

An archaeological magnetometer survey

Land off Godwell Lane, Ivy Bridge Devon

Centred on NGR (E/N): 264705,055893

Report: 1702EXM-R-1

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5 June 2017

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Project archive

Report	Adobe PDF format
Copies of report figures	Adobe PDF format
Raw and processed grid & composite files	DW Consulting TerraSurveyor 3 formats
Minimal processing data plots and metadata	DW Consulting TerraSurveyor 3 formats
Final data processing data plots and metadata	DW Consulting TerraSurveyor 3 formats
GIS project, shape files and classification schema	
GIS project	
GIS shape files	ESRI standard
GIS classification schema	Adobe PDF format
AutoCAD version of the survey interpretation	AutoCAD DXF

Website: substrata.co.uk

For an overview of Substrata, our archaeological geophysical surveying techniques and the results we obtain.

1 Survey description and summary

1.1 Survey

•	
Type:	twin-sensor fluxgate gradiometer
Date:	15 to 16 May 2017
Area:	4.1ha
Lead surveyor:	Mark Edwards BA
Author:	Ross Dean BSc MSc MA MIfA

1.2 Clients

AC Archaeology Ltd, 4 Halthaies Workshops, Bradninch Nr Exeter, Devon EX5 4QL

1.3 Location

Land off Godwell Lane
Ivy Bridge
South Hams
Devon
PL21 0FH
SX 64705 55893 (point)
264705,055893 (point)

1.4 Archive

Archivesubstrat1-286087Archive:At the time of writing, the archive of this survey will be held by
Substrata. Depending on local authority policy, an archive of the
unprocessed data may be deposited with the Archaeological Data
Service

1.5 Introduction

This report presents the results of an archaeological magnetometer survey at the above site, hereafter referred to as the survey area. It has been prepared for AC Archaeology Ltd on behalf of clients. The survey area location is shown in Figure 1.

Approximately 0.3ha of the target survey area (Area 4 in Figure 2) could not be surveyed because of the density and height of vegetation.

1.6 Summary

The magnetic responses across the survey area were sufficient to be able to differentiate between anomalies representing possible archaeological features and background magnetic responses.

Twenty-two magnetic anomaly groups were mapped as representing potential archaeological deposits or features. One of these groups is likely to represent a former field boundary recorded on the 1843 Ugborough tithe map but not on later historic maps. One group may represent a sub-rectangular enclosure abutting a field boundary. Three groups may represent a further enclosure. One group may represent an area of archaeological deposition although a natural origin cannot be ruled out. A group adjacent to this area may represent two pits.

The other anomaly groups mapped as representing potential archaeological deposits and features have patterns that typically represent former field and agricultural enclosure boundaries of unknown date and possibly of more than one phase of past land management.

2 Survey aims and objectives

2.1 Aims

To establish the presence or absence, extent and character of any archaeological features and deposits within the survey area.

2.2 Survey objectives

- 1. Complete a magnetometer survey across agreed parts of the survey area.
- 2. Identify any magnetic anomalies that may be related to archaeological deposits, structures or artefacts.
- 3. Within the limits of the techniques 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.

3 Standards

The standards used to complete this survey are defined by the Chartered Institute for Archaeologists (2014a) and Historic England (2010). The codes of approved practice that were followed are those of the Chartered Institute for Archaeologists (2014b) and Archaeology Data Service (undated).

4 Site description

4.1 Landscape and land use

The survey area comprises four agricultural fields on the south-eastern edge of Ivy Bridge, as shown in Figure 1. The fields are designated Areas 1 to 4 as shown in Figure 2. All four fields are bounded by hedges. Godwell Lane and a housing estate lie along the north-eastern edge of the survey area. A few houses and farm buildings border the south-eastern corner. Otherwise, the area is surrounded by agricultural fields. The survey area was under pasture at the time of the survey.

4.2 Geology

The bedrock across the site is slate of the Middle Devonian Slates. The superficial deposits for the site are unknown (British Geological Survey, undated).

5 Archaeological background

5.1 Historic landscape characterisation

Areas 1 and 2: 'Medieval enclosures based on strip fields' Enclosures of post-medieval date. Fields laid out in the eighteenth and nineteenth centuries. Commonly they have many surveyed dead-straight field boundaries (Devon County Council, undated)

Areas 3 and 4: Former orchards

This area was once an orchard planted with fruit trees, but these have been lost in the C20th (ibid).

5.2 Summary of archaeological background

The Devon County Council Historic Environment Record (DHER) was examined via the Heritage Gateway (Historic England, undated) to gain an appreciation of historic assets pertinent to the geophysical survey data within approximately 500m of the survey area perimeter.

This section is not designed to provide a comprehensive understanding of the historic environment of the surrounding area and should not be used as a source for further work.

Table 1 provides a summary of the DHER entries though relevant. There are no entries recorded within the survey area.

6 Results, discussion and conclusions

6.1 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 changes in the magnetism of 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 terms 'archaeological deposit', 'structure' and 'feature' refer to any artefacts, material deposits or disturbance of natural deposits thought to be the result of human activity, excluding recent land maintenance and farming.

Magnetic anomalies cannot be regarded as physical archaeological deposits, structures or features and the dimensions of the anomalies shown do not represent the dimensions of any associated archaeology.

The analysis presented below identifies and characterises anomalies and anomaly groups that may relate to archaeological deposits, structures and features.

The reader is referred to section 7.

6.2 Results

The fields comprising the survey area were designated Areas 1 to 4 for descriptive purposes (Figure 2).

Figure 2 shows the interpretation of the survey data which includes the anomaly groups identified as possibly relating to archaeological deposits along with their identifying numbers. Table 2 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 along with Table 2 comprise the analysis of the survey data.

Figures 3 and 4 are plots of processed data as specified in Table 3. Figure 5 is a plot of unprocessed data with its metadata.

6.3 Discussion

6.3.1 General points

Discussion scope

Not all anomalies or anomaly groups identified in Figure 2 and Table 2 are necessarily discussed below. All identified anomaly groups are recorded in the GIS project held 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 2.

Anomaly characterisation and mapping

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 were mapped as potential archaeology when they were associated with other significant anomaly groups or otherwise formed recognisable patterns as listed in Table 2.

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

Numerous dipole magnetic anomalies are scattered across the data set. 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

A north-north-east to south-south-west trend can be seen in Areas 1 and 2 (Figures 3 and 4). This likely to represent ploughing disturbance, as is an east-north-east to west-south-west trend in Area 3.

6.3.2 Data relating to historic maps and other records

Magnetic anomaly group **20** coincides with a former field boundary recorded on the 1843 Ugborough tithe map but not on later historical maps.

6.3.3 Data with no previous archaeological provenance

The majority of the magnetic anomaly groups characterised as representing potential archaeological deposits have characteristics typical of those reflecting former field or agricultural enclosure boundaries of unknown date and possibly of more than one phase of land management. Some, however, stand out and these are discussed below.

Groups 4, along with groups 3 and 5, are unusual compared to the rest of the data in terms of shape and orientation. They may reflect a partial enclosure or similar archaeological feature.

Group 14 may represent natural deposits but stands out as an area of enhanced response in the data which often implies an area of archaeological deposition. The adjacent group 15 may represent two pits.

Group 16 may represent a sub-rectangular enclosure abutting group 9, a disrupted linear anomaly which may represent a former field boundary.

Group 17 in Area 3 may be an extension of group 20 discussed above.

6.4 Conclusions

The magnetic responses across the survey area were sufficient to be able to differentiate between anomalies representing possible archaeological features and background magnetic responses.

Twenty-two magnetic anomaly groups were mapped as representing potential archaeological deposits or features. One of these groups (20) is likely to represent a former field boundary recorded on the 1843 Ugborough tithe map but not on later historic maps. One group (16) may represent a sub-rectangular enclosure abutting a field boundary (9). Three groups (3, 4, 5) may represent a further enclosure. One group (14) may represent an area of archaeological deposition although a natural origin cannot be ruled out. A group (15) adjacent to this area may represent two pits.

The other anomaly groups mapped as representing potential archaeological deposits and features (groups 1, 2, 6, 7 to 13, 17 to 19, 21 and 22) have patterns that typically represent former field and agricultural enclosure boundaries of unknown date and possibly of more than one phase of past land management.

7 Disclaimer and copyright

The description and discussion of the results presented in this report are the authors, based on his 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. The evaluation programme of which this survey is part may also be informed by other archaeological assessment work and analysis. It must be presumed that more archaeological features will be evaluated than those specified in this report.

Substrata Ltd will assign copyright to the client upon written request but retains the right to be identified as the author of all project documentation and reports as defined in the Copyright, Designs and Patents Act 1988 (Chapter IV, s.79). This report contains material that is non-Substrata Limited copyright or the intellectual property of third parties. Such material is labelled with the appropriate copyright and is non-transferrable by Substrata Ltd.

8 Acknowledgements

Substrata would like to thank John Valentin of AC Archaeology Ltd for commissioning us to complete this survey.

9 Bibliography

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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 (see Section 6.1).

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.



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Figure 1: location map

Barnstaple, Devon EX32 7LZ Tel: 01271 342721 Email: geophysics@substrata.co.uk Web: substrata.co.uk



British Grid centre X: 264732.19 m, centre Y: 55881.11 m

Geophysical survey: Copyright Substrata Limited. Base map: Ordnance Survey (c) Crown Copyright 2017. All rights reserved. Licence number 100022432

Scale: 1:1000 @ A3. Spatial Units: Meter. Do not scale off this drawing

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 geological or other natural deposits are not mapped unless relevant to potential archaeological events or deposits.

An archaeological magnetometer survey Land off Godwell Lane, Ivy Bridge, Devon Centred on NGR (E/N) 264705,055893 Report: 1703IVY-R-1

Figure 2: survey interpretation

Substrata Limited Langstrath, Goodleigh Barnstaple, Devon EX32 7LZ Tel: 01271 342721 Email: geophysics@substrata.co.uk Web: substrata.co.uk



British Grid centre X: 264732.19 m, centre Y: 55881.11 m Geophysical survey: Copyright Substrata Limited. Base map: Ordnance Survey (c) Crown Copyright 2017. All rights reserved. Licence number 100022432

Scale: 1:1000 @ A3. Spatial Units: Meter. Do not scale off this drawing

An archaeological magnetometer survey Land off Godwell Lane, Ivy Bridge, Devon Centred on NGR (E/N) 264705,055893 Report: 1703IVY-R-1

Figure 3: shade plot of processed data

Substrata Limited Langstrath, Goodleigh Barnstaple, Devon EX32 7LZ Tel: 01271 342721 Email: geophysics@substrata.co.uk Web: substrata.co.uk



British Grid

Geophysical survey: Copyright Substrata Limited. Base map: Ordnance Survey (c) Crown Copyright 2017. All rights reserved. Licence number 100022432

Scale: 1:1000 @ A3. Spatial Units: Meter. Do not scale off this drawing

An archaeological magnetometer survey Land off Godwell Lane, Ivy Bridge, Devon Centred on NGR (E/N) 264705,055893 Report: 1703IVY-R-1

centre X: 264732.19 m, centre Y: 55881.11 m

Figure 4: contour plot of processed data

Substrata Limited Langstrath, Goodleigh Barnstaple, Devon EX32 7LZ Tel: 01271 342721 Email: geophysics@substrata.co.uk Web: substrata.co.uk



3000 nT 3.5 2.2 1.5 0.9 0.4 0 -0.5 -1.2 -2.3



Appendix 2 Tables

County: Devon District: South Hams Parish: Ivy Bridge Source: Heritage Gateway Site centre: 264705,055893

HER	grid	type	period	description	distance (m)	bearing (GN)
number	reference				from site centre	from site centre
MDV80655	SX 646 552	DRAIN	XVIII - 1701 AD to 1800 AD (Between)	Possible water management features, ditches, drains and channels, shown on aerial photographs of	701	189
				Filham Park. The features may be associated with the creation of the parkland and gardens around		
				Lower Filham House. They seem rather too elaborate to have been purely functional.		
MDV2842	SX 646 550	MINE	XIX - 1801 AD to 1900 AD (Between)	Filham Mine Engine House was formerly listed as Ivybridge Consoles Engine House. Ruins of the	899	187
				engine house at the disused Ivybridge Consoles silver-lead mine. A roofless rectangular building built in		
				1856 of stone rubble. This was a former silver-lead working active from 1838 until 1857. It is one of		
				the few surviving engine houses in Devon.		
MDV115157	SX 649 552	HEARTH	Iron Age - 700 BC to 42 AD (Between)	Deliberately placed deposits of clay were found in the eastern part of the site, the former dated to the	720	164
				Iron Age by two sherds of pottery. Associated with the clay was a group of post or stakeholes. The		
				group is interpreted as a possible hearth/oven with an associated superstructure. Near the group of		
				stakeholes were two undated intercutting ditches while to the north-east was an undated shallow pit.		
MDV115308	SX 649 552	ARCHAEOLOGICAL FEATURE	Unknown date	A magnetometer survey was carried out along sections of the route of a gas pipeline from Fishacre	720	164
	(part of route)			to Choakford. The underlying geology and soils provided good conditions for magnetic survey and		
				more than 130 anomalies were recorded. Many, however, are likely to relate to agricultural activity and		
				land drainage. Characteristic anomalies relating to former land boundaries were located in at least six of		
				the surveyed areas and several areas revealed rectilinear and linear anomalies caused by cut features		
				that may have archaeological potential.		

Table 1: Historic Environment Record Entries thought relevant to the geophysical survey

Site: An archaeological magnetometer survey, Land off Godwell Lane, Ivy Bridge, Devon Centred on NGR (E/N) 264705,055893 Report: 1703IVY-R-1

area	anomaly	associated	anomaly characterisation	anomaly form	additional archaeological	comments	supporting evidence
number	group	anomalies	certainty & class		characterisation		
1	1		possible, positive	linear			
	2	2	possible, positive	linear			
	301	1	possible, high contrast mixed sp	read	rubble with ferrous material		
2	3	3	possible, positive	linear			
	4	1	possible, positive	return			
	5	5	possible, negative	linear			
	6	5	possible, positive	disrupted linear			
	7	7	possible, positive	disrupted linear			
	8	3	possible, positive	disrupted linear			
	9	9 16	possible, positive	disrupted linear		anomaly group may be abutted by a sub-rectangular enclosure	
	10)	possible, positive	linear			
	11		possible, positive	disrupted linear			
	12	2	possible, positive	linear			
	13	3	possible, positive	linear			
	14	1	possible, positive	irregular			
	15	5	possible, positive	oval	pits		
	16	5 9	possible, positive	sub-rectangular	enclosure	anomaly group may represent a disrupted enclosure abutting a linear feature	
	302	2	possible, low contrast linear		service trench		
	303	3	possible, low contrast linear		service trench		
	304	1	possible, high contrast response		ferrous material		
3	17	7	possible, negative, positive	return	field boundary - Devon bank		
	18	3	possible, positive	linear			
	19	9	possible, positive	disrupted linear			
	20)	likely, positive	disrupted linear pair	field boundary	anomaly group coincides with a field boundary mapped in 1843 but not recorded on later historical maps	1843 Ugborough tithe map
	21		possible, positive	disrupted linear			
	22	2	possible, positive	linear			
	305	5	possible, low contrast linear				

Table 2: data analysis

Documents				
Survey methodology statement: Dean (2017)				
 Methodology The work was undertaken in accordance with the survey methodology statement. The geophysical (magnetometer) survey was undertaken with reference to standard guidance provided by the Chartered Institute for Archaeologists (2014) and Archaeology Data Service (undated). The survey grid location information and grid plan was recorded as part of the project in a suitable GIS system. Data processing was undertaken using appropriate software, with all anomalies being digitised and geo-referenced. The final report included 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 				
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.				
EquipmentData CaptureInstrument: Bartington Instruments grad601-2Sample Interval: 0.25mFirmware: version 6.1Traverse Interval: 1 metreTraverse Method: zigzagTraverse Orientation: GN215				
Data Processing, Analysis and Presentation Software IntelliCAD Technology Consortium IntelliCAD 8.0 DW Consulting TerraSurveyor3 Manifold System 8 GIS Microsoft Corp. Office Excel 2013 Microsoft Corp. Office Publisher 2013 Adobe Systems Inc Adobe Acrobat 9 Pro Extended				

Table 3: methodology summary

SITE Instrument Type: Units: Direction of 1st Tr Collection Method Sensors:	raverse: 1: 2	Bartington Grad-601 gradiometer nT see below ZigZag 2 @ 1.00 m spacing.
Dummy value:		32702
PROGRAM		
Name:	Terras	Surveyor
Version:	3.0.31	.0
Stats		Processes: 13
Max:	12.05	1 Base Layer
Min:	-11.75	2 Clip at 1.00 SD
Std Dev:	2.92	3 Clip at 5.00 SD
Mean:	0.14	4 De Stagger: Grids: All Mode: Both By: -1 intervals
Median:	0.02	5 De Stagger: Grids: b2.xgd Mode: Both By: -1 intervals
		6 De Stagger: Grids: b8.xgd Mode: Both By: 1 intervals
		7 De Stagger: Grids: b5.xgd Mode: Both By: -1 intervals
		8 De Stagger: Grids: b1.xgd Mode: Both By: 2 intervals
		9 DeStripe Median Sensors: Grids: All
		10 De Stagger: Grids: a15.xgd Mode: Both By: 1 intervals
		11 De Stagger: Grids: a24.xgd Mode: Both By: -1 intervals
		12 Interpolate: Match X & Y Doubled.
		13 Clip at 3.00 SD

Table 4: processed data metadata