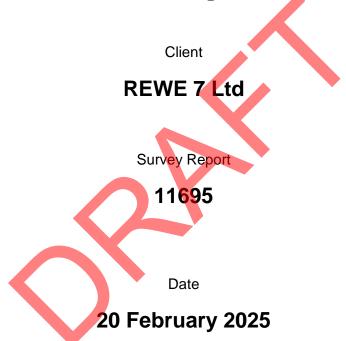


GEOPHYSICAL SURVEY REPORT

Land north of Castle Road, Rhoose, Vale of Glamorgan, Wales





Survey Report 11695: Land north of Castle Road, Rhoose, Vale of Glamorgan, Wales

Survey dates 12-13 & 19 August 2024

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SUMO GeoSurveys is a trading name of SUMO Geophysics Ltd.

Job ref: 11695 Date: 20 February 2025

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Appendix A Technical Information: Magnetometer Survey Methods, Processing and

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3 SURVEY TECHNIQUE

3.1 Detailed magnetic survey (magnetometry) was chosen as the most efficient and effective method of locating the type of archaeological anomalies which might be expected at this site. All survey techniques followed the guidance set out by ClfA (2020) and the European Archaeology Council (EAC) (2016).

Bartington Grad 601-2 Traverse Interval 1.0m Sample Interval 0.25m

The only processes performed on data are the following unless specifically stated otherwise:

Zero Mean

This process sets the background mean of each traverse within each grid to zero. The operation removes instrument striping effects and edge discontinuities over the whole of the data set.

discontinuities over the whole of the data set.

Step Correction (De-stagger) When gradiometer data are collected in 'zig-zag' fashion, stepping errors can sometimes arise. These occur because of a slight difference in the speed of walking on the forward and reverse traverses. The result is a staggered effect in the data, which is particularly noticeable on linear anomalies. This process

corrects these errors.

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4 EXECUTIVE SUMMARY OF RESULTS

4.1 A magnetometer survey of 10.5 hectares of land north of Castle Road, Rhoose, Vale of Glamorgan, has recorded numerous magnetic responses which have been interpreted as being of possible archaeological interest. The survey has detected evidence of possible enclosures, trackways, ditches and pits in the west of Area 3 (see Figures 04). Responses of uncertain origin have also been plotted which could also have archaeological origins; however, some may have been caused by variations in the underlying geology or agricultural processes. Former field boundaries plus ridge and furrow cultivation has also been detected in the magnetic data.

5 Crynodeb o'r Canlyniadau

5.1 Yn ystod arolwg magnetomedr ar dir yn mesur 10.5 hectar i'r gogledd o Castle Rd, y Rhws, ym Mro Morgannwg, fe gafwyd nifer o ganlyniadau magnetig sydd yn debygol o fod o ddiddordeb archeolegol. Mae'r arolwg yn dangos llociau, llwybrau, ffosydd a phydewau posib yn rhan orllewinol Parth 3 (wele ffigwr 04). Mae yma, hefyd, nifer o ganlyniadau ansicr sydd o ddiddordeb posib archeolegol, ond fe all eu bod o ganlyniad i'r ddaeareg naturiol a phrosesau amaethyddol. Fe nodwyd hen ffiniau caeau, a nodweddion grwn a rhych yn ystod yr arolwg.

6 INTRODUCTION

- 6.1 **SUMO GeoSurveys** was commissioned to undertake a geophysical survey of an area outlined for development. This survey forms part of an archaeological investigation being undertaken by **REWE 7 Ltd.**
- 6.2 Site Details

NGR / Postcode ST 03690 67655 / CF62 3BJ

Location The site is located 7km west of Barry and 2km east of St Athan. The

survey area is bounded to the north by the B4265, to the south by

Castle Road and to the east and west by unnamed roads.

Heneb Glamorgan Gwent Archaeology

District Vale of Glamorgan

Topography Flat Land Use Arable

Geology Bedrock: Porthkerry Member - Limestone and mudstone,

(BGS 2024) interbedded

Superficial: None recorded

Soils (CU 2024) Soilscape 7: Freely draining slightly acid but base-rich soils

Survey Methods Magnetometer survey (fluxgate gradiometer)

Study Area 10.5 ha

6.3 Archaeological Background

6.3.1 No designated heritage assets are recorded within the Site. The Site lies c.215m to the south of Llancadle Deserted Medieval Village Scheduled Monument (Ref: GM534) and c.620m to the south-east of the Site is East Orchard Manor House Scheduled Monument, which also contains two Grade II Listed Buildings (GM082; 83125; 83118). Located c.575m to the west of the Site is a Second World War pillbox Scheduled Monument. Located c.420m to the east of the Site is Fonmon Castle Grade II Listed Registered Park and Garden, which contains seven associated Listed Buildings, including the Grade I Listed Fonmon Castle (13597) built following the Norman Conquest in the 11th century. The Llancadle Conservation Area is located c.320m to the north of the Site and encompasses the small settlement of Llancadle (Llancatal). The

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East Aberthaw Conservation Area lies c.535m to the south of the Site and conservation area appraisal and management plans for both conservation areas were produced in 2009.

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6.3.2 The remains of a possible medieval house platform or enclosure have been identified within the Site (RCAHMW ref: 15247). This could be suggestive of historic settlement activity. Several other heritage records are located within the Site and suggest evidence of ridge and furrow and historic agricultural activity. Evidence of possible post-medieval and historic dry-stone wall and remains of enclosures (GGAT ref: 01906s) have also been identified within and in proximity to the Site. Several sherds of post-medieval pottery were also recovered within the Site following fieldwalking in the area (03365s). The Site lies adjacent to Burton farmstead and the remains of the medieval Burton Chapel (00501s). In proximity to the northern extent of the Site the remains of pits and middens dated to the 12th to 15th centuries were identified. (01009s) Further within the area medieval pottery sherds have been recovered. Recorded c.170m to the north of the Site are the remains of possible prehistoric ring ditches, suggestive of ploughed out barrows (02417s). Remains of historic sluices and mills are located c.300m to the west of the Site and associated with the course of the Afon Ddawan that runs in proximity to the western and northern boundary of the Site.

6.4 Aims and Objectives

6.4.1 To locate and characterise any anomalies of possible archaeological interest within the study area.

7 RESULTS

7.1 The survey has been divided into three survey areas (Areas 1-3).

7.2 Possible Archaeology

7.2.1 In the west of Area 3 numerous responses are visible in the magnetic data which have been interpreted as being of possible archaeological interest. Some of the responses may form rectangular and circular enclosures, pits, trackways and diches but in places, the responses are not overly clear. The HER records a Medieval enclosure within the vicinity of the anomalies which supports an archaeological interpretation (RCAHMW ref: 15247), however, the anomalies lack the defined patterning which would normally be associated with settlement remains. Weathering or cracking of the underlying limestone geology can cause similar responses, which may cast doubt over the origins of some of the anomalies. Alternatively, if they are archaeological they could be badly damaged by ploughing.

7.3 Uncertain

7.3.1 Bands of increased response, linear trends and discrete anomalies have been detected in the survey which have been assigned to the category of *Uncertain*. Some of them could have archaeological origins given the responses of potential interest mapped in the survey (see 7.2); they could mark the locations of ditches or pits. However, they may also have been caused by variations in the underlying geology, agricultural processes or deeply buried ferrous debris. Hence, the uncertain categorisation.

7.4 Former Field Boundary – Corroborated

7.4.1 Linear responses have been detected in Areas 2 and 3 which correspond with former field boundaries that are visible on historic mapping and aerial imagery (see Figures 05 & 06).

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7.5 Agricultural - Ridge and Furrow

7.5.1 A series of parallel linear anomalies, on two varying alignments, have been detected in Area 2 which are the results of historic ridge and furrow cultivation; some of the anomalies are visible as cropmarks on aerial imagery (see Figure 06).

7.6 Ferrous / Magnetic Disturbance

- 7.6.1 A zone of magnetic disturbance has been plotted in Area 3. A building was once located in the south of Area 3, surrounded by field boundaries; it is visible on 1948-1977 Ordnance Survey mapping (see figure 06). The zone of disturbance is likely to have been caused by spreads of demolition debris from the building. The removal of the former field boundaries and subsequent groundworks is also likely to have contributed to the disturbance.
- 7.6.2 Ferrous responses close to boundaries are due to adjacent fences and gates. Smaller scale ferrous anomalies ("iron spikes") are present throughout the data and are characteristic of small pieces of ferrous debris (or brick / tile) in the topsoil; they are commonly assigned a modern origin. Only the most prominent of these are highlighted on the interpretation diagram.

8 DATA APPRAISAL & CONFIDENCE ASSESSMENT

8.1 Historic England Table 4 (EH 2008) states that the typical magnetic response on the local soils / geology is variable. The results from this survey indicate the presence of discrete anomilies, trends plus ridge and furrow cultivation; consequently, they survey is deemed to have worked well.

9 CONCLUSION

The magnetometer survey has recorded numerous magnetic responses which have been 9.1 interpreted as being of possible archaeological interest. In the west of Area 3 linear responses, trends and pit-like anomalies could be evidence of enclosures, trackways, ditches and pits, however they are poorly defined making a clear interpretation difficult. Responses of uncertain origin have also been detected throughout the survey area which may have been caused by variations in the underlying geology or agricultural processes, though archaeological origins cannot be totally ignored. Former field boundaries plus ridge and furrow cultivation have also been detected in the magnetic data.

6

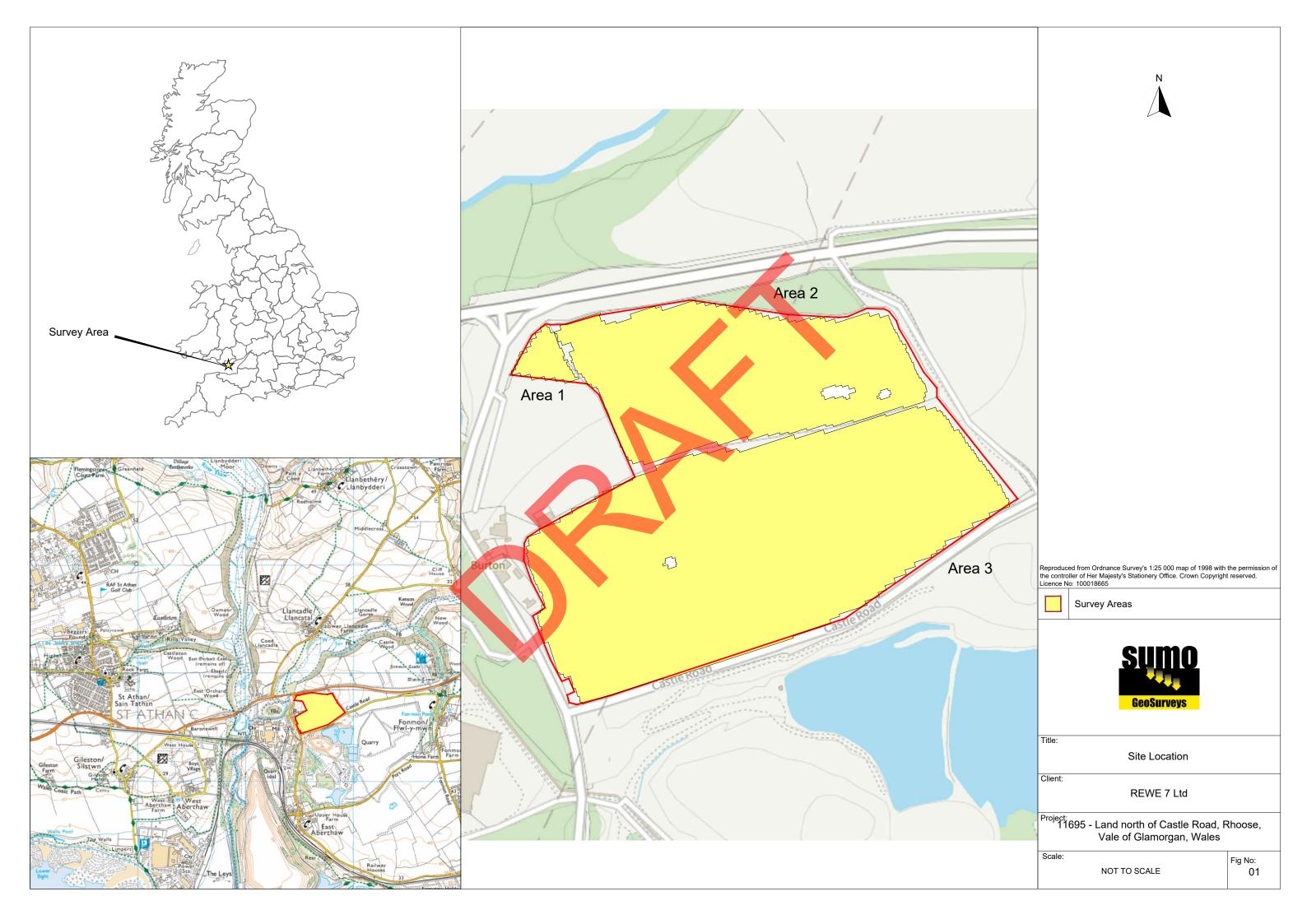
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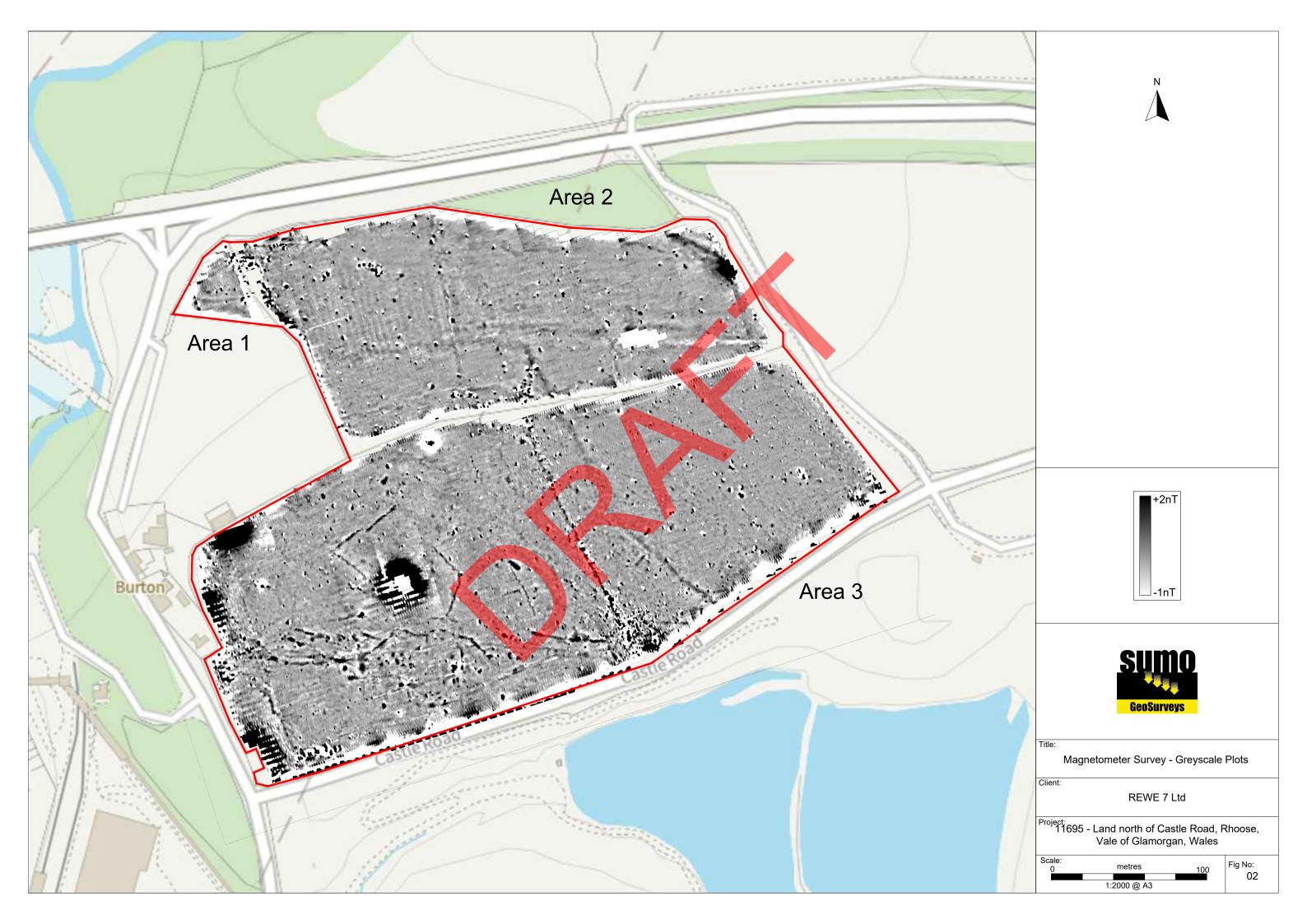
10 REFERENCES

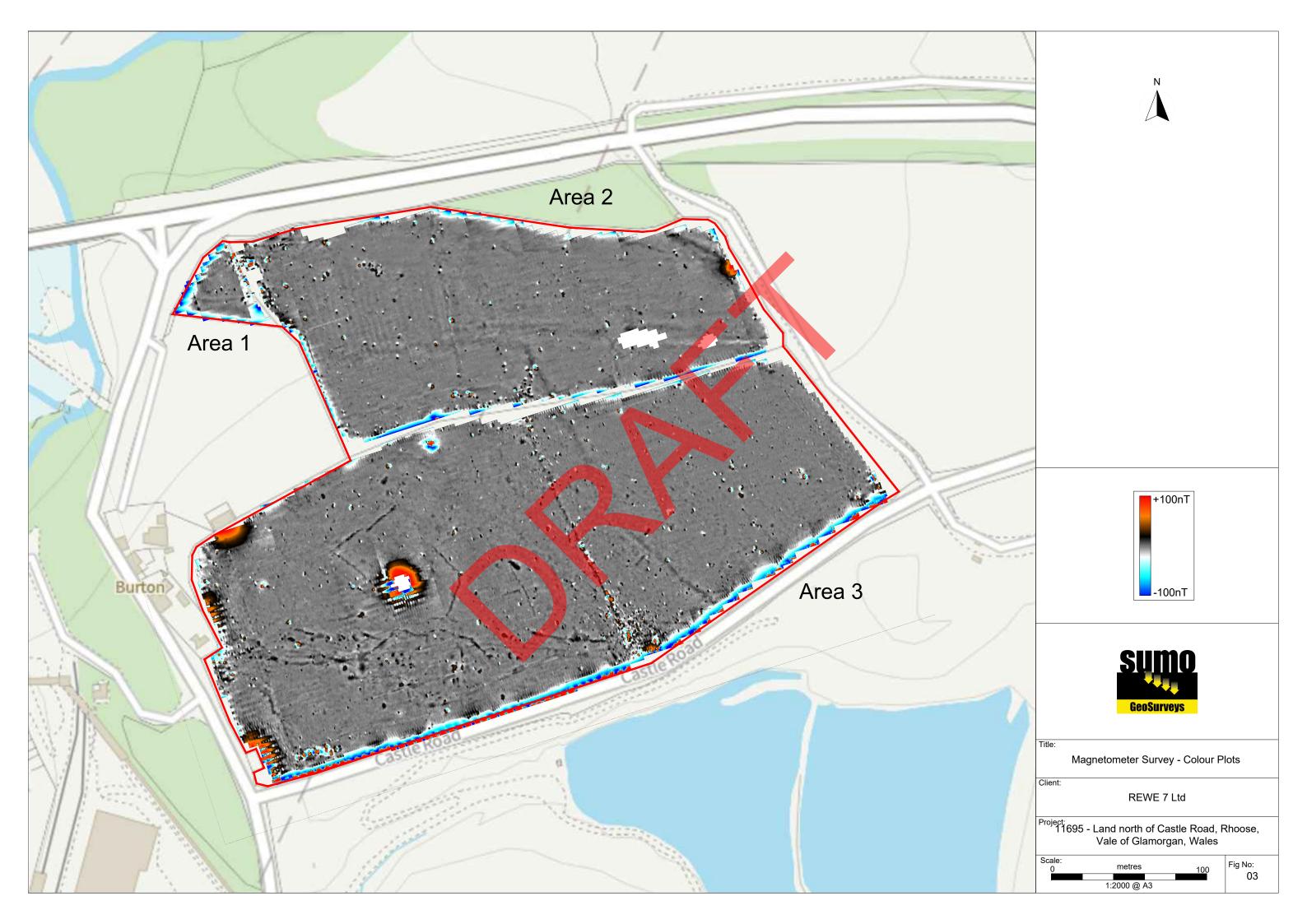
BGS 2024	Geology of Britain Viewer, British Geological Survey, website: (http://www.bgs.ac.uk/opengeoscience/home.html?Accordion1=1#maps)
CIfA 2020	Standard and Guidance for Archaeological Geophysical Survey. 2014 amended 2020. ClfA Guidance note. Chartered Institute for Archaeologists, Reading https://www.archaeologists.net/sites/default/files/ClfAS%26GGeophysics_3.pdf
CU 2024	The Soils Guide. www.landis.org.uk. Cranfield University, UK. website: http://mapapps2.bgs.ac.uk/ukso/home.html
EAC 2016	EAC Guidelines for the Use of Geophysics in Archaeology, European Archaeological Council, Guidelines 2.
EH 2008	Geophysical Survey in Archaeological Field Evaluation. English Heritage, Swindon (now withdrawn, but used for evaluating suitability of soil types)

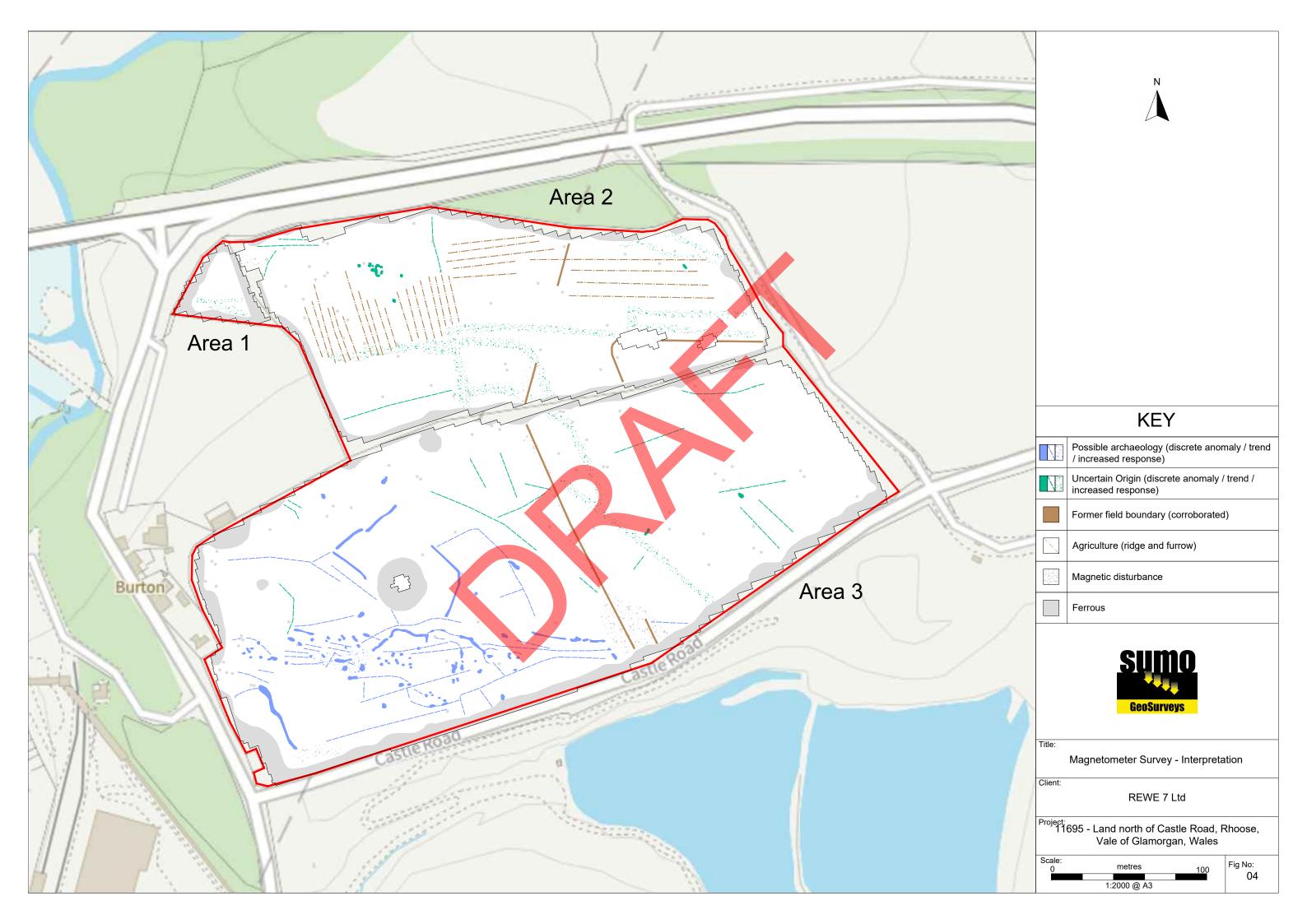
11 ARCHIVE

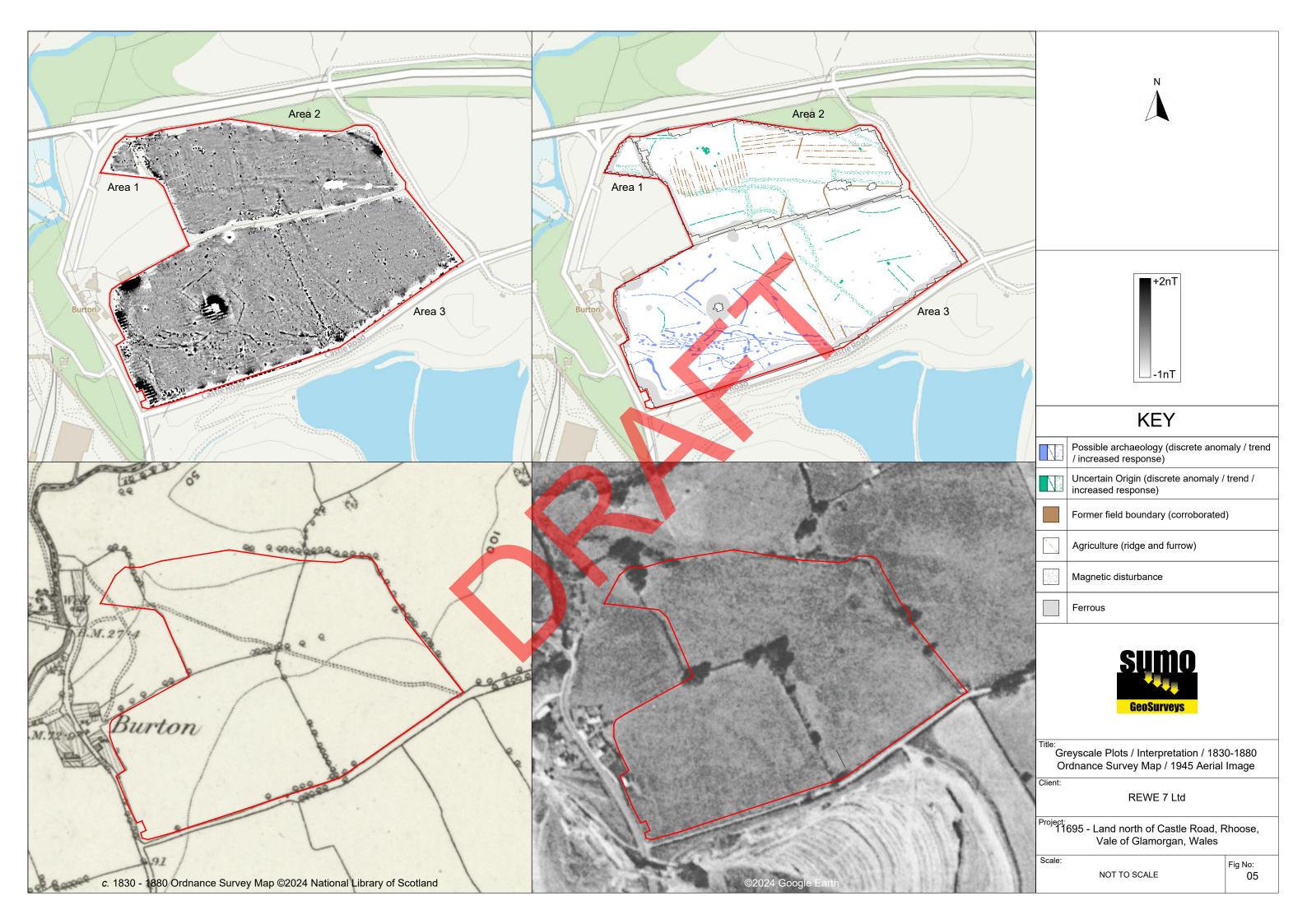
- The minimally processed data, data images, XY traces and a copy of this report are stored in **SUMO GeoSurveys'** digital archive, on an internal RAID configured NAS drive in the Midlands Office. These data are also backed up to the Cloud for off-site storage.
- The full report will be submitted to the HER and adhere to the Guidance for the Submission of Data to the Welsh Historic Environment Record (HERs) (2022). A digital copy of the archive will be sent to the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW) as per their guidelines.



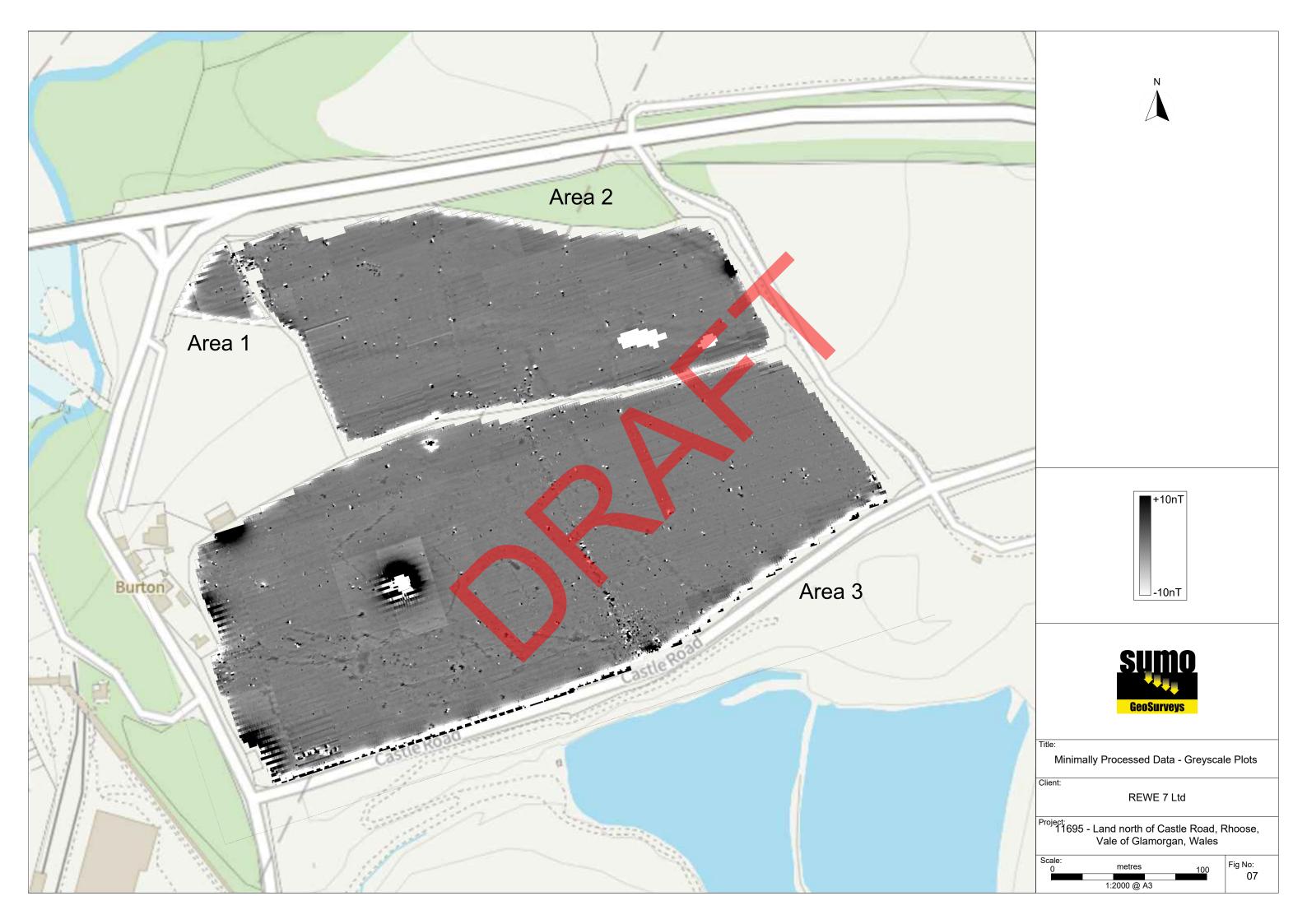


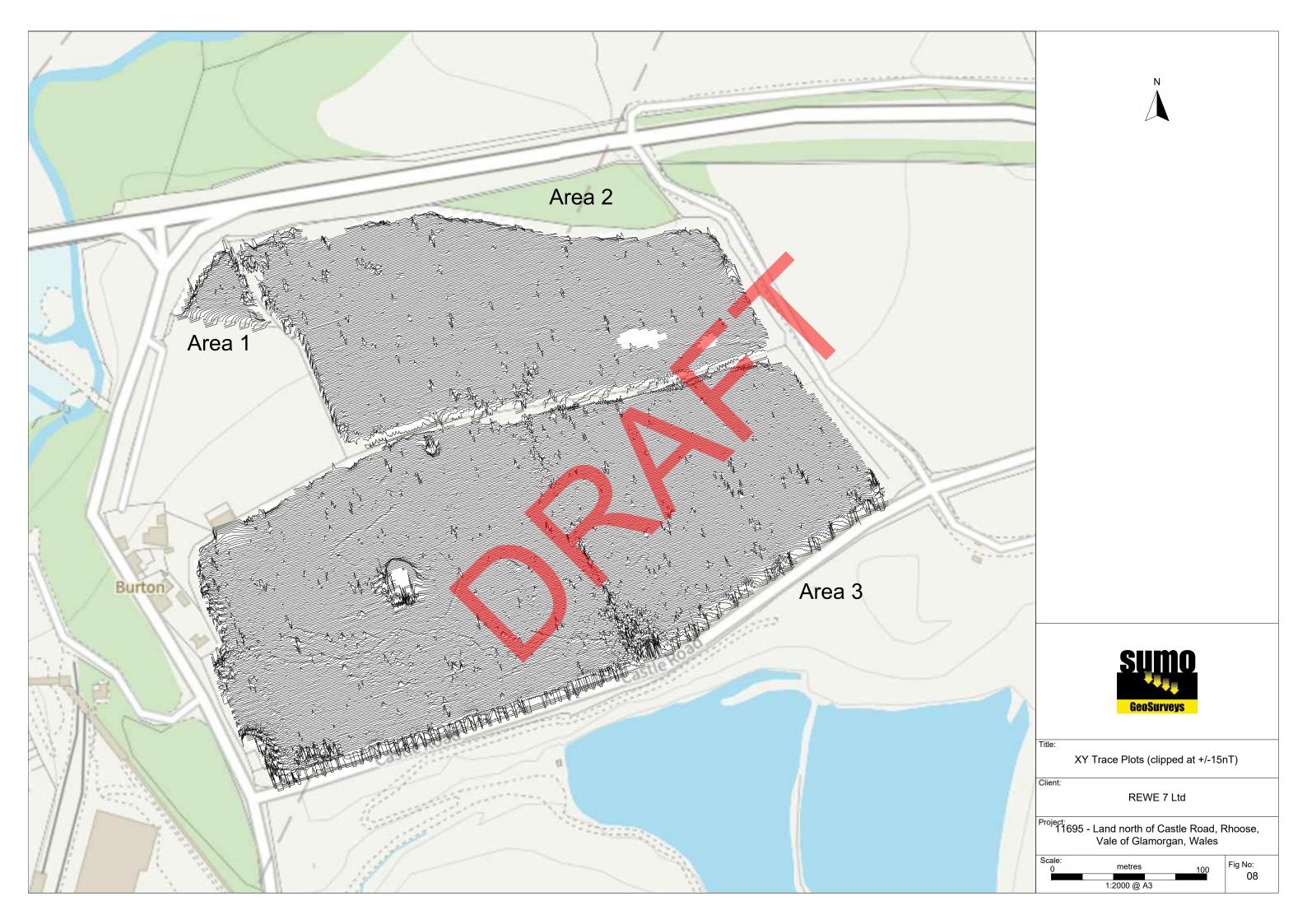


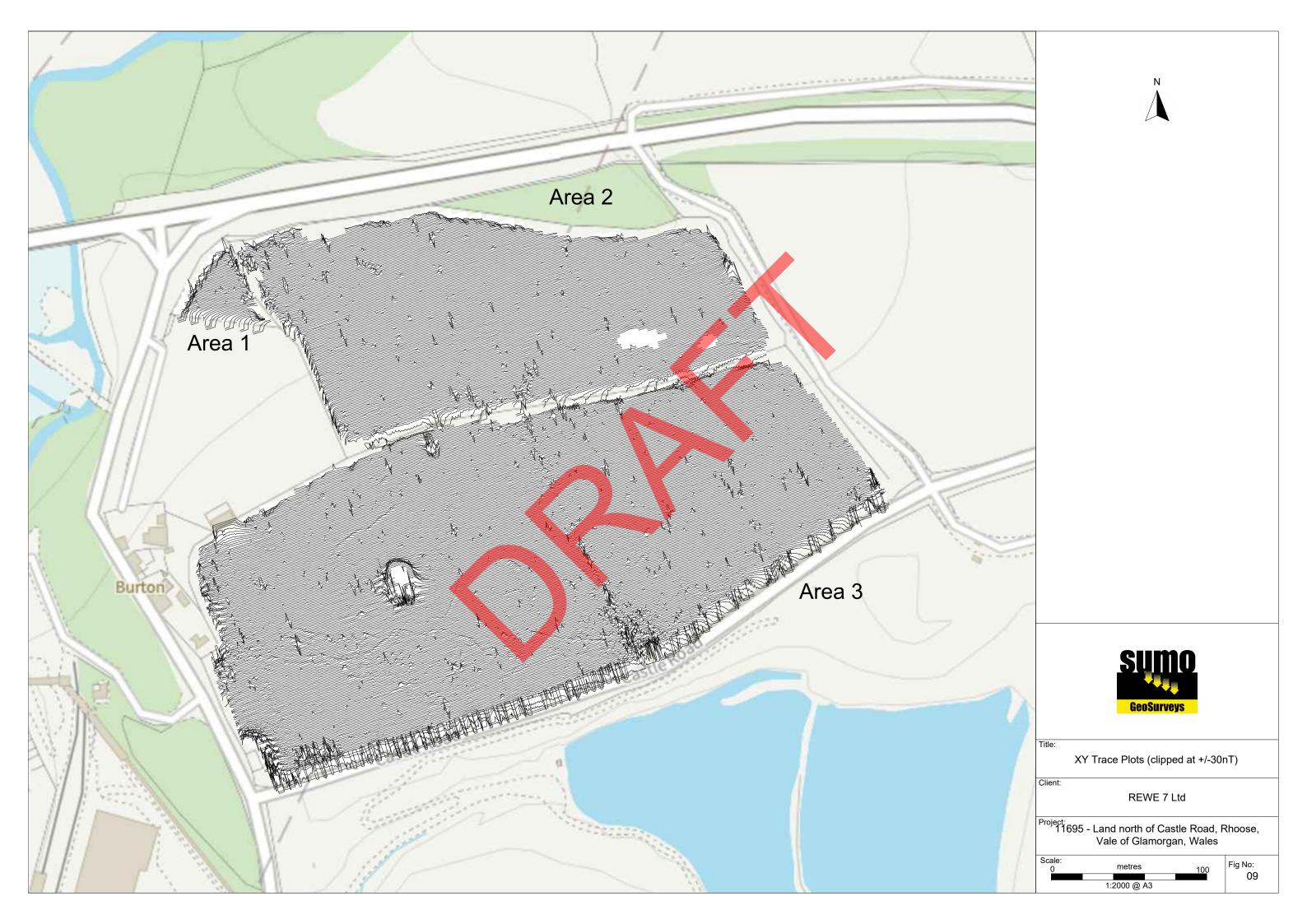












Appendix A - Technical Information: Magnetometer Survey Method

Grid Positioning

For hand held gradiometers the location of the survey grids has been plotted together with the referencing information. Grids were set out using a Trimble R8 Real Time Kinematic (RTK) VRS Now GNSS GPS system.

An RTK GPS (Real-time Kinematic Global Positioning System) can locate a point on the ground to a far greater accuracy than a standard GPS unit. A standard GPS suffers from errors created by satellite orbit errors, clock errors and atmospheric interference, resulting in an accuracy of 5m-10m. An RTK system uses a single base station receiver and a number of mobile units. The base station rebroadcasts the phase of the carrier it measured, and the mobile units compare their own phase measurements with those they received from the base station. This results in an accuracy of around 0.01m.

Technique	Instrument	Traverse Interval	Sample Interval
Magnetometer	Bartington Grad 601-2	1.0m	0.25m
Magnetometer	Bartington Cart System	1.0m	0.125m

Instrumentation:

Bartington instruments operate in a gradiometer configuration which comprises fluxgate sensors mounted horizontally, set 1.0m apart. The fluxgate gradiometer suppresses any diurnal or regional effects. The instruments are carried, or cart mounted, with the bottom sensor approximately 0.1-0.3m from the ground surface. At each survey station, the difference in the magnetic field between the two fluxgates is measured in nanoTesla (nT). The sensitivity of the instrument can be adjusted; for most archaeological surveys the most sensitive range (0.1nT) is used. Generally, features up to 1m deep may be detected by this method, though strongly magnetic objects may be visible at greater depths.

Bartington Grad 601-2

Hand-Held: Data will be collected using a Bartington Grad 601-2. The instrument consists of two paired sensors and readings are logged at 0.25m centres along traverses 1.0m apart across 30m grids. The collection of data at 0.25m centres provides an appropriate methodology balancing cost and time with resolution as per Historic England guidelines

Bartington Cart System

Data will be collected using a cart carrying four paired Bartington magnetic sensors. Each data point is geographically referenced using an on-board Trimble RTK survey grade GPS system. Readings will be taken at 0.125m centres along traverses 1.0m apart.

Data Processing

Zero Mean Traverse This process sets the background mean of each traverse within each grid to zero. The operation removes striping effects and edge discontinuities over the whole of the data set.

Step Correction (De-stagger)

When gradiometer data are collected in 'zig-zag' fashion, stepping errors can sometimes arise. These occur because of a slight difference in the speed of walking on the forward and reverse traverses. The result is a staggered effect in the data, which is particularly noticeable on linear anomalies. This process corrects these errors.

Display

Greyscale/ Colourscale Plot This format divides a given range of readings into a set number of classes. Each class is represented by a specific shade of grey, the intensity increasing with value. All values above the given range are allocated the same shade (maximum intensity); similarly, all values below the given range are represented by the minimum intensity shade. Similar plots can be produced in colour, either using a wide range of colours or by selecting two or three colours to represent positive and negative values. The assigned range (plotting levels) can be adjusted to emphasise different anomalies in the data-set.

Interpretation Categories

In certain circumstances (usually when there is corroborative evidence from desk-based or excavation data) very specific interpretations can be assigned to magnetic anomalies (for example, Roman Road, Wall, etc.) and where appropriate, such interpretations will be applied. The list below outlines the generic categories commonly used in the interpretation of the results.

Archaeology / Probable Archaeology

This term is used when the form, nature and pattern of the responses are clearly or very probably archaeological and /or if corroborative evidence is available. These anomalies, whilst considered anthropogenic, could be of any age.

Possible Archaeology

These anomalies exhibit either weak signal strength and / or poor definition, or form incomplete archaeological patterns, thereby reducing the level of confidence in the interpretation. Although the archaeological interpretation is favoured, they may be the result of variable soil depth, plough damage or even aliasing as a result of data collection orientation.

Industrial / Burnt-Fired Strong magnetic anomalies that, due to their shape and form or the context in which they are found, suggest the presence of kilns, ovens, corn dryers, metalworking areas or hearths. It should be noted that in many instances modern ferrous material can produce similar magnetic anomalies.

Former Field & possible)

Anomalies that correspond to former boundaries indicated on historic mapping, or Boundary (probable which are clearly a continuation of existing land divisions. Possible denotes less confidence where the anomaly may not be shown on historic mapping but nevertheless the anomaly displays all the characteristics of a field boundary.

Ridge & Furrow Parallel linear anomalies whose broad spacing suggests ridge and furrow cultivation. In some cases, the response may be the result of more recent

agricultural activity.

Agriculture (ploughing) Parallel linear anomalies or trends with a narrower spacing, sometimes aligned with existing boundaries, indicating more recent cultivation regimes.

Land Drain Weakly magnetic linear anomalies, guite often appearing in series forming parallel and herringbone patterns. Smaller drains may lead and empty into larger diameter pipes, which in turn usually lead to local streams and ponds. These are indicative

of clay fired land drains.

Natural These responses form clear patterns in geographical zones where natural

variations are known to produce significant magnetic distortions.

Magnetic Disturbance

Service

Ferrous

Broad zones of strong dipolar anomalies, commonly found in places where modern

ferrous or fired materials (e.g. brick rubble) are present.

Magnetically strong anomalies, usually forming linear features are indicative of ferrous pipes/cables. Sometimes other materials (e.g. pvc) or the fill of the trench can cause weaker magnetic responses which can be identified from their uniform

linearity.

This type of response is associated with ferrous material and may result from small

items in the topsoil, larger buried objects such as pipes, or above ground features such as fence lines or pylons. Ferrous responses are usually regarded as modern. Individual burnt stones, fired bricks or igneous rocks can produce responses

similar to ferrous material.

Uncertain Origin Anomalies which stand out from the background magnetic variation, yet whose

> form and lack of patterning gives little clue as to their origin. Often the characteristics and distribution of the responses straddle the categories of *Possible* Archaeology / Natural or (in the case of linear responses) Possible Archaeology /

Agriculture; occasionally they are simply of an unusual form.

Where appropriate some anomalies will be further classified according to their form (positive or negative) and relative strength and coherence (trend: weak and poorly defined).

Appendix B - Technical Information: Magnetic Theory

Detailed magnetic survey can be used to effectively define areas of past human activity by mapping spatial variation and contrast in the magnetic properties of soil, subsoil and bedrock. Although the changes in the magnetic field resulting from differing features in the soil are usually weak, changes as small as 0.1 nanoTeslas (nT) in an overall field strength of 48,000 (nT), can be accurately detected.

Weakly magnetic iron minerals are always present within the soil and areas of enhancement relate to increases in *magnetic susceptibility* and permanently magnetised *thermoremanent* material.

Magnetic susceptibility relates to the induced magnetism of a material when in the presence of a magnetic field. This magnetism can be considered as effectively permanent as it exists within the Earth's magnetic field. Magnetic susceptibility can become enhanced due to burning and complex biological or fermentation processes.

Thermoremanence is a permanent magnetism acquired by iron minerals that, after heating to a specific temperature known as the Curie Point, are effectively demagnetised followed by re-magnetisation by the Earth's magnetic field on cooling. Thermoremanent archaeological features can include hearths and kilns; material such as brick and tile may be magnetised through the same process.

Silting and deliberate infilling of ditches and pits with magnetically enhanced soil creates a relative contrast against the much lower levels of magnetism within the subsoil into which the feature is cut. Systematic mapping of magnetic anomalies will produce linear and discrete areas of enhancement allowing assessment and characterisation of subsurface features. Material such as subsoil and non-magnetic bedrock used to create former earthworks and walls may be mapped as areas of lower enhancement compared to surrounding soils.

Magnetic survey is carried out using a fluxgate gradiometer which is a passive instrument consisting of two sensors mounted vertically 1m apart. The instrument is carried about 30cm above the ground surface and the top sensor measures the Earth's magnetic field whilst the lower sensor measures the same field but is also more affected by any localised buried feature. The difference between the two sensors will relate to the strength of a magnetic field created by this feature, if no field is present the difference will be close to zero as the magnetic field measured by both sensors will be the same.

Factors affecting the magnetic survey may include soil type, local geology, previous human activity and disturbance from modern services.

Appendix C – Data Management Plan & Archive Selection Strategy

Data Management Plan Project ID SUMO-11695 **Project Name** Land north of Castle Road, Rhoose, Vale of Glamorgan, Wales **Project Description** Detailed magnetic survey over approx. 10ha Client Cotswold Archaeology Project Manager Thomas Cockcroft / Rebecca Fradgley Field Leader Robert Knight / Craig Wakefield Date DMP created 07.08.2024 Date DMP last updated 03.10.2024 Version 3 Technique - data Detailed magnetic survey.

Manual - cart - other

Handheld magnetometers

Documentation and metadata

All documentation and data produced are stored on SUMO servers in a specific job file.

Data storage, access and back-up

SUMO Secure server during the project life set up in a RAID configuration (a RAID configuration incorporates a level of data redundancy meaning if a single hard drive in fails data can still be restored).

- Snap shots of the data will be made at several intervals during the day to allow data to be restored for up to 30 days if changed / deleted.
- Once the final report has been completed data will be moved onto NAS drive set up in a RAID configuration.
- All data is backed up to an off-site location (Cloud storage).

Archive Selection Strategy

Digital Data

Selection

It is proposed that only the final version of all born digital documents (reports, images and CAD files) will be selected for inclusion in the Preserved Archive. All raw and processed survey data will be included in the preserved archive. Below is what will constitute the selected archive:

- Raw data in XYZ format .csv and .png plus .pgw world file
- Processed data as .png plus .pgw world file
- Final survey report .pdf
- CAD and Vector graphics (interpretations) in .dwg format

De-selected digital data

The de-selected material will be retained on the SUMO Secure server and Cloud storage.

Documents

Not applicable - no archive

Materials

Not applicable - no archive



- Archaeological Geophysics Engineering Geophysics Measured Building Services
- Utility and Topographic Services Aerial Surveys
- Rail Surveys