

Substrata

Archaeological Geophysical Surveyors

An archaeological gradiometer survey

Sturminster Marshall to Culpepper's Dish Pipeline;

West Almer Farm, Mapperton, Winterborne
Tomson, Bloxworth Down, Lincoln Farm,
Townsend and Galton Heath

Report: 141212

Ross Dean BSc MSc MA MifA

12 December 2014

Substrata
Archaeological Geophysical Surveyors
15 Horizon View, Bath Hotel Road
Westward Ho!
Bideford
Devon EX39 1GX
Tel: 07788627822
Email: geophysics@substrata.co.uk
Web: substrata.co.uk

Client:
AC Archaeology Ltd
Manor Farm Stables
Chicklade
Hindon
Nr. Salisbury
Wiltshire SP3 5SU
Web: acarchaeology.co.uk

Contents

1. Survey description and summary	1
2. Survey aims and objectives	2
3. Standards	2
4. Site description	2
5. Archaeological background	2
6. Results, discussion and conclusions	4
7. Disclaimer and copyright	7
8. Acknowledgements	7
9. Bibliography	7
Appendix 1 Data Analysis and Figures	8
Appendix 2 Methodology summary	34
Appendix 3 Geophysical survey techniques	35

Figures

Figure 1: location map, areas 1 to 9	11
Figure 2: location map, areas 1 to 3	12
Figure 3: location map, areas 4 to 9	13
Figure 4: location map, area 10	14
Figure 5: survey analysis, Area 1 West Almer Farm	15
Figure 6: survey analysis, Area 2 Mapperton	16
Figure 7: survey analysis, Area 3 Winterborne Tomson	17
Figure 8: survey analysis, Area 4 Bloxworth Down	18
Figure 9: survey analysis, Area 5 Bloxworth Down	19
Figure 10: survey analysis, Area 6 Bloxworth Down	20
Figure 11: survey analysis, Area 7 Lincoln Farm	21
Figure 12: survey analysis, Area 8 Lincoln Farm	22
Figure 13: survey analysis, Area 9 Townsend	23
Figure 14: shade plot of processed data, Area 1 West Almer Farm	24
Figure 15: shade plot of processed data, Area 2 Mapperton	25
Figure 16: shade plot of processed data, Area 3 Winterborne Tomson	26
Figure 17: shade plot of processed data, Area 4 Bloxworth Down	27
Figure 18: shade plot of processed data, Area 5 Bloxworth Down	28
Figure 19: shade plot of processed data, Area 6 Bloxworth Down	29
Figure 20: shade plot of processed data, Area 7 Lincoln Farm	30
Figure 21: shade plot of processed data, Area 8 Lincoln Farm	31
Figure 22: shade plot of processed data, Area 9 Townsend	32
Figure 23: shade plot of processed data, Area 10 Galton Heath	33

Tables

Table 1: survey areas location information	1
Table 2: data analysis, areas 1 to 4	9
Table 3: data analysis, areas 5 to 9	10
Table 4: methodology summary	34

Accompanying CD-ROM

Report	Adobe PDF format
Copies of report figures	Adobe PDF format
Survey metadata and processing	Adobe PDF format
Raw and processed grid & composite files	DW Consulting TerraSurveyor 3 formats
Minimal processing data plots and metadata	Adobe PDF format
GIS project, shape files and classification schema	
GIS project	Manifold 8 'map' file
GIS shape files	ESRI standard
GIS classification schema	Adobe PDF format
AutoCAD version of the survey interpretation	AutoCAD DXF

1 Survey description and summary

1.1 Survey

Type: twin-sensor fluxgate gradiometer
Date: October and November 2014
Area: 28ha
Lead surveyor: Ross Dean BSc MSc MA MifA

1.2 Client

AC Archaeology Ltd, Manor Farm Stables, Chicklade, Hindon, Nr. Salisbury,
Wiltshire SP3 5SU

1.3 Location

Site: Sturminster Marshall to Culpepper's Dish Pipeline
County: Dorset

	Area 1 West Almer Farm	Area 2 Mapperton	Area 3 Winterborne Tomson	Areas 4 to 9 Bloxworth Down, Lincoln Farm and Townsend	Area 10 Galton Heat
Ordnance Survey E/N (points):	391580,99244 to 391098,98916	391011,98794 to 390686,98354	388901,97597 to 388811,97211	388071,96889 to 385292, 95283	379150,87610
NGR (points):	SY915992 to SY910989	SY910987 to SY906983	SY889975 to SY888972	SY880968 to SY852952	SY791876
Nearest Postcode:	DT11 9EP	DT11 9EP to DT11 9EW	DT11 9EX to DT11 9HA	DT11 9EX to BH20 7JZ	DT2 8DS

Table 1: survey areas location information

1.4 Archive

OASIS number: substrat1-197955
Archive: At the time of writing, the archive of this survey will be held by Substrata.

1.5 Introduction

This report was commissioned by AC Archaeology Ltd on behalf of Wessex Water in support of a proposal to construct a new water main linking the Sturminster Marshall Water Treatment Works and Culpeppers Dish Reservoir, Dorset. The magnetometer survey was requested by the Senior Archaeologist, Dorset County Council, in order to identify the nature of potential heritage assets following routine consultation by Wessex Engineering Construction Services. A desk-based archaeological assessment (Cottam and Cox 2013) identified the presence of a range of archaeological assets on or close to the pipeline route which formed the basis of the selection of the survey areas.

The survey was undertaken in accordance with the Project Design (Cox 2014) with minor adjustments to the survey corridor as discussed below. Five locations along the proposed pipeline route were surveyed at Galton Heath, West Almer Farm, Mapperton, Winterborne Tomson, Bloxworth Down and areas south of Lincoln Farm. These locations were sub-divided into ten areas to aid reporting (Table 1 and Figures 1 to 4).

In areas 1 to 9 the survey was undertaken along a 50m wide corridor in following the centreline of the proposed pipeline wherever possible. In places the proposed pipeline route ran very close to the A31. To ensure the collection of viable magnetic data the corridor was moved a few metres from the A31 in places to reduce the influence of passing vehicles. The volume of traffic encountered during the actual survey required some narrowing of the revised survey corridor close to the A31 as surveying close to highly magnetic materials (passing vehicles) adversely affects data collection. This is due to the magnetic sensors retaining false high readings for a short period after the magnetic source has passed which, if not accounted for, would render otherwise viable data unusable. The zone of influence of the traffic was assessed on site and the necessary narrowing of the corridor kept to a minimum at all times.

1.6 Summary

The magnetic contrast across the survey areas was sufficient to be able to differentiate between anomalies representing possible archaeological features and background magnetic responses. Eighty-five magnetic anomaly groups were identified as pertaining to archaeological deposits or structures. The majority of these are most likely to reflect linear deposits such as field and enclosure boundaries not relating to the current field systems. There are a number of areas of enhanced magnetic response. These areas can relate to archaeological deposits created by craft, industrial and other activities. One ring ditch and part of a known barrow were recorded on Bloxworth Down. One possible ditched track or road was recorded south of Lincoln Farm.

The survey area at Galton Heath contained no magnetic anomalies though to relate to archaeological features or deposits.

2 Survey aims and objectives

2.1 Aims

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

2.2 Objectives

1. Complete a gradiometer survey across the agreed 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 site about the location and possible archaeological character of the recorded anomalies.

3 Standards

The standards used to complete this survey are defined by the Institute for Archaeologists (2011). The codes of approved practice that were followed are those of the Institute for Archaeologists (2008 and 2009) and Archaeology Data Service/Digital Antiquity Guides (undated). The document text was written using the house style of the Institute for Archaeologists (Institute for Archaeologists, undated).

4 Site description

4.1 Landscape and land use

The proposed water main is approximately 16.5km in length. The survey took place across farmland at five locations as shown in Figures 1 to 4.

4.2 Geology

The underlying geology varies along the pipeline route but largely comprises Chalk formed during the Cretaceous period. The extreme south-western end of the pipeline route lies on sands and gravels the Poole Formation and clays, silts and gravels of the Thames formation (after Cottam and Cox 2013).

5 Archaeological background

The following is taken from an Historic Environment Assessment forming part of the programme of archaeological work required in support of the proposed pipeline (Cottam and Cox 2013).

There are no designated assets on the route of the pipeline, although it does cross both the Almer and the Piddle Valley Conservation Areas. There are a further nineteen designated

assets within the 500m study corridor comprising ten Scheduled Monument, two Registered Parks and Gardens one Grade I Listed Building, three Grade II* Listed Buildings, three Grade II Listed Buildings and a further three Conservation Areas. The proposed water main will not affect the setting of these assets. An additional 174 designated assets lie within the 1km of the pipeline.

The pipeline crosses an area of archaeologically important Prehistoric funerary remains on Bloxworth Down, within which there is a number of Scheduled barrows. Further ring ditches have been identified by examination of air photographs. The Roman road from Lake Farm to Dorchester is also believed to cross this area, although its route is conjectural at this point. The road crosses the pipeline route again, at a point where its existence has been confirmed, close to Culpepper's Dish. No clear evidence for the road was recorded during the survey. There are a number of deserted or shrunken medieval settlements within the study area and the number of surviving houses and churches suggests that the area was well settled at this time, largely by small agricultural villages and hamlets.

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 attempts to identify and characterise anomalies and anomaly groups that may pertain to archaeological deposits and structures.

The reader is referred to section 7.

6.1 Results

Figures 5 to 13 (Appendix 1) provide the interpretation of the survey across survey areas 1 to 9, the locations of which are provided in Figures 1 to 3. They include the anomaly groups identified as pertaining to archaeological deposits along with their numbers. Tables 2 and 3 (Appendix 1) are extracts from a detailed analysis of the survey data provided in the attribute tables of the GIS project on the accompanying CD-ROM.

No anomaly groups pertaining to archaeological deposits or structures were recorded in area 10, Galton Heath.

Figures 5 to 13 along with Tables 2 and 3 comprise the analysis of the survey data.

Plots of the processed data are provided in Figures 14 to 23 (Appendix 1).

6.2 Discussion

Not all anomalies or anomaly groups identified in the survey dataset are necessarily discussed below. All identified anomaly groups are recorded in the GIS project on the accompanying CD-ROM. Those anomaly groups possibly representing archaeological deposits are included in the data analysis (Tables 2 and 3).

General points

Anomalies thought to relate to natural features were not mapped. Recent man-made objects such as services or recent land fill have not been mapped except where they comprise significant magnetic responses across the dataset in which case they are recorded in the figures and in Tables 2 and 3 but are not discussed below.

Data collection along field edges, close to roads and adjacent to other structures was restricted as shown in the Figures due to the presence of magnetic materials and objects. Strong magnetic responses mapped close to these are likely to relate to these items except where indicated otherwise in Figures 5 to 13.

Area 1 West Almer Farm (Figure 5)

Magnetic anomaly groups 1 to 4 are most likely to reflect linear deposits such as field and enclosure boundaries not relating to the current field system. Group 5 is an area of enhanced magnetic response which may relate to archaeological deposits.

Area 2 Mapperton (Figure 6)

Group 13 may represent a large pit although a natural origin is equally likely. All of the other mapped anomaly groups may reflect linear deposits such as field and enclosure boundaries not relating to the current field system. The broader groups (8, 9 and 12) may denote ploughed out field banks or lynchets.

Area 3 Winterborne (Figure 7)

All of the mapped anomaly groups may reflect linear deposits such as field and enclosure boundaries not relating to the current field system. The broader groups (17, 18, 19 and 21) may reflect ploughed out field banks or lynchets.

Area 4 Boxworth Down (Figure 8)

The dataset contains evidence for a number of large natural deposits (Figure 17) and it is not clear whether anomaly group 26 represents an archaeological or natural linear deposit. In areas 9 and 10, the proposed pipeline crosses an area of archaeologically important Prehistoric funerary remains on Bloxworth Down, within which there is a number of Scheduled barrows (Section 5). Further ring ditches have been identified by examination of air photographs and it is clear that group 41 represents a ring ditch.

Group 38 is an area of enhanced magnetic response which almost certainly represents ground disturbance and may have archaeological significance.

The remaining mapped anomaly groups may reflect linear deposits such as field and enclosure boundaries not relating to the current field system although, given the presence of Prehistoric funerary remains in the area, other archaeological origins may be applicable.

Area 5 Bloxworth Down (Figure 9)

Group 48 coincides with a mapped barrow and is certain to represent deposits associated with the barrow.

As well as passing through an area of archaeologically important Prehistoric funerary remains discussed above and in Section 5, a Roman road from Lake Farm to Dorchester is also believed to cross the south-western part of area 5. No clear evidence for the road was recorded in the survey data.

Group 51 is an area of enhanced magnetic response which could represent ground disturbance and may have archaeological significance.

The remaining mapped anomaly groups may reflect linear deposits such as field and enclosure boundaries not relating to the current field system although, given the presence of Prehistoric funerary remains in the area, other archaeological origins may be applicable.

Area 6 Bloxworth Down (Figure 10)

Group 57 is an area of enhanced magnetic response which could represent ground disturbance and may have archaeological significance. The remaining mapped anomaly groups may reflect linear deposits such as field and enclosure boundaries not relating to the current field system.

Area 7 Lincoln Farm (Figure 11)

The mapped anomaly groups may reflect linear deposits such as field and enclosure boundaries not relating to the current field system. Of these, group 72 is likely to represent part of a sub-rectangular enclosure while group 77 may represent a pair of linear deposits which could indicate the presence of a former ditched track or road.

Area 8 Lincoln Farm (Figure 12)

The mapped anomaly groups are most likely to reflect linear deposits such as field and enclosure boundaries not relating to the current field system.

Area 9 Townsend (Figure 13)

The mapped anomaly groups are most likely to reflect linear deposits such as field and enclosure boundaries not relating to the current field system.

Area 10 Townsend (Figure 23)

None of the anomaly groups recorded could be characterised as having archaeological potential.

6.3 Conclusions

The magnetic contrast across the survey areas was sufficient to be able to differentiate between anomalies representing possible archaeological features and background magnetic responses. Eighty-five magnetic anomaly groups were identified as pertaining to archaeological deposits or structures. The majority of these are most likely to reflect linear deposits such as field and enclosure boundaries not relating to the current field systems. There are a number of areas of enhanced magnetic response. These areas can relate to archaeological deposits created by craft, industrial and other activities. One ring ditch and part of a known barrow were recorded on Bloxworth Down. One possible ditched track or road was recorded south of Lincoln Farm.

The survey area at Galton Heath contained no magnetic anomalies thought to relate to archaeological features or deposits.

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.

Ross Dean, trading as Substrata, will assign copyright to the client upon written request but retains the right to be identified as the author of all project documentation and reports as defined in the Copyright, Designs and Patents Act 1988 (Chapter IV, s.79).

8 Acknowledgements

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

9 Bibliography

Archaeology Data Service/Digital Antiquity Guides to Good Practice (undated): *Geophysical Data in Archaeology* [Online], Available: http://guides.archaeologydataservice.ac.uk/g2gp/Geophysics_Toc [October 2014]

Clark, A. (2000) *Seeing Beneath the Soil, Prospecting methods in archaeology*, London: Routledge

Cottam, S. and Cox, P. (2013) *STURMINSTER MARSHALL TO CULPEPPER'S DISH PIPELINE From land opposite Sturminster Marshall Water Treatment Works (NGR ST93710036) to Culpepper's Dish Reservoir (NGR ST81499250) Historic Environment Assessment*, Unpublished AC Archaeology Ltd report ACW5313/1/0

Cox, P. (2014) *From Sturminster Marshall Water Treatment Works (NGR ST93710036) to Culpepper's Dish Reservoir (NGR ST81499250) Project Design for non-intrusive archaeological evaluation by geophysical survey*, Unpublished AC Archaeology Ltd report ACW716/2/0

Dean, R. (2014) *A gradiometer survey method statement, From Sturminster Marshall Water Treatment Works (NGR ST93710036) to Culpepper's Dish Reservoir (NGR ST81499250)*, Substrata unpublished document

Institute for Archaeologists (undated) *IfA house style*, [Online], Available: http://www.archaeologists.net/sites/default/files/node-files/ifa_house_style.pdf [October 2014]

Institute for Archaeologists (2011) *Standard and guidance archaeological geophysical survey*. Reading: Author [Online], Available: <http://www.archaeologists.net/sites/default/files/node-files/Geophysics2010.pdf> [October 2014]

Institute for Archaeologists (2009) *Code of conduct*. Reading: Author [Online], Available: http://www.archaeologists.net/sites/default/files/node-files/code_conduct.pdf [October 2014]

Institute for Archaeologists (2008) *Code of approved practice for the regulation of contractual arrangements in archaeology*. Reading: Author [Online], Available: http://www.archaeologists.net/sites/default/files/node-files/ifa_code_practice.pdf [October 2014]

Appendix 1 Data Analysis and Figures

General Guidance

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

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

Site: An archaeological gradiometer survey
 Sturminster Marshall to Culpepper's Dish Pipeline;
 West Almer Farm, Mapperton, Winterborne Tomson,
 Bloxworth Down, Lincoln Farm, Townsend and Galton Heath
 Report: 141212

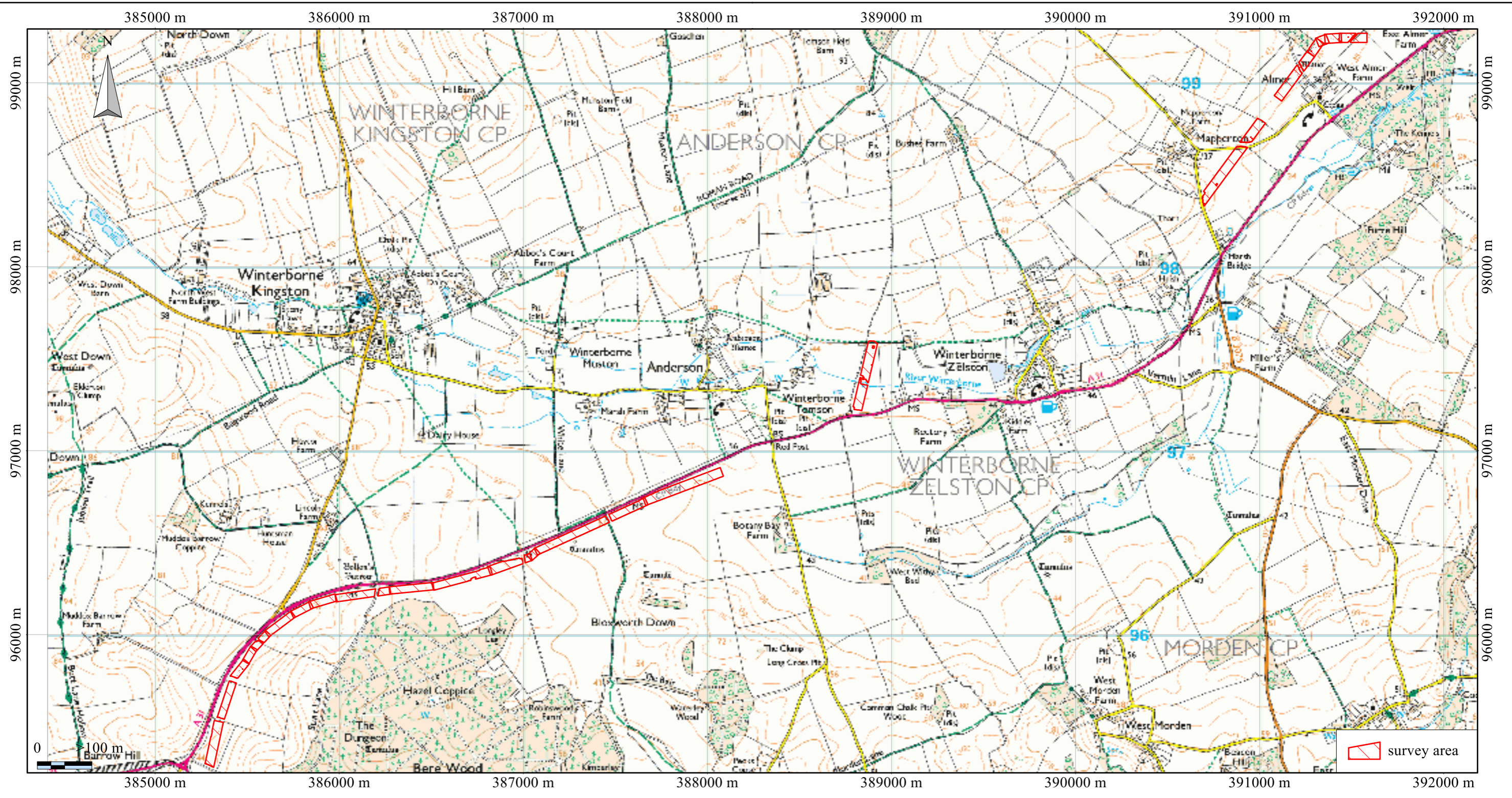
area number	anomaly group	associated anomalies	anomaly characterisation certainty & class	anomaly form	additional archaeological characterisation	comments	supporting evidence	
1 (Fig 5)	1		possible, positive	linear		anomaly group either represents an archaeological deposit or sub-soil disturbance due to cultivation		
	2		possible, positive	linear		anomaly group either represents an archaeological deposit or sub-soil disturbance due to cultivation		
	3		possible, positive	linear				
	4		possible, positive	linear				
	5		possible, mixed spread	irregular		anomaly group may represent a spread of archaeological material		
2 (Fig 6)	6		possible, positive	disrupted linear				
	7		possible, positive	disrupted linear				
	8		possible, positive spread	broad linear		anomaly group may represent a linear deposit in the form of a ditch or a former earthen bank		
	9		possible, positive spread	broad linear		anomaly group may represent a linear deposit in the form of a ditch or a former earthen bank		
	10		possible, positive	disrupted linear				
	11		possible, positive	disrupted linear				
	12		possible, positive spread	broad linear		anomaly group may represent a linear deposit in the form of a ditch or a former earthen bank		
	13		possible, positive	oval	large pit or natural deposit			
	14		possible, positive	disrupted linear				
	15		possible, repeated parallels			cultivation traces	strip lynchets or similar cultivation	
3 (Fig 7)	101		possible, high contrast linear			service	anomaly group represents an iron, steel or cathodically protected service cable, pipe or drain	
	16		possible, positive	linear			anomaly group may represent a linear deposit in the form of a ditch or a former earthen bank	
	17		possible, positive spread	linear			anomaly group may represent a linear deposit in the form of a ditch or a former earthen bank	
	18		possible, positive spread	linear			anomaly group may represent a linear deposit in the form of a ditch or a former earthen bank	
	19		possible, positive spread	disrupted linear			anomaly group may represent a linear deposit in the form of a ditch or a former earthen bank	
	20		possible, positive	linear				
	21		possible, positive spread	linear			anomaly group may represent a linear deposit in the form of a ditch or a former earthen bank	
	22		possible, positive	linear			anomaly could be mistaken as being part of a sub-circular anomaly group but the 'sub-circular' component is not real	
	23		possible, positive	linear				
	24		possible, positive	disrupted linear			anomaly could in part be mistaken as being part of a sub-circular anomaly group but the 'sub-circular' component is not real	
4 (Fig 8)	25		possible, positive	linear				
	102		possible, high contrast linear			service	anomaly group represents an iron, steel or cathodically protected service cable, pipe or drain	
	26		possible, positive spread	broad linear	archaeological or natural deposit			
	27		possible, positive	linear				
	28	29	possible, negative				anomaly group may be a 'shadow' associated with group 29 or an archaeological deposit associated with 29	
	29	28	possible, positive	linear				
	30		possible, positive	linear				
	31		possible, positive					
	32		possible, positive	linear				
	33		possible, positive	linear				
	34	35	possible, positive	curvilinear			anomaly groups 4 and 35 appear to mirror each other and may reflect the same archaeological feature	
	35	34	possible, positive	curvilinear			anomaly groups 4 and 35 appear to mirror each other and may reflect the same archaeological feature	
	36		possible, positive	linear				
	37		possible, positive	disrupted linear				
	38		possible, mixed spread	irregular			anomaly groups are typical of enhanced magnetic groups associated with archaeological activities including heated deposits and deposits associated with craft or industrial production	
39		possible, positive	multi-linear					
40		possible, positive	curvilinear					
41		possible, positive	sub-circular	ring ditch & possible barrow		anomaly group is within an area of Prehistoric funerary remains including a number of Scheduled barrows		
42		possible, positive spread	broad linear	archaeological or natural deposit		anomaly group may represent a linear deposit in the form of a ditch or a former earthen bank		
	103		likely, high contrast linear			service	anomaly group represents an cathodically protected service	P. Cox, AC Archaeology Ltd, pers comm
	104		possible, high contrast linear			service	anomaly group represents an iron, steel or cathodically protected service cable, pipe or drain	
	104		possible, high contrast linear			service	anomaly group represents an iron, steel or cathodically protected service cable, pipe or drain	
	105		possible, high contrast linear			service	anomaly group represents an iron, steel or cathodically protected service cable, pipe or drain	

Table 2: data analysis, Areas 1 to 4

Site: An archaeological gradiometer survey
 Sturminster Marshall to Culpepper's Dish Pipeline;
 West Almer Farm, Mapperton, Winterborne Tomson,
 Bloxworth Down, Lincoln Farm, Townsend and Galton Heath
 Report: 141212

area number	anomaly group	associated anomalies	anomaly characterisation certainty & class	anomaly form	additional archaeological characterisation	comments	supporting evidence
5 (Fig 9)	43		possible, positive	disrupted curvilinear			
	44		possible, positive	oval	large pit or natural		
	45		possible, positive	linear			
	46		possible, positive	curvilinear			
	47		possible, positive	linear			
	48		likely positive	sub-circular with internals	barrow	anomaly group coincides with a mapped, Scheduled Bronze Age bowl barrow	LEN1017626, HER MDO7214
	49		possible, positive	disrupted linear			
	50		possible, positive	linear			
	51		possible, mixed spread	irregular		anomaly group may represent a spread of archaeological material	
	52		possible, positive	curvilinear			
6 (Fig 10)	53		possible, positive	linear			
	54		possible, positive	disrupted linear			
	55		possible, positive	linear			
	56		possible, positive	curvilinear			
	57		possible, mixed spread	irregular		anomaly group may represent a spread of archaeological material	
	58		possible, positive	curvilinear			
	59		possible, positive	linear			
	60		possible, positive spread	broad linear		anomaly groups may represent a pair of archaeological deposits but they could be the result of close, passing heavy traffic during the survey	
	61		possible, positive	linear			
	62		possible, positive	curvilinear			
	63		possible, positive	linear			
	64		possible, positive	linear			
	65		possible, positive	linear			
	66		possible, positive	curvilinear			
	67		possible, positive	linear			
	68		possible, positive	linear			
7 (Fig 11)	69		possible, positive	linear			
	70		possible, positive	linear			
	71		possible, positive	linear			
	72		possible, positive	disrupted rectilinear			
	73		possible, positive	linear			
	74		possible, positive	linear			
	75		possible, positive	disrupted linear			
	76		possible, positive	linear			
	77		possible, positive	parallel disrupted linears		anomaly groups may represent the same archaeological feature such as a parallel set of ditches	
8 (Fig 12)	78		possible, positive	linear			
	79		possible, positive	linear			
	80		possible, positive spread	linear			
	106		possible, high contrast linear		service	anomaly group represents an iron, steel or cathodically protected service cable, pipe or drain	
9 (Fig 13)	81		possible, positive spread	linear			
	82		possible, positive spread	linear			
	83		possible, positive spread	linear			
	84		possible, positive spread	linear			
	85		possible, positive spread	linear			

Table 3: data analysis, Areas 5 to 9



British Grid
centre X: 388244.45 m, centre Y: 97270.38 m

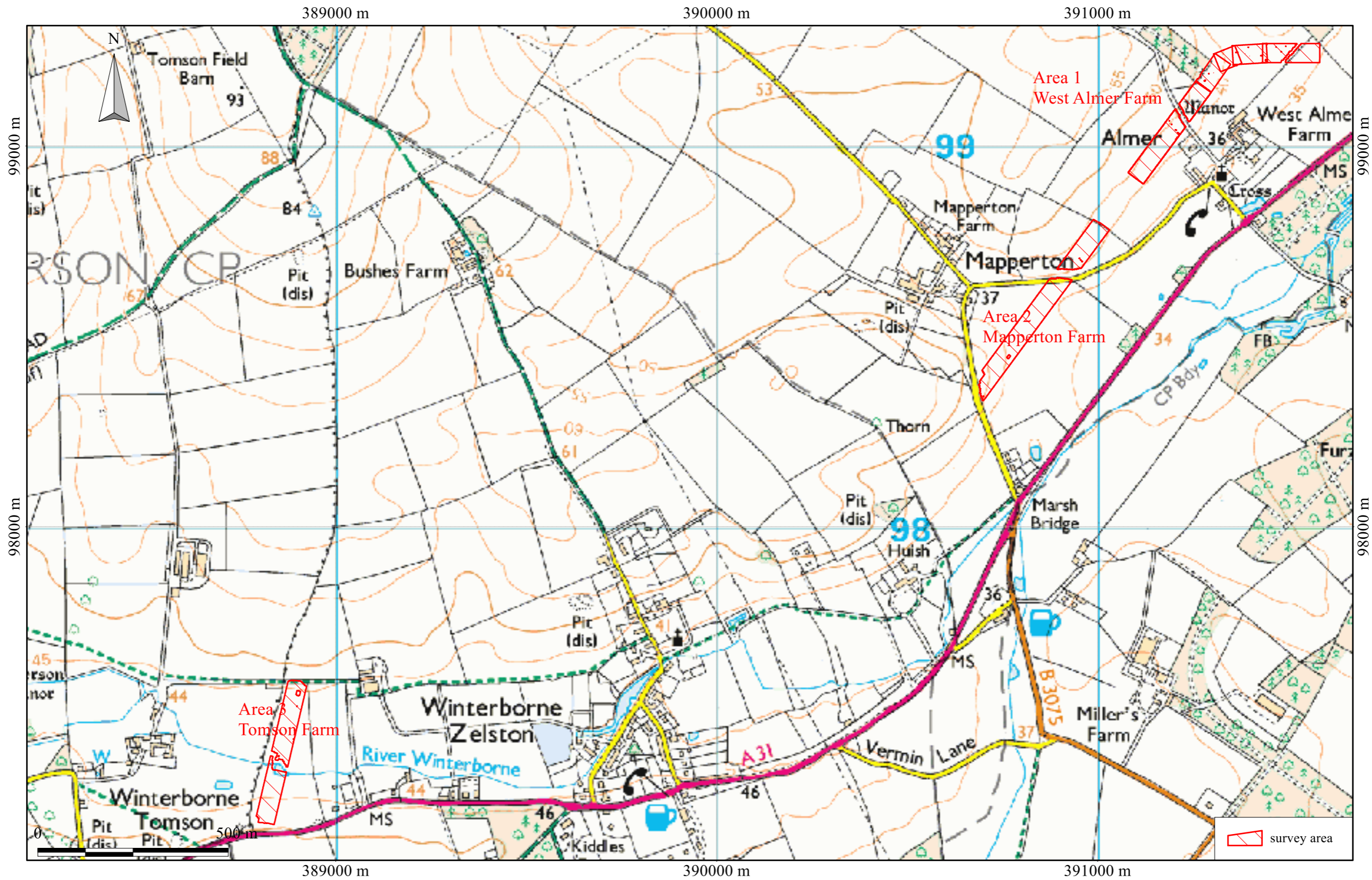
Scale: 1:21000 @ A3. Spatial Units: Meter. Do not scale off this drawing

Copyright Substrata 2014.
Base map: Ordnance Survey (c) Crown Copyright 2014.
All rights reserved. Licence number 100022432

An archaeological gradiometer survey
Sturminster Marshall to Culpepper's Dish Pipeline;
West Almer Farm, Mapperton, Winterborne Tomson,
Bloxworth Down, Lincoln Farm, Townsend and Galton Heath
Report: 141212

Figure 1: location map, areas 1 to 9

Substrata
15 Horizon View, Bath Hotel Road
Westward Ho!, Bideford, Devon EX39 1GX
Tel: 07788627822
Email: geophysics@substrata.co.uk
Web: substrata.co.uk



British Grid
 centre X: 389929.63 m, centre Y: 98220.04 m

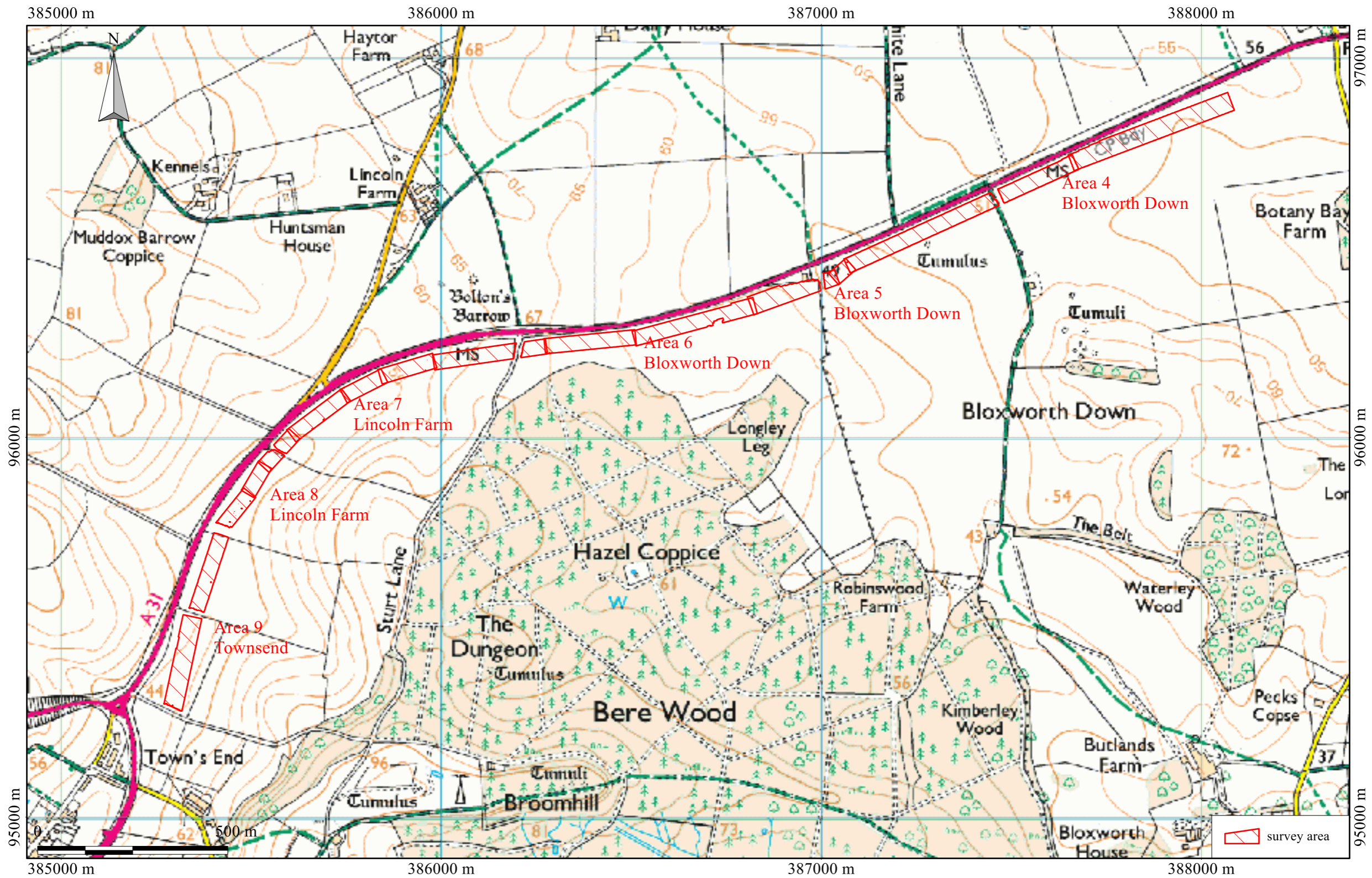
Copyright Substrata 2014.
 Base map: Ordnance Survey (c) Crown Copyright 2014.
 All rights reserved.

Scale: 1:11000 @ A3. Spatial Units: Meter. Do not scale off this drawing

An archaeological gradiometer survey
 Sturminster Marshall to Culpepper's Dish Pipeline;
 West Almer Farm, Mapperton, Winterborne Tomson,
 Bloxworth Down, Lincoln Farm, Townsend and Galton Heath
 Report: 141212

Figure 2: location map, areas 1 to 3

Substrata
 15 Horizon View, Bath Hotel Road
 Westward Ho!, Bideford, Devon EX39 1GX
 Tel: 07788627822
 Email: geophysics@substrata.co.uk
 Web: substrata.co.uk



British Grid
centre X: 386649.70 m, centre Y: 95987.80 m

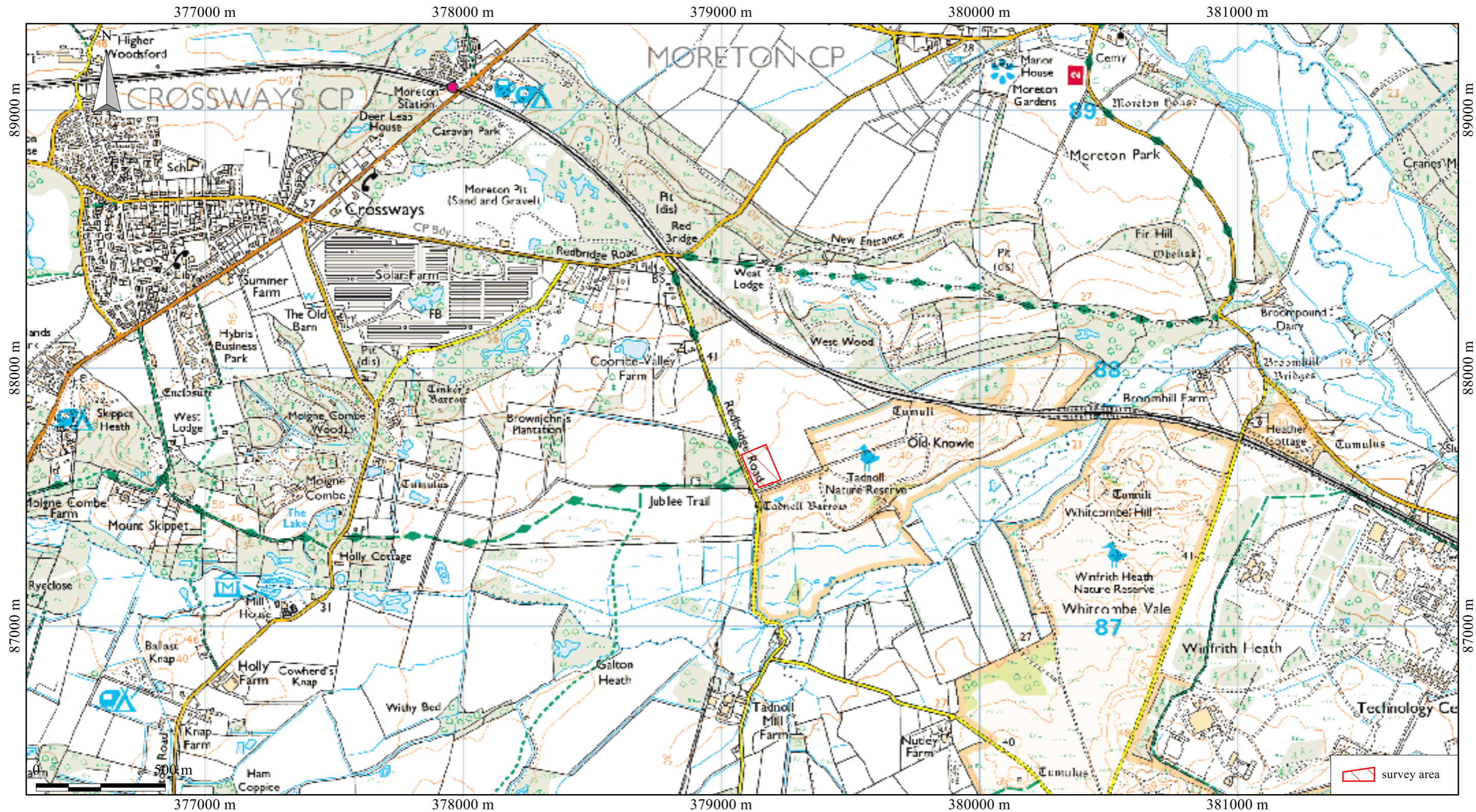
Copyright Substrata 2014.
Base map: Ordnance Survey (c) Crown Copyright 2014.
All rights reserved.

Scale: 1:11000 @ A3. Spatial Units: Meter. Do not scale off this drawing

An archaeological gradiometer survey
Sturminster Marshall to Culpepper's Dish Pipeline;
West Almer Farm, Mapperton, Winterborne Tomson,
Bloxworth Down, Lincoln Farm, Townsend and Galton Heath
Report: 141212

Figure 3: location map, areas 4 to 9

Substrata
15 Horizon View, Bath Hotel Road
Westward Ho!, Bideford, Devon EX39 1GX
Tel: 07788627822
Email: geophysics@substrata.co.uk
Web: substrata.co.uk



British Grid
centre X: 379081.45 m, centre Y: 87839.71 m

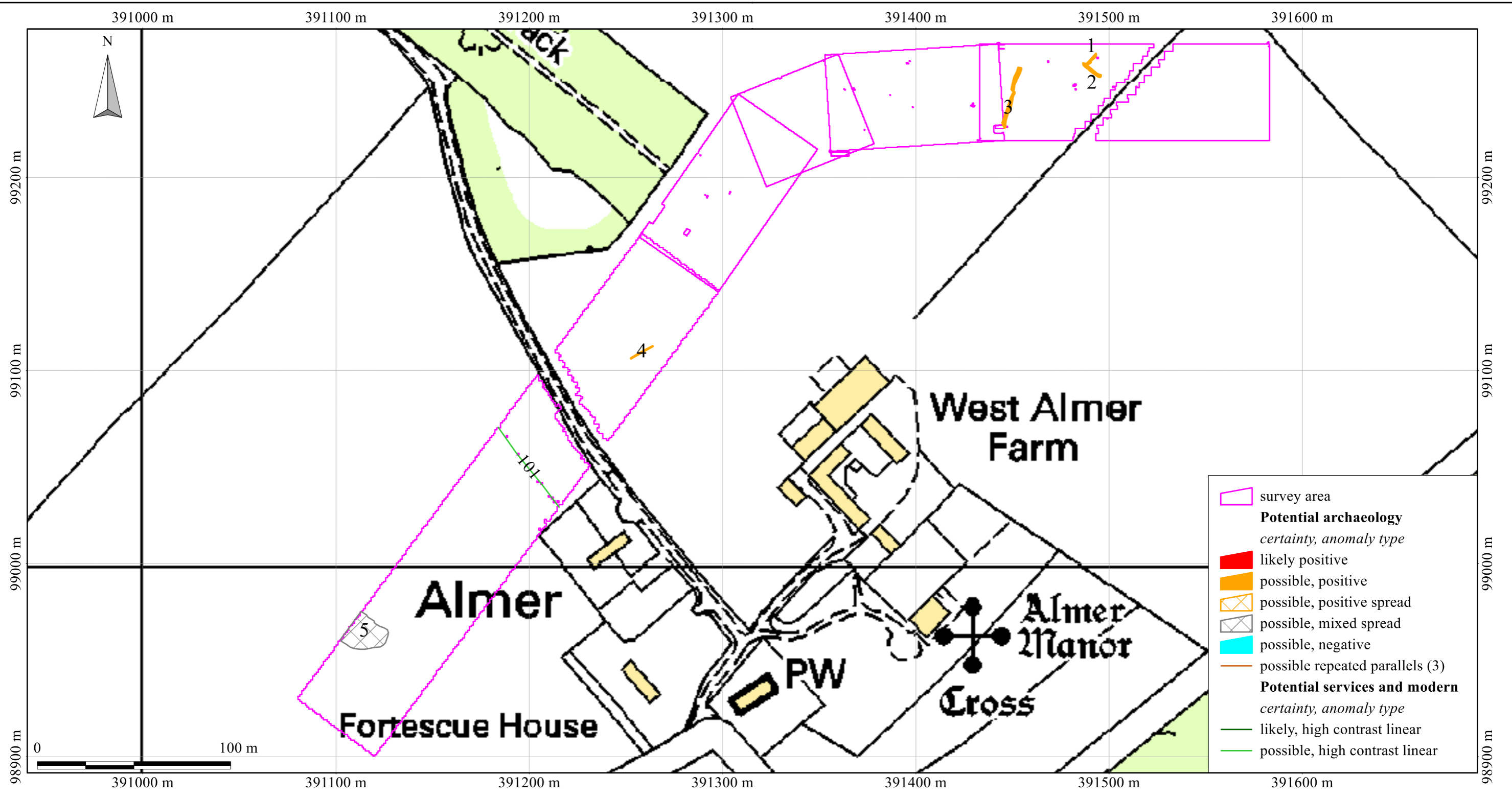
Copyright Substrata 2014.
Base map: Ordnance Survey (c) Crown Copyright 2014.
All rights reserved.

Scale: 1:15000 @ A3. Spatial Units: Meter. Do not scale off this drawing

An archaeological gradiometer survey
Sturminster Marshall to Culpepper's Dish Pipeline;
West Almer Farm, Mapperton, Winterborne Tomson,
Bloxworth Down, Lincoln Farm, Townsend and Galton Heath
Report: 141212

Figure 4: location map, area 10

Substrata
15 Horizon View, Bath Hotel Road
Westward Ho!, Bideford, Devon EX39 1GX
Tel: 07788627822
Email: geophysics@substrata.co.uk
Web: substrata.co.uk



British Grid
centre X: 391315.44 m, centre Y: 99084.26 m

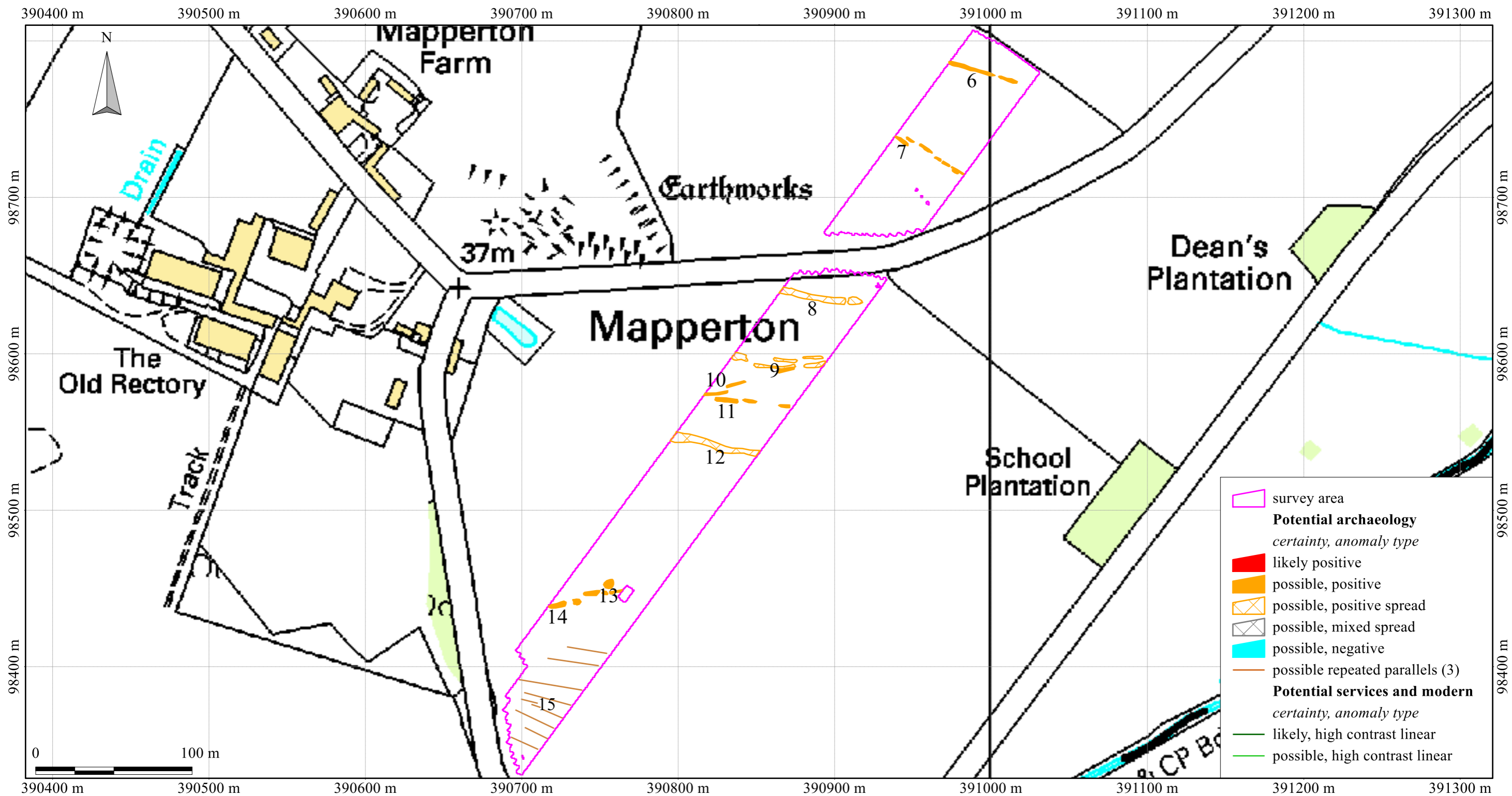
Scale: 1:2000 @ A3. Spatial Units: Meter. Do not scale off this drawing

Copyright Substrata 2014.
Base map: Ordnance Survey (c) Crown Copyright 2014.
All rights reserved. Licence number 100022432

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.

Figure 5: survey analysis, Area 1 West Almer Farm



British Grid
centre X: 390851.72 m, centre Y: 98569.35 m

Scale: 1:2500 @ A3. Spatial Units: Meter. Do not scale off this drawing

Copyright Substrata 2014.
Base map: Ordnance Survey (c) Crown Copyright 2014.
All rights reserved. Licence number 100022432

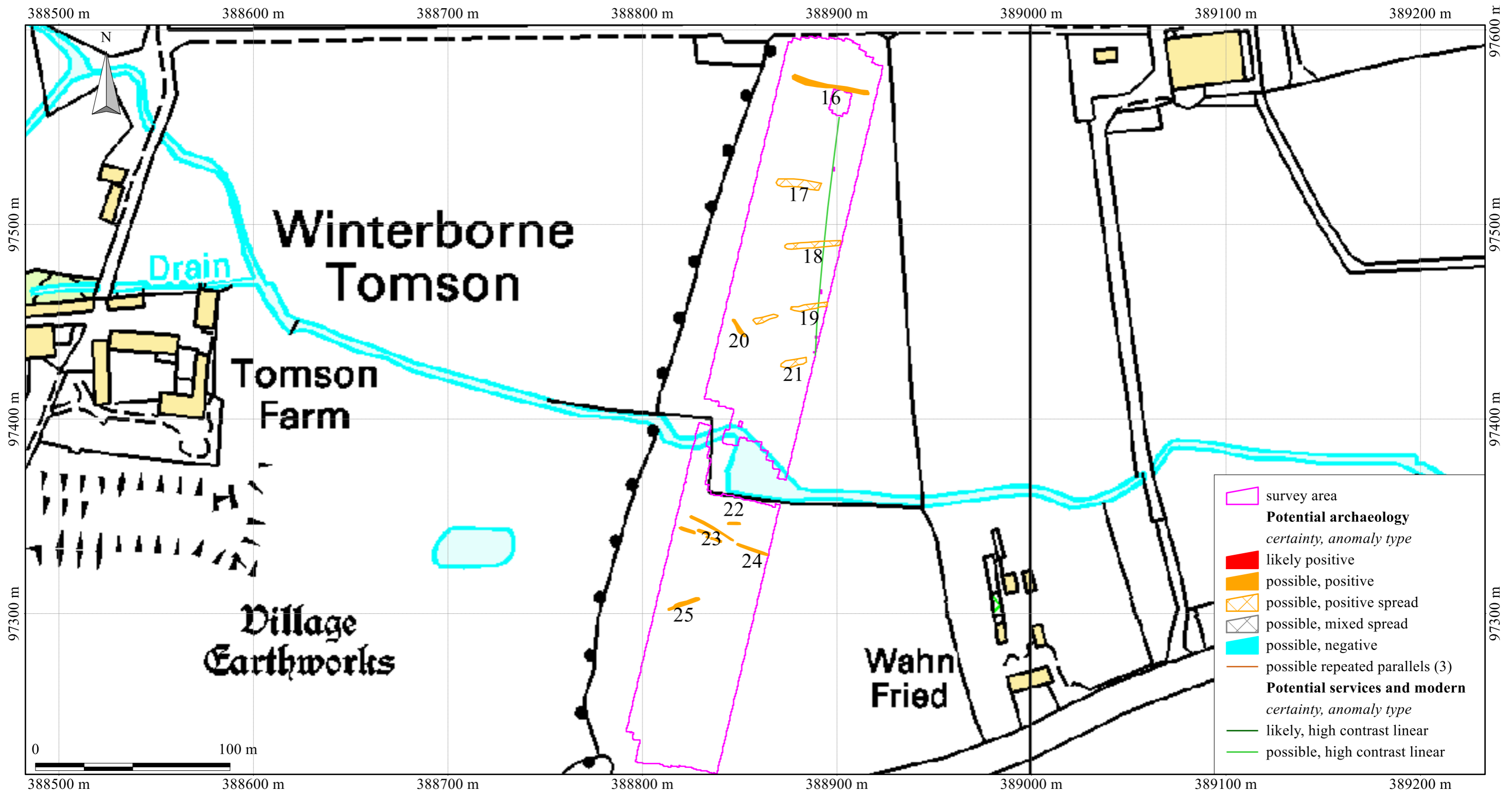
Notes:

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.

An archaeological gradiometer survey
Sturminster Marshall to Culpepper's Dish Pipeline;
West Almer Farm, Mapperton, Winterborne Tomson,
Bloxworth Down, Lincoln Farm, Townsend and Galton Heath
Report: 141212

Figure 6: survey analysis, Area 2 Mapperton

Substrata
15 Horizon View, Bath Hotel Road
Westward Ho!, Bideford, Devon EX39 1GX
Tel: 07788627822
Email: geophysics@substrata.co.uk
Web: substrata.co.uk



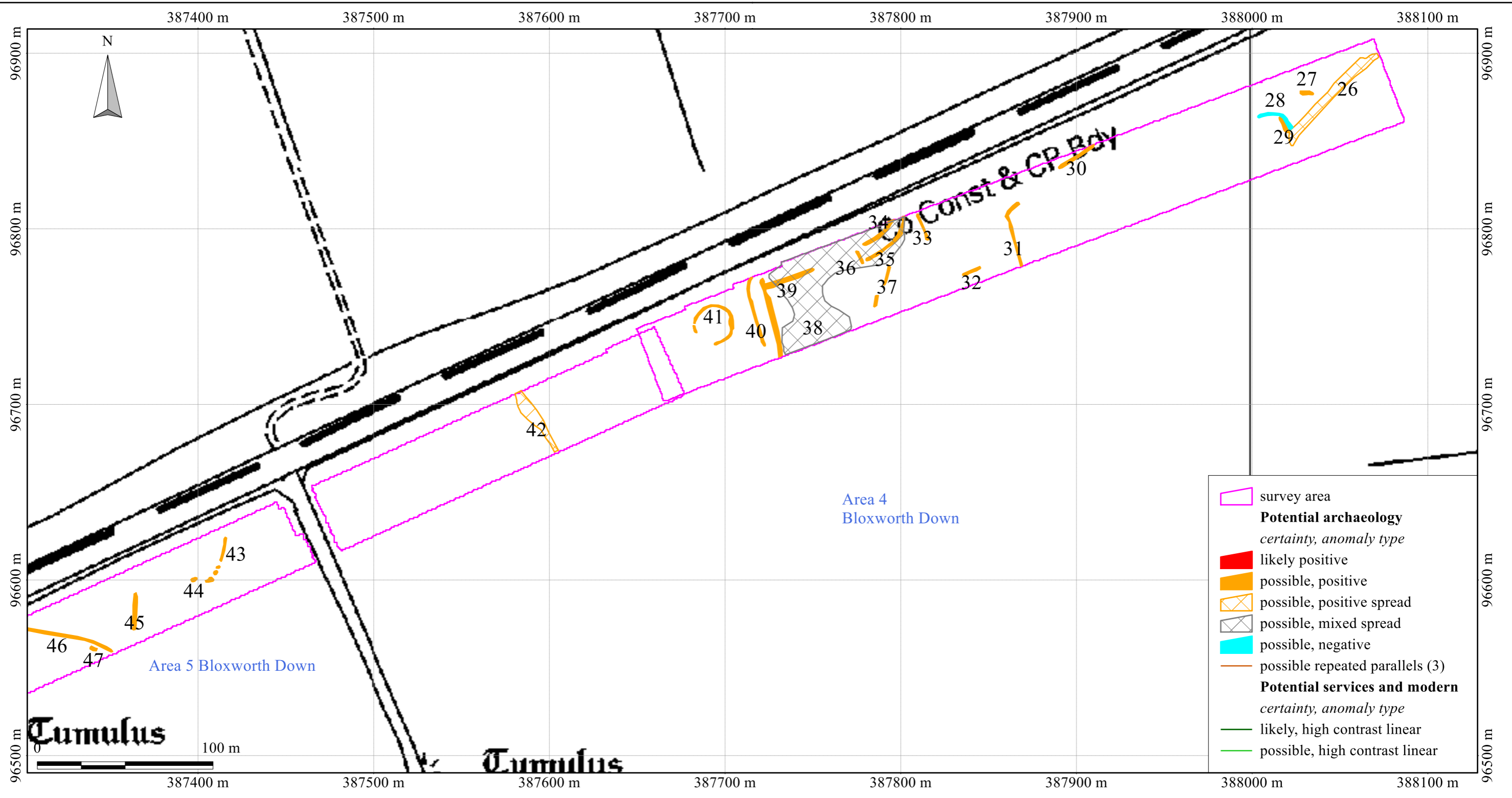
British Grid
centre X: 388857.97 m, centre Y: 97409.93 m

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

Copyright Substrata 2014.
Base map: Ordnance Survey (c) Crown Copyright 2014.
All rights reserved. Licence number 100022432

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.



British Grid
 centre X: 387715.56 m, centre Y: 96701.99 m

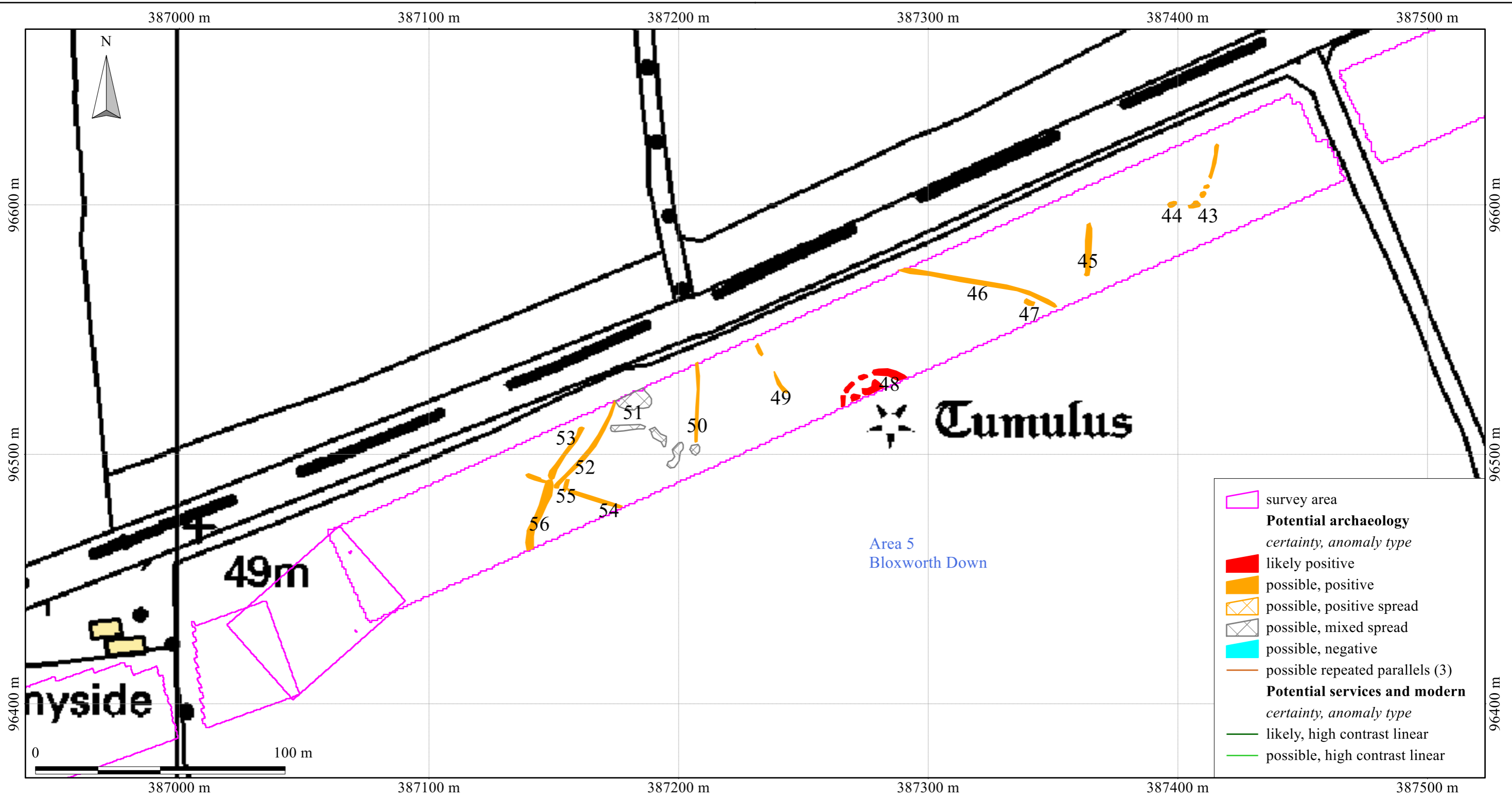
Scale: 1:2200 @ A3. Spatial Units: Meter. Do not scale off this drawing

Copyright Substrata 2014.
 Base map: Ordnance Survey (c) Crown Copyright 2014.
 All rights reserved. Licence number 100022432

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.

Figure 8: survey analysis, Area 4 Bloxworth Down



British Grid
 centre X: 387230.68 m, centre Y: 96520.38 m

Scale: 1:1600 @ A3. Spatial Units: Meter. Do not scale off this drawing

Copyright Substrata 2014.
 Base map: Ordnance Survey (c) Crown Copyright 2014.
 All rights reserved. Licence number 100022432

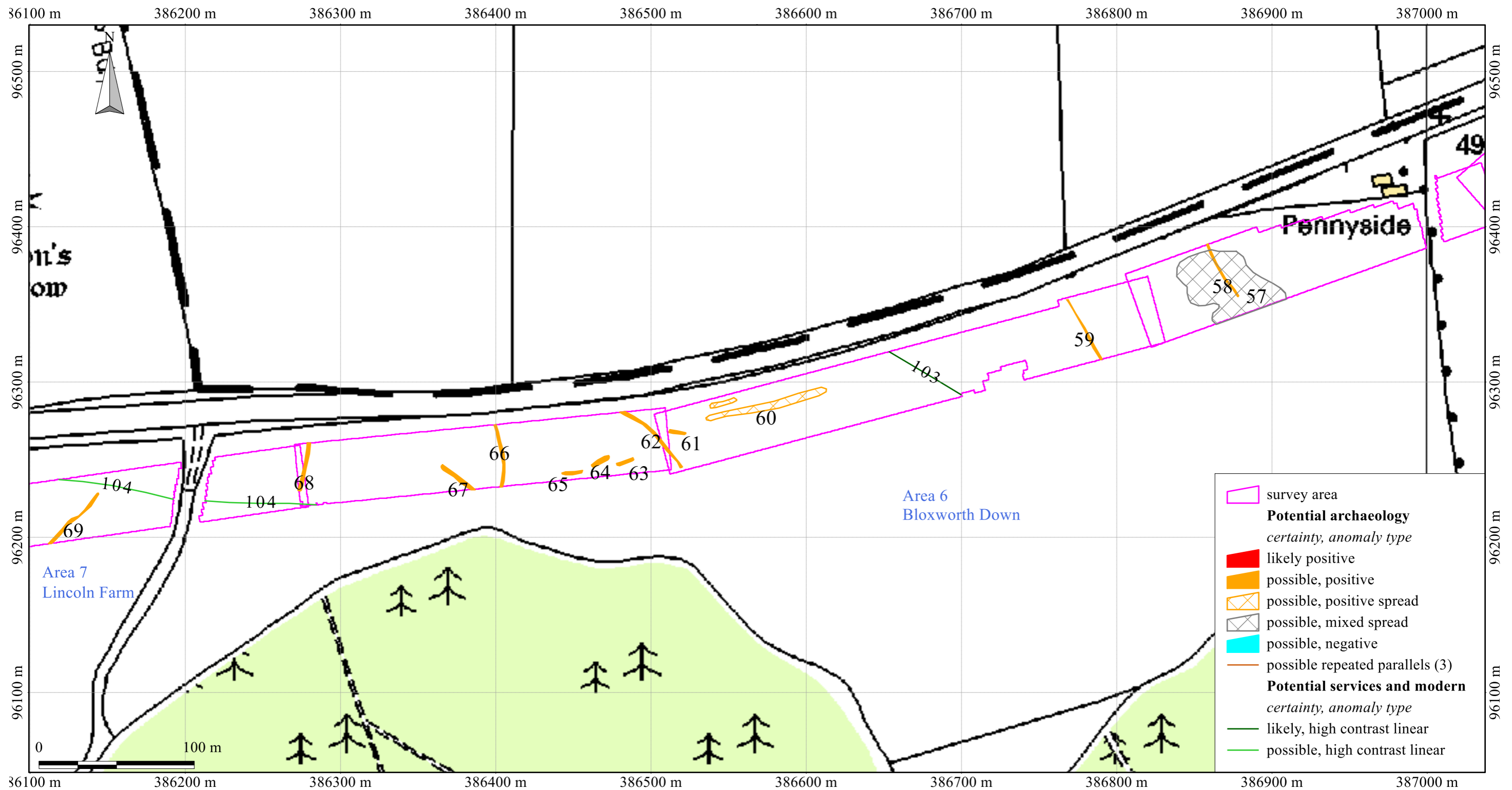
Notes:

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.

An archaeological gradiometer survey
 Sturminster Marshall to Culpepper's Dish Pipeline;
 West Almer Farm, Mapperton, Winterborne Tomson,
 Bloxworth Down, Lincoln Farm, Townsend and Galton Heath
 Report: 141212

Figure 9: survey analysis, Area 5 Bloxworth Down

Substrata
 15 Horizon View, Bath Hotel Road
 Westward Ho!, Bideford, Devon EX39 1GX
 Tel: 07788627822
 Email: geophysics@substrata.co.uk
 Web: substrata.co.uk



British Grid
centre X: 386568.28 m, centre Y: 96289.24 m

Scale: 1:2500 @ A3. Spatial Units: Meter. Do not scale off this drawing

Copyright Substrata 2014.
Base map: Ordnance Survey (c) Crown Copyright 2014.
All rights reserved. Licence number 100022432

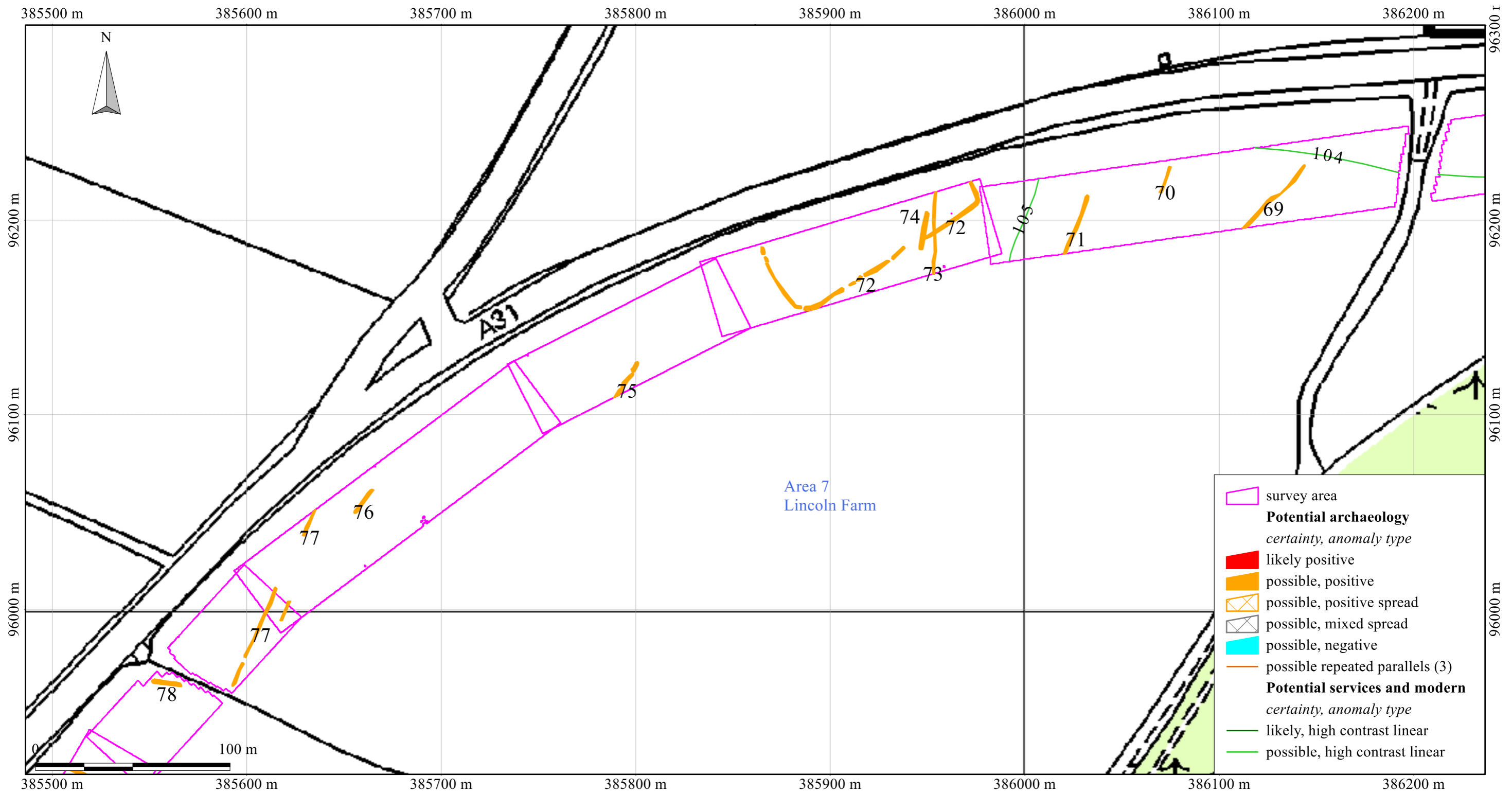
Notes:

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.

An archaeological gradiometer survey
Sturminster Marshall to Culpepper's Dish Pipeline;
West Almer Farm, Mapperton, Winterborne Tomson,
Bloxworth Down, Lincoln Farm, Townsend and Galton Heath
Report: 141212

Figure 10: survey analysis, Area 6 Bloxworth Down

Substrata
15 Horizon View, Bath Hotel Road
Westward Ho!, Bideford, Devon EX39 1GX
Tel: 07788627822
Email: geophysics@substrata.co.uk
Web: substrata.co.uk



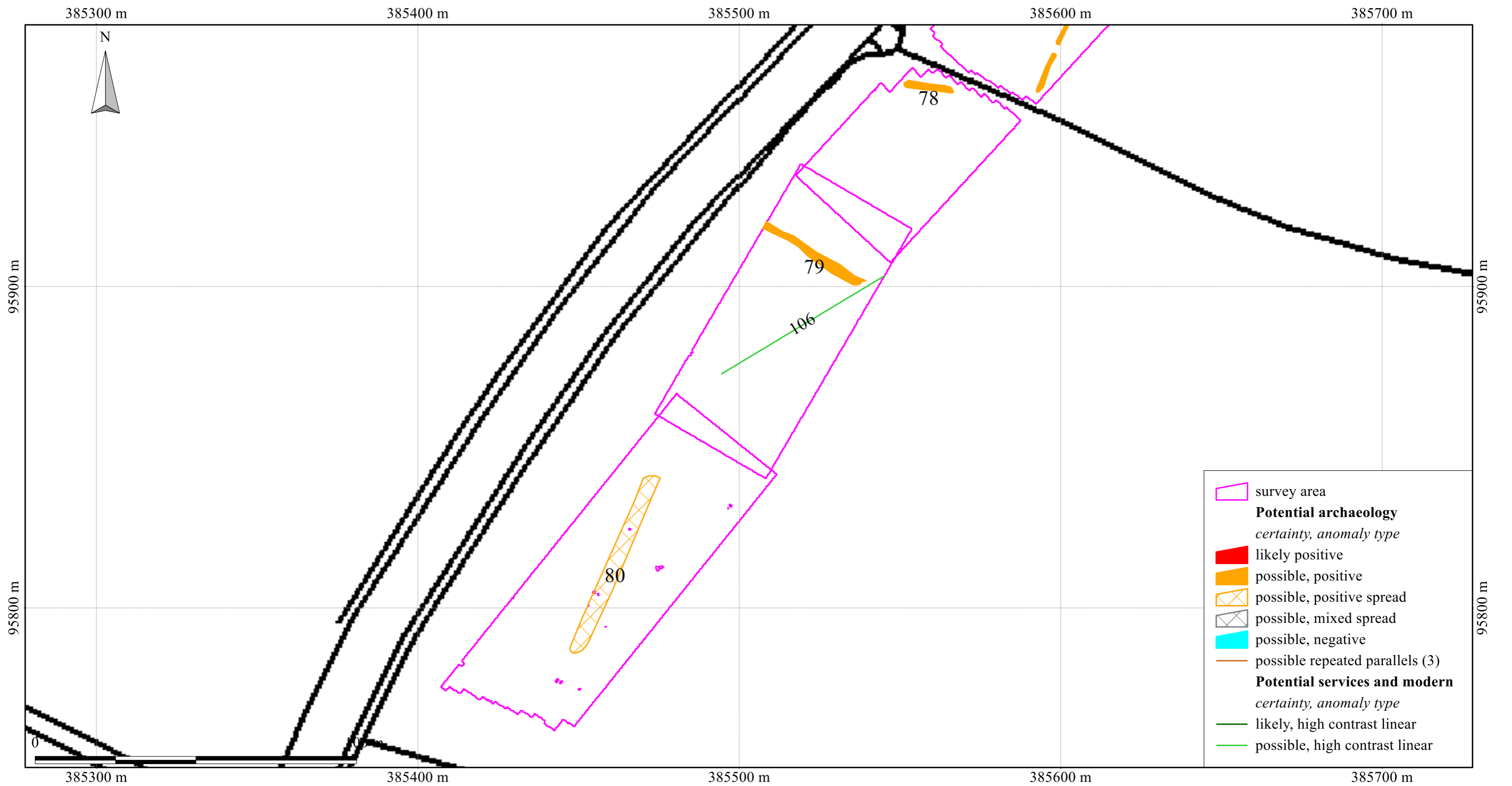
British Grid
centre X: 385861.43 m, centre Y: 96107.71 m

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

Copyright Substrata 2014.
Base map: Ordnance Survey (c) Crown Copyright 2014.
All rights reserved. Licence number 100022432

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.



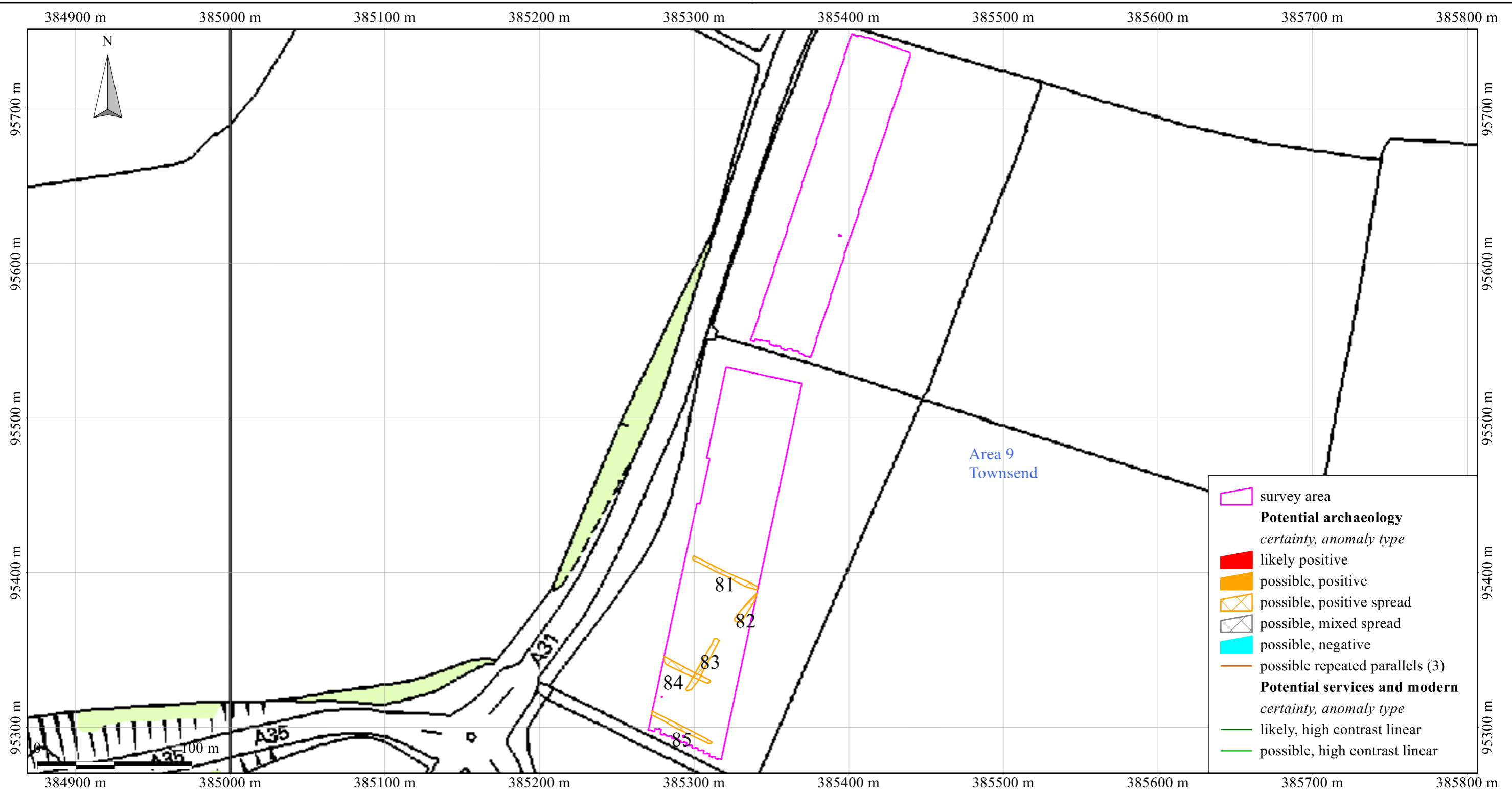
British Grid
centre X: 385502.98 m, centre Y: 95865.88 m

Scale: 1:1200 @ A3. Spatial Units: Meter. Do not scale off this drawing

Copyright Substrata 2014.
Base map: Ordnance Survey (c) Crown Copyright 2014.
All rights reserved. Licence number 100022432

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.



British Grid
 centre X: 385337.73 m, centre Y: 95511.11 m

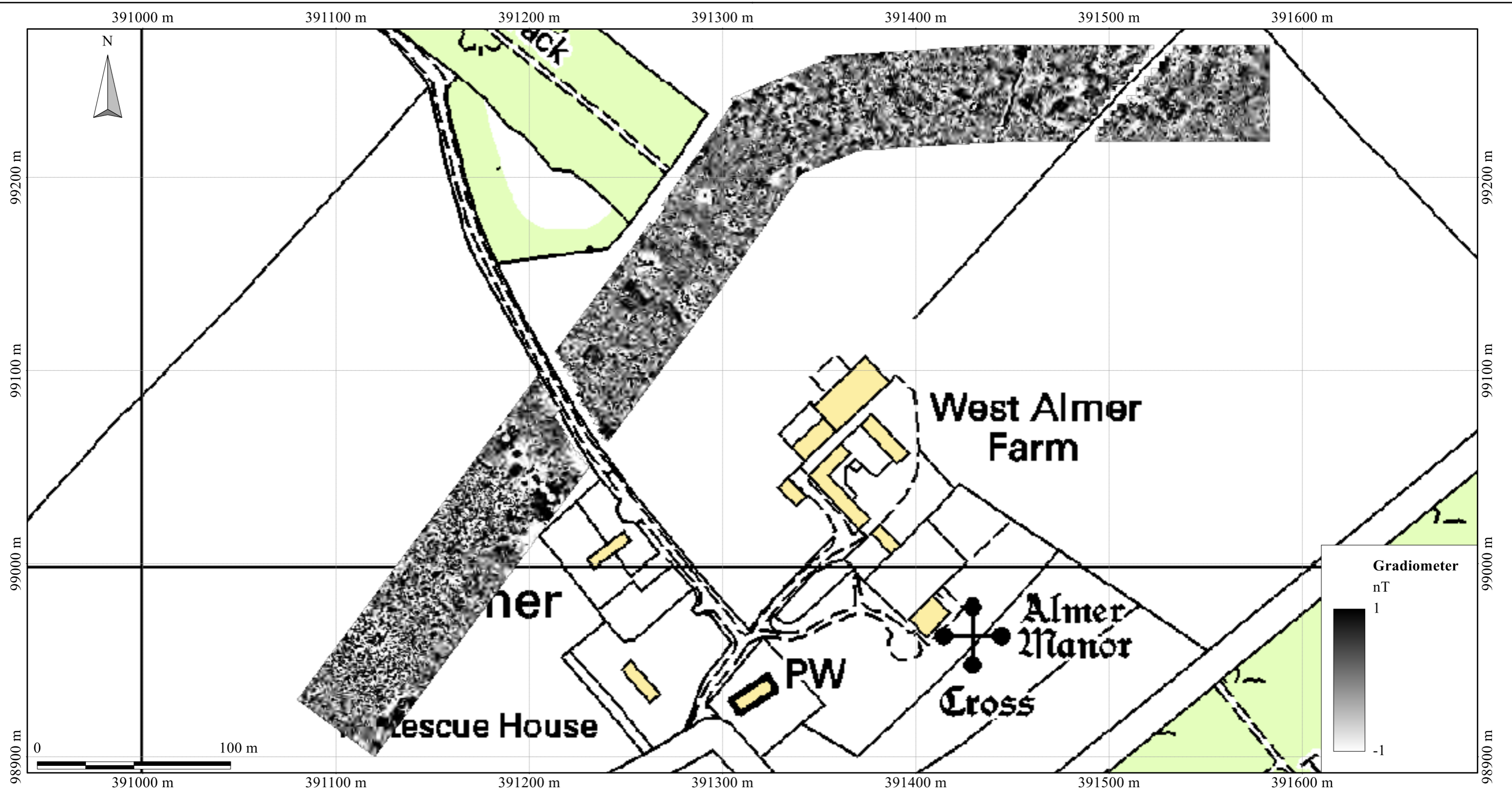
Scale: 1:2500 @ A3. Spatial Units: Meter. Do not scale off this drawing

Copyright Substrata 2014.
 Base map: Ordnance Survey (c) Crown Copyright 2014.
 All rights reserved. Licence number 100022432

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.

Figure 13: survey analysis, Area 9 Townsend



British Grid
 centre X: 391315.44 m, centre Y: 99084.26 m

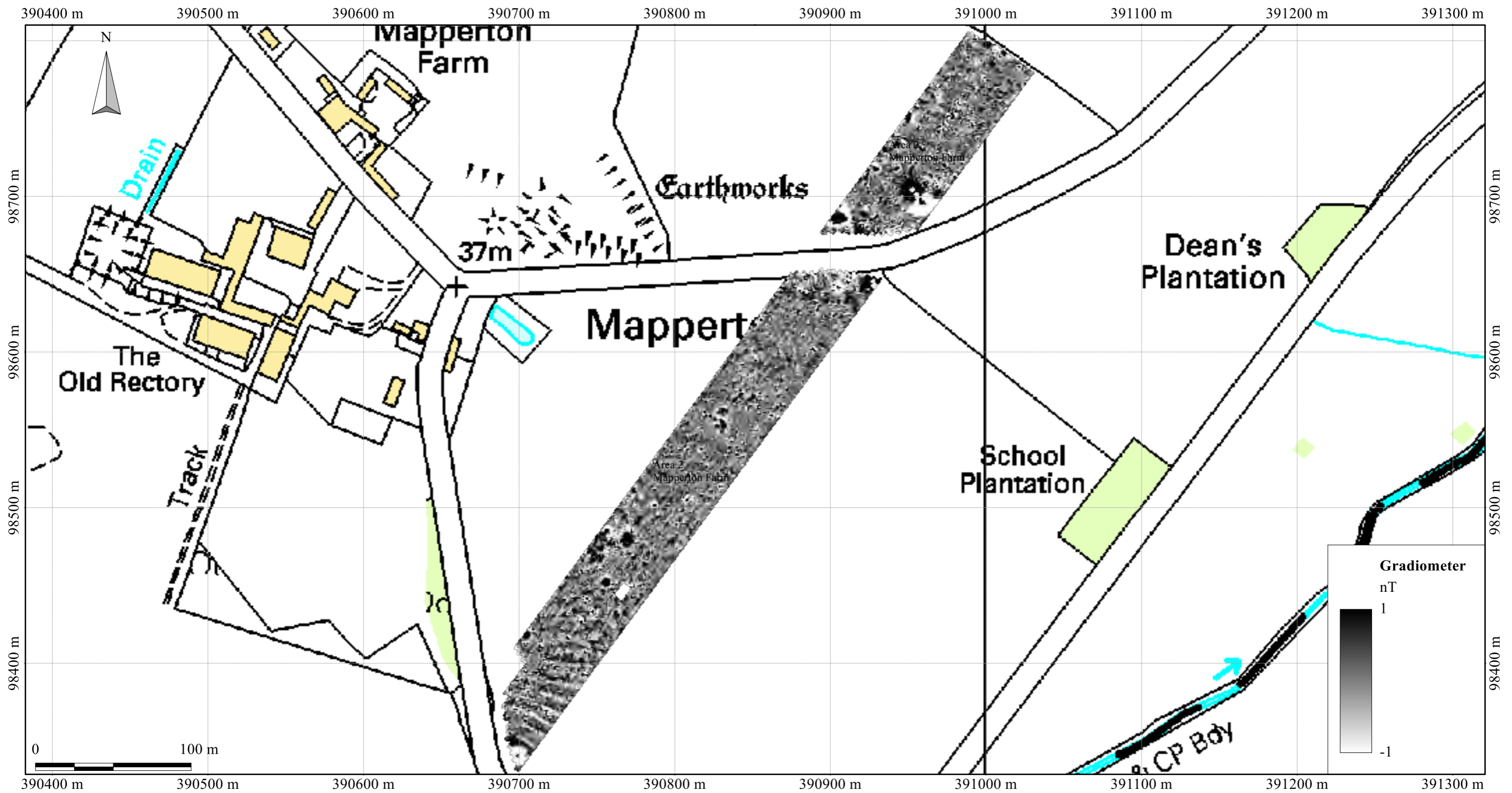
Scale: 1:2000 @ A3. Spatial Units: Meter. Do not scale off this drawing

Copyright Substrata 2014.
 Base map: Ordnance Survey (c) Crown Copyright 2014.
 All rights reserved. Licence number 100022432

An archaeological gradiometer survey
 Sturminster Marshall to Culpepper's Dish Pipeline;
 West Almer Farm, Mapperton, Winterborne Tomson,
 Bloxworth Down, Lincoln Farm, Townsend and Galton Heath
 Report: 141212

Figure 14: shade plot of processed data, Area 1 West Almer Farm

Substrata
 15 Horizon View, Bath Hotel Road
 Westward Ho!, Bideford, Devon EX39 1GX
 Tel: 07788627822
 Email: geophysics@substrata.co.uk
 Web: substrata.co.uk



British Grid
 centre X: 390851.72 m, centre Y: 98569.35 m

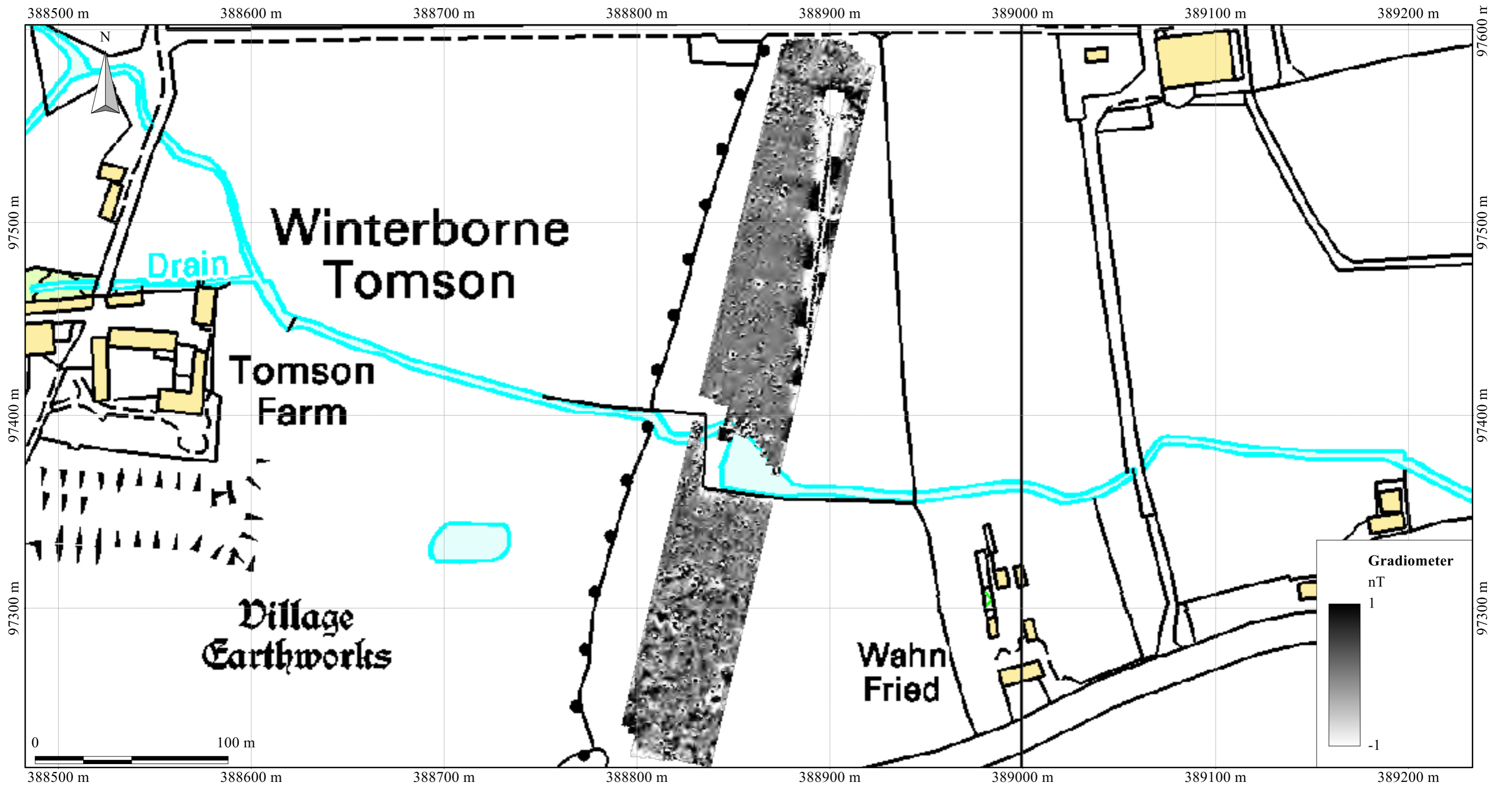
Scale: 1:2500 @ A3. Spatial Units: Meter. Do not scale off this drawing

Copyright Substrata 2014.
 Base map: Ordnance Survey (c) Crown Copyright 2014.
 All rights reserved. Licence number 100022432

An archaeological gradiometer survey
 Sturminster Marshall to Culpepper's Dish Pipeline;
 West Almer Farm, Mapperton, Winterborne Tomson,
 Bloxworth Down, Lincoln Farm, Townsend and Galton Heath
 Report: 141212

Figure 15: shade plot of processed data, Area 2 Mapperton

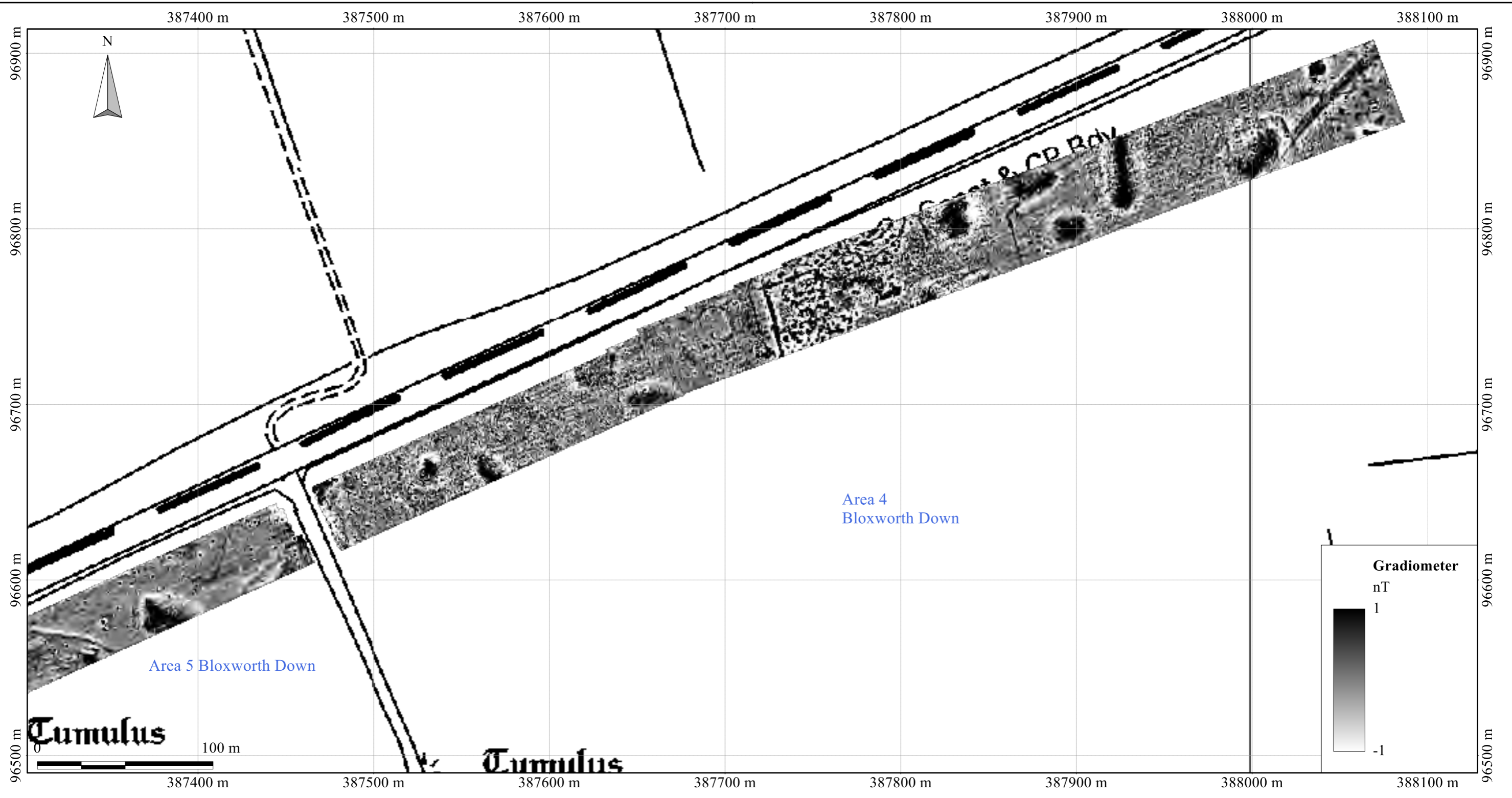
Substrata
 15 Horizon View, Bath Hotel Road
 Westward Ho!, Bideford, Devon EX39 1GX
 Tel: 07788627822
 Email: geophysics@substrata.co.uk
 Web: substrata.co.uk



British Grid
 centre X: 388857.97 m, centre Y: 97409.93 m

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

Copyright Substrata 2014.
 Base map: Ordnance Survey (c) Crown Copyright 2014.
 All rights reserved. Licence number 100022432

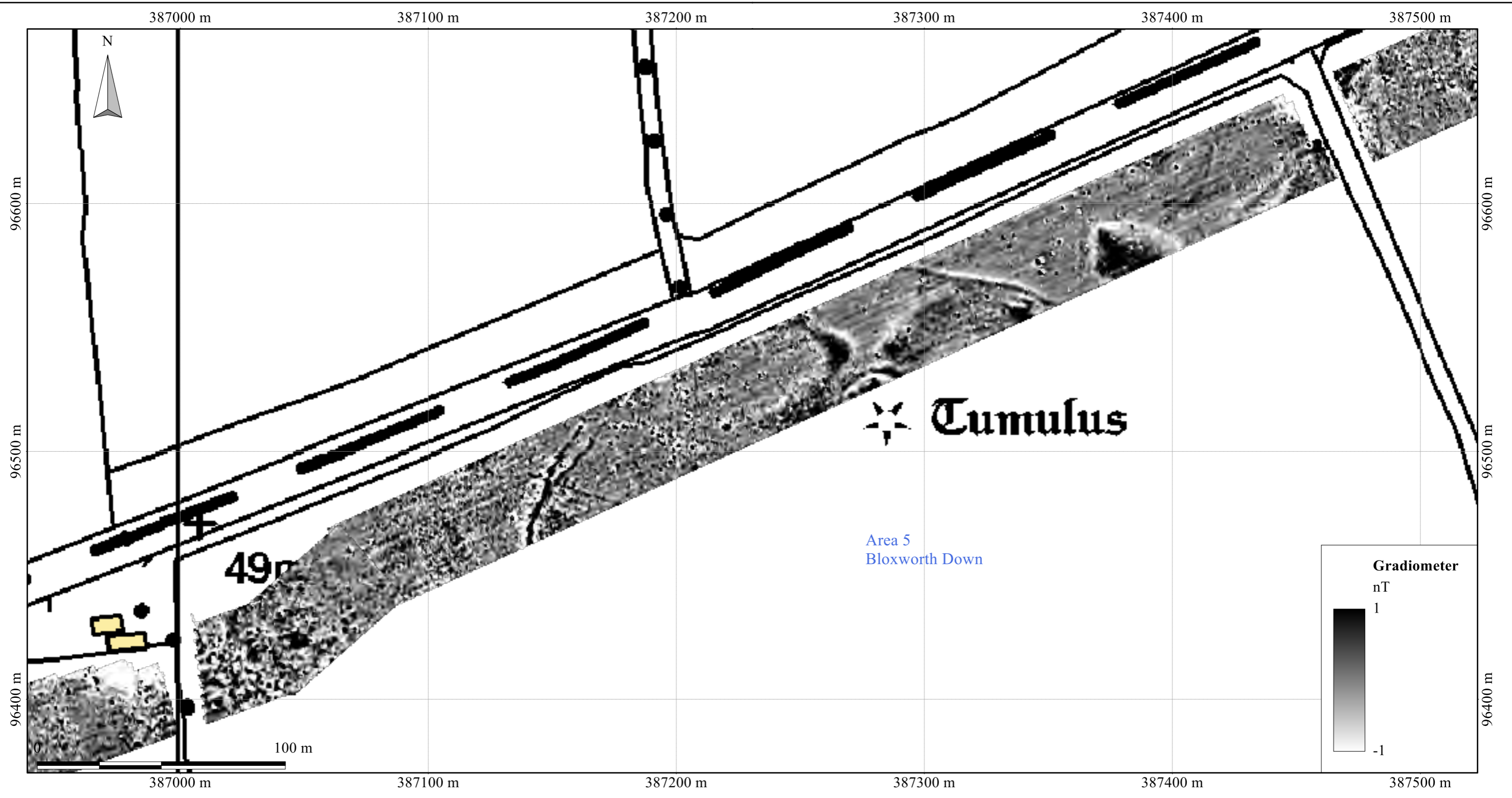


British Grid
 centre X: 387715.56 m, centre Y: 96701.99 m

Scale: 1:2200 @ A3. Spatial Units: Meter. Do not scale off this drawing

Copyright Substrata 2014.
 Base map: Ordnance Survey (c) Crown Copyright 2014.
 All rights reserved. Licence number 100022432

Figure 17: shade plot of processed data, Area 4 Bloxworth Down



British Grid
centre X: 387230.68 m, centre Y: 96520.38 m

Scale: 1:1600 @ A3. Spatial Units: Meter. Do not scale off this drawing

Copyright Substrata 2014.
Base map: Ordnance Survey (c) Crown Copyright 2014.
All rights reserved. Licence number 100022432



British Grid
 centre X: 386568.28 m, centre Y: 96289.24 m

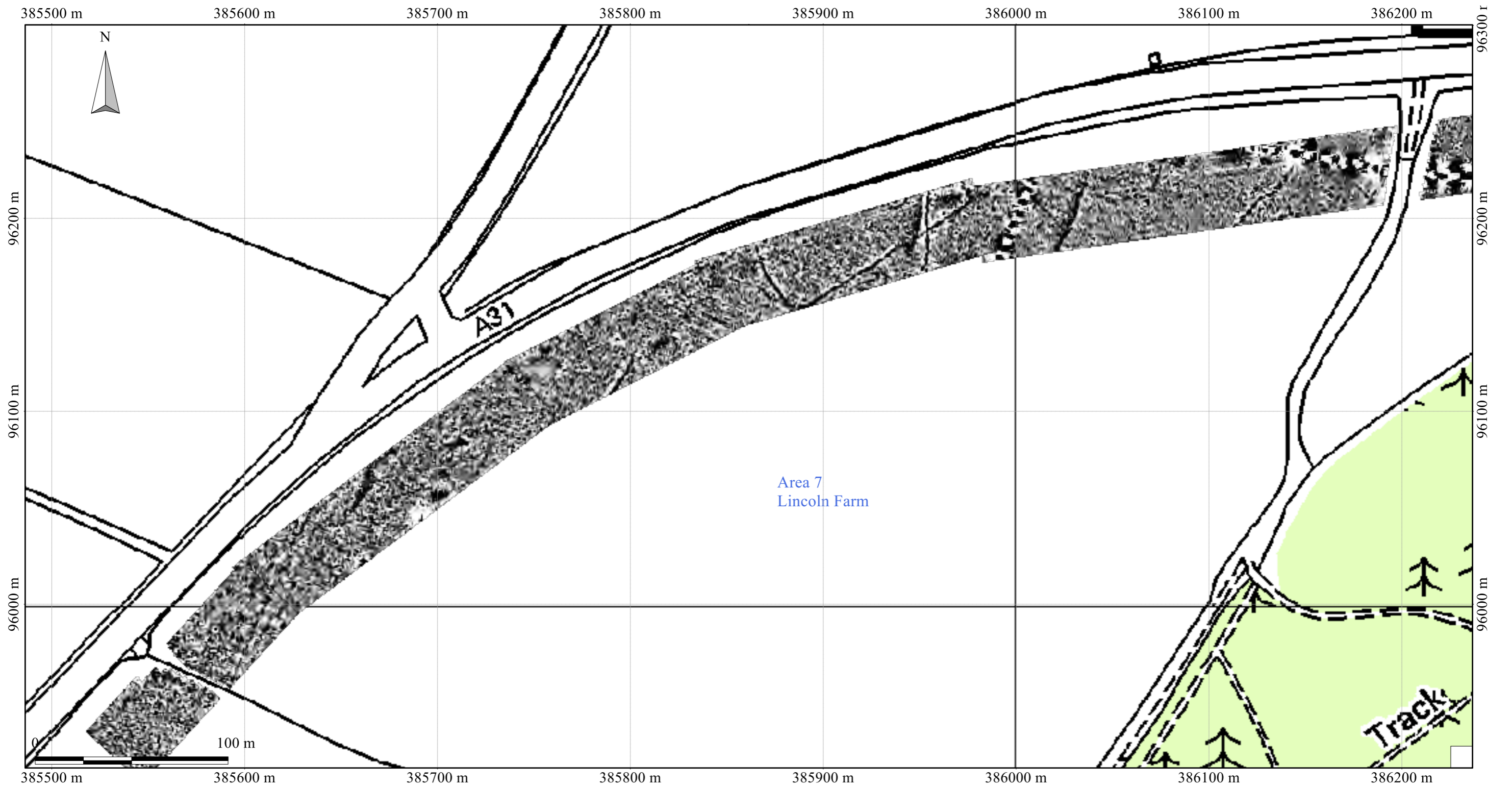
Scale: 1:2500 @ A3. Spatial Units: Meter. Do not scale off this drawing

Copyright Substrata 2014.
 Base map: Ordnance Survey (c) Crown Copyright 2014.
 All rights reserved. Licence number 100022432

An archaeological gradiometer survey
 Sturminster Marshall to Culpepper's Dish Pipeline;
 West Almer Farm, Mapperton, Winterborne Tomson,
 Bloxworth Down, Lincoln Farm, Townsend and Galton Heath
 Report: 141212

Figure19: shade plot of processed datas, Area 6 Bloxworth Down

Substrata
 15 Horizon View, Bath Hotel Road
 Westward Ho!, Bideford, Devon EX39 1GX
 Tel: 07788627822
 Email: geophysics@substrata.co.uk
 Web: substrata.co.uk

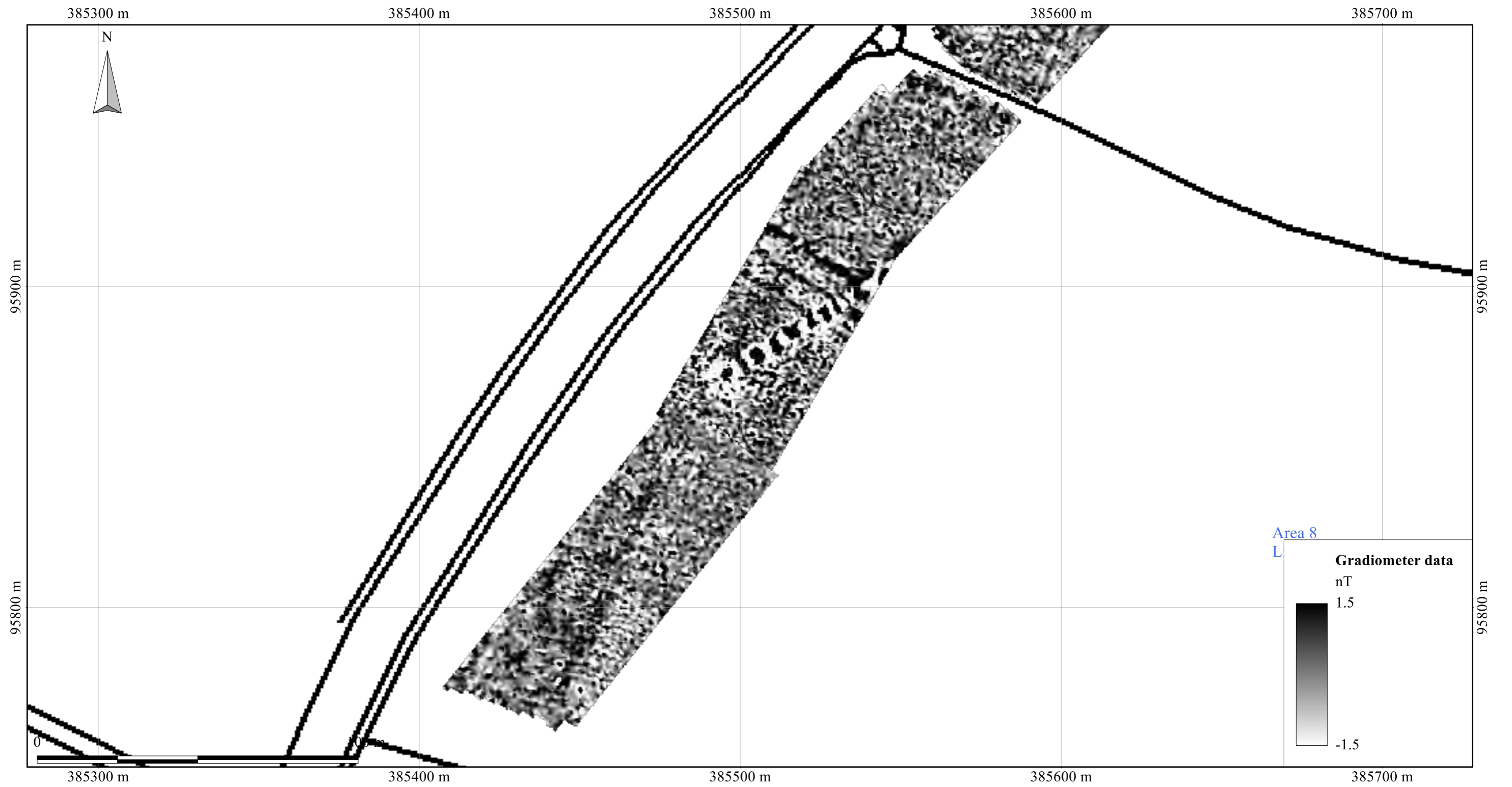


British Grid
 centre X: 385861.43 m, centre Y: 96107.71 m

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

Copyright Substrata 2014.
 Base map: Ordnance Survey (c) Crown Copyright 2014.
 All rights reserved. Licence number 100022432

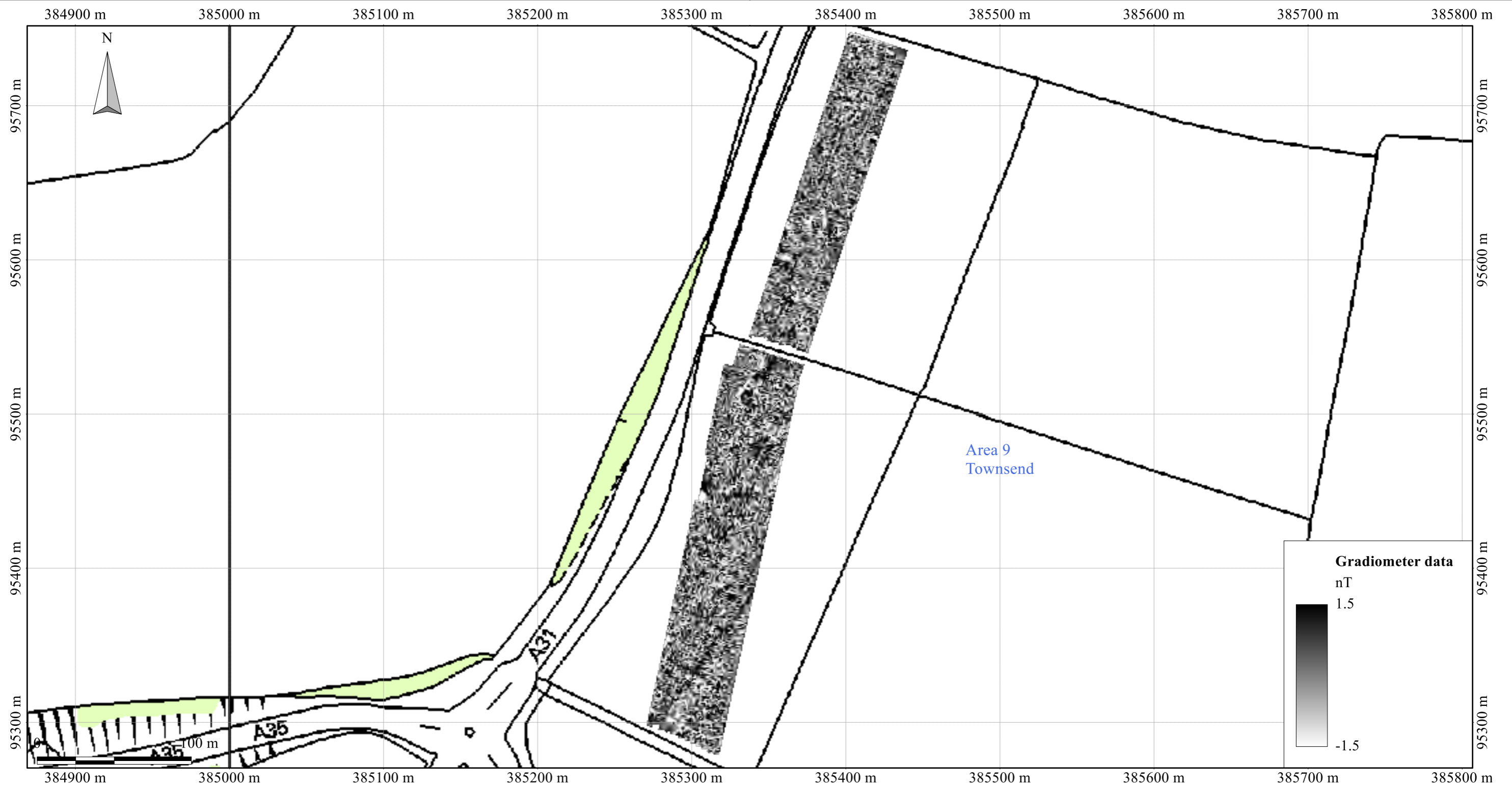
Figure 20: shade plot of processed data, Area 7 Lincoln Farm



British Grid
 centre X: 385502.98 m, centre Y: 95865.88 m

Scale: 1:1200 @ A3. Spatial Units: Meter. Do not scale off this drawing

Copyright Substrata 2014.
 Base map: Ordnance Survey (c) Crown Copyright 2014.
 All rights reserved. Licence number 100022432

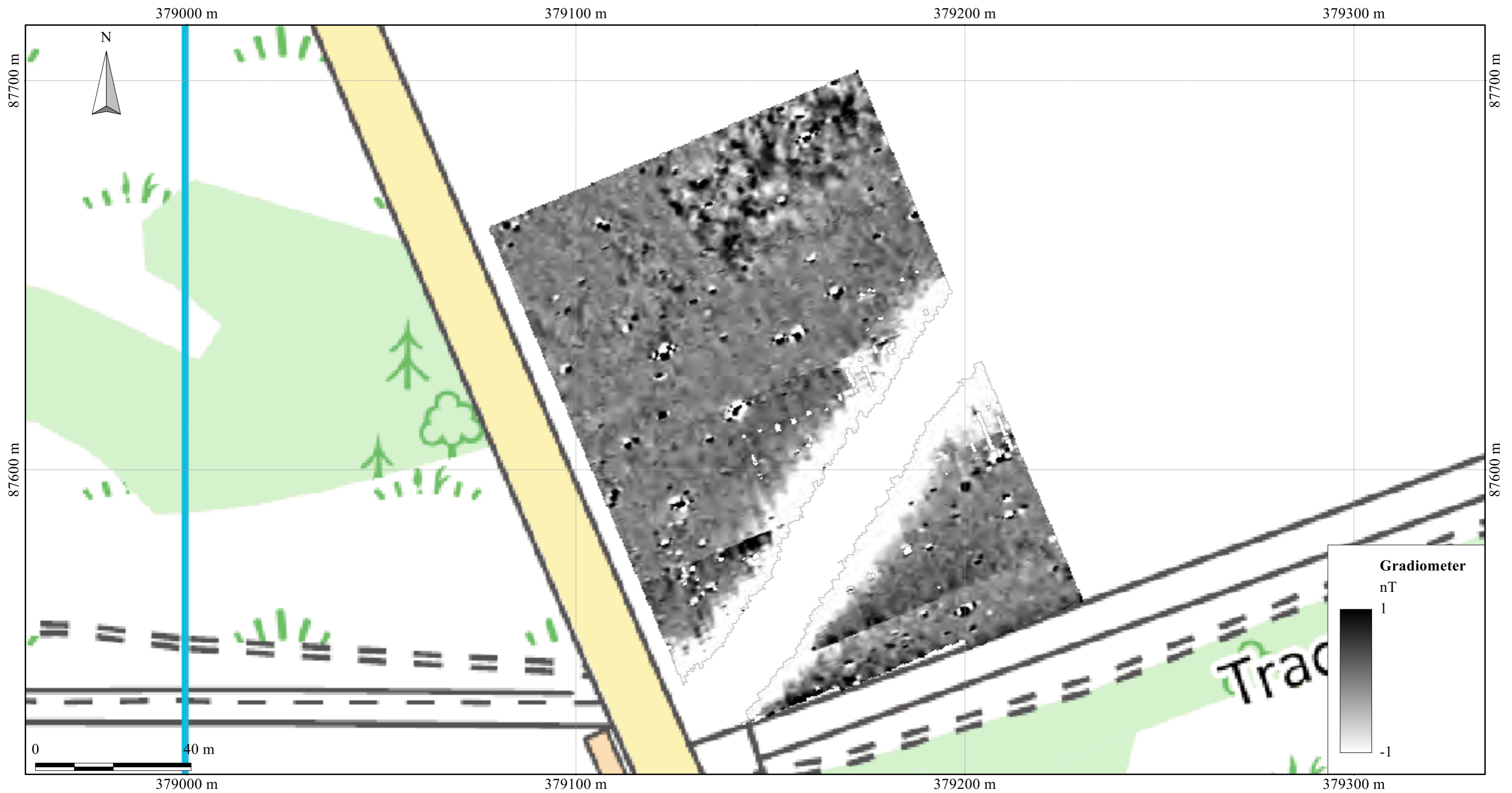


British Grid
 centre X: 385337.73 m, centre Y: 95511.11 m

Scale: 1:2500 @ A3. Spatial Units: Meter. Do not scale off this drawing

Copyright Substrata 2014.
 Base map: Ordnance Survey (c) Crown Copyright 2014.
 All rights reserved. Licence number 100022432

Figure 22: shade plot of processed data, Area 9 Townsend



British Grid
 centre X: 379146.09 m, centre Y: 87618.00 m

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

Copyright Substrata 2014.
 Base map: Ordnance Survey (c) Crown Copyright 2014.
 All rights reserved. Licence number 100022432

Appendix 2 Methodology Summary

Table 4: methodology summary	
<p>Documents Project design: Cox (2014) Survey methodology statement: Dean (2014)</p>	
<p>Methodology</p> <ol style="list-style-type: none"> 1. The work was undertaken in accordance with the survey methodology statement produced in response to the Project Design. The geophysical (gradiometer) survey was undertaken with reference to standard guidance provided by the Institute for Archaeologists (2011) 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. 	
<p>Grid <i>Method of Fixing:</i> DGPS set-out using pre-planned survey grids and Ordnance Survey coordinates. <i>Composition:</i> 30m by 30m grids <i>Recording:</i> Geo-referenced and recorded using digital map tiles. <i>DGPS used:</i> Spectra Precision PM5V2 GPS with external antenna and survey pole and DigiTerra Explorer 7 as the survey control program.</p>	
<p>Equipment <i>Instrument:</i> Bartington Instruments grad601-2 <i>Firmware:</i> version 6.1</p>	<p>Data Capture <i>Sample Interval:</i> 0.25-metres <i>Traverse Interval:</i> 1 metre <i>Traverse Method:</i> zigzag <i>Traverse Orientation:</i> varies by pipeline bearing</p>
<p>Data Processing, Analysis and Presentation Software IntelliCAD Technology Consortium IntelliCAD 7.2 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</p>	

Appendix 3 Geophysical surveying techniques

1 Introduction

Substrata offers magnetometer and earth resistance surveying. We also provide other archaeology-specific geophysical surveys such as ground penetrating radar and resistivity. The particular method or combination of methods used depends on local soil conditions and the survey requirements. These methods are capable of delivering fast and accurate assessments of the archaeology of both large and small sites.

Further details can be found on our website at www.substrata.co.uk.

2 Magnetometer surveying

Standard magnetometer surveys are the workhorse of archaeological surveying when speed and cost-effectiveness are important. 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.

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 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.

Bartington grad601-2 gradiometers

A gradiometer is a type of magnetometer and is sensitive to relatively small changes in the earth's magnetic field. Our primary surveying instruments are Bartington Grad601-2 (dual sensor) fluxgate gradiometers with automatic data loggers. They are specifically designed for field use by archaeologists. The Bartington gradiometers provide proven technology in archaeological magnetic surveying and offer fast, accurate set-up and survey rates. They are sensitive to depths of between 0 and 1.5m below ground level, with optimum sensitivity at depths of 1m or less.

Multiple sensor arrays

A technique relatively new to commercial archaeological surveying but well understood in academic circles involves the use of multiple magnetometer sensors towed behind a quad bike or similar vehicle. With multiple sensors and the use of on-board GPS units, it is possible to achieve faster survey rates at competitive commercial rates when compared to the use of multiple instruments and the techniques discussed above provided the ground is suitable for the vehicle and array. Substrata is pleased to announce that we now offer this service on suitable larger sites

3 Earth resistance surveying

Earth resistance surveying is an excellent tool for detecting buried archaeology. Its relatively slow rate of survey compared to magnetometer surveys means that it is usually employed in commercial surveys when a detailed understanding of buried building remains is required. This technique measures changes in the electrical resistance of the ground being surveyed. In practice, the recording of differences in the electrical resistance of near-surface deposits and structures allows the detection and interpretation of masonry and brick foundations, paving and floors, drains and other cavities, large pits, building platforms, robber trenches, 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.

For earth resistance surveying Substrata uses the Geoscan Research RM15 series multi-probe resistance meters and purpose-built automatic data-loggers. The Geoscan MPX15 multiplexer is an integral part to the instrument configuration and facilitates multi-probe arrays which speed up survey area coverage rates and, if required, facilitate simultaneous multiple-depth data collection.