

An archaeological magnetometer survey

Gallantry Bower Bowl Barrow
Centred on NGR:SS 30474 26243
Report: 2108GAL-R-1

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Contents

| | |
|---|----|
| 1. Introduction | 1 |
| 2. Client | 1 |
| 3. Copyright | 1 |
| 4. Survey type and location | 1 |
| 5. Summary | 1 |
| 6. Standards | 2 |
| 7. Aims and objectives | 2 |
| 8. Methodology | 2 |
| 9. Survey Area | 2 |
| 10. Archaeological background | 3 |
| 11. Results | 4 |
| 12. Discussion | 4 |
| 13. Conclusions | 6 |
| 14. Disclaimer | 7 |
| 15. Archive | 7 |
| 16. Acknowledgements | 7 |
| 17. Bibliography | 7 |
| Appendix 1 Figures | 9 |
| Appendix 2 Tables | 15 |
| Appendix 3 Project archive contents | 20 |

Figures

| | |
|---|----|
| Figure 1: location map | 10 |
| Figure 2 survey interpretation | 11 |
| Figure 3: shade plot of magnetometer processed data | 12 |
| Figure 4: shade plot of processed resistance data | 13 |
| Figure 5: grid plan and location | 14 |

Tables

| | |
|--|----|
| Table 1: data analysis | 16 |
| Table 2: methodology information | 17 |
| Table 3: processed data metadata | 18 |
| Table 4: minimally processed data metadata | 19 |

1 Introduction

This report presents the results of an archaeological magnetometer survey at the proposed site listed in Section 4.

Substrata Limited have been commissioned to undertake a Level 3 archaeological geophysical survey of the scheduled round barrow monument at Gallantry Bower by North Devon AONB as part of the Monument Management Scheme covering selected sites in North Devon in conjunction with Historic England and Devon County Council. This report presents the results of the magnetometry survey of the scheduled monument, and two other potential archaeological sites within 100m in the same clifftop clearing, as proposed in the S42 application document. The survey and report were completed in compliance with a Survey Method Statement (Substrata Ltd, 2021).

2 Client

North Devon Coast AONB, Taw View, North Walk, Barnstaple, Devon, EX31 1EE

3 Copyright

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4 Survey type and location

4.1 Survey

| | |
|----------------------|-----------------------------------|
| Method: | shallow depth magnetometer survey |
| Instrument: | twin-sensor fluxgate gradiometer |
| Date: | September 2021– March 2022 |
| Area: | <1ha hectares |
| Investigation level: | Level 3 |
| Survey resolution: | 1m by 0.125m |

4.2 Location

| | |
|-----------------------------------|------------------------------------|
| Location: | Gallantry Bower |
| Town: | Clovelly |
| Civil Parish: | Clovelly |
| County: | Devon |
| Nearest Postcode: | EX39 5RW |
| NGR: | SS3047426243 (point) |
| NGR (E/N): | 230474,126243 (point) |
| Historic environment designation: | Scheduled monument 1018520 (MDV72) |
| Oasis ID: | substrat1-506454 |

5 Summary

A magnetometer survey was selected to provide a relatively fast and cost-effective evaluation of any buried archaeology across the Survey Area. The anomaly groups pertaining to potential buried archaeology were georeferenced to the Ordnance Survey National Grid, mapped, characterised and assigned with an appropriate degree of certainty in conformance with the survey aims and objectives set out in Section 7.

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

A geophysical survey using magnetic method was carried out on the scheduled round barrow monument at Gallantry bower, and two further potential archaeological monuments in the immediate vicinity. The geophysical data from the scheduled monument closely mirrors the visible earthworks with the additional identification of a possible counterscarp ditch external to the bank. The square earthwork 90m south of the barrow was detected as a slight trapezoidal enclosure with a relatively homogenous interior. The southwest border exhibits a more ephemeral geophysical signal suggesting a different materiality to the enclosure here. The LIDAR anomaly 95m southeast of the scheduled monument was not detected as an identifiable archaeological feature, instead reflecting the general mottled background signal of the geophysical plot across the Survey Area.

6 Standards

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

7 Survey aims and objectives

7.1 Aims

1. Within the framework set out in Chartered Institute for Archaeologists (2014b) and Europae Archaeologiae Consilium (undated), complete an archaeological geophysical survey and report which will, as far as possible, establish the presence or absence, extent and character of any buried archaeology within the survey area.
2. Provide sufficient information on the nature of any archaeological remains to facilitate the assessment of their interest prior to the determination of the planning application.

7.2 Objectives

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

8 Methodology

The magnetometer survey was undertaken in accordance a Survey Method Statement (Substrata Ltd, 2019) using the standards specified in Section 6 to achieve the aims and objectives set out in Section 7. The survey method was selected to provide a relatively fast and cost-effective evaluation of any buried archaeology across the Survey Area (see Section 14).

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

9 Survey Area

9.1 Location and description

The scheduled monument and other sites surveyed are all located on a bluff above the Bideford Bay on the North Devon cliffs (see Figure x). The ground is marshy with predominant heather and gorse vegetation. The topography is generally flat: The land slopes from the 93m OD in the south west to 112m OD to the north east. The site is currently open coastal scrub with the SW Coast Path running along the cliff edge, around the north of the monument. For the

purposes of this report, the scheduled monument is Area A, the square enclosure to the south is Area B, and the potential round barrow to the southeast, Area C. These survey areas are introduced in more detail below, and the archaeological background provided in Section 10.

Area A

Area A consists of one whole, and three partial 30 x 30m grids positioned over the scheduled prehistoric round barrow, to encompass the visible round barrow earthworks and any further subsurface features in the immediate vicinity. This monument was largely cleared of surface vegetation in 2021 by North Devon AONB working parties, assisting the survey process greatly.

Area B

Area B consists of a single 30 x 30m grid located over the centre of a subtle square earthwork visible on the EA LIDAR data, and located c.100m south of the scheduled round barrow. This area had been previously cleared of thick heather scrub by North Devon AONB volunteers.

Area C

Area C consists of a single 30 x 30m grid placed over a possible round barrow monument proposed by the N. Devon AONB NMP (Knight and Hegarty 2013) based on LIDAR information, and located c. 100m southeast of the scheduled round barrow.

9.2 Geology and sub-surface deposits

The underlying solid geology consists of sandstone of the Crackington Formation - Sandstone. Sedimentary Bedrock formed approximately 318 to 328 million years ago in the Carboniferous Period. Local environment previously dominated by sub-aqueous slopes. (British Geological Survey, undated).

Previous magnetic surveys by Substrata on this parent geology in North Devon have produced good results with clear differentiation between archaeological deposits and the background signal.

Magnetometer survey can be recommended over any sedimentary geology. There are few significant distorting factors although a wide range of magnetic susceptibility in the parent rock results in a very variable background response to survey (English Heritage 2008, Table 4).

9.3 Soils

Freely draining acid loamy soils (www.landis.org.uk, undated).

10 Archaeological background

10.1 Historic landscape characterisation

Other woodland: Broad-leaved plantations, re-planted ancient woodland or secondary woodland that has grown up from scrub.

10.2 Summary of the archaeological background

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

Gallantry Bower monument is a round barrow which is situated near to a north-facing cliff edge on a promontory known as Gallantry Bower. The barrow survives as a 9.3m diameter mound standing up to 1.1m high, surrounded by a 2.1m wide and 0.6m deep ditch. Sitting on the outer edge of this ditch is a 3.3m wide bank standing up to 0.4m high. At least six edge set stones within the northern side of this bank may indicate the presence of a kerb, which survives elsewhere as a buried feature. The monument measures 19.9m in overall diameter. A 2m wide and 0.4m deep trench cutting across the mound from north west to south east may be the result of a partial early excavation or robbing. Given the prominent location of the barrow, it has been suggested that it may have been reused in historic times as a beacon. There is anecdotal evidence that Gallantry Bower may have been the site of a maze (MDV17534) (Historic England). This is Area A of the present survey.

Ninety-two meters south of the scheduled monument is a possible enclosure (MDV102340), visible as three sides of a roughly square or trapezoidal ditched earthwork on images derived

from LIADR data collected in 2007. It is approximately 17 metres across with ditches of approximately 2 metres in width. The size is consistent with an interpretation as the partial ditch of an Iron Age square barrow, although no local parallels for this type of feature are known. This is Area B of the present survey.

Ninety metres southeast of the scheduled monument a possible round barrow is visible as a circular earthwork mound, with a possible outer bank, on images derived from LIDAR data collected in 2007 (MDV102339). It is approximately 10 metres in diameter, and an external bank of approximately 3.5 metres in width. Identification is however tentative due to the limited resolution of the LIDAR images, and its presence on a single aerial photo. This is Area C of the present survey.

11 Results

11.1 Scope and definitions

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

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

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

11.2 Analysis

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

Figure 2, 3, 4 and Table 1 comprise the analysis of the survey data.

Figures 5 and 6 is a plot of the processed data as specified in Table 3. Figure 7 shows the location of the survey grid and grid data files.

12 Discussion

12.1 General points

Scope

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

Data collection

Data collection along the survey area edges was restricted as shown in the figures due to the presence magnetic materials within and adjacent to the plot boundaries. Strong magnetic responses mapped close to the boundaries are likely to relate to the magnetic materials except where otherwise indicated in Figures 2, 3,4 and Table 1.

Anomaly characterisation

A number of anomaly groups that could be interpreted as relating to large postholes or pits will be visible on most magnetometer surveys, although most will have natural origins. Anomalies of this sort are mapped as potential archaeology when they are well defined in the data, associated with other significant anomaly groups or otherwise formed recognisable patterns as listed in Table 1.

Anomalies thought to relate to natural features and recent man-made objects such as manholes, water management equipment, drains, cables and other services are only mapped

where they comprise significant magnetic responses across the dataset that need clarification.

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

Data trends

12.2 Data relating to historic maps and other records

Anomaly Group 100 is likely to be the signal of the SW Coastal Path Route, as visible on Google satellite imagery (2022).

12.3 Data with no previous archaeological provenance

Area A

Anomaly Group 1 is likely to be the central cairn of the scheduled monument, which is expressed as a moderate positive signal (10-20nT). The physical cleft across the cairn, thought to be potential quarrying activity, is evident in the geophysical data, suggesting the stone has been fully quarried out here.

Anomaly Group 2 is likely to be the ditch around the cairn of the scheduled monument. The negative signal theoretically reflecting the less enhanced natural substrata the ditch digging exposed in prehistory. The good preservation of the ditch and lack of enhanced ditch fill silts is notable. The physical ditch is infilled in the southeast quadrant (perhaps due to quarrying activity) however this is not identifiable in the geophysical data.

Anomaly Group 3 is likely to be the external bank around the cairn. The similarity in signal to the central cairn may suggest they are made of similar materials, i.e. large stones. The geophysics reflects the physical survival of the bank earthwork, i.e. gaps in the northeast and southeast quadrants. The flattening of the physical bank in the northeast quadrant is likely to be due to coastal path footfall, and the flattening in the southeast quadrant, aligns with the cleft in the cairn perhaps indicating the direction the cairn material was quarried and carted away. The geophysics suggests potential embellishment of the bank either side of the SE gap in the form of small spurs. This is not reflected in the remnant earthworks perhaps reflecting features only surviving below ground.

Anomaly Group 4 consist of two negative curvilinear anomalies concentric and external to the outer bank (Group 3). These are possibly counterscarp ditches, that are not visible as surviving earthworks.

Anomaly Group 5 is a dipolar spike at the centre of the cairn. This probably modern ferrous rubbish however it is possible it is a deposit from historic, or prehistoric period use of the site.

Anomaly Group 6 is possibly a ditch heading southwest outside the survey area. The unprocessed data plot possibly indicates this anomaly extends northwards to connect with Group 4.

Area B

Anomaly Group 7 is likely to be the ditch visible on the EA LIDAR data from 2007 (DCC HER Mon. No. MDV102340). The anomaly traces out three sides of a slight trapezoidal enclosure 19.3 x 20m in size. There are no obvious internal features, arguably the opposite, looking at the unprocessed data plot, the interior of the enclosure appears to be more homogenous than the general background level for the region.

Anomaly Group 8 is a roughly rectangular anomaly, of uncertain interpretation. Possibly a socket hole for a large gate post?

Anomaly Group 9 is two roughly parallel linear anomalies forming a side of the trapezoidal enclosure depicted by Group 7. These are a narrower, straighter and more subtle than Group 7 in geophysical terms. This might indicate different materiality to the threshold here, perhaps fencing or a gate?

Area C

No anomalies were positively identified here.

13 Conclusions

The geophysical survey was successful in detecting the scheduled monument at Gallantry Bower, and providing potential additional detail in the form of a potential external counterscarp ditch, and possible embellishment of the bank in the southeast quadrant. The barrow may link into wider landscape features in the form of a ditch system that extends southwest beyond the survey area (Area A).

The 'square' feature to the south (Area B) was detected as a strong trapezoidal anomaly. The geophysical plot suggests a different manifestation of the southwest border of this enclosure, and that the interior may comprise less enhanced surface, however the reason for this is unclear.

The potential second clifftop barrow (Area C) was not positively identified.

14 Disclaimer

The description and discussion of the results presented in this report are the authors', based on their interpretation of the survey data. Every effort has been made to provide accurate descriptions and interpretations of the geophysical data set. The nature of archaeological

15 Archive

15.1 Online Access to the Index of archaeological investigations (OASIS) substrat1-506454

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

15.2 Substrata Limited archive

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

15.3 Archaeological Data Service (ADS)

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

15.4 Historic Environment Record (HER)

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

16 Acknowledgements

Substrata would like to thank Dave Edgecombe of North Devon AONB for commissioning us to complete this survey.

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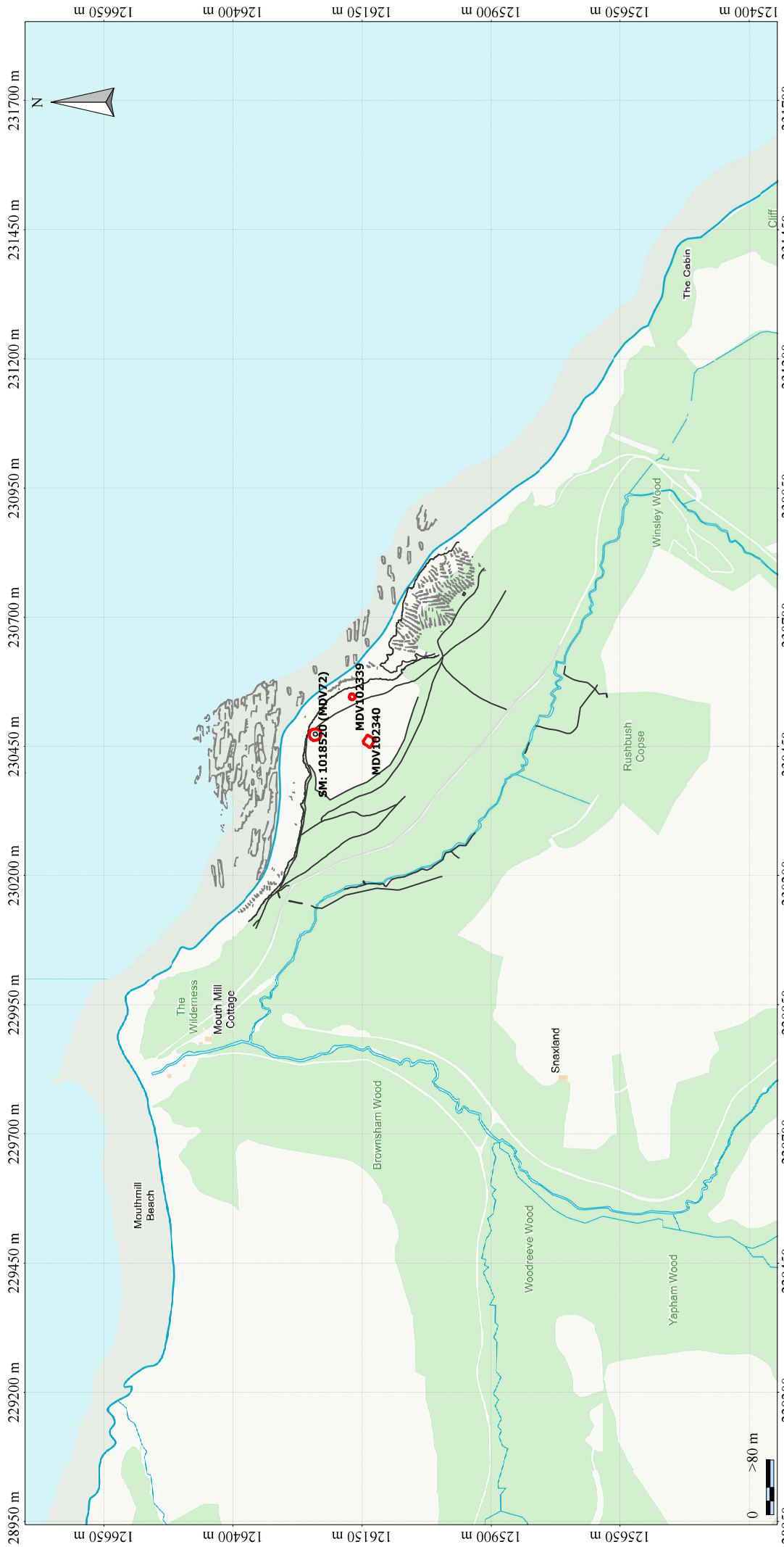
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Appendix 1 Figures

General Guidance

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

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



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Scale: 1:7500 @ A3. Spatial Units: Meter. Do not scale off this drawing

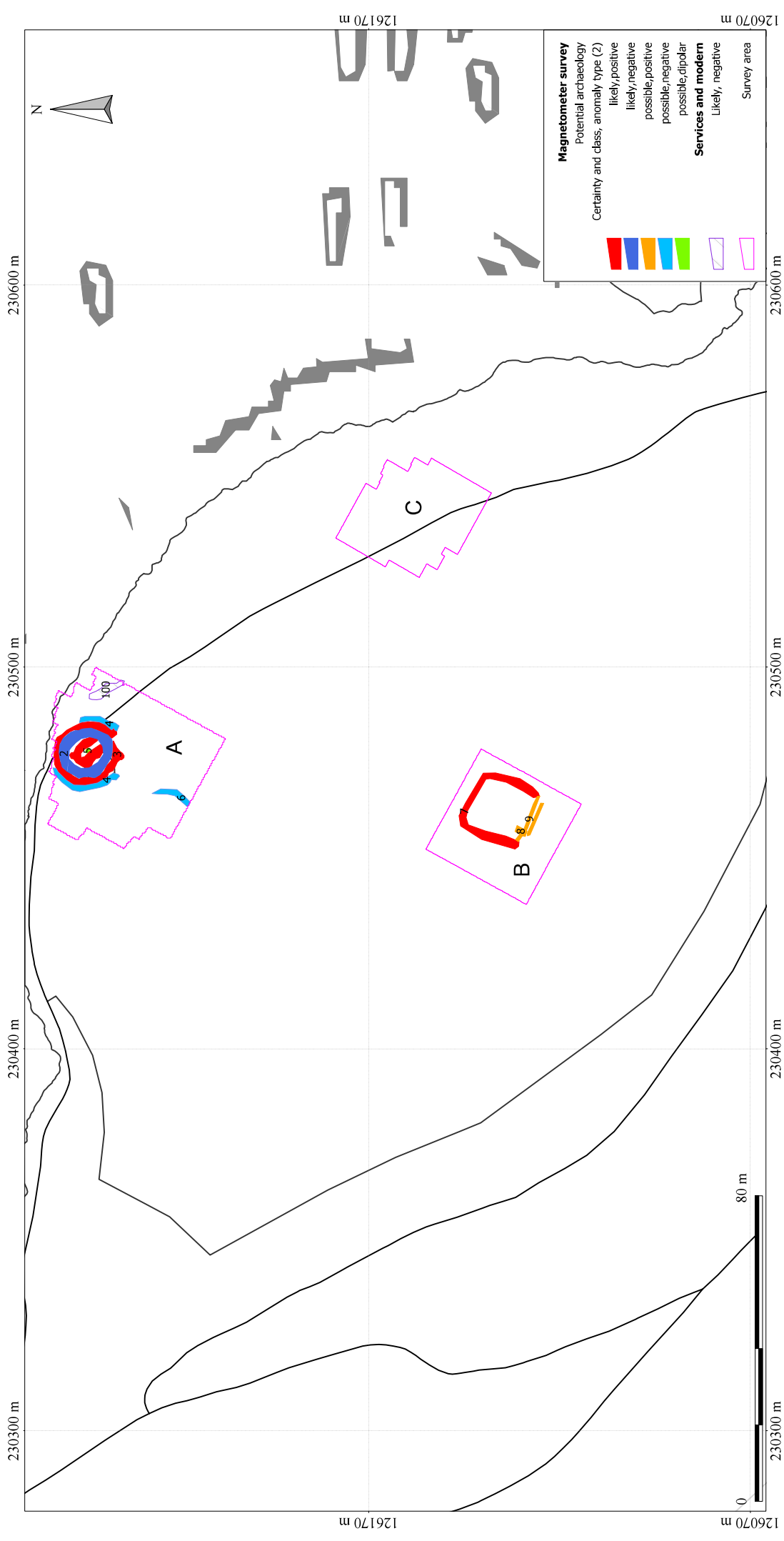
Notes:

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

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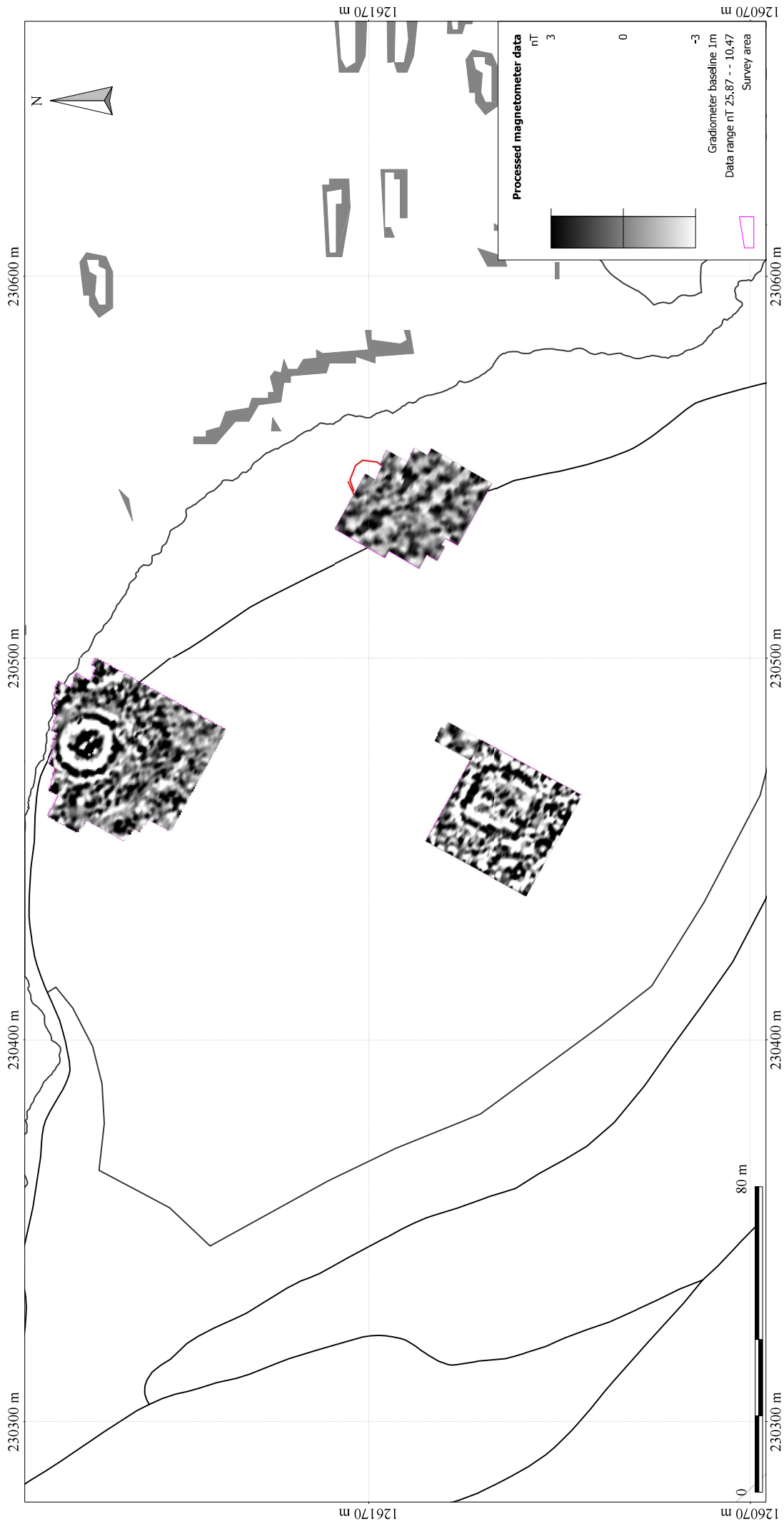
Figure 1: Location map



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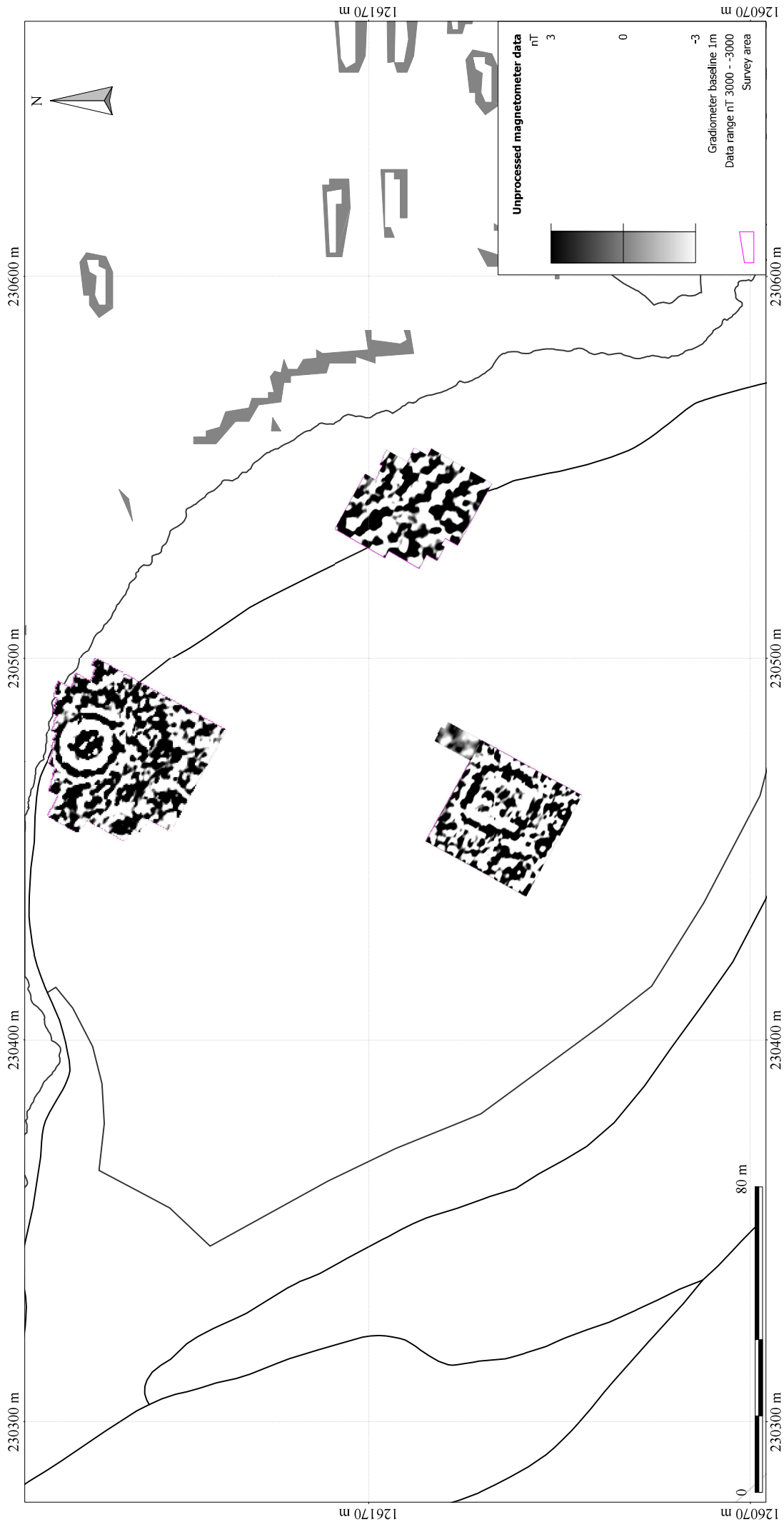


British Grid
 centre X: 230472.86 m, centre Y: 126162.98 m

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

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

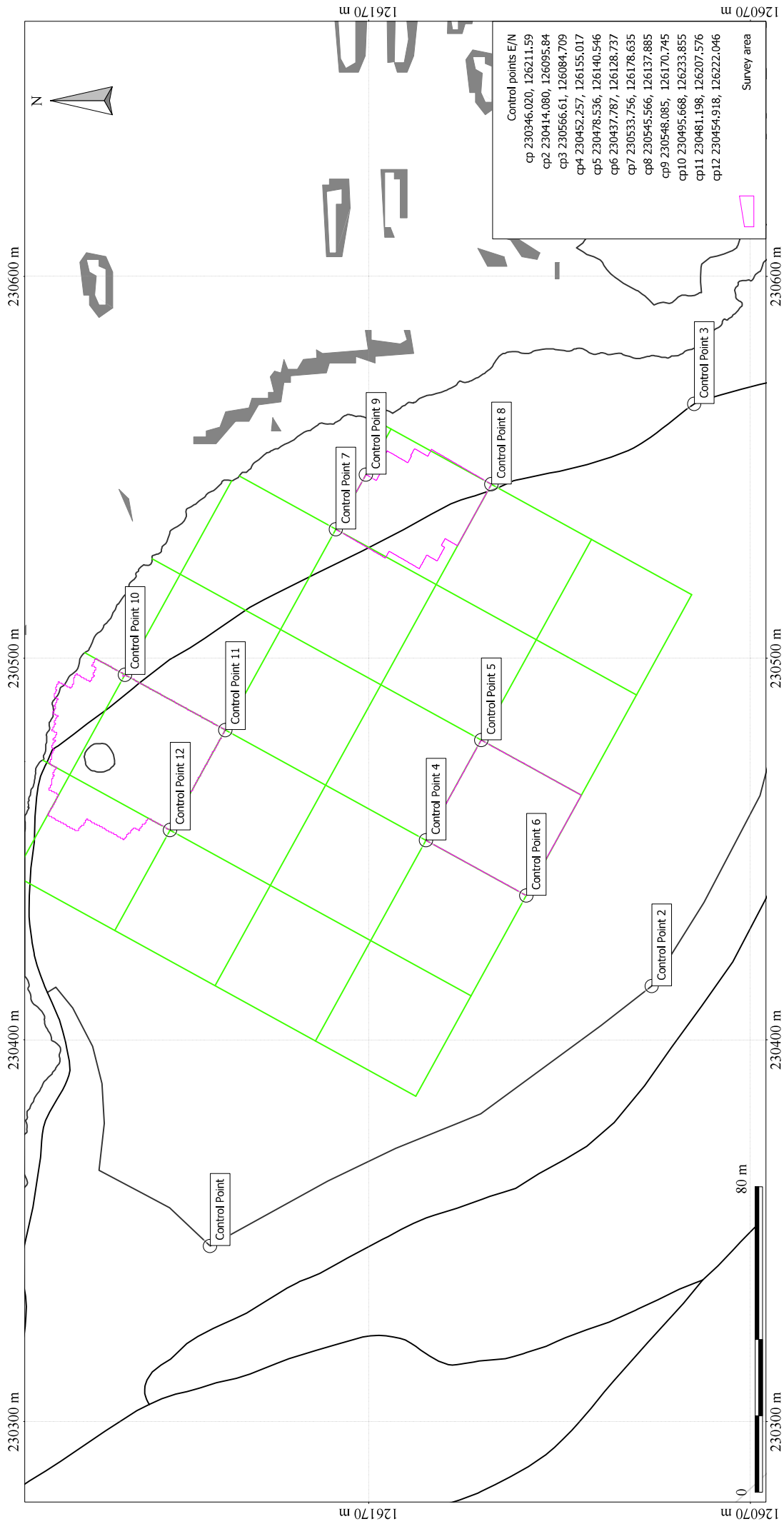
Notes:

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Figure 4 : Unprocessed magnetometer data



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Figure 5 : Grid plan and control points

Appendix 2 Tables

Site: Gallantry Bower Bowl Barrow
Centred on NGR: SS 30474 26243

| plot | anomaly group | associated anomaly groups | anomaly characterisation certainty & class | anomaly form | additional archaeological characterisation | comments | supporting evidence |
|------|---------------|---------------------------|--|-------------------|--|---|---------------------|
| A | 1 | | likely,positive | irregular | cairn? | centre fully quarried out? | |
| A | 2 | | likely,negative | circular | inner ditch? | | |
| A | 3 | | likely,positive | penannular | bank? | same material as cairn? embellished around SE gap? | |
| A | 4 | | possible,negative | curvilinear | bank counterscarp? | not visible on ground | |
| A | 4 | | possible,negative | curvilinear | bank counterscarp? | not visible on ground | |
| A | 5 | 1? | possible,dipolar | unknown | ferrous item | modern trash or prehistoric grave item? | |
| A | 6 | | possible,negative | curvilinear | ditch? | unprocessed data appears to link this to round barrow counterscarp enclosure? not rigidly rectangular | |
| B | 7 | | likely,positive | loose rectilinear | ditch? | | |
| B | 8 | | possible,positive | irregular | uncertain gatepost? | | |
| B | 9 | | possible,positive | linear | temporary fencing/gate? | more ephemeral than Group 7 | |
| B | 9 | | possible,positive | linear | temporary fencing/gate? | more ephemeral than Group 7 | |
| A | 100 | | likely,negative | irregular | SW Coastal Path? | | |

Table 1: data analysis

| | |
|--|---|
| <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> 0.25m <i>Traverse Interval:</i> 1 metre <i>Traverse Method:</i> zigzag <i>Traverse Orientation:</i> GN</p> |
| <p>Data Processing, Analysis and Presentation Software IntelliCAD 8.4 DW Consulting TerraSurveyor3 Manifold System 8 GIS Microsoft Corp. Office 365: Excel, Publisher, Word Adobe Systems Inc Adobe Acrobat 9 Pro Extended</p> | |

Table 2: methodology information

| | |
|---|---|
| Description: | |
| Instrument Type: | Grad 601 (Magnetometer) |
| Units: | nT |
| Direction of 1st Traverse: | 0 deg |
| Collection Method: | ZigZag |
| Sensors: | 2 @ 1.00 m spacing. |
| Dummy Value: | 32702 |
| Dimensions | |
| Composite Size (readings): | 1920 x 300 |
| Survey Size (meters): | 240 m x 150 m |
| Grid Size: | 30 m x 30 m |
| X Interval: | 0.125 m (surveyed @ 0.25 m) |
| Y Interval: | 0.5 m (surveyed @ 1 m) |
| Stats | |
| Max: | 4.90 |
| Min: | -5.09 |
| Std Dev: | 0.80 |
| Mean: | 0.06 |
| Median: | 0.01 |
| PROGRAM | |
| Name: | TerraSurveyor |
| Version: | 3.0.34.10 |
| Processes: | 6 |
| 1 | Base Layer |
| 2 | Clip at 1.00 SD |
| 3 | DeStripe Median Sensors: All |
| 4 | De Stagger: Grids: All Mode: Both By: -2 intervals |
| 5 | De Stagger: Grids: b08.xgd b09.xgd Mode: Both By: 2 intervals |
| 6 | Interpolate: X & Y Doubled. |
| Note: Input to the GIS results in slight changes to the stats shown above. The data stored in the archives (Appendix 3) will have the above metadata and the values quoted in the report figures will be those quoted in this metadata table. | |

Table 3: processed data metadata

| | |
|---|-----------------------------|
| Description: | |
| Instrument Type: | Grad 601 (Magnetometer) |
| Units: | nT |
| Direction of 1st Traverse: | 0 deg |
| Collection Method: | ZigZag |
| Sensors: | 2 @ 1.00 m spacing. |
| Dummy Value: | 32702 |
| Dimensions | |
| Composite Size (readings): | 1920 x 300 |
| Survey Size (meters): | 240 m x 150 m |
| Grid Size: | 30 m x 30 m |
| X Interval: | 0.125 m (surveyed @ 0.25 m) |
| Y Interval: | 0.5 m (surveyed @ 1 m) |
| Stats | |
| Max: | 4.90 |
| Min: | -5.09 |
| Std Dev: | 0.80 |
| Mean: | 0.06 |
| Median: | 0.01 |
| PROGRAM | |
| Name: | TerraSurveyor |
| Version: | 3.0.34.10 |
| Processes: | 1 |
| 1 | Base Layer |
| Note: Input to the GIS results in slight changes to the stats shown above. The data stored in the archives (Appendix 3) will have the above metadata and the values quoted in the report figures will be those quoted in this metadata table. | |

Table 4: unprocessed data metadata

Appendix 3 Project archive contents

A3.1 Substrata Limited archive

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

| | |
|---|--|
| Report: | Adobe PDF (.pdf), Microsoft Publisher (.pub) |
| Raw grid data files: | DW Consulting TerraSurveyor 3 (.xgd) and CSV (.xyz) |
| Raw data composite files: | CSV (.xyz) |
| Minimally processed data composite files: | DW Consulting TerraSurveyor 3 (.xgd) and CSV (.xyz) |
| Final data processing composite files: | DW Consulting TerraSurveyor 3 (.xgd) and CSV (.xyz) |
| GIS project: | GIS project Manifold 8 (.map) |
| Survey interpretation: | ESRI shape files |
| AutoCAD version of the survey interpretation: (if generated) | AutoCAD (.dwg) |
| All project working files: | IntelliCAD 8.4 Microsoft Corp. Office 365: Excel, Publisher, Word Adobe Systems Inc Adobe Acrobat 9 Pro Extended |

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

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

A3.3 Archaeological Data Service

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

| | |
|-----------------------------|--------------------------------|
| Raw data composite file: | CSV (xyz) |
| Processed data plot: | rendered images in TIFF format |
| Survey grid plot: | image in TIFF format |
| Details of data processing: | image in TIFF format |
| Interpretation plot: | rendered images in TIFF format |
| Metadata: | Microsoft Excel format |

A3.4 Historic Environment Record (HER)

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