

An archaeological magnetometer survey

Land off Francis Road, Trebetherick Wadebridge, Cornwall

Centred on NGR (E/N): 193308,078468

Report: 1806FRA-R-1

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13 July 2018

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1 Introduction

This report presents the results of an archaeological geophysical survey at the site listed in Section 2 and shown in Figure 1, hereafter referred to as the 'Survey Area'. It was commissioned by Cotswold Archaeology Limited on behalf of clients in relation to planning application PA18/01515 to Cornwall Council for Outline Planning Permission for the construction of 10 new holiday homes. The commissioning of this report was in keeping with the National Planning Policy Framework, Paragraph 128 (Department for Communities and Local Government, 2012).

The survey and report were completed in compliance with a Written Scheme of Investigation (Dean, 2018) approved by Cornwall Council.

2 Survey description

2.1 Survey

Method: shallow depth magnetometer survey Instrument: twin-sensor fluxgate gradiometer

Date: 25 June 2018 Area: 0.8ha

2.2 Location

Location: Land off Francis Road

Address: Francis Road, Trebetherick, Wadebridge,

Cornwall PL27 6TR St Minver Lowlands

Civil Parish: St Minver Lowla
District: North Cornwall
Country Cornwall

County: Cornwall

Survey centre NGR: SW 93308 78468 (point) Survey centre NGR (E/N): 193308,078468 (point)

Historic environment designation: None

2.3 Client

Cotswold Archaeology Ltd, Unit 53 Basepoint Business Centre, Yeoford Way, March Barton Trading Estate, Exeter, Devon EX2 8LB

3 Summary

A magnetometer survey was selected to provide a relatively fast and cost-effective evaluation of any buried archaeology across the Survey Area (see Section 12). The magnetic anomaly groups pertaining to potential buried archaeology were georeferenced to the Ordnance Survey National Grid, mapped, characterised and assigned with an appropriate degree of certainty in conformance with the survey aims and objectives set out in Section 4.

The differences in magnetic responses across the Survey Area were sufficient to be able to differentiate between anomalies representing possible buried archaeology and background magnetic responses.

Four magnetic anomaly groups have been characterised as representing potential buried archaeology. Of these, one is most likely to represent a former field boundary, possibly of the Cornish Bank type, which is not recorded on historic Ordnance Survey maps or on the 1843 St Minver tithe map. One group may represent a linear archaeological feature such as a ditch. The remaining two groups may represent linear archaeological deposits or relatively recent ploughing disturbance. No geophysical evidence was found for two conjoined enclosures recorded in the Devon County Council Historic Environment Record as lying within the survey area.

4 Aims and objectives

4.1 Aims

1. Within the framework set out in Chartered Institute for Archaeologists (2014a), complete an

- archaeological geophysical survey and report which will, as far as possible, establish the presence or absence, extent and character of any buried archaeology within the survey area.
- 2. Provide sufficient information on the nature of any archaeological remains to facilitate the assessment of their interest prior to the determination of the planning application.

4.2 Objectives

- 1. Complete a magnetometer survey across the Survey Area.
- 2. Identify any magnetic anomalies that may be related to buried archaeology.
- 3. Within the limits of the technique and dataset, archaeologically characterise any such anomalies or patterns of anomalies.
- 4. Accurately record the location of the identified anomalies.
- 5. Produce a report based on the survey that is sufficiently detailed to inform any subsequent development on the survey area about the location and possible archaeological character of the recorded anomalies.

5 Standards

The standards used to complete this survey are defined by the Chartered Institute for Archaeologists (2014a) and Historic England (2008). The codes of approved practice that were followed are those of the Chartered Institute for Archaeologists (2014b) and Archaeology Data Service (undated).

6 Methodology

The magnetometer survey was undertaken in accordance a Written Scheme of Investigation (Dean, 2018) to achieve the aims and objectives set out in Section 4 using the standards and guidance specified in Section 5. The survey method was selected to provide a relatively fast and cost-effective evaluation of any buried archaeology across the Survey Area (see Section 12).

Data processing was undertaken using appropriate software (Table 2), with all anomalies being digitised and geo-referenced. The final report (this document) includes a graphical and textual account of the techniques undertaken, the data obtained and an archaeological interpretation of that data and conclusions about any likely archaeology. The survey and report conform to the Chartered Institute for Archaeologists standard for geophysical survey (CIfA, 2014a).

7 Survey Area

7.1 Location

The survey area, hereafter referred to as the 'Survey Area' lies within a large grass field with holiday cottages and access roads, hereafter referred to as the 'Site' (Figure 1). The Site has domestic dwellings and access roads to the north, domestic dwellings and holiday cottages along Francis Road to the east, holiday cottages to the south along Francis Lane and agricultural fields to the west (Figure 1).

The Survey Area is bound to the north by a hedge, fencing and an access road to two properties. A field boundary comprising a hedge with wire fencing lies on the western boundary. The rest of the Survey Area boundaries are within the grass field with a wooden fence, which separates the holiday cottages to the east and south from the grass field, along the south-eastern boundary.

7.2 Geology

The bedrock across the Site is mudstone, siltstone and sandstone of the Devonian Polzeath Slate Formation. Generically, these rocks comprise cleaved purple mudstone with pale green and grey beds and laminae, and thin sandstone and laminated siltstone horizons. Thicker beds of green mudstone occur in association with dark grey mudstone. The superficial geology is not recorded in the source used (British Geological Survey, undated).

7.3 Soils and near-surface deposits

The topsoil is 'Freely draining acid loamy soils over rock' (LandIS, undated).

No site-relevant geotechnical reports or borehole logs of near-surface deposits were available at the time of writing.

7.4 Topography

The Survey Area is relatively flat with a gentle slope from approximately 60m AOD in the south to approximately 65m AOD in the north.

7.5 Land use

The Site was under cut grass at the time of the survey.

8 Archaeological background

8.1 Historic landscape characterisation

Farmland: Medieval

The agricultural heartland, with farming settlements documented before the 17th century AD and whose field patterns are morphologically distinct from the generally straight-sided fields of later enclosure. Either medieval or prehistoric origin (Cornwall Council, undated).

8.4 Archaeological summary

At the time of writing, Cotswold Archaeology Limited are producing a Heritage Assessment which will include a summary of the recorded archaeology within 1000m of the Site (Cotswold Archaeology 2018).

Table 5 provides a summary of the historic assets pertinent to the geophysical survey data within approximately 500m of the Survey Area perimeter (Dean 2018).

One HER entry (MCO21762) lies within the Survey Area: a possible building consisting of two conjoined single-ditched enclosures visible as cropmarks on aerial photographs. As discussed in Section 10.2, no evidence for this feature was recorded in the survey data.

9 Results

9.1 Scope and definitions

This survey was designed to record magnetic anomalies. A magnetic anomaly is a local variation in the Earth's magnetic field. Such variations can result from variations in the magnetism of the underlying solid geology, superficial geology and other near-surface deposits including those altered and created by past human activities. Near-surface artefacts can also create magnetic anomalies.

The dimensions of magnetic anomalies mapped as representing potential buried archaeology do not represent the dimensions of any associated archaeology.

The analysis presented below identifies and characterises anomalies and anomaly groups that may relate to buried archaeology.

9.2 Analysis

Figure 2 shows the interpretation of the survey data and includes the anomaly groups identified as possibly relating to archaeological deposits along with their identifying numbers. Table 1 is an extract of the detailed analysis of the survey data sourced from the attribute tables of the GIS project provided in the project archive.

Figure 2 and Table 1 comprise the analysis of the survey data.

Figures 3 and 4 are plots of the processed data as specified in Table 3. Figure 5 is a plot of minimally processed data as specified in Table 4. Figure 6 shows the location of the survey grid and grid data files.

10 Discussion

10.1 General points

Scope

Not all anomalies or anomaly groups identified in Table 1 are necessarily discussed below. All identified anomaly groups are recorded in the GIS project held in the survey archive.

Data collection

Data collection along the survey area edges was restricted as shown in the figures due to the presence of magnetic materials within and adjacent to boundaries. Strong magnetic responses mapped close to the boundaries are likely to relate to these materials except where otherwise indicated in Figure 2 and Table 1.

Anomaly characterisation

There are a number of anomaly groups that could be interpreted as relating to large postholes or pits although most will have natural origins. Anomalies of this sort are mapped as potential archaeology when they are associated with other significant anomaly groups or otherwise formed recognisable patterns as listed in Table 1.

Anomalies thought to relate to natural features and recent man-made objects such as manholes, water management equipment, drains, cables and other services are only mapped where they comprise significant magnetic responses across the dataset that need clarification.

Numerous dipole magnetic anomalies are present within the dataset. These are likely to represent recent ferrous objects. They are only mapped if they could influence the analysis of anomaly groups thought to have an archaeological origin.

Data trends

Two sets of linear trends were recorded in the data. These are likely to reflect relatively recent ploughing disturbance (groups 201 and 202, Figure 2).

Some other, randomly distributed lines on the western side of the data (Figure 3) are most likely to relate to near-surface geological features.

10.2 Data relating to historic maps and other records

None of the magnetic anomaly groups characterised as representing possible buried archaeology relate to known historic assets.

There was no evidence in the dataset for a possible building described in HER entry MCO21762 and located at SW 9332 7846 (Table 5).

10.3 Data with no previous archaeological provenance

Anomaly group 2 is most likely to represent a field boundary, possibly of the Cornish Hedge type, removed before the publication of the St Minver tithe map in 1843.

Group 3 may represent a linear archaeological feature such as a ditch.

Groups 1 and 4 may represent linear fragments of field boundaries and enclosures of unknown origin and date but the may equally relate to relatively recent ploughing disturbance.

11 Conclusions

The differences in magnetic responses across the Survey Area were sufficient to be able to differentiate between anomalies representing possible buried archaeology and background magnetic responses.

Four magnetic anomaly groups have been characterised as representing potential buried archaeology. Of these, one (group 2) is most likely to represent a former field boundary, possibly of the Cornish Bank type, which is not recorded on historic Ordnance Survey maps or on the 1843 St Minver tithe map. One group (3) may represent a linear archaeological feature such as a ditch. The remaining two groups (1 and 4) may represent linear archaeological deposits or relatively recent ploughing disturbance.

No geophysical evidence was found for two conjoined enclosures recorded in the Devon County Council Historic Environment Record as lying within the survey area.

12 Disclaimer

The description and discussion of the results presented in this report are the authors', based on their interpretation of the survey data. Every effort has been made to provide accurate descriptions and interpretations of the geophysical data set. The nature of archaeological geophysical surveying is such that interpretations based on geophysical data, while informative, can only be provisional. Geophysical surveys are a cost-effective early step in the multi-phase process that is archaeology.

13 Copyright

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14 Archive

14.1 Online Access to the Index of archaeological investigationS (OASIS)

OASIS ID: substrat1-322160

The OASIS entry has been completed and the boundary file and report uploaded with six months delay in publication.

14.2 Substrata Limited archive

A full archive of this survey will be held by Substrata Limited on cloud and local hard drive storage as specified in Appendix 3.

14.3 Archaeological Data Service (ADS)

Depending on local authority policy, an archive may be deposited with the ADS as specified in Appendix 3.

14.4 Historic Environment Record (HER)

Subject to any contractual requirements on confidentiality, a PDF or printed copy of the report will be submitted to the appropriate HER within six months of completion.

15 Acknowledgements

Substrata would like to thank Zoe Arkley, Heritage Consultant, Cotswold Archaeology Ltd for commissioning us to complete this survey.

16 Bibliography

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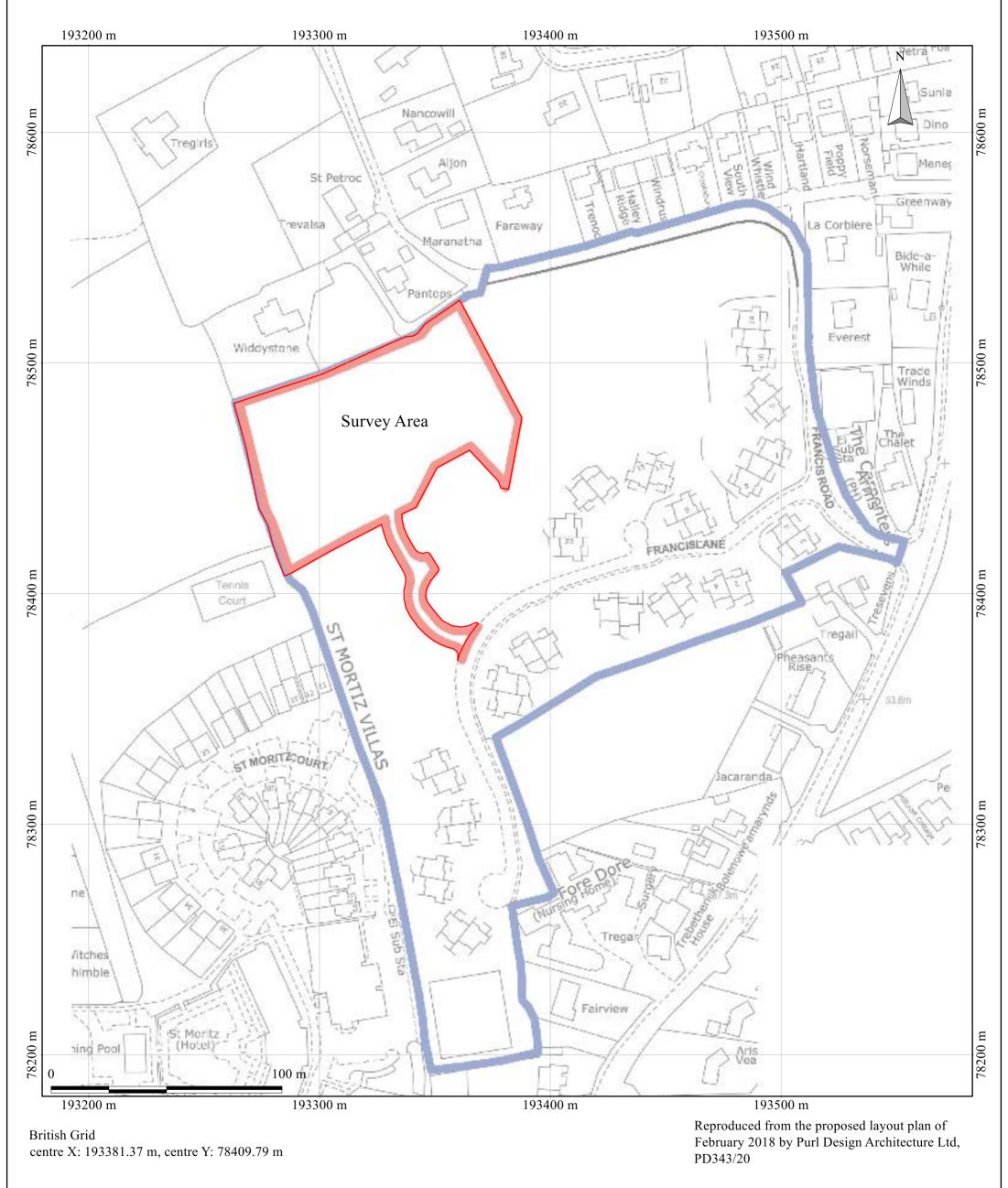
LandIS (undated) *Cranfield Soils and Agrifood Institute Soilscapes* [Online], Available: http://www.landis.org.uk/soilscapes/ [June 2018]

Appendix 1 Figures

General Guidance

The anomalies represented in the survey plots provided in this appendix are magnetic anomalies. The apparent size of such anomalies and anomaly patterns are unlikely to correspond exactly with the dimensions of any associated archaeological features .

A rough rule for interpreting magnetic anomalies is that the width of an anomaly at half its maximum reading is equal to the width of the buried feature, or its depth if this is greater (Clark, 2000: 83). Caution must be applied when using this rule as it depends on the anomalies being clearly identifiable and distinct from adjacent anomalies. In northern latitudes the position of the maximum of a magnetic anomaly will be displaced slightly to the south of any associated physical feature.



Written Scheme of Investigation An archaeological magnetometer survey Land off Francis Road, Trebetherick Wadebridge, Cornwall

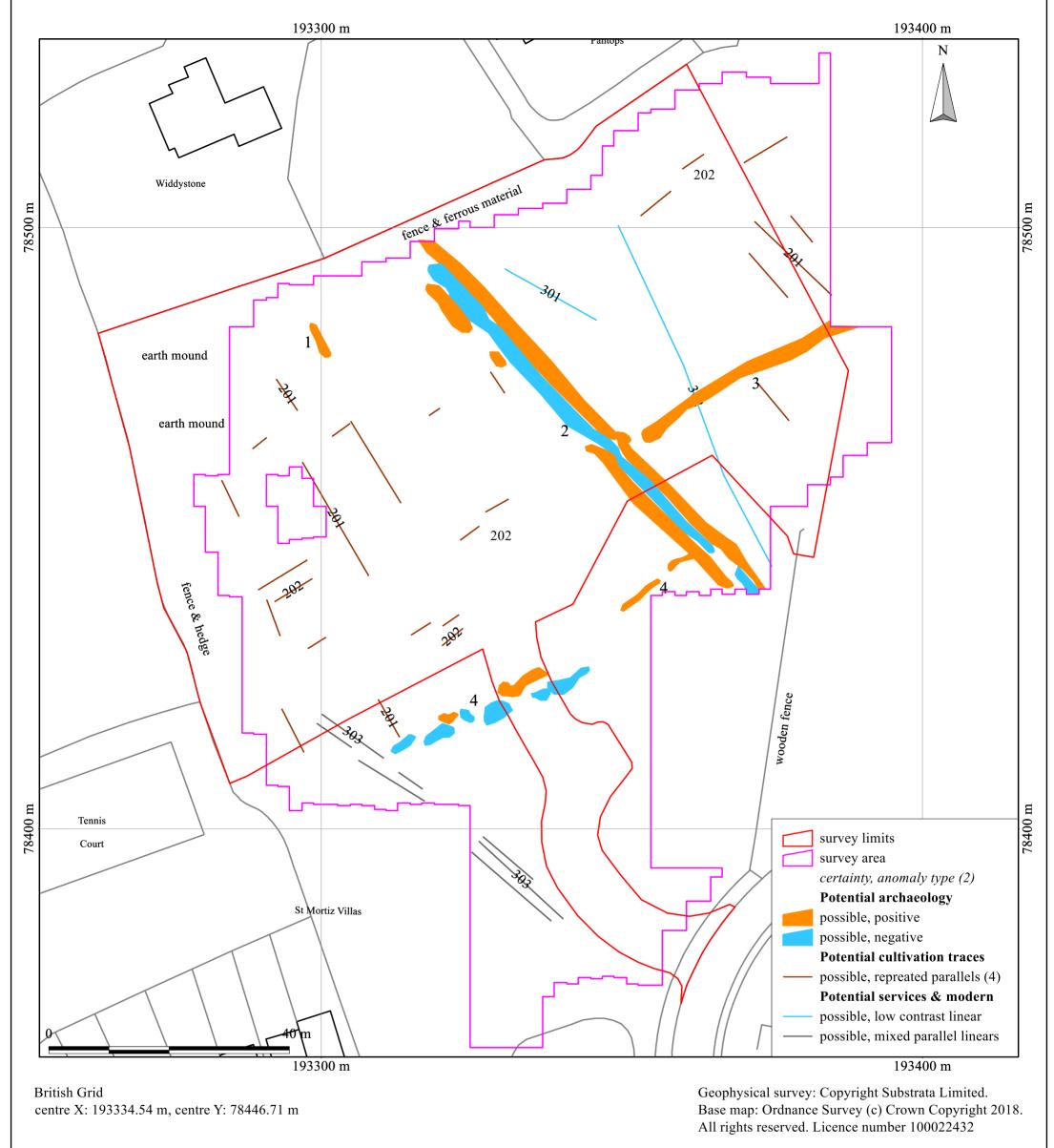
Centred on NGR (E/N): 193308,078468

Report 1806FRA-R-1

Figure 1: location map

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Notes:

- 1. All interpretations are provisional and represent potential archaeological deposits.
- 2. 'Anomaly type' is a description of the magnetic anomaly. See the report text or GIS for an archaeological characterisation.
- 3. Anomalies designated "likely archaeology" have supporting evidence e.g. historical maps and or visible earthworks.
- 4. Not all instances are mapped.
- 5. Anomalies likely to represent recent deposits or ground disturbance, or geological and other natural deposits are not mapped unless relevant to potential buried archaeology.

An archaeological magnetometer survey Land off Francis Road, Trebetherick Wadebridge, Cornwall

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Centred on NGR (E/N): 193308,078468

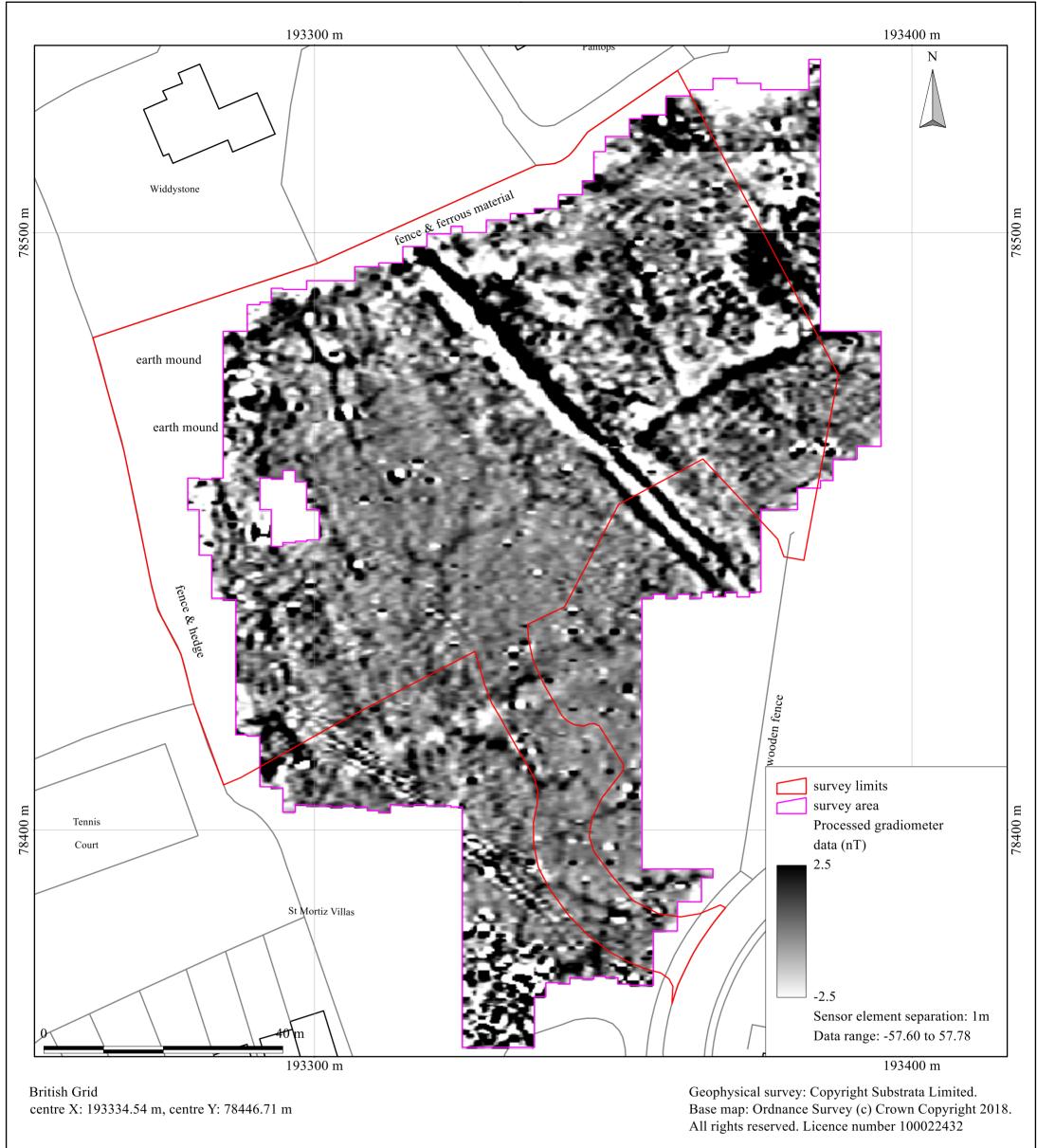
Report: 1806FRA-R-1

Figure 2: survey interpretation

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Email: enquiries@substrata.co.uk



An archaeological magnetometer survey Land off Francis Road, Trebetherick

Wadebridge, Cornwall

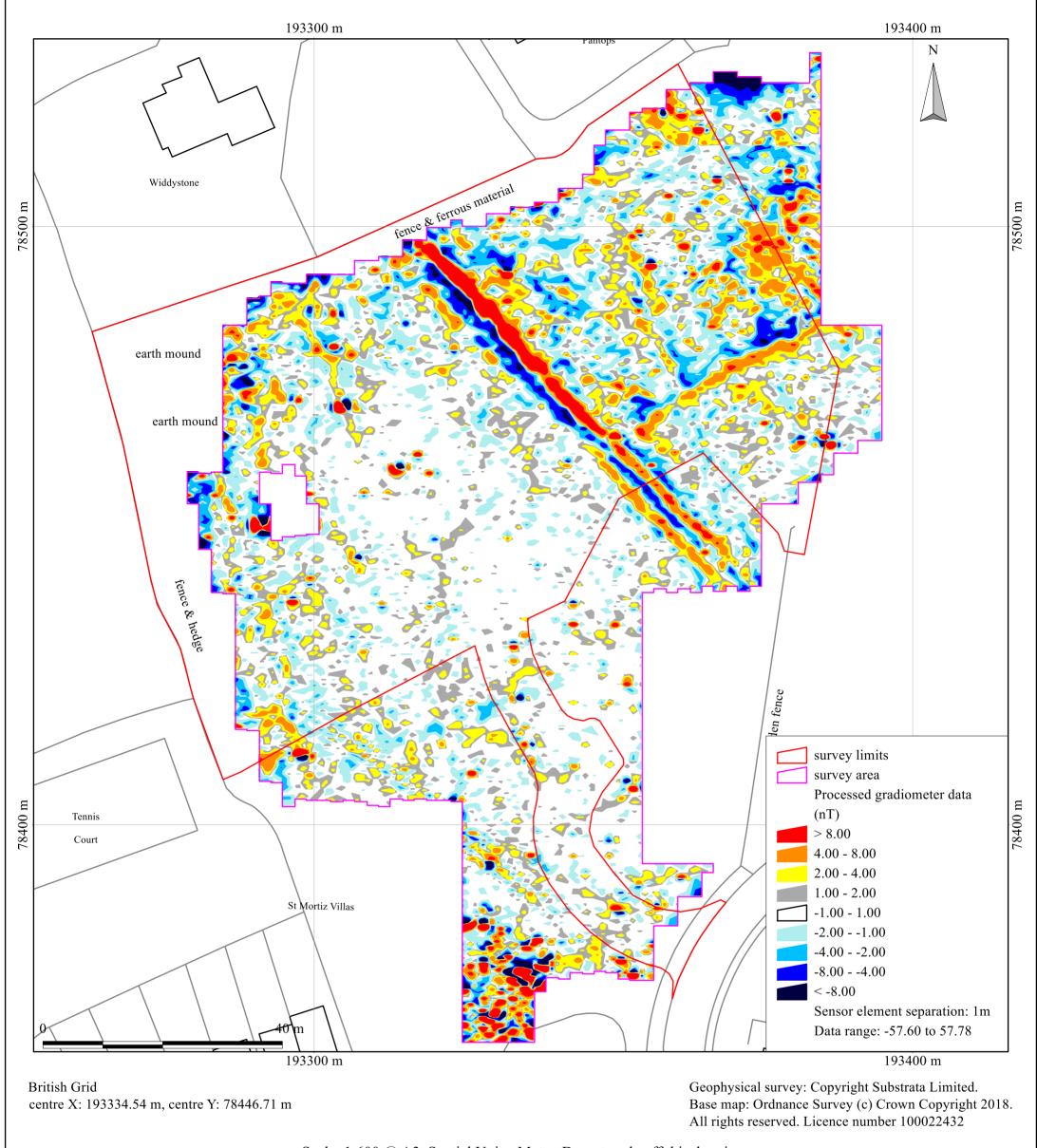
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Figure 3: shade plot of processed data

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Email: enquiries@substrata.co.uk



An archaeological magnetometer survey Land off Francis Road, Trebetherick Wadebridge, Cornwall

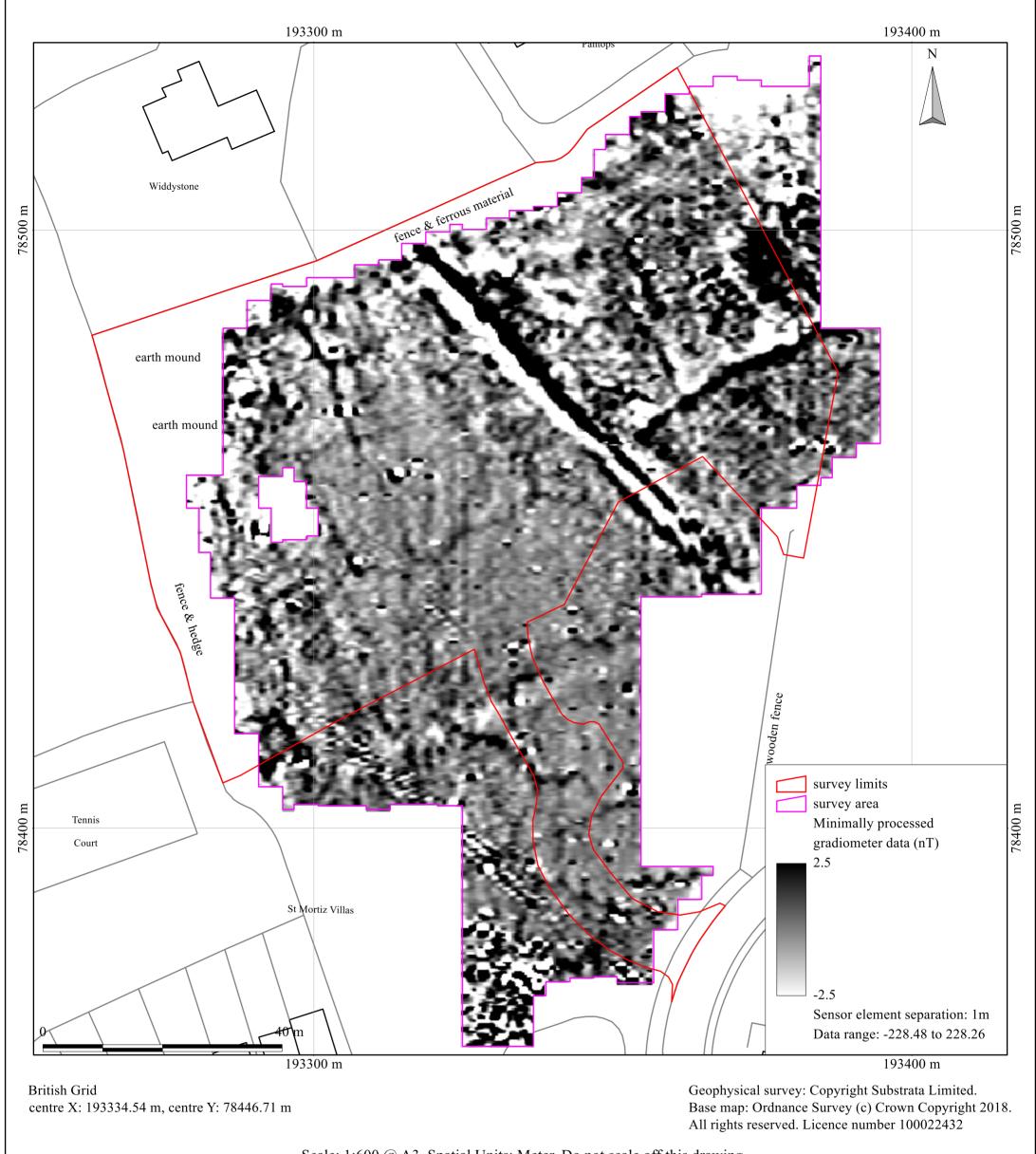
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Figure 4: contour plot of processed data

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An archaeological magnetometer survey Land off Francis Road, Trebetherick Wadebridge, Cornwall

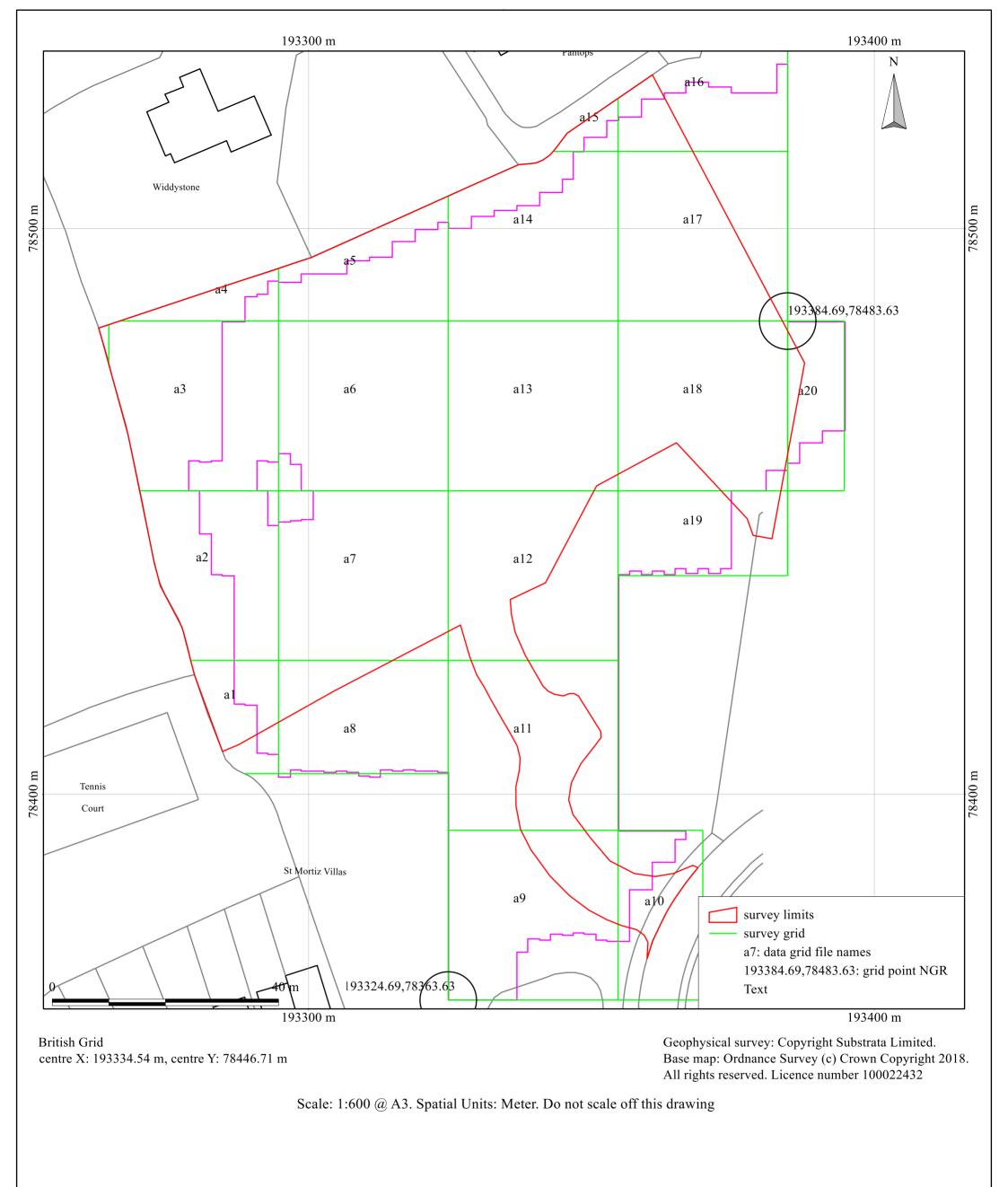
Centred on NGR (E/N): 193308,078468

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Figure 5: shade plot of minimally processed data

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Figure 6: survey grid plan and location

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Appendix 2 Tables

Site:

Land off Francis Road, Trebetherick Wadebridge, Cornwall Centred on NGR (E/N): 193308,078468

anomaly	anomaly characterisation	anomaly form	additional archaeological	comments	supporting evidence
group	certainty & class		characterisation		
1	possible, positive	linear	linear archaeological deposit or relatively recent ploughing		
			disturbance		
2	possible, positive/negative/positive	disrupted linear	field boundary - possibly a Cornish Hedge	removed before the publication of the tithe map in 1843	1843 St Minver tithe map
3	possible, positive	linear			
4	possible, positive & negative	disrupted linear	linear archaeological deposit or relatively recent ploughing		
			disturbance with influence from underlying geology		
201	possible, repeated parallels		ploughing disturbance	anomaly group probably relates to relatively recent ploughing	
202	possible, repeated parallels		ploughing disturbance	anomaly group probably relates to relatively recent ploughing	
301	possible, low contrast linear		service trench		
302	possible, low contrast linear		service trench		
303	possible, mixed parallel linears		rough path		

Table 1: data analysis

Grid

Method of Fixing: DGPS set-out using pre-planned survey grids and Ordnance Survey coordinates.

Composition: 30m by 30m grids

Recording: Geo-referenced and recorded using digital map tiles.

DGPS used: Spectra Precision PM5V2 GPS with external antenna and survey pole and DigiTerra

Explorer 7 as the survey control program.

Equipment

Instrument: Bartington Instruments grad601-2

Firmware: version 6.1

Data Capture

Sample Interval: 0.25m Traverse Interval: 1 metre Traverse Method: zigzag Traverse Orientation: GN

Data Processing, Analysis and Presentation Software

IntelliCAD 8.4

DW Consulting TerraSurveyor3

Manifold System 8 GIS

Microsoft Corp. Office 365: Excel, Publisher, Word Adobe Systems Inc Adobe Acrobat 9 Pro Extended

Table 2: methodology information

Instrument Type: Bartington Grad-601 gradiometer Units: nT Direction of 1st Traverse: see below Collection Method: ZigZag Sensors: 2 @ 1.00 m spacing, each with 1m separation Dummy Value: 32702				
ProgramName:TerrasVersion:3.0.33	Surveyor .6			
Statistics Max: 57.78 Min: -57.60 Std Dev: 4.27 Mean: 0.14 Median: 0.00	3 De Stagger: Grids: a9.xgd a1.xgd a8.xgd a11.xgd a2.xgd a7.xgd a12.xgd By: 0 intervals, 25.00cm			

Table 3: processed data metadata

Instrument				
Type: Bartington Grad-601 gradiometer				
Units:	nT T			
Direction of 1st Traverse: s	see below			
Collection Method: Z	ZigZag			
Sensors: 2	2 @ 1.00 m spacing, each with 1m separation			
Dummy Value: 3	32702			
Program Name: TerraSurveyor Version: 3.0.33.6				
Statistics	Processing			
Max: 228.26				
Min: -228.48	2 Clip at 4.00 SD			
Std Dev: 6.74	•			
Mean: 0.02	Interpolate match x & y double is imposed on export to the GIS			

Table 4: minimally processed data metadata

-0.10

Median:

Land off Francis Road, Trebetherick Wadebridge, Cornwall Centred on NGR (E/N): 193308,078468

County: Cornwall
Parish: St Minver Lowlands
Source: Cornwall Council Interactive Map

Heritage Gateway

HER number		grid	designations	type	form	description	distance (m)	bearing (GN)
Cornwall Council	Heritage Gateway	reference					from site centre	from site centre
MCO21762	52159	SW 9332 7846		ENCLOSURE? (Prehistoric - 500000 BC to 42 AD ENCLOSURE? (Medieval - 1066 AD to 1539 AD)	CROPMARK	Possible building consisting of two conjoined single-ditched enclosures visible as cropmarks on aerial photographs.	14	124
MCO8388	52158	SW 9341 7849		ROUND (Iron Age - 800 BC to 42 AD) ROUND (Romano British - 43 AD to 409 AD)	CROPMARK	Possible curvilinear univallate enclosure, 40m across, partially visible as a faint cropmark on air photographs.	104	78
MCO4058	26317	SW 9318 7845		BEACON? (Early Medieval to Modern - 410 AD to 2050 AD)	DOCUMENTARY EVIDENCE	The tithe award for St Minver records the field name of 'the beacon' for the location. The site is near a coastal hilltop.	129	262
MCO1199	26415	SW 9332 7878		FINDSPOT (Prehistoric - 500000 BC to 42 AD)	FIND	A possible flint borer or awl found in the surface soil whilst building a bungalow at Windy Hill, Higher Tristram, Polzeath during 1978.	312	2
MCO17080	26332	SW 9339 7811		SETTLEMENT? (Early Medieval - 410 AD to 1065 AD SETTLEMENT (First mentioned, Medieval - 1066 AD to 1539 AD)	DOCUMENTARY EVIDENCE	The settlement of Trebetherick is first recorded in 1284 (b1). The name is Cornish and contains the element tre meaning 'estate, farmstead' (which implies a settlement of early medieval origin) and a personal name.	е 367	167
MCO12438	41809	SW 937 786		MINE (Post Medieval - 1540 AD to 1900 AD)	DOCUMENTARY EVIDENCE	POLZEATH CONSOLS - Post Medieval mine.	414	71
MCO8387	26316	SW 9347 7895		ROUND? (Early Iron Age to Romano British - 800 BC to 409 AD)	DOCUMENTARY EVIDENCE	The field-name 'Borough Close' suggests the site of a round but there are no remains.	508	19
MCO1197	26413	SW 93 78		FINDSPOT (Mesolithic - 8000 BC to 4001 BC)	FIND	A micro burin found at Polzeath which is part of the Muriro collection at the Royal Cornwall Museum, Truro. The exact findspot is not known and the grid reference refers to the general area only.	560	213
MCO16446	26329	SW 9369 7888		SETTLEMENT (First mentioned, Medieval - 1066 AD to 1539 AD)	DOCUMENTARY EVIDENCE	The settlement of Polzeath is first recorded in 1311 when it is spelt "Polsegh". The name is Cornish and contains the elements pol meaning 'pool, pit, stream' and segh meaning 'dry.	562	43
MCO56202	MCO56202	SW 9342 7903		SHIPWRECK GRAVE? (16th Century to 18th Century - 1540 AD to 1800 AD)	EXCAVATED FEATURE	Grave and human bone remains of probable shipwreck victim, dating from the C18, discovered in 2011.	573	11
MCO1490	26318.1	SW 9272 7819		FINDSPOT (Mesolithic - 8000 BC to 4001 BC)	FIND	A flint flake with a prepared butt found during geological fieldwork at Trebetherick point.	650	245
MCO26609	26399	SW 929 779		FIELD SYSTEM (Medieval - 1066 AD to 1539 AD) FIELD SYSTEM (Post Medieval - 1540 AD to 1900 AD)	DOCUMENTARY EVIDENCE	The field boundaries east and south of Trebetherick appear to be the remains of the enclosed strips of a medieval open-field system.	669	216

Table 5: Historical Environment entries thought relevant to the geophysical survey Note: entries marked in blue lie within the Survey Area

Appendix 3 Project archive contents

A3.1 Substrata Limited archive

A full archive of this survey will be held by Substrata Limited on cloud and local hard drive storage as follows:

Report: Adobe PDF (.pdf), Microsoft Publisher (.pub)
Raw grid date files: DW Consulting TerraSurveyor 3 (.xgd) and

XYZ (.dat)

Minimally processed data composite files: DW Consulting TerraSurveyor 3 (.xgd) and

ESRI ASCII (.asc)

Final data processing composite files: DW Consulting TerraSurveyor 3 (.xgd) and

ESRI ASCII (.asc)

GIS project: GIS project Manifold 8 (.map)

Survey interpretation: ESRI shape files AutoCAD version of the survey interpretation: AutoCAD (.dwg)

(if generated)

All project working files: various (Table 2)

A3.2 Online Access to the Index of archaeological investigationS (OASIS)

Metadata: online form
Georeferenced survey boundary file: ESRI shape file
Report: Adobe PDF (.pdf)

A3.3 Archaeological Data Service

Depending on local authority policy, an archive may be deposited with the ADS as follows:

Raw data composite file: XYZ file

Processed data plot: rendered images in TIFF format

Survey grid plot: image in TIFF format
Details of data processing: image in TIFF format

Interpretation plot: rendered images in TIFF format

Metadata: Microsoft Excel format

A3.4 Historic Environment Record (HER)

Subject to any contractual requirements on confidentiality, a PDF copy of the report will be submitted to the appropriate HER within 6 months of the completion of this report via the OASIS process or by other means, depending on the relevant HER process.