

T H A M E S V A L L E Y

ARCHAEOLOGICAL

S E R V I C E S

S O U T H W E S T

**Bowdens Lane Quarry Extension,
Huish Episcopi, Somerset**

Geophysical Survey (Magnetic)

by Kyle Beaverstock and Tim Dawson

Site Code BLQ 16/166

(ST 4169 2865)

Bowdens Lane Quarry Extension, Huish Episcopi, Somerset

Geophysical Survey (Magnetic) Report

For Lovell Purbeck Ltd

by Kyle Beaverstock and Tim Dawson

Thames Valley Archaeological Services Ltd

Site Code BLQ 16/166

October 2016

Summary

Site name: Bowdens Lane Quarry Extension, Huish Episcopi, Somerset

Grid reference: ST 4169 2865

Site activity: Magnetometer survey

Date and duration of project: 30th August – 2nd September 2016

Project manager: Steve Ford

Site supervisor: Kyle Beaverstock

Site code: BLQ 16/166

Area of site: 5.1ha

Summary of results: A range of magnetic anomalies were recorded across the entire site. Many of these are of potential archaeological origin although there is a strong trend of positive and negative anomalies representing modern ploughing activity.

Location of archive: The archive is presently held at Thames Valley Archaeological Services, Reading in accordance with TVAS digital archiving policies.

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Report edited/checked by: Steve Ford ✓ 26.10.16

Bowdens Lane Quarry Extension, Huish Episcopi, Somerset A Geophysical Survey (Magnetic)

by Kyle Beaverstock and Tim Dawson

Report 16/166

Introduction

This report documents the results of a geophysical survey (magnetic) carried out at land to the north of Bowdens Lane Quarry, Bowdens Lane, Huish Episcopi, Somerset (ST 4169 2865) (Fig. 1). The work was commissioned by Simon Hart of Lovell Purbeck Ltd, Downs Quarry, Kingston Road, Langton Matravers, Swanage, Dorset, BH19 3JP.

Planning consent is to be sought from Somerset County Council to extend an existing quarry at Bowdens Lane. A geophysical survey has been requested as part of a wider programme of archaeological work in order to better inform the planning application. This is in accordance with the Department for Communities and Local Government's National Planning Policy Framework (NPPF 2012), and the County's policies on archaeology. The fieldwork was undertaken by Kyle Beaverstock, Nick Dawson, Dominika Golebiowska and Ellen McManus-Fry between 30th August and 2nd September 2016 and the site code is BLQ 16/166.

The archive is presently held at Thames Valley Archaeological Services, Reading in accordance with TVAS digital archiving policies.

Location, topography and geology

The site is located 1.8km to the north of historic core of Huish Episcopi on an upstanding high outcrop of Marl, Mudstone Clays and Lias clays and stone known as the Somerton plateau (BGS 1967). It is a high point in the surrounding countryside at a height of approximately 72m above Ordnance Datum and overlooks the valley of the River Parrett and the town of Langport which lies at *c.*15–20m aOD. The site lies on the north side of Bowdens Lane and occupies an area of *c.*5.1ha. Conditions during the survey were dry (Pl. 1-2).

Site history and archaeological background

The site lies in an archaeologically rich location with extensive excavations immediately to the south-east revealing Iron Age occupation along with a Roman villa complex. Earlier excavations carried out prior to mineral extraction revealed Iron Age occupation spanning the Middle and Late Iron Ages (Pine and Weale

2012). Further fieldwork in an adjacent plot revealed additional Iron Age deposits along with a Roman settlement complex with several stone-built buildings, corn driers, field boundaries and burials.

Methodology

Sample interval

Data collection required a temporary grid to be established across the survey area using wooden pegs at 20m intervals with further subdivision where necessary. Readings were taken at 0.25m intervals along traverses 1m apart. This provides 1600 sampling points across a full 20m × 20m grid (English Heritage 2008), providing an appropriate methodology balancing cost and time with resolution. The survey grid was laid out across the entire site with very little obstruction around the perimeter.

The Grad 601-2 has a typical depth of penetration of 0.5m to 1.0m. This would be increased if strongly magnetic objects have been buried in the site. Under normal operating conditions it can be expected to identify buried features >0.5m in diameter. Features which can be detected include disturbed soil, such as the fill of a ditch, structures that have been heated to high temperatures (magnetic thermoremnance) and objects made from ferro-magnetic materials. The strength of the magnetic field is measured in nano Tesla (nT), equivalent to 10^{-9} Tesla, the SI unit of magnetic flux density.

Equipment

The purpose of the survey was to identify geophysical anomalies that may be archaeological in origin in order to inform a targeted archaeological investigation of the site prior to development. The survey and report generally follow the recommendations and standards set out by both English Heritage (2008) and the Chartered Institute for Archaeologists (2002, 2011, 2014).

Magnetometry was chosen as a survey method as it offers the most rapid ground coverage and responds to a wide range of anomalies caused by past human activity. These properties make it ideal for the fast yet detailed surveying of an area.

The detailed magnetometry survey was carried out using a dual sensor Bartington Instruments Grad 601-2 fluxgate gradiometer. The instrument consists of two fluxgates mounted 1m vertically apart with a second set positioned at 1m horizontal distance. This enables readings to be taken of both the general background magnetic field and any localised anomalies with the difference being plotted as either positive or negative buried features. All sensors are calibrated to cancel out the local magnetic field and react only to anomalies above or below this

base line. On this basis, strong magnetic anomalies such as burnt features (kilns and hearths) will give a high response as will buried ferrous objects. More subtle anomalies such as pits and ditches, can be seen from their infilling soils containing higher proportions of humic material, rich in ferrous oxides, compared to the undisturbed subsoil. This will stand out in relation to the background magnetic readings and appear in plan following the course of a linear feature or within a discrete area.

A Trimble Geo7x handheld GPS system with sub-decimetre real-time accuracy was used to tie the site grid into the Ordnance Survey national grid. This unit offers both real-time correction and post-survey processing; enabling a high level of accuracy to be obtained both in the field and in the final post-processed data.

Data gathered in the field was processed using the TerraSurveyor software package. This allows the survey data to be collated and manipulated to enhance the visibility of anomalies, particularly those likely to be of archaeological origin. The table below lists the processes applied to this survey, full survey and data information is recorded in Appendix 1.

Process	Effect
Clip from -0.80 to 1.20 nT	Enhance the contrast of the image to improve the appearance of possible archaeological anomalies.
Interpolate: y doubled	Increases the resolution of the readings in the y axis, enhancing the shape of anomalies.
De-stripe: median, all sensors	Removes the striping effect caused by differences in sensor calibration, enhancing the visibility of potential archaeological anomalies.
De-spike: threshold 1, window size 3×3	Compresses outlying magnetic points caused by interference of metal objects within the survey area.
De-stagger: all grids, both by -1 intervals	Cancels out effects of site's topography on irregularities in the traverse speed.

The raw data plot is presented as a greyscale plot shown in relation to the site (Fig. 3) with the processed data then presented as a second figure (Fig. 4), followed by a third plan to present the abstraction and interpretation of the magnetic anomalies (Fig. 5). Anomalies are shown as colour-coded lines, points and polygons. The grid layout and georeferencing information (Fig. 2) is prepared in EasyCAD v.7.58.00, producing a .FC7 file format, and printed as a .PDF for inclusion in the final report.

The greyscale plot of the processed data is exported from TerraSurveyor in a georeferenced portable network graphics (.PNG) format, a raster image format chosen for its lossless data compression and support for transparent pixels, enabling it to easily be overlaid onto an existing site plan. The data plot is combined with grid and site plans in QGIS 2.16.2 and exported again in .PNG format in order to present them in figure templates in Adobe InDesign CS5.5, creating .INDD file formats. Once the figures are finalised they are exported in .PDF format for inclusion within the finished report.

Results

A range of magnetic anomalies were recorded across the entire site (Fig. 4). The majority of these were positive in polarity which usually represents the fill of buried cut features, e.g. ditches and pits, but are undated so may or may not be of archaeological interest.

The strongest of the positive anomalies were a series of strong linears forming three sides of a rectangular enclosure measuring 18m × 14m just to the north-west of the centre of the site [Fig. 5: 1]. This matches the orientation of a large proportion of the slightly weaker linear positive anomalies recorded during the survey which may also be archaeological in origin. The first of these is a set of anomalies which form a T shape with a shorter east-west section [2] crossing the top of a longer north-south one [3]. The latter may be of archaeological interest but there is a regular pattern of north-south anomalies which cross the field which most likely represent modern ploughing activity [27] or modern field boundaries [28]. To the west of the T are two shorter sections of linear positive anomaly [4, 5] which extend at slightly different angles out into the field from the north-western site boundary. The orientation of [4] matches [2] and [3] but [5] has more of a east-south-easterly direction and appears to lead towards a shorter, stronger length of anomaly [6]. To the south of this and 7m to the west of north-south linear [3] are two more discrete positive anomalies [7] which may indicate the presence of buried pit-type features. Another such positive anomaly [8], albeit slightly larger, was recorded to the north of rectangular enclosure [1]. To the south of the enclosure are two curvilinear weak positive anomalies [9, 10] which together appear to curve around a similar point on the ground, although it cannot be determined from the survey whether they are both contemporary.

The eastern half of the field is dominated by a series of strong and weak positive linear anomalies [11, 13, 14, 17, 20, 23, 25] which together appear to form an enclosure measuring 140m north-south by 130m east-west. Several other linear positive anomalies were recorded along the northern and southern edges of this large enclosure with [14], [15] and [16] running parallel or perpendicular to the northern edge and [18] and [19] appearing to form two circular enclosures in the north-eastern corner. In the south-western corner are a pair of parallel weak positive linear anomalies which cut across and connect to the southern edge with two stronger positive anomalies [24]. To the north of these a short section of weak positive linear anomaly [12] extends eastwards into the large enclosed area while to the west a length of stronger positive anomaly [21] runs parallel to the westward extension of the enclosure's southern edge [23]. Between the southern edge of the enclosure and the southern edge of the field is an area of magnetic disturbance which appears to contain an inverted L shaped

negative anomaly [26]. These usually indicate the presence of buried standing structures such as earthwork banks or walls.

In addition to the anomalies detailed above the field is scattered with stronger dipole magnetic spikes which commonly represent ferrous objects in the soil or on the surface, usually fragments of more recent farm equipment. The southern and western edges of the survey area were subject to areas of magnetic disturbance caused by nearby metal objects such as fences and field gates. These, particularly those recorded along the southern boundary, may have a masking effect on any weaker anomalies caused by potential buried archaeological features.

Conclusion

The survey of the proposed Bowdens Lane Quarry extension site was undertaken successfully, with the entire field covered. A range of magnetic anomalies were recorded, several of which are likely to represent buried cut features, possibly of archaeological origin. While conclusions can be drawn that suggest the presence of enclosures of different sizes the survey cannot give information as to the date of the possible buried features and it might be that the various anomalies are not contemporary. The large areas of magnetic disturbance along the southern and western boundaries of the field and, to a lesser extent, the regular north-south anomalies indicating more recent ploughing may both mask or distort any weaker anomalies in these areas which could indicate the presence of buried archaeology.

References

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- Pine, J and Welae, A, 2012, Middle Iron Age and Late Iron Age/Roman occupation at Bowden's Quarry, Bowden's Lane, Huish Episcopi, Somerset, Draft Publication Report, Thames Valley Archaeological Services project 12/53, Taunton

Appendix 1. Survey and data information

Programme:

Name: TerraSurveyor
Version: 3.0.29.3

Raw data

Survey corner coordinates (X/Y):
Northwest corner: 341828.31, 128785.76 m
Southeast corner: 342088.31, 128485.76 m
Direction of 1st Traverse: 178.1104 deg
Collection Method: ZigZag
Sensors: 2 @ 1.00 m spacing.
Dummy Value: 2047.5

Dimensions

Composite Size (readings): 1040 x 300
Survey Size (meters): 260 m x 300 m
Grid Size: 20 m x 20 m
X Interval: 0.25 m
Y Interval: 1 m

Stats

Max: 100.00
Min: -100.00
Std Dev: 7.41
Mean: -4.14
Median: -2.60
Composite Area: 7.8 ha
Surveyed Area: 4.8934 ha

Source Grids: 153

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3 Col:0 Row:3 grids\25.xgd
4 Col:0 Row:4 grids\26.xgd
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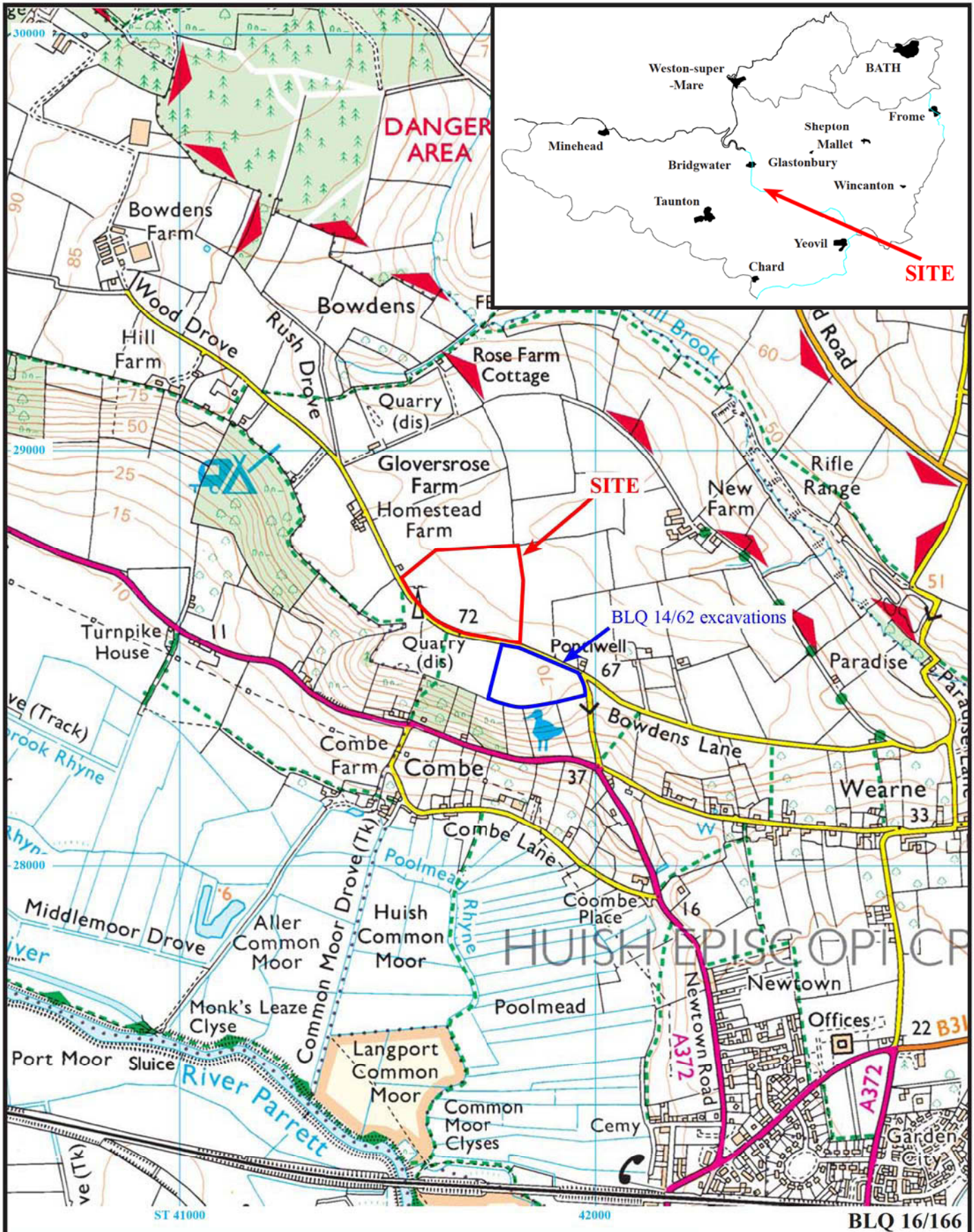
Processed data

Stats

Max: 1.20
Min: -0.80
Std Dev: 0.47
Mean: 0.04
Median: 0.00

Processes: 6

- 1 Base Layer
- 2 DeStripe Median Sensors: Grids: All
- 3 De Stagger: Grids: All Mode: Both By: -1 intervals
- 4 Despike Threshold: 1 Window size: 3x3
- 5 Interpolate: Y Doubled.
- 6 Clip from -0.80 to 1.20 nT

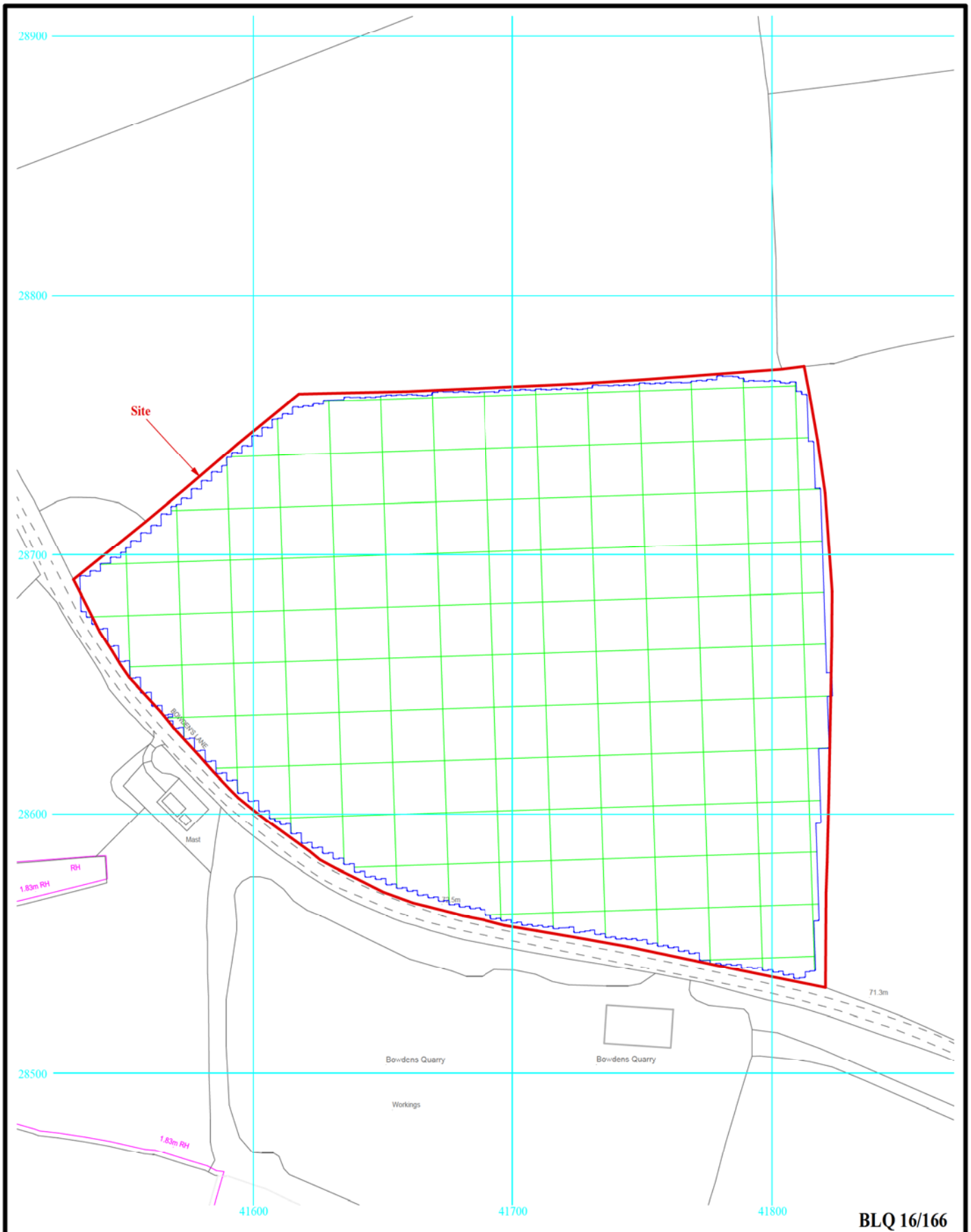


**Bowdens Lane Quarry Extension,
Huish Episcopi, Somerset, 2016
Geophysical Survey (Magnetic)**

Figure 1. Location of site within Huish Episcopi and Somerset.

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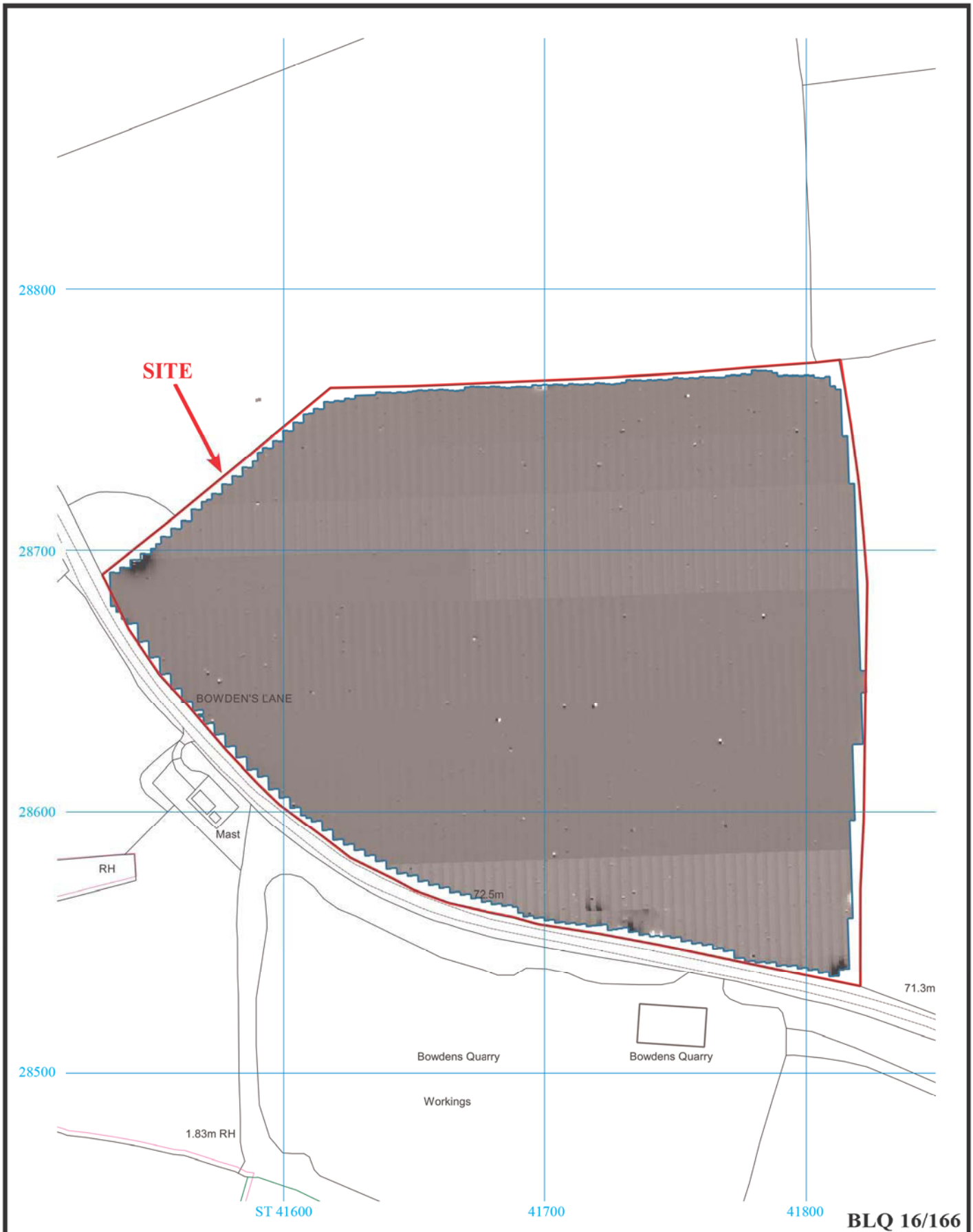
TVAS
SOUTH WEST



**Bowdens Lane Quarry Extension,
Huish Episcopi, Somerset, 2016
Geophysical Survey (Magnetic)**

Figure 2. Survey grid layout.





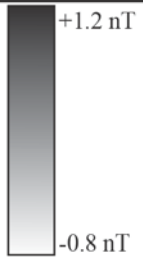
**Bowdens Lane Quarry Extension,
Huish Episcopi, Somerset, 2016
Geophysical Survey (Magnetic)**
Figure 3. Plot of raw gradiometer data.

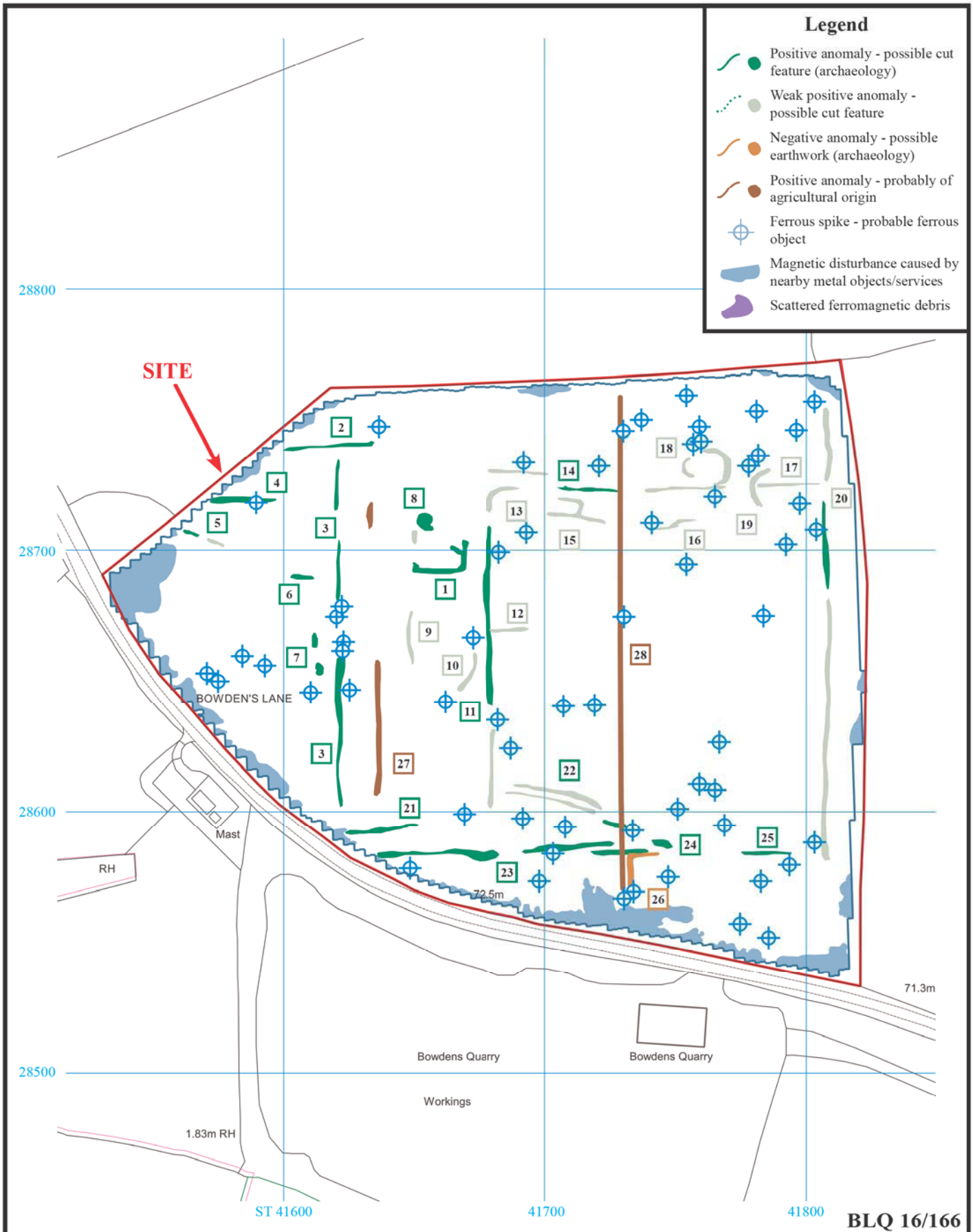




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Figure 4. Plot of minimally processed gradiometer data.





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Geophysical Survey (Magnetic)**
Figure 5. Interpretation plot.





Plate 1. The site, looking north-east.



Plate 2. The site, looking north-west.

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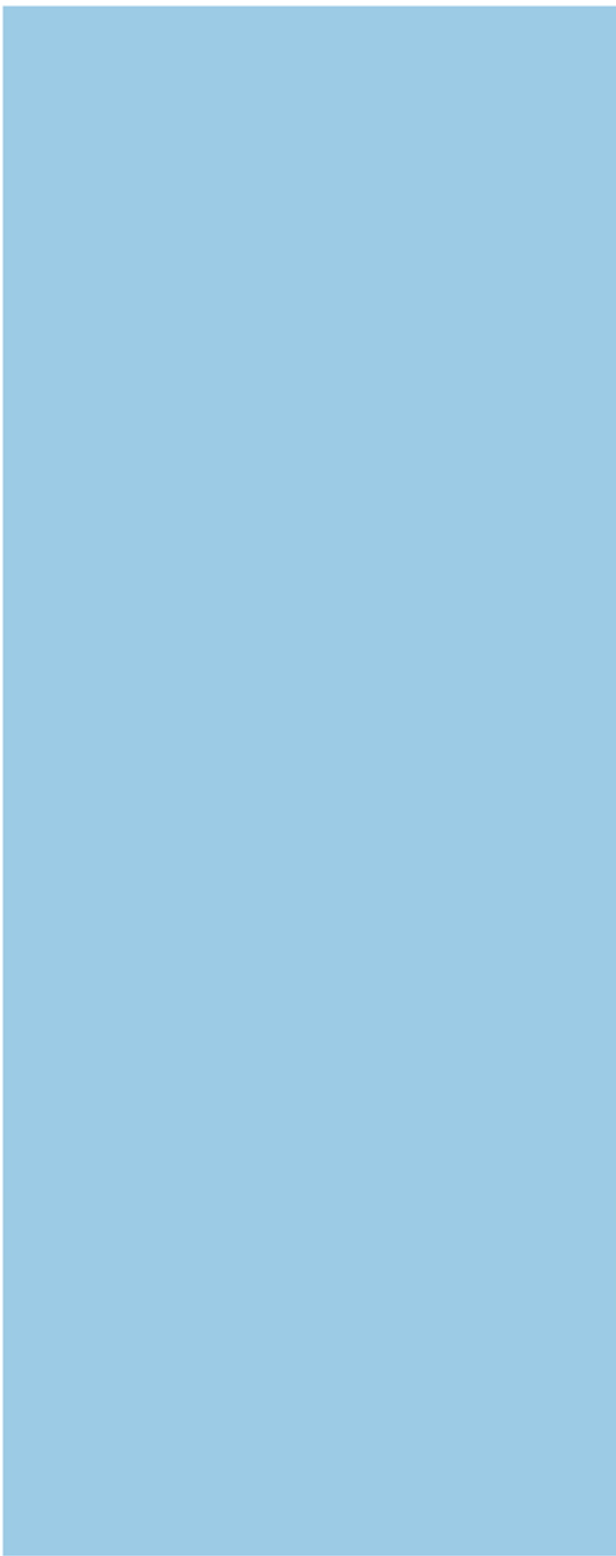
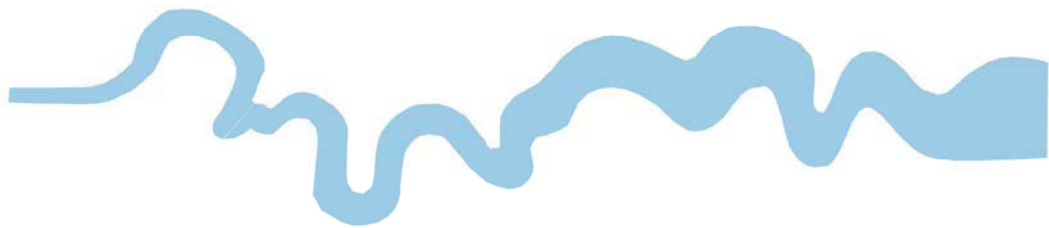
**Bowdens Lane Quarry Extension,
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Geophysical Survey (Magnetic)**
Plates 1 - 2.

TVAS
SOUTH WEST

TIME CHART

	Calendar Years
Modern _____	AD 1901
Victorian _____	AD 1837
Post Medieval _____	AD 1500
Medieval _____	AD 1066
Saxon _____	AD 410
Roman _____	AD 43
Iron Age _____	BC/AD 750 BC
Bronze Age: Late -----	1300 BC
Bronze Age: Middle -----	1700 BC
Bronze Age: Early -----	2100 BC
Neolithic: Late	3300 BC
Neolithic: Early	4300 BC
Mesolithic: Late	6000 BC
Mesolithic: Early	10000 BC
Palaeolithic: Upper	30000 BC
Palaeolithic: Middle	70000 BC
Palaeolithic: Lower	2,000,000 BC





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