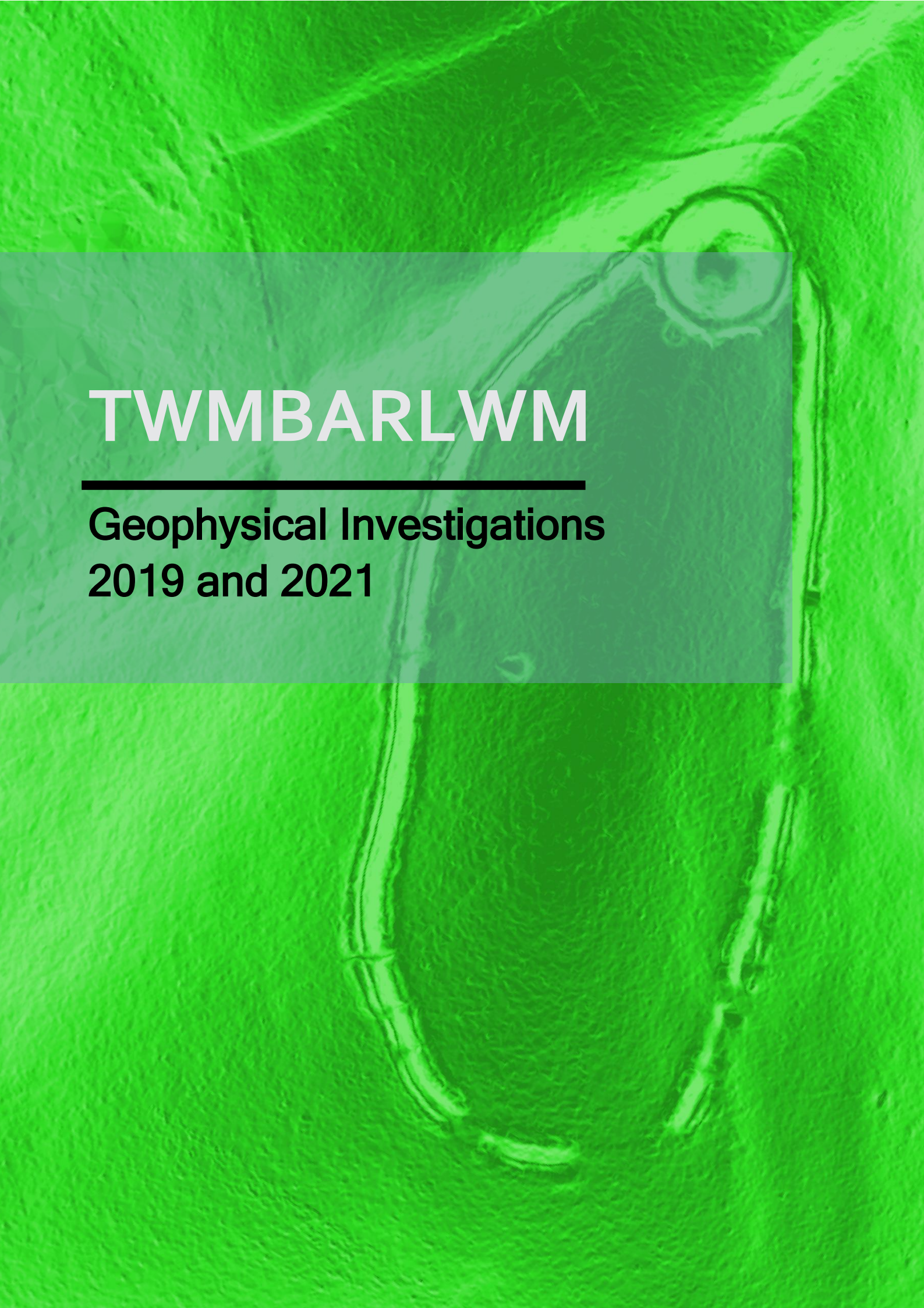

TWMBARLWM

Geophysical Investigations 2019 and 2021

Cover image: LiDAR slope analysis produced by Archaeological Survey West. Contains Natural Resources Wales information © Natural Resources Wales and database right

Twmbarlwm

Geophysical Investigations 2019 and 2021

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with contributions from

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2021

Produced on behalf of

Clwyd Powys Archaeological Trust and the Twmbarlwm Society

Version 1.01

Abstract

This report describes the results of an archaeological geophysical investigation undertaken at the site of Twmbarlwm near Risca, South Wales. The investigations were conducted by Archaeological Survey West LLP (ASW) and consisted of high resolution magnetic gradiometery undertaken within the interior of the enclosure and overlapping the south-western ramparts. The objective of the survey was to identify features of potential archaeological interest, as well as, to test the damage sustained to the Scheduled Monument by recent and historic grass fires.

Features of potential archaeological interest were identified across the site, however, the affects of grass fires have significantly reduced the clarity of the data, especially on the south facing side of the enclosure.

Contents

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1. Introduction

This report describes the results of an archaeological geophysical investigation undertaken on the scheduled site of Twmbarlwm near Risca, South Wales (SAM MM044). The objectives of the survey were to identify any archaeological features associated with the scheduled site in order to inform both ongoing conservation, as well as, future interpretation.

The work was carried out as part of investigations by the Twmbarlwm Society into the scheduled site of Twmbarlwm. The survey was requested by Clwyd Powys Archaeological Trust and Archaeological Survey West were commissioned to carry out the fieldwork. The purpose was to determine the presence and extent of archaeological features that would help to inform further archaeological investigation, as well as, to ascertain the extent of damage that may have resulted from recent and historic grassfires.

The site is a Scheduled Monument under the Ancient Monuments and Archaeological Areas Act 1979 (SAM MM044), for which permission to undertake this survey was obtained by Clwyd Powys Archaeological Trust and the Twmbarlwm Society.

The method of survey employed during this investigation comprised of high 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, and an electronic record of the project details will be deposited with the Dyfedd Powys Archaeological Trust Historic Environment Record.

2. Site background

Geology and Topology

The site is situated on a promontory hilltop overlooking Risca to the south with Cwmcarn Forest to the north. To the northeast the site joins a spur of raised ground known as Mynydd Maen Common, which extends towards Upper Cwmbran.

The bedrock geology consists of 'Hughes Member' sandstone formed approximately 308-310 million years ago in the Carboniferous period which is set within Rhonda sandstone formations. Both are sedimentary rocks that are fluvial in origin and associated with floodplains, rivers or estuaries (BGS, 2018).

This form of geology is known to produce mixed results in geophysical survey, with concentrations iron rich sedimentary rock often resulting in noisy background data.

Historical background

The site of Twmbarlwm (SAM number MM044) is comprised of a Medieval motte, utilising a probable earlier Iron Age Hillfort as a bailey. Twmbarlwm holds an imposing position within the uplands of South Wales, with commanding views across Cardiff, Newport and across the Channel towards Bristol.

Little in the way of archaeological investigation has been undertaken within the site and current intereptations are based solely on extant remains. The hillfort consists of a 4.14ha area enclosed by a single rampart and ditch. This positioning takes advantage of the natural steep slopes on all sides of the spur which the site occupies. Gaps in the western and southern ramparts have been interpreted as incomplete with the enclosure never finished, although this is not certain and may be the results of later damage (Whittle 1992). There are no known internal features contemporary with the Hillfort, however, a recent grass fire revealed three small stony rings located against the south-east and northern ramparts, these are thought to be later sheepfolds. Evidence of ploughing over the southern half of the enclosure was also identified and is likely later in date (Davis, 2019).

The earliest possible activity on the site comprises of a small stony mound truncated by the motte ditch. This is believed to be a cairn although no attempts to formally date or investigate the feature have been made (Davis 2019). In the wider area there are several known sites including a linear grouping of four prehistoric cairns situated 752m to the west of the site, as well as, a single Bronze Age cairn located across the valley 3km to the south-west. Several other Iron Age hillforts are also overlooked by Twmbarlwm, for example, Rhiwderin Hillfort and Tredegar Fort in Newport or? Lodge Wood Camp in Caerleon known to be in use from the 5th century BC and into the later Roman period (Pollard, J, et al, 2006).

Caerleon is also the location of the Roman legionary fortress and home to the Second Augusta, who would have used the fortress as a base to assert Rome's control over the surrounding area, including Twmbarlwm (if it were in use at the time).

The Medieval motte is located at the north-west end of the Hillfort, cutting the rampart of the existing Hillfort, and consists of a steep sided mound 7m high with a 17m diameter level summit. At the base of the mound to the east, south and west is a rock-cut ditch, 2.5m deep and 4m wide at its most substantial. The motte is believed to be Norman in date, possibly a hunting seat or assembly for local vassals: however, given the remote nature of the castle and commanding viewpoint, one possible interpretation was as a lookout tower or signalling outpost (Whittle, 1992).

3. Survey methodology

The purpose of geophysical survey is 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.

The survey was conducted in two phases, the first, due to the difficult walking conditions over the western extent of the enclosure, utilised a 10m survey grid. The second phase was changed to 20m due to the improved walking conditions and to enable a more efficient grid setup (figure 1).

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).

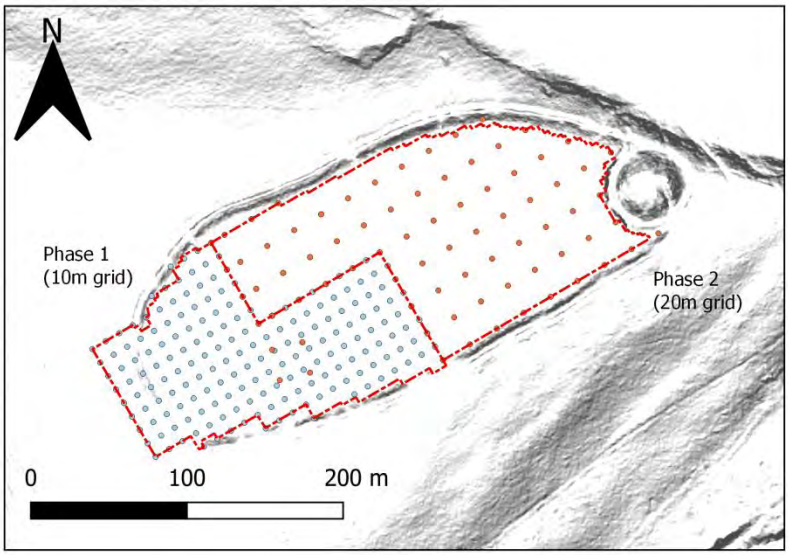

Figure 1: Survey setup plan

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 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 high resolution survey areas were plotted with a temporary grid of either 10m x 10m or 20m x 20m. Each grid was then walked using a zig-zag traverse with a sample interval of **0.25m** (4 points per meter) and an overlapping traverse interval of **0.5m**. Phase 1 was walked at the same resolution but using 10m grids.

Processing and interpretation

Data collected in the field was downloaded and processed using TerraSurveyor software version 3.0.32.4. 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 combination of greyscale plots and interpretations published through GIS.

The types of features have been classified using established typologies based on Gafney and Gater (2003), as well as, the standardised interpretation key used by Archaeological Survey West.

4. Survey analysis

Summary

The survey data covers an area of 3.91 hectares situated within the enclosure of Twmbarlwm and overlapping the south-east ramparts. The survey was conducted in two phases, the first measuring 1.64 hectares was conducted in 2019 during very wet windy conditions and the second measuring 2.27 was conducted in 2021 during overcast warm conditions. During the 2019 survey, the ground was still visibly scorched by recent fires which weren't as evident by 2021; showing re-growth of grass across the site to a depth of between 10 and 50 cm.

The following feature analysis is based on observed anomalies within the combined phase 1 and 2 magnetic survey data sets shown in Map 1 of the appendices with the annotated features depicted in Maps 2 and 3. Each feature is given a letter code (e.g. A, B, C…) with sub features both numbered and depicted separately (e.g. A1, A2, A3…). Due to the significant affect of grassfires visible in the data, features within areas of significantly increased magnetic activity have been discounted from this analysis due to the limited reliability of their interpretation.

A- These features consist of faint negative linear anomalies set within the levelled sections the western earthwork. This anomaly indicates the presence of bank material and possible ditch fills suggesting that these sections of earthwork have been later demolished.

B- This group of features consists of weak circular anomalies most likely to be geological but may also indicate potential structural disturbances associated with prehistoric activity. The most prominent is B1 which consists of a circular disturbance of mixed positive and negative readings with a diameter of 11m. B2 is a faint sharply defined positive linear forming a ring with a diameter of 7.4m. B3 similarly is a faint sharply defined positive linear forming a ring with a diameter of 8.5m. The walking conditions in this area, as well as, the disturbance caused by later cultivation limits the reliability of these anomalies.

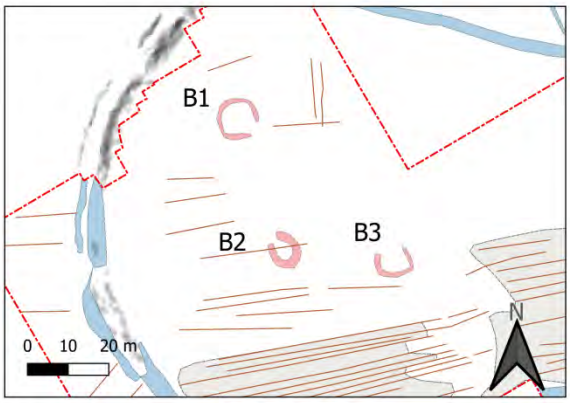

Figure 2: Feature group B

C- This feature consists of regular cultivation marks most prominent in the southeast facing side of the enclosure which has been most recently affected by grass fire. The striations appear as regular parallel lines following the contour and boundary of the enclosure and are likely the result of modern cultivation. The grass fires appear to have highly magnetised the cultivation ridges resulting in the linear anomalies being very pronounced and surrounded by significant magnetic noise (D). Some pattern to the cultivation is apparent with a terminating section that was re-tested as it corresponded with the edge of the survey grid. The re-tested grid confirmed the orientation of the terminating cultivation and therefore indicates either an edge to the cultivation or a track way that's has resulted in a firebreak during the grassfires.

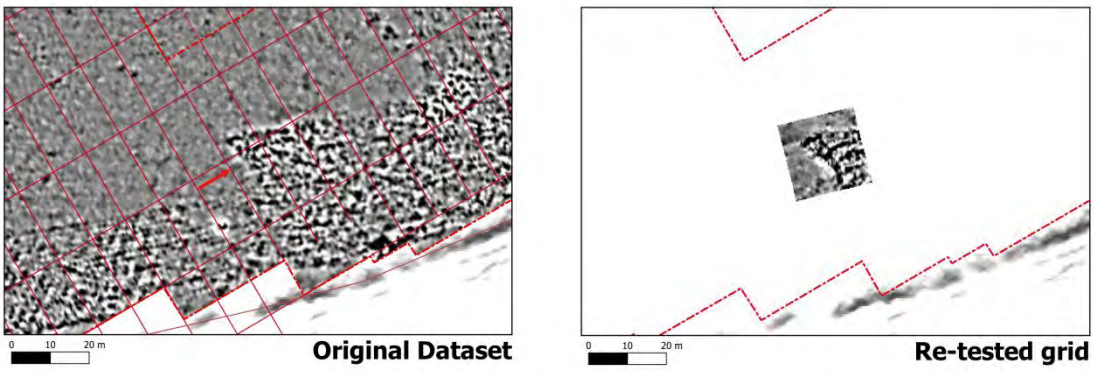

Figure 3: Cultivation re-test grid

D- This anomaly consist of areas of pronounced magnetic noise likely a thermoremanence resulting from the recent and/or historic grassfires. The most affected area appears to be the 55m area of interior extending from the south eastern ramparts. The north eastern area is also presenting magnetic noise likely associated with grassfires but to a lesser degree.

E- This feature consists of the magnetic disturbance associated with the trigonometry marker located on the natural summit of the site.

F- This feature consists of a sharply defined strong positive linear forming an 'axe shape' enclosure measuring 16.5m long by 10m wide. The anomaly is situated between the edge of the fire affected cultivation area and the trigonometry marker and is either the result of recent fire damage or could be archaeological in origin, such as a small animal enclosure or large structure.

G- This feature consist of a strong magnetic rectangular anomaly located adjacent to the modern footpath and may be structural in origin and associated with archaeological activity or a subsequently removed modern feature similar to the trigonometry marker.

H- This feature consists of a linear absence of noise and corresponds with the modern pathway.

I- This feature consists of a weak circular anomaly that is most likely geological given the visibly shallow bedrock in this area. There is some limited potential that it may indicate a structural disturbance associated with prehistoric activity.

J- This feature consists of parallel weak negative linear anomalies extending from a pit or pond feature and running in a different orientation to nearby cultivation marks. This feature is likely to be a track way, boundary or drainage and associated with modern activity on the site.

K- This group of features consists of circular disturbances located in the north eastern quarter of the enclosure and may represent structural disturbances associated with prehistoric activity. These consist of:

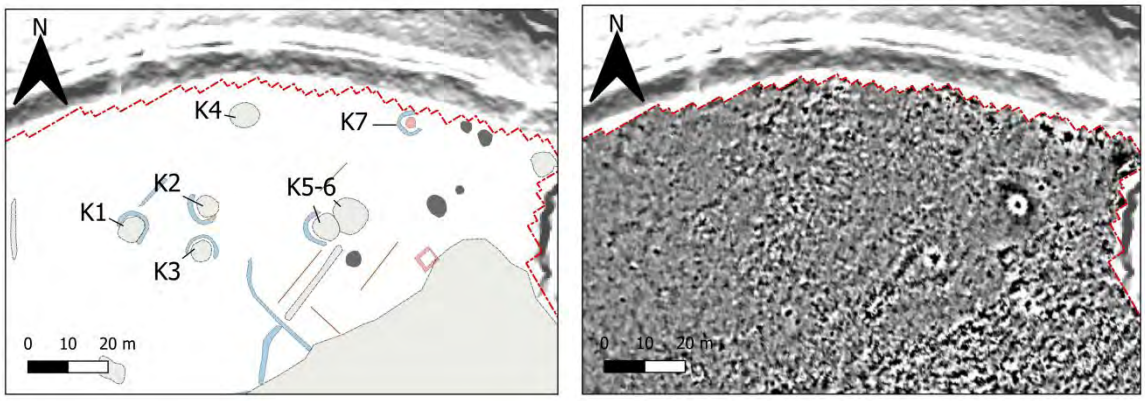

Figure 4: Feature group K

K1: an area of weak magnetic disturbance with a partial positive and negative outline forming a circle 7.4m in diameter set within a relatively quiet area of background readings.

K2: a roughly circular area of weak magnetic disturbance with a weak negative outline 6.7m in diameter and set within an area of increased magnetic noise that may be associated with either grassfires or human activity.

K3: a circular area of weak magnetic disturbance with a positive linear outline measuring 7.5m in diameter and set within an area of increased magnetic noise, which may be associated with either grassfires or human activity.

K4: a roughly circular area located close to the rampart and defined by a mixed positive-negative circular ring with a 8.2m diameter and also set within an area of increased magnetic noise.

K5 and 6: comprise of an area of increased magnetic noise with two partly overlapping disturbances with weak positive-negative outlines. K5 has a diameter of 9m and k6 has a diameter of 8.9m.

K7: is comprised of a magnetic spike with a circular positive linear outline measuring 5.4m in diameter. This anomaly directly corresponds with a visible stone ring on the surface surveyed by Clwyd Powys Archaeological Trust in 2019. The internal magnetic spike may potentially represent a small thermal/industrial anomaly such as a hearth.

L- These features consist of large ferrous spikes that may be associated with large near surface ferrous objects or industrial anomalies related to ovens, hearths or kilns. The two anomalies located adjacent to the northern rampart (L2-3) correspond with a sub-circular stone feature visible on the surface and surveyed by Clwyd Powys Archaeological Trust in 2019. These therefore have a greater potential to be associated with archaeological activity similar to K7.

M- This feature consists of a sharply defined rectangular anomaly located on the edge of the heat affected areas of the survey. Whilst this may be a product of the adjacent thermal magnetic noise, it may also represent a structural anomaly measuring 4.5m by 4.3m.

5. Discussion and Conclusion

Figure 5: Google Earth view of survey data

In 2019 and 2021, a geophysical investigation was undertaken on the site of Twmbarlwm Motte and bailey and Hillfort near Risca South Wales. The objective of the survey was to identify any archaeological features associated with the scheduled site in order to inform both ongoing conservation and investigations to be undertaken by Clwyd Powys Archaeological Trust. The survey consisted of 3.91 hectares of magnetometry conducted within the main enclosure and overlapping the south-east ramparts.

The most prominent findings of this survey have been the extent of magnetic noise likely resulting from the recent grassfires, as well as, the cultivation marks that the burning has magnetically

enhanced. This appears to have affected the south-east facing slopes of the enclosure most, which is the side geographically closest to the ignition point of the recent grassfires. In theory, an updraft affect from valley bellow may have served to intensify the fire in this area, resulting in the heavily magnetised soil; however the magnetic properties of the topsoil and bedrock on this side of the enclosure may also be a factor. The north-east quadrant of the enclosure was burnt during the recent grass fires but appeared significantly less magnetically active in the data. Further work to determine the changeable magnetic susceptibility of soils affected by grassfire needs to be conducted in order to establish the full extent of fire damage on this site and to determine the reliability of features identified in areas affected by grassfire.

The survey covering the levelled sections of the south-western ramparts produced evidence of surviving sub surface remains, most likely associated with the ramparts and therefore suggesting that they were demolished, as opposed to the enclosure having been 'incomplete'. This will however require further investigation to determine whether these anomalies are contemporary with the adjacent earthworks.

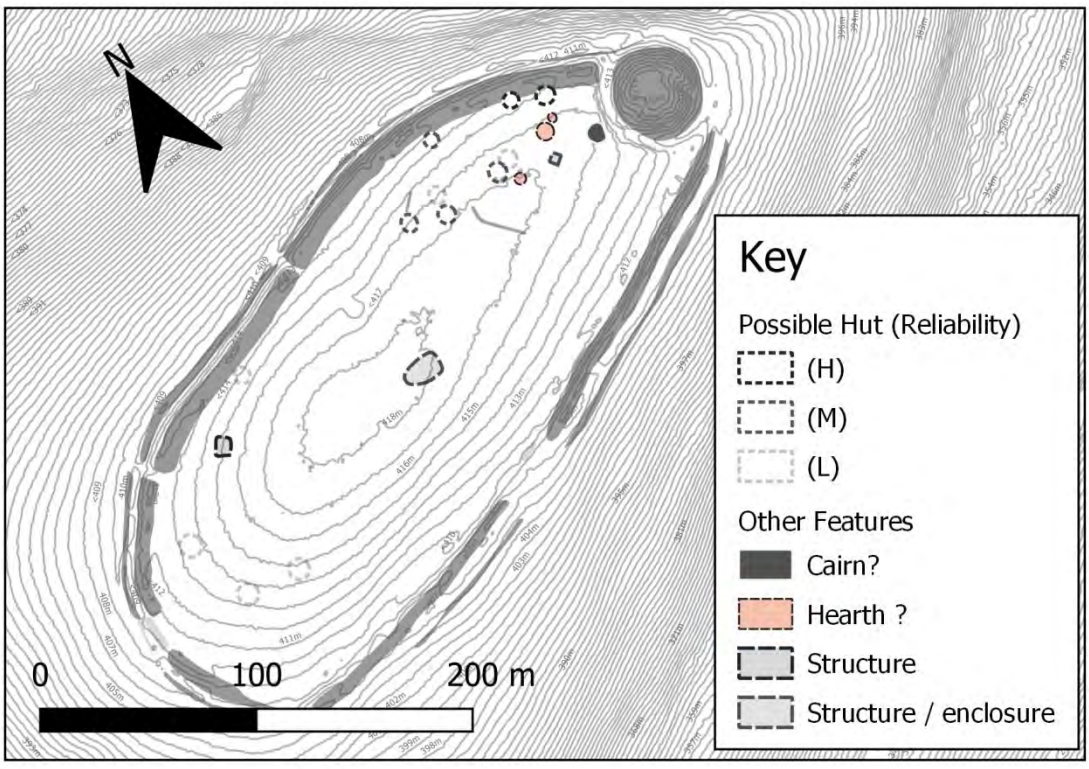

Figure 6: Archaeological interpretation

The features with the most archaeological potential are predominantly contained within the north eastern quarter of the enclosure, adjacent to the motte. Whilst this area also appears to have been partly heat affected from grassfires (resulting in a scatter of magnetic noise), it is also where the majority of structural features were identified on the surface. The anomalies in the data consist of mostly circular areas of disturbance, with a ring outline measuring an average diameter of 8m. Two of the features which contain a magnetic spike are likely associated with a hearth, (L2-3 and (K7)

directly correspond with sub circular stone rings visible on the surface adjoining the northern rampart.

Amongst the potential prehistoric structural features identified within the interior, features K1 K3 and K5 have the most archaeological potential due to their similar appearance in the data, defined as a central area of noise encircled by a faint positive negative linear. In addition they are comparable to the results of a survey undertaken by Archaeological Survey West at Nesscliffe Hillfort in Shropshire (Matthews, 2019). Whilst the recent grassfires and resulting background noise in this area presents limitations to this interpretation, these features warrant further investigation.

Other notable features include three possible structural anomalies: feature G a strong rectangular magnetic anomaly that appears structural but could be associated with modern activity such as a mounting, potentially related to WW2 activity on the site. Feature F is an irregular shaped small enclosure located in the centre of the site, this may have archaeological origins but may also be associated with modern activity. Feature M consists of a sharply defined rectangular feature that may also be archaeological or associated with modern activity. Its proximity to the possible cairn and other potential prehistoric features make it a feature worthy of further consideration.

Within the worst heat affected areas there are some partial linear features that stand out against the regular pattern of cultivation, it is difficult to determine whether these anomalies were a product of the thermal affected ground or features of archaeological interest and therefore have been discounted from the interpretation.

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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.

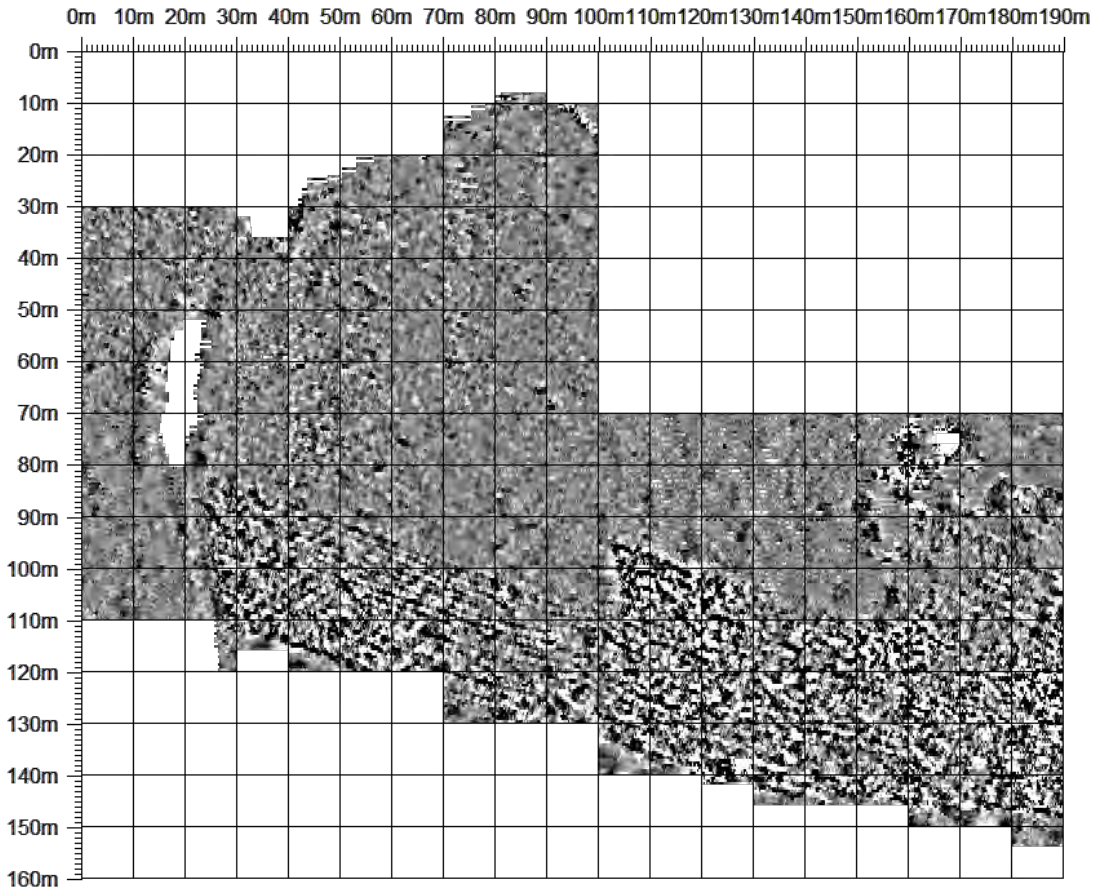
Modern service: This is a feature defined by a strong positive-negative linear that regularly alternates between positive and negative polarity and is caused by modern piping and cables. Electricity cables tend to create a very broad area of disturbance.

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

Phase 1 Survey Raw dataset (-1.8 – 2nT clip)



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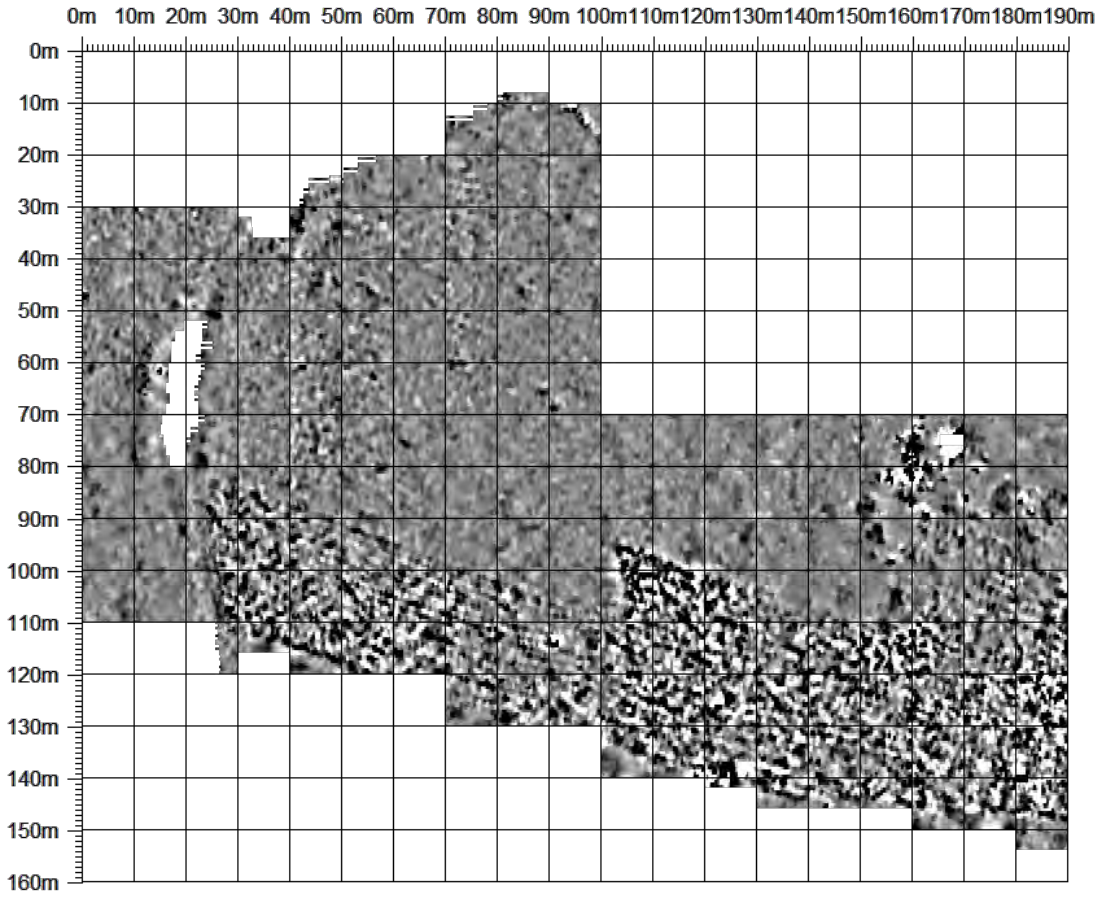

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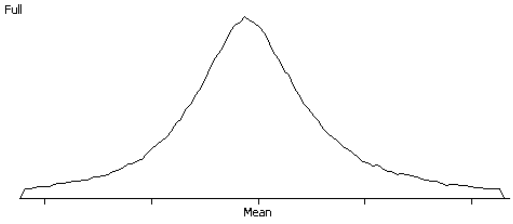

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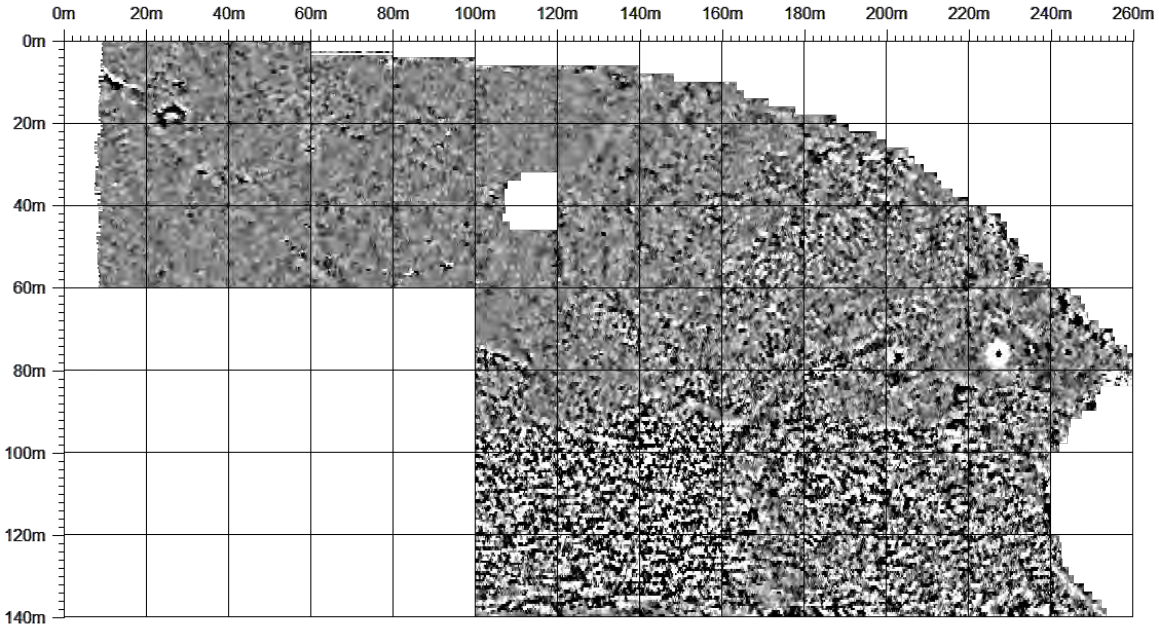

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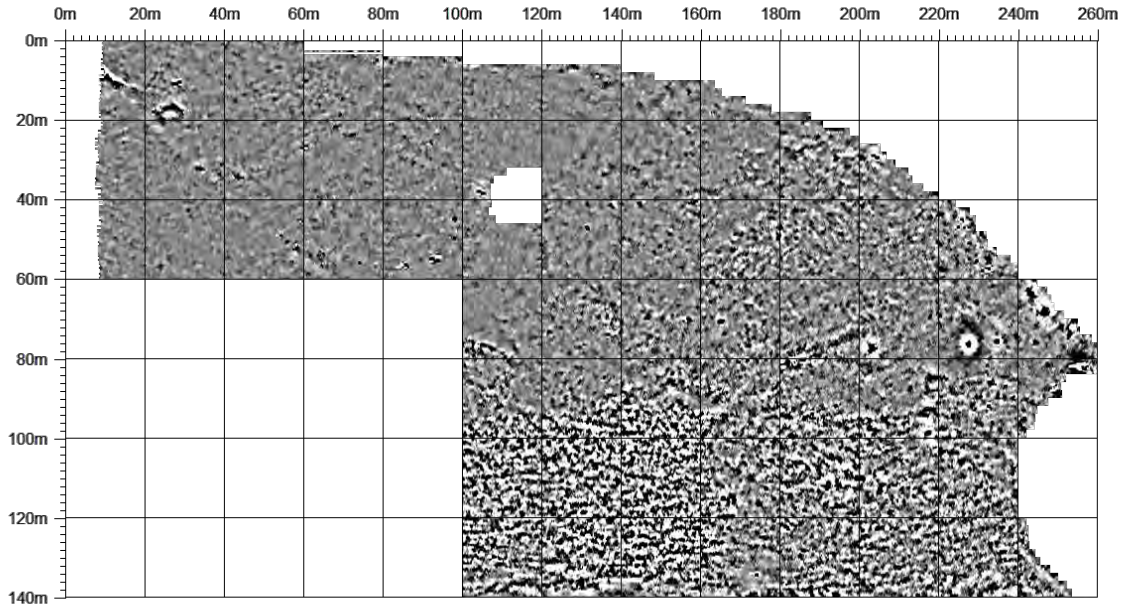

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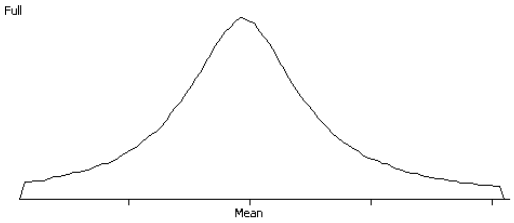
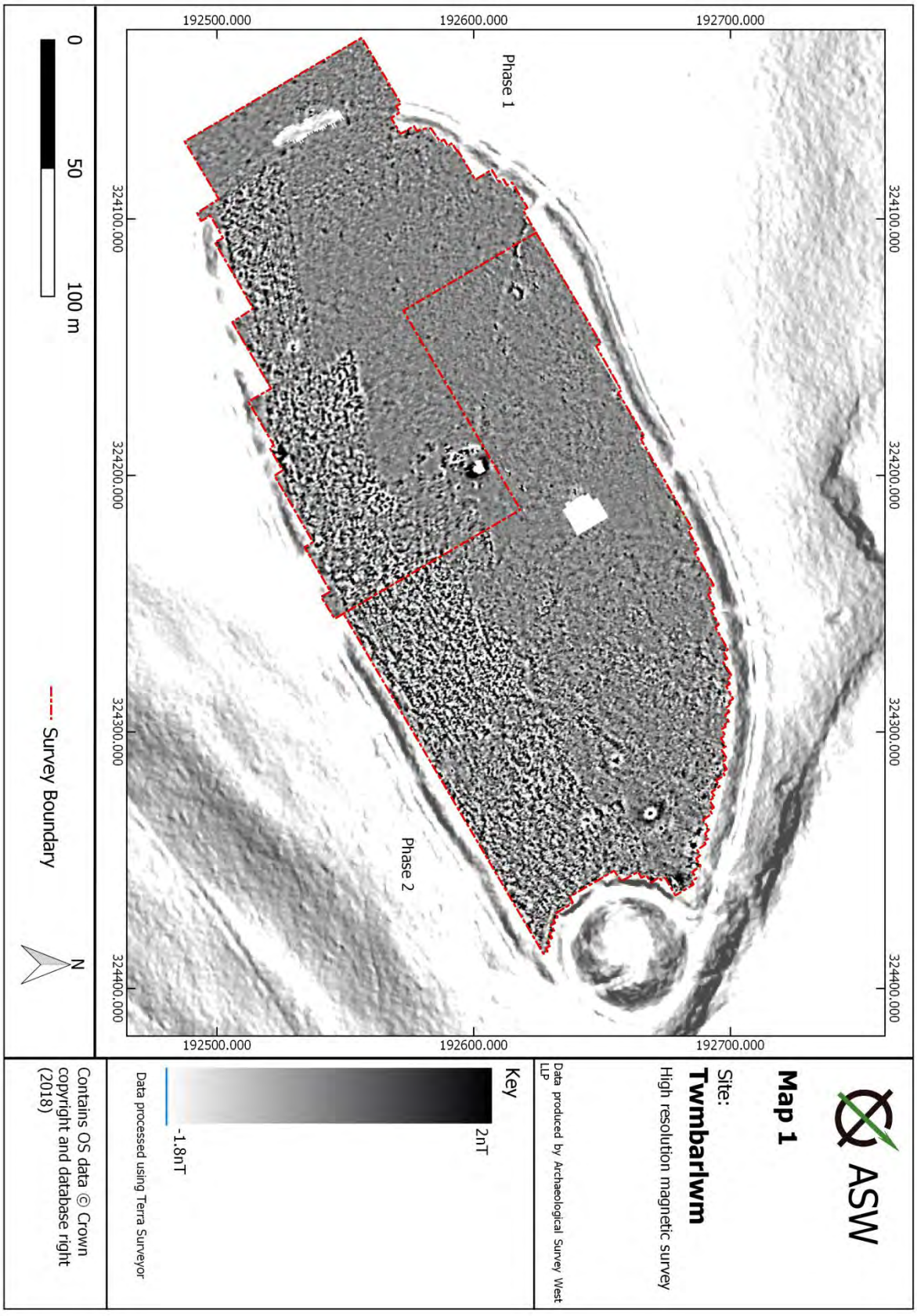
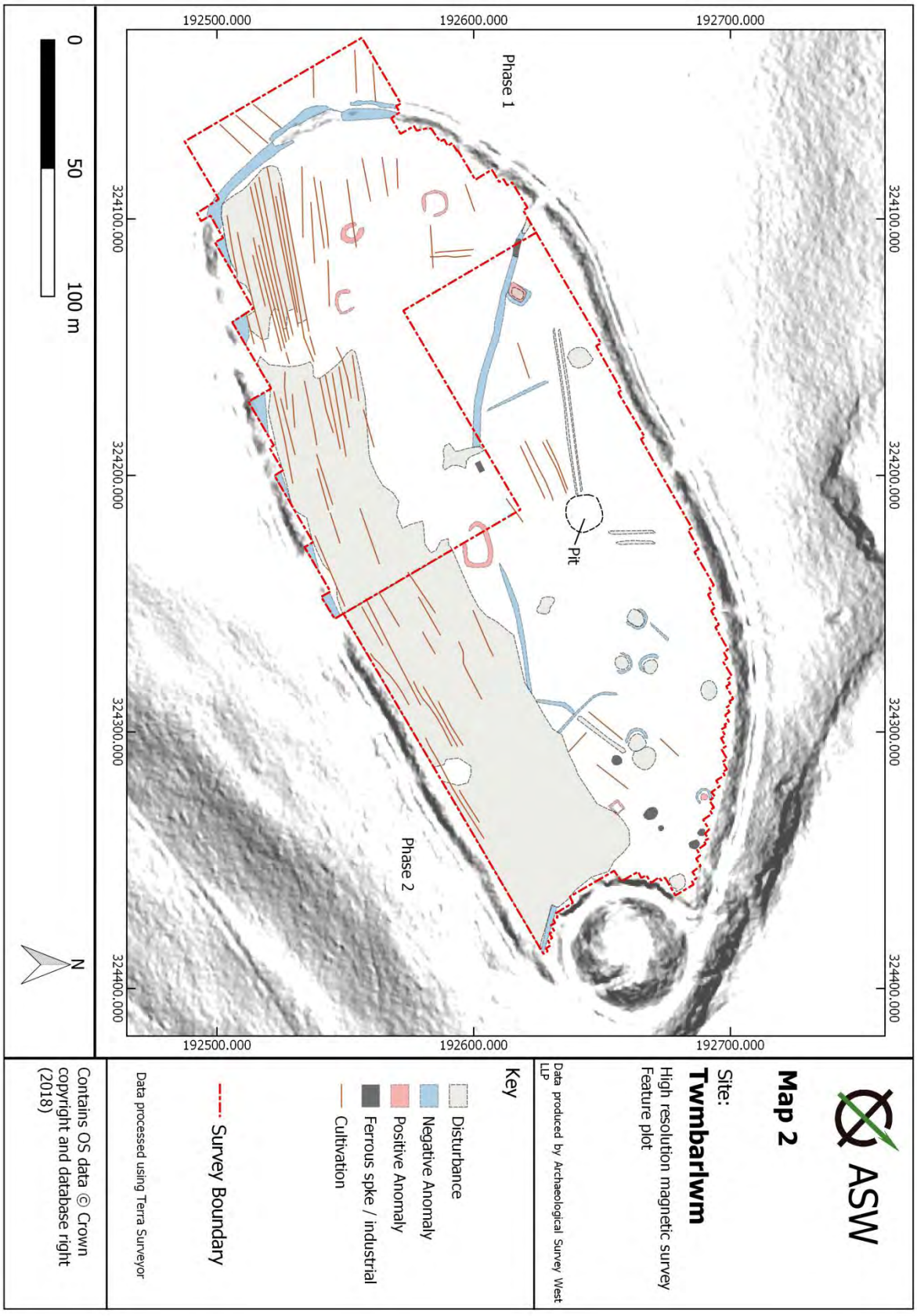


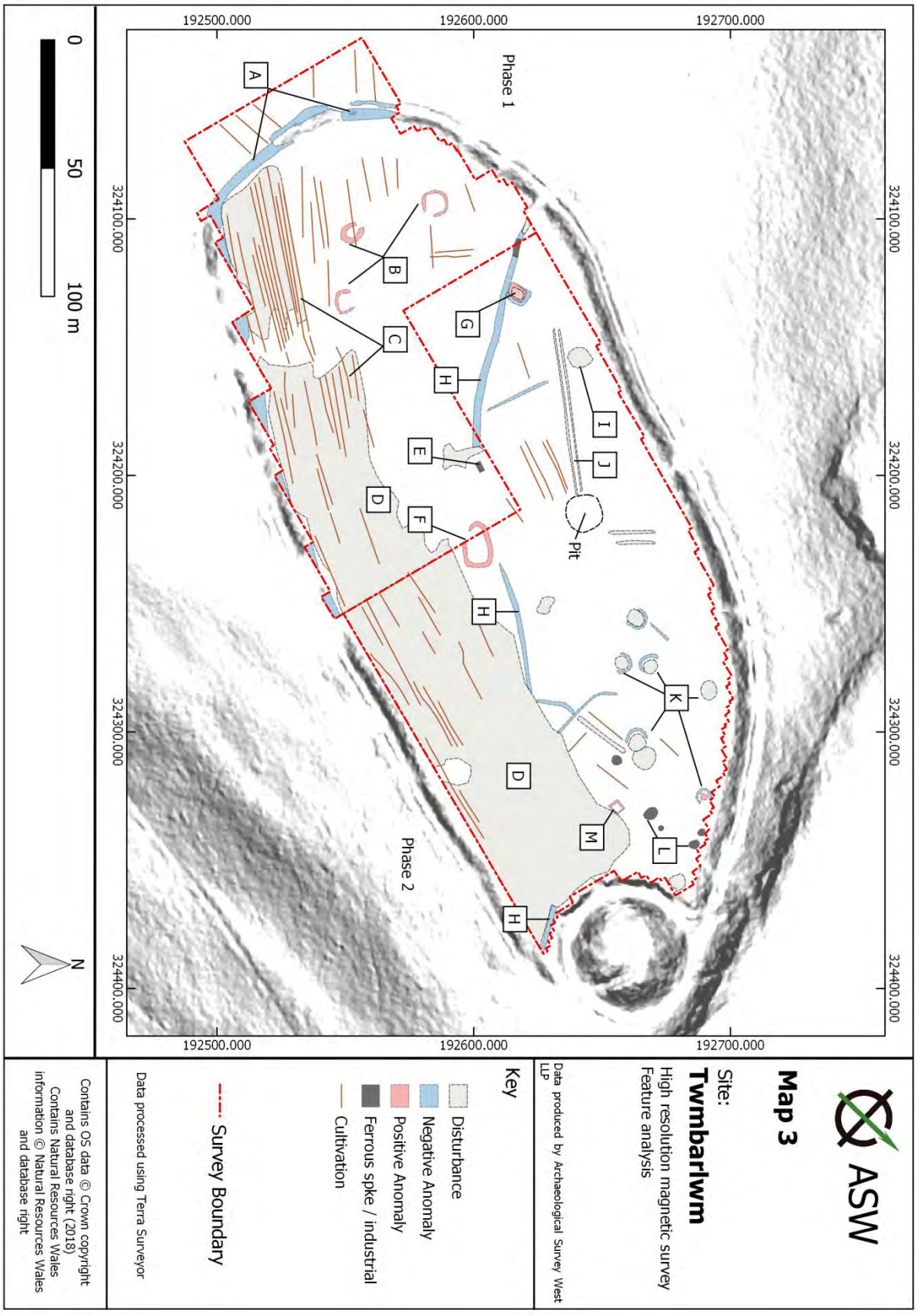
Plates



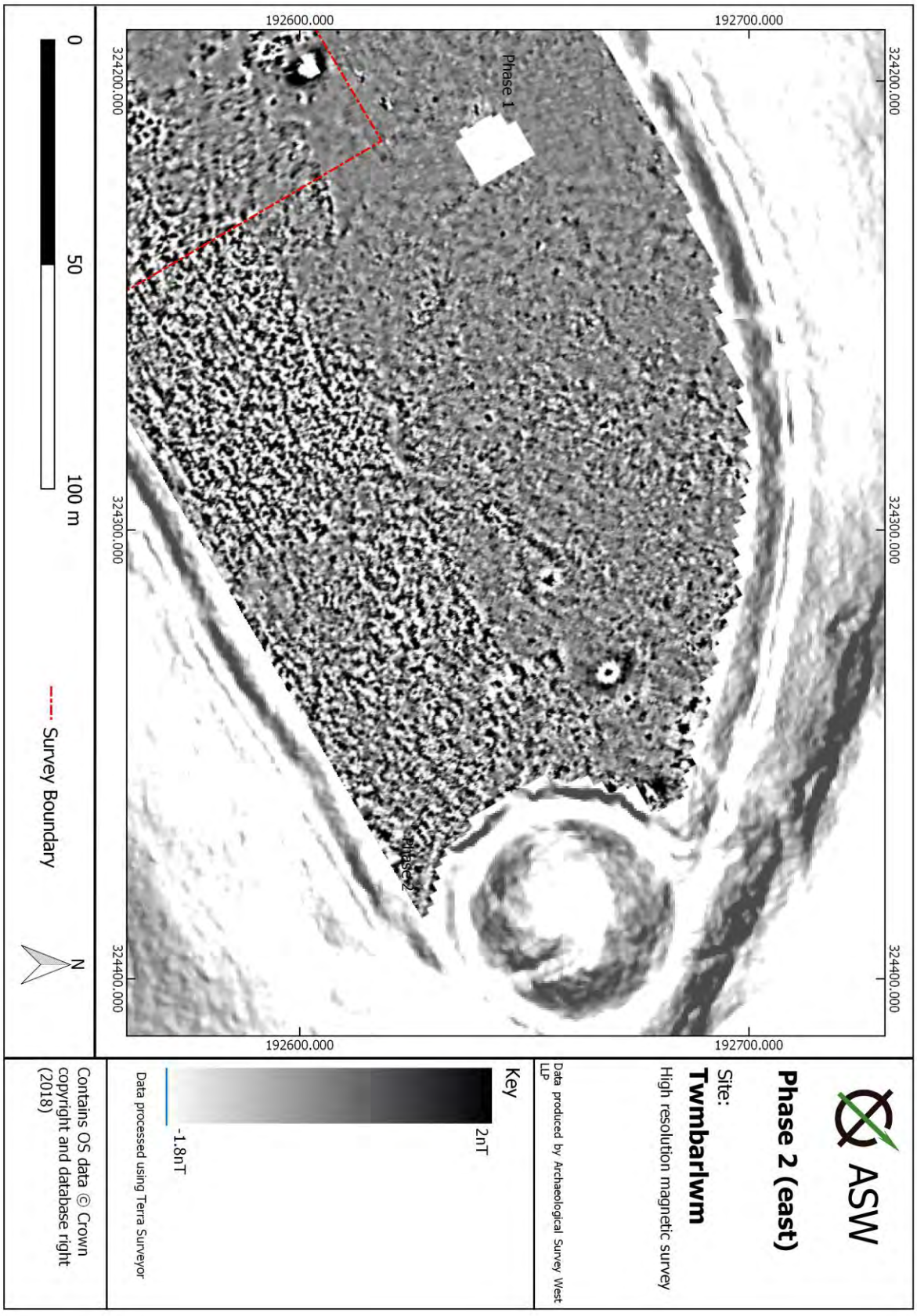
Map 1: Combined magnetic data grey-scale plot



Map 2: Combined magnetic survey feature plot



Map 3: Feature interpretation plot



Map 4: North-east survey area grey-scale plot