Substrata
Archaeological Geophysical Surveyors

An archaeological magnetometer survey

Land at Wolborough Barton Newton Abbot, Devon

Centred on NGR (E/N): 285600,70000 (point)
and 286300,69400 (point)

Report: 1508WOL-R-1

Ross Dean BSc MSc MA MCIfA

18 June 2016

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Client:
Mr Anthony Rew
Wolborough Barton
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Project archive

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Copies of report figures ..... Adobe PDF format
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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:	between 14 January and 23 February 2016
Area:	54ha
Lead surveyor:	Mark Edwards BA
Author:	Ross Dean BSc MSc MA MIfA

1.2 Client

Mr Anthony Rew, Wolborough Barton, Newton Abbot, Devon TQ12 1EJ

1.3 Agent

PCL Planning Ltd, 1st Floor, 3 Silverdown Office Park, Fairoak Close, Clyst Honiton, Exeter, Devon EX5 2UX

1.4 Location

Site:	Land at Wolborough Barton
Civil Parish:	Newton Abbot
District:	Teignbridge
County:	Devon
Nearest Postcode:	TQ12 5PZ
NGR:	SX 859 697
Ordnance Survey NGR (E/N):	centred on 285600,70000 (point) and 286300,69400 (point)

1.5 Archive

OASIS number:	substrat1-254242
Archive:	At the time of writing, the archive of this survey will be held by Substrata.

1.6 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 Mr Anthony Rew as contributing information for a forthcoming planning application concerned with the above area. The survey area location is shown in Figure 1.

The area and plot designations used in this report follow those of an historic environment assessment completed by AC Archaeology Ltd for the same application albeit for a larger area of 92.4ha (Costen, 2015).

1.7 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.

One hundred and five magnetic anomaly groups were mapped as representing possible archaeological deposits or structures. Of these, seventeen are likely to represent a former field boundaries recorded on historical maps. One anomaly group represents a former quarry recorded on historic maps. A similar, nearby anomaly group probably represents an un-mapped, disused quarry. One group may represent, a rubble and/or brick deposit and may possibly be associated with nearby former rifle butts from a nineteenth century rifle range that continued in use until after World War 2. Three groups may represent former routeways such as stock paths or un-ditched tracks. Eighteen groups are thought to represent historic ridge-and-furrow cultivation. The sixty four remaining magnetic anomaly groups have characteristics that are typical of anomalies representing former field and enclosure boundaries of unknown origin and more than one phase of land enclosure.

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. The results of the survey and any subsequent trial trenching will be reviewed and used to inform any ensuing mitigation.

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/Digital Antiquity Guides (undated).

4 Site description

4.1 Landscape and land use

The survey area covers 54 ha, which for the purposes of description, has been split into three areas A, B and D (Figure 1). These area designations, and plot designations shown in Figure 2, are those used in an historic environment assessment produced by AC Archaeology Ltd as part of the same programme of work as this report (Costen, 2015). Not all of the plots discussed by Costen were included in the magnetometer survey.

The topography of the area varies as shown in Figure 2. The land is broadly a northwest to southwest orientated hilltop location, with the land dropping away to the northeast, southeast, south and southwest.

Land use	Plot
grass	2, 5, 6, 8, 10, 21, 22, 23, 24
ploughed	3
young crops	11, 12, 14, 25
sugar beet	18
stubble	4, 17, 19

Table 1: land use during the survey

4.2 Geology

The survey area has a solid geology as follows (British Geological Survey, undated):

Area A
Part of Plot 11, part of Plot12, Plot 14
Carboniferous and Devonian Whiteway Mudstone Formation. Consists predominantly of red and purple mudstone with subordinate green and grey-black, locally laminated mudstone. Thin units of basalitic (spilitic) lava are sparsely present in thicker developments

Part of Plot 12
Devonian to Permian Southwest England Minor Intrusive Suite which is microgabbro.

Part of Plot 11 and part of Plot12
Devonian East Ogwell Limestone Formation.

Area B
Palaeogene Aller Gravel Formation which comprise10-20cm-thick beds of lenticular-bedded abraded flint and chert gravels, with subordinate red-mottled silts and clays, coarse, angular, flinty gravelly clayey sand, with some cross-bedded coarse sand, lenticles of white clayey sand and reddish brown coarse sand. The constituents of the gravel vary locally, and may contain some or all of the following: flint, quartz and tourmaline rock, Greensand chert, Lower Carboniferous chert, Upper Carboniferous sandstone, white rounded clay clasts, vein quartz, dark grey hornfels and tuff.

Area D
Cretaceous Upper Greensand Formation comprising glauconitic and shelly, fine-grained sand, sandstone and silt.

5 Archaeological background

5.1 Historic landscape characterisation

Area	Plot	HLC Modern	HLC Post-medieval
A	11, 12	Medieval enclosures	Medieval enclosures
A	14	Post-medieval enclosures	Post-medieval enclosures
B	2, 3, 5, 6, 10	Medieval enclosures	Medieval enclosures
B	4	Modern enclosures adapting medieval fields	Medieval enclosures (west) Rough ground (eastern third)
D	17	Modern enclosures adapting medieval fields	Medieval enclosures based on strip fields (west) Post-medieval enclosures with medieval elements (east)
D	18, 19	Modern enclosures adapting medieval fields	Post-medieval enclosures with medieval elements
D	21, 22, 23, 24, 25	Modern enclosures adapting medieval fields	Medieval enclosures based on strip fields

Table 2: Historic Landscape Characterisation (HLC) (Devon County Council, undated).

Medieval enclosures
Fields probably first enclosed with hedge-banks during the middle ages.

Modern enclosures adapting medieval fields
These modern fields have been created out of probable medieval enclosures. The sinuous medieval boundaries survive in places.

Rough ground
Rough grazing ground, heathland or moorland.

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

Modern enclosures adapting medieval fields
These modern fields have been created out of probable medieval enclosures. The sinuous medieval boundaries survive in places.

Medieval enclosures based on strip fields
This area was probably first enclosed with hedge-banks during the later middle ages. The curving form of the hedge-banks suggests that earlier it may have been farmed as open strip-fields.

Post-medieval enclosures with medieval elements
These enclosures are probably based on medieval fields, but the many straight field boundaries suggest they were substantially re-organised in the post-medieval period.

5.2 Historical and archaeological background

Archaeological sites, buildings, historic parks and gardens, conservation areas, registered battlefields and other aspects of the historic environment that are significant because of their historic, archaeological, architectural or artistic interest are considered *heritage assets*. *Designated heritage assets* are afforded protection as either scheduled monuments, listed buildings or through their inclusion within conservation areas. *Non-designated heritage assets* are potential archaeological remains and historic landscapes.

An historic environment assessment of an area of 500m around the survey area was produced by AC Archaeology Ltd (Costen, 2015) as part of the same programme of work as this report and is the source for the discussion below.

There are no heritage assets within survey area or the wider study area of the historic environment assessment that provide an indication of prehistoric or Romano-British land use, such as burial activity or settlement. However, archaeological investigations in advance of development in the rural areas around Newton Abbot have identified previously-unrecorded evidence for prehistoric burials and settlement and Romano-British settlement. The hilltops within Plots 12 and 14 in Area A, Plot 4 in Area B and Plots 17 and 18 in area D were suggested as suitable locations for such activity, survival under later ploughing permitting. None were recorded during the magnetometer survey.

The manor of Wolborough Barton, as mapped by the Historic Environment Record, extends into the survey area (Plots 8 and 9 in Area B). However, there is no archaeological or documentary evidence for the extent of the manor (which is likely to be much larger than the mapped area) or the location of settlement activity within it. It is possible that the present Wolborough Barton represents an early settlement focus within the manor, but this may not have extended beyond its current curtilage. The combination of a 'barton' placename next to a medieval parish church is indicative of a medieval manor house location.

The only other recorded asset within the survey area is a rifle range (Area B, south-eastern side of Plot 4). Some possible below-ground evidence of the butts associated with the rifle range was recorded.

Costen (ibid) points out that the survey area is an historic agricultural landscape and contains field boundaries of probable medieval and post-medieval date. There were formerly additional smaller fields within its boundary than at present. Below-ground evidence, in the form of remnant banks and associated flanking drainage ditches, for removed field boundaries were recorded during the survey.

6 Results, discussion and conclusions

This survey was designed to record magnetic anomalies. The anomalies themselves cannot be regarded as actual archaeological features and the dimensions of the anomalies shown do not represent the dimensions of any associated archaeological features. The analysis presented below identifies and characterises anomalies and anomaly groups that may relate to archaeological deposits, structures and features.

The terms archaeological deposits, structures and features refer to any artefacts, material deposits or disturbance of natural deposits thought to be the result of human activity and not undertaken as recent land maintenance or farming.

The reader is referred to section 7.

6.1 Results

The survey area covers 54 ha, which for the purposes of description has been split into three areas A, B and D. The area and plot designations used in this report, shown in Figure 2 and elsewhere, are those used by Costen (2015). Not all of the plots discussed by Costen were included in the magnetometer survey.

Figures 2 and 3 show the interpretation of the survey data. They include the anomaly groups identified as relating to archaeological deposits along with their identifying numbers. Figures 5 to 10 show the same interpretation plots at more detailed scales. Tables 3 and 4 are extracts of the detailed analysis of the survey data sourced from the attribute tables of the GIS project provided in the project archive.

Figures 3 to 10 along with Table 3 and Table 4 comprise the analysis of the survey data.

Figures 11 to 18 are plots of the processed data as specified in Tables 6 to 8. Figures 19 to 24 are plots of minimally processed survey data.

6.2 Discussion

6.2.1 General points

Discussion scope

Not all anomalies or anomaly groups identified in Tables 3 and 4 are necessarily discussed below. All identified anomaly groups are fully 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 and physical objects adjacent to the survey area. Strong magnetic responses mapped close to survey boundaries are likely to relate to these materials except where otherwise indicated.

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 are only mapped as potential archaeology if they are clustered in groups or otherwise form recognisable patterns.

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. If mapped, they are listed in Table 1 but are not discussed below.

Anomalies thought to relate to natural features were not mapped.

Numerous dipole magnetic anomalies are scattered across the data set. These are likely to represent recent buried ferrous objects and such patterns are frequently found in close proximity to settlements.

Anomaly trends

A number of parallel linear anomaly trends are present across the data set. Some of these may indicate deposit disruption caused by historic ridge-and-furrow ploughing and were mapped as part of the analysis. Another type are most likely to relate to relatively recent field drains. These were also mapped to distinguish them from the potentially historical ridge -and-furrow. A third set of unmapped groups of parallel linear anomaly trends is most likely to represent relatively recent and modern ploughing.

6.2.2 Data relating to historic maps and other records

A number of magnetic anomaly groups coincide with, and likely represent, former field boundaries recorded on the Wolborough Tithe map of 1845, the Abbotskerswell Tithe map of 1839 (Plot 19 only) and historic Ordnance Survey maps as listed in Tables 3 and 4. These anomaly groups are designated as 'likely archaeology' because of the supporting historic map evidence. These linear anomalies are group **2** (Plot 2, Figure 5), groups **19**, **24**, **25** and **27** (plot 4, Figure 7), **44** (Plot 12, Figure 8), **56** (Plot 18, Figure 9), **63**, **65**, **67**, **70** and **71** (plot 19, Figure 9), **79**, **82** and **83** (Plot 21, Figure 10), **90** (Plot 24, Figure 10) and **99** (Plot 25, Figure 10).

Anomaly group **43** (Plot 12, Figure 8) represents a now in-filled quarry recorded on historical maps between 1845 and 1974-75.

Anomaly group **28** probably represent a deposit of rubble, possibly mixed with fired bricks, that may be associated with the former rifle butts and rifle range that lay in part along the south-eastern edge of Plot 4 (Figure 7).

6.2.3 Data with no previous archaeological provenance

Magnetic anomaly group **18** (Plot 3, Figure 5) is difficult to characterise and may represent a deposit or structure comprising relatively magnetic material such as may be left by craft or industrial processes of unknown date or purpose. The presence of concrete is an alternative explanation although no such material was visible to the surveyors.

Group **20** (Plot 4, Figure 7) appears to indicate the presence a sub-rectangular shaped structure or group of deposits. It is more likely that the two northwest-southeast trending 'arms' relate to relatively recent ploughing although a sub-rectangular shape cannot be entirely ruled out.

Anomaly group **42** (Plot 11, Figure 8) has very similar characteristics to the nearby group 43 and is likely to represent another unrecorded former quarry.

Groups **59** (Plot 18, Figure 9), **78** (Plot 19, Figure 9) and **88** (Plot 23, Figure 10) are difficult to characterise but may represent former routeways in the form of stock paths or un-ditched lanes.

The sixty four remaining magnetic anomaly groups have characteristics that are typical of anomalies representing former field and enclosure boundaries of unknown origin and very likely of more than one phase of land enclosure.

6.3 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.

One hundred and five magnetic anomaly groups were mapped as representing possible archaeological deposits or structures. Of these, seventeen are likely to represent a former

field boundaries recorded on historical maps. One anomaly group represents a former quarry recorded on historic maps. A similar, nearby anomaly group probably represents an un-mapped disused quarry. One group may represent, a rubble and/or brick deposit and may possibly be associated with nearby former rifle butts from a nineteenth century rifle range that continued in use until after World War 2. Three groups may represent former routeways such as stock paths or un-ditched tracks. Eighteen groups are thought to represent historic ridge-and-furrow cultivation. The sixty four remaining magnetic anomaly groups have characteristics that are typical of anomalies representing former field and enclosure boundaries of unknown origin and more than one phase of land enclosure.

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.

8 Acknowledgements

Substrata would like to thank Mr Anthony Rew for commissioning us to complete this survey.

9 Bibliography

Archaeology Data Service/Digital Antiquity Guides to Good Practice: *Geophysical Data in Archaeology* [Online], Available: http://guides.archaeologydataservice.ac.uk/g2gp/Geophysics_Toc [June 2016]

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Costen, D. (2015) *Wolborough Barton, Newton Abbot, Devon, National Grid References SX 85666 70923 north, SX 87298 69869 east, SX 87130 68423 south, SX 85090 69844 west, Historic Environment Assessment*, AC Archaeology Ltd unpublished document ACD1188/1/0

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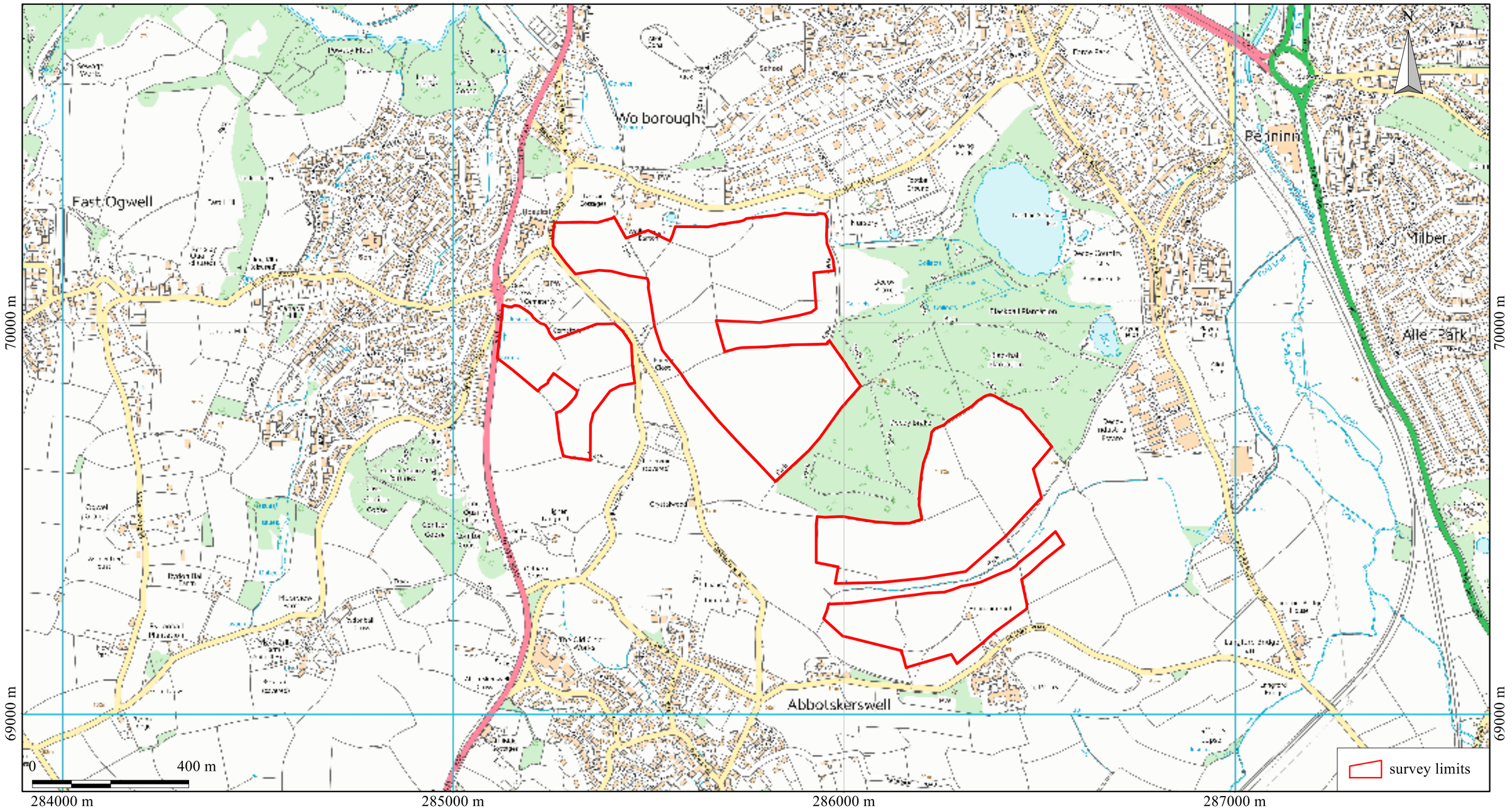
Historic England (2010) *Geophysical Survey in Archaeological Field Evaluation*, [Online], Available: https://content.historicengland.org.uk/images-books/publications/geophysical-survey-in-archaeological-field-evaluation/geophysics-guidelines.pdf/ [April 2016]

Appendix 1 Supporting 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.



British Grid
centre X: 285774.85 m, centre Y: 69807.90 m

Scale: 1:10000 @ A3. Spatial Units: Meter. Do not scale off this drawing

An archaeological magnetometer survey
Land at Wolborough Barton, Newton Abbot, Devon
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Figure 1: location map

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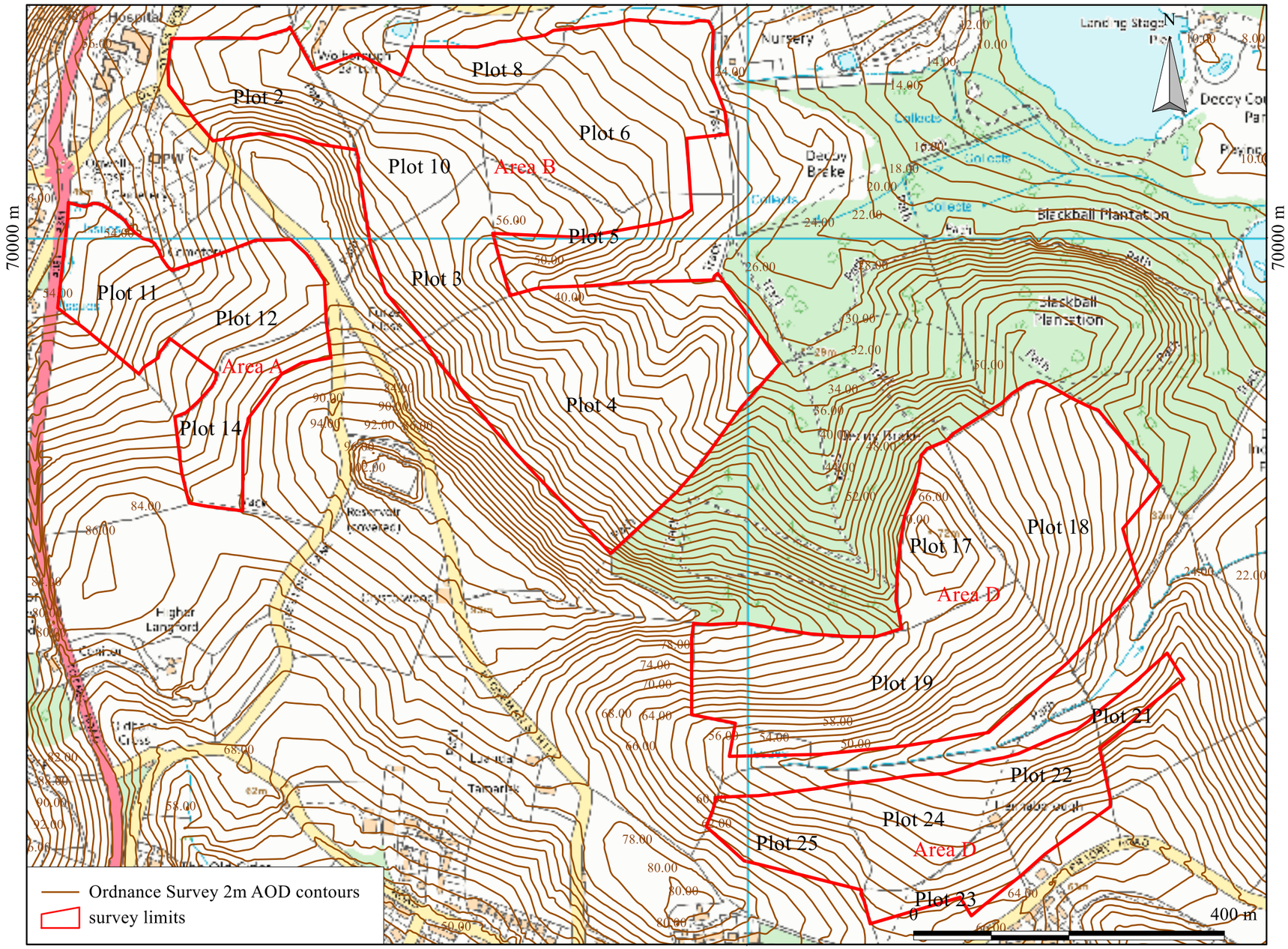

British Grid
centre X: 285870.99 m, centre Y: 69695.22 m

Scale: 1:6000 @ A3. Spatial Units: Meter. Do not scale off this drawing

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Figure 2: area and plot designations of the geophysical survey areas with Ordnance Survey 2m AOD contours (after Costen, 2015)

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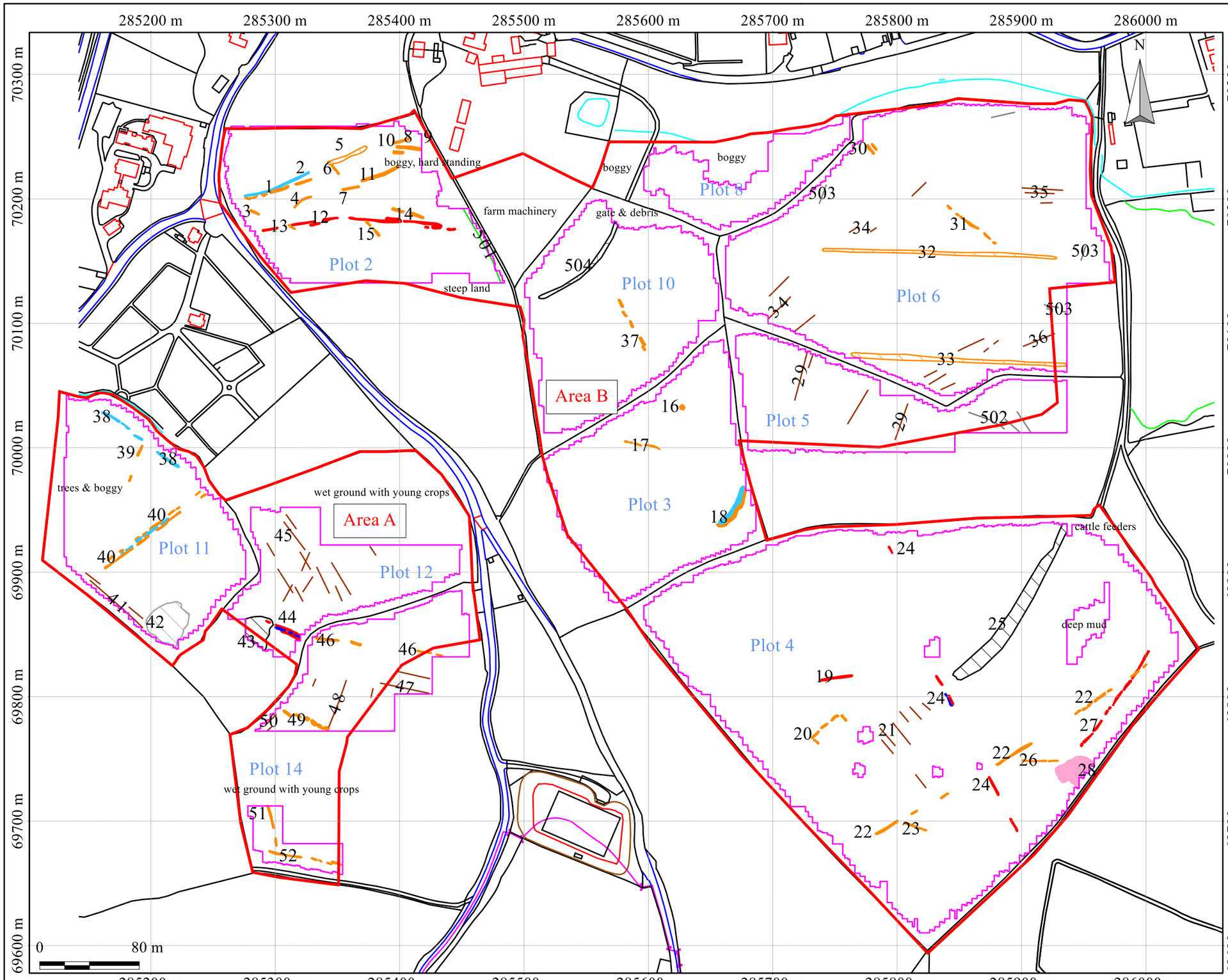

- survey limits
- survey area

Potential archaeology

certainty, anomaly type (2)

- likely, positive (3)
- likely, negative (3)
- likely, mixed (3)
- possible, positive
- possible, positive spread
- possible, mixed
- possible, negative
- positive, parallel liners
- possible, medium contrast
- possible, repeated parallels (4)

Potential services & modern

certainty, anomaly type (2)

- likely, positive parallel linears (3)
- possible, high contrast linear
- possible, low contrast linear
- possible, regular narrow linears (4)

Notes:

1. All interpretations are provisional and represent potential archaeological deposits.
2. Anomalies designated "likely archaeology" have supporting evidence e.g. historical maps and or visible earthworks.
3. Representative; not all instances are mapped.
4. Anomalies likely to represent geological or other natural deposits are not mapped unless relevant to potential archaeological events or deposits.

Scale: 1:3200 @ A3. Spatial Units: Meter.
Do not scale off this drawing

British Grid
centre X: 285582.06 m, centre Y: 69955.78 m

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Figure 3: survey interpretation, areas A and B

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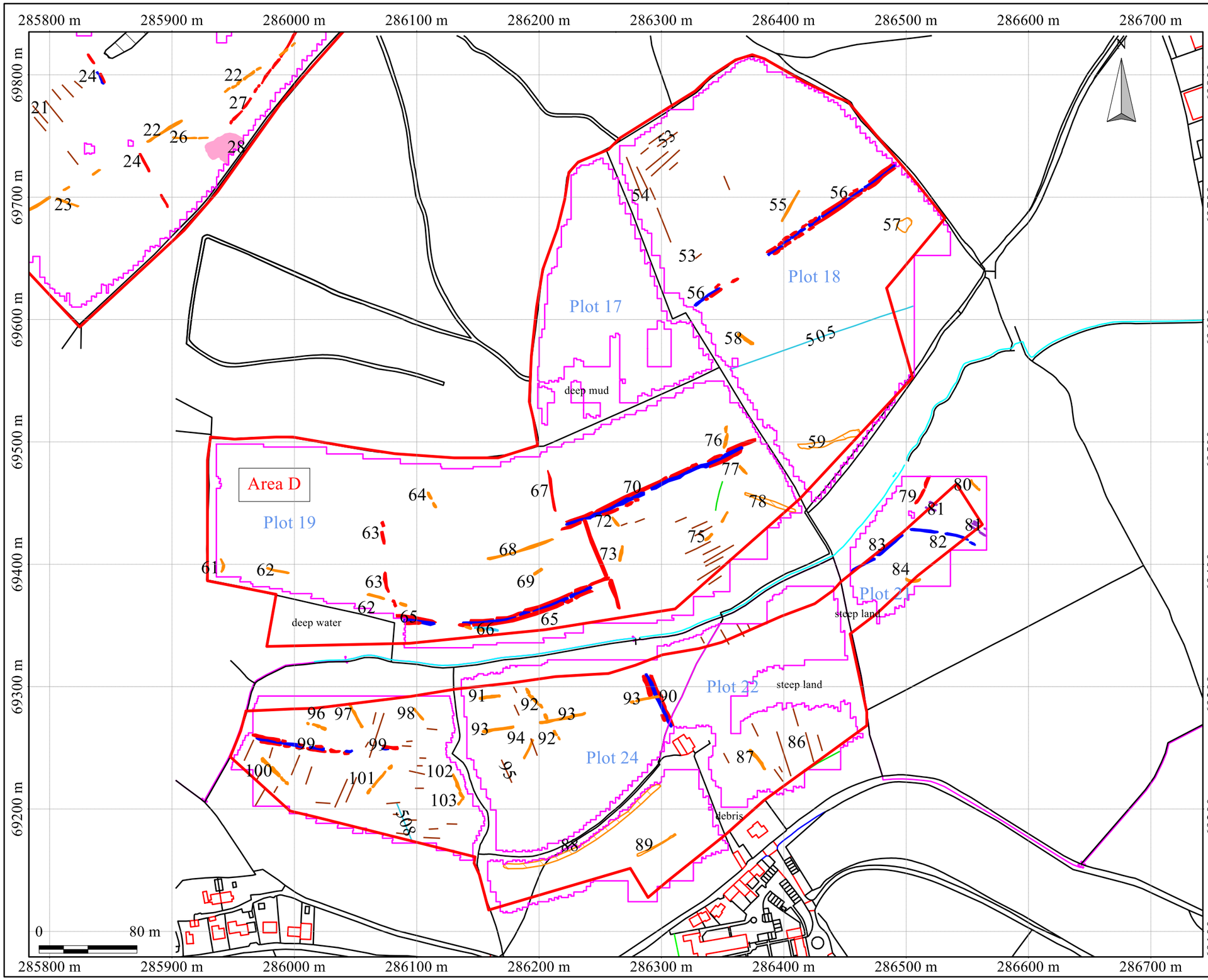
area	plot	anomaly group	associated anomalies	anomaly characterisation certainty & class	anomaly form	additional archaeological characterisation	comments	supporting evidence
B	2	1		possible, negative	curvilinear			
		2		possible, positive	disrupted linear			
		3		possible, positive	linear			
		4		possible, positive	curvilinear			
		5		possible, positive spread	linear			
		6		possible, positive	linear			
		7		possible, positive	linear			
		8		possible, positive	linear			
		9		possible, positive	linear			
		10		possible, positive	linear			
		11		possible, positive	linear			
		12		likely, positive	disrupted curvilinear	field boundary	anomaly group coincides with a field boundary mapped on historical maps	1845 Wolborough tithe map, Ordnance Survey 1888-1890 1:2500 to 1906 1:10560
		13		possible, positive	linear			
		14		possible, positive	disrupted linear			
		15		possible, positive	disrupted linear			
		501		possible, high contrast linear		ferrous cable, pipe or drain		
B	3	16		possible, positive	oval	pit or natural deposit		
		17		possible, positive	disrupted linear			
		18		possible, positive/negative/positive	broad curvilinear	problematic - possibly a man-made feature	anomaly group has a high positive and a high negative element, neither of which can be distinguished as a 'magnetic shadow' of the other	
B	4	19		likely, positive	linear	field boundary	anomaly group coincides with a field boundary mapped on historical maps	1845 Wolborough tithe map, Ordnance Survey 1888-1890 1:2500 to 1955-56 1:2500
		20		possible, positive	disrupted sub-rectangular or linear		northwest-southeast trending components may be remnant ploughing	
		21		possible, repeated parallels		cultivation traces - possible ridge-and-furrow		
		22		possible, positive	disrupted linear			
		23		possible, positive	disrupted linear			
		24		likely, positive/negative	disrupted linear	field boundary	anomaly group coincides with a field boundary mapped on historical maps	1845 Wolborough tithe map, Ordnance Survey 1888-1890 1:2500 to 1955-56 1:2500
		25		likely, mixed	curvilinear	field boundary & footpath	anomaly group coincides with a field boundary and footpath mapped on historical maps	1845 Wolborough tithe map, Ordnance Survey 1888-1890 1:2500 to 1955-56 1:2500
		26		possible, positive	disrupted linear			
		27		likely, positive	disrupted linear	field boundary	anomaly group coincides with a field boundary mapped on historical maps	1845 Wolborough tithe map, Ordnance Survey 1888-1890 1:2500 to 1955-56 1:2500
		28		possible, medium contrast	irregular	deposit of rubble, possibly including fired bricks	anomaly group may be associated with rifle butts mapped in the late 19th and early 20th centuries and part of the Decoy Brake rifle range	HER entries MDV 52528 (butts) & MDV52539 (rifle range)
B	5	29		possible, repeated parallels		cultivation traces - possible ridge-and-furrow		
		502		possible, regular narrow linears		field drains		
B	6	30		possible, positive	double linear			
		31		possible, positive	disrupted linear			
		32		possible, positive spread	linear			
		33		possible, positive spread	linear			
		34		possible, repeated parallels		cultivation traces - possible ridge-and-furrow		
		35		possible, repeated parallels		cultivation traces - possible ridge-and-furrow		
		36		possible, repeated parallels		cultivation traces - possible ridge-and-furrow		
		503		possible, regular narrow linears		field drains	anomaly group is most likely to represent a field drain although recent ploughing disturbance cannot be ruled out entirely	
B	10	37		possible, positive	disrupted linear			
		504		likely, positive parallel linears		track	anomaly group is a clear southern extension of an extant track which is only shown on current OS mapping (absent from historical mapping)	
A	11	38		possible, negative	disrupted linear			
		39		possible, positive	disrupted linear			
		40		possible, positive/negative/positive	disrupted linear	field boundary, possibly a Devon bank		
		41		possible, repeated parallels		cultivation traces - possible ridge-and-furrow		
		42		possible, mixed	irregular	rubble or near-surface bedrock	anomaly group is likely to represent a quarry not mapped on historic maps	
A	12	43		likely, mixed	irregular	filled quarry	anomaly group coincides with a quarry mapped on historic maps and may represent rubble fill and/or near-surface bedrock	HER entry MDV48403 post-medieval quarry, 1845 Wolborough tithe, Ordnance Survey 1888-1890 1:2500 to 1974-75 1:2500
		44		likely, positive/negative/positive	linear	field boundary, possibly a Devon bank	anomaly group coincides with a field boundary mapped on historical maps	1845 Wolborough tithe map, Ordnance Survey 1888-1890 1:2500 to 1906 1:10560
		45		possible, repeated parallels		cultivation traces - possible ridge-and-furrow		
A	14	46		possible, positive	disrupted linear			
		47		possible, repeated parallels		cultivation traces - possible ridge-and-furrow		
		48		possible, repeated parallels		cultivation traces - possible ridge-and-furrow		
		49		possible, positive	disrupted linear	ploughing headland		
		50		possible, repeated parallels		cultivation traces - possible ridge-and-furrow		
		51		possible, positive	disrupted linear			
		52		possible, positive	disrupted linear			

Table 3: data analysis, Plots 2 to 6, 10, 11 and 14



survey limits
survey area

Potential archaeology

certainty, anomaly type (2)

likely, positive (3)
likely, negative (3)
likely, mixed (3)
possible, positive
possible, positive spread
possible, mixed
possible, negative
positive, parallel liners
possible, medium contrast
possible, repeated parallels (4)

Potential services & modern

certainty, anomaly type (2)

likely, positive parallel linears (3)
possible, high contrast linear
possible, low contrast linear
possible, regular narrow linears (4)

Notes:

1. All interpretations are provisional and represent potential archaeological deposits.
2. Anomalies designated "likely archaeology" have supporting evidence e.g. historical maps and or visible earthworks.
3. Representative; not all instances are mapped.
4. Anomalies likely to represent geological or other natural deposits are not mapped unless relevant to potential archaeological events or deposits.

Scale: 1:3200 @ A3. Spatial Units: Meter.
Do not scale off this drawing

British Grid
centre X: 286262.78 m, centre Y: 69457.10 m

An archaeological magnetometer survey
Land at Wolborough Barton, Newton Abbot, Devon
Centred on NGR (E/N): 285600,70000 and 286300,69400 (point)
Report: 1508WOL-R-1

Figure 4: survey interpretation, area D

Substrata
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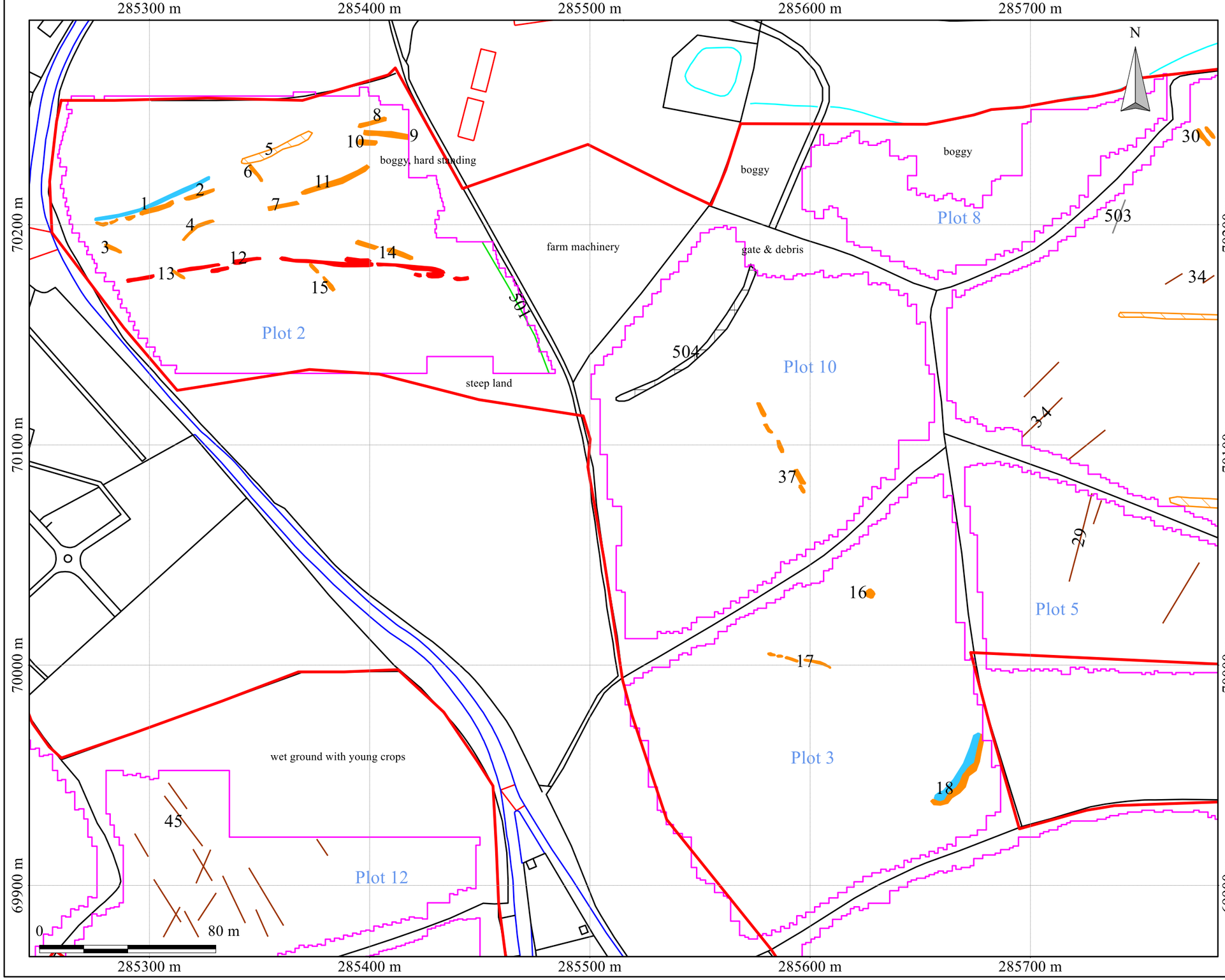
Email: geophysics@substrata.co.uk
Web: substrata.co.uk

Site: An archaeological magnetometer survey
Land at Wolborough Barton, Newton Abbot, Devon
Centred on NGR (E/N): 285600,70000 (point) and 286300,69400 (point)
Report: 1508WOL-R-1

area	plot	anomaly group	associated anomalies	anomaly characterisation certainty & class	anomaly form	additional archaeological characterisation	comments	supporting evidence
D	18	53		possible, repeated parallels		cultivation traces - possible ridge-and-furrow		
		54		possible, repeated parallels		cultivation traces - possible ridge-and-furrow		
		55		possible, positive	linear			
		56		likely, positive/negative/positive	disrupted linear	field boundary, possibly a Devon bank	anomaly group coincides with a field boundary mapped on historical maps	1845 Wolborough tithe map, Ordnance Survey 1888-1890 1:2500 to 1964 1:10560
		57		possible, positive spread	broad linear	filled hollow, earthen surface or earthen spread		
		58		possible, positive	linear			
		59		possible, positive spread	curvilinear		anomaly group may represent either an archaeological or natural deposit	
		505		possible, low contrast linear		service trench	anomaly group represents a service trench with a possible fired ceramic or ferrous pipe	
D	19	61		possible, positive	curvilinear			
		62	66	possible, positive	disrupted linear			
		63		likely, positive	disrupted curvilinear	field boundary	anomaly group coincides with a field boundary mapped on historical maps	1839 Abbotskerswell tithe map, Ordnance Survey 1888-1890 1:2500 to 1938 1:10560
		64		possible, positive	disrupted linear			
		65		likely, positive/negative/positive	disrupted curvilinear	field boundary - possible Devon bank	anomaly group coincides with a field boundary mapped on historical maps	1839 Abbotskerswell tithe map, Ordnance Survey 1888-1890 1:2500 to 1964:10560
		66	62	possible, negative	linear			
		67		likely, positive	linear	field boundary, possibly a Devon bank	anomaly group coincides with a field boundary mapped on historical maps and which formed part of the historic Wolborough and Abbotskerswell parish boundary	1845 Wolborough tithe & 1839 Abbotskerswell tithe maps, Ordnance Survey 1888-1890 1:2500 to 1964 1:10560
		68	70?	possible, positive	linear			
		69		possible, positive	linear			
		70	68?	likely, positive/negative/positive	disrupted linear	field boundary, possibly a Devon bank	anomaly group coincides with a field boundary mapped on historical maps, the western end of which formed part of the historic Wolborough and Abbotskerswell parish boundary	1845 Wolborough tithe & 1839 Abbotskerswell tithe maps, Ordnance Survey 1888-1890 1:2500 to 1964 1:10560
		71		likely, positive	linear	field boundary	anomaly group coincides with a field boundary mapped on historical maps and which formed part of the historic Wolborough and Abbotskerswell parish boundary	1845 Wolborough tithe & 1839 Abbotskerswell tithe maps, Ordnance Survey 1888-1890 1:2500 to 1964 1:10560
		72		possible, positive	linear			
		73		possible, positive	linear			
		74		possible, repeated parallels		cultivation traces - possible ridge-and-furrow		
		75		possible, positive	disrupted curvilinear			
		76		possible, positive	disrupted linear			
		77		possible, positive	linear			
		78		possible, positive spread	linear			
		506		possible, high contrast linear		ferrous cable, pipe or drain or buried wire		
D	21	79		likely, positive	curvilinear	field boundary	anomaly group coincides with a field boundary mapped on historical maps	1845 Wolborough tithe map, Ordnance Survey 1888-1890 1:2500 to 1964 1:10560
		80		possible, positive	linear			
		81		positive, parallel liners		routeway, track or ridge-and-furrow		
		82		likely, negative	curvilinear	field boundary	anomaly group coincides with a field boundary mapped on historical maps	1845 Wolborough tithe map, Ordnance Survey 1888-1890 1:2500 to 1964 1:10560
		83		likely, negative	curvilinear	field boundary	anomaly group coincides with a field boundary mapped on historical maps	1845 Wolborough tithe map, Ordnance Survey 1888-1890 1:2500 to 1964 1:10560
		84		possible, positive	curvilinear		anomaly group may represent either an archaeological or natural deposit	
D	22	85		possible, repeated parallels		cultivation traces - possible ridge-and-furrow		
		86		possible, repeated parallels		cultivation traces - possible ridge-and-furrow		
		87		possible, positive	linear			
		507		possible, high contrast linear		service or buried fence wire		
D	23	88		possible, positive spread	broad linear			
		89		possible, positive spread	broad linear			
D	24	90		likely, positive/negative/positive	linear	field boundary, possibly a Devon bank	anomaly group coincides with a field boundary mapped on historical maps	1845 Wolborough tithe map, Ordnance Survey 1888-1890 1:2500 to 1964 1:10560
		91		possible, positive	linear			
		92		possible, positive	disrupted linear			
		93		possible, positive	disrupted linear	field boundary		
		94		possible, positive	linear			
		95		possible, repeated parallels		cultivation traces - possible ridge-and-furrow		
D	25	96		possible, positive	disrupted linear			
		97		possible, positive	linear		anomaly group may represent an archaeological deposit or a field drain	
		98		possible, positive	linear			
		99		likely, positive/negative/positive	disrupted curvilinear	field boundary, possibly a Devon bank	anomaly group coincides with a field boundary mapped on historical maps	Ordnance Survey 1888-1890 1:2500 to 1937-39 1:2500
		102		possible, positive	disrupted linear			
		103		possible, positive	linear			
		104		possible, repeated parallels		cultivation traces - possible ridge-and-furrow		
		105		possible, repeated parallels		cultivation traces - possible ridge-and-furrow		
		508		possible, low contrast linear		service trench		

Table 4: data analysis, Plots 17 (*) to 19, 21 to 25

(*) no relevant anomalies recorded in Plot 17



survey limits
survey area

Potential archaeology

certainty, anomaly type (2)

likely, positive (3)
likely, negative (3)
likely, mixed (3)
possible, positive
possible, positive spread
possible, mixed
possible, negative
positive, parallel liners
possible, medium contrast
possible, repeated parallels (4)

Potential services & modern

certainty, anomaly type (2)

likely, positive parallel linears (3)
possible, high contrast linear
possible, low contrast linear
possible, regular narrow linears (4)

Notes:

1. All interpretations are provisional and represent potential archaeological deposits.
2. Anomalies designated "likely archaeology" have supporting evidence e.g. historical maps and or visible earthworks.
3. Representative; not all instances are mapped.
4. Anomalies likely to represent geological or other natural deposits are not mapped unless relevant to potential archaeological events or deposits.

Scale: 1:1800 @ A3. Spatial Units: Meter.
Do not scale off this drawing

British Grid
centre X: 285515.28 m, centre Y: 70080.24 m

An archaeological magnetometer survey
Land at Wolborough Barton, Newton Abbot, Devon
Centred on NGR (E/N): 285600,70000 and 286300,69400 (point)
Report: 1508WOL-R-1

Figure 5: survey interpretation: area B; plots 2, 3, 8 and 10

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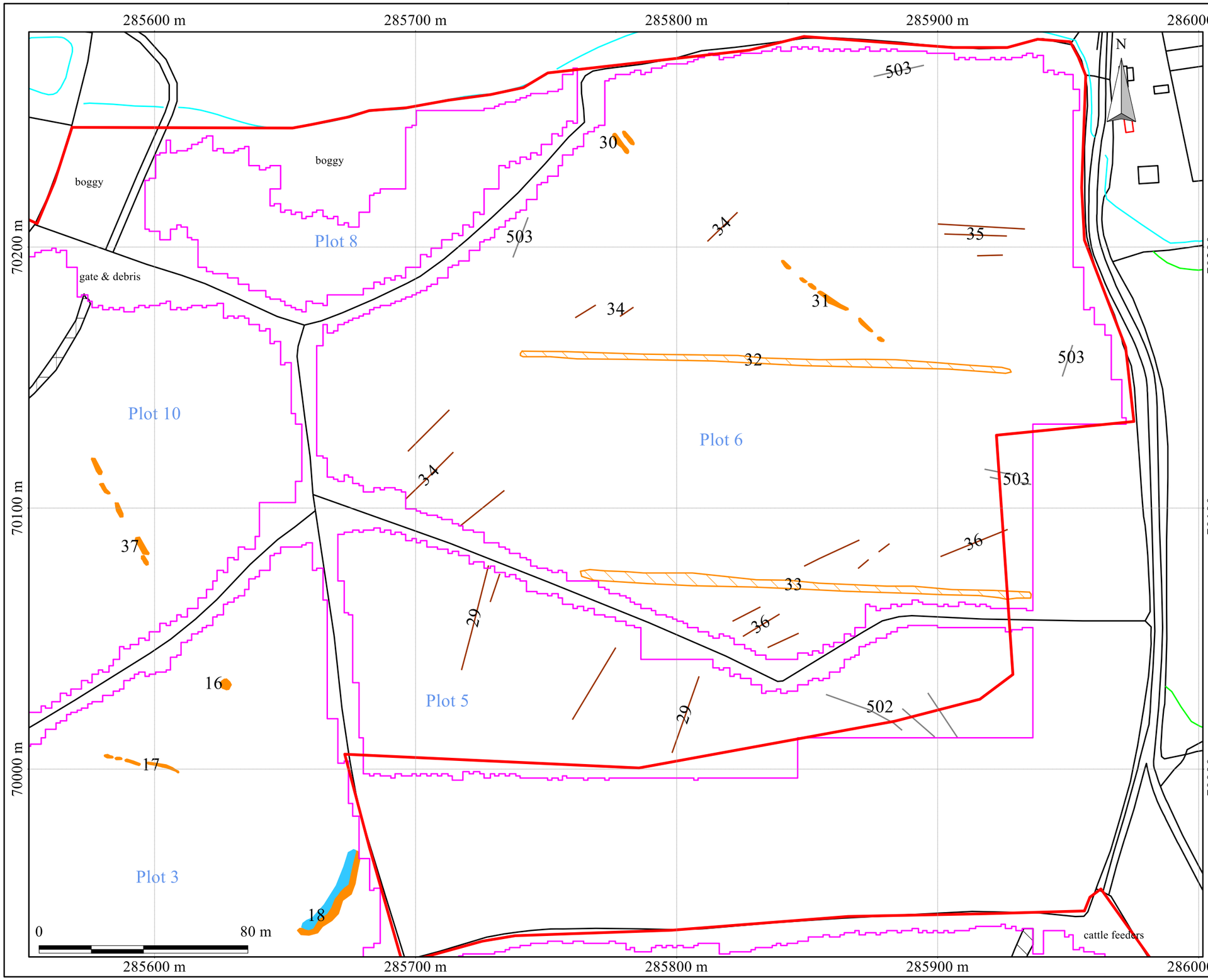

survey limits
survey area

Potential archaeology

certainty, anomaly type (2)

likely, positive (3)
likely, negative (3)
likely, mixed (3)
possible, positive
possible, positive spread
possible, mixed
possible, negative
positive, parallel liners
possible, medium contrast
possible, repeated parallels (4)

Potential services & modern

certainty, anomaly type (2)

likely, positive parallel linears (3)
possible, high contrast linear
possible, low contrast linear
possible, regular narrow linears (4)

Notes:

1. All interpretations are provisional and represent potential archaeological deposits.
2. Anomalies designated "likely archaeology" have supporting evidence e.g. historical maps and or visible earthworks.
3. Representative; not all instances are mapped.
4. Anomalies likely to represent geological or other natural deposits are not mapped unless relevant to potential archaeological events or deposits.

Scale: 1:1500 @ A3. Spatial Units: Meter.
Do not scale off this drawing

British Grid
centre X: 285776.74 m, centre Y: 70105.25 m

An archaeological magnetometer survey
Land at Wolborough Barton, Newton Abbot, Devon
Centred on NGR (E/N): 285600,70000 and 286300,69400 (point)
Report: 1508WOL-R-1

Figure 6: survey interpretation: area B; plots 5, 6 and 8

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285600 m 285700 m 285800 m 285900 m 286000 m

69900 m 69800 m 69700 m 69600 m

Plot 3

Plot 4

18 24 19 24 20 21 22 25 22 27 22 26 28 24 21 22 23

cattle feeders

deep mud

N

0 80 m

- survey limits
- survey area

Potential archaeology

certainty, anomaly type (2)

- likely, positive (3)
- likely, negative (3)
- likely, mixed (3)
- possible, positive
- possible, positive spread
- possible, mixed
- possible, negative
- positive, parallel liners
- possible, medium contrast
- possible, repeated parallels (4)

Potential services & modern

certainty, anomaly type (2)

- likely, positive parallel linears (3)
- possible, high contrast linear
- possible, low contrast linear
- possible, regular narrow linears (4)

Notes:

1. All interpretations are provisional and represent potential archaeological deposits.
2. Anomalies designated "likely archaeology" have supporting evidence e.g. historical maps and or visible earthworks.
3. Representative; not all instances are mapped.
4. Anomalies likely to represent geological or other natural deposits are not mapped unless relevant to potential archaeological events or deposits.

Scale: 1:1700 @ A3. Spatial Units: Meter.
Do not scale off this drawing

British Grid
centre X: 285800.73 m, centre Y: 69778.46 m

An archaeological magnetometer survey
Land at Wolborough Barton, Newton Abbot, Devon
Centred on NGR (E/N): 285600,70000 and 286300,69400 (point)
Report: 1508WOL-R-1

Figure 7: survey interpretation: area B; plot 4

Substrata
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285200 m 285300 m 285400 m 285500 m 285600 m

70000 m 69900 m 69800 m 69700 m

N

trees & boggy

wet ground with young crops

Plot 3

Plot 11

Plot 12

Plot 14

wet ground with young crops

38 39 38 40 40 41 42 43 44 45 46 46 47 48 49 50 51 52 17

0 80 m

- survey limits
- survey area
- **Potential archaeology**
- *certainty, anomaly type (2)*
- likely, positive (3)
- likely, negative (3)
- likely, mixed (3)
- possible, positive
- possible, positive spread
- possible, mixed
- possible, negative
- positive, parallel liners
- possible, medium contrast
- possible, repeated parallels (4)
- **Potential services & modern**
- *certainty, anomaly type (2)*
- likely, positive parallel linears (3)
- possible, high contrast linear
- possible, low contrast linear
- possible, regular narrow linears (4)

Notes:
1. All interpretations are provisional and represent potential archaeological deposits.
2. Anomalies designated "likely archaeology" have supporting evidence e.g. historical maps and or visible earthworks.
3. Representative; not all instances are mapped.
4. Anomalies likely to represent geological or other natural deposits are not mapped unless relevant to potential archaeological events or deposits.

Scale: 1:1700 @ A3. Spatial Units: Meter.
Do not scale off this drawing

British Grid
centre X: 285357.69 m, centre Y: 69847.28 m

An archaeological magnetometer survey
Land at Wolborough Barton, Newton Abbot, Devon
Centred on NGR (E/N): 285600,70000 and 286300,69400 (point)
Report: 1508WOL-R-1

Figure 8: survey interpretation: area A; plots 11, 12 and 14

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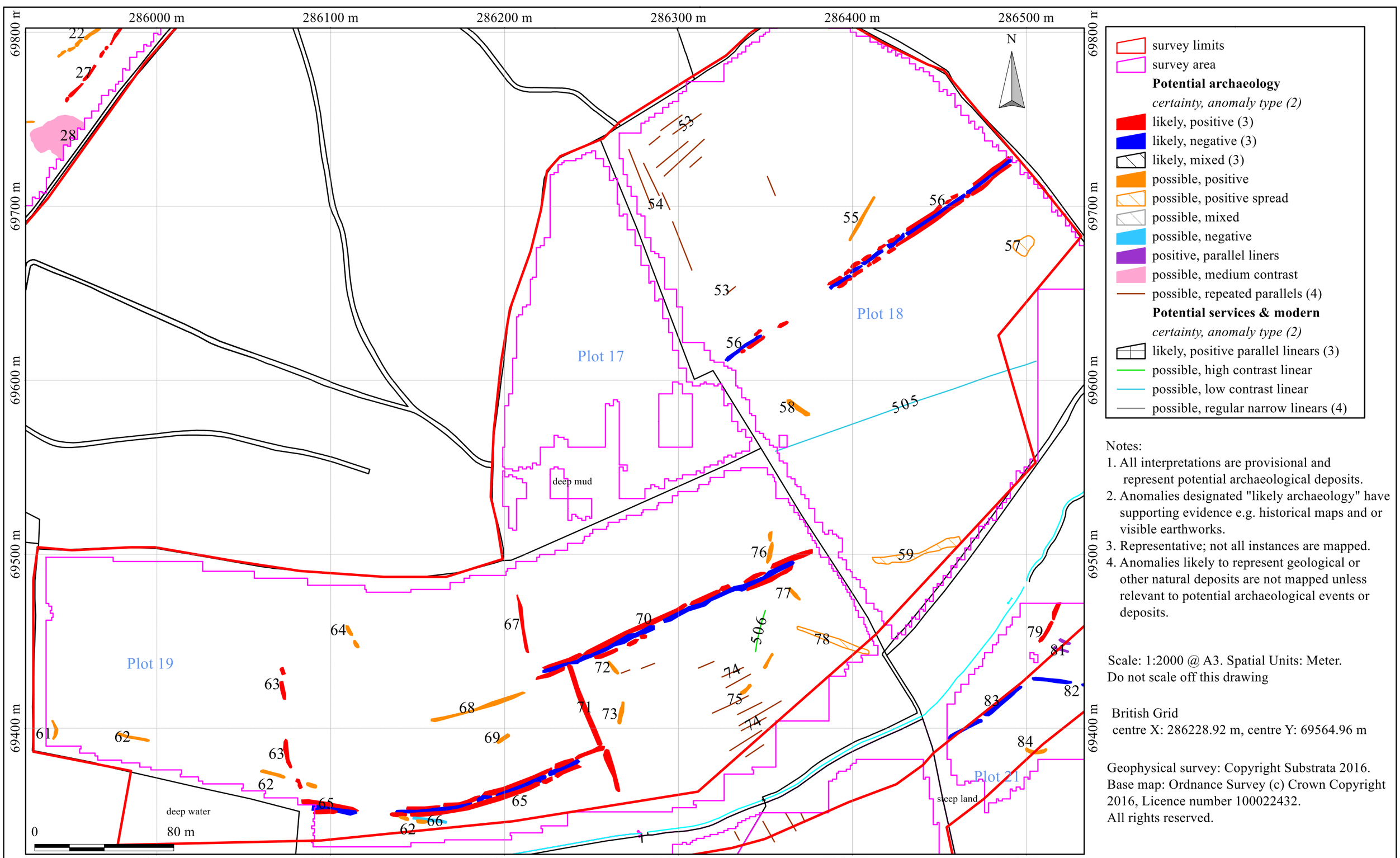
Web: substrata.co.uk



Notes:

1. All interpretations are provisional and represent potential archaeological deposits.
2. Anomalies designated "likely archaeology" have supporting evidence e.g. historical maps and or visible earthworks.
3. Representative; not all instances are mapped.
4. Anomalies likely to represent geological or other natural deposits are not mapped unless relevant to potential archaeological events or deposits.

Scale: 1:2000 @ A3. Spatial Units: Meter.
Do not scale off this drawing

British Grid
centre X: 286228.92 m, centre Y: 69564.96 m

An archaeological magnetometer survey
Land at Wolborough Barton, Newton Abbot, Devon
Centred on NGR (E/N): 285600,70000 and 286300,69400 (point)
Report: 1508WOL-R-1

Figure 9: survey interpretation: area D; plots 17, 18 and 19

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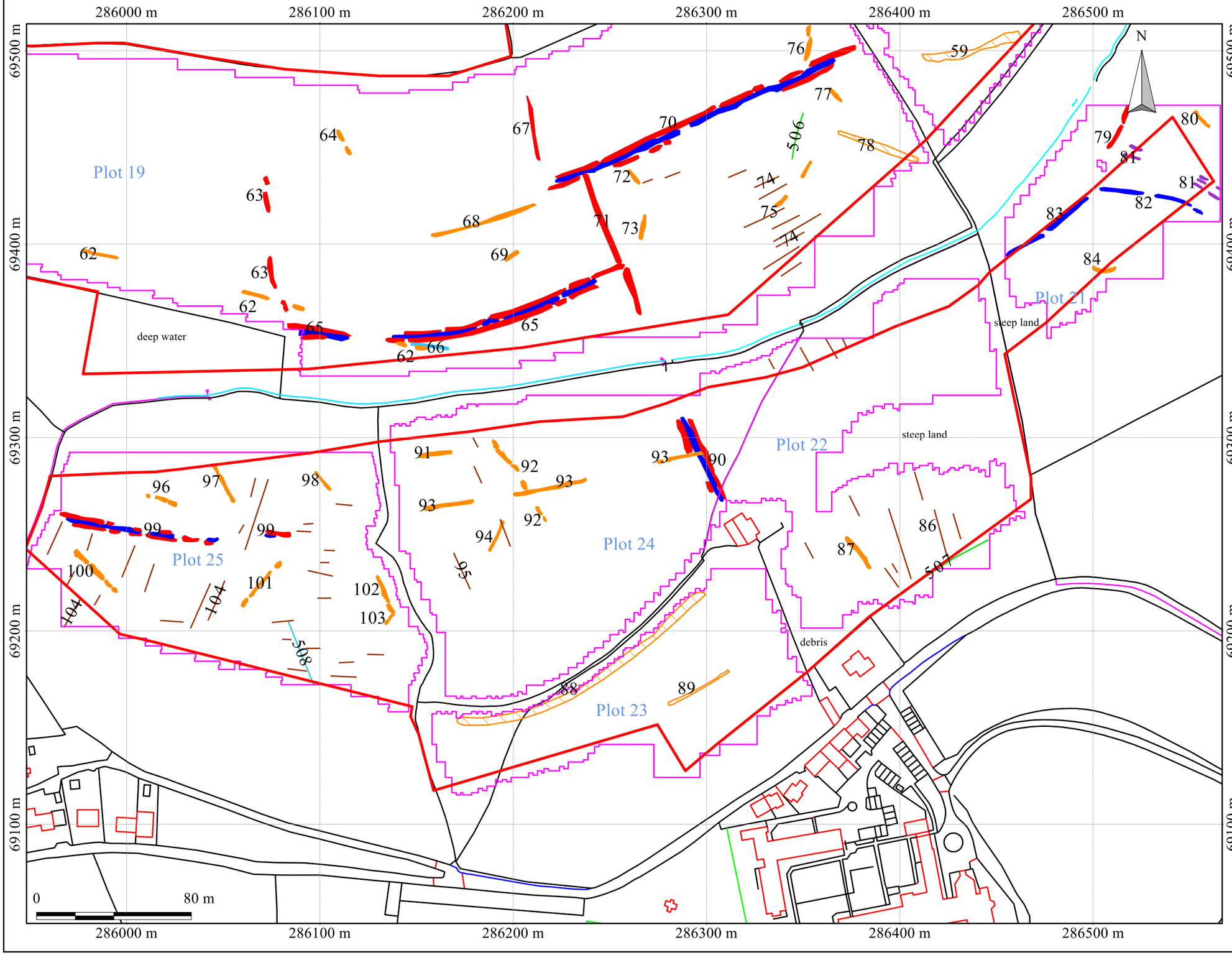
Tel: 01273 273599
Email: geophysics@substrata.co.uk
Web: substrata.co.uk



- survey limits
- survey area

Potential archaeology

certainty, anomaly type (2)

- likely, positive (3)
- likely, negative (3)
- likely, mixed (3)
- possible, positive
- possible, positive spread
- possible, mixed
- possible, negative
- positive, parallel liners
- possible, medium contrast
- possible, repeated parallels (4)

Potential services & modern

certainty, anomaly type (2)

- likely, positive parallel linears (3)
- possible, high contrast linear
- possible, low contrast linear
- possible, regular narrow linears (4)

Notes:

1. All interpretations are provisional and represent potential archaeological deposits.
2. Anomalies designated "likely archaeology" have supporting evidence e.g. historical maps and or visible earthworks.
3. Representative; not all instances are mapped.
4. Anomalies likely to represent geological or other natural deposits are not mapped unless relevant to potential archaeological events or deposits.

Scale: 1:2000 @ A3. Spatial Units: Meter.
Do not scale off this drawing

British Grid
centre X: 286257.50 m, centre Y: 69281.32 m

An archaeological magnetometer survey
Land at Wolborough Barton, Newton Abbot, Devon
Centred on NGR (E/N): 285600,70000 and 286300,69400 (point)
Report: 1508WOL-R-1

Figure 10: survey interpretation: area D; plots 21 to 25

Substrata
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285200 m 285300 m 285400 m 285500 m 285600 m 285700 m 285800 m 285900 m 286000 m

70300 m 70200 m 70100 m 70000 m 69900 m 69800 m 69700 m 69600 m

N

boggy hard standing

boggy

boggy

farm machinery

gate & debris

steep land

trees & boggy

wet ground with young crops

cattle feeders

deep mud

wet ground with young crops

0 80 m

survey limits
Processed gradiometer data shade plot (nT)
1.5
-1.5

Scale: 1:3200 @ A3. Spatial Units: Meter.
Do not scale off this drawing

British Grid
centre X: 285582.06 m, centre Y: 69955.78 m

An archaeological magnetometer survey
Land at Wolborough Barton, Newton Abbot, Devon
Centred on NGR (E/N): 285600,70000 and 286300,69400 (point)
Report: 1508WOL-R-1

Figure 11: processed gradiometer data, areas A and B

Substrata
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285800 m 285900 m 286000 m 286100 m 286200 m 286300 m 286400 m 286500 m 286600 m 286700 m

69800 m 69700 m 69600 m 69500 m 69400 m 69300 m 69200 m 69100 m

deep mud

deep water

steep land

steep land

debris

0 80 m

survey limits
Processed gradiometer data shade plot (nT)
1.5
-1.5

Scale: 1:3200 @ A3. Spatial Units: Meter.
Do not scale off this drawing

British Grid
centre X: 286262.78 m, centre Y: 69457.10 m

An archaeological magnetometer survey
Land at Wolborough Barton, Newton Abbot, Devon
Centred on NGR (E/N): 285600,70000 and 286300,69400 (point)
Report: 1508WOL-R-1

Figure 12: processed gradiometer data, area D

Substrata
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Email: geophysics@substrata.co.uk
Web: substrata.co.uk

285300 m 285400 m 285500 m 285600 m 285700 m

70200 m

70100 m

70000 m

69900 m

N

boggy, hard standing

boggy

boggy

farm machinery

gate & debris

steep land

wet ground with young crops

0 80 m

survey limits
Processed gradiometer data shade plot (nT)
1.5
-1.5

Scale: 1:1800 @ A3. Spatial Units: Meter.
Do not scale off this drawing

British Grid
centre X: 285515.28 m, centre Y: 70080.24 m

An archaeological magnetometer survey
Land at Wolborough Barton, Newton Abbot, Devon
Centred on NGR (E/N): 285600,70000 and 286300,69400 (point)
Report: 1508WOL-R-1

Figure 13: processed gradiometer data: area B; plots 2, 3, 8 and 10

Substrata
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Scale: 1:1500 @ A3. Spatial Units: Meter.
Do not scale off this drawing

British Grid
centre X: 285776.74 m, centre Y: 70105.25 m

An archaeological magnetometer survey
Land at Wolborough Barton, Newton Abbot, Devon
Centred on NGR (E/N): 285600,70000 and 286300,69400 (point)
Report: 1508WOL-R-1

Figure 14: processed gradiometer data: area B; plots 5, 6 and 8

Substrata
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Tel: 01273 273599
Email: geophysics@substrata.co.uk
Web: substrata.co.uk

285600 m 285700 m 285800 m 285900 m 286000 m

69900 m
69800 m
69700 m
69600 m

N

cattle feeders

deep mud

survey limits
Processed gradiometer data shade plot (nT)
1.5
-1.5

0 80 m

Scale: 1:1700 @ A3. Spatial Units: Meter.
Do not scale off this drawing

British Grid
centre X: 285800.73 m, centre Y: 69778.46 m

An archaeological magnetometer survey
Land at Wolborough Barton, Newton Abbot, Devon
Centred on NGR (E/N): 285600,70000 and 286300,69400 (point)
Report: 1508WOL-R-1

Figure 15: processed gradiometer data: area B; plot 4

Substrata
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Web: substrata.co.uk

285200 m 285300 m 285400 m 285500 m 285600 m

70000 m 69900 m 69800 m 69700 m

trees & boggy

wet ground with young crops

wet ground with young crops

survey limits
Processed gradiometer data shade plot (nT)
1.5
-1.5

0 80 m

Scale: 1:1700 @ A3. Spatial Units: Meter.
Do not scale off this drawing

British Grid
centre X: 285357.69 m, centre Y: 69847.28 m

An archaeological magnetometer survey
Land at Wolborough Barton, Newton Abbot, Devon
Centred on NGR (E/N): 285600,70000 and 286300,69400 (point)
Report: 1508WOL-R-1

Figure 16: processed gradiometer data: area A; plots 11, 12 and 14

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Email: geophysics@substrata.co.uk
Web: substrata.co.uk

286000 m
286100 m
286200 m
286300 m
286400 m
286500 m
69800 m
69700 m
69600 m
69500 m
69400 m
N
deep mud
deep water
sleep land
0
80 m
survey limits
Processed gradiometer data shade plot (nT)
1.5
-1.5

Scale: 1:2000 @ A3. Spatial Units: Meter.
Do not scale off this drawing

British Grid
centre X: 286228.92 m, centre Y: 69564.96 m

An archaeological magnetometer survey
Land at Wolborough Barton, Newton Abbot, Devon
Centred on NGR (E/N): 285600,70000 and 286300,69400 (point)
Report: 1508WOL-R-1

Figure 17: processed gradiometer data: area D; plots 17, 18 and 19

Substrata
Office 1, 5 Mill Street
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Tel: 01273 273599
Email: geophysics@substrata.co.uk
Web: substrata.co.uk

286000 m 286100 m 286200 m 286300 m 286400 m 286500 m

69500 m 69400 m 69300 m 69200 m 69100 m

N

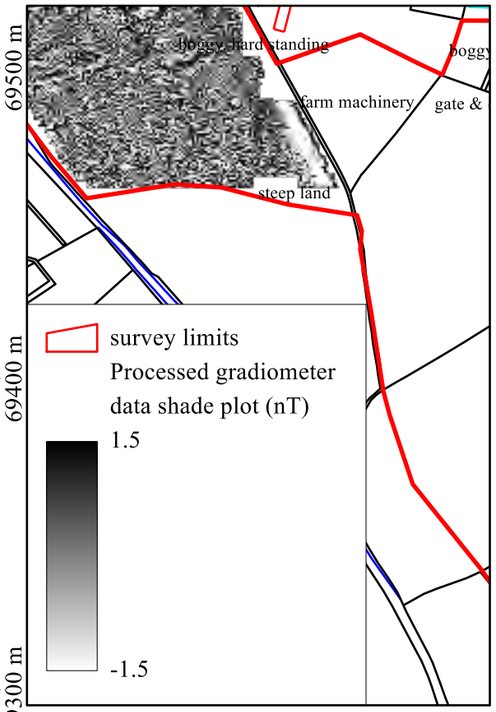
deep water

steep land

steep land

debris

0 80 m



Scale: 1:2000 @ A3. Spatial Units: Meter.
Do not scale off this drawing

British Grid
centre X: 286257.50 m, centre Y: 69281.32 m

An archaeological magnetometer survey
Land at Wolborough Barton, Newton Abbot, Devon
Centred on NGR (E/N): 285600,70000 and 286300,69400 (point)
Report: 1508WOL-R-1

Figure 18: processed gradiometer data: area D; plots 21 to 25

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Web: substrata.co.uk

Appendix 2 Methodology Summary

Table 5: methodology summary	
Documents Survey methodology statement: Dean (2016)	
Methodology 1. 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/ Digital Antiquity Guides (undated). 2. The survey grid location information and grid plan was recorded as part of the project in a suitable GIS system. 3. 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.	
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 except for fields 2, 19, 25 which were GN90
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	

Appendix 3 Data processing

Table 6: magnetometer survey - processed data metadata: Area B, plots 2 to 6, 8, 10

SITE
Instrument Type: Bartington Grad-601 gradiometer
Units: nT
Direction of 1st Traverse: GN except plots 2, 19 & 25 which were GN90
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

PROGRAM
Name: TerraSurveyor
Version: 3.0.29.3

Area B; plot 2

Stats

Max:	157.33
Min:	-166.18
Std Dev:	12.90
Mean:	-0.25
Median:	0.00

Processes: 7
1 Base Layer
2 Clip at 1.00 SD
3 De Stagger: Grids: All Mode: Both By: -1 intervals
4 De Stagger: Grids: All Mode: Both By: -1 intervals
5 DeStripe Median Traverse: Grids: e1.xgd e12.xgd e13.xgd f1.xgd e2.xgd e11.xgd e14.xgd f2.xgd f15.xgd e3.xgd e10.xgd e15.xgd f3.xgd f14.xgd e4.xgd e9.xgd e16.xgd f4.xgd f13.xgd e5.xgd e8.xgd e17.xgd f5.xgd f12.xgd e6.xgd e7.xgd e18.xgd f6.xgd f11.xgd e19.xgd f7.xgd f10.xgd
6 Search & Replace From: -3000 To: 3000 With: Dummy (Area: Top 30, Left 688, Bottom 60, Right 720)
7 Interpolate: Match X & Y Doubled

Area B, plots 3, to 6, 8, 10

Stats

Max:	5676.25
Min:	-3391.56
Std Dev:	26.57
Mean:	-0.03
Median:	0.00

Processes: 19
1 Base Layer
2 De Stagger: Grids: All Mode: Both By: -1 intervals
3 De Stagger: Grids: All Mode: Both By: -1 intervals
4 DeStripe Median Traverse: Grids: h11.xgd o4+h12.xgd o15+h24.xgd o17.xgd n21.xgd h10.xgd h13.xgd h23.xgd j1+o16.xgd n22.xgd h9.xgd h14.xgd h22.xgd j2.xgd n23+j9.xgd h8.xgd h15.xgd h21.xgd j3.xgd g1+j8.xgd
5 DeStripe Median Traverse: Grids: h16.xgd h20.xgd j4.xgd g2+j7.xgd
6 DeStripe Median Traverse: Grids: h17.xgd h19.xgd n5+j5.xgd
7 Edge Match (Area: Top 600, Left 2280, Bottom 539, Right 2399) to Left edge
8 Search & Replace From: -3000 To: 3000 With: Dummy (Area: Top 570, Left 1681, Bottom 539, Right 1768)
9 DeStripe Median Traverse: Grids: o8.xgd o11.xgd o21.xgd n17+v4.xgd u6.xgd o1.xgd o7.xgd o12.xgd o20.xgd n18.xgd o22.xgd o2.xgd o6.xgd o13.xgd o19.xgd n19.xgd n26.xgd o3.xgd o5.xgd o14.xgd o18.xgd n20.xgd n25+m1.xgd
10 DeStripe Median Traverse: Grids: o9.xgd o10+v2.xgd
11 DeStripe Median Traverse: Grids: n17+v4.xgd
12 DeStripe Median Traverse: Grids: y6.xgd y7.xgd w10.xgd y5.xgd y8.xgd u15.xgd w11.xgd y4.xgd y9.xgd u16.xgd x14.xgd w9.xgd w12.xgd y3.xgd y10.xgd u17.xgd x13.xgd x15.xgd u14.xgd w8.xgd w13.xgd y2.xgd y11.xgd u18.xgd x12.xgd x16.xgd z11.xgd u13.xgd w7.xgd w14.xgd y1.xgd y12.xgd u19.xgd x11.xgd x17.xgd z10.xgd z12.xgd u12.xgd w6.xgd w15.xgd v16.xgd y13.xgd u20.xgd x10.xgd x18.xgd z9.xgd z13.xgd z21.xgd u11.xgd w5.xgd w16.xgd v15.xgd y14.xgd u21.xgd x9.xgd x19.xgd z8.xgd z14.xgd z20.xgd u10.xgd w4.xgd w17.xgd v14.xgd y15.xgd x1.xgd x8.xgd x20.xgd z7.xgd z15.xgd z19.xgd u9.xgd w3.xgd z1.xgd v13.xgd y16.xgd x2.xgd x7.xgd x21.xgd z6.xgd z16.xgd z18.xgd u8.xgd w2.xgd z2.xgd v12.xgd y17.xgd x3.xgd x6.xgd x22.xgd z5.xgd z17.xgd u7.xgd w1.xgd z3.xgd v11.xgd y18.xgd x4.xgd x5.xgd x23.xgd z4.xgd
13 DeStripe Median Traverse: Grids: u1.xgd v8.xgd u2.xgd v6.xgd v7.xgd u3.xgd v5.xgd v9.xgd u4.xgd v3.xgd v10.xgd u5.xgd
14 DeStripe Median Traverse: Grids: v1.xgd
15 DeStripe Median Traverse: Grids: u6.xgd
16 DeStripe Median Traverse: Grids: g6.xgd g5.xgd g4+n10.xgd n9.xgd
17 DeStripe Median Traverse: Grids: n1.xgd n4.xgd n7.xgd n2.xgd n3.xgd n8.xgd
18 DeStripe Median Traverse: Grids: m8.xgd m9.xgd m15.xgd m16.xgd m19.xgd m7.xgd m10.xgd m14.xgd m17.xgd m18.xgd m20.xgd m23.xgd m24.xgd m6.xgd m11.xgd i2+m13.xgd i16.xgd j10.xgd k3+m21.xgd l1+m22.xgd l16+m25.xgd m5+g7.xgd m12+g17.xgd i1.xgd i15.xgd j11.xgd k1.xgd l2.xgd l15.xgd g8.xgd g16.xgd i3.xgd i14.xgd j12.xgd k2.xgd l3.xgd l14.xgd g9.xgd g15.xgd i4.xgd i13.xgd j13.xgd k4.xgd l4.xgd l13.xgd l17.xgd l18.xgd g10.xgd g14.xgd i5.xgd i12.xgd j14.xgd k5.xgd l5.xgd l12.xgd l19.xgd g11+n11.xgd g13.xgd i6.xgd i11.xgd j15.xgd k6.xgd l6.xgd l11.xgd k11.xgd n12.xgd g12+n14.xgd i7+n15.xgd i10.xgd j16.xgd k7.xgd l7.xgd l10.xgd k10.xgd n13.xgd i8+n16.xgd i9.xgd j17.xgd k8.xgd l8.xgd l9.xgd k9.xgd
19 Interpolate: Match X & Y Doubled.

Appendix 3 Data processing

Table 7: magnetometer survey - processed data metadata: area A; plots 11, 12, 14

SITE
Instrument Type: Bartington Grad-601 gradiometer
Units: nT
Direction of 1st Traverse: GN except plots 2, 19 & 25 which were GN90
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

PROGRAM
Name: TerraSurveyor
Version: 3.0.29.3

Area A: plots 11, 12, 14

Stats

Max:	69.19
Min:	-104.24
Std Dev:	3.45
Mean:	0.10
Median:	0.01

Processes: 5
1 Base Layer
2 Clip at 1.00 SD
3 De Stagger: Grids: All Mode: Both By: -2 intervals
4 DeStripe Median Traverse: Grids: All
5 Interpolate: Match X & Y Doubled.

Appendix 3 Data processing

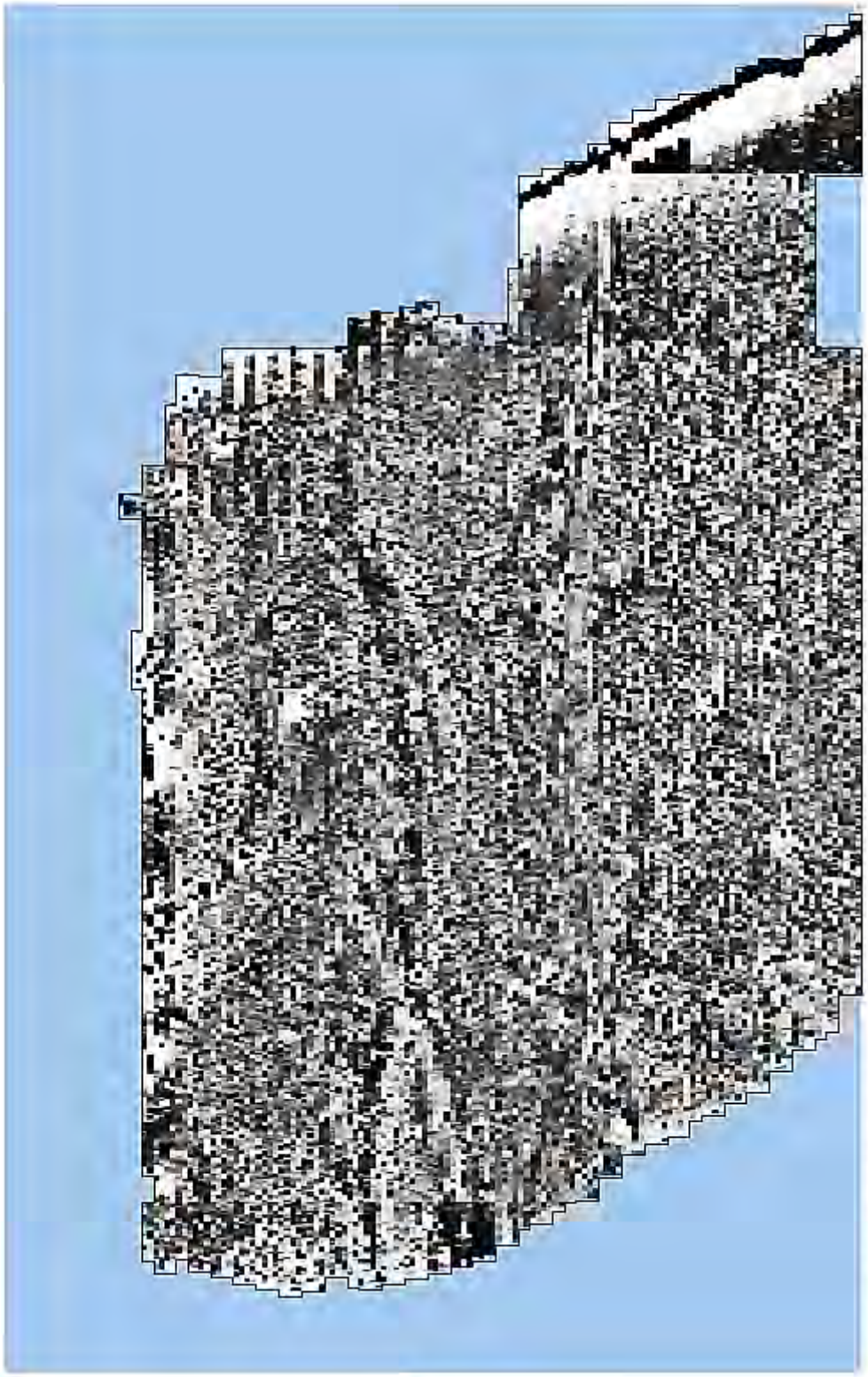
Table 8: magnetometer survey - processed data metadata: area D; plots 17 to 19, 21 to 25

SITE
Instrument Type: Bartington Grad-601 gradiometer
Units: nT
Direction of 1st Traverse: GN except plots 2, 19 & 25 which were GN90
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 32702

PROGRAM
Name: TerraSurveyor
Version: 3.0.29.3

Area D; plot 19 Stats Max: 89.61 Min: -79.46 Std Dev: 4.31 Mean: 0.08 Median: 0.01	Processes: 10 1 Base Layer 2 Clip at 3.00 SD 3 De Stagger: Grids: All Mode: Both By: -3 intervals 4 DeStripe Median Traverse: Grids: All 5 De Stagger: Grids: ac17.xgd Mode: Both By: 2 intervals 6 De Stagger: Grids: aa5.xgd ab5.xgd ac2.xgd ac23.xgd ad4.xgd Mode: Both By: 1 intervals 7 De Stagger: Grids: ab6.xgd ac3.xgd ac22.xgd ab7.xgd ac4.xgd ac21.xgd ab8.xgd ac5.xgd ac20.xgd ab9.xgd ac6.xgd ac19.xgd Mode: Both By: 1 intervals 8 De Stagger: Grids: ab14.xgd Mode: Both By: -2 intervals 9 Edge Match (Area: Top 30, Left 1320, Bottom 59, Right 1439) to Bottom edge 10 Interpolate: Match X & Y Doubled
Area D; plots 17, 18, , 21 to 24 Stats Stats Max: 19.53 Min: -19.61 Std Dev: 1.36 Mean: -0.05 Median: -0.01	Processes: 16 1 Base Layer 2 Clip at 1.00 SD 3 Clip at 1.00 SD 4 De Stagger: Grids: All Mode: Both By: -2 intervals 5 De Stagger: Grids: a11.xgd a12.xgd a13.xgd a14.xgd a15.xgd Mode: Both By: -2 intervals 6 DeStripe Median Traverse: Grids: All 7 Edge Match (Area: Top 360, Left 1800, Bottom 389, Right 1919) to Right edge 8 Edge Match (Area: Top 390, Left 1800, Bottom 419, Right 1919) to Top edge 9 Edge Match (Area: Top 420, Left 1800, Bottom 449, Right 1919) to Left edge 10 Edge Match (Area: Top 450, Left 1920, Bottom 449, Right 2039) to Right edge 11 Edge Match (Area: Top 480, Left 1920, Bottom 449, Right 2039) to Right edge 12 Edge Match (Area: Top 450, Left 1800, Bottom 449, Right 1919) to Bottom edge 13 Edge Match (Area: Top 240, Left 1800, Bottom 389, Right 1919) to Left edge 14 Edge Match (Area: Top 360, Left 1800, Bottom 389, Right 2039) to Left edge 15 Edge Match (Area: Top 330, Left 1920, Bottom 389, Right 2039) to Right edge 16 Interpolate: Match X & Y Doubled
Area D; plot 25 **Stats** **Max: 24.59** **Min: -13.99** **Std Dev: 1.30** **Mean: 0.04** **Median: 0.01**	Processes: 5 1 Base Layer 2 Clip at 5.00 SD 3 De Stagger: Grids: All Mode: Both By: -2 intervals 4 DeStripe Median Traverse: Grids: All 5 Interpolate: Match X & Y Doubled.

Appendix 4 Minimally processed data plots



Instrument Type: Bartington Grad 601
Units: nT
Direction of 1st Traverse: 90 deg
Collection Method: ZigZag
Sensors: 2 @ 0.00 m spacing.
Dummy Value: 32702

Dimensions
Composite Size (readings): 960 x 150
Survey Size (meters): 240 m x 150 m
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 3006.10
Min: -3000.20
Std Dev: 103.62
Mean: 1.42
Median: 0.00

PROGRAM
Name: TerraSurveyor
Version: 3.0.29.3
Processes: 3
1 Base Layer
2 DeStripe Median Sensors: Grids: All
3 Clip from -100.00 to 100.00 nT

Figure 19: shade plot of minimally processed gradiometer data: area B; plot 2

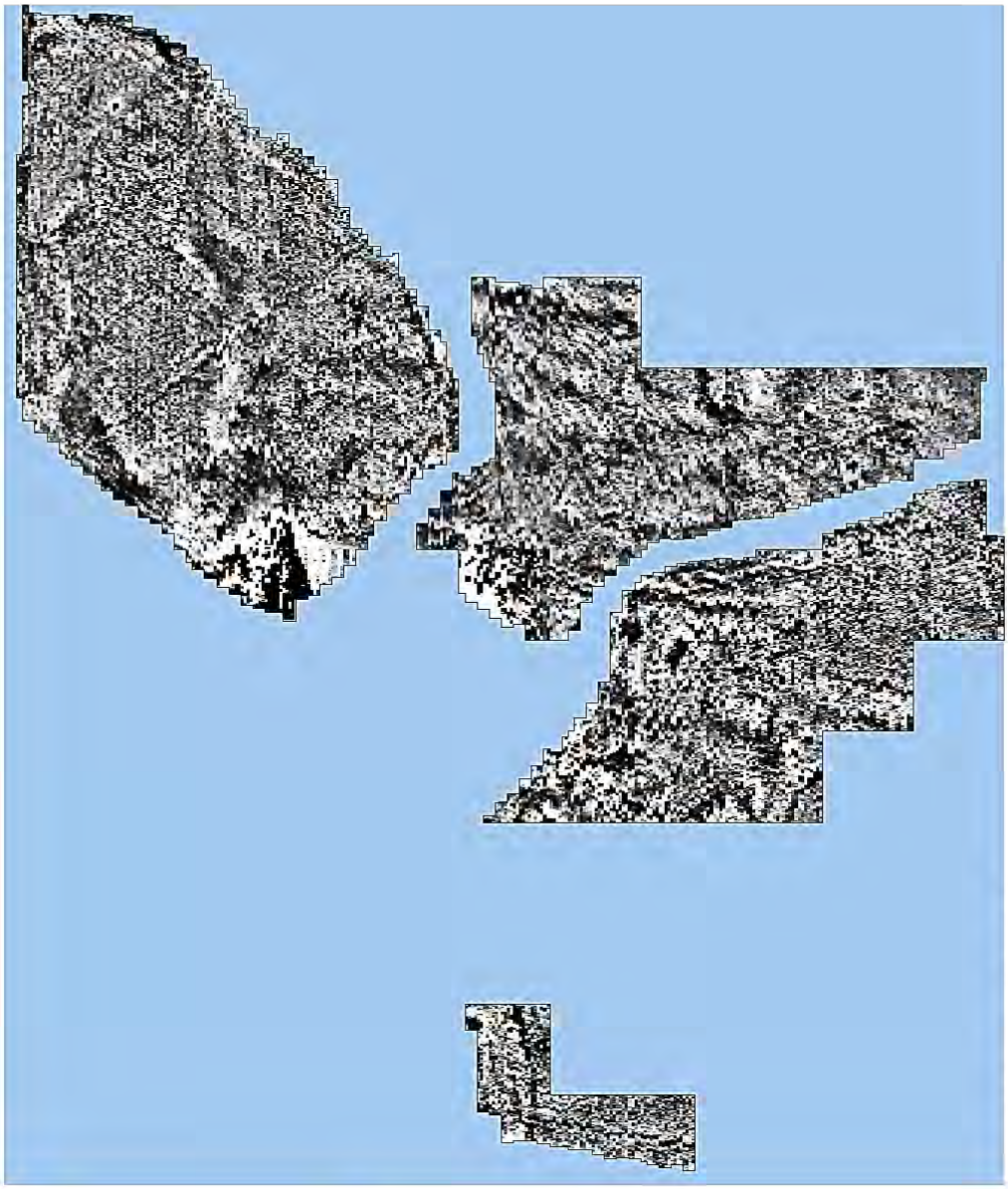
Instrument Type: Bartington Grad 601
Units: nT
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 0.00 m spacing.
Dummy Value: 32702
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 200.00
Min: -101.91
Std Dev: 5.46
Mean: 0.01
Median: 0.00

PROGRAM
Name: TerraSurveyor
Version: 3.0.29.3 Traverse: 0 deg

Processes: 3
1 Base Layer
2 DeStripe Median Sensors: Grids: All
3 Clip from -100.00 to 100.00 nT

Figure 20: shade plot of minimally processed gradiometer data: area B; plots 3 to 6, 8 and 10



Instrument Type: Bartington Grad 601
Units: nT
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 0.00 m spacing.
Dummy Value: 32702

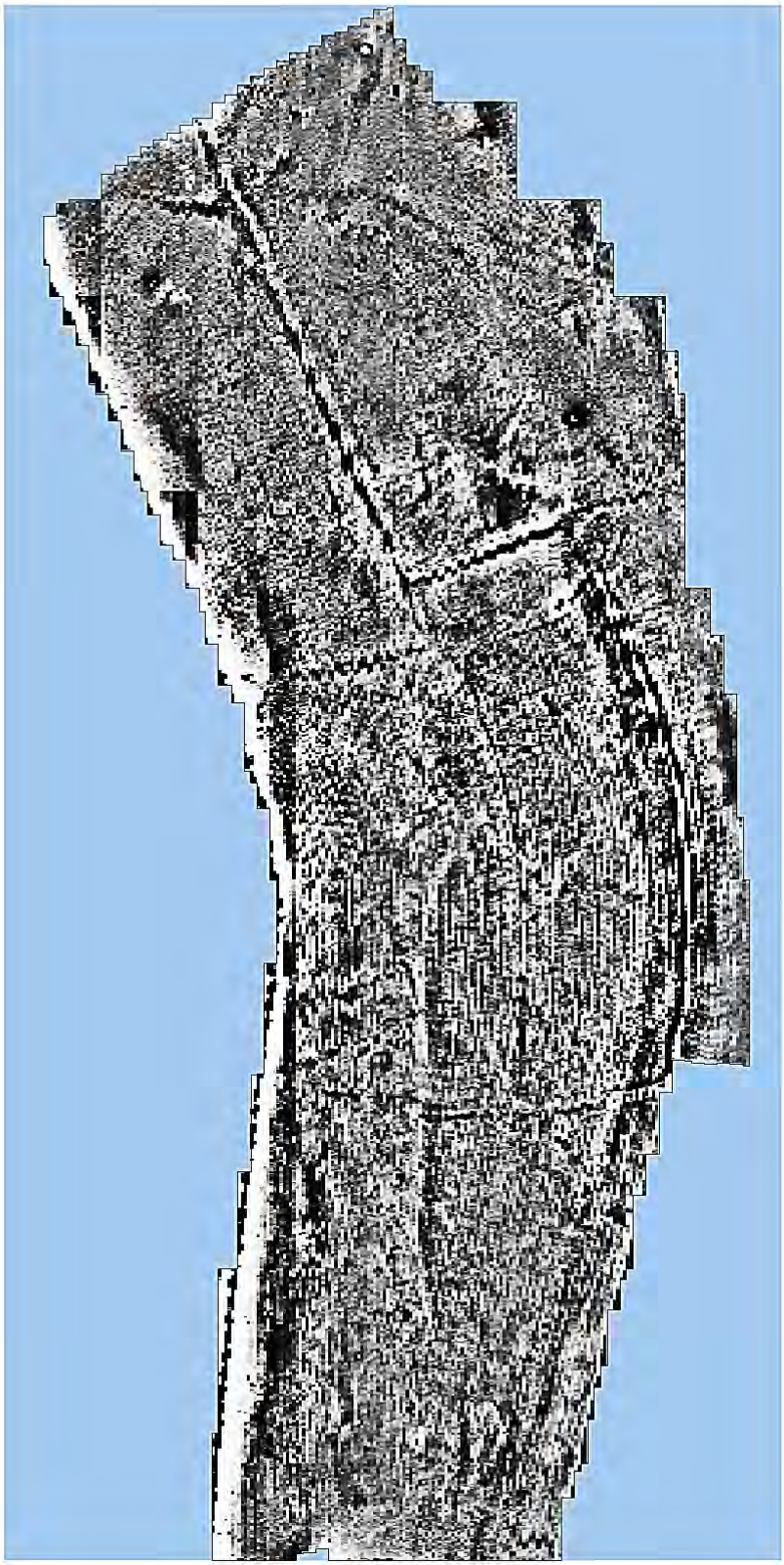
Dimensions
Composite Size (readings): 2760 x 540
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 3001.00
Min: -3000.50
Std Dev: 26.51
Mean: -0.05
Median: 0.00

PROGRAM
Name: TerraSurveyor
Version: 3.0.29.3

Processes: 3
1 Base Layer
2 DeStripe Median Sensors: Grids: All
3 Clip from -100.00 to 100.00 nT

Figure 21: shade plot of minimally processed gradiometer data: area A; plots 11,12 and 14



Instrument Type: Bartington Grad 601
Units: nT
Direction of 1st Traverse: 90 deg
Collection Method: ZigZag
Sensors: 2 @ 0.00 m spacing.
Dummy Value: 32702
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 100.00
Min: -100.00
Std Dev: 8.53
Mean: -0.04
Median: 0.00

PROGRAM
Name: TerraSurveyor
Version: 3.0.29.3

Processes: 3
1 Base Layer
2 DeStripe Median Sensors: Grids: All
3 Clip from -100.00 to 100.00 nT

Figure 22: shade plot of minimally processed gradiometer data:
area D; plot 19

Instrument Type: Bartington Grad 601
Units: nT
Direction of 1st Traverse: 0 deg
Collection Method: ZigZag
Sensors: 2 @ 0.00 m spacing.
Dummy Value: 32702
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 100.00
Min: -100.00
Std Dev: 6.38
Mean: -0.02
Median: 0.00

PROGRAM
Name: TerraSurveyor
Version: 3.0.29.3

Processes: 3
1 Base Layer
2 DeStripe Median Sensors: Grids: All
3 Clip from -100.00 to 100.00 nT

Figure 23: shade plot of minimally processed gradiometer data: area D; plots 17, 18, 21 to 24

Instrument Type: Bartington Grad 601
Units: nT
Direction of 1st Traverse: 90 deg
Collection Method: ZigZag
Sensors: 2 @ 0.00 m spacing.
Dummy Value: 32702
Grid Size: 30 m x 30 m
X Interval: 0.25 m
Y Interval: 1 m

Stats
Max: 100.00
Min: -70.56
Std Dev: 2.36
Mean: 0.07
Median: 0.00

PROGRAM
Name: TerraSurveyor
Version: 3.0.29.3

Processes: 3
1 Base Layer
2 DeStripe Median Sensors: Grids: All
3 Clip from -100.00 to 100.00 nT

Figure 24: shade plot of minimally processed gradiometer data: area D; plot 25