Upper Denbigh Road, St Asaph

Geophysical Investigations 2021

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Produced on behalf of

Clwyd Powys Archaeological Trust

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Abstract

This report describes the results of an archaeological geophysical investigation undertaken on land adjacent to Upper Denbigh Road, St Asaph. The investigations were conducted by Archaeological Survey West LLP (ASW) and consisted of surveys divided between two separate areas: Area one between Upper Denbigh Road and St Kentigern Hospice and Area 2 immediately to the southeast of the Hospice.

With the exception of cultivation marks and a 19th century backfilled pond, no features of significant archaeological interest were identifie,d with most anomalies being attributed to cultivation, modern magnetic interference and surface debris.

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1. Introduction

This report describes the results of an archaeological geophysical investigation undertaken on land adjacent to Upper Denbigh Road and the St Kentigern Hospice in St Asaph, Denbighshire. The main aim of the survey was to identify the archaeological potential of two areas of land totalling 4.3 hectares, so as to inform a prospective purchaser.

Archaeological Survey West was commissioned by Clwyd Powys Archaeological trust to conduct the survey after the potential for a Roman Road located within the site was raised by the development control archaeologist.

The method of survey employed during these investigations comprised a standard resolution magnetometry survey.

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 Records.

2. Site background

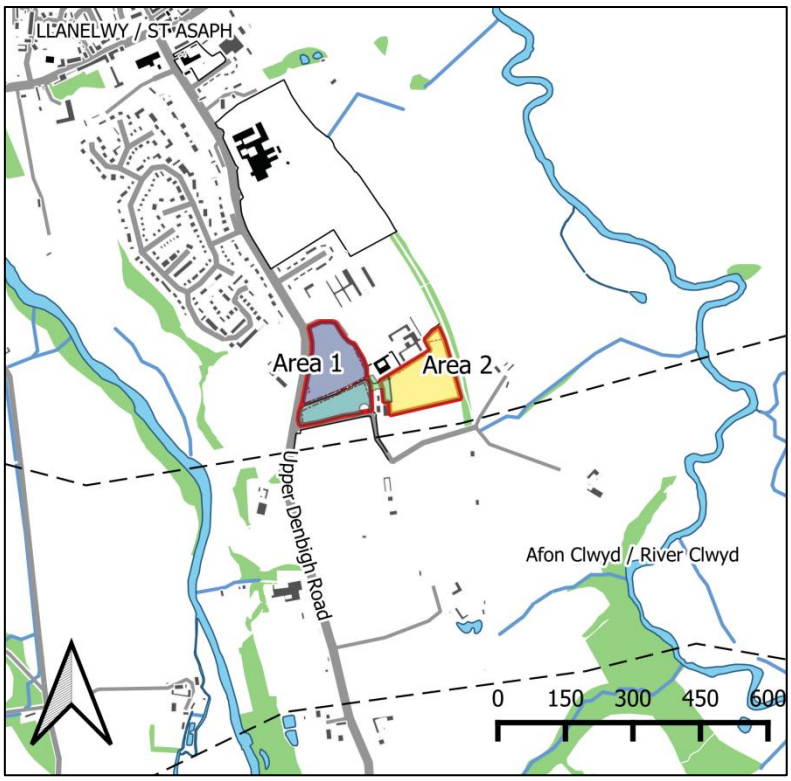


Figure 1: Site location plan

Geology and Topology

The site is situated to the east of Upper Denbigh Road, adjoining St Kentigern Hospice in St Asaph, Denbighshire (SJ 04390 73610). The site is comprised of predominantly flat pastoral land, the larger

field of Area 1 contained a small pond at its southern extent and the smaller field contained a large metallic animal enclosure. The western extent of the site is bordered by Upper Denbigh Road, the eastern boundary formed by a dismantled railway. To the north of both Areas 1 and 2 is housing and St Kentigern Hospice. To the south is a small lane giving access to farms. The two areas are divided by a small farm yard with gardens and metallic agricultural buildings.

The geology of the site consists of Warwickshire Group - Mudstone, Siltstone and Sandstone formed approximately 272 to 318 million years ago in the Permian and Carboniferous Periods. The superficial geology consists of Devensian Till (BGS, 2018).

Historical background

There is no known archaeological activity recorded within the survey area, however, the site is situated to the south-east of the Historic Medieval town of St Asaph which is also believed to be the site of the Roman fort and settlement of 'Varis'.

Based on the 1845 Tithe map [1] the modern field boundaries appear to be largely unchanged with the exception of the construction of the railway that appears to follow a pre-existing boundary at the eastern extent of Area 2.

3. Survey methodology

The purpose of 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 these 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 tophonomic processes that can alter magnetic properties. As a broad example, buried walls and built-up features which are generally comprised 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

[1] Tithe maps of the townships of Talar, Brynpolyn, Gwernglevryd and Gwerneigron in the parish of Saint Asaph and County of Flint, 1845

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 20m x20m. Each 20m 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 were downloaded and processed using TerraSurveyor software version 3.0.37.4. 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 2 areas of survey-able ground, the first (Area 1) was an area of pastoral lands with a gentle slope towards the west, the second (Area 2) comprised of level pastoral lands with adjoining agricultural structures including a metallic barn. The ground conditions were mostly dry with areas of dense meadow vegetation with some large metallic obstacles including ceramic debris and sheet metal being used for ecological surveys.

The features identified in Map 4 (Appendix) are as follows.

Area 1

Background: The background data for Area 1 shows significant scatters of noise across the northern field with greater concentrations along the western extent adjoining Upper Denbigh Road. This is likely to be the result of topsoil debris associated with modern activity and/or agricultural activity, such as the spreading of Green waste containing metallic compounds. A selection of sample grids were re-tested in order to determine whether this was a mechanical fault, but yielded the same result.

There was significant metallic interference resulting from steel construction fencing and parked vehicles along the northern and north-eastern extent of the larger field. A large circular animal enclosure was also present in the smaller field which resulted in significant metallic disturbance.

1a- This feature consisted of a scatter of ferrous readings along the northern boundary which are likely the result of modern topsoil debris associated with the adjacent housing.

1b- This feature consists of faint linear striations that match cultivation marks visible on the Natural Resources Wales LiDAR data. Their reduced clarity is the result of the 1m traverse resolution following a similar orientation.

1c- This feature consists of a metallic disturbance surrounding the pond at the southern extent of the larger field. The readings suggest topsoil debris and activity associated with the pond.

1d- This feature consists of a ferrous linear running on an east-west alignment through the southern field and is typically associated with metallic services such as a water pipe, gas, or inactive electric.

1e- This feature consist of a metallic disturbance surrounding a large circular animal enclosure visible as tall steel fencing.

Area 2

The background data for Area 2 is relatively quiet with the exception of metallic interference from field boundaries and the agricultural buildings situated on the western boundary. A concentration of ceramic building material was noted while walking the survey which is discussed below.

2a- This feature consists of regular linear striations associated with cultivation. The orientation matches the cultivation marks visible on the LiDAR data.

2b- This feature consists of a strong positive linear running northwest to southeast and is likely a small service or ceramic land drain.

2c- This area consist of a concentration of metallic noise that corresponds with concentrations of demolition materials observed on the surface. The area of this anomaly is shown as a pond on the 19th and early to mid 20th century Ordnance Survey maps and appears to have been backfilled by 2006.

2d- This feature consists of a weak linear running northwest to southeast, parallel to feature 2b, and is also likely a small service or ceramic land drain.

2e- This feature consists of a linear ferrous disturbance which connects to feature 2c , running on a northeast-southwest alignment. The anomaly is likely associated with a service or drain.

2f- This feature consists of two weak positive linear anomalies running on a north-south alignment. The linear features correspond with metallic fencing visible in the 2016 aerial photography (Maxar Technologies: Google Earth) and visible in the LiDAR data as a faint linear truncating the cultivation marks (Map 2).

LiDAR analysis

The LiDAR data presented in Maps 2 and 3 has been processed using a combination of DTM and DSM data sourced from Natural Resources Wales and processed into hillshade models using QGIS. Multiple azimuths where used in order to analyse the data, the two that identified the most anomalies where selected for insertion into this report.

The data for both Areas 1 and 2 show regular cultivation marks running on a similar northeast-southwest alignment. The location of a backfilled pond is shown on 19th and 20th century Ordnance Survey mapping is also visible as a concentrated disturbance in Area 2. Map 3 shows a linear drain crossing the field on a northwest-southeast alignment which measures an average of 3m wide and appears to connect with a track way on the opposite side of the dismantled railway, to the southeast.

5. Discussion and Conclusion

During September 2021, a geophysical investigation was undertaken on land adjacent to Upper Denbigh Road and the St Kentigern Hospice in St Asaph, Denbighshire. The survey consisted of 2 separate survey-able areas, the first (Area 1) was an area of pastoral lands divided between two fields, both with a gentle slope towards the west. The second (Area 2) comprised of level pastoral lands with adjoining agricultural structures including a metallic barn. The aim was to determine the archaeological potential of the site prior to the sale of the land.

A key objective of the survey was identification of a possible Roman road which was raised by the development control archaeologist after local researchers identified a linear visible on the Natural Resources Wales LiDAR data as a possible candidate.

No significant archaeological features were identified during this survey with most features also visible as topographic anomalies on the LiDAR data and likely associated with recent and historic cultivation.

The most prominent magnetic features consist of regular cultivation marks with a similar orientation throughout the survey area. The location of a backfilled pond shown on the 19th and early to mid 20th century Ordnance Survey was also identified and noted to contain a mixture of 19th and 20th century demolition material.

Two linear anomalies were identified in Area 2, one of which corresponds with a ditch feature visible on the LiDAR data running northwest to southeast. These features are likely to represent land drainage with the larger ditch feature containing an intermittent strong positive linear often associated with boundaries or drains.

Typically, and given the appropriate conditions, a feature such as a Roman road in a rural setting would present as a wide negative linear with two flanking positive linear edges, measuring an average of 6m wide. In the case of an urban setting, roads can often appear as a linear absence of readings (Gaffney & Gater, 2003). The visibility of roadways in a magnetic survey is reliant on either the construction material being sufficiently magnetically different from surrounding background data and/or having substantial roadside ditches that are in filled with materials that will also contrast with the background data. Due to these constrictive conditions, Roman roads can often be illusive in magnetic surveys.

At present, this survey has not produced sufficient evidence for a Roman road within these fields and has indicated that the linear features present in the LiDAR data are more likely attributed to modern and recent historic agricultural activity.

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 Institute 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

Road: This is typically defined by a wide negative linear flanked on either side by narrow positive Linear features. In areas with more built up archaeology, this can also present as a linear absence of anomalies.

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 DATA

Instrument Type: Bartington (Gradiometer)
Units: nT
Direction of 1st Traverse: 270 deg
Collection Method: ZigZag
Sensors: 2 @ 1 m spacing.
Dummy Value: 32702

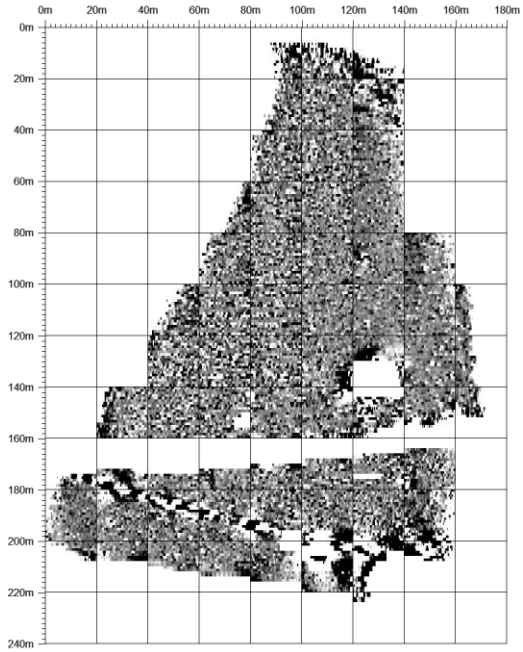
PROGRAM

Name: TerraSurveyor
Version: 3.0.37.3

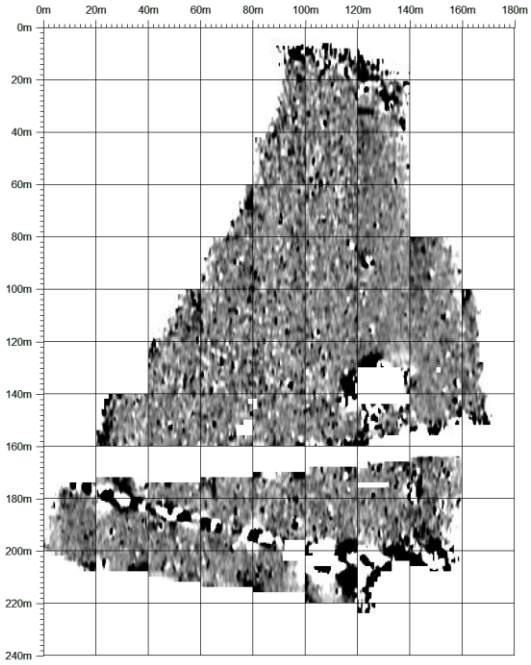
Area 1 Raw

Stats

Max: 2.00
Min: -1.80
Std Dev: 1.18
Mean: 0.02
Median: 0.00
Composite Area: 4.32 ha
Surveyed Area: 2.0165 ha



Area 1 Processed Data



Stats

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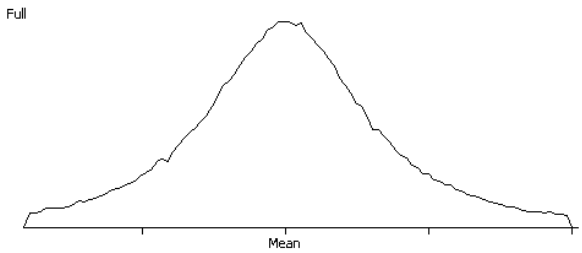
Min: -1.80
Std Dev: 0.98
Mean: -0.01
Median: 0.00
Composite Area: 4.32 ha
Surveyed Area: 2.0165 ha

Processes: 6

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



Area 2 Raw

Stats

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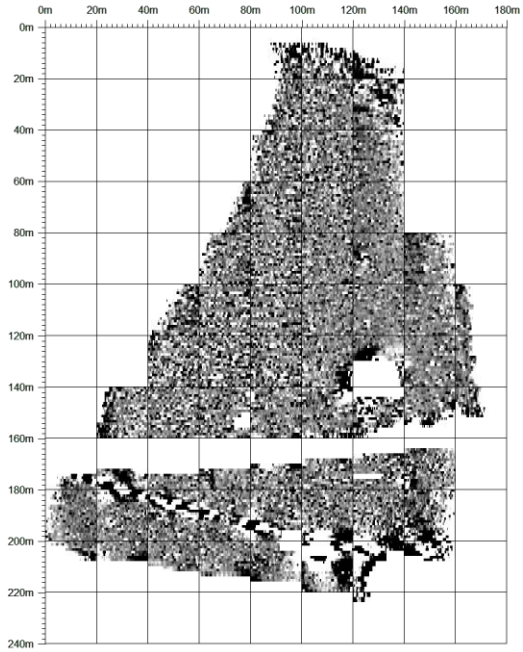
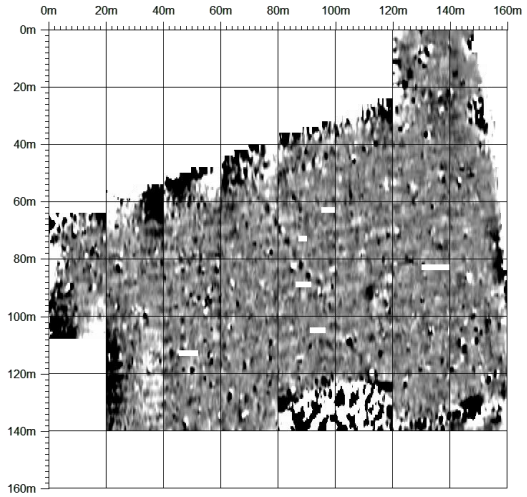
Min: -1.80
Std Dev: 1.18
Mean: 0.02
Median: 0.00
Composite Area: 4.32 ha
Surveyed Area: 2.0165 ha



Area 2 Processed Data



Stats

Max: 2.00
Min: -1.80
Std Dev: 0.94
Mean: 0.02
Median: 0.00
Composite Area: 2.56 ha
Surveyed Area: 1.5876 ha

Processes: 6

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2. *Despike Threshold: 1 Window size: 3x3*
3. *DeStripe Median Traverse: Grids: All*
4. *Low pass Gaussian filter: Window: 3 x 3*
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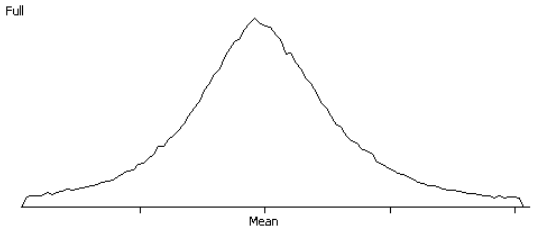
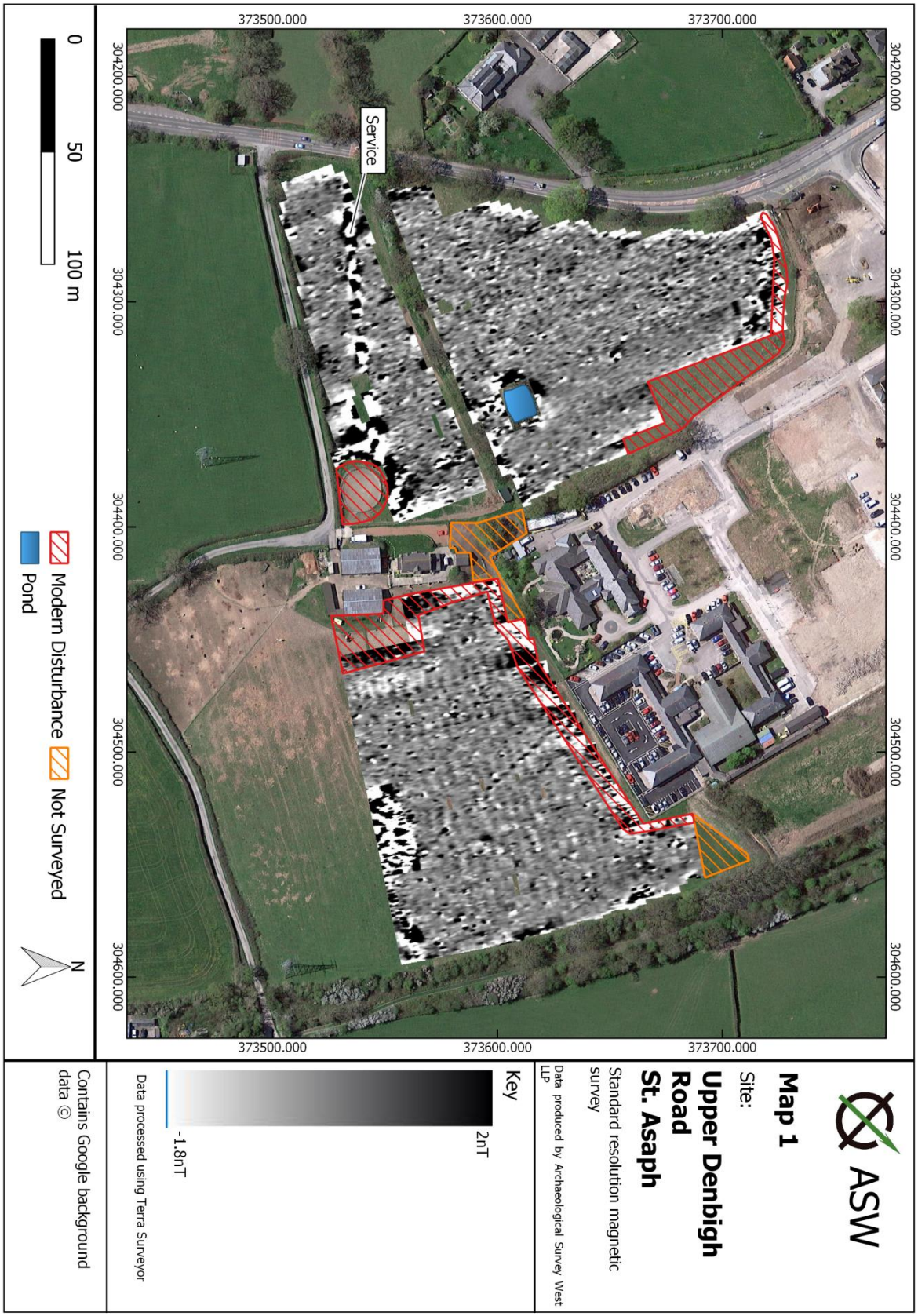
6. *Clip from -1.80 to 2.00 nT*



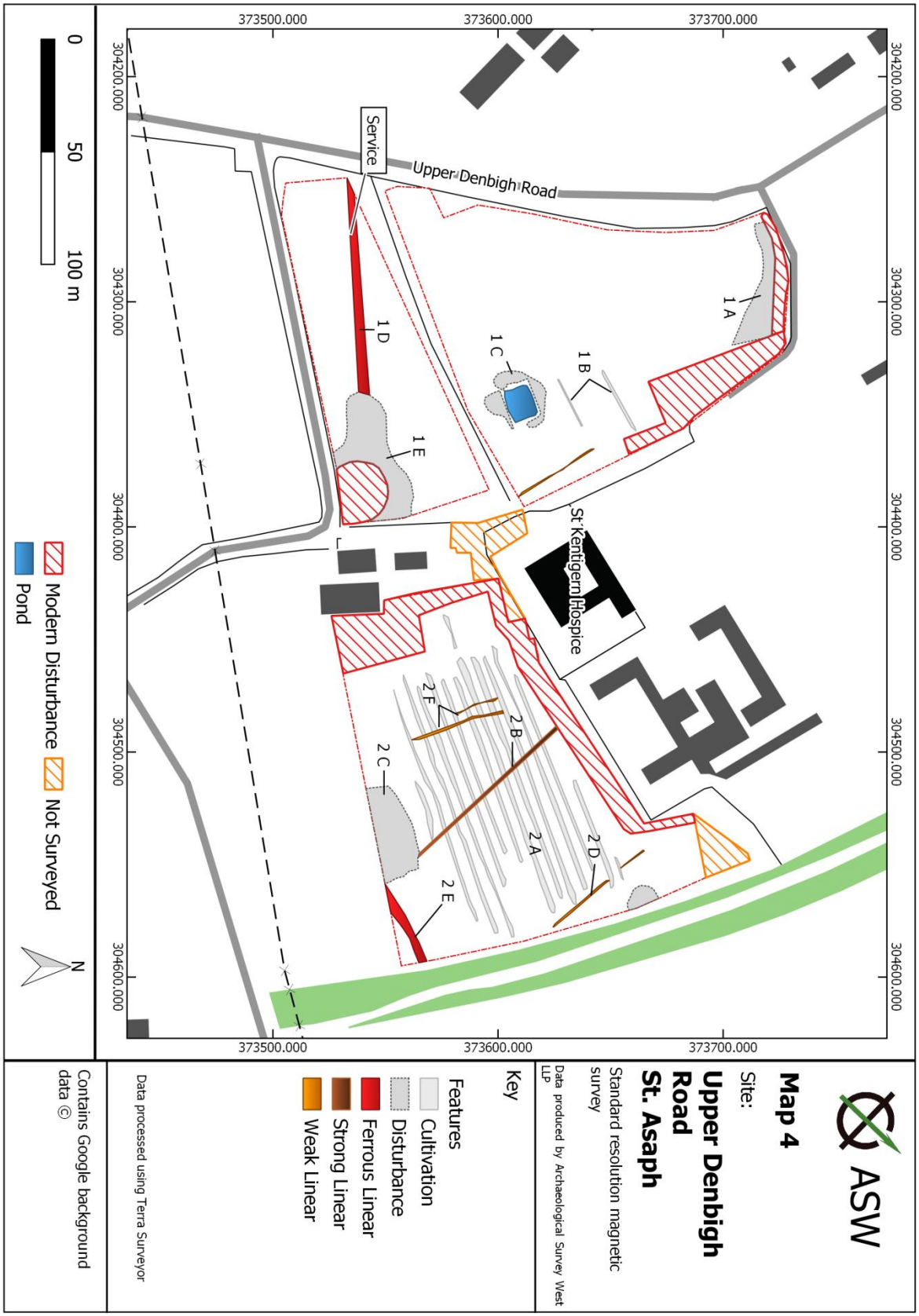
Plates



Map 1: Grey scale magnetic data plot

Map 2: NW LiDAR hillshade plot

Map 3: NE LiDAR hillshade data plot



Map 4: Magnetic survey interpretation