Substrata
Archaeological Geophysical Surveyors

An Archaeological Gradiometer Survey

Land at Dartmouth
Devon
Centred on 285713m 50630m

28 October 2010
Report: 101028
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Accompanying CD-ROM

1 Introduction

Location: Land at Dartmouth
Parish: Stoke Fleming
District: South Hams
County: Devon
NGR: 285713m 50630m

An archaeological gradiometer survey was completed by Substrata across approximately 21ha at the above site. The survey was commissioned by South West Archaeology Ltd, The Old Dairy, Hacche Lane Business Park, Pathfield Business Park, South Molton, Devon EX36 3LH (the Client) on behalf of Millwood Homes (Devon) Ltd, Millwood House, Collett Way, Newton Abbot TQ12 4PH.

The survey was part of a pre-planning phase investigation of the site. The aim of the survey was to define and characterise any detectable archaeological remains which might require action in the form of further recording, evaluation or other mitigation work prior to or during the course of any development works.

2. Summary

A detailed description of the data analysis, results and recommendations is provided in section 6 of this report.

The magnetic response across all fields provided sufficient contrast for potential archaeological feature evaluation. A total of 139 groups of anomalies pertaining to potential archaeological deposits and structures were identified.

Fourteen recommendations have been made for further archaeological investigations of the potential archaeology, subject to an assessment of this survey and other work by Devon County Council Historic Environment Service (DCC-HES).

A number of the anomaly sets representing potential archaeological features fade within the data set in a manner suggestive of destruction by ploughing and/or burial beyond the reach of the survey instrument (usually at depths of over 1 to 1.5m depending on localised soils and geology). Given these conditions, it is possible that more archaeological features exist than those potential features identified in the data set.

3 Site Description

3.1 Location

The site is an area of farmland comprising 15 fields lying to the west of Dartmouth and centred on 285713m 50630m (figure 11).

The following land within the survey area was found to be unsuitable for a gradiometer survey:

- the majority of Little Cotton caravan park. The land is crossed by numerous services which would negate meaningful magnetic data collection. Fields 11 and 12 of this land (figure 11) were surveyed
- the South Hams District Council Park-and-Ride site on the eastern side of the survey area was developed at the time of the survey. The small area of grassland suitable for survey and had problematic GPS coverage precluding sufficiently accurate results

- the sides of the valley to southeast of field 10 and west of field 14 (figure 11) were too steep for safe and effective surveying

3.2 Landscape, land use, geology and soils

Landscape
The land undulates between approximately 120m OD and 140m OD with drainage running north– to south.

Land use (refer to figure 11 for field designations)
At the time of the survey the condition of the fields were:

- fields 2, 3, 4, 5, 7, 8, 9, 11 and 12 were under grass and used for grazing at the time of the survey
- fields 1, 6 and 10 were under grass for cropping during various phases of the survey
- fields 13, 14 and 15 were under cereal crops and only became available for survey in October 2010

Geology
The site is located on a solid geology of Lower Devonian rocks comprising of undifferentiated mudstones, siltstones and sandstones (British Geological Society, undated 1; undated 2).

Soils
The survey area has soils of the Denbigh 1 association which are defined as typical brown earths (Soil Survey of England and Wales, 1983).

3.3 Known archaeological sites in the survey area

See appendix 5 for a summary of the Devon Historical Environment Record (DHER) entries near the site and for the Devon County Council historic landscape characterisation of the fields in the survey area.

There were no DHER entries located within the survey area.

The two farms Great Cotton and Little Cotton that lie partially within the survey area are likely to have once been a single medieval farmstead managed as an infield-outfield system. Evidence for this can be found in some of the field names and the configuration of some of the historical boundaries. A long curving boundary to the south of the farmstead on the northern boundary of fields 13 and 14 (figure 11) is characteristic of an early stage of medieval settlement (Green, 2010).

4 Survey description

4.1 Aims and objectives

Aims

1. define and characterise any detectable archaeological remains on the site which might require action in the form of further recording, evaluation or other mitigation work prior to or during the course of any development works
2. record all potential archaeology found during the survey
3. inform any future archaeological investigation of the area

Objectives

1. complete a gradiometer survey across the area
2. identify any magnetic anomalies that may be related to archaeological deposits
3. attempt to 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 archaeological investigation

4.2 Summary of methodology

The standards used to complete this survey are defined in David et al (2008), Institute for Archaeologists (2009b) and Schmitt (2002). The codes of approved practice that were followed are those of the Institute for Archaeologists (2008 and 2009a) and English Heritage (Andrews, G. and Thomas, R., 1991). The document text was written using the house style of the Institute for Archaeologists (Institute for Archaeologists, undated)

This magnetometer survey was completed using a Bartington g*rad*601-2 (dual sensor) fluxgate gradiometer magnetometer and automatic data logger. The survey was conducted using 30m by 30m grids which were set out using a DGPS. The methodology and data processing are detailed in appendices 3 and 4.

5 Disclaimer and copyright

The recommendations contained within 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 contained in this report. 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 initial step in the multi-phase process that is archaeology.

The evaluation programme of which this survey is part will also be informed by the wider archaeological assessment work and analysis by other archaeological organisations and the Devon County Council Historic Environment Service (DCC-HES). This and any further planned work may well result in more recommendations. It must be presumed that more archaeological features will be evaluated than those specified in this report.

6 Results and recommendations

Refer to figures 1 and 6 for an overview of the survey and results and to figure 11 for the field designations.

Detailed analysis is provided for groups of fields. Figures 2 to 5 are interpretative diagrams for each group and each diagram is accompanied by a data analysis table, an explanation and any recommendations for further work. The processed data is shown in appendix 1 as a single summary figure (figure 6) and also as separate figures grouped by fields (figures 7 to 10).

The widths of the anomalies shown do not represent the width of any associated archaeological feature. More information about the apparent dimensions of geophysical anomalies is provided in appendix 1.

All the recommendations below assume that further archaeological investigations will be carried out on the site. The decisions concerning further work will be made by DCC-HES and others. Please refer to section 5.

6.1 General observations (refer to figures 1 and 6)

Results

The magnetic response variation across all fields provided sufficient contrast for potential archaeological feature evaluation.

A number of the anomaly sets representing potential archaeological features fade within the data set in a manner suggestive of destruction by ploughing and/or burial beyond the reach of the survey instrument (usually at depths of over 1 to 1.5m depending on localised soils and geology). Given these conditions, it is likely that more archaeological features exist than those potential features identified in the data set.

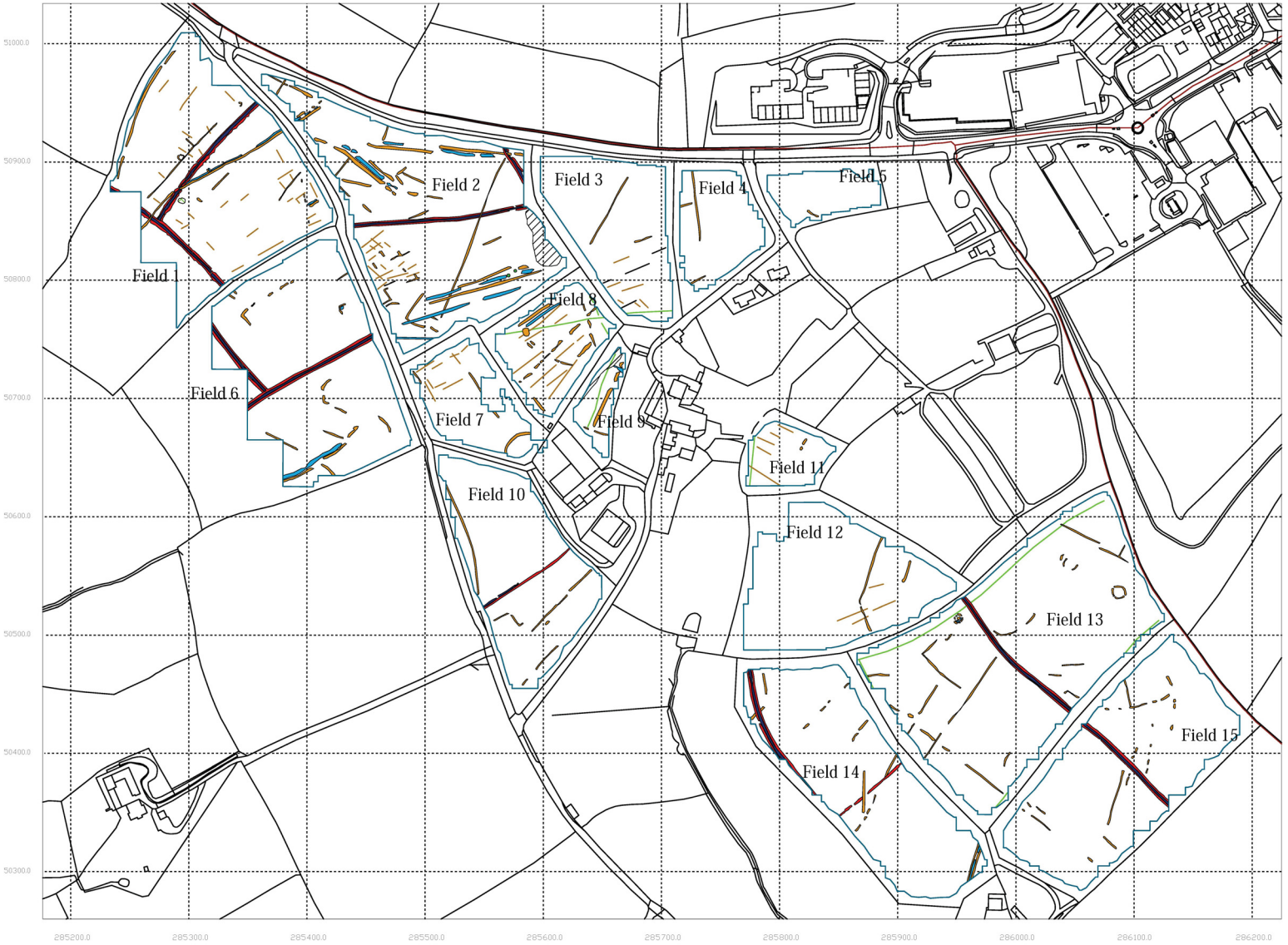
Sufficient magnetic contrast was available to define 139 groups of anomalies pertaining to potential archaeological deposits and structures.

General Recommendations

6.1.1 Given the nature of the magnetic response of the survey area discussed above, any further archaeological investigations must assume that more archaeological features exist than those potential features identified in the data set.

6.1.2 The anomalies representing possible enclosures and boundaries suggest a landscape that pre-dates later medieval farming. This conclusion is supported by a recent desk-based historical and archaeological assessment of the area (Green, 2010). With this in mind, any further archaeological investigations need to be planned to take account of early historic and prehistoric patterns of settlement and enclosure.

6.1.3 Any surveying and other positional work using the information provided in this report should make use of the maps provided in the GIS project on the accompanying CD-ROM. While accurate, the paper reproductions presented here are provided at a scale suitable for survey description only and are not intended to offer sufficiently accurate positional information.



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Legend

survey area

survey area

potential archaeology

likely, positive

likely, negative

possible archaeology, positive anomaly

possible archaeology, negative anomaly

possible archaeology, possible rubble

possible archaeology, possible heated deposit

possible archaeology, filled hollow

possible archaeology, possible stony surface

ferrous material (2, 4)

trends and services

possible archaeology, linear trend in data

cultivation traces (2)

recent services (drains, pipelines, cables)

potential natural land forms

possible land form, palaeochannel

possible land form, spring

17 (5) anomaly group (anomaly id.)

N

Notes:

1. All interpretations are provisional and represent potential archaeological deposits.
2. Representative of trends; not every instance is recorded.
3. Anomalies certain to represent very recent ground disturbance are not highlighted.
4. Filled circles used to define anomalies are symbols and do not indicate possible circular archaeological features unless specifically indicated in the text.

0 50 100 200 Meters

Figure 1: survey interpretation

6.2 Fields 1, 2, 6 and 7 (refer to figures 2 and 7)

Historical landscape characterisation (Devon County Council, undated)
Fields 1, 2 and 6: Modern enclosures adapting post-medieval fields
Field 7: Recreation

Notes
Every effort was made to maximise the area surveyed. The limits shown were imposed by the presence of magnetic material in field boundaries, water troughs and stock shelters (field 7).

Results
A detailed analysis for this area can be found in table 1.

The linear anomaly groups recorded as 'likely' (anomaly groups **6**, **7**, **27**, **32**, **61** and **62**) represent field boundaries removed in the twentieth century after 1938 .

Numerous anomaly groups were recorded across the area. The majority of these potential archaeological features are linear and multilinear. They are suggestive of more than one phase of enclosure and do not conform with the directional trends of extant or recently removed field boundaries. Examples include groups **6** and **9** in field 1, groups **17**, **22**, **24**, **26**, **33** and **38** in field 2 and groups **58**, **65** (and possibly **71**) in field 6.

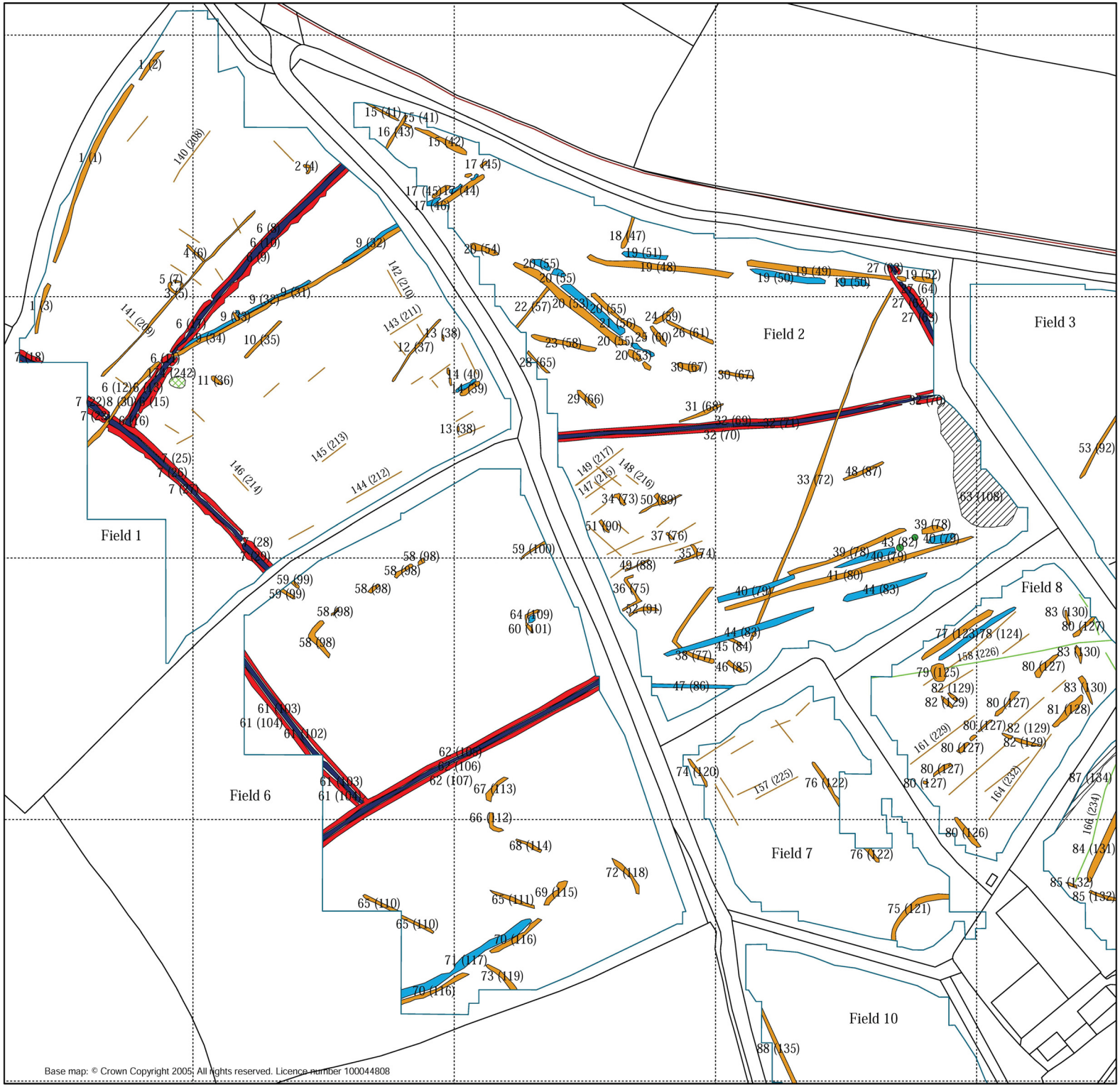
There is a hint of a subcircular structure in anomaly pattern **60** in field 6, possibly with an associated pit (**64**). The patterns are tenuous and may be due to modern ploughing disturbance.

A potential subcircular anomaly pattern **75** in field 7 may be related to a subcircular archaeological structure with an internal diameter of approximately 35m.

Recommendations
6.2.1 The anomalies likely to represent field boundaries removed after 1938 should be assessed to evaluate likely construction dates which will be sometime before the production of in the 1841 Stoke Fleming tithe map.
6.2.2 Some of the possible enclosure phases discussed above will need further archaeological investigation to assess their likely age and relationships to each other.
6.2.3 Further work is required to assess the nature of the potential subcircular enclosure 75 in field 7.
6.2.4 Investigation of anomaly group 60 is required to assess its potential as an archaeological structure.

field number	anomaly group	anomaly id	characterisation certainty	anomaly class	anomaly form	additional characterisation	comments	period	supporting evidence	associated anomaly group(s)
1	1	1	possible	positive	linear		probably associated with extant field boundary			
1	1	2	possible	positive	linear		probably associated with extant field boundary			
1	1	3	possible	positive	linear		probably associated with extant field boundary			
1	2	4	possible	positive	curvilinear					
1	3	5	possible	positive	linear					
1	4	6	possible	positive	linear					
1	5	7	possible	positive	subcircular	subcircular structure	tenuous - approximately 3.5m internal diameter - could be recent plough marks			
1	6	8	likely	positive	linear		field boundary mapped on 1841 tithe map, not present on OS 1954-56 1:10,560 map	post-medieval	1841 Stoke Fleming tithe map, OS 1954-56 1:10,560 map	
1	6	9	likely	positive	linear		field boundary mapped on 1841 tithe map, not present on OS 1954-56 1:10,560 map	post-medieval	1841 Stoke Fleming tithe map, OS 1954-56 1:10,560 map	
1	6	10	likely	negative	linear		field boundary mapped on 1841 tithe map, not present on OS 1954-56 1:10,560 map	post-medieval	1841 Stoke Fleming tithe map, OS 1954-56 1:10,560 map	
1	6	11	likely	positive	linear		field boundary mapped on 1841 tithe map, not present on OS 1954-56 1:10,560 map	post-medieval	1841 Stoke Fleming tithe map, OS 1954-56 1:10,560 map	
1	6	12	likely	positive	linear		field boundary mapped on 1841 tithe map, not present on OS 1954-56 1:10,560 map	post-medieval	1841 Stoke Fleming tithe map, OS 1954-56 1:10,560 map	
1	6	13	likely	negative	linear		field boundary mapped on 1841 tithe map, not present on OS 1954-56 1:10,560 map	post-medieval	1841 Stoke Fleming tithe map, OS 1954-56 1:10,560 map	
1	6	14	likely	positive	linear		field boundary mapped on 1841 tithe map, not present on OS 1954-56 1:10,560 map	post-medieval	1841 Stoke Fleming tithe map, OS 1954-56 1:10,560 map	
1	6	15	likely	positive	linear		field boundary mapped on 1841 tithe map, not present on OS 1954-56 1:10,560 map	post-medieval	1841 Stoke Fleming tithe map, OS 1954-56 1:10,560 map	
1	6	16	likely	positive	linear		field boundary mapped on 1841 tithe map, not present on OS 1954-56 1:10,560 map	post-medieval	1841 Stoke Fleming tithe map, OS 1954-56 1:10,560 map	
1	6	17	likely	positive	linear		field boundary mapped on 1841 tithe map, not present on OS 1954-56 1:10,560 map	post-medieval	1841 Stoke Fleming tithe map, OS 1954-56 1:10,560 map	
1	7	18	likely	positive	linear		field boundary mapped on 1841 tithe map, still present on OS 1988 1:10,000 map	post-medieval	1841 Stoke Fleming tithe map, OS 1954-56 1:10,560 map	59
1	7	19	likely	negative	linear		field boundary mapped on 1841 tithe map, still present on OS 1988 1:10,000 map	post-medieval	1841 Stoke Fleming tithe map, OS 1988 1:10,000 map	59
1	7	20	likely	positive	linear		field boundary mapped on 1841 tithe map, still present on OS 1988 1:10,000 map	post-medieval	1841 Stoke Fleming tithe map, OS 1988 1:10,000 map	59
1	7	21	likely	positive	linear		field boundary mapped on 1841 tithe map, still present on OS 1988 1:10,000 map	post-medieval	1841 Stoke Fleming tithe map, OS 1988 1:10,000 map	59
1	7	22	likely	negative	linear		field boundary mapped on 1841 tithe map, still present on OS 1988 1:10,000 map	post-medieval	1841 Stoke Fleming tithe map, OS 1988 1:10,000 map	59
1	7	23	likely	positive	linear		field boundary mapped on 1841 tithe map, still present on OS 1988 1:10,000 map	post-medieval	1841 Stoke Fleming tithe map, OS 1988 1:10,000 map	59
1	7	24	likely	negative	linear		field boundary mapped on 1841 tithe map, still present on OS 1988 1:10,000 map	post-medieval	1841 Stoke Fleming tithe map, OS 1988 1:10,000 map	59
1	7	25	likely	positive	linear		field boundary mapped on 1841 tithe map, still present on OS 1988 1:10,000 map	post-medieval	1841 Stoke Fleming tithe map, OS 1988 1:10,000 map	59
1	7	26	likely	negative	linear		field boundary mapped on 1841 tithe map, still present on OS 1988 1:10,000 map	post-medieval	1841 Stoke Fleming tithe map, OS 1988 1:10,000 map	59
1	7	27	likely	positive	linear		field boundary mapped on 1841 tithe map, still present on OS 1988 1:10,000 map	post-medieval	1841 Stoke Fleming tithe map, OS 1988 1:10,000 map	59
1	7	28	likely	positive	linear		field boundary mapped on 1841 tithe map, still present on OS 1988 1:10,000 map	post-medieval	1841 Stoke Fleming tithe map, OS 1988 1:10,000 map	59
1	7	29	likely	negative	linear		field boundary mapped on 1841 tithe map, still present on OS 1988 1:10,000 map	post-medieval	1841 Stoke Fleming tithe map, OS 1988 1:10,000 map	59
1	8	30	possible	positive	linear					
1	9	31	possible	positive	linear					17
1	9	32	possible	negative	linear					17
1	9	33	possible	positive	linear					17
1	9	34	possible	negative	linear					17
1	10	35	possible	positive	linear					
1	11	36	possible	positive	linear					
1	12	37	possible	positive	linear					
1	13	38	possible	positive	linear					
1	14	39	possible	positive	linear					
1	14	40	possible	negative	linear					
1	140	208	possible		trend	cultivation				
1	141	209	possible		trend	cultivation				
1	142	210	possible		trend	cultivation				
1	143	211	possible		trend	cultivation				
1	144	212	possible		trend	cultivation				
1	145	213	possible		trend	cultivation				
1	146	214	possible		trend	cultivation				
1	174	242	possible		irregular	spring				
2	15	41	possible	positive	linear					
2	15	42	possible	positive	linear					
2	16	43	possible	positive	linear					
2	17	44	possible	positive	linear					9
2	17	45	possible	positive	linear					9
2	17	46	possible	negative	linear					9
2	18	47	possible	positive	linear					
2	19	48	possible	positive	linear					
2	19	49	possible	positive	linear					
2	19	50	possible	negative	linear					
2	19	51	possible	negative	linear					
2	19	52	possible	positive	linear					
2	20	53	possible	positive	linear					
2	20	54	possible	positive	linear					
2	20	55	possible	negative	linear					
2	21	56	possible	positive	linear					
2	22	57	possible	positive	linear					
2	23	58	possible	positive	linear					26
2	24	59	possible	positive	linear					
2	25	60	possible	positive	linear					
2	26	61	possible	positive	linear					
2	27	62	likely	positive	linear		field boundary mapped on 1841 tithe map, not present on OS 1954 1:2,500 map	post-medieval	1841 Stoke Fleming tithe map, OS 1954 1:2,500 map	
2	27	63	likely	negative	linear		field boundary mapped on 1841 tithe map, not present on OS 1954 1:2,500 map	post-medieval	1841 Stoke Fleming tithe map, OS 1954 1:2,500 map	
2	27	64	likely	positive	linear		field boundary mapped on 1841 tithe map, not present on OS 1954 1:2,500 map	post-medieval	1841 Stoke Fleming tithe map, OS 1954 1:2,500 map	
2	28	65	possible	positive	linear					
2	29	66	possible	positive	linear					
2	30	67	possible	positive	linear					23
2	31	68	possible	positive	linear					
2	32	69	likely	positive	linear		field boundary mapped on 1841 tithe map, still present on OS 1988 1:10,000 map	post-medieval	1841 Stoke Fleming tithe map, OS 1988 1:10,000 map	
2	32	70	likely	positive	linear		field boundary mapped on 1841 tithe map, still present on OS 1988 1:10,000 map	post-medieval	1841 Stoke Fleming tithe map, OS 1988 1:10,000 map	
2	32	71	likely	negative	linear		field boundary mapped on 1841 tithe map, still present on OS 1988 1:10,000 map	post-medieval	1841 Stoke Fleming tithe map, OS 1988 1:10,000 map	
2	33	72	possible	positive	linear					
2	34	73	possible	positive	multilinear					
2	35	74	possible	positive	multilinear					
2	36	75	possible	positive	multilinear					
2	37	76	possible	positive	linear					
2	38	77	possible	positive	multilinear					
2	39	78	possible	positive	linear		possible linear or trend in geology - needs checked			40 41
2	40	79	possible	negative	linear		possible linear or trend in geology - needs checked			39 41
2	41	80	possible	positive	linear		possible linear or trend in geology - needs checked			39 40
2	42	81	possible	dipole						
2	43	82	possible	dipole						
2	44	83	possible	negative	linear		possible linear or trend in geology - needs checked			
2	45	84	possible	positive	linear					
2	46	85	possible	positive	linear					
2	47	86	possible	negative	linear		possible service trench but needs checked			
2	48	87	possible	positive	linear					
2	49	88	possible	positive	linear					
2	50	89	possible	positive	multilinear					
2	51	90	possible	positive	linear					
2	52	91	possible	positive	curvilinear					
2	63	108	possible	mixed	irregular		area of mixed signals and large ferrous response- site of 2 buildings on OS 1964-84 1:2,500 map		OS 1964-84 1:2,500 map	
2	147	215	possible		trend	cultivation				
2	148	216	possible		trend	cultivation				
2	149	217	possible		trend	cultivation				
2	150	218	possible		trend	cultivation				
2	151	219	possible		trend	cultivation				
6	58	98	possible	positive	multilinear					
6	59	99	possible	positive	linear		extension of known demolished field boundary?			7
6	59	100	possible	positive	linear		tenuous			
6	60	101	possible	positive	curvilinear		archaeology or fortuitous plough marks			
6	61	102	likely	positive	linear		field boundary mapped on 1841tithe map, not present on OS 1960 1:2,500 map	post-medieval	1841 Stoke Fleming tithe map, OS 1960 1:2,500 map	
6	61	103	likely	negative	linear		field boundary mapped on 1841tithe map, not present on OS 1960 1:2,500 map	post-medieval	1841 Stoke Fleming tithe map, OS 1960 1:2,500 map	
6	61	104	likely	positive	linear		field boundary mapped on 1841tithe map, not present on OS 1960 1:2,500 map	post-medieval	1841 Stoke Fleming tithe map, OS 1960 1:2,500 map	
6	62	105	likely	positive	linear		field boundary mapped on 1841tithe map, not present on OS 1960 1:2,500 map	post-medieval	1841 Stoke Fleming tithe map, OS 1960 1:2,500 map	
6	62	106	likely	negative	linear		field boundary mapped on 1841tithe map, not present on OS 1960 1:2,500 map	post-medieval	1841 Stoke Fleming tithe map, OS 1960 1:2,500 map	
6	62	107	likely	positive	linear		field boundary mapped on 1841tithe map, not present on OS 1960 1:2,500 map	post-medieval	1841 Stoke Fleming tithe map, OS 1960 1:2,500 map	
6	64	109	possible	negative	oval					
6	65	110	possible	positive	linear					73
6	65	111	possible	positive	linear					
6	66	112	possible	positive	curvilinear					
6	67	113	possible	positive	curvilinear					
6	68	114	possible	positive	linear					
6	69	115	possible	positive	linear					70
6	70	116	possible	positive	linear					69 71
6	71	117	possible	negative	linear		archaeology or natural feature - could be soil creep			70
6	72	118	possible	positive	linear					
6	73	119	possible	positive	linear					65
7	74	120	possible	positive	linear					
7	75	121	possible	positive	curvilinear		suggestion of a subcircular structure, internal diameter would be approximately 35m			
7	76	122	possible	positive	linear					
7	157	225	possible		trend	cultivation				

Table 1: Data analysis, fields 1, 2, 6 and 7



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Legend

survey area

survey area

potential archaeology

likely, positive

likely, negative

possible archaeology, positive anomaly

possible archaeology, negative anomaly

possible archaeology, possible rubble

possible archaeology, possible heated deposit

possible archaeology, filled hollow

possible archaeology, possible stony surface

ferrous material (2, 4)

trends and services

possible archaeology, linear trend in data

cultivation traces (2)

recent services (drains, pipelines, cables)

potential natural land forms

possible land form, palaeochannel

possible land form, spring

17 (5) anomaly group (anomaly id.)

N

Notes:

1. All interpretations are provisional and represent potential archaeological deposits.
2. Representative of trends; not every instance is recorded.
3. Anomalies certain to represent very recent ground disturbance are not highlighted.
4. Filled circles used to define anomalies are symbols and do not indicate possible circular archaeological features unless specifically indicated in the text.

0 25 50 100 Meters

Figure 2: survey interpretation, fields 1, 2, 6 and 7

6.3 Fields 3, 4 and 5 (refer to figures 3 and 8)

Historical landscape characterisation (Devon County Council, undated)
Field 3: Post-medieval enclosure
Fields 4 and 5: Recreation

Notes
Every effort was made to maximise the area surveyed. The limits shown were imposed by the presence of magnetic material in field boundaries and water troughs.

Results
A detailed analysis for this area can be found in table 2.

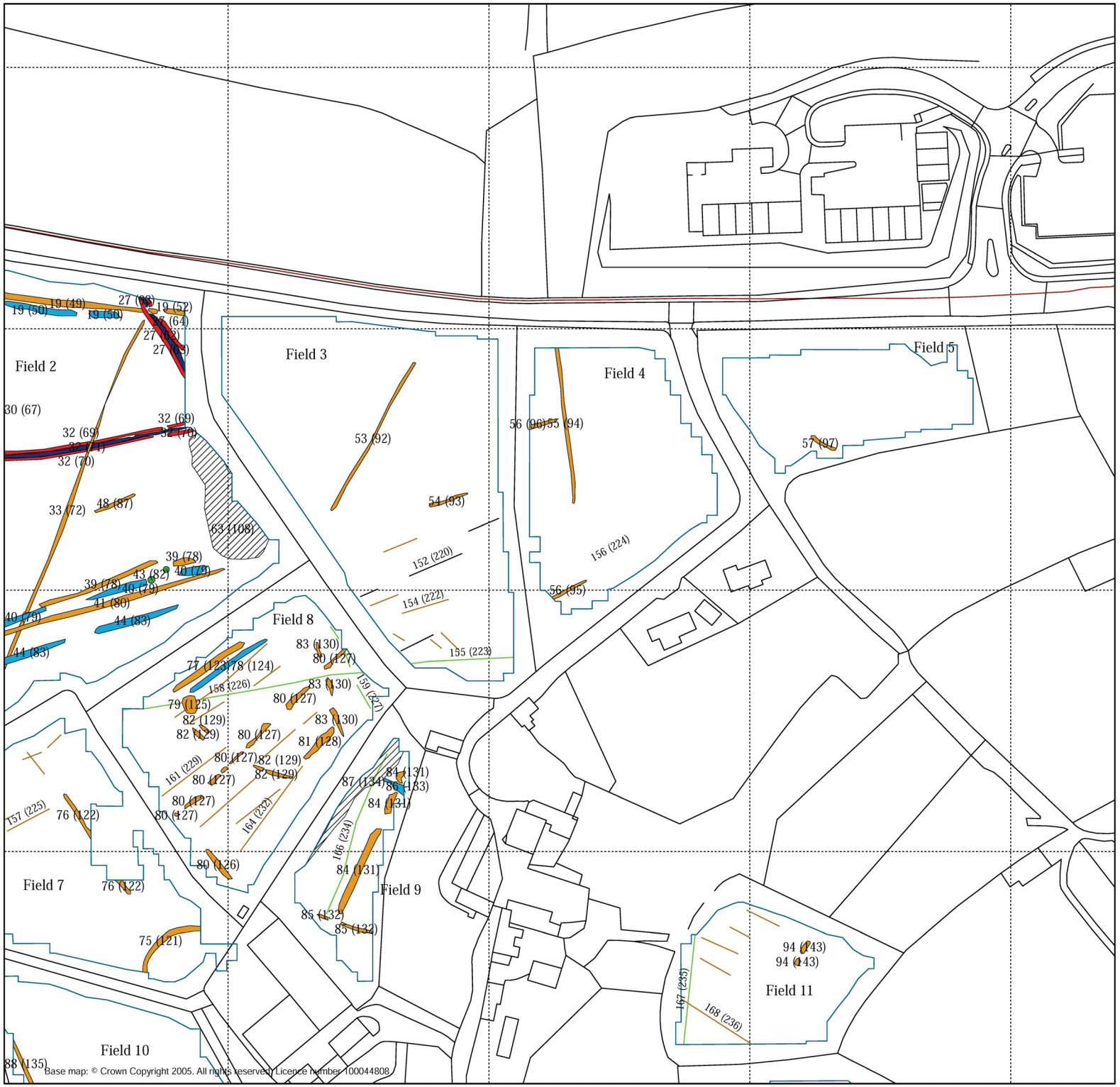
Very few anomalies of potential archaeological significance were recorded in these fields although the magnetic response was sufficient to record likely geological variations.

Recommendations

6.3.1 It is recommended that any further archaeological investigations of these fields include an assessment of the linear anomaly patterns 53 and 56.

field number	anomaly group	anomaly id	characterisation certainty	anomaly class	anomaly form	additional characterisation	comments	period	supporting evidence	associated anomaly group(s)
3	53	92	possible	positive	linear		possible service trench but needs checked			
3	54	93	possible	positive	linear					
3	152	220	possible		trend	archaeological	archaeology or drainage?			
3	153	221	possible		trend	cultivation				
3	154	222	possible		trend	cultivation				
3	155	223	possible		linear	service				
4	55	94	possible	positive	linear					
4	56	95	possible	positive	linear					
4	56	96	possible	positive	linear					
4	156	224	possible		trend	archaeology				
5	57	97	possible	positive	linear					

Table 2: Data analysis, fields 3, 4 and 5



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An Archaeological Geophysical Gradiometer Survey

Land at Dartmouth
Devon
NGR 285713m 50630m

Report: 101028

Legend

survey area

- survey area

potential archaeology

- likely, positive
- likely, negative
- possible archaeology, positive anomaly
- possible archaeology, negative anomaly
- possible archaeology, possible rubble
- possible archaeology, possible heated deposit
- possible archaeology, filled hollow
- possible archaeology, possible stony surface
- ferrous material (2, 4)

trends and services

- possible archaeology, linear trend in data
- cultivation traces (2)
- recent services (drains, pipelines, cables)

potential natural land forms

- possible land form, palaeochannel
- possible land form, spring

17 (5) anomaly group (anomaly id.)

N

Notes:

1. All interpretations are provisional and represent potential archaeological deposits.
2. Representative of trends; not every instance is recorded.
3. Anomalies certain to represent very recent ground disturbance are not highlighted.
4. Filled circles used to define anomalies are symbols and do not indicate possible circular archaeological features unless specifically indicated in the text.

0 25 50 100 Meters

Figure 3: survey interpretation, fields 3, 4 and 5

6.4 Fields 8, 9, 10 and 11 (refer to figures 4 and 9)

Historical landscape characterisation (Devon County Council, undated)
Fields 8 and 9: Post-medieval enclosures
Field 10: Recreation
Field 11: Barton Field

Notes
Every effort was made to maximise the area surveyed. The limits shown were imposed by the presence of magnetic material in field boundaries and water troughs.

Results
A detailed analysis for this area can be found in table 3.

The linear anomaly groups recorded as 'likely' **89** represent a field boundary removed after 1988.

The majority of potential archaeological features are linear and multilinear. Most are along similar directional trends to the modern extant and relatively recently removed field boundaries. Of these, the anomaly group **80** in field 8 may represent a sub-division of the field not recorded on any tithe or Ordnance Survey map but may represent an earlier enclosure phase. Anomaly group **84** in field 9 has an associated visible earthwork but no such linear feature is recorded on available maps from 1841 onwards.

Anomaly groups **90** and **91** in field 10 may represent an earlier phase of enclosure.

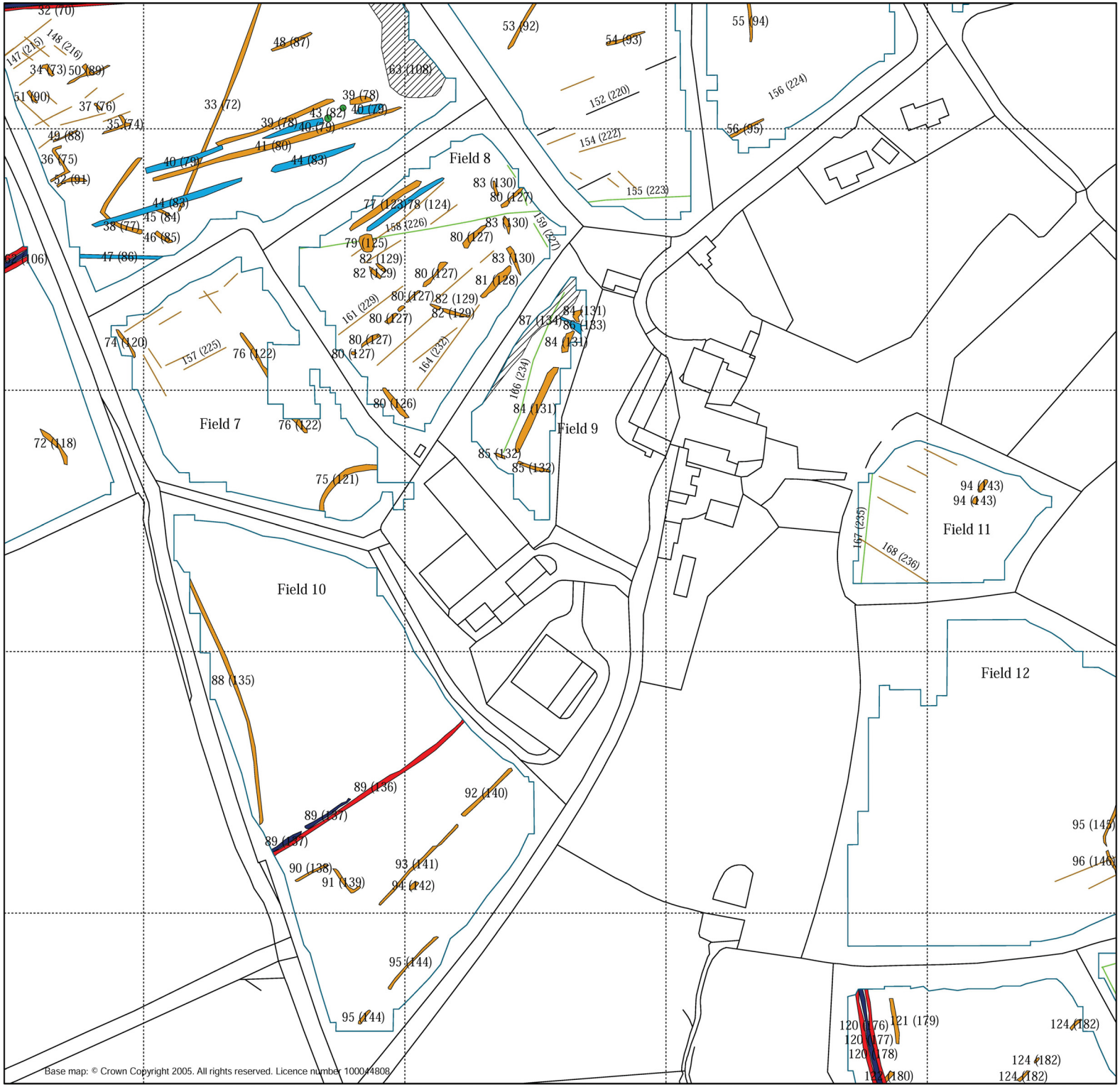
Recommendations

6.4.1 The anomaly group 89 is likely to represent a field boundary removed after 1988. These anomalies should be assessed to evaluate likely construction dates which will be sometime before the production of in the 1841 Stoke Fleming tithe map.

6.4.2 It is recommended that any further archaeological investigations of these fields include an assessment of the linear anomaly patterns **77** and **80** in field 8, **84** in field 9, **88**, **90** and **91** in field 10 and one of **92**, **93** and **95** in field 10.

field number	anomaly group	anomaly id	characterisation certainty	anomaly class	anomaly form	additional characterisation	comments	period	supporting evidence	associated anomaly group(s)
8	77	123	possible	positive	linear					78
8	78	124	possible	negative	linear					77
8	79	125	possible	positive	oval	pit				
8	80	126	possible	positive	linear					
8	80	127	possible	positive	linear					
8	81	128	possible	positive	linear					
8	82	129	possible	positive	linear					
8	83	130	possible	positive	linear					
8	158	226	possible		linear	service				
8	159	227	possible		linear	service				
8	160	228	possible		trend	archaeology	likely ploughing but needs checked			
8	161	229	possible		trend	cultivation				
8	162	230	possible		trend	archaeology	likely ploughing but needs checked			
8	163	231	possible		trend	cultivation				
8	164	232	possible		trend	cultivation				
8	165	233	possible		trend	archaeology				
9	84	131	possible	positive	linear		linear earthwork noted by survey team - suggestion of a wall footing			
9	85	132	possible	positive	linear					
9	86	133	possible	negative	irregular					
9	87	134	possible	mixed	irregular		raised linear earthwork noted by survey team - wall footing, re-built wall or rough track			
9	166	234	possible		linear	service				
10	88	135	possible	positive	linear					
10	89	136	likely	positive	linear		field boundary mapped on 1841 tithe map, still present on OS 1988 1:10,000 map			
10	89	137	likely	negative	linear		field boundary mapped on 1841 tithe map, still present on OS 1988 1:10,000 map			
10	90	138	possible	positive	linear					
10	91	139	possible	positive	linear					
10	92	140	possible	positive	linear					
10	93	141	possible	positive	linear					
10	94	142	possible	positive	oval					
10	95	144	possible	positive	linear					
11	94	143	possible	positive	linear					
11	167	235	possible		linear	service				
11	168	236	possible		trend	cultivation				

Table 3: Data analysis, fields 8, 9, 10 and 11



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Devon
NGR 285713m 50630m

Report: 101028

Legend

survey area

- survey area

potential archaeology

- likely, positive
- likely, negative
- possible archaeology, positive anomaly
- possible archaeology, negative anomaly
- possible archaeology, possible rubble
- possible archaeology, possible heated deposit
- possible archaeology, filled hollow
- possible archaeology, possible stony surface
- ferrous material (2, 4)

trends and services

- possible archaeology, linear trend in data
- cultivation traces (2)
- recent services (drains, pipelines, cables)

potential natural land forms

- possible land form, palaeochannel
- possible land form, spring

17 (5) anomaly group (anomaly id.)

N

Notes:

1. All interpretations are provisional and represent potential archaeological deposits.
2. Representative of trends; not every instance is recorded.
3. Anomalies certain to represent very recent ground disturbance are not highlighted.
4. Filled circles used to define anomalies are symbols and do not indicate possible circular archaeological features unless specifically indicated in the text.

0 25 50 100 Meters

Figure 4: survey interpretation, fields 8, 9, 10 and 11

6.5 Fields 12, 13, 14 and 15 (refer to figures 5 and 10)

Historical landscape characterisation (Devon County Council, undated)
Field 12: Barton Field
Fields 13, 14 and 15: Modern enclosures adapting post-medieval fields

Notes
Every effort was made to maximise the area surveyed. The limits shown were imposed by the presence of magnetic material in the field boundaries.

Results
A detailed analysis for this area can be found in table 4.

The linear anomaly groups recorded as 'likely' (anomaly groups **108** in field 13, **120** and **127** in field 14, and **131** in field 15) represent field boundaries removed after 1964. Of these the boundaries represented by groups 108 and 131 were removed after publication of the Ordnance Survey 1988 1:10,000 map. From the relevant Ordnance Survey maps, the boundaries in field 14 (groups 120 and 127) are likely to have been removed in 1963 or 1964.

The linear structure represented by anomaly group **128** in field 14 has a structure consistent with a typical Devon bank much the same as those recently removed boundaries discussed above. This potential structure is not recorded on the available Ordnance Survey maps or on the 1841 Stoke Fleming tithe map.

The majority of potential archaeological features recorded in these fields are linear and multilinear. They are suggestive of more than one phase of enclosure that do not conform with the directional trends of extant or recently removed field boundaries. Examples include groups **98**, **99**, **101**, **112**, **113** and **115** to **118** in field 13, groups **123** to **126** in field 14, and groups **129**, **130**, **133**, **136** and **138** in field 15.

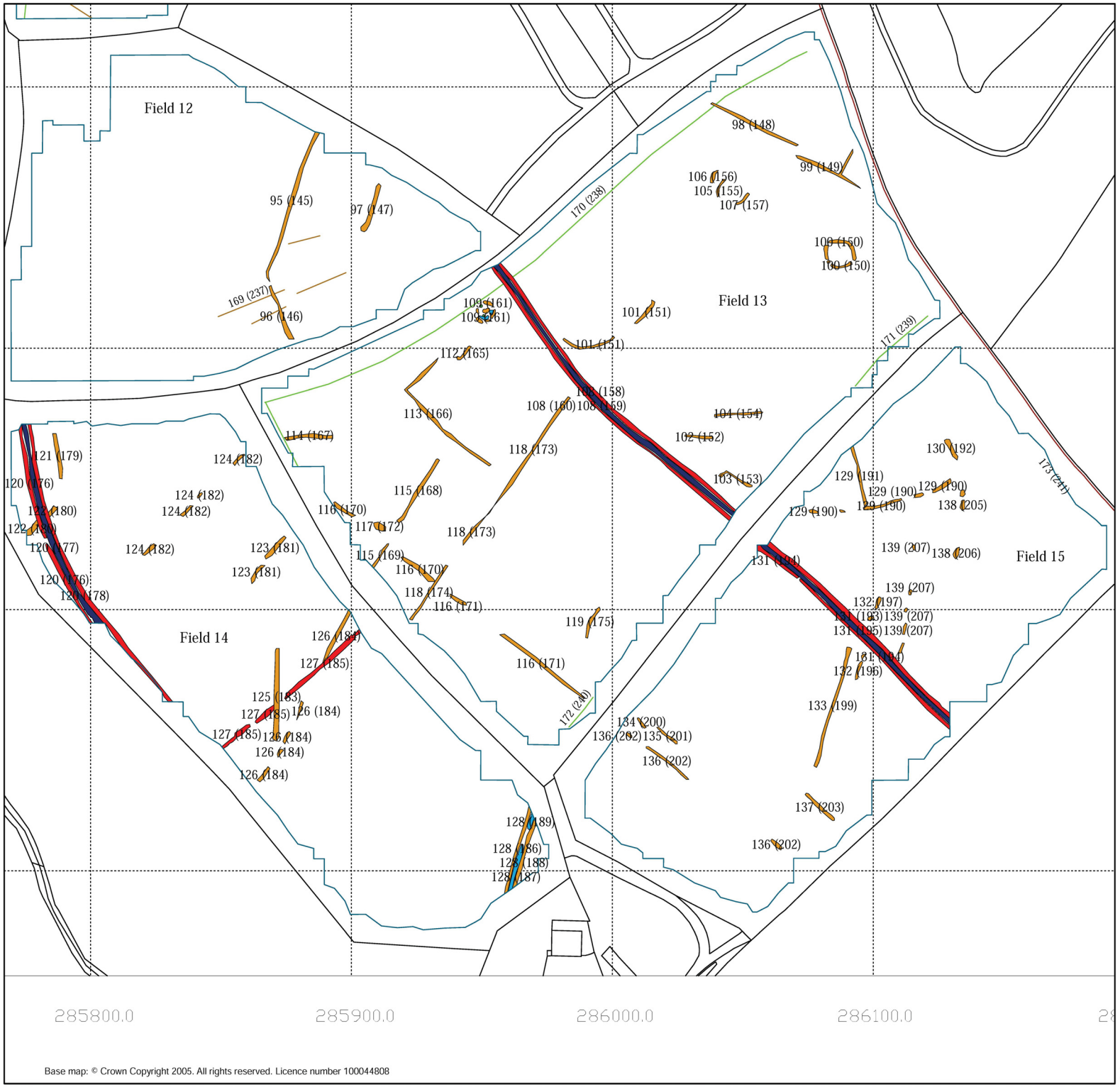
There are a hints of two subcircular structures in field 13 (groups **100** and **109**). These patterns are tenuous and may be due to modern ploughing disturbance.

The linear patterns **95**, **96** and **97** in field 12 follow the trends of recent ploughing but have a magnetic response indicating that they are more substantial and may represent potential archaeological deposits.

Recommendations
6.5.1 The anomalies likely to represent field boundaries removed during or after 1963 should be assessed to evaluate likely construction dates which will be sometime before the production of in the 1841 Stoke Fleming tithe map.
6.5.2 Some of the possible enclosure phases across all the fields discussed above will need further archaeological investigation to assess their likely age and relationships to each other.
6.5.3 Further work is required to assess the nature of the potential subcircular enclosures represented by groups 100 and 109 in field 13.
6.5.4 Investigation of anomaly group 128 is required to assess its potential as an archaeological structure.

field number	anomaly group	anomaly id	characterisation certainty	anomaly class	anomaly form	additional characterisation	comments	period	supporting evidence	associated anomaly group(s)
12	95	145	possible	positive	linear		same orientation as cultivation marks			
12	96	146	possible	positive	linear					
12	97	147	possible	positive	linear					
12	169	237	possible		trend	cultivation	drainage?			
13	98	148	possible	positive	linear					
13	99	149	possible	positive	multilinear					
13	100	150	possible	positive	subcircular	subcircular structure	tenuous - approximately 9m internal diameter			
13	101	151	possible	positive	curvilinear					
13	102	152	possible	positive	linear					
13	103	153	possible	positive	multilinear					
13	104	154	possible	positive	linear					
13	105	155	possible	positive	linear					
13	106	156	possible	positive	linear					
13	107	157	possible	positive	linear					
13	108	158	likely	positive	linear		field boundary mapped on 1841 tithe map, still present on OS 1988 1:10,000 map		1841 tithe map, OS 1988 1:10,000 map	
13	108	159	likely	negative	linear		field boundary mapped on 1841 tithe map, still present on OS 1988 1:10,000 map		1841 tithe map, OS 1988 1:10,000 map	
13	108	160	likely	positive	linear		field boundary mapped on 1841 tithe map, still present on OS 1988 1:10,000 map		1841 tithe map, OS 1988 1:10,000 map	
13	109	161	possible	positive	subcircular	subcircular structure	tenuous - approximately 6m internal diameter			
13	109	162	possible	negative	subcircular	subcircular structure	tenuous - approximately 6m internal diameter			
13	110	163	possible	dipole						
13	111	164	possible	dipole						
13	112	165	possible	positive	linear					
13	113	166	possible	positive	multilinear					
13	114	167	possible	positive	linear					
13	115	168	possible	positive	linear					
13	115	169	possible	positive	linear					
13	116	170	possible	positive	linear					136
13	116	171	possible	positive	linear					136
13	117	172	possible	positive	oval	pit				
13	118	173	possible	positive	linear					
13	118	174	possible	positive	linear					
13	119	175	possible	positive	linear					
13	170	238	possible		linear	service	water or drain			
13	171	239	possible		linear	service	water or drain			
13	172	240	possible		linear	service	water or drain			
14	120	176	likely	positive	linear		field boundary mapped on 1841 tithe map, not present on OS 1964-68 1:2,500 map		1841 tithe map, OS 1964-68 1:2,500 map	
14	120	177	likely	negative	linear		field boundary mapped on 1841 tithe map, not present on OS 1964-68 1:2,500 map		1841 tithe map, OS 1964-68 1:2,500 map	
14	120	178	likely	positive	linear		field boundary mapped on 1841 tithe map, not present on OS 1964-68 1:2,500 map		1841 tithe map, OS 1964-68 1:2,500 map	
14	121	179	possible	positive	linear					
14	122	180	possible	positive	linear					
14	123	181	possible	positive	linear					
14	124	182	possible	positive	linear					
14	125	183	possible	positive	linear					
14	126	184	possible	positive	linear					
14	127	185	likely	positive	linear		field boundary mapped on 1841 tithe map, not present on OS 1964-68 1:2,500 map		1841 tithe map, OS 1964-68 1:2,500 map	
14	128	186	possible	positive	linear		field boundary - pre-1841 - extant boundary shown on 1841 tithe map		1841 tithe map	
14	128	187	possible	negative	linear		field boundary - pre-1841 - extant boundary shown on 1841 tithe map		1841 tithe map	
14	128	188	possible	positive	linear		field boundary - pre-1841 - extant boundary shown on 1841 tithe map		1841 tithe map	
14	128	189	possible	negative	linear		field boundary - pre-1841 - extant boundary shown on 1841 tithe map		1841 tithe map	
15	129	190	possible	positive	linear					
15	129	191	possible	positive	linear		tenuous			
15	130	192	possible	positive	curvilinear		tenuous			
15	131	193	likely	positive	linear		field boundary mapped on 1841 tithe map, still present on OS 1988 1:10,000 map		1841 tithe map, OS 1988 1:10,000 map	
15	131	194	likely	positive	linear		field boundary mapped on 1841 tithe map, still present on OS 1988 1:10,000 map		1841 tithe map, OS 1988 1:10,000 map	
15	131	195	likely	negative	linear		field boundary mapped on 1841 tithe map, still present on OS 1988 1:10,000 map		1841 tithe map, OS 1988 1:10,000 map	
15	132	196	possible	positive	linear		tenuous			
15	132	197	possible	positive	linear					
15	132	198	possible	positive	linear					
15	133	199	possible	positive	linear					
15	134	200	possible	positive	linear					
15	135	201	possible	positive	linear					
15	136	202	possible	positive	linear					116
15	137	203	possible	positive	linear					
15	138	204	possible	positive	curvilinear		tenuous			
15	138	205	possible	positive	curvilinear		tenuous			
15	138	206	possible	positive	curvilinear		tenuous			
15	139	207	possible	positive	linear					
15	173	241	possible		linear	seervice	water or drain			

Table 4: Data analysis, fields 12, 13, 14 and 15



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Legend

survey area

- survey area

potential archaeology

- likely, positive
- likely, negative
- possible archaeology, positive anomaly
- possible archaeology, negative anomaly
- possible archaeology, possible rubble
- possible archaeology, possible heated deposit
- possible archaeology, filled hollow
- possible archaeology, possible stony surface
- ferrous material (2, 4)

trends and services

- possible archaeology, linear trend in data
- cultivation traces (2)
- recent services (drains, pipelines, cables)

potential natural land forms

- possible land form, palaeochannel
- possible land form, spring

17 (5) anomaly group (anomaly id.)

N

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0 25 50 100 Meters

Figure 5: survey interpretation, fields 12, 13, 14 and 15

7 Acknowledgements

Substrata would like to thank Colin Humphreys of South West Archaeology Ltd (the Client) for commissioning us to complete this survey on behalf of Millwood Homes (Devon) Ltd. We would also like to thank the landowners for access to their land.

8 References

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Appendix 1 Survey Plots

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.

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N

Legend

-400 - -300	nT
-200 - -100	
0 - -60	
-50 - -30	
-20 - -20	
-10 - 0	
0.1 - 20	
30 - 30	
40 - 60	
70 - 100	
200 - 300	
400 - 400	
High : 17.57	
Low : -18.55	

0 50 100 200 Meters

Figure 6: shade plot, all fields

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-400 - -300	nT
-200 - -100	
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-50 - -30	
-20 - -20	
-10 - 0	
0.1 - 20	
30 - 30	
40 - 60	
70 - 100	
200 - 300	
400 - 400	
High : 17.57	
Low : -18.55	

0 25 50 100 Meters

Figure 7: shade plot, fields 1, 2, 6 and 7

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N

Legend

-400 - -300	nT
-200 - -100	
0 - -60	
-50 - -30	
-20 - -20	
-10 - 0	
0.1 - 20	
30 - 30	
40 - 60	
70 - 100	
200 - 300	
400 - 400	
High : 17.57	
Low : -18.55	

0 25 50 100 Meters

Figure 8: shade plot, fields 3, 4 and 5

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N

Legend

-400 - -300	nT
-200 - -100	
0 - -60	
-50 - -30	
-20 - -20	
-10 - 0	
0.1 - 20	
30 - 30	
40 - 60	
70 - 100	
200 - 300	
400 - 400	
High : 17.57	
Low : -18.55	

0 25 50 100 Meters

Figure 9: shade plot, fields 8, 9, 10 and 11

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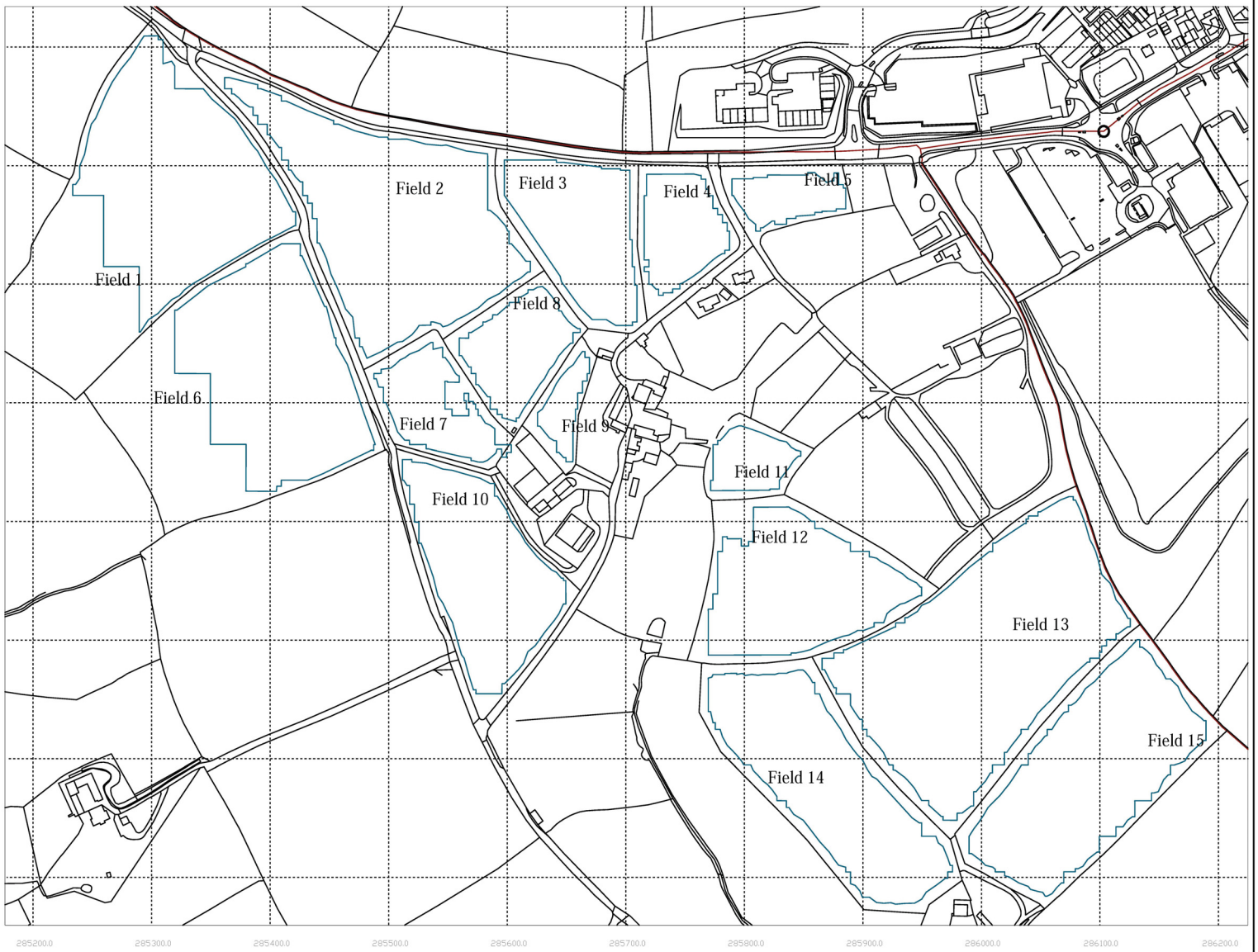
N

Legend

-400 - -300	nT
-200 - -100	
0 - -60	
-50 - -30	
-20 - -20	
-10 - 0	
0.1 - 20	
30 - 30	
40 - 60	
70 - 100	
200 - 300	
400 - 400	
High : 17.57	
Low : -18.55	

0 25 50 100 Meters

Figure 10: shade plot, fields 12, 13, 14 and 15



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Report: 101028

Legend

survey area

survey area

N

0 50 100 200 Meters

Figure 11: survey areas and fields

Appendix 2 GIS classification schema

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GIS classification schema

shapefile properties

field name	data type	length/precision	alias	use
FID	*object Id*			all
shape	*geometry*			all
Id	*long integer*		anomaly id.	all
area	short integer		area or field number	all
group	short integer	0	anomaly group	potential_archaeology, potential_natural, grad_trends_&_services
associated	text	50	associated anomaly group (s)	potential_archaeology, potential_natural, grad_trends_&_services
potential	text	50	characterisation certainty	potential_archaeology, potential_natural, grad_trends_&_services
attribute	text	50	anomaly class	potential_archaeology, potential_natural, grad_trends_&_services
form	text	50	anomaly form	potential_archaeology, potential_natural, grad_trends_&_services
interp	text	100	additional characterisation	potential_archaeology, potential_natural, grad_trends_&_services
comments	text	100		potential_archaeology, potential_natural, grad_trends_&_services
period	text	50		potential_archaeology, potential_natural, grad_trends_&_services
supp_evi	text	100	supporting evidence	potential_archaeology, potential_natural, grad_trends_&_services

anomaly classification

attribute class	potential * characterisation certainty	attribute anomaly class	key ****		legend	form * anomaly form	characterisation ** *** additional characterisation
potential archaeology	likely	positive		mars red	likely archaeology, positive anomaly (supporting evidence)	linear	quarry
	likely	negative		dark navy	likely archaeology, negative anomaly (supporting evidence)	multilinear	pit(s)
	possible	positive		seville orange	possible archaeology, positive anomaly	curvilinear	posthole(s)
	possible	negative		moorea blue	possible archaeology, negative anomaly	oval	pit(s) or posthole(s)
	possible	high contrast		mars red	possible archaeology, possible industrial/craft deposits	subcircular	subcircular structure
	possible	mixed		black	possible archaeology, possible rubble	circular	routeway
	possible	dipole		leaf green	possible archaeology, ferrous material (2, 4)	rectilinear	enclosure
	possible	strong positive		ginger pink	possible archaeology, possible heated deposit	subrectangular	
	possible	positive spread		seville orange	possible archaeology, filled hollow	polygon	
	possible	negative spread		moorea blue	possible archaeology, possible stony surface	irregular	
						interference	
potential natural	possible			apatite blue	possible natural, palaeochannel	linear	palaeochannel
	possible			quetzel green	possible natural, spring(s)	multilinear	springs
	possible			60% grey	possible natural, near surface bedrock	curvilinear	bedrock
						irregular	
trends & services				black	possible archaeology, linear trends	trend	archaeological
				raw umber	possible archaeology, cultivation traces	linear	cultivation
				quetzel green	recent services (drains, pipelines, cables)		service

*** FORM do not repeat anomaly class values (e.g. dipole)**

anomaly form	anomaly/anomaly pattern description
linear	straight or near-straight
multilinear	more than one connected linear on different orientations
curvilinear	
oval	used for subcircular and oval smaller patterns (e.g. possible pits and postholes)
subcircular	used for larger patterns (e.g. possible roundhouses or ring ditches)
circular	
rectilinear	linears forming an apparent rectangular larger patterns (e.g. a possible enclosure or building)
subrectangular	a near-rectilinear quadrilateral smaller pattern (e.g. pits, graves)
polygon	linears and curvilinears forming an closed or near-closed polygonal larger patterns (e.g. possible enclosure)
irregular	
interference	used for significant ferrous anomaly patterns when not deemed to be archaeology

** anomaly form is primary description, characterisation is a supporting description only - do not use unless 'form' needs further explanation
*** if there is supporting evidence then a more detailed characterisation can be made and the 'potential' field will be 'likely'
**** Notes below key:

Notes:

1. All interpretations are provisional and represent potential archaeological deposits.
2. Representative of trends; not every instance is recorded.
3. Anomalies likely to represent very recent ground disturbance are not highlighted.
4. Filled circles used to define anomalies are symbols and do not indicate possible circular archaeological features unless specifically indicated in the text.

hilo data scale

dark navy	-ive
lapis lazuli	
moorea blue	
permian 3	
missassippian 1	
blank	
blank	
solar yellow	
electron gold	
mars red	
dark umber	
volcanic 3	+ive

Appendix 3 Survey methodology

Substrata
Archaeological Geophysical Surveyors

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A gradiometer survey design and methodology statement: survey across land at Dartmouth centred on 285713m 50630m

Survey Aims and Objectives

Aims

1. Define and characterise and detectable archaeological remains on the site.
2. Inform any future archaeological investigation of the area.

Objectives

1. Complete a gradiometer 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 archaeological investigation about the location and possible archaeological character of the recorded anomalies.

Survey Grid

1. The survey will use a temporary survey grid accurately positioned using a suitable DGPS system. The temporary grid will be co-registered to the Ordnance Survey National Grid using digital tiles provided by Substrata or suitable digital map tiles provided by the client. The grid will also be marked by 2 discrete permanent survey markers if required.
2. The survey grid will be composed of continuous 30-metre square sub-grids with partial sub-grids to maximise the area surveyed where practical.
3. The survey grid location information and grid plan will be recorded as a project in a suitable GIS system.

Survey Equipment and Data Capture

1. The magnetometer survey will be completed using a Bartington *Grad*601-2 (dual sensor) fluxgate gradiometer and automatic data logger. The readings will be recorded on 1-metre traverses at 0.125-metre intervals using north-south orientated zigzag traverses. Sensor balance will be checked and adjusted at regular intervals.
2. Environmental conditions including land use, soils, terrain, ground conditions and weather will be recorded and a digital photographic record of the site pertinent to the geophysical survey will be provided.

Data Processing, Interpretation and Report

1. Data processing will be undertaken using DW Consulting's ArcheoSurveyor2 and Golden Software Inc.'s Surfer 8 software.
2. Anomalies will be digitised and geo-referenced in the GIS project. They will be colour coded using Substrata's standard scheme to provide the most likely interpretation. Anomalies will be numbered and catalogued in the text as systematic groups or individual anomalies as appropriate.

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3. The final report will include 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.
4. Three printed copies of the report will be provided. A PDF file of the report, the raw geophysical data files and the GIS project will be provided on DVD-ROM with each printed copy.

Standards:

David, A., Linford, N., Linford, P. (2008) *Geophysical survey in archaeological field evaluation*, English Heritage.

Institute for Archaeologists (2009) *Standards and guidance for stewardship of the historical environment*. Reading: Author

Schmidt, A 2002 Geophysical Data in Archaeology: A Guide to Good Practice, *ADS series of Guides to Good Practice*. Oxford: Oxbow Books
[ONLINE], Available: http://ads.ahds.ac.uk/project/goodguides/geophys/

Institute for Archaeologists (undated) *IfA house style*, [Online], Available: http://www.archaeologists.net/modules/icontent/inPages/docs/pubs/IFA%20HOUSE%20STYLE%202007.doc

Codes of approved practice:

Institute for Archaeologists (2008) *Code of approved practice for the regulation of contractual arrangements in archaeology*. Reading: Author

Institute for Archaeologists (2008) *Code of conduct*. Reading: Author

Andrews, G. and Thomas, R. (1991) *Management of Archaeological Projects (MAP2)*, 2nd edition, English Heritage

Table 5: Survey methodology - gradiometer survey	
Grid: *Method of Fixing:* DGPS set-out using pre-planned survey grids and Ordnance Survey coordinates. *Composition:* 30–metre by 30-metre grids *Recording:* Geo-referenced and recorded using digital map tiles and Autodesk's AutoCAD 2004LT.	
Equipment: *Instrument:* Bartington Instruments grad601-2 *Firmware:* version 6.1	**Data Capture:** *Sample Interval:* 0.125-metres *Traverse Interval:* 1 metre *Traverse Method:* zigzag *Traverse Orientation:* GN 0
Data Processing, Analysis and Presentation Software: DW Consulting ArcheoSurveyor2 ArcGIS 9 Golden Software Inc. Surfer 8 Autodesk AutoCAD 2004LT Microsoft Corp. Office Publisher 2003.	

Appendix 4 Data processing

Table 6: Survey Data Processing - all fields, all figures: grey scale

Software: DW Consulting ArcheoSurveyor2 v 2.5.7.19

Stats

Max:	6.41
Min:	-6.02
Std Dev:	3.56
Mean:	0.13
Median:	0.00
Composite Area:	72 ha
Surveyed Area:	21.112 ha

Processes: 13

1. Base Layer
2. De Stagger: Grids: All Mode: Both By: -6 intervals
3. De Stagger: Grids: dd03.xgd dd04.xgd dd02.xgd dd01.xgd dd09.xgd dd05.xgd dd07.xgd dd10+de01.xgd dd06.xgd dd08.xgd de02.xgd Mode: Both By: 9 intervals
4. De Stagger: Grids: de03.xgd de05.xgd de07.xgd de04.xgd de06.xgd de08.xgd Mode: Both By: 7 intervals
5. De Stagger: Grids: dk01.xgd dk02.xgd dk03.xgd Mode: Both By: -6 intervals
6. De Stagger: Grids: dm10.xgd dm15+do02.xgd dm11.xgd dm16.xgd dm12.xgd dm17.xgd dm13.xgd dm18.xgd dm14.xgd Mode: Both By: 6 intervals
7. De Stagger: Grids: dm20.xgd dm22+do16.xgd dm21.xgd dm23.xgd Mode: Both By: 6 intervals
8. De Stagger: Grids: da15.xgd Mode: Both By: -2 intervals
9. De Stagger: Grids: db43.xgd Mode: Both By: -2 intervals
10. Clip from -3000.00 to 3000.00 nT
11. DeStripe Median Sensors: All
12. Clip at 1.00 SD
13. Clip at 1.00 SD

Table 7: Survey Data Processing - all fields, all figures: colour scale

Software: DW Consulting ArcheoSurveyor2 v 2.5.7.19

Stats

Max:	339.33
Min:	-339.39
Std Dev:	11.60
Mean:	0.18
Median:	0.00
Composite Area:	72 ha
Surveyed Area:	21.112 ha

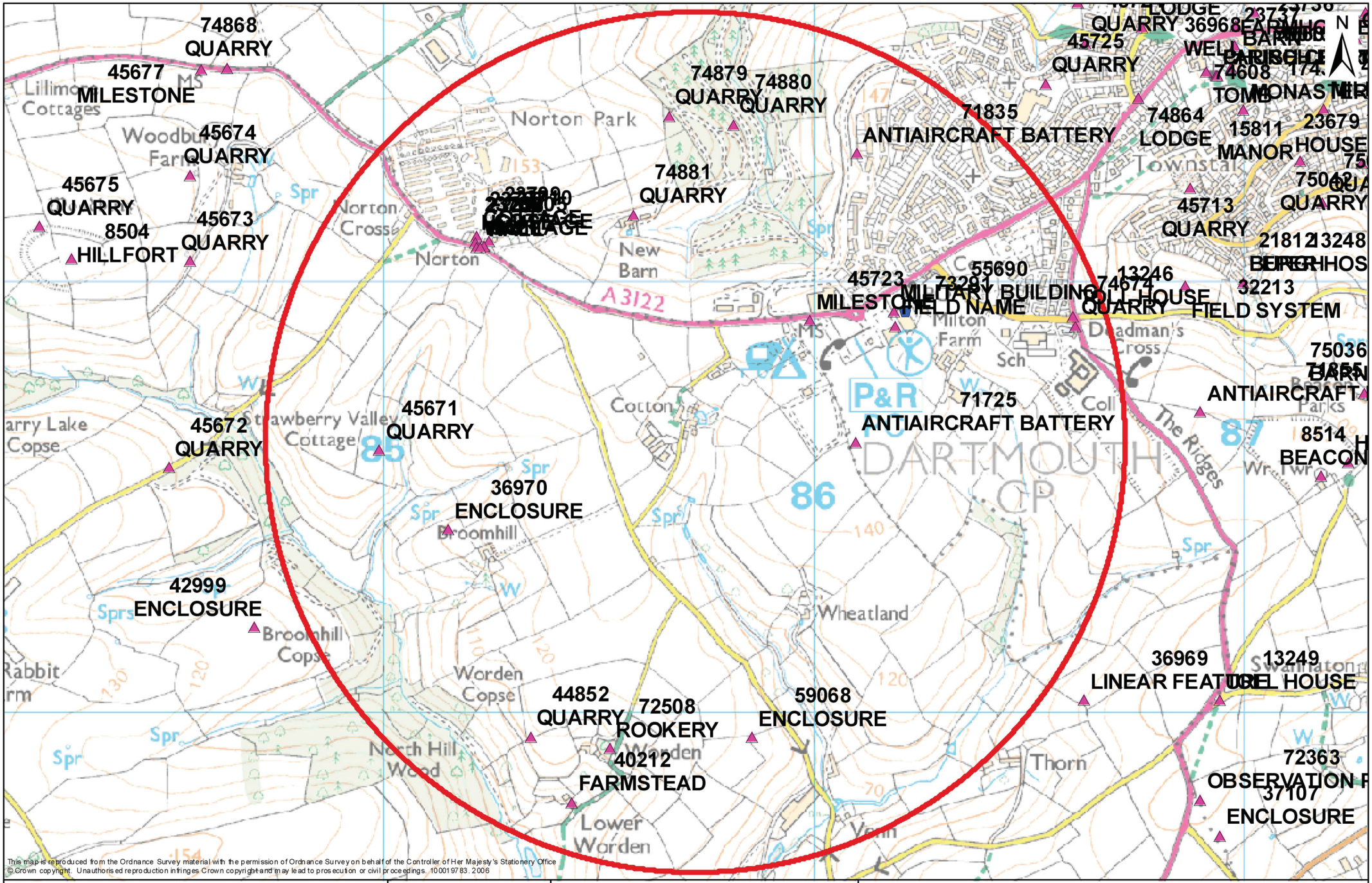
Processes: 12

1. Base Layer
2. De Stagger: Grids: All Mode: Both By: -6 intervals
3. De Stagger: Grids: dd03.xgd dd04.xgd dd02.xgd dd01.xgd dd09.xgd dd05.xgd dd07.xgd dd10+de01.xgd dd06.xgd dd08.xgd de02.xgd Mode: Both By: 9 intervals
4. De Stagger: Grids: de03.xgd de05.xgd de07.xgd de04.xgd de06.xgd de08.xgd Mode: Both By: 7 intervals
5. De Stagger: Grids: dk01.xgd dk02.xgd dk03.xgd Mode: Both By: -6 intervals
6. De Stagger: Grids: dm10.xgd dm15+do02.xgd dm11.xgd dm16.xgd dm12.xgd dm17.xgd dm13.xgd dm18.xgd dm14.xgd Mode: Both By: 6 intervals
7. De Stagger: Grids: dm20.xgd dm22+do16.xgd dm21.xgd dm23.xgd Mode: Both By: 6 intervals
8. De Stagger: Grids: da15.xgd Mode: Both By: -2 intervals
9. De Stagger: Grids: db43.xgd Mode: Both By: -2 intervals
10. Clip from -3000.00 to 3000.00 nT
11. DeStripe Median Sensors: All
12. Clip at 4.00 SD

Appendix 5 Related historical data

Historic Environment Record : Map of entries near survey area
Entries within survey area

Devon County Council historic landscape characterisation



Please note that this information has been compiled from a number of different sources. It is provided for information only and must not be relied on for legal or planning related work without further reference to the Historic Environment Service. The information may be freely used for private or commercial research but the source must be acknowledged. Points or areas shown may represent part of a site that may be of considerable extents. Most archaeological sites in Devon are on private land. The inclusion of a site in the Historic Environment Record does not imply any right of public access.

Scale: 1:11,321

Name: Marrina Neophytou

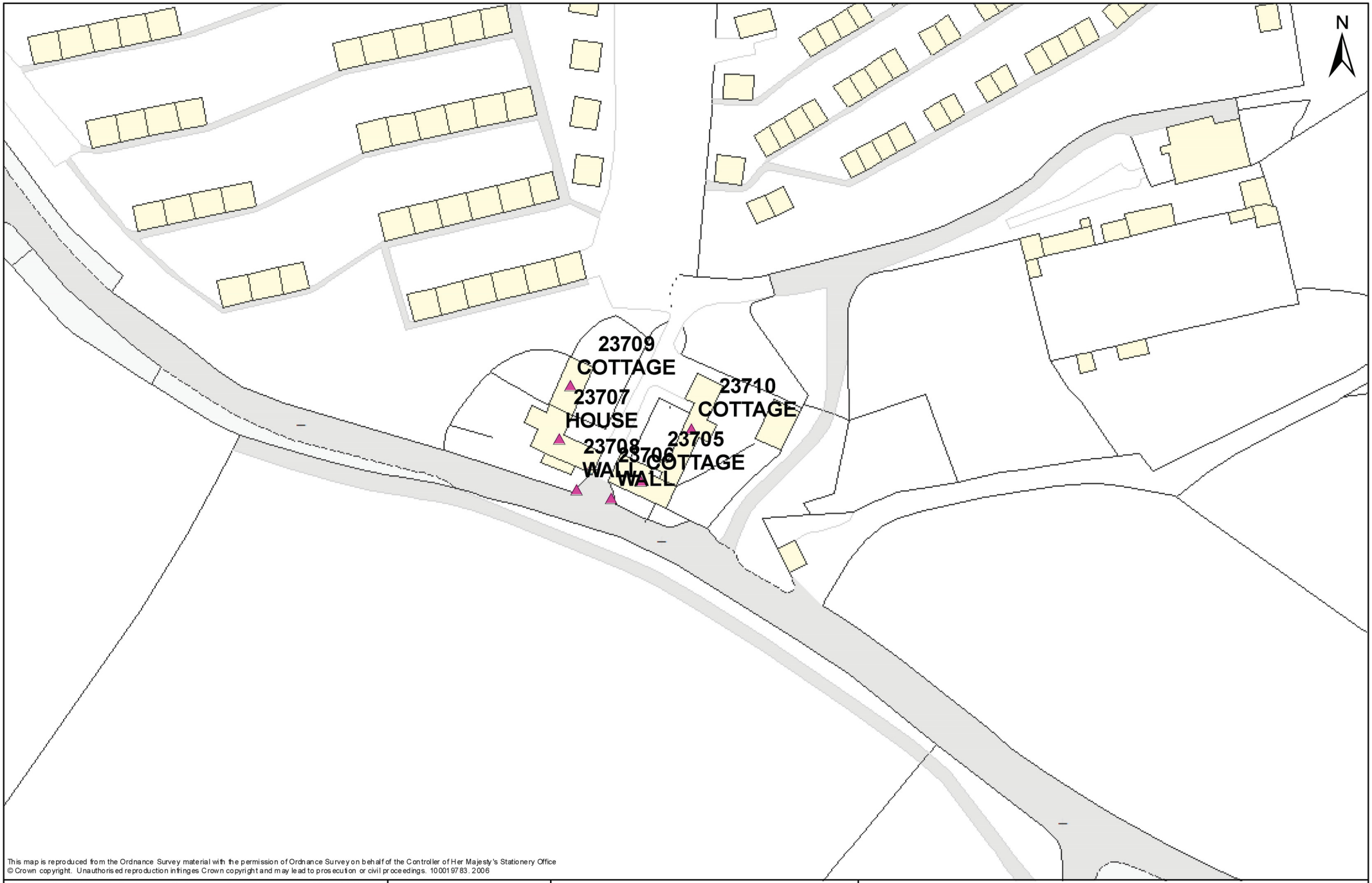
Date: 12 Oct 2010

Little Cotton Farm, Dartmouth Study Area, showing Monument and Event ID

Our ref: Arch/HER/ENQ DC

Devon Historic Environment Record
Historic Environment Service
Devon County Council
County Hall, Exeter. EX2 4QW
Tel: 01392 382246 Fax: 01392 383011
e-mail: archaeol@devon.gov.uk
www.devon.gov.uk/archaeology

Devon County Council



Scale: 1:1,133

Name: Marrina Neophytou

Date: 12 Oct 2010

Little Cotton Farm, Dartmouth Study Area, showing Monument and Event IDEnlarged Map

Our ref: Arch/HER/ENQ DC

Devon Historic Environment Record
Historic Environment Service
Devon County Council
County Hall, Exeter. EX2 4QW
Tel: 01392 382246 Fax: 01392 383011
e-mail: archaeol@devon.gov.uk
www.devon.gov.uk/archaeology

Devon County Council

Field designation (figure 11)	Historic landscape characterisation
4, 5, 7, 10	Recreation
1, 2, 6, 13, 14, 15	Modern enclosures adapting post-medieval fields
3, 8, 9	Post-medieval enclosures
11, 12	Barton Fields

Table 8: Devon County Council historic landscape characterisation

Explanation

Recreation
Areas set aside for recreation including sports fields and stadiums, golf courses, fishing lakes, campsites

Modern enclosures adapting post-medieval fields
Modern enclosures that have been created by adapting earlier fields of probable post-medieval date

Post-medieval enclosures
Enclosures of post-medieval date. Fields laid out in the C18th and C19th commonly have many surveyed dead-straight field boundaries

Barton fields
These relatively large, regular enclosures seem likely to have been laid out between C15 th-C18th. Some curving boundaries may be following earlier divisions in the pre-existing medieval fields. In Cornwall these are sometimes called Barton fields .

Appendix 6 Geophysical surveying techniques

1.0 Introduction

Substrata offers magnetometer (gradiometer) and earth resistance surveying. We also provide other archaeology-specific geophysical surveys such as ground penetrating radar and magnetic susceptibility. The particular method or combination of methods used depends on local soil conditions and the survey requirements.

Magnetometry and earth resistance surveying are frequently complementary. It is good practice to assess an area with a magnetometer survey and then selectively apply earth resistance surveys to areas identified as being likely to contain building remains and other buried archaeology.

The geophysical surveying equipment Substrata uses is specifically developed for archaeological surveying and is a proven technology. When used in conjunction with software designed to analyse and present the recorded data, these systems are capable of delivering fast and accurate assessments of the archaeology of both large and small sites. If excavation is required, the geophysical assessment can be used to place trenches over potential archaeological features. The gradiometers (a type of magnetometer) and resistance meters employed are sensitive to depths of between 0 and 3 metres below ground level, with maximum sensitivity at depths of 1.5 metres or less. Most surveys are designed to work within the 0 to 1.5 metre range.

2.0 Magnetometer scanning and area surveying

2.1 General concepts

Magnetometer surveying is used to detect and map small changes in the earth's magnetic field caused by concentrations of ferrous-based minerals within the soil and subsoil, and by magnetised materials buried beneath the surface. While most of these changes are too small to affect a compass needle, they can be detected and mapped by sensitive field equipment. During surveys the different magnetic properties of top-soils, sub-soils, rock formations and archaeological features are recorded as variations against a background value. Subsequently magnetic anomalies resulting from potential archaeology can be identified and interpreted. Identifiable archaeological features include areas of occupation, hearths, kilns, furnaces, ditches, pits, post-holes, ridge-and-furrow, timber structures, wall footings, roads, tracks and similar buried features.

2.2 Surveying instruments

A gradiometer is a type of magnetometer and is sensitive to relatively small changes in the earth's magnetic field. Substrata uses two types of gradiometer both specifically designed for field use by archaeologists. Our primary surveying instruments are Bartington *Grad*601-2 (dual sensor) fluxgate gradiometers with automatic data loggers. We also use a Geoscan FM36 fluxgate gradiometer with the option of either manual or automatic sampling triggers. The Bartington gradiometers provide proven technology in archaeological magnetic surveying and offer fast, accurate set-up and survey rates. The Geoscan FM36 provides an effective, if older, proven technology solution when surveys are required within woodland and other areas of limited accessibility. More technical details can be provided as required.

2.3 Magnetic scanning surveys

When speed and general assessment without data recording are key requirements, scanning with Bartington *Grad*601-2 gradiometers facilitate fast, on-site data analysis. This method allows rapid assessment of large areas of land such as proposed main communi-

cations routes, pipeline routes and significant commercial developments. Scanning is useful in complementing aerial surveys across wooded areas or fields under permanent pasture. This technique is also effective in the exploration of suspected archaeological sites provisionally identified during field walking and other archaeological surveys.

2.4 Magnetic area surveys

These are detailed area surveys employing a greater density of traverses and readings across the area of interest compared to scanning surveys. The current typical sampling interval for detailed area surveys is 0.125 metres on traverses 1.0 metre apart.

Typically, area surveys are undertaken when archaeological features are expected to be relatively concentrated or when a comprehensive survey is required. They are used to clarify areas of archaeological interest and to enable decisions to be made on the location of features to be preserved or excavated. Recent developments in the speed of surveying equipment such as the *Grad*601-2 system means that area surveys are often cost-effective alternatives to scanning surveys.

3.0 Earth resistance area and linear surveying

3.1 General concepts

This method measures changes in the electrical resistance of the ground being surveyed. In practice, differences in the electrical resistance of materials facilitates the detection and interpretation of masonry and brick foundations, paving and floors, drains and other cavities, large pits, building platforms, robber trenches, timber structures, ditches, graves and similar buried features.

Resistance to electrical current flow in the ground depends on the moisture content and structure of the soil and other materials buried beneath the surface. For example, the higher the moisture content of a soil, the less resistant it is to electrical current flow. A ditch completely buried beneath the present ground surface is likely to have an infill soil different to that surrounding the ditch in terms of compactness and composition. As a result, the soil filling the buried ditch will retain moisture in a different way to the surrounding soil which means it will have an electrical resistance at variance with the surrounding environment. By passing a small current through the ground it is possible to detect, record, plot and interpret such changes in electrical resistance.

3.2 Surveying instruments

For earth resistance surveying Substrata uses the Geoscan Research RM15 multi-probe resistance meters and purpose-built automatic data-loggers. The MPX15 multi-probe facility can be used to speed up standard surveys and it is also useful when simultaneous multiple-depth analysis is required.

3.3 Earth resistance area surveys

Earth resistance area surveys are excellent tools for the detailed planning of likely archaeological sites and particularly useful in the surveying of areas likely to contain building footings or similar structures.

3.4 Earth resistance linear surveys

Earth resistance linear surveys are useful when searching a large area for buried buildings or roads and similar large linear archaeological features.