

ARCHAEOLOGICAL EVALUATION REPORT:
GEOPHYSICAL SURVEY BY MAGNETOMETRY ON LAND NORTH AND SOUTH OF NATIONAL
ROAD, CILFYNYDD, WALES

Client: REWE 2
NGR: ST 09583 93386
AAL Site Code: CINR 23
OASIS Reference Number: allenarc1-521066



Report prepared for REWE 2

By
Allen Archaeology Limited
Report Number AAL2023160

November 2023



Allenarchaeology



Contents

Executive Summary	1
1.0 Introduction.....	2
2.0 Site Location and Description.....	2
3.0 Planning Background.....	2
4.0 Archaeological and Historical Background	3
Prehistoric (pre-43 AD).....	3
Romano-British (AD 43 - 410).....	3
Early medieval - medieval (410 AD – 1539).....	4
Post-medieval - present (1540 – present).....	4
5.0 Geophysical Survey Methodology.....	4
Summary of Survey Parameters	4
Data Collection and Processing	5
6.0 Geophysical Survey Results (Figures 2 - 8)	6
7.0 Discussion and Conclusions.....	6
8.0 Effectiveness of Methodology.....	6
9.0 Acknowledgements	6
10.0 References	7

List of Appendices

Appendix 1: Figures	8
---------------------------	---

List of Figures

Figure 1: Survey area outlined in red	8
Figure 2: Field numbering.....	9
Figure 3: Greyscale raw data	10
Figure 4: Processed trace plots	11
Figure 5: Processed greyscale plot and interpretation of fields 1-6.....	12
Figure 6: Processed greyscale plot and interpretation of fields 7-9.....	13
Figure 7: Processed greyscale plot location superimposed over 1885 OS Map	14
Figure 8: Interpretation location superimposed over 1885 OS Map	15

Document Control

Element:	Name:	Date:
Report prepared by:	Benjamin Jenkins BSc (Hons)	29/11/2023
Illustrations prepared by:	Benjamin Jenkins BSc (Hons) and Robert Evershed BSc (Hons)	28/11/2023
Report edited by:	Chris Clay BA MA (Hons)	29/11/2023
Report reviewed by:	Tobin Rayner BSc (Hons) MSc ACIfA	05/12/2023
Version no:	1.0	

Cover image: Site boundary superimposed over 1885 OS Map

Executive Summary

- Pegasus Planning Group Limited commissioned Allen Archaeology Limited (AAL) to undertake a geophysical survey using magnetometry on land north and south of National Road, Cilfynydd, Wales prior to the submission of a planning application for a proposed Battery Energy Storage System (BESS) with Associated Infrastructure, Earthworks including On-Site Substation, Access, Drainage and Landscaping and Underground Cable Route Connection.
- The site lies within an area with limited archaeological potential, with no known prehistoric, Roman or medieval activity within the site boundaries, and limited activity in the nearby area. One demolished post-medieval dwelling lays within the site boundary, and evidence of post-medieval agricultural and quarrying activity is visible in the wider area.
- The survey has revealed very little of archaeological significance. Scattered throughout the site were several probable palaeochannels, a few former field boundaries visible in historic maps, and magnetic noise likely caused by extractive waste from a nearby quarry.

1.0 Introduction

- 1.1 Pegasus Planning Group Limited commissioned Allen Archaeology Limited (AAL) to undertake a geophysical survey using magnetometry on land north and south of National Road, Cilfynydd, Wales prior to the submission of a planning application for a proposed Battery Energy Storage System (BESS) with Associated Infrastructure, Earthworks including On-Site Substation, Access, Drainage and Landscaping and Underground Cable Route Connection.
- 1.2 The site works and reporting conform to current national guidelines as set out in '*EAC Guidelines for the Use of Geophysics in Archaeology*' (EAC 2016), '*The Use of Geophysical Techniques in Archaeological Evaluations*' (Gaffney et al. 2002), the Chartered Institute for Archaeologists '*Standard and guidance for archaeological geophysical survey*' (CIfA 2020), and a Written Scheme of Investigation by this company (AAL 2023).
- 1.3 The documentation and records generated by the survey will be assembled and deposited in accordance with the guidelines in '*Archaeological Archives: A guide to best practice in creation, compilation, transfer and curation*' (Brown 2011), '*Archaeological Archives: Selection, Retention and Disposal Guidelines for Wales*' (WMF 2019) and '*RCAHMW Guidelines for Digital Archives*' (Edwards nd).
- 1.4 A digital copy of the report will be submitted to the client and to Glamorgan-Gwent Archaeological Trust via the planning application process. A digital copy of the report will be submitted to the Royal Commission for the Ancient and Historic Monuments of Wales, and the Glamorgan-Gwent Archaeological Trust Historic Environment Record, in accordance with the guidelines set out in '*Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)*' (The Welsh Archaeological Trusts 2022). Additionally, a summary account on the results of the geophysical survey in the form of an OASIS form will be forwarded to the ADS in York following the completion of the works.

2.0 Site Location and Description

- 2.1 Cilfynydd is a village in the county borough of Rhondda Cynon Taf, Wales, c.2km from the South Wales Valleys town of Pontypridd, and c.21km north of Cardiff. The proposed Battery Energy Storage System site is located c.2km northwest of the centre of Cilfynydd and is approximately 15 hectares of pasture. The site is centred at National Grid Reference (NGR) ST 09583 93386 (Figure 1).
- 2.2 The bedrock geology comprises mudstone, siltstone and sandstone of the Hughes Formation with superficial deposits of diamicton till formed in the Devensian period c.115,000 – c.11,700 years ago (<https://www.bgs.ac.uk/map-viewers/geoindex-onshore/>). Generally, mudstone, siltstone and sandstone are known to give a generally poor response to magnetometry, whilst the superficial deposit of diamicton till is very variable (English Heritage 2008).

3.0 Planning Background

- 3.1 The geophysical survey was undertaken to inform a planning application that will be submitted in due course for a proposed Battery Energy Storage System. This is the first stage of archaeological investigation, intended to provide detailed information that will allow the planning authority to make an informed decision as to whether further archaeological

investigations will be required prior to or following the determination of a planning application for the proposed development.

- 3.2 The site works and reporting conformed to current national guidelines as set out in ‘*EAC Guidelines for the Use of Geophysics in Archaeology*’ (EAC 2016), ‘*The Use of Geophysical Techniques in Archaeological Evaluations*’ (Gaffney et al. 2002) and the Chartered Institute for Archaeologists ‘*Standard and guidance for archaeological geophysical survey*’ (CIfA 2020).
- 3.3 The approach adopted is consistent with the recommendations of national planning policy, as set out in Planning Policy Wales (PPW 2024), section 6.1.
- 3.4 ‘*PPW provides the national planning policy framework for the consideration of the historic environment, and this is supplemented by guidance contained in Technical Advice Note 24: The Historic Environment and Cadw associated best practice guidance on the historic environment.*’ (6.14).
- 3.5 ‘*It is the responsibility of all those with an interest in the planning system, including planning authorities, applicants, developers and communities, to appropriately care for the historic environment in their area. The protection, conservation and enhancement of historic assets is most effective when it is considered at the earliest stage of plan preparation or when designing proposals new proposals.*’ (6.18).
- 3.6 ‘*Any decisions made through the planning system must fully consider the impact on the historic environment and on the significance and heritage values of individual historic assets and their contribution to the character of place.*’ (6.19).

4.0 Archaeological and Historical Background

- 4.1 This geophysical survey is part of a Heritage Statement which is being prepared for this site, and the information presented below is a summary of the data which will be included in the final document.

Prehistoric (pre-43 AD)

- 4.2 There are no records of prehistoric assets within the proposed development area. The wider landscape to the south contains records of prehistoric assets and predominantly comprising Bronze Age cairns and ridge dykes located with these features located along ridge lines and hill tops in the area.
- 4.3 Throughout the prehistoric period the known sites in the south Wales area show a distinction between settlements in the lowlands with funerary practices and displays of wealth on areas of high ground; this was noted to extend to dykes and other boundary features demarking territories, though it is acknowledged that preservation biased and the later reuses of these boundaries may hamper their survival in lowland areas which have undergone a greater level of redevelopment.

Romano-British (AD 43 - 410)

- 4.4 There are no known Roman assets within the site boundary. A possible Roman coin was located approximately 1km to the west (GGAT (hereafter Glamorgan-Gwent Archaeological Trust))

Reference 03253m) and another Roman coin, a denarius of Trajan, was located approximately 1.3km to the east-southeast of the site (GGAT 03254m).

- 4.5 Previous research in the southeast of Wales has focused on major Roman settlements and military sites, leading to an under-representation of the area's rural economy. It is known that in this area there was a reliance on imported grain from the south of England, hence the full complexity of the rural Roman economy in southeast Wales is poorly understood.

Early medieval - medieval (410 AD – 1539)

- 4.6 There are no known heritage assets from the early medieval period or medieval periods within the site or the wider study area.
- 4.7 Across the wider southwest region land uses are poorly understood outside of the Bristol Channel areas in early medieval times with this lack of research in the valleys extending into the medieval period.

Post-medieval - present (1540 – present)

- 4.8 There is one post-medieval asset recorded within the site's boundaries (GGAT 02203m) which is the site of a now demolished post-medieval domestic building. This asset sits outside the proposed location for any battery storage units or associated infrastructure. The site's wider environs contain assets associated with the agricultural economy of the area such as steadings, field boundaries and quarries (GGAT 10255m, 10256m, 01384m, 01853m, 02198m, 02220m, 02302m, 04878m and 04875m).

5.0 Geophysical Survey Methodology

- 5.1 The geophysical survey consisted of a detailed gradiometer survey of the development area (approximately 14.7ha). Some parts of the development area were not suitable for surveying being either too boggy, overgrown with bracken or too steep. This left an area of approximately 7.5ha that was suitable for surveying. The survey was undertaken using a multi-sensor cart system using 4 fluxgate magnetometers set 0.5m apart.

Summary of Survey Parameters

5.2 Fluxgate Magnetometer

Instrument:	Multi-sensor cart with 4 x Bartington Grad601 Fluxgate Gradiometer
Sample Interval:	0.20m
Traverse Separation:	0.5m
Traverse Method:	Continuous
Resolution:	0.1nT
Processing Software:	Terrasurveyor 3.0.38.0
Surface Conditions:	Stubble
Area Surveyed:	7.46 hectares
Date Surveyed:	Monday 6 th to Friday 10 th of November 2023
Surveyors:	Peter Masters BA (Hons)
Data Interpretation:	Benjamin Jenkins BSc (Hons) and Robert Evershed BSc (Hons)

Data Collection and Processing

- 5.3 A multi-sensor cart system was used to allow the geophysical surveyor to gather high quality data at a faster rate than is possible with other magnetic techniques. Four Grad601 fluxgate magnetometers were mounted on to a cart which was pushed across the site. GPS is completely integrated into the system, eliminating the need to mark up a set of survey lines. All instrument outputs could be seen in real time allowing instant quality control and analysis. The data collected from the survey has been analysed using Terrasurveyor 3.0.38.0. The resulting data set plots are presented with positive nT/m values and high resistance as black and negative nT/m values and low resistance as white.
- 5.4 The survey was undertaken with data collected at a sampling frequency of c.6Hz (c.0.20m sample interval – 5 readings /m). The zigzag traverse method of survey was used, with a 0.5m wide separation between fluxgate magnetometers covering a 2m wide swath at a time. The sensitivity of the fluxgate magnetometers was set to record magnetic variation in the order of 0.1 nT.
- 5.5 Geomar MLgrad601 data logging system was used to record data in the field using a Panasonic Toughbook. The main function of this program is to position each Grad601 sensor based on the recorded GPS position and the configuration of the system. Following the post-processing of the data in this software all data is exported to an ASCII file format.
- 5.6 The data collected from the survey was then imported into Terrasurveyor 3.0.38.0. The resulting data set plots are presented with positive nT/m values and high resistance as black and negative nT/m values and low resistance as white.

The data sets have been subjected to processing using the following filters:

- De-stripping
 - Clipping
- 5.7 The de-stripe process is used to equalise underlying differences between grids or traverses. Differences are most often caused by directional effects inherent to magnetic surveying instruments, instrument drift, instrument orientation (for example off-axis surveying or heading errors) and delays between surveying adjacent grids. The de-stripe process is used with care as it can sometimes have an adverse effect on linear features that run parallel to the orientation of the process.
- 5.8 The clipping process is used to remove extreme data point values which can mask fine detail in the data set. Excluding these values allows the details to show through.
- 5.9 Plots of the data are presented in processed linear greyscale (smoothed) with any corrections to the measured values or filtering processes noted, and as separate simplified graphical interpretations of the main anomalies detected.

6.0 Geophysical Survey Results (Figure 5)

- 6.1 For the purposes of interpreting the anomalies, the survey data has been processed to best reveal archaeological features within the results. All fields within the survey area were clipped to ± 3 nT/m. This enhances faint anomalies that may otherwise not be noted in the data, with a few anomalies identified across the data set. These are discussed in turn and noted as single- or double-digit numbers in square brackets. Positive anomalies represent material that is more magnetically susceptible than the surrounding material, with negative anomalies representing material that is less magnetically susceptible.
- 6.2 The areas of magnetic noise along the edges of each field [1] (Fields 1-6), [9] (Field 7), [10] (Field 9) produced readings of up to -100 to 100 nT/m and are likely the product of a build-up of modern waste around the edges of the fields and fencing along the field boundaries.
- 6.3 The irregular curvilinear positive features in the survey area [2] (Field 1), [3] (Field 2), [4] (Field 3), [5] (Field 4), [6] (Field 6), [12] (Field 7) have variable readings of 2 to 4 nT/m and are most likely palaeochannels.
- 6.4 The linear dipolar response in Field 2 [7] has readings of -100 to 100 nT/m and is most likely produced by a modern service.
- 6.5 The positive linear features within Field 7 [11], have readings of 2 to 3 nT/m, and loosely correspond to field boundaries marked on the 1885 OS map (Figure 8).
- 6.6 The areas of magnetic noise in Field 8 [13] and [14], have readings of -40 to 40 nT/m with some higher spikes, and are likely the product of extractive waste from the nearby Trefychan Quarry (Figure 8).
- 6.7 Scattered throughout the entire site are many weak and strong dipolar responses, examples of which are highlighted as [8] and [15]. The characteristic dipolar response of pairs of positive and negative 'spikes' suggest near-surface ferrous metal or other highly fired material in the topsoil, which could represent small pieces of metal such as nails, horseshoes, or parts of a tractor.

7.0 Discussion and Conclusions

- 7.1 The survey has revealed very little of archaeological significance. Scattered throughout the site were several palaeochannels, a few former field boundaries visible in historic maps, and magnetic noise likely caused by extractive waste from a nearby quarry.

8.0 Effectiveness of Methodology

- 8.1 The non-intrusive methodology employed is appropriate to the scale and nature of the site. Magnetometry was the prospection technique best suited to the identification of archaeological remains on the site. Other techniques would have required further justification and may have proved too time consuming or cost prohibitive.

9.0 Acknowledgements

- 9.1 Allen Archaeology Limited would like to thank REWE 2 for this commission.

10.0 References

- AAL, 2023, *Specification for a geophysical survey by magnetometry: Land off National Road, Cilfynydd, Rhondda Cynon Taf, Wales*, Allen Archaeology Ltd, unpublished planning document
- Aspinall, A, Gaffney, C, and Schmidt, A, 2008, *Magnetometry for Archaeologists*, Plymouth: Altamira Press
- CIfA, 2020, *Standard and guidance for archaeological geophysical survey*, Chartered Institute for Archaeologists, Reading
- Department for Levelling Up, Housing and Communities, 2023, *National Planning Policy Framework*. London: HMSO
- Edwards, G., nd, *RCAHMW Guidelines for Digital Archives*, RCAHMW
- English Heritage, 2008, *Geophysical Survey in Archaeological Field Evaluation*. English Heritage
- Europae Archaeologiae Consilium (EAC), 2016, *EAC Guidelines for the use of geophysics in Archaeology, Questions to Ask and Points to Consider. EAC Guidelines 2*. European Archaeological Council
- Gaffney, C., Gater J., and Ovenden, S., 2002, *The Use of Geophysical Techniques in Archaeological Evaluations. IFA Paper No. 6*. The Institute for Archaeologists
- PPW, 2024, *Planning Policy Wales: Edition 12*, Chapter 6: Distinctive and Natural Places
- The Welsh Archaeological Trusts, 2022, *Guidance for the Submission of Data to the Welsh Historic Environment Records (HERs)*
- WMF 2019, *Archaeological Archives: Selection, Retention and Disposal Guidelines for Wales*, Welsh Museums Federation

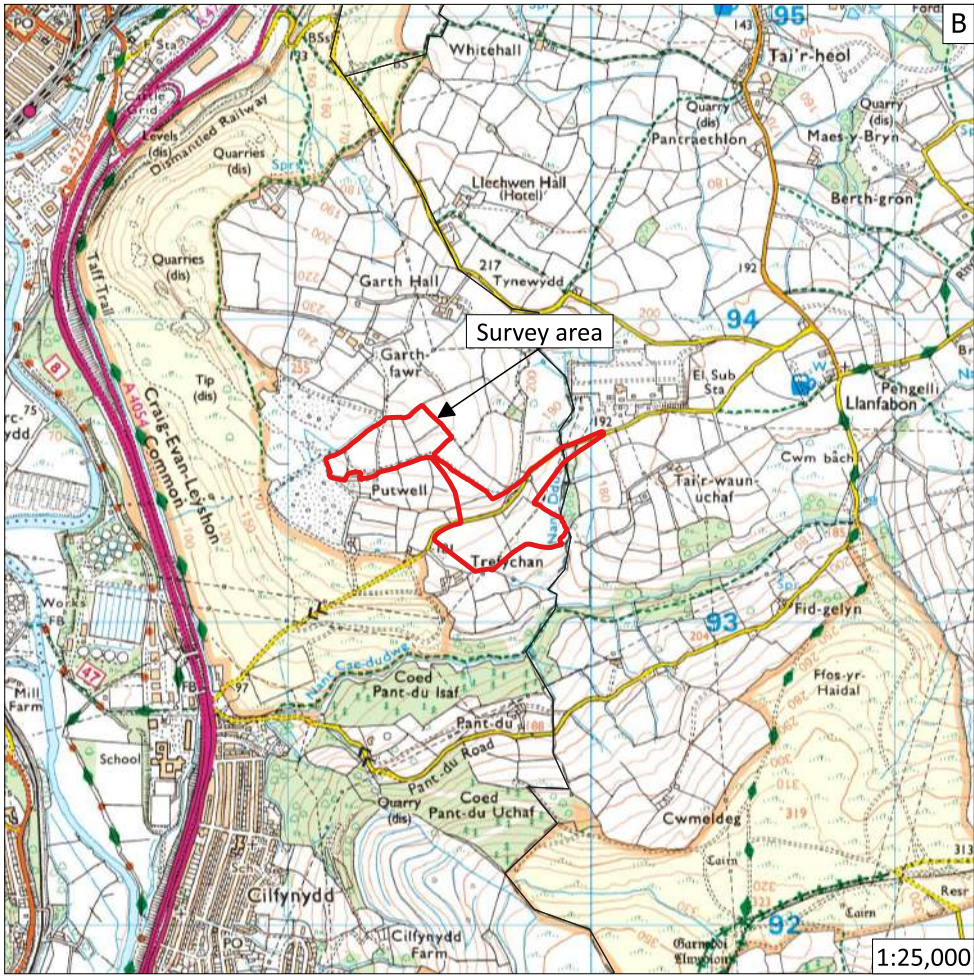
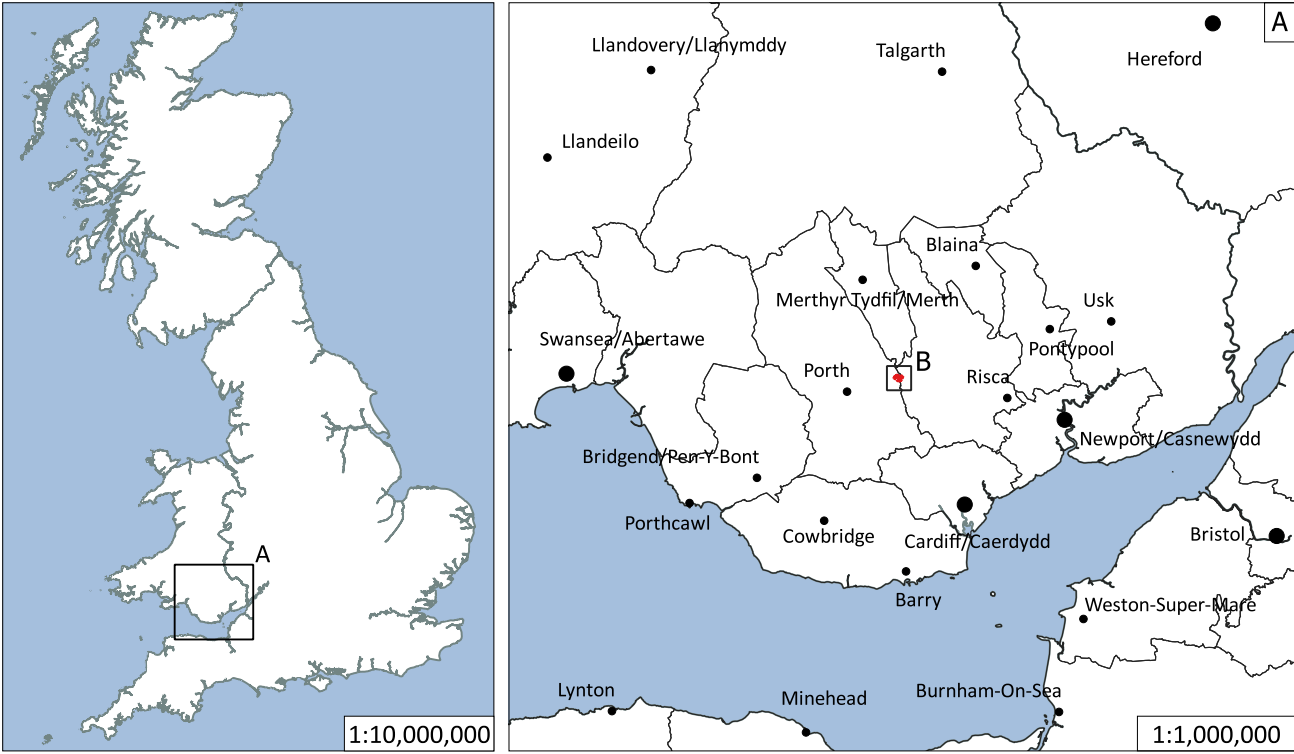


Figure 1: Survey area outlined in red

© Crown copyright 2000. All rights reserved. Licence Number 100047330

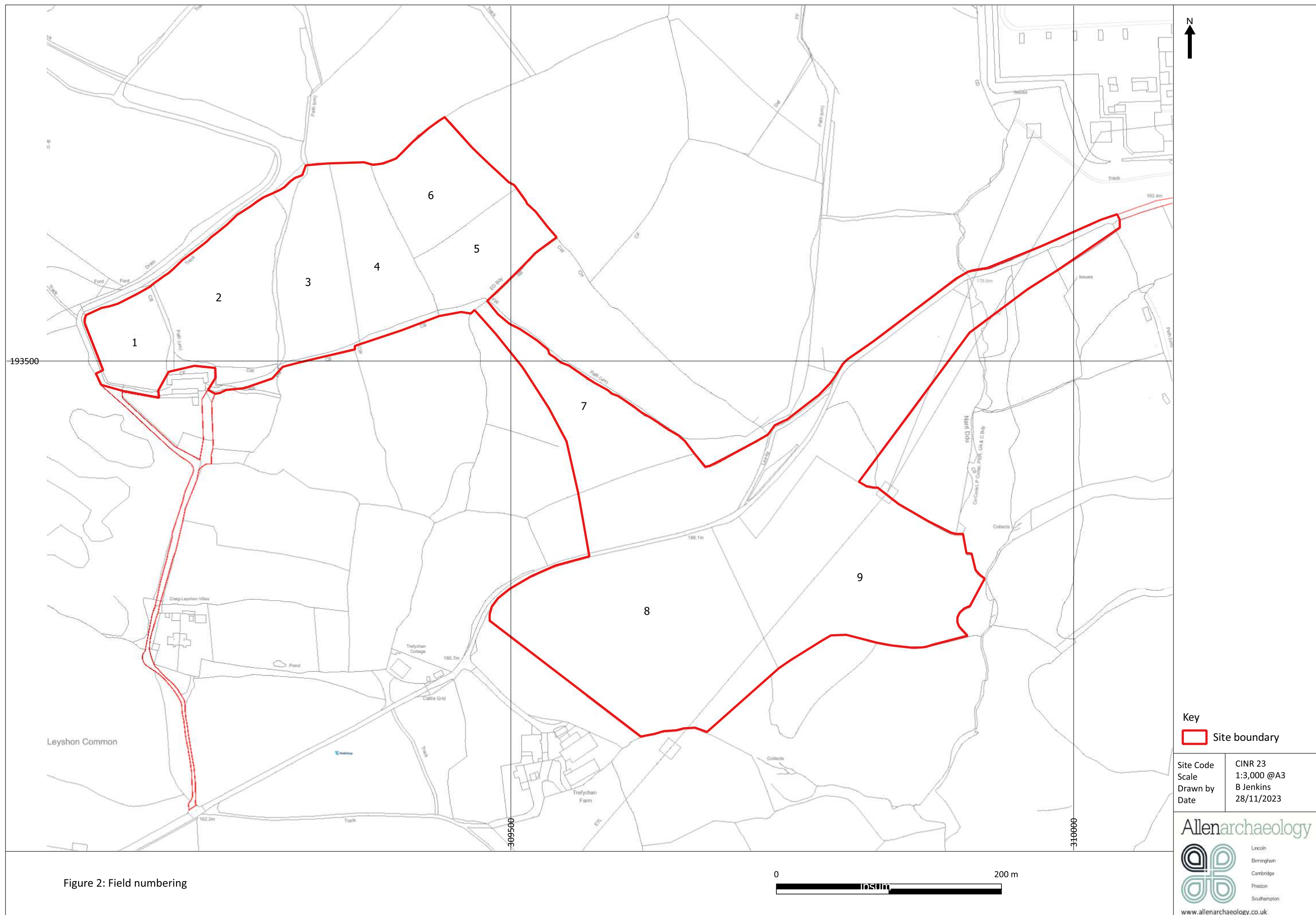
Site Code	CINR 23
Scale	1:10,000,000 1:1,000,000 1:25,000 @ A4
Drawn by	B Jenkins
Date	18/02/2025

Allenarchaeology



Lincoln
Birmingham
Cambridge
Preston
Southampton

www.allenarchaeology.co.uk





Raw data (clipped to +/- 40 nT)

Field 1

Field 2

Field 3

Field 4

Field 5

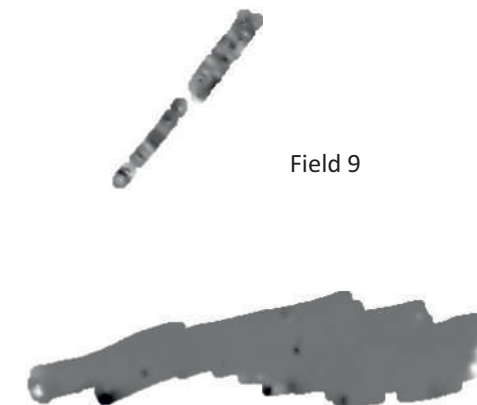
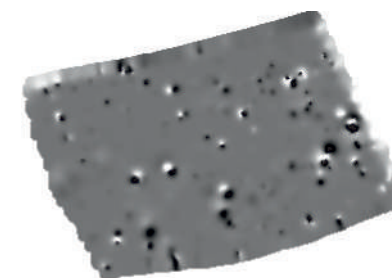
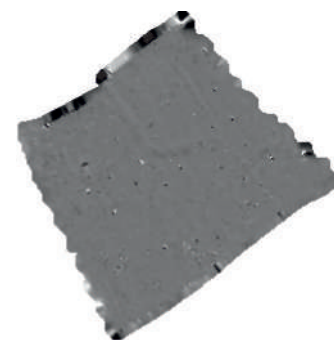


Field 6

Field 7

Field 8

Field 9

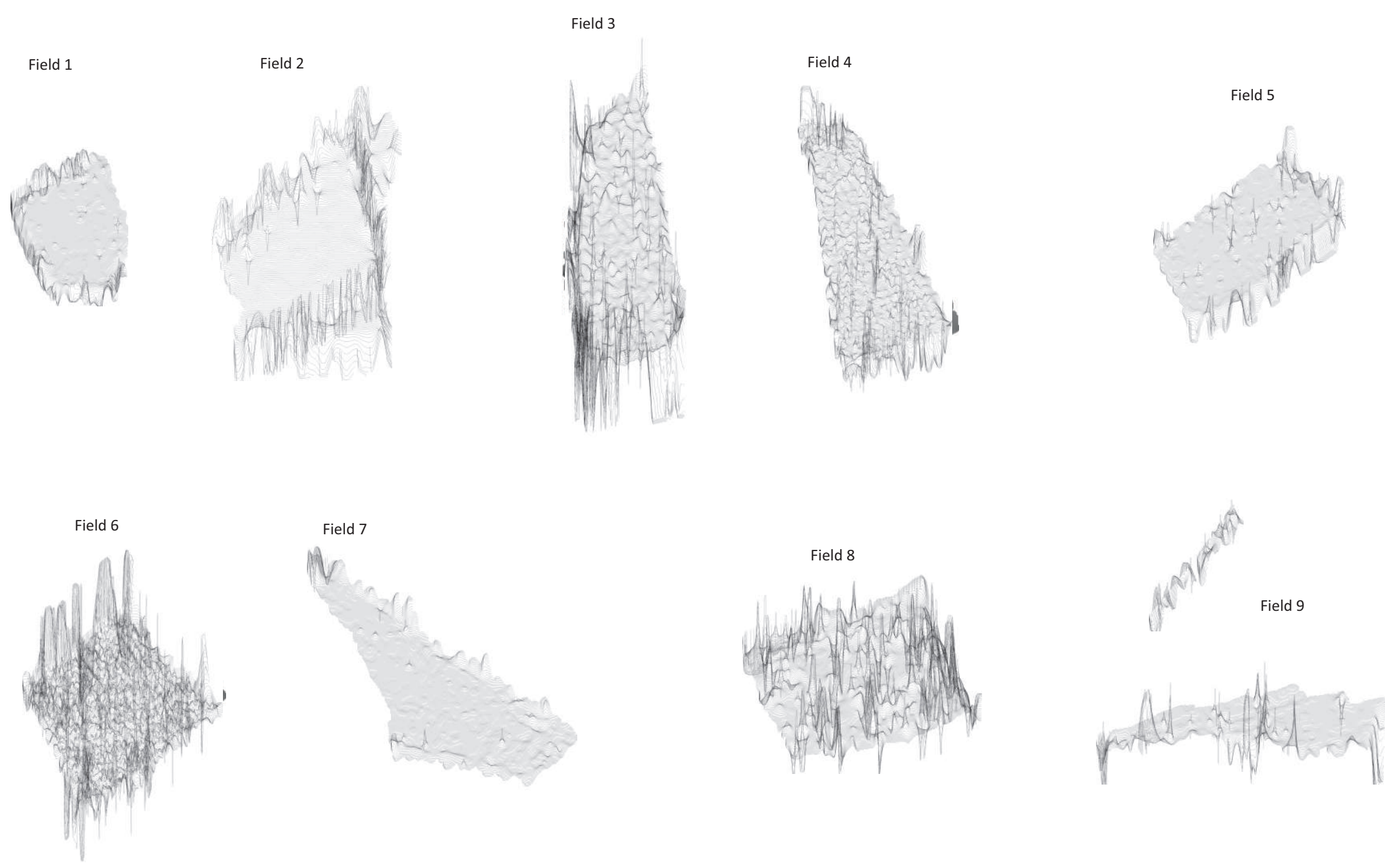


Site Code	CINR 23
Scale	1:3,000 @ A3
Drawn by	R Evershed
Date	17/11/23

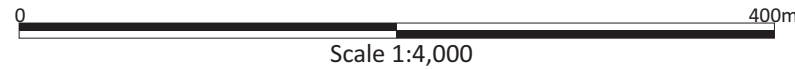
Figure 3: Greyscale raw data



Trace Plot (ZMT and clipped to +/- 25nT)



25nT



Site Code	HESL 23
Scale	1:4,000 @ A3
Drawn by	R Evershed
Date	15/11/23



Allenarchaeology

Lincoln
Birmingham
Cambridge
Southampton

www.allenarchaeology.co.uk

Figure 4: Processed trace plots



Figure 5: Processed greyscale plot and interpretation of fields 1-6

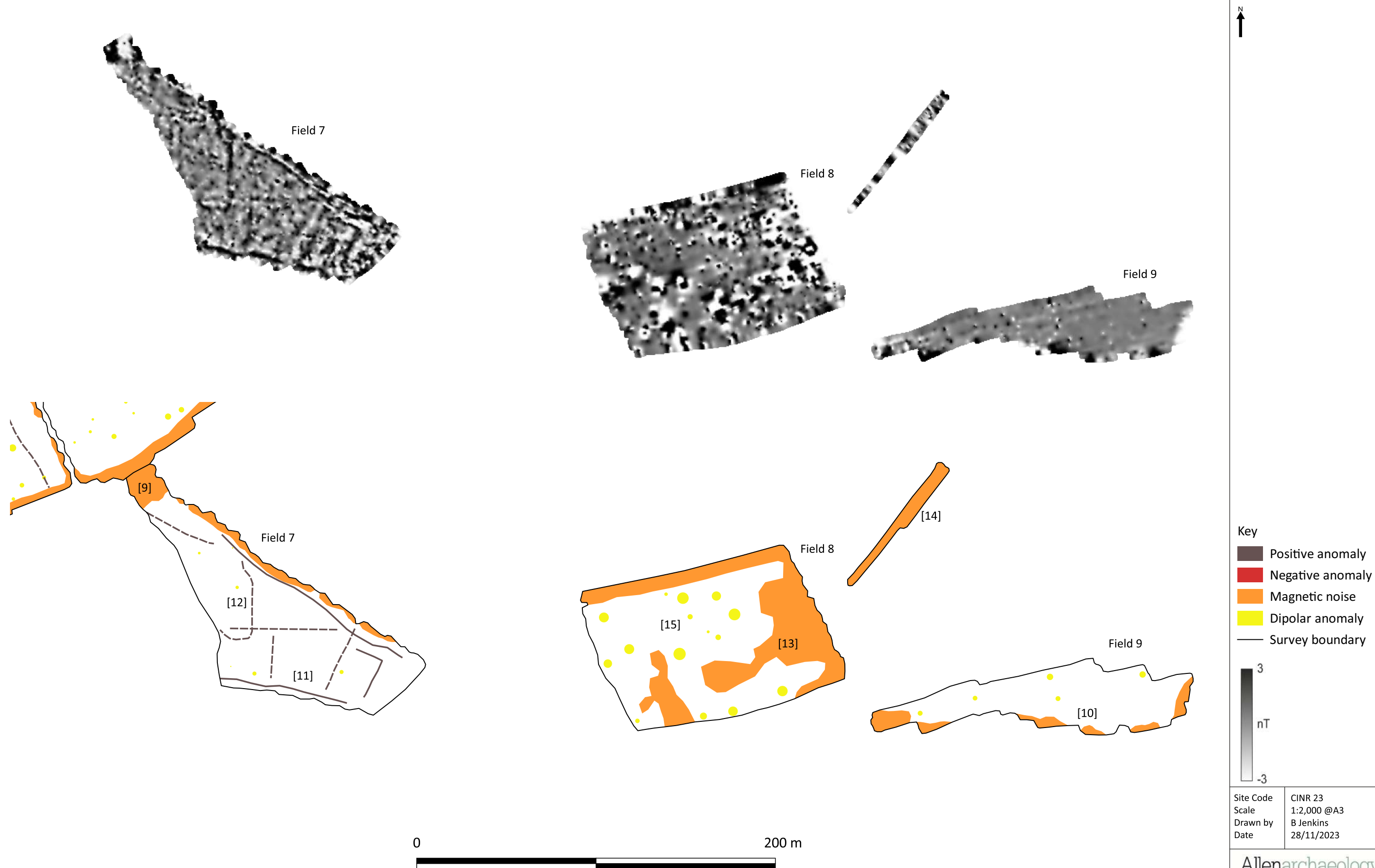
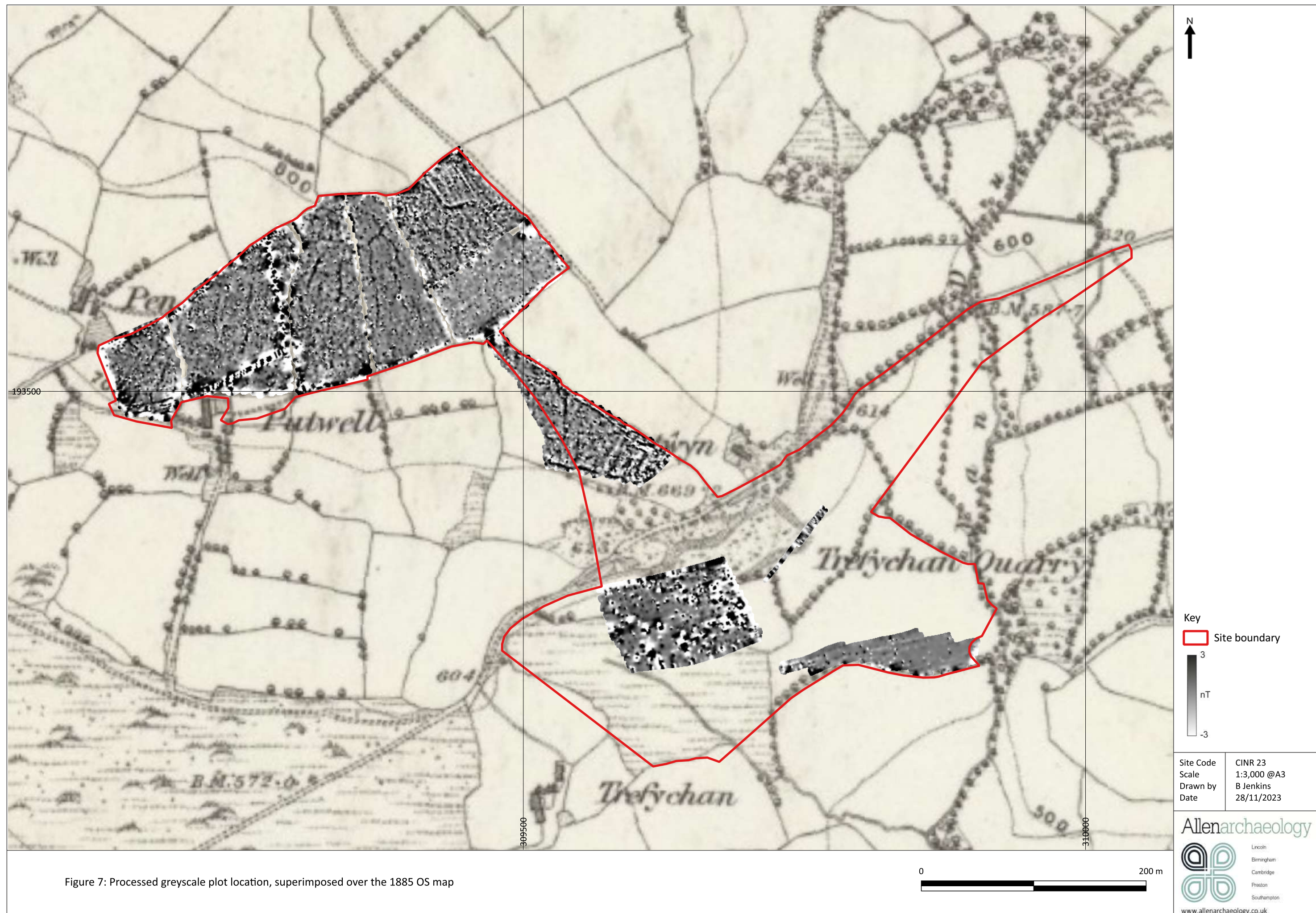
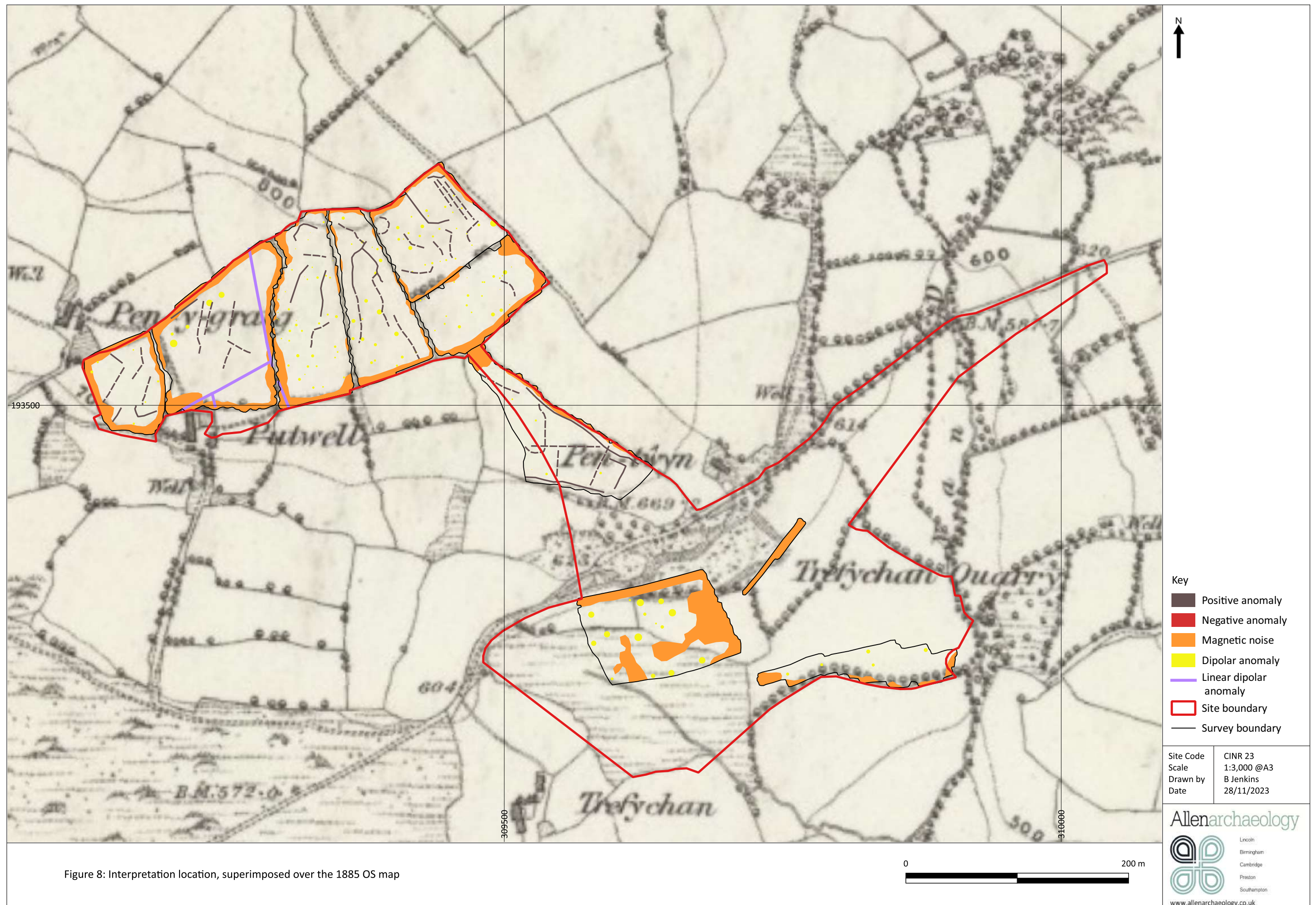


Figure 6: Processed greyscale plot and interpretation of fields 7-9







Allen Archaeology Limited
www.allenarchaeology.co.uk

Company Registered in England and Wales No: 6935529

Lincoln
Whisby Lodge
Hillcroft Business Park
Whisby Road
Lincoln
Lincolnshire
LN6 3QL

T: +44 (0) 1522 685356
E: info@allenarchaeology.co.uk

West
Arion Business Centre
Harriet House
118 High Street
Birmingham
B23 6BG
T: +44 (0) 800 610 2545
E: birmingham@allenarchaeology.co.uk

South
International House
Southampton International Business
Park
George Curl Way
Southampton
SO18 2RZ

T: +44 (0) 800 610 2555
E: southampton@allenarchaeology.co.uk

East
Wellington House
East Road
Cambridge
Cambridgeshire
CB1 1BH
T: +44 (0) 800 610 2550
E: cambridge@allenarchaeology.co.uk

Northwest
Office 4
Barbury House,
8 Hardy Close,
Nelson Court Business Centre,
Preston,
PR2 2XP

T: +44 (0) 1772 963039
M: +44 (0) 7710 099052
E: northwest@allenarchaeology.co.uk