Geophysical Investigations of land to the south of Wrexham Road, Holt

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J10 Planning

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Summary

This report describes the results of an archaeological geophysical investigation undertaken on land to the south of Wrexham Road, Holt. The investigations were conducted by Archaeological Survey West LLP (ASW).

The survey was limited by surrounding metallic interference; however, linear features including two associated with 19th century boundaries, as well as possible earlier boundaries were identified. There was also a small weak circular disturbance that is likely to be agricultural in origin but has some limited potential to represent prehistoric activity.

Crynodeb

Mae'r adroddiad hwn yn disgrifio canlyniadau ymchwiliad geoffisegol archeolegol a gynhaliwyd ar dir i'r de o Ffordd Wrecsam, Holt. Cynhaliwyd yr ymchwiliadau gan Archeological Survey West LLP (ASW).

Cyfyngwyd yr arolwg gan ymyrraeth fetelaidd amgylchynol; fodd bynnag, nodwyd nodweddion llinellol gan gynnwys dwy yn gysylltiedig â ffiniau'r 19eg ganrif, yn ogystal â ffiniau cynharach o bosibl. Roedd yna hefyd aflonyddwch cylchol bach, gwan sy'n debygol o fod yn amaethyddol ei darddiad ond sydd â photensial cyfyngedig i gynrychioli gweithgaredd cynhanesyddol.

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1. Introduction

This report describes the results of an archaeological geophysical investigation undertaken on land to the south of Wrexham Road, Holt. The objective of the survey was to identify the archaeological potential of the site.

This investigation forms part of pre-determination investigation ahead of a proposed housing development. The geophysical survey was requested by the Development Control Archaeologist at Clwyd Powys Archaeological Trust to determine the potential for archaeological features and to inform potential further mitigation.

The method of survey employed during these investigations comprised of standard resolution magnetometry, a full specification of which can be found in the section 4: Methodology.

The survey was carried out in accordance with national standards, as laid out by 'Geophysical survey in archaeological field evaluation by David A, Linford N (2008)' and the Chartered Institute for Archaeology's (CIfA) 'Standard and guidance for archaeological geophysical survey' (2014).

As stipulated by CIfA guidelines, this report and its associated archive will be deposited with the relevant local and national curators by our client, and an electronic record of the project details will be deposited with the Clwyd Powys Archaeological Trust Historic Environment Record.

2. Site background

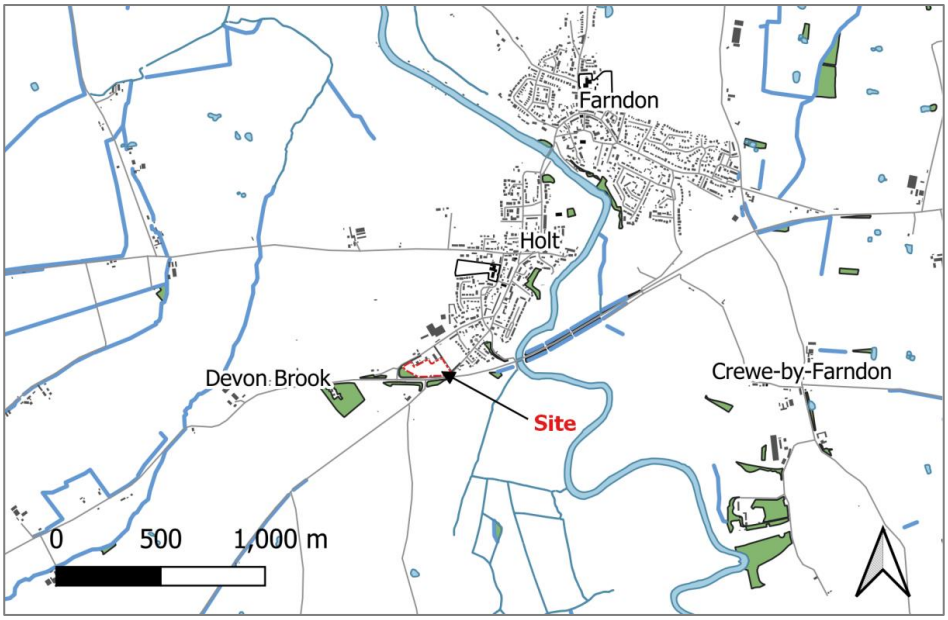


Figure 1: Site location map

Geology and Topology

The site is currently comprised of pastoral lands set between two roads, the A354 to the south and Wrexham Road to the north. Between the field and the road at the northern most part of the site is a farm yard and house. The farm yard forms part of the development area but was discarded from this investigation due to the presence of significant metallic obstacles.

The bedrock geology of the site consist of Chester formation pebbly sandstone, formed approximately 247 to 250 million years ago in the Triassic Period. The superficial geology consists of glacial till formed up to 2 million years ago in the Quaternary Period.

The drift geology of this site is known to give mixed to good results in locations with sufficient soil depth.

Historical background

The site is situated to the south of the historic village of Holt in the county of Wrexham. The village is defined by Roman activity associated with the Holt Roman tile works, as well as, Medieval and civil war era activity associated with Holt Castle.

The Clwyd Powys Archaeological Trust Historic Environment Record (HER) records several historic assets within close proximity of these sites, these include Sycamore House mound, which is a possible Bronze Age barrow or Medieval Windmill situated 54m to the east of the site [PRN: 102484] and Pate Gate, a grade II listed poste medial gateway immediately to the north of the site [PRN: 36758];

The site is situated between two of the original roadways, Wrexham Road and Francis Lane, which linked Holt and Wrexham prior to the establishment of the A534 bypass.

3. Survey methodology

The purpose of the geophysical survey was to identify the archaeological potential of an area of land in a non-intrusive, quick and relatively inexpensive way. To achieve all three and still produce the highest standard of data possible, which also identifies the widest range of past human activity, the survey method of magnetometry was chosen.

All fieldwork and the resulting reports follow the recommendations set out by the Chartered Institute for Archaeologists guidelines for geophysical survey in archaeology (CIFA, 2014).

Magnetometry measures and maps the background magnetic field and any local anomalies. These anomalies can be caused by the presence of features containing greater or lesser magnetic properties than the soils around them. This can be due to the natural magnetic properties of a material, as well as, a range of processes that can alter magnetic properties. As a broad example, buried walls and built-up features which are generally comprise of low magnetic materials, such as stone, appear as weak negative magnetic anomalies, where as a ditch would often appear as a weak positive anomaly due to a collection of more magnetic material. These can be distinguished from responses caused by high ferrous materials such as iron and ceramic or areas of intense burning (thermoremnance), based on the strength and gradient of the magnetic response. The strength of the magnetic field is measured in nano Tesla (nT), a unit of measurement of magnetic flux density, equal to one billionth of a Tesla [T] (1T = 1000000000 nT) (Milsom & Eriksen, 2011).

The equipment used for the survey was a dual sensor Bartington Instrument Grad 601-2 fluxgate gradiometer. This instrument consists of two sets of sensors, each mounted with a vertical separation of 1m, one set at each end of a 1m long horizontal bar. This provides two sets of parallel readings and, under normal operating conditions, is capable of surveying to a depth of between 0.5m to 1m, although, materials with higher magnetic properties can be detected at a greater depth.

To set out the survey grids, a Trimble R4 GPS run with a VRS correction was used, operating at an accuracy of 0.014m to 0.03m. The survey areas were plotted with a temporary grid of 40m x40m.

Each 40m grid was then walked using a zig-zag traverse with a sample interval of **0.25m** (4 points per meter) and traverse interval of **1m**.

Processing and interpretation

Data collected in the field was downloaded and processed using TerraSurveyor software. This allows the survey data to be collated and manipulated to enhance the visibility of anomalies. Full survey and processing metadata can be seen in the appendix with additional plots available on request.

The results of this survey have been presented as a combination of greyscale plots and interpretations published through GIS.

The types of features have been classified using established typologies based on Gaffney and Gater (Revealing the buried past: geophysiscs for archaeologists, 2003), as well as, the standardised interpretation key used by Archaeological Survey West.

4. Survey analysis

Summary

The survey data covers 1.2 hectares of flat pastoral ground between Wrexham Road and the A534. The ground conditions were mostly dry with flat well grazed turf. There were significant concentrations of metallic obstacles associated with farm buildings and vehicles along the northern boundary. There were also two steel cattle feeders present in the field at the time of the survey.

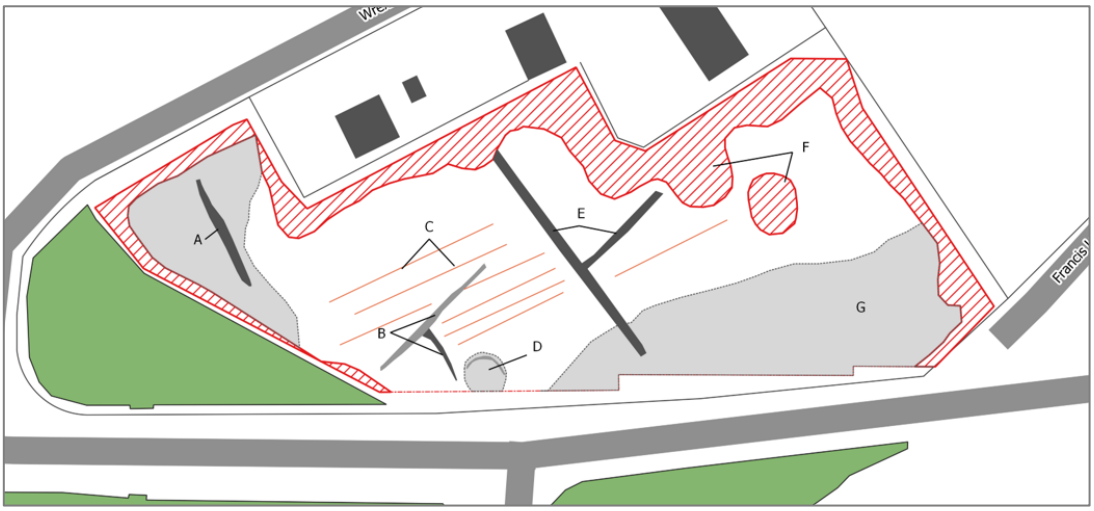


Figure 2: Feature interpretation

Historic mapping has been consulted for this analysis in order to identify potential features. The sources consulted include the following:

- Google satellite imagery (1945)
- Google satellite imagery (2005)
- Google satellite imagery (2010)
- Google satellite imagery (2012)
- Google satellite imagery (2021)
- Ordnance Survey Six inch Map (1872) Denbighshire Sheet XXIX

The magnetic survey features identified in Map 2 (Appendix) are as follows.

A. This feature consists of an alignment of metallic spikes that may be associated with a former field boundary present in the 19th and early 20th century Ordnance Survey maps.

B. This feature consists of two intersecting linear features, one comprised of a weak positive on a northeast southwest alignment and the second a sharply defined linear running northwest to southeast. These features are likely to represent former field boundaries that do not appear on the 19th or 20th century Ordnance Survey maps, but may relate to Post Medieval field systems noted in the field to the west by the Historic Environment Record (PRN: 55622).

C. This feature consists of regular northeast to south west orientated linear striations typical of cultivation that corresponds with 21st century activity.

D. This feature consists of a circular disturbance with a weak positive linear outline and weak positive centre. Circular disturbances of this kind are often attributed to prehistoric activity, such as a round house, however, this anomaly is likely to be associated with plough headlands and mechanical turning circles that are visible in the 2005 aerial photography (Figure 3).



Figure 3: Google Earth aerial photography (2005)

E. This feature consists of two sharply defined linear anomalies, one bisecting the field on a northwest to southeast alignment, the second extending towards the northeast from the middle of the first. The northwest to south east aligned linear corresponds with field boundaries present in the first and second edition Ordnance Survey maps. The second linear may also be an earlier field boundary or drainage.

F. This feature was the result of two stainless steel cattle feeders present within the field at the time of the survey (Figure 4).



Figure 4: Cattle feeders within the survey area.

G. This feature consists of a spread of noise along the southern and south eastern boundary and is likely caused by topsoil debris associated with the adjacent road and/or the former route of Francis Lane.

5. Discussion and Conclusion

In June 2022, a geophysical investigation was undertaken on land between Wrexham Road and the A534 in Holt, Wrexham. The objective of the survey was to determine the archaeological potential of the site prior to a proposed redevelopment. The survey consisted of 1.2 hectares of flat pastoral land, however, the area within the farm yard was not surveyed due to the presence of metallic structures and farm vehicles. The following forms the interpretation of the features identified in the section 4 (analysis).

The most notable feature that has been identified in this survey were linear field boundaries present on the first edition Ordnance Survey maps. The boundaries formed regular plots between the then two roadways linking Wrexham and Holt. This is also likely to have formed part of the Sycamore House property, which dates to the 17th century. The only surviving element of the 17th century property is a Grade II listed gateway (Cadw Listed Building, 16966), the original house having been demolished in 1908 and replaced with the present red brick house.

Some weaker linear features were identified which may be associated with field boundaries that predate the Ordnance Survey mapping. Similar post medieval field systems are recorded by Historic Environment Record in the field to immediately to the northeast of the site (PRN: 55622).

The survey also produced evidence of mechanical cultivation dating to the late 20th and early 21st century. Incorporated within this is a circular anomaly most likely associated with plough turning circles, but has some limited potential to be associated with archaeological activity.

There was a significant amount of metallic interference from the surrounding agricultural buildings, as well as, ferrous noise in the areas nearest the roads, the latter is likely associated with modern debris.

Works Cited

BGS. (2018). *British Geological Survey Open Geoscience*. Retrieved May 2019, from www.bgs.ac.uk/opengeoscience

CIFA. (2014). *Standard and Guidance: for archaeological geophysical survey.* Chartered Institure for Archaeology.

Gaffney, C., & Gater, J. (2003). *Revealing the buried past: geophysiscs for archaeologists.* Stroud: Tempus.

Milsom, J., & Eriksen, A. (2011). *Field Geophysiscs* (4th ed.). Oxford: Wiley & Sons Ltd.

Appendices

Glossary of terms

Industrial: This consists of anomalies with a strong positive to negative magnetic gradient that can be distinguished as separate from surface ferrous spikes. These readings indicate a thermoremanence where the action of heating has altered the magnetic properties within the ground or a structure and are usually associated with features such as kilns or furnaces.

Strong Positive linear: This is a linear feature defined by strong positive readings that are not of a gradient associated with ferrous but stronger than a weak positive anomaly. This can indicate fired materials such as ceramic and is often associated with field drains.

Wall (positive): This is a sharply defined positive linear feature that occurs when the wall materials have higher magnetic properties than the surrounding soils.

Wall (negative): This is a sharply defined negative linear feature that occurs when the building materials have lower magnetic properties than the surrounding soils.

Disturbed area (Structural): This is a feature associated with structural remains but where the footprint of the building cannot be determined. The depth and survival of an archaeological structure can often result in an area of magnetic noise as oppose to a clear rectilinear feature. This can be due to a number of tophonomic processes including demolition and the extraction of materials (robbing).

Disturbed area: This is an area of increased noise that cannot be associated with modern activity and therefore is of potential archaeological interest.

Modern service: This is a feature defined by a strong positive-negative linear that regularly alternates between positive and negative polarity and is caused by modern piping and cables. Electricity cables tend to create a very broad area of disturbance.

Modern disturbance: This is a feature of disturbance generated by modern surface activity, often in the form of ferrous anomalies.

Geological: These include features believed to be of a geomophological origin.

Raw data and metadata

SURVEY

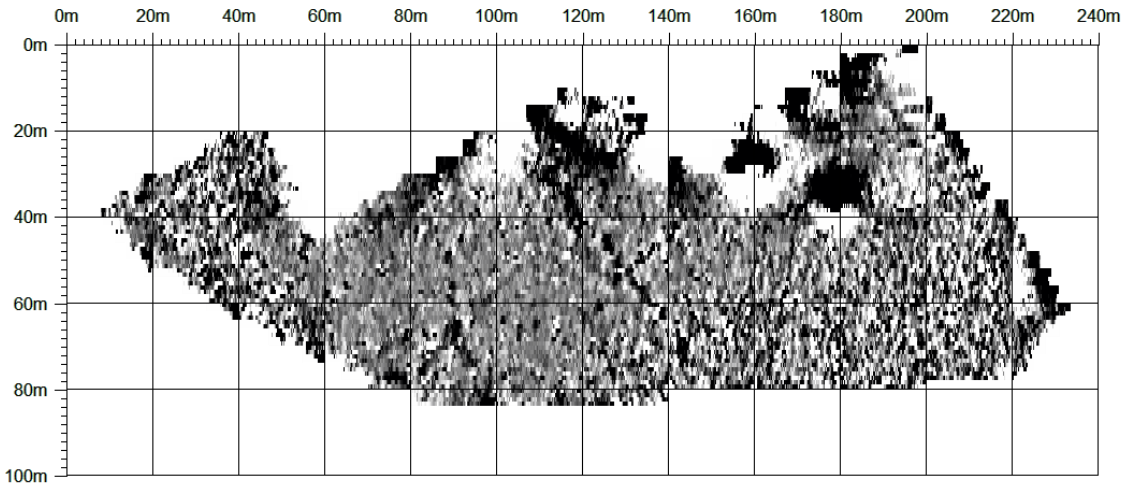
Instrument Type: Bartington (Gradiometer)
Units: nT
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
PROGRAM
Name: TerraSurveyor
Version: 3.0.37.3

Plot presentation: QGIS version 3.12.3-Bucureşti

Dimensions

Composite Size (readings): 960 x 100
Survey Size (meters): 240 m x 100 m
Grid Size: 20 m x 20 m
X Interval: 0.25 m
Y Interval: 1 m

Raw

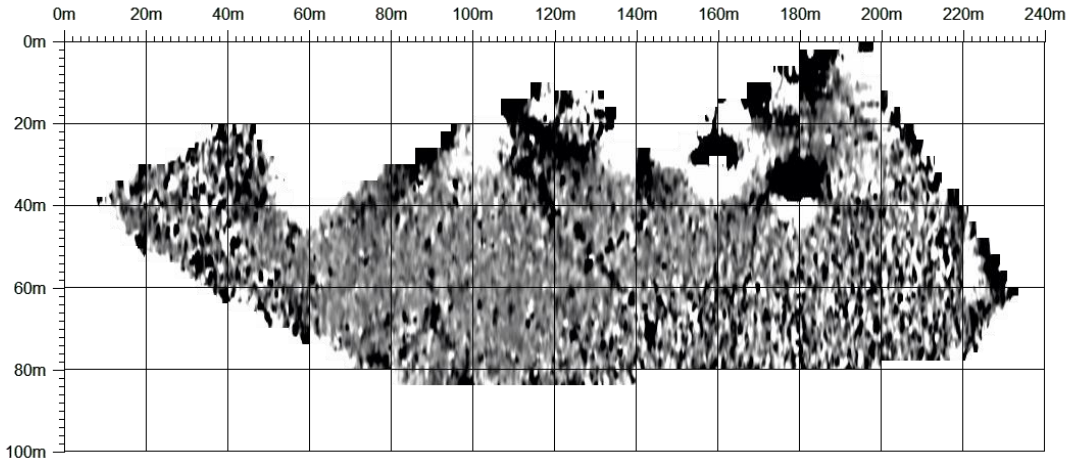


Raw data at -1.8 to 2 nT clip

Stats

Max: 2.00
Min: -1.80
Std Dev: 1.31
Mean: 0.03
Median: 0.00
Composite Area: 2.4 ha
Surveyed Area: 1.1929 ha

Processed data



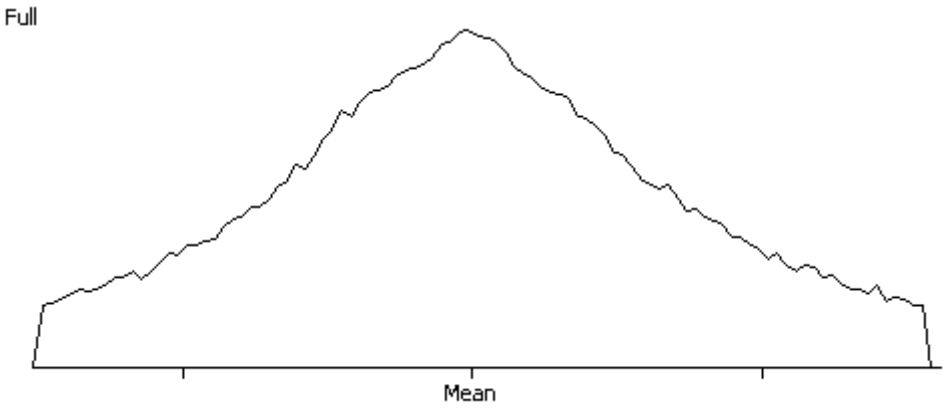
Processed data at -1.8 to 2 nT clip

Stats

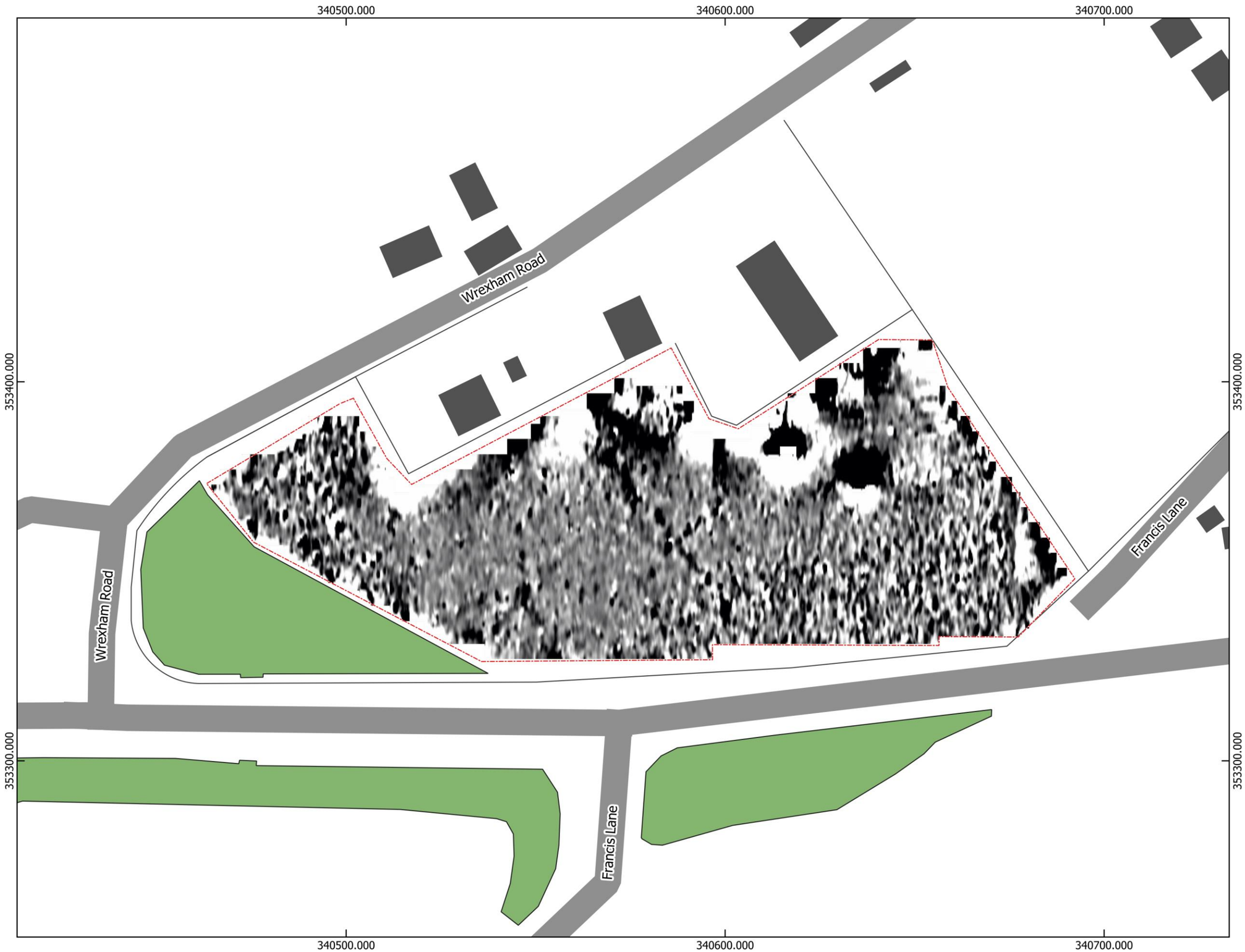
Max:	*2.00*
Min:	*-1.80*
Std Dev:	*1.21*
Mean:	*0.04*
Median:	*0.03*
Composite Area:	*2.4 ha*
Surveyed Area:	*1.1929 ha*

Processes: 6

1. *Base Layer*
2. *DeStripe Median Traverse: Grids: All*
3. *Despike Threshold: 1 Window size: 3x3*
4. *Low pass Gaussian filter: Window: 3 x 3*
5. *Interpolate: X & Y Doubled.*
6. *Clip from -1.80 to 2.00 nT*



Plates



0 50 100 m

N

Map 1

Site:

Wrexham Road, Holt

Standard resolution magnetic survey

Scale: 1:1000 @ A3

Data produced by Archaeological Survey West LLP

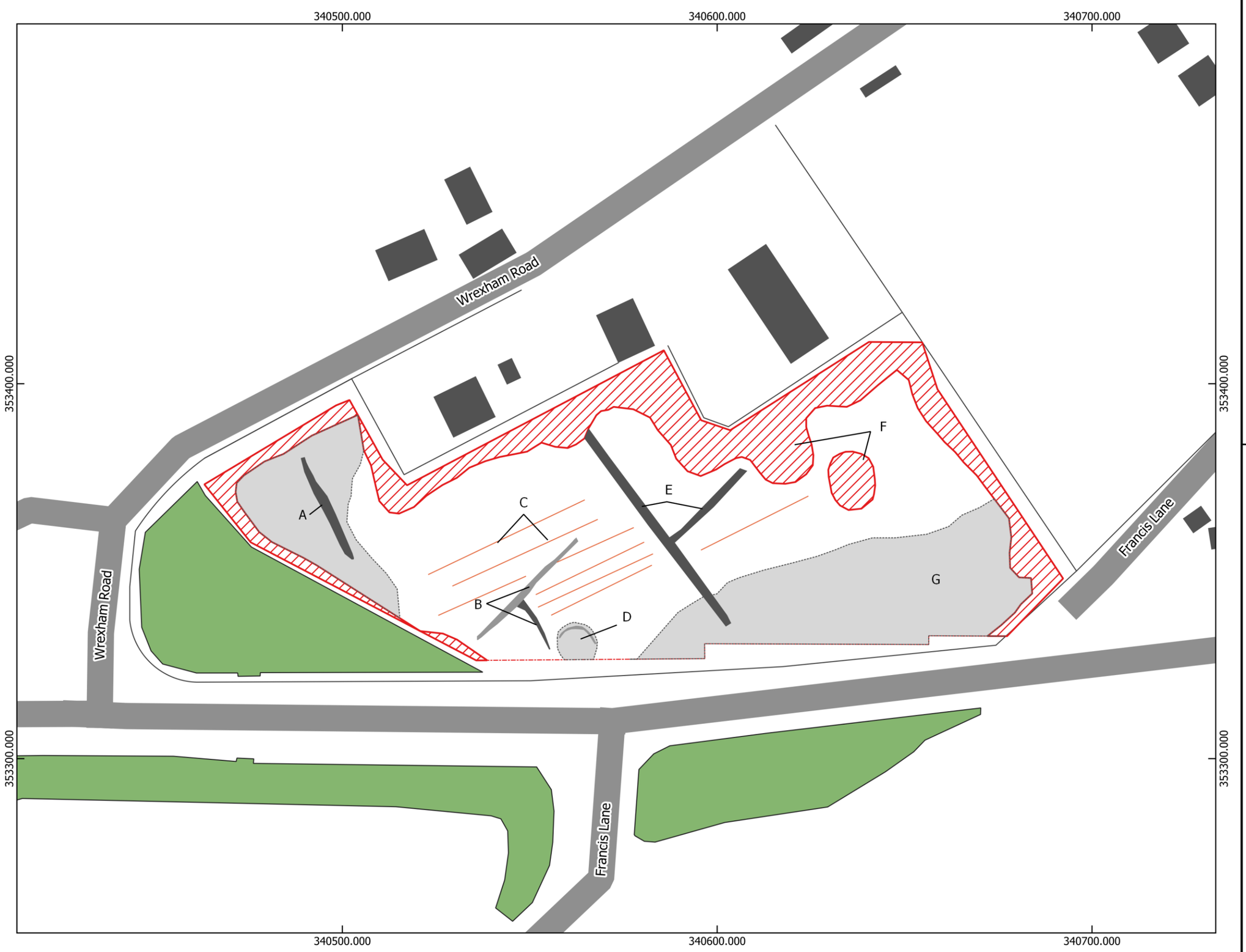
Key

2nT

-1.8nT

Data processed using Terra Surveyor

Contains OS data © Crown copyright and database right (2018)



Map 2

Site:

Wrexham Road, Holt

Standard resolution magnetic survey

Scale: 1:1000 @ A3

Data produced by Archaeological Survey West LLP

Key

- Limit of Survey

Features

- Linear
- Weal Linear
- Disturbance
- Modern disturbance
- Cultivation

Data processed using Terra Surveyor

0 50 100 m

N

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