

**LAND NORTH OF WHEAL ALBERT
GOONHAVERN
PERRANZABULOE
CORNWALL**

Results of a Geophysical Survey



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LAND NORTH OF WHEAL ALBERT, GOONHAVERN, PERRANZABULOE, CORNWALL

RESULTS OF A GEOPHYSICAL SURVEY

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Work undertaken by SWARCH for Cornwall Council (The Client)

SUMMARY

This report presents the results of a geophysical survey carried out by South West Archaeology Ltd. (SWARCH) on land north of Wheal Albert, Goonhavern, Perranzabuloe, Cornwall. The site comprises four fields located approximately 1km east of Goonhavern, to the south of an unadopted track/bridleway to Lanteague Farm between the A3075 and Scotland Road. The 19th century Wheal Albert mine and line of an early 20th century railway lie immediately to the south of the site.

The geophysical survey identified 6 groups of anomalies. These were predominantly linear anomalies associated with historic boundaries, possible agricultural activity or topographically related geological variation, and ground disturbance associated with Wheal Albert mine, but also included a small number of pits.

The results of the geophysical survey would suggest that the archaeological potential of the site is low, the identified anomalies in the northern part of the survey area likely relating to agricultural use of and post-medieval sub-division of common lands; the southern part historically mapped as rough grassland and containing spoil mounds associated with 19th century mining. Any further archaeological works undertaken on the site would both substantiate the geophysical survey and better characterise the nature and condition of any potential buried archaeological resource.



September 2020

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1.0 INTRODUCTION

LOCATION:	LAND NORTH OF WHEAL ALBERT, GOONHAVERN
PARISH:	PERRANZABULOE
COUNTY:	CORNWALL
NGR:	SW 179855 53760
SWARCH REF.	GWA20

1.1 PROJECT BACKGROUND

South West Archaeology Ltd. (SWARCH) was commissioned by Cornwall Council to undertake a geophysical survey on land north of Wheal Albert, Goonhavern, Perranzabuloe, Cornwall, as a precursor to the use of the site as a temporary works compound. This work was undertaken in consultation with the Local Planning Authority and in accordance with best practice and ClfA guidance.

1.2 TOPOGRAPHICAL BACKGROUND

The site is located approximately 1km east of Goonhavern, to the south of an unadopted track/bridleway to Lanteague Farm between the A3075 and Scotland Road. It covers four fields with moderately sloping south facing slopes, which become level at their southern ends at an altitude of between c.70-75m AOD (Figure 1).

1.3 HISTORICAL AND ARCHAEOLOGICAL BACKGROUND

The site is situated parish of Perranzabuloe, in the Hundred and Deanery of Pyder, on land belonging to the Domesday manor of Tywarnhayle, held by Robert Count of Mortain from the Canons of St Petroc (Williams & Martin 1992) and subsequently through the Duchy of Cornwall, until it was purchased by John Thomas, Esq. of Chiverton in 1798 (Lysons 1814). The 1841 Perranzabuloe tithe award records the land as owned by Stephen and Richard Davey and variously occupied by John Brimmcombe and Christopher Pollard. The surrounding land formed part of Tywarnhayle Common.

The historic landscape in this area is characterised by the Cornwall and Scilly Historic Landscape Characterisation (HLC) as *post-medieval enclosed land*, enclosed in the 17th, 18th and 19th centuries from land that was previously upland rough ground and/or medieval commons. The proposed site lies in a wider prehistoric landscape, the Cornwall and Scilly Historic Environment Record (HER) recording possible barrows in all directions and settlement to the east. Much of the surrounding landscape also contains evidence of medieval farming and settlement; though it is post-medieval and modern activity that most closely surrounds the site with the 19th century Wheal Albert lead mine and 20th century branch of the Chacewater & Newquay line of the Great Western Railway both to the immediate south.

Historic mapping (see Appendix 1) shows that by the mid-19th century the site was formed of a combination of common land and plots associated with cottages. In 1841 the Perranzabuloe tithe map shows the site as containing four small parcels of land and part of the wider Tywarnhayle Common, including a cottage (plot 300). By the end of the century the common had been significantly divided up into small rectangular parcels of land with wider open areas used for mining. By the early 20th century further development saw the creation of the Chacewater & Newquay railway across the site of the now disused Wheal Albert mine, whilst some of the surrounding cottages had been demolished, including the one within the site.

Relatively few archaeological investigations have taken place in the immediate area. An archaeological assessment with walkover was undertaken of land at Monkey Tree Campsite (Bampton *et al* 2014); with geophysical surveys at Goonhavern (Sharp 2013; ECO4346, ECO4404, ECO5063; Boyd *et al* 2018) and at Hendra Croft (Webb 2019); and a limited excavation at St Piran's Round (Cole 2005).

1.4 METHODOLOGY

This work was undertaken in accordance with current best practice and ClfA guidance. Any desk-based assessment aspect of this report follows the guidance as outlined in: *Standard and Guidance for Archaeological Desk-Based Assessment* (ClfA 2014a) and *Understanding Place: historic area assessments in a planning and development context* (English Heritage 2012). The geophysical (gradiometer) survey follows the general guidance as outlined in: *EAC Guidelines for the use of geophysics in Archaeology: Questions to Ask and Points to Consider* (Europae Archaeologiae Consilium/European Archaeological Council 2016); *Geophysical Survey in Archaeological Field Evaluation* (English Heritage 2008) and *Standard and Guidance for Archaeological Geophysical Survey* (ClfA 2014b).



FIGURE 1: SITE LOCATION (THE SITE IS INDICATED).

2.0 GEOPHYSICAL SURVEY

2.1 INTRODUCTION

An area of c.0.60ha was the subject of a magnetometry (gradiometer) survey. The purpose of this survey was to identify and record geophysical anomalies within the proposed site. While anomalies identified via magnetometry may relate to archaeological deposits and structures the dimensions of recorded anomalies may not correspond directly with any associated features. The following discussion attempts to clarify and characterise the identified anomalies. The survey was undertaken on the 16th of September 2020 by P. Webb; the survey data was processed by P. Webb. Additional graphic images of the survey data and numbered grid locations can be found in Appendix 2; and supporting photographs for the site inspection can be seen in Appendix 3.

2.2 SITE INSPECTION

The site is located across parts of four rectangular fields; the geophysical survey only being carried out across parts of the two easternmost of the fields. The land predominantly slopes moderately steeply down to south, where it becomes relatively level; and is currently under relatively short pasture, though the southern end has significant taller reed growth. The field boundaries are heavily overgrown with internal wooden (north, east, and west boundaries) and concrete (southern boundary) post-&-wire fences, though evidence of a stone-faced bank was visible in the boundary between the two surveyed fields. To the north of the site is a bridleway joining to an unadopted road/track; to the south an overgrown dismantled railway line; and to the east and west pastoral fields. A large spoil mound associated with the Wheal Albert mine and further irregular undulations were visible all along the southern edge of the survey area.



FIGURE 2: VIEW ALONG THE SOUTHERN EDGE OF THE SITE TO THE EXISTING SPOIL MOUND, DETAILING THE UNDULATIONS AND REED GROWTH OF THIS AREA; VIEWED FROM THE WEST-NORTH-WEST.

2.3 METHODOLOGY

The gradiometer survey follows the general guidance as outlined in: *EAC Guidelines for the use of geophysics in Archaeology: Questions to Ask and Points to Consider* (Europae Archaeologiae Consilium/European Archaeological Council 2016), *Geophysical Survey in Archaeological Field Evaluation* (English Heritage 2008) and *Standard and Guidance for Archaeological Geophysical Survey* (ClfA 2014b).

The survey was carried out using a twin-sensor fluxgate gradiometer (Bartington Grad601). These machines are sensitive to depths of up to 1.50m. The survey parameters were: sample intervals of 0.25m, traverse intervals of 1m, a zigzag traverse pattern, traverse orientation was circumstantial, grid squares of 30x30m. The gradiometer was adjusted ('zeroed') every 0.5-1ha. The survey grid was set out by tape and tied into the Ordnance Survey National Grid post-processing. The data was downloaded onto *Grad601 Version 3.16* and processed using *TerraSurveyor Version 3.0.36.0*. The primary data plots and analytical tools used in this analysis were *Shade* and *Metadata*. The details of the data processing are as follows:

Processes:

Clip +/- 3SD; DeStripe all traverses, median; DeStagger all traverses out- and inbound by 0.50cm.

Details: 0.5977ha surveyed; Max. 108.10nT, Min. -102.99nT; Standard Deviation 13.60nT, mean -0.95nT, median 0.00nT.

2.4 RESULTS

Table 1 with the accompanying Figures 3 and 4 show the analyses and interpretation of the geophysical survey data.

TABLE 1: INTERPRETATION OF GRADIOMETER SURVEY DATA.

Anomaly Group	Class and Certainty	Form	Archaeological Characterisation	Comments
1	Weak-moderate positive and negative, probable	Linear	Historic boundary	Indicative of banked material flanked by cut and in-filled features such as ditches. Aligned approximately north to south and east to west. Responses of between -17.06nT and +30.08nT.
2	Moderate-strong positive, probable	Linear	Historic boundary	Indicative of a cut and in-filled feature such as a ditch. Aligned approximately east to west. Responses of between +10.34nT and +53.41nT.
3	Weak-moderate positive and negative	Linear	Agricultural activity / geological	Alternating linear features indicative of cut and in-filled features such as ditches with flanking banked material suggestive ploughing. Responses of between -22.67nT and +17.28nT.
4	Weak-moderate positive, possible	Discrete ovoid	Pit	Indicative of cut and in-filled discrete features such as pits. Responses of between +2.15nT and +18.68nT.
5	Very strong mixed positive and negative, possible	Rectangular	Modern disturbance	Mixed responses indicative of disturbed ground, including metallic debris. May obfuscate archaeological features. Responses of between -90.49nT and +89.40nT.
6	Very strong dipolar (mixed response)	Discrete ovoid	Ferrous anomaly	Indicative of large metallic object. Responses of between -99.11nT and +102.06nT.
	Strong dipolar (mixed response)	Discrete	Ferrous anomaly	Indicative of metallic object. Responses of between -98.54nT and +99.69nT.
	Strong bipolar	Irregular	Modern disturbance	Indicative of disturbed ground and disturbance caused by proximity to metallic fences and debris. Responses of between -100.32nT and +91.38nT.

2.5 DISCUSSION

The survey identified 6 groups of anomalies. These were predominantly linear anomalies likely associated with historic boundaries, possible agricultural activity, and modern ground disturbance. The identified anomaly groups include: historic field boundaries; agricultural activity; possible pits; and evidence of ground disturbance. The background geological variation across the site was between $\pm 2\text{nT}$.

Anomaly Group 1 consists of weak to moderate negative (-17.06nT to -0.36nT) linear anomalies indicative of banked material flanked to both sides by moderate positive ($+5.50\text{nT}$ to $+30.08\text{nT}$) linear anomalies indicative of cut and in-filled features such as ditches. Two sets are present, one orientated approximately north to south and the other approximately east to west, along the lines of elements of the existing field-system and corresponding to boundaries depicted on 19th century mapping.

Anomaly Group 2 consists of a moderate to strong positive ($+10.34\text{nT}$ to $+53.41\text{nT}$) linear anomaly indicative of a cut and in-filled feature such as a ditch. It is aligned approximately east to west, immediately to the south of an existing boundary, and roughly corresponds to the line of a boundary depicted on 19th century mapping.

Anomaly Group 3 consists of a series of alternating weak to moderate negative (-22.67nT to -1.45nT) and positive ($+1.24\text{nT}$ to $+17.28\text{nT}$) linear anomalies indicative of cut and in-filled features with associated bank material. The repeated occurrence and regularity of these features suggests that they are associated with ploughing and agricultural activity; though they only occur where the topography changes and may reflect naturally formed lynchets and/or geological variation.

Anomaly Group 4 comprises a pair of weak to moderate positive ($+2.15\text{nT}$ to $+18.68\text{nT}$) discrete ovoid anomalies indicative of cut and in-filled features such as pits. Given the proximity of the site to the former Wheal Albert mine, it is possible that they are associated prospecting pits.

Anomaly Group 5 consists of a sub-rectangular area of mixed very strong negative (-90.49nT to -4.20nT) and positive ($+2.11\text{nT}$ to $+89.40\text{nT}$) indicative of disturbed ground. Given its position, to the immediate south-west of an existing spoil mound associated with the former Wheal Albert mine it likely represents a continued spread of this material. The presence of archaeological features may be obfuscated beneath this material.

Anomaly Group 6 consists of very strong dipolar (-99.11nT to $+102.06\text{nT}$) discrete ovoid anomaly indicative of a buried large metallic object and is likely associated with the disturbed ground of anomaly Group 5.

Modern disturbance, dipolar anomalies and magnetic disturbance area also located across the site, particularly around the site and field boundaries. This is likely due to the presence of ferrous objects and other metallic debris and the metallic components of fence lines and field boundaries.



FIGURE 3: SHADE PLOT OF GRADIOMETER SURVEY; MINIMAL PROCESSING.



FIGURE 4: INTERPRETATION OF GRADIOMETER SURVEY DATA.

3.0 CONCLUSION

The site comprises parts of four fields located to the north of the 19th century Wheal Albert mine and along the northern edge of an early 20th century dismantled railway to the east of Goonhavern. Parts of the two eastern fields were subject to geophysical survey.

The geophysical survey identified 6 groups of anomalies. These were predominantly linear anomalies associated with historic boundaries, possible agricultural activity or topographically related geological variation, and ground disturbance associated with Wheal Albert mine, but also included a small number of pits.

The results of the geophysical survey would suggest that the archaeological potential of the site is *low*, the identified anomalies in the northern part of the survey area likely relating to agricultural use of and post-medieval sub-division of common lands; the southern part historically mapped as rough grassland and containing spoil mounds associated with 19th century mining. Any further archaeological works undertaken on the site would both substantiate the geophysical survey and better characterise the nature and condition of any potential buried archaeological resource.

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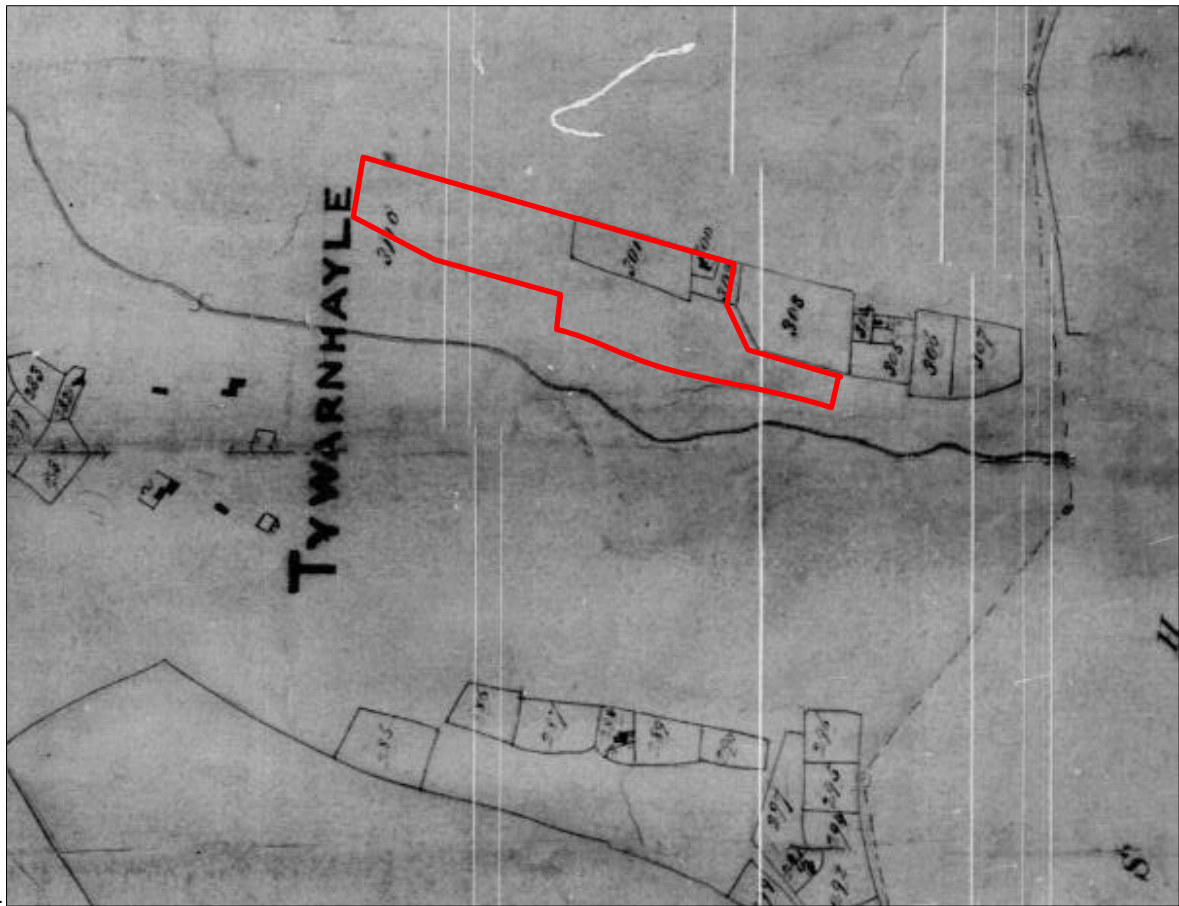
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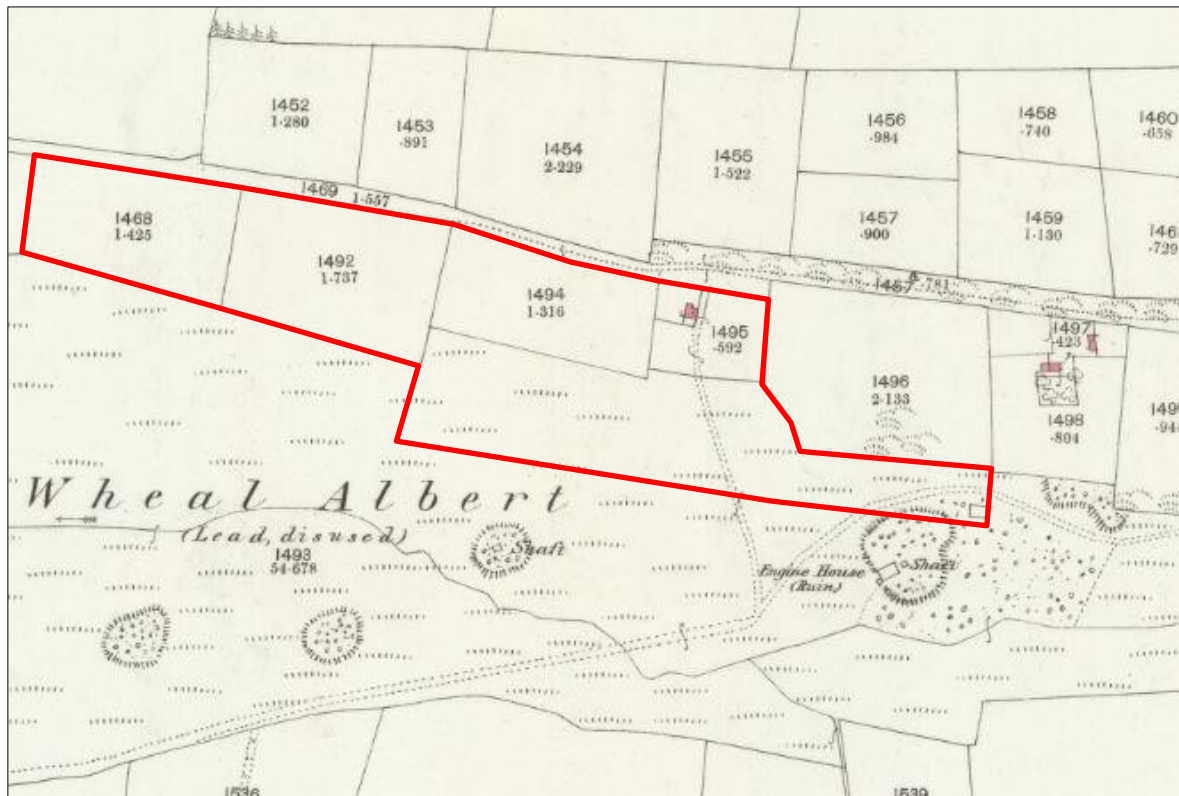
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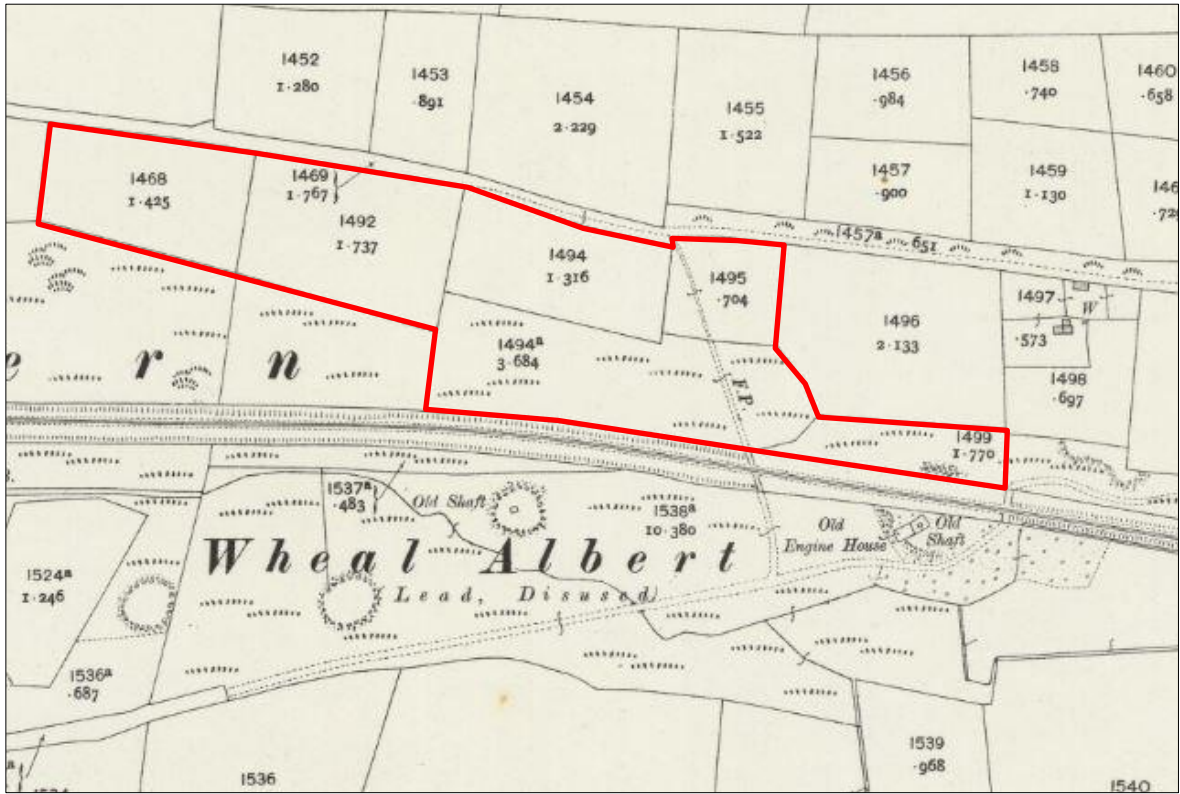
APPENDIX 1: HISTORICAL BACKGROUND SUPPORTING SOURCES



1. EXTRACT FROM THE PERRANZABULOE TITHE MAP OF 1841; THE EXTENT OF THE SITE IS INDICATED (THE GENEALOGIST).



2. EXTRACT FROM THE FIRST EDITION ORDNANCE SURVEY 25" MAP OF 1880; THE EXTENT OF THE SITE IS INDICATED (NLS).

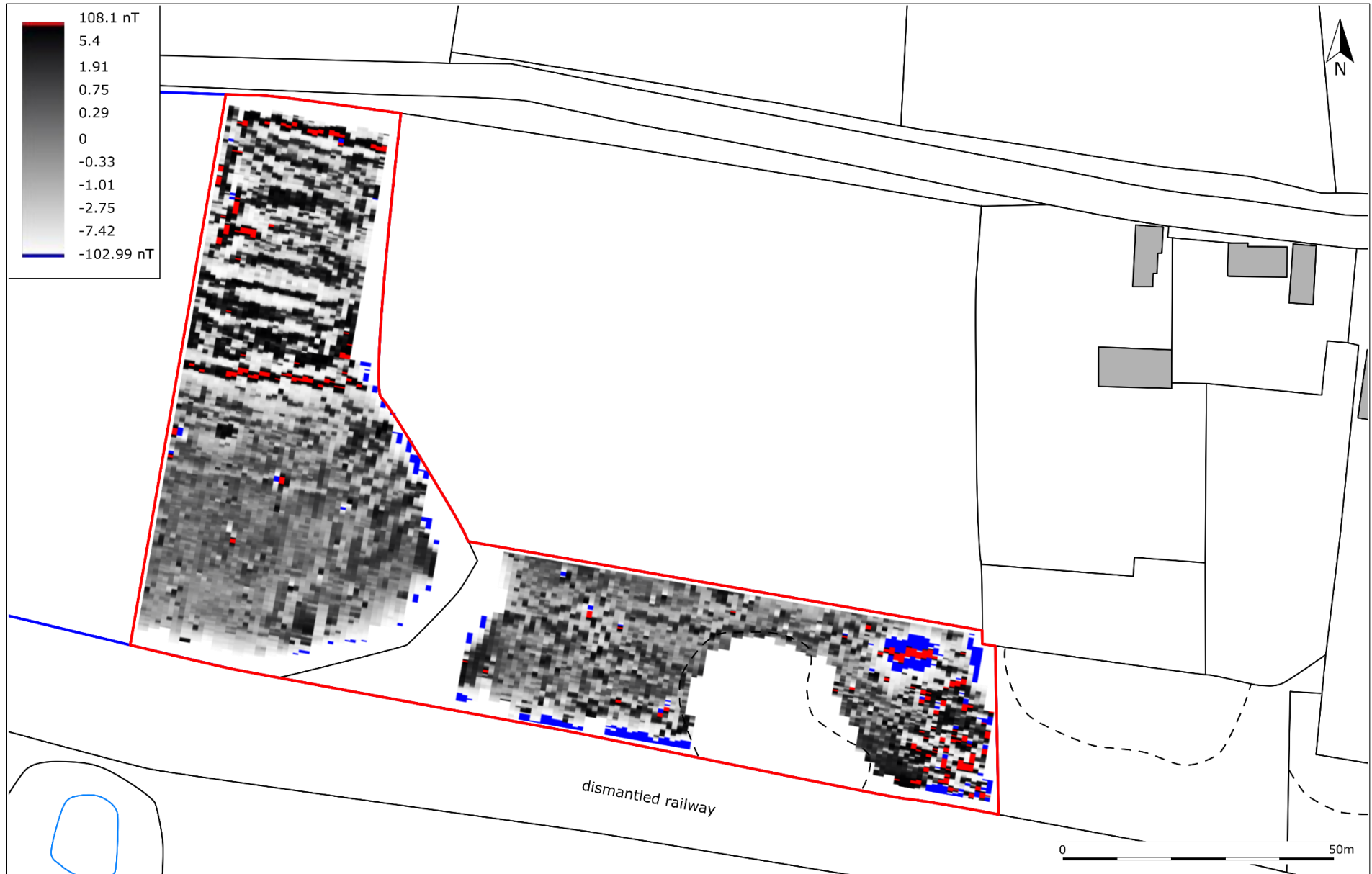


3. EXTRACT FROM THE SECOND EDITION ORDNANCE SURVEY 25" MAP OF 1907; THE EXTENT OF THE SITE IS INDICATED (NLS).

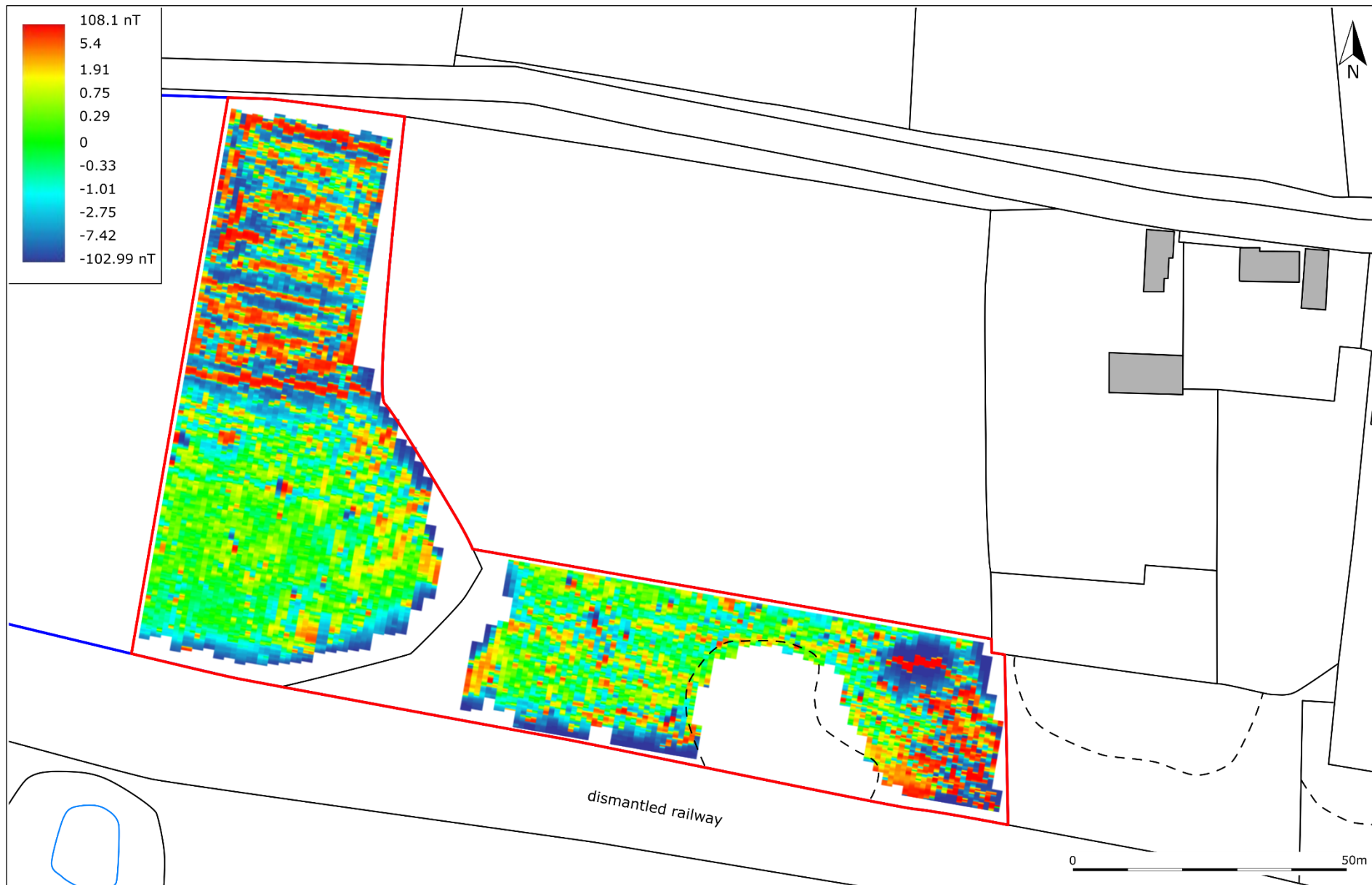
APPENDIX 2: ADDITIONAL GRAPHICAL IMAGES ASSOCIATED WITH THE GEOPHYSICAL SURVEY



1. GEOPHYSICAL SURVEY GRID LOCATION AND NUMBERING.



2. RED-GREY-BLUE SHADE PLOT OF GRADIOMETER SURVEY DATA; BAND WEIGHT EQUALISED.



3. RED-GREEN-BLUE SHADE PLOT OF GRADIOMETER SURVEY DATA; BAND WEIGHT EQUALISED.

APPENDIX 3: SUPPORTING PHOTOGRAPHS



1. VIEW ACROSS THE WESTERN HALF OF THE SURVEY AREA; VIEWED FROM THE NORTH.



2. VIEW ACROSS THE SOUTHERN HALF OF THE SURVEY AREA; VIEWED FROM THE NORTH-NORTH-WEST.



3. VIEW ACROSS THE SOUTHERN HALF OF THE SURVEY AREA; VIEWED FROM THE NORTH-EAST.



4. DETAIL OF THE SITE OF A FORMER RING FEEDER IN THE NORTH-WEST CORNER OF THE SURVEY AREA; VIEWED FROM THE SOUTH-EAST.



5. VIEW LONG THE UNDULATING 'ROUGH GRASSLAND' WITH REEDS THAT FORMS THE SOUTHERN EDGE OF THE SITE; VIEWED FROM THE EAST.



6. DETAIL OF STONE FACING TO THE VERY OVERGROWN BOUNDARY BETWEEN THE TWO EASTERN FIELDS; VIEWED FROM THE SOUTH.



7. DETAIL OF UNDULATIONS ACROSS THE SOUTHERN EDGE OF THE SITE (SOUTH-WEST CORNER OF EASTERN FIELD); VIEWED FROM THE NORTH-EAST.



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