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Engineering Archaeological Services Ltd.



**Land opposite Village Hall in Llanddarog,
Carmarthenshire: Geophysical Survey**

**Analysis by
I.P. Brooks**

EAS Client report 2018/14

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Geophysical Survey**

Commissioned by Trysor

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Engineering Archaeological Services Ltd is

Registered in England No 286978

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NGR

Centred on:

Area 1: SN 50098 16658

Area 2: SN 50137 16616

Location and Topography (Figures 1 and 2)

The survey area consists of two small fields on the south western side of the B4310, opposite the Llanddarog Village Hall, Llanddarog, Carmarthenshire. The north eastern side of the survey area consists of the embankment on which the B4310 runs whilst the remaining boundaries are well established hedges. The two fields are divided by a metal mesh fence topped with barbed wire, supported by concrete fence posts.

At the time of survey, the north western field was under permanent pasture with short cropped grass, whilst the south eastern field was under rough pasture. This field had rough vegetation which was largely ankle deep, but reached chest height in places. In the eastern corner of the survey area there is an electrical transformer mounted on two telegraph poles and a corrugated iron hut. These features and the density of rank vegetation in this part of the field lead to the decision to exclude this portion of the field from the survey.

In general, the survey area slopes down gently to the south and west, although there are hints of slight topographical features within the survey area. These features are largely ploughed out in the northern eastern field, but are slightly better preserved in the south eastern field. No coherent plan could be determined during the course of the survey.

The survey took place on 20th November 2018.

Archaeological Background

It is intended to build a new housing development on the site consisting of fifteen houses with their associated facilities (Block Plan PA/03 prepared by Iago Cymru (Cyf)). This development had archaeological conditions placed upon it by Carmarthenshire County Council as part of the outline planning permission granted on 17th February (Carmarthenshire Planning Application Number W/26987).

The current survey was commissioned by Trysor as part of the require evaluation.

Aims of Survey

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

SUMMARY OF RESULTS

The only magnetic anomalies located in the survey appear to relate to the modern use of the field with modern service pipe/cable crossing the survey area. There are also two other highly magnetic anomalies which are also assumed to be modern.

Methods

The survey consisted of parts of 22, 20 x 20 m grid squares laid out as in Figure 9. Readings were taken at 0.25 m intervals along transects 1 m apart using a Geoscan FM256 Fluxgate Gradiometer. Grey scale plots were produced using Geoscan Research “Geoplot” v.3.00v and X - Y plots using Golden Software “Surfer” v. 10.7.972.

Small soil samples were taken for Magnetic Susceptibility analysis from some of the grid squares (Figure 9). These were dried, sieved through a 2mm sieve and analysed using a Bartington MS2 Magnetic Susceptibility meter and MS2B detector.

Survey Results:

Area

0.69 Ha

Display

The results are displayed as a grey scale images at one standard deviation and clipped to ± 5 nT (Figures 3 and 6). They are also displayed as X-Y trace plots (Figure 4 and 7). Interpretation plots are shown as Figures 5 and 8 and the data is summarised in Figure 10.

Results:

Fluxgate Gradiometer Survey

The grey scale plots are dominated by a highly magnetic anomaly crossing the survey area (Anomaly A, Figure 5 and Anomaly D, Figure 8). This relates to a modern service, probably either an iron pipe or electricity cable which had been pegged out across the field before the survey took place. There are also two other linear, high magnetic anomalies in Area 2 (Anomalies E and F, Figure 8). Both of these anomalies have similarly high values to the known modern service and are also assumed to be modern services, possibly iron pipes.

Two other ferromagnetic responses were also recorded. Anomaly B in Area 1 (Figure 5) relates to the modern fence dividing the two fields and Anomaly G (Figure 8) is part of the magnetic disturbance related to the electrical transformer in this corner of the field.

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. The location of the magnetic susceptibility samples is shown on Figure 8.

Sample	Volume susceptibility χ_v	Mass susceptibility χ_m
Grid 1	15	23.4
Grid 3	28	37.8
Grid 5	28	35.4
Grid 8	36	46.2
Grid 10	34	38.2
Grid 15	24	35.3

Sample	Volume susceptibility χ_v	Mass susceptibility χ_m
Grid 17	38	48.7
Grid 19	21	30.0
Grid 21	23	31.9

In general, the susceptibilities, as measured, are of moderate to low values, suggesting that magnetic conditions are not ideal for magnetic survey. There is a degree of variability within the measured values with slightly high values particularly in Grid Squares 8 and 17. Magnetic susceptibility can be used as a proxy for the level of archaeological activity within the general area of the sample (Clark 1996, 106), thus the increased values from the survey may suggest slightly increased activity in Grid Squares 8 and 17. The increased activity in Grid Square 8 may be related to the access gate into this field which is just to the north east of this square, whilst the interpretation of the increased value in the south east corner of the survey area (Grid Square 17) is unknown.

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.

The only anomalies recorded in this survey would appear to related to the modern use of the fields, particularly modern services within the survey area.

References

Clark, A. 1996. *Seeing Beneath the Soil. Prospecting Methods in Archaeology*. Routledge, London

Acknowledgements

This survey was commissioned by Trysor and the help of Jenny Hall and Paul Sambrook for commissioning the survey and for providing background information is gratefully acknowledged. Access to the field was permitted by the land owner Mr. Dorian Davies.

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 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:

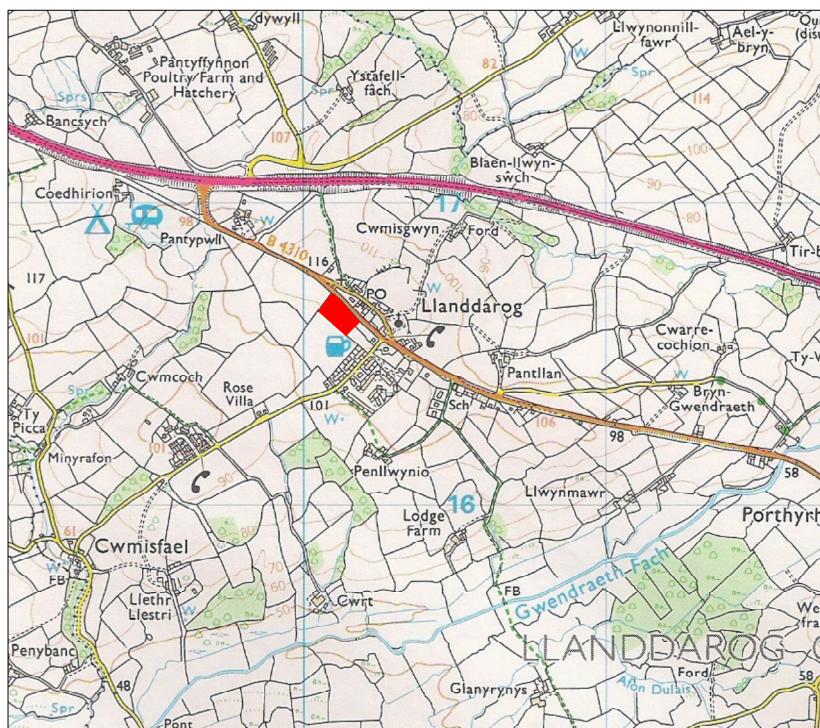
For Gradiometer and Resistivity Survey 20m x 20m or 30m x 30m grids are laid out over the survey area. Gradiometer readings are logged at either 0.5m or 1m intervals along traverses 1m apart. Resistance meter readings are logged at 0.5m or 1m intervals. Data is down-loaded to a laptop computer in the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

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Figure 1: Location
Scale 1:25,000



Based on the 1950
Ordnance Survey
Carmarthenshire XL.SW Map

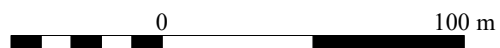
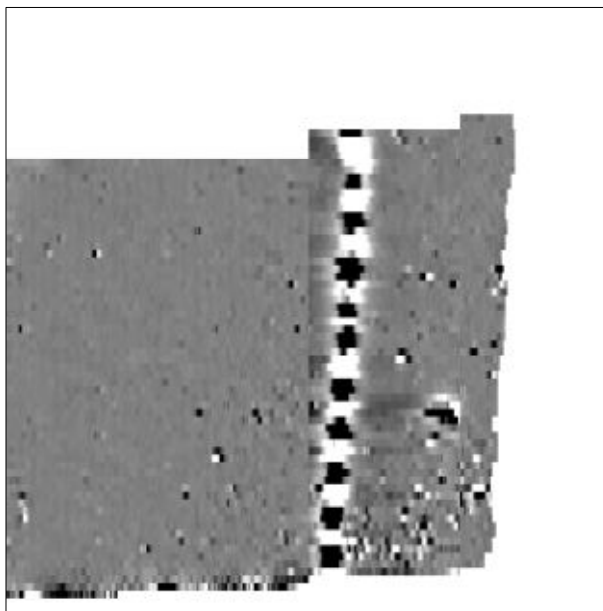
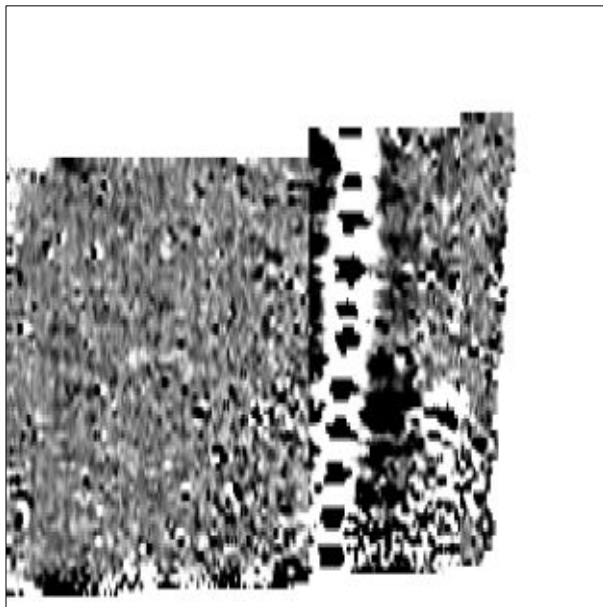
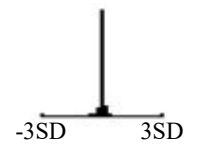
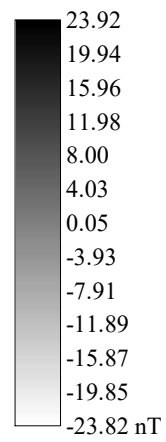


Figure 2: Location of the Survey Areas
Scale 1:2,500



Plotted at \pm one standard deviation



Clipped to \pm 5 nT

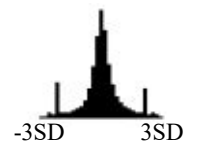
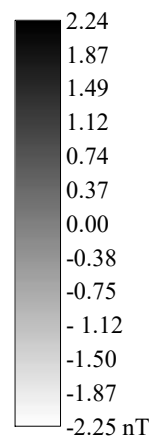


Figure 3: Area 1, Grey Scale Plots
Scale 1:1,000

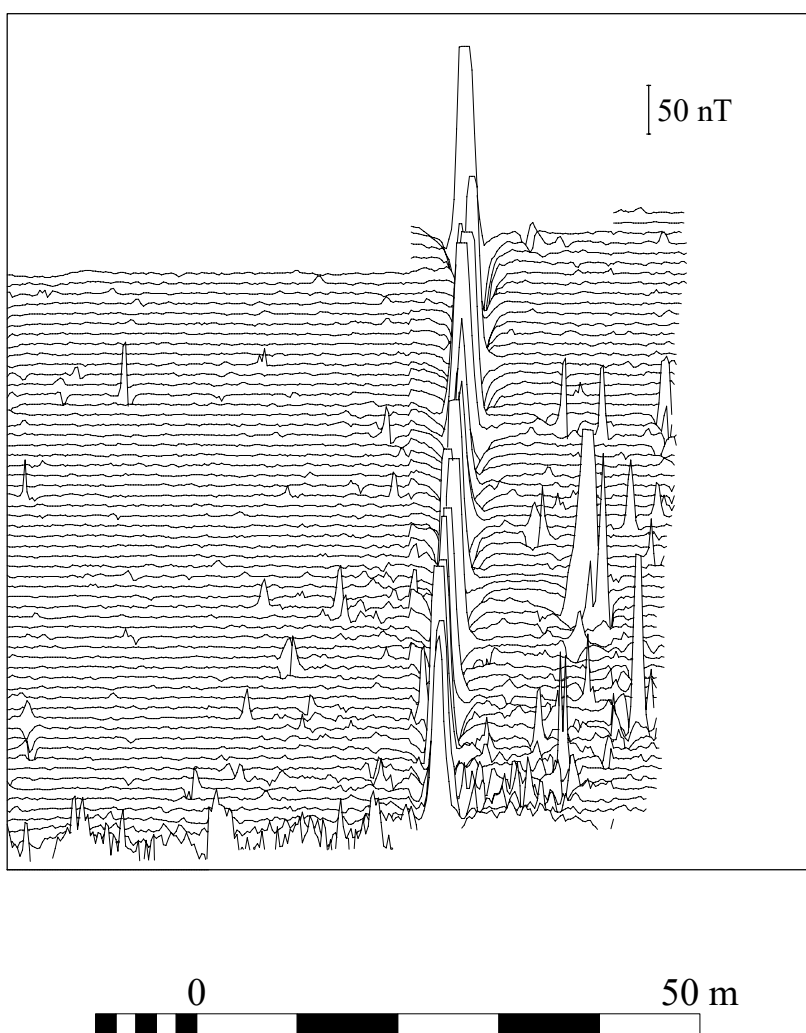
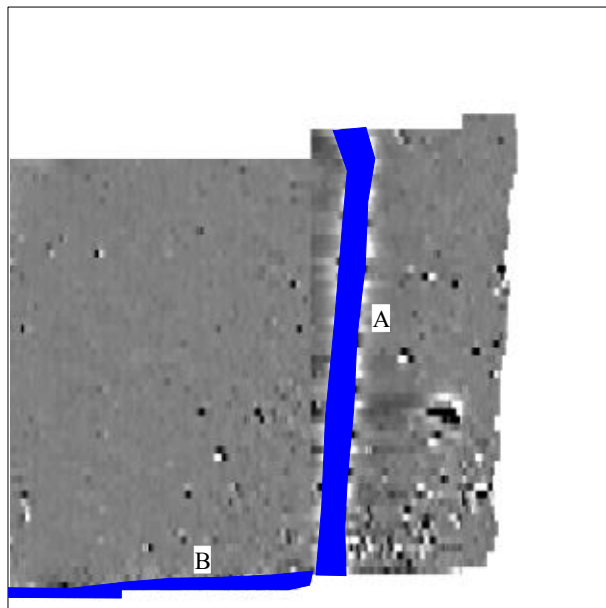
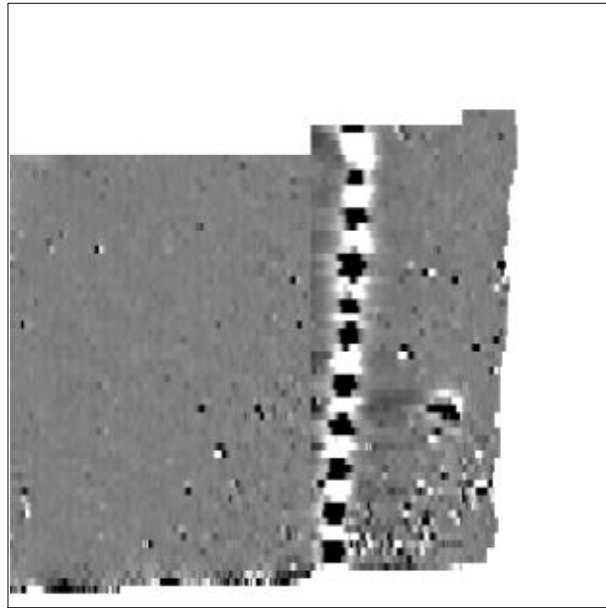


Figure 4: Area 1, X-Y Plot
Scale 1:750




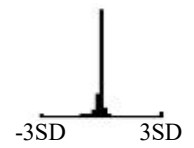
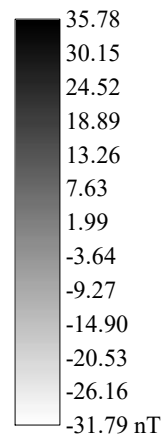
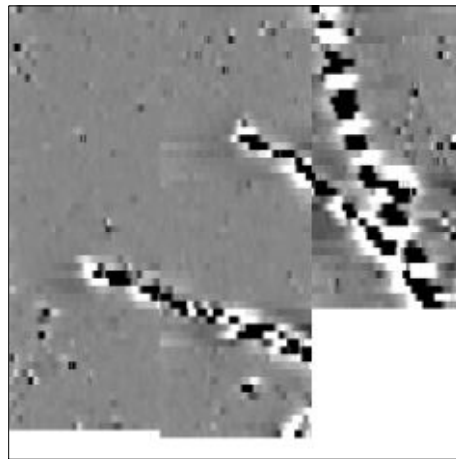
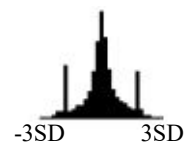
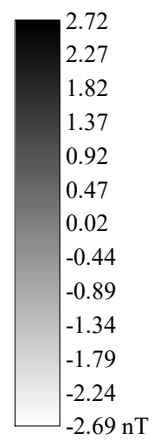
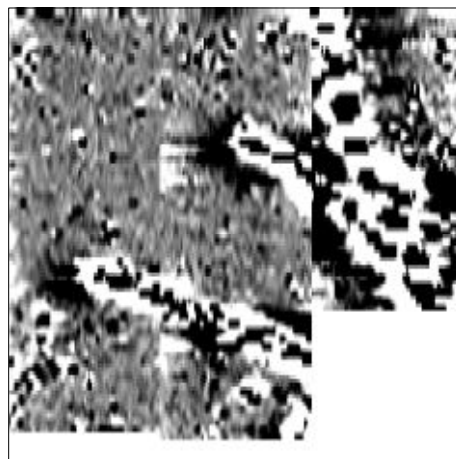
 Ferromagnetic response



Figure 5: Area 1, Interpretation
Scale 1:1,000



Plotted at \pm one standard deviation



Clipped to \pm 5 nT



Figure 6: Area 2, Grey Scale Plots
Scale 1:1,000

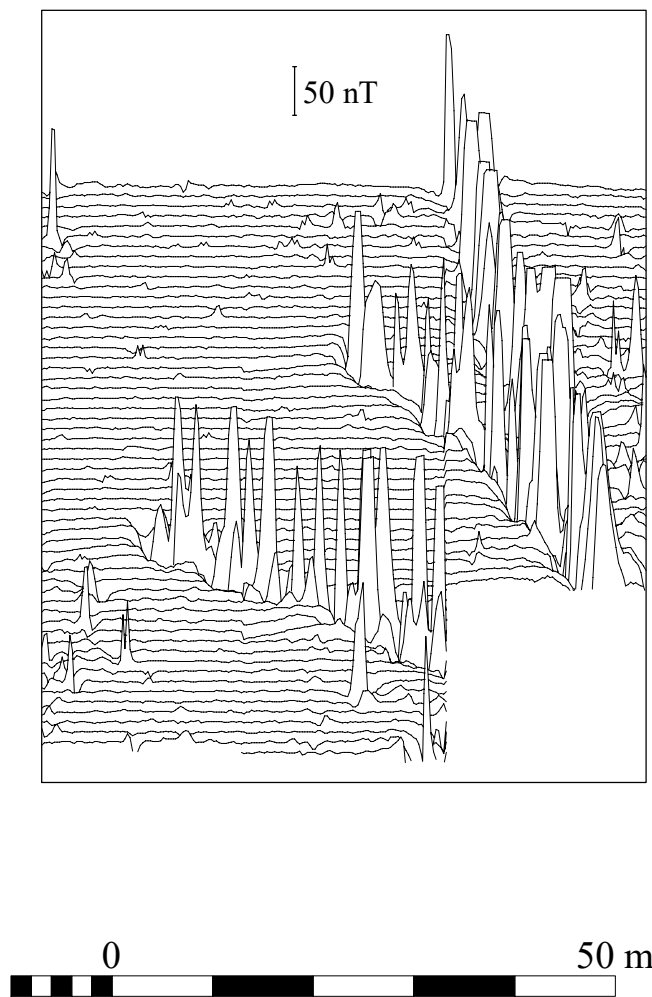
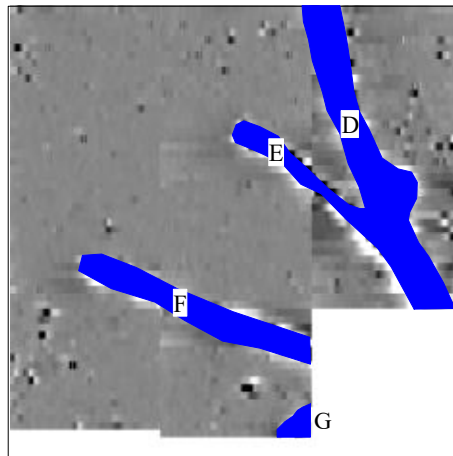
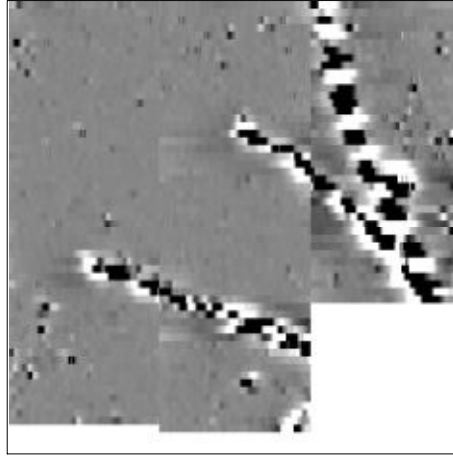


Figure 7: Area 2, X-Y Plot
Scale 1:750




 Ferromagnetic response

Figure 8: Area 2, Interpretation
Scale 1:1,000



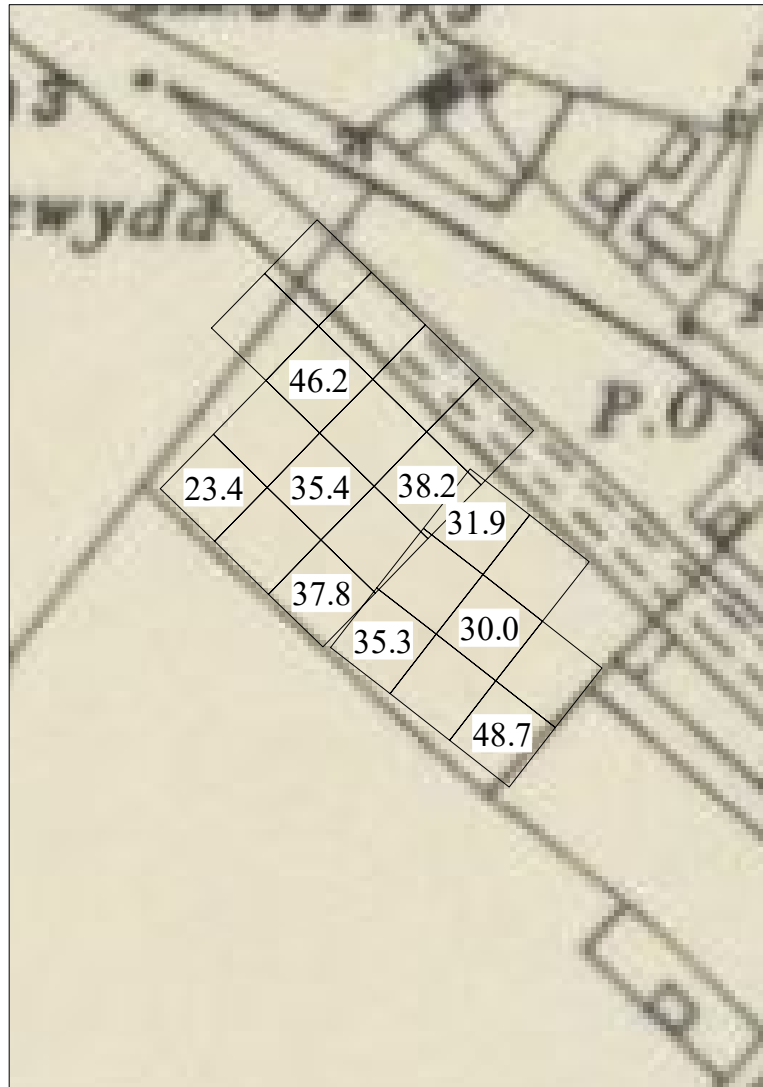


Figure 9: Location of the Magnetic Susceptibility Samples
Scale 1:2,000



Based on the 1950
Ordnance Survey
Carmarthenshire XL.SW Map



Figure 10: Summary
Scale 1:2,500