	64	77.7
Grid 12 Sub-soil	141	156.3

The samples, as measured, are generally of moderate to high values suggesting that, the conditions for magnetic survey were suitable. There is also a difference between the readings from the topsoil within Grid 12 and the sub-soil in the same square confirming the suitability of the area 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 (Clark, 1996, 99). The readings recorded tend to follow the pattern of the Fluxgate Gradiometer survey with higher values along the northern grid squares which correspond with complex of linear anomalies which cross the survey area in a NE – SW direction. There is a second area of enhanced readings in the south-east corner of the survey area, the origins of which is unknown.

Conclusions (Figure 10)

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.

At Robeston Wathen, however, the quality of the grey scale plot and the magnetic susceptibility samples suggests that the area is suitable for magnetic survey. The major feature of the grey scale plot is a group of anomalies which cross the northern half of the survey in a NE – SW direction. This is bounded by two, parallel, anomalies (Anomalies B and C) set approximately 8 m apart. It is not certain what this anomaly group represents, but given its width, it is possible it may be a trackway; however, this can only be confirmed by excavation. This group of anomalies also appear to correlate with the linear feature recorded in the LIDAR image of the area.

The other anomalies of potential archaeological origins (Anomalies F and G) appear to be sub-rectangular in shape and possibly may be buildings, but the plots are not clear enough to confirm this. Also, there does not appear to be the level of magnetic disturbance one would associate with domestic occupation associated with these anomalies. Anomaly F appears to be aligned with the major anomaly group and may be associated with disturbance within this group. Anomaly G, however, appears to align with a series of feint anomalies which are assumed to be agricultural in origins. This anomaly is also largely outside the development area.

References

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

Hall, J and Sambrook, P. 2021 *Historic Environment Desk-Based Assessment for a Development on part of Field Adjacent to Treffgarne, Robeston Wathen, Narberth, Pembrokeshire, SA67 8EL, Planning Application: 20/0037/PA (Pembrokeshire CC).* Trysor Project No. 2021/779

Acknowledgements

This survey was commissioned by Trysor. The base maps were provided by Aaron Mills (Architectural Technologist).

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:

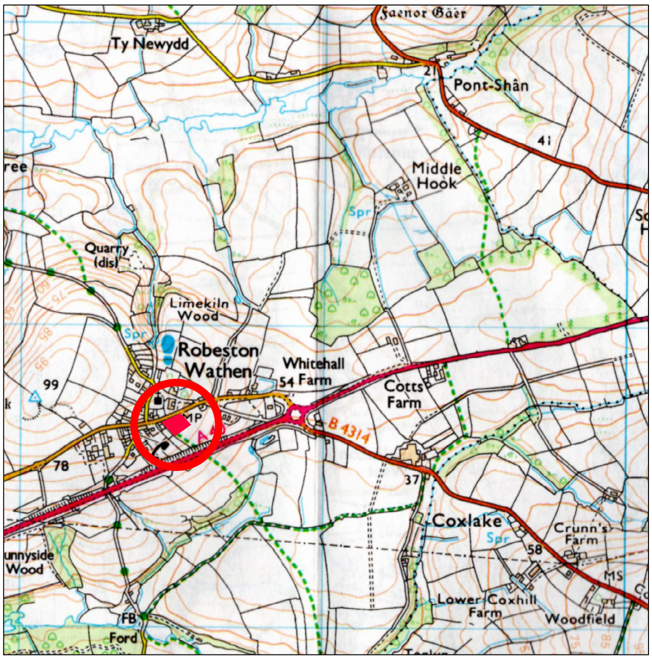

Figure 1: Location
Scale 1:25,000

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

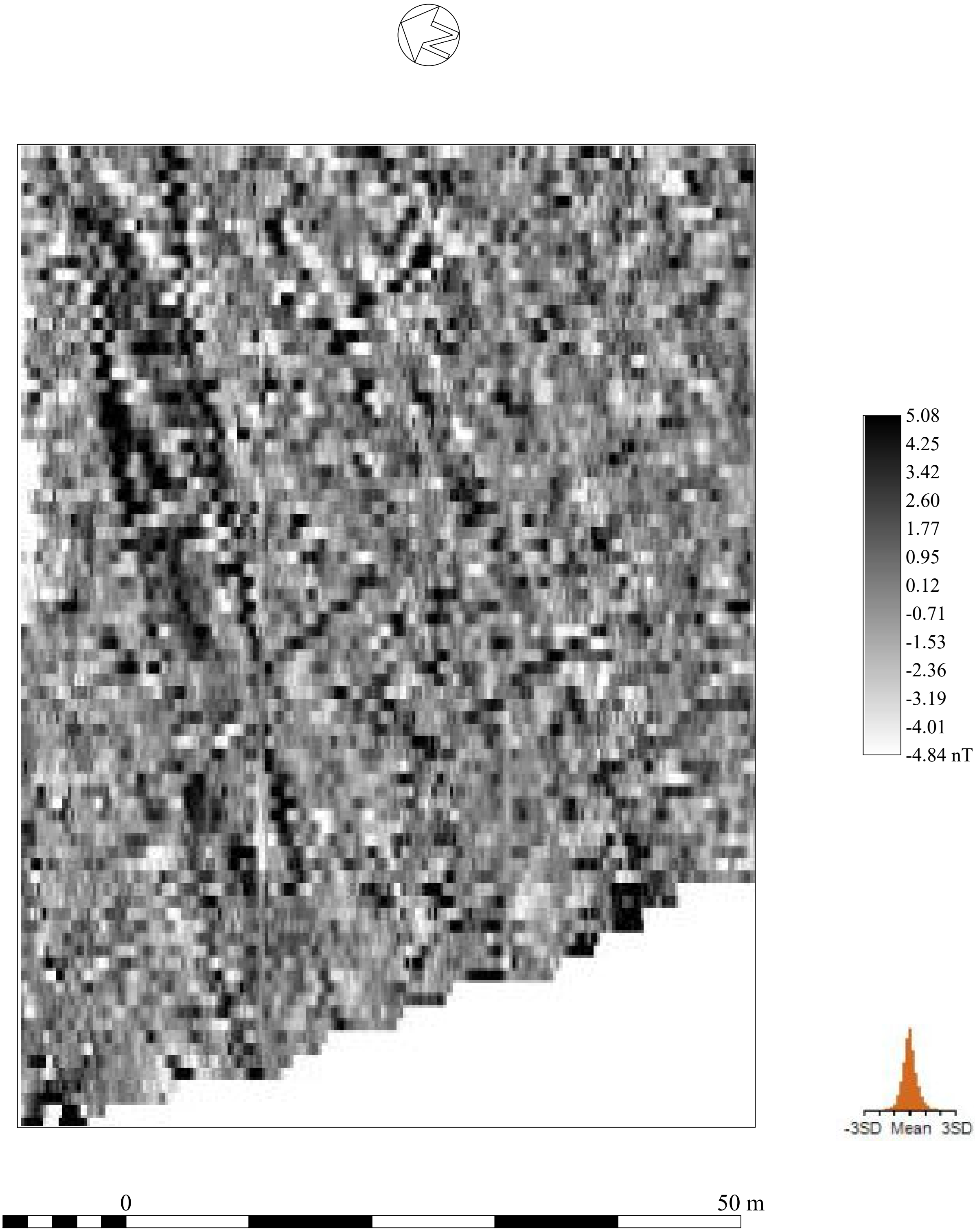

Figure 3: Grey Scale Plot
Scale 1:500

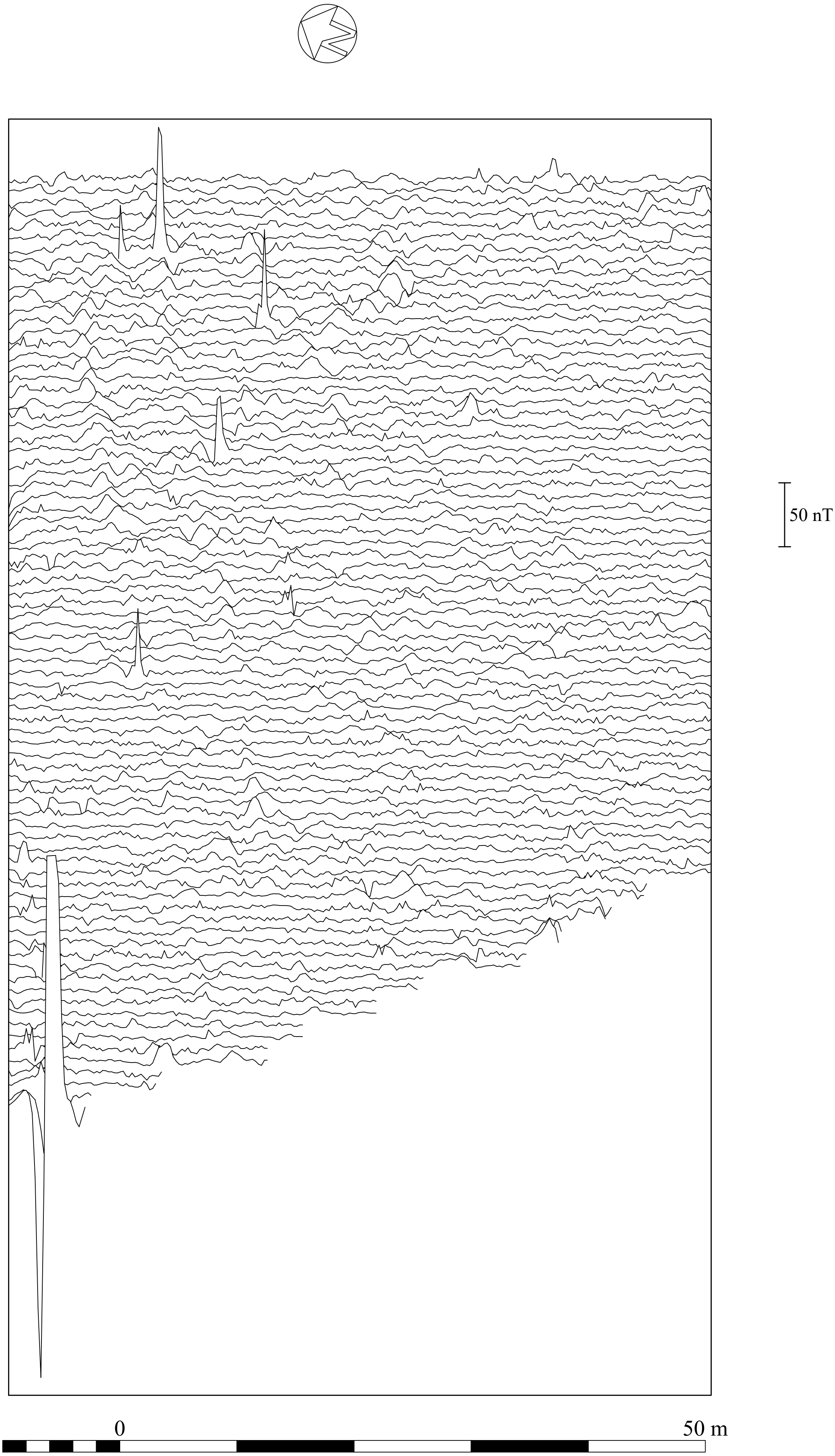

Figure 4: X-Y Plot
Scale 1:500

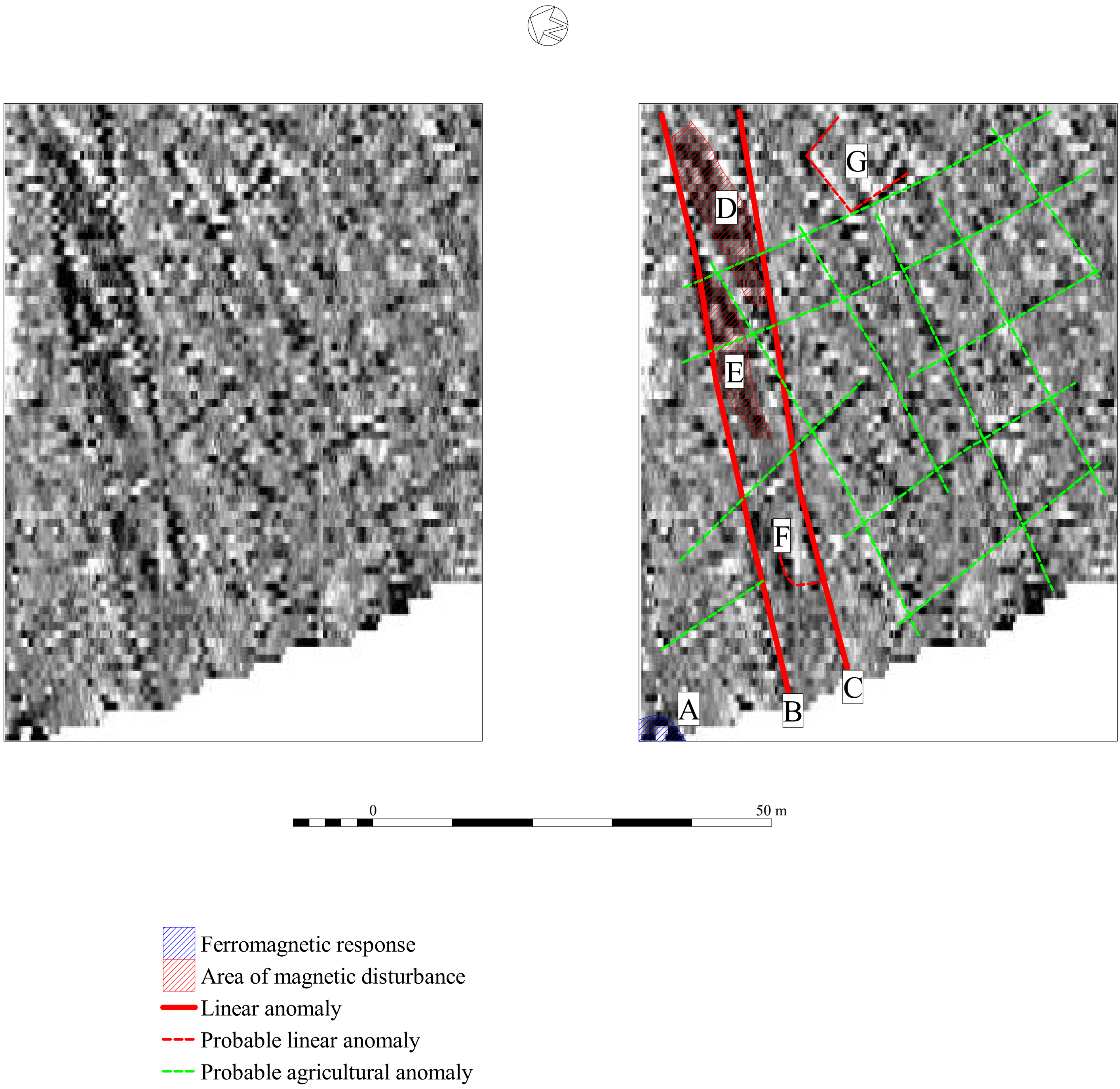

Figure 5: Interpretation
Scale 1:750

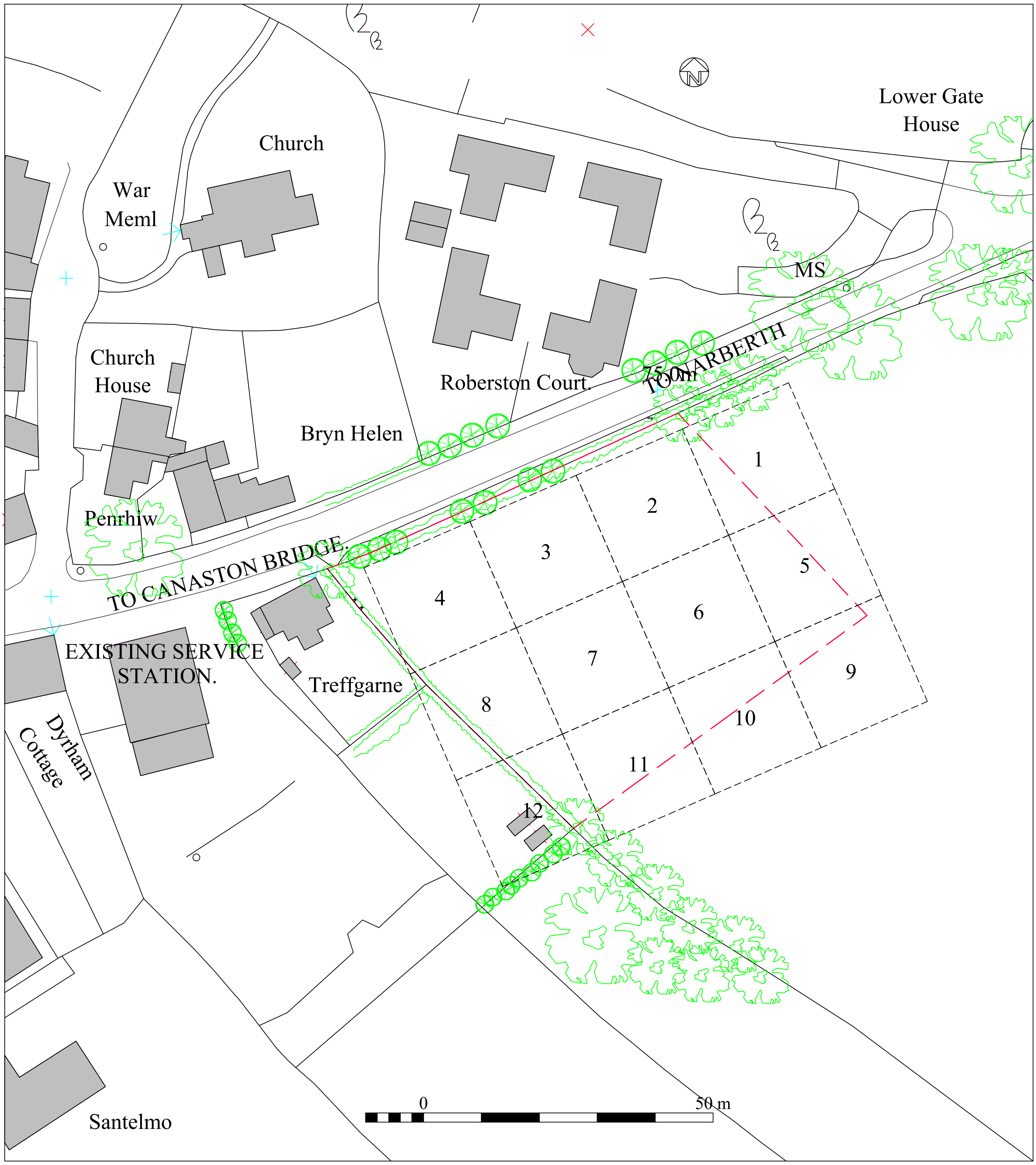

Figure 6: Location of Magnetic Susceptibility Samples
Scale 1:1,000

Figure 7: Magnetic Susceptibility Results
Scale 1:1,000

Ferromagnetic response
Area of magnetic disturbance
Linear anomaly
Probable linear anomaly
Probable agricultural anomaly

Figure 8: Summary
Scale 1:1,000