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Engineering Archaeological Services Ltd.

Abbey Farm, Rhuddlan, Denbighshire: Geophysical Surveys

Commissioned by

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Engineering Archaeological Services Ltd

EAS Client Report 2020/05

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NGR

Centred on: SJ 02938 77381

Location and Topography (Figures 1 and 2)

The survey area lies to the south of Abbey Farm, Abbey Road Rhuddlan, LL18 5RL, within a large pasture field. The development area is within part of Site of Norman Borough of Rhuddlan, a scheduled ancient monument (Scheduled Monument Reference FL 129). The northern side of the survey area is bounded by the existing touring caravan site and to the west is the field boundary between the field and a sunken lane which is the extension of Abbey Road.

At the time of the survey the field had short cropped grass with the occasional patch of thistles. Although the field is essentially flat, there was a very slight slope, down to the north and west.

Archaeological Background

It is intended to extend the existing touring caravan site, to the south of the Abbey Farm buildings, by approximately 0.65 ha. This will provide a further twenty-seven pitches for touring caravans and three glamping pods. It is not intended to carry out major excavation within the scheduled area with the road ways within the development being constructed of plastic meshing laid on the surface. Indeed, the only disturbance of the soil will be the electricity cable running around the edge of the development and the fence posts marking its extent (R. and Williams *pers. comm*.)

The proposed development is within the scheduled area of the Norman Borough of Rhuddlan (Scheduled Monument Reference FL 129, http://cadwpublic-api.azurewebsites.net/reports/sam/FullReport?lang=en&id=3102) and is immediately south of the farm buildings associated with Abbey Farm. Abbey Farm is on the site of a Dominican Friary founded in or before 1258 and dissolved in 1538 (https://coflein.gov.uk/en/site/157155/details/rhuddlan-friary-dominicanabbey-farm). The current farmyard includes three listed buildings of late eighteen century date (https://historicwales.gov.uk). These buildings are the barn (Listed Building reference 1404, Grade II*), a Cowhouse (14971, Grade II*) and a Workshop Range (14972, Grade II*)

To the south of the survey is the southern run of the Town Ditch (NPRN 92914). This is an earthwork thought to outline the prospective site of the Early Medieval planned Cathedral city which was replace by the later, smaller Norman borough (NPRN 300415) (https://coflein.gov.uk/en/site/306672/details/rhuddlan-town-ditch)

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 south of Abbey Farm, Rhuddlan on 4th August 2020. Only a limited number of anomalies of potential archaeological origins were located. Also recorded were a number of ferromagnetic responses which are largely the effect of modern disturbance of the magnetic field. One of these marks the line of a galvanised water pipe crossing the survey area.

Gwnaethpwyd Arolwg Graddiomedr Fluxgate yn y cae i'r de o Abbey Farm, Rhuddlan ar 4 Awst 2020. Dim ond nifer gyfyngedig o anghysonderau o darddiad archeolegol posibl a leolwyd. Cofnodwyd hefyd nifer o ymatebion ferromagnetig sydd i raddau helaeth yn effaith aflonyddwch modern ar y maes magnetig. Mae un o'r rhain sy'n nodi llinell pibell ddŵr galfanedig sy'n croesi ardal yr arolwg.

Methods

The survey was based on a series of twenty-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 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 out in a warming oven, sieved and processed using a Bartington MS2 Magnetic Susceptibility Meter.

Survey Results:

Area

Area of Survey: 0.94 Ha.

Display

The results are displayed as grey scale images (Figures 3 and 4) and as X-Y trace plot (Figure 5). The interpretation plot is shown as Figure 6. The presence of large areas of ferromagnetic responses gives a larger range of values to the survey than is typical. This tends to flatten the appearance of the grey scale image (Figure 3) making low magnitude anomalies difficult to determine. Figure 4 plots the data after it had been clipped to ± 5 nT, allowing feint, low magnitude, anomalies to be defined.

Results:

Fluxgate Gradiometer Survey (Figures 3 - 6)

Only a limited number of magnetic anomalies were recorded in the survey. The most dominant of these are a series of ferromagnetic responses which are shown in blue on Figure 6. Anomalies A and B are related to the proximity of the field boundaries to these sections of the survey. Anomaly A being the wire fence between caravan site and the field and Anomaly B the hedge line along the western side of the field. The stripe of ferromagnetic responses (Anomaly C) crossing the survey from north to south is the effect of a galvanised waterpipe which is known to cross the field (R. Williams *pers. comm*.). There are also a series of discrete ferromagnetic anomalies within the survey area. One group of these (Anomaly D) concentrates near to the northern edge of the survey and are likely to be related to the fence line and caravans which less than 8 m from the survey. The other discrete anomalies are spread throughout the survey area and are likely to be the result of fragments of magnetic materials

within the plough soil. Whilst some of these are likely to be from agricultural implements, the field was used for the summer camp for the Boys Brigade for a number of years (R. Williams *pers. comm*.) and some of the disturbance may be due to this activity.

There are a few, feint, linear anomalies which appear to mark potential archaeological features within the field. Anomaly E forms an arc through the southern half of the survey (Figure 6), defining an area of at least 65 x 40 m in size. The western side of this anomalies is lost in the magnetic disturbance of the galvanised water pipe, whilst the north eastern end appears to loop to the east (Anomaly F). It is not certain that Anomalies E and F and contemporary, however they appear to be aligned.

Anomaly E is crossed two possible linear anomalies (Anomalies G and H). Anomaly G is a short length of linear anomaly approximately 17 m long which crosses Anomaly E at right angles and they may, therefore, be contemporary with each other. Anomaly H, however, crosses the survey in a NW – SE direction which does not align with the other linear anomalies, the galvanised water pipe and the current field boundaries. This anomaly does appear to have a series of discrete ferromagnetic anomalies along its length, although this may be coincidental.

Magnetic Susceptibility (Figure 7)

Nine, small, soil samples were taken for Magnetic Susceptibility analysis. These were taken only from grid squares within the development area. 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 7

Sample	Volume susceptibility χ_v	Mass susceptibility χ_m
Grid 1	7	8.1
Grid 3	9	10.3
Grid 5	10	11.0
Grid 7	8	8.4
Grid 9	10	9.8
Grid 11	13	14.1
Grid 13	6	8.1
Grid 16	9	10.1
Grid 18	9	9.2

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

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). Those recorded from the survey area, however are reasonably consistent suggesting there is little variability in human activity levels within the survey.

Conclusions (Figures 8 and 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.

Although the magnetic conditions do not appear to be ideal for the survey, a limited number of feint linear anomalies have been defined. Probably most significant is Anomaly E which appear to form the southern end of a large feature, probably an enclosure or field system. The date of this feature is

unknown and it could equally be either prehistoric or related to the medieval Friary. Anomaly H is clearly of a different period as it crosses Anomaly E at an angle, however, its possible date and function are unknown.

There is a relatively high level of magnetic disturbance within the field, besides that related to the field boundaries and the galvanised pipe, which may be fragments of agricultural iron within the plough soil. It is also possible that some of these anomalies are the result of the field having been used as a summer campsite by the Boys Brigade.

There is little correspondence between the anomalies defined by the Fluxgate Gradiometer Survey and the proposed development (Figure 9). Indeed, Anomalies E, F and G are either outside the development area or run through area where it is planned not to have either a caravan pitch nor a glamping pod. Only Anomaly H crosses the development area, however, the proposed construction techniques mean that any disturbance of the feature should be minimal.

References

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

Acknowledgements

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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 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:

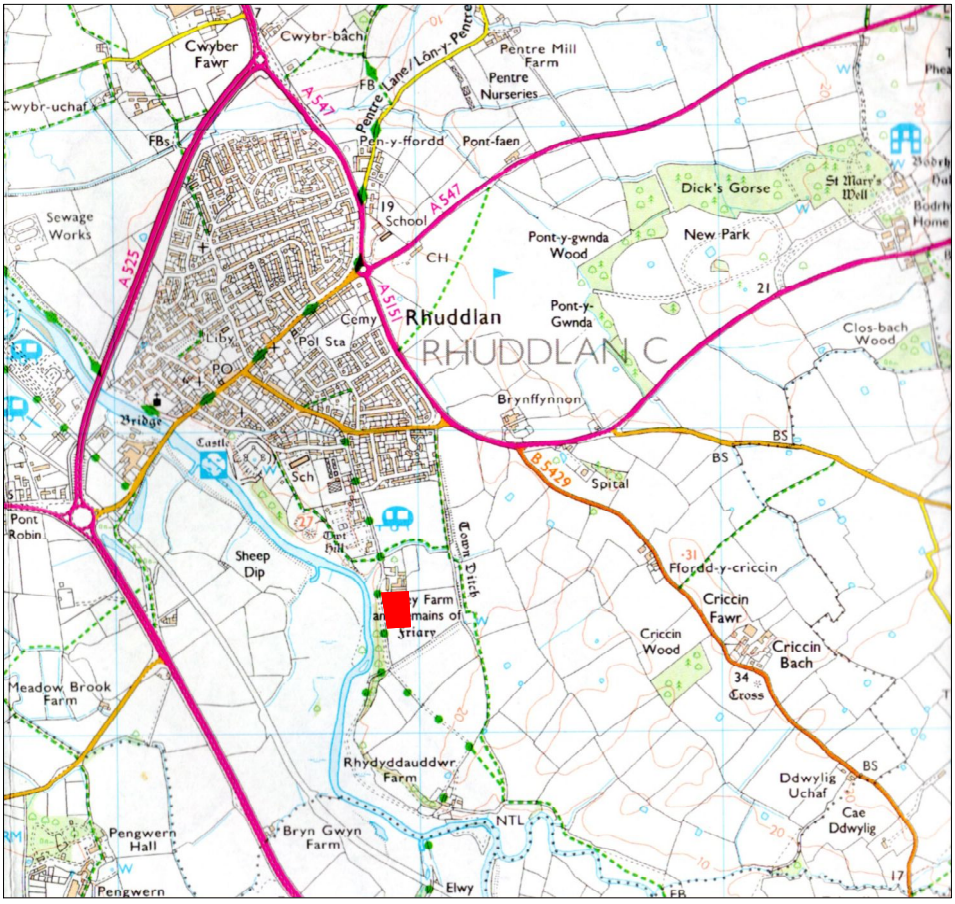

Figure 1: Location
Scale 1:25,000

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

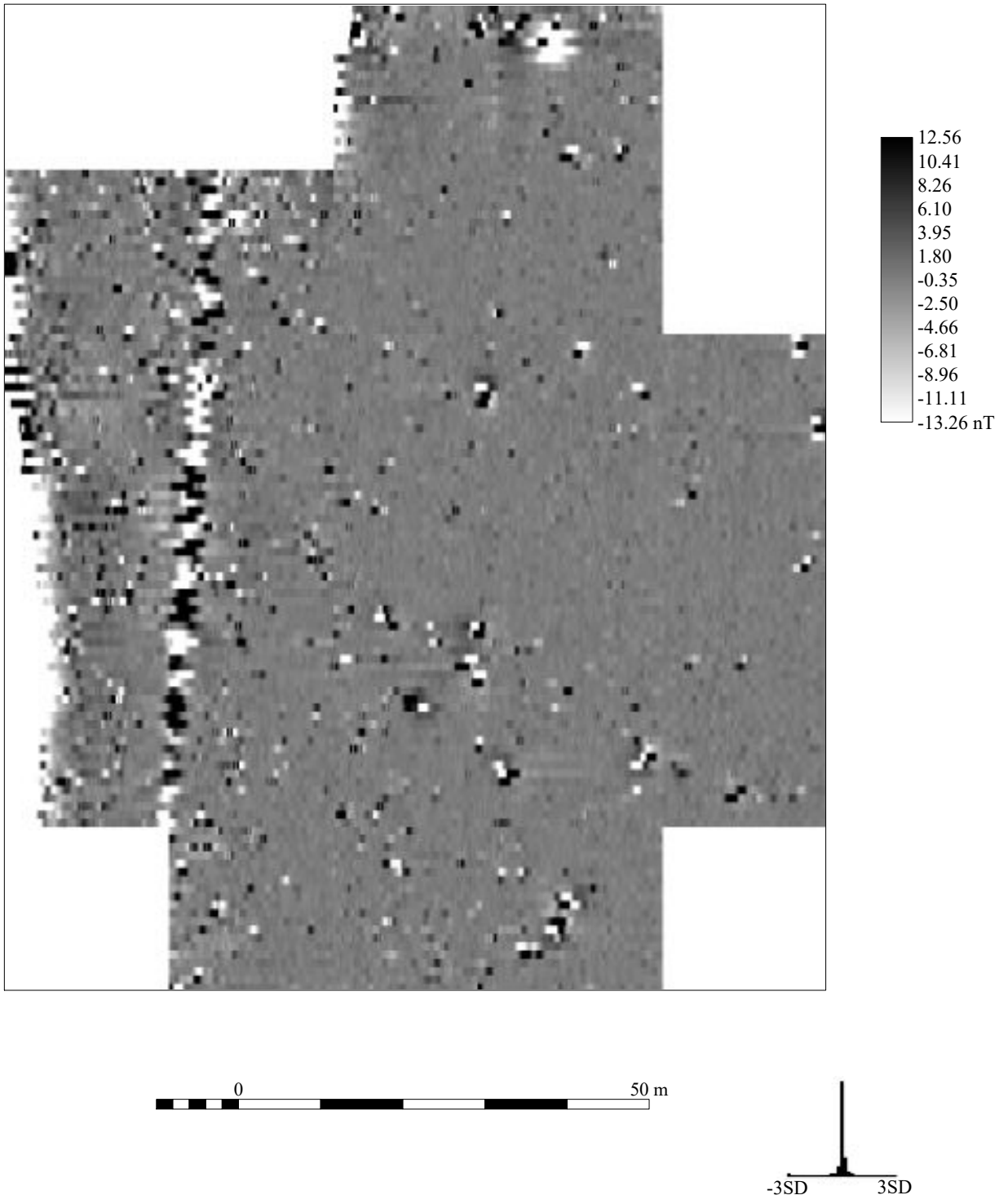

Figure 3: Grey Scale Plot at +/- One Standard Diviation
Scale 1:750

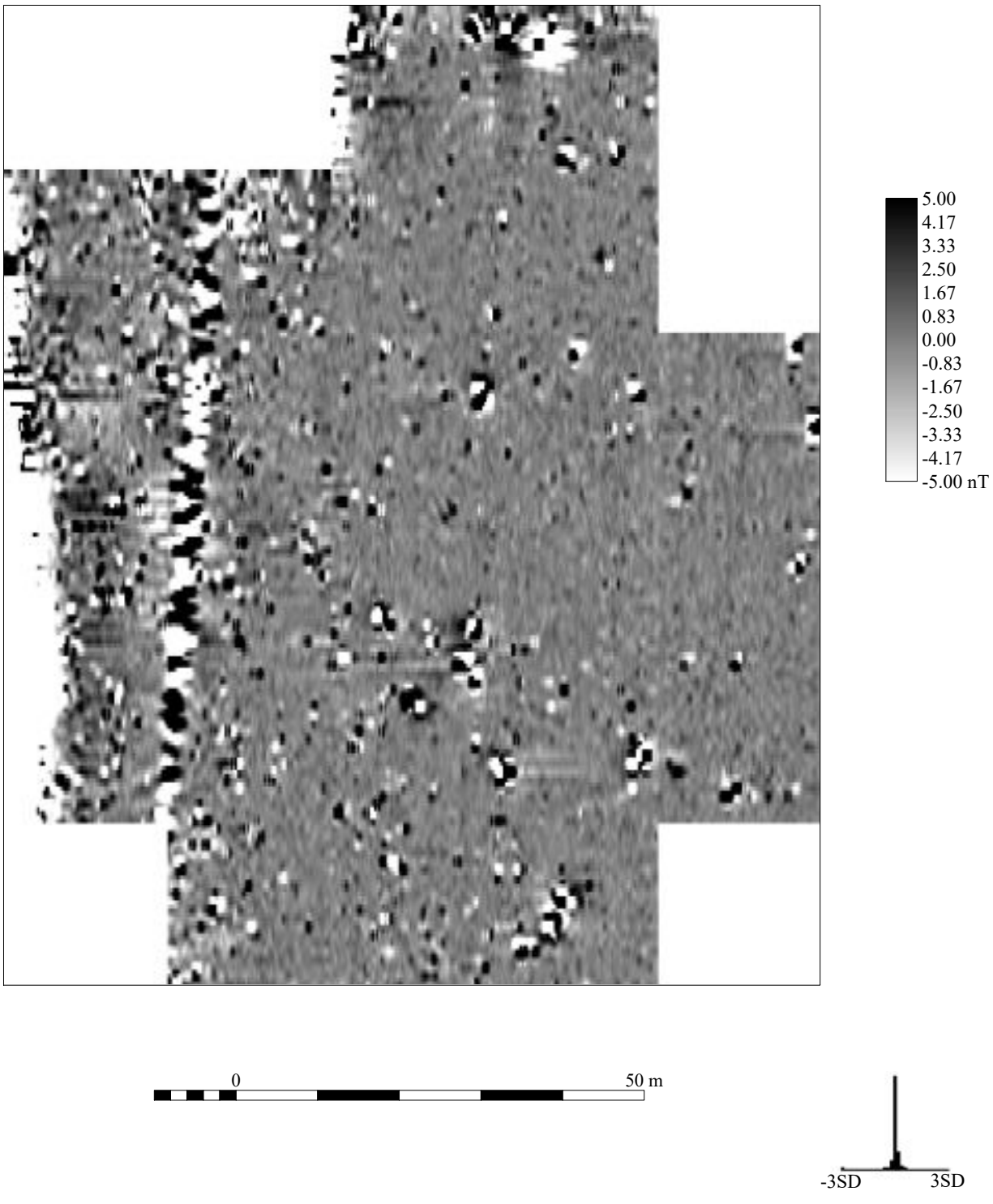

Figure 4: Grey Scaled Plot Clipped to +/- 5 nT
Scale 1:750

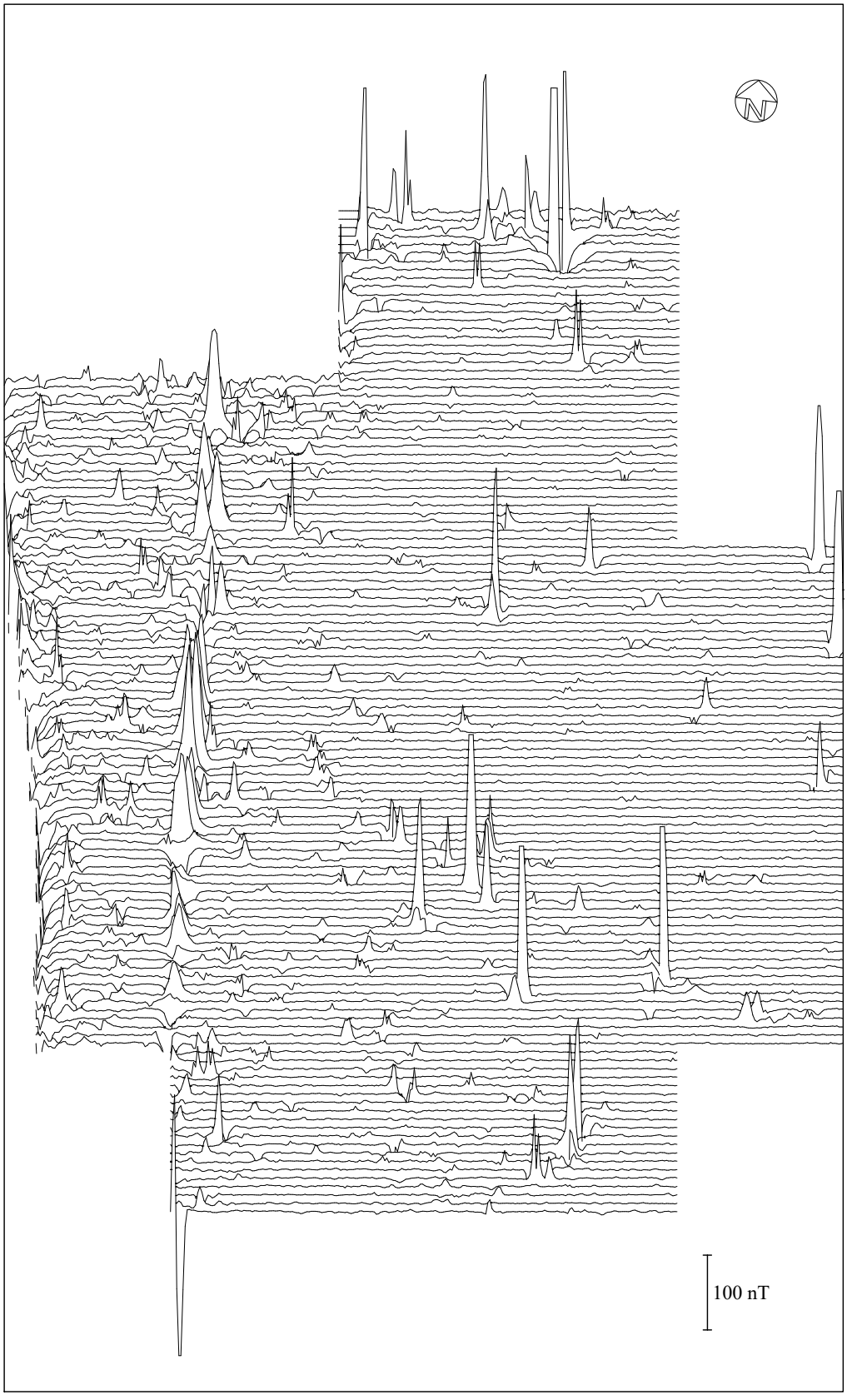

Figure 5: X-Y Plot
Sxale 1:750

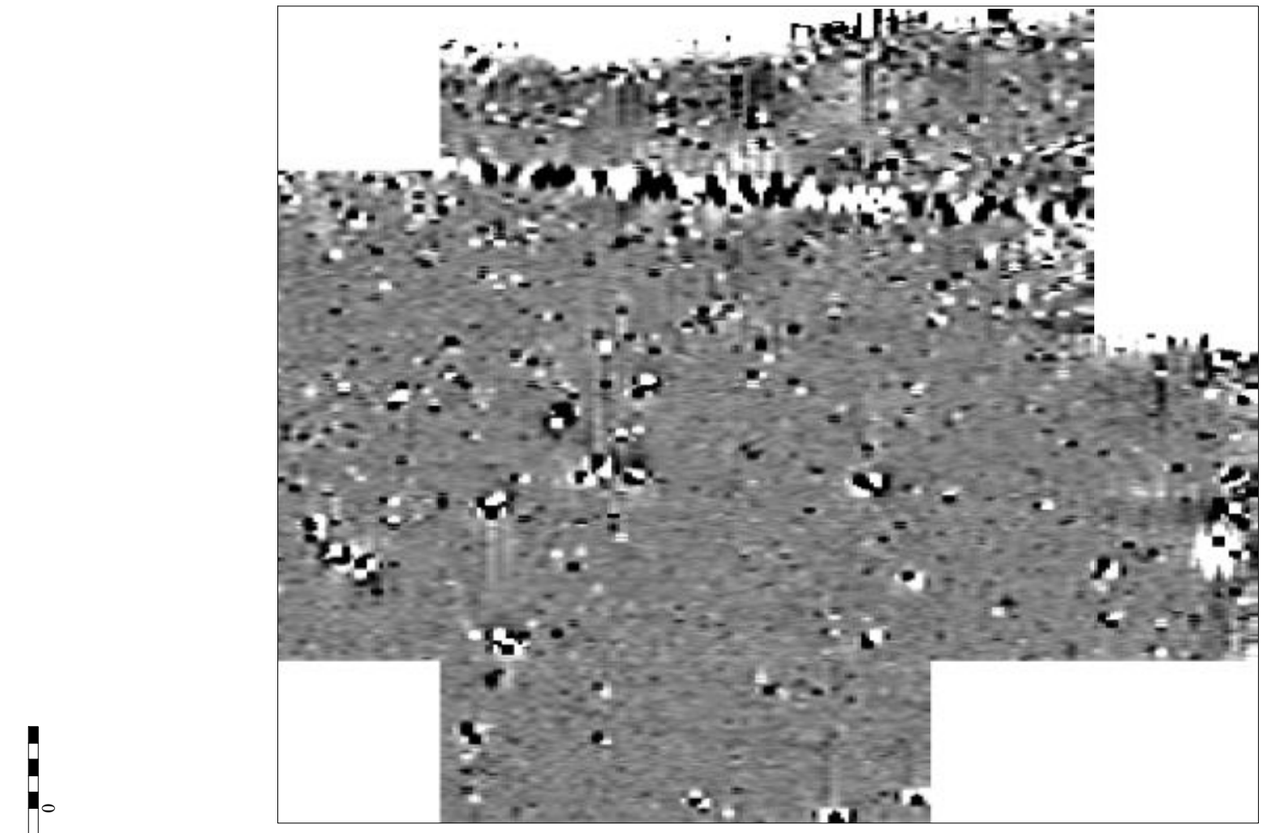

Figure 6: Interpretation
Scale 1:750

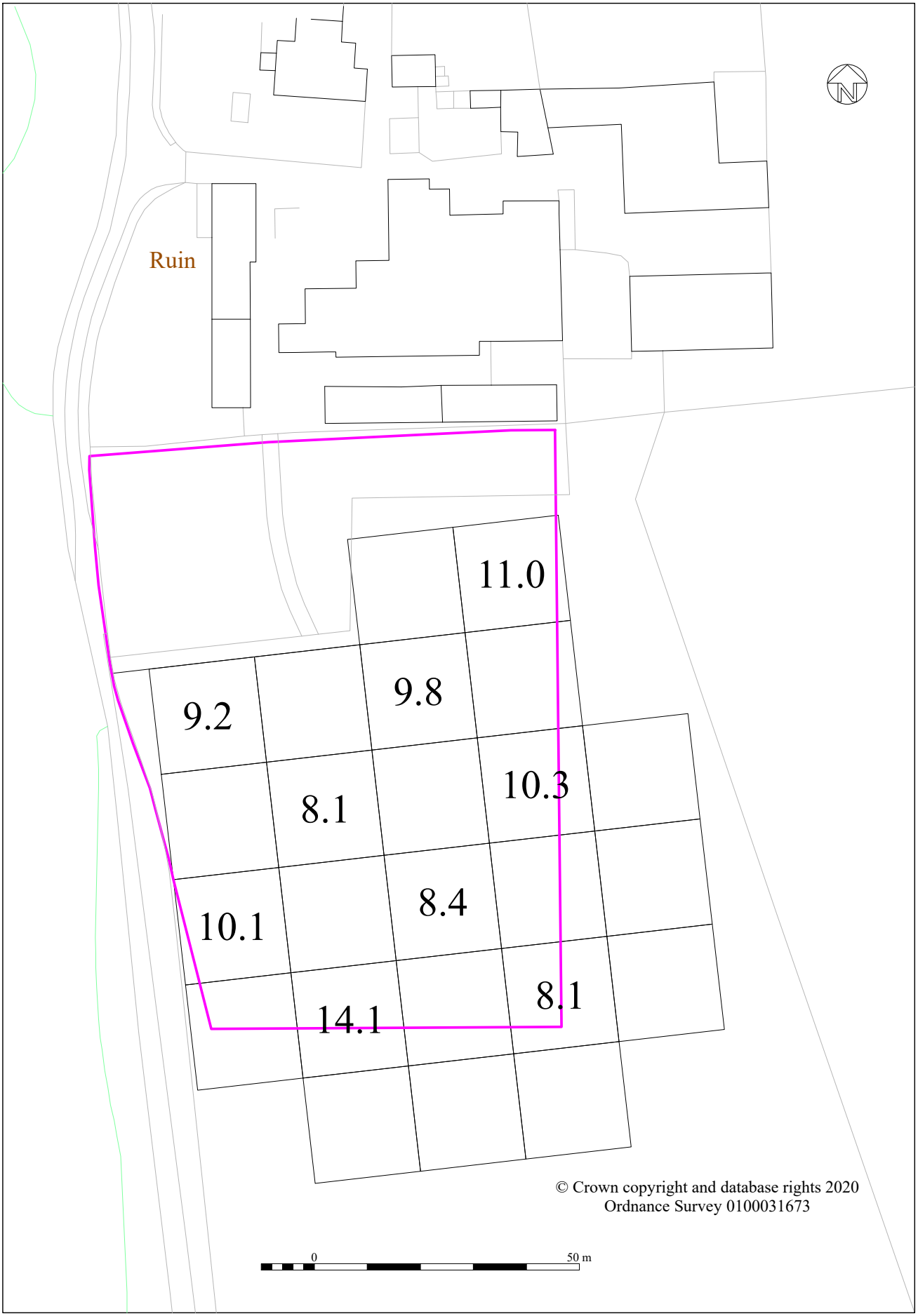

Figure 7: Magnetic Susceptibility Results
Scale 1:1,000

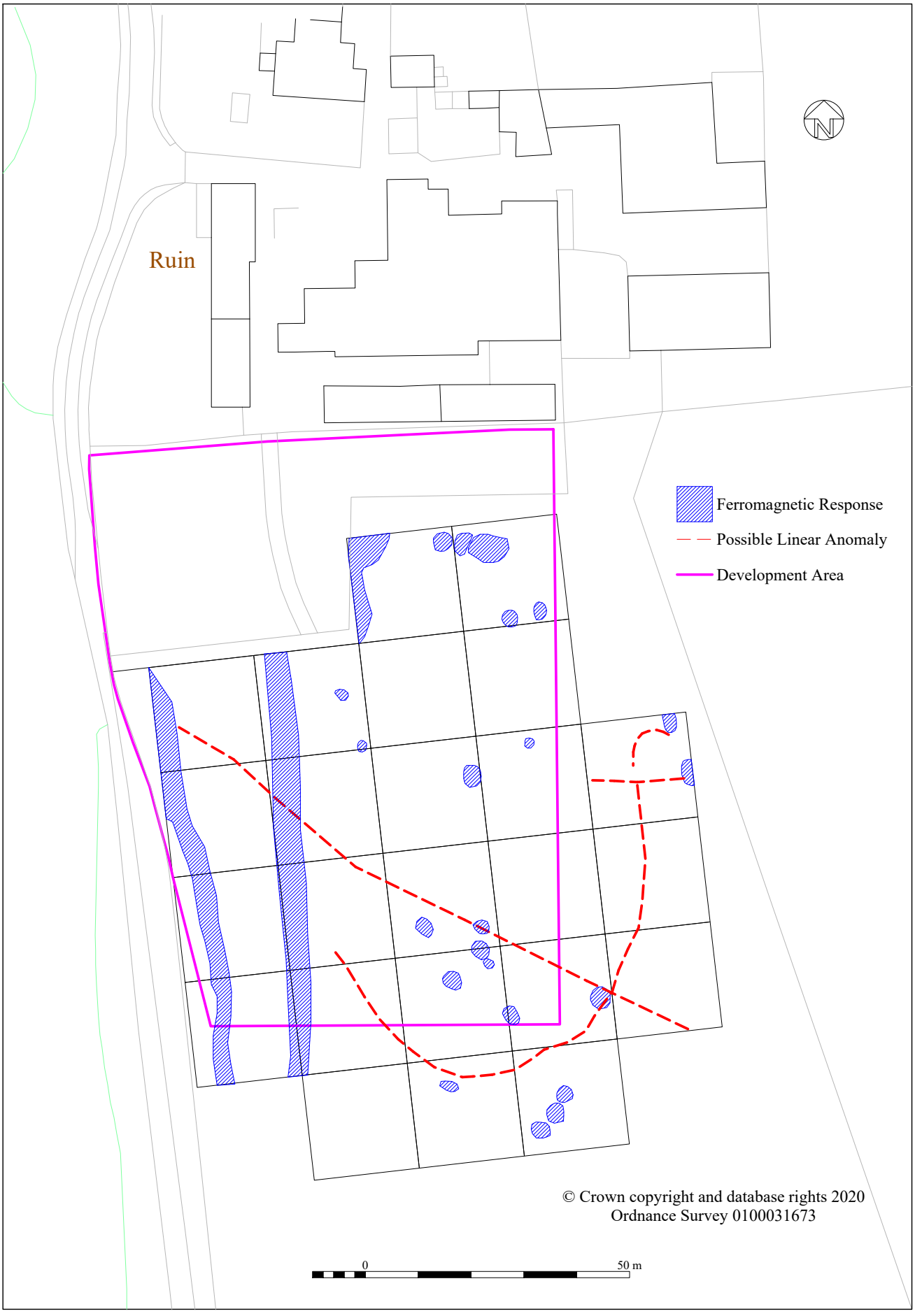

Figure 8: Summary
Scale 1:1,000

Figure 9: Correspondence between the Proposed Development and the Survey Results
Scale 1:1,000