ARCHAEOLOGICAL SERVICES
DURHAM UNIVERSITY

on behalf of
BWB Consulting Ltd

Land at Lizard Lane
Whitburn
South Tyneside

geophysical survey

report 6303
October 2025

Durham University

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1. Summary

The project

1.1 This report presents the results of a geophysical survey conducted in advance of proposed development of land at Lizard Lane, Whitburn, South Tyneside. The works comprised 10.25ha of magnetometer survey.

1.2 The works were commissioned by BWB Consulting Ltd and conducted by Archaeological Services Durham University.

Results

1.3 Large concentrations of probable dumped material and ground disturbance have been identified, including an area of former colliery buildings.

1.4 Possible traces of former ridge and furrow cultivation have been detected.

1.5 Soil-filled features of uncertain age and origin have been detected.

1.6 An infilled former pond has been detected, as shown on historic OS editions.

1.7 A possible utility has been identified.

1.8 Relatively recent ploughing regimes and probable land drains have also been detected.

2. Project background

Location (Figure 1)

2.1 The site was located on land at Lizard Lane, Whitburn, South Tyneside (NGR centre: NZ 4057 6339). To the west was Lizard Lane, with farmland beyond; to the north was Kitchener Road, with residential properties and Marsden Quarry beyond; to the east was the A183 road, Mill Lane; and to the south was a housing estate and Marsden Primary School.

2.2 One survey of approximately 10.25ha was conducted in a single land parcel.

Development proposal

2.3 A residential development is proposed.

Objective

2.4 The aim of the survey was to assess the nature and extent of any sub-surface features of potential archaeological significance within the survey area, so that an informed decision may be made regarding the nature and scope of any further scheme of archaeological works that may be required in relation to the development.

2.5 The updated regional research framework *North-East Regional Research Framework for the Historic Environment* (NERRF 2.0) contains an agenda for archaeological research in the region, which is incorporated into regional planning policy implementation. In this instance, the scheme of works was designed to address the following research questions: Late Bronze Age and Iron Age, La3: How can we improve our understanding of late prehistoric landscapes in north-east England?; Later medieval, MD21: How can we better understand medieval field systems?

Methods statement

2.6 The surveys have been undertaken in accordance with instructions from the client, a method statement provided by Archaeological Services Durham University and national standards and guidance (below, 5.1).

Dates

2.7 Fieldwork was undertaken on 1st October 2025. This report was prepared for October 2025.

Personnel

2.8 Fieldwork and geophysical data processing was conducted by Richie Villis and Mark Woolston-Houshold. This report was prepared by Richie Villis, with illustrations by Janine Watson.

Archive/OASIS

2.9 The site code is **WLL25**, for **W**hitburn **L**izard **L**ane 20**25**. The survey archive is held at Archaeological Services Durham University. Archaeological Services Durham University is registered with the **O**nline **A**cces**S** to the **I**ndex of archaeological investigation**S** project (**OASIS**). The OASIS ID number for this project is **archaeol3-537445**.

Acknowledgements

2.10 Archaeological Services Durham University is grateful for the assistance of the landowners and tenants in facilitating this scheme of works.

3. Historical and archaeological background

3.1 A detailed archaeological desk-based assessment has been conducted for the proposed development (BWB 2025); the results of that assessment are summarised here.

3.2 There is evidence for prehistoric activity in the wider area, although this is mainly limited to findspots. No heritage assets are recorded within the site, however, this should not be taken to imply that archaeological remains were never present, so there is some potential for unrecorded prehistoric remains to be present. However, prolonged and intensive agricultural activity will probably have caused disturbance and truncated any archaeological horizon.

3.3 The site lies to the north of the medieval core of the village of Whitburn and was likely within an area of medieval common and agricultural land. Map regression has shown the site to have remained in agricultural use since at least the late 19th century. There is a high potential for medieval and post-medieval agricultural activity (ridge and furrow) to survive.

3.4 The site has moderate potential for remains relating to the post-medieval Hope House farmstead in the north-east corner, and 19th or 20th century remains relating to Whitburn Colliery which incorporated the earlier farmhouse.

4. Landuse, topography and geology

4.1 At the time of survey the site comprised a single field of improved arable land. It was bound by post and wire fencing, with steel security fencing to the school in the south-east. The A183 road to the east stood on a reinforced concrete bank where the ground dipped into a natural hollow in the north-eastern part of the site. Occasional geotechnical test pits had been excavated across the area.

4.2 The site occupied a generally gentle south-east-facing slope, with elevations from approximately 40m OD in the north-west to 33m in the south and south-east. A natural dip to a low point of approximately 29m OD was also present in the north-eastern part of the area.

4.3 The underlying solid geology of the area comprises Permian dolostone of the Roker Formation, which are overlain by Devensian glaciofluvial deposits of sand and gravel in the east and till in the west (BGS 2025).

5. Geophysical survey

Standards

5.1 The survey and reporting were conducted in accordance with the Chartered Institute for Archaeologists (CIfA) *Standard and Guidance for archaeological geophysical survey* (2020); the *EAC Guidelines for the Use of Geophysics in Archaeology* (Schmidt

et al. 2016); and the Archaeology Data Service & Digital Antiquity *Geophysical Data in Archaeology: A Guide to Good Practice* (Schmidt 2013).

Technique selection

5.2 Geophysical survey enables the relatively rapid and non-invasive identification of sub-surface features of potential archaeological significance and can involve a suite of complementary techniques such as magnetometry, earth electrical resistance, ground-penetrating radar, electromagnetic survey and topsoil magnetic susceptibility survey. Some techniques are more suitable than others in particular situations, depending on site-specific factors including the nature of likely targets; depth of likely targets; ground conditions; proximity of buildings, fences or services and the local geology and drift.

5.3 In this instance it was considered likely that cut features such as ditches and pits could be present on the site, and that other types of feature such as trackways, wall foundations and fired structures (for example kilns and hearths) might also be present.

5.4 Given the anticipated nature and depth of targets, and the non-igneous geological environment of the study area, a magnetic technique, fluxgate gradiometry, was considered appropriate for detecting the types of feature mentioned above. This technique involves the use of magnetometers to detect and record anomalies in the vertical component of the Earth's magnetic field caused by variations in soil magnetic susceptibility or permanent magnetisation; such anomalies can reflect archaeological features.

Field methods

5.5 Magnetic gradient measurements were determined using a Sensys Magneto MX V3 multi-sensor magnetometer survey system towed by a quad-bike. Eight FGM650/3 fluxgate gradiometer sensors were mounted at 0.5m intervals, logging data at less than 0.08m intervals along traverses, providing high density data collection.

5.6 Data collection point locations were recorded using an integrated global navigation satellite system (GNSS) with real-time kinematic (RTK) correction typically providing 5-10mm accuracy and subsequently converted to the Ordnance Survey (OS) National Grid using the OSTN15 transformation.

5.7 Data were downloaded on site into a laptop computer for initial processing and storage and subsequently transferred to a desktop computer for processing, interpretation and archiving.

Data processing

5.8 Sensys MonMX, DLMGPS and MagnetoARCH software were used to record and display gradient and positional data, to create a matrix of gridded values at 0.2m by 0.2m intervals and to produce a continuous tone greyscale image of the raw data. TerraSurveyor software was then used to produce a continuous tone greyscale image of filtered data and trace plots. Trace plots of the data were examined but are not presented in this report. The greyscale images are presented in Figures 2 and 3; geophysical and archaeological interpretations are presented in Figures 4 and 5. In the greyscale images, positive magnetic anomalies are displayed as dark grey and

negative magnetic anomalies as light grey. Palette bars relate the greyscale intensities to anomaly values in nanoTesla.

5.9 The following basic processing functions have been applied to each dataset:

clip	clips data to specified maximum or minimum values; to eliminate large noise spikes; also generally makes statistical calculations more realistic
de-spike	locates and suppresses iron spikes in gradiometer data
interpolate	increases the number of data points in a survey to match sample and traverse intervals; in this instance the data have been interpolated to 0.1m x 0.1m intervals

5.10 The following filter has been applied to the magnetic data (Figure 3):

low pass filter	(applied with Gaussian weighting) to remove high frequency, small-scale spatial detail; for enhancing larger weak features and smoothing data

Interpretation: anomaly types

5.11 A colour-coded geophysical interpretation plan is provided. Three types of magnetic anomaly have been distinguished in the data:

positive magnetic	regions of anomalously high or positive magnetic field gradient, which may be associated with high magnetic susceptibility soil-filled structures such as pits and ditches
negative magnetic	regions of anomalously low or negative magnetic field gradient, which may correspond to features of low magnetic susceptibility such as wall footings and other concentrations of sedimentary rock or voids
dipolar magnetic	paired positive-negative magnetic anomalies, which typically reflect ferrous or fired materials (including fences and utilities) and/or fired structures such as kilns or hearths

Interpretation: features

5.12 A colour-coded archaeological interpretation plan is provided. For ease of reference, anomaly numbers shown bold in the text below (eg **A**, **B**, etc) are also shown on the archaeological interpretation plan.

5.13 The geophysical data collected here area characterised by high concentrations of dipolar magnetic anomalies. Typically these reflect items of near-surface ferrous and/or fired debris, such as horseshoes and brick fragments, and in most cases have little or no archaeological significance. When present in high quantity these can also reflect areas of disturbed ground, including deliberately dumped material and manuring for land-improvement. Despite the widespread presence of these anomalies here, areas of higher concentration can also be distinguished in the data. Concentrations of more intense dipolar magnetic anomalies have been detected in

the north-west corner of the survey area (**A**) which almost certainly reflect relatively modern ground disturbance, including possible colliery wate. A relatively rectangular concentration detected in the north-east corner of the area (**B**) corresponds to the location of former colliery buildings shown on historic OS editions. Whilst there is no definitive evidence of structural remains evident in the data this almost certainly reflects a quantity of demolition material and other ground disturbance.

5.14 A large and intense dipolar magnetic anomaly has been detected in the east of the survey area (**C**). This broadly corresponds to a shallow hollow in the natural topography of the field, and it may reflect a collection of former colliery waste deliberately dumped to infill the ground. Three further intense magnetic anomalies, almost certainly reflecting ferrous items, have been detected to the south-west of this (**D**). These are regularly spaced, approximately 75m apart, and could possibly reflect ferrous components of a buried utility, although no evidence of the utility itself or associated trench have been detected.

5.15 Smaller, irregular concentrations of dipolar magnetic anomalies have been detected along the western boundary of the area, often associated with field entrances. A small concentration in the south-west of the area (**E**) corresponds to an in-filled pond shown on historic OS editions.

5.16 Occasional weak and diffuse linear and curvilinear positive magnetic anomalies (eg **F**) have been detected across the area. These could possibly represent anthropogenic features of uncertain age and origin.

5.17 Broadly north/south aligned, closely spaced, linear magnetic anomalies have been detected across the area; these almost certainly reflect relatively modern ploughing regimes and in the interests of clarity have been omitted from the geophysical interpretation plan. Perpendicular, border and more widely spaced, slightly curving anomalies almost certainly reflect older ploughing regimes, including possible former ridge and furrow cultivation. These older regimes are in the same orientation as older field systems shown on historic maps of the area.

5.18 Occasional straight and narrow, regularly arrayed anomalies have also been detected (eg **G**), these almost certainly reflect land drains.

6. Conclusions

6.1 Approximately 10.25ha of magnetometer survey was undertaken on land at Lizard Lane, Whitburn, South Tyneside prior to proposed residential development.

6.2 Large concentrations of probable dumped material and ground disturbance have been identified, including an area of former colliery buildings.

6.3 Possible traces of former ridge and furrow cultivation have been detected.

6.4 Soil-filled features of uncertain age and origin have been detected.

6.5 An infilled former pond has been detected, as shown on historic OS editions.

6.6 A possible utility has been identified.

6.7 Relatively recent ploughing regimes and probable land drains have also been detected.

7. Sources

BWB 2025 *Lizard Lane, Whitburn, South Tyneside, Tyne and Wear: archaeology assessment.* Report **255481**, BWB Consulting

CIfA 2020 *Standard and Guidance for archaeological geophysical survey*. Chartered Institute for Archaeologists

Schmidt, A, 2013 *Geophysical Data in Archaeology: A Guide to Good Practice*. Archaeology Data Service & Digital Antiquity, Oxbow

Schmidt, A, Linford, P, Linford, N, David, A, Gaffney, C, Sarris, A & Fassbinder, J, 2016 *EAC Guidelines for the Use of Geophysics in Archaeology: Questions to Ask and Points to Consider*. EAC Guidelines **2**, Namur

Websites

https://researchframeworks.org/nerf/

https://geologyviewer.bgs.ac.uk/

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Figure 1: Site location

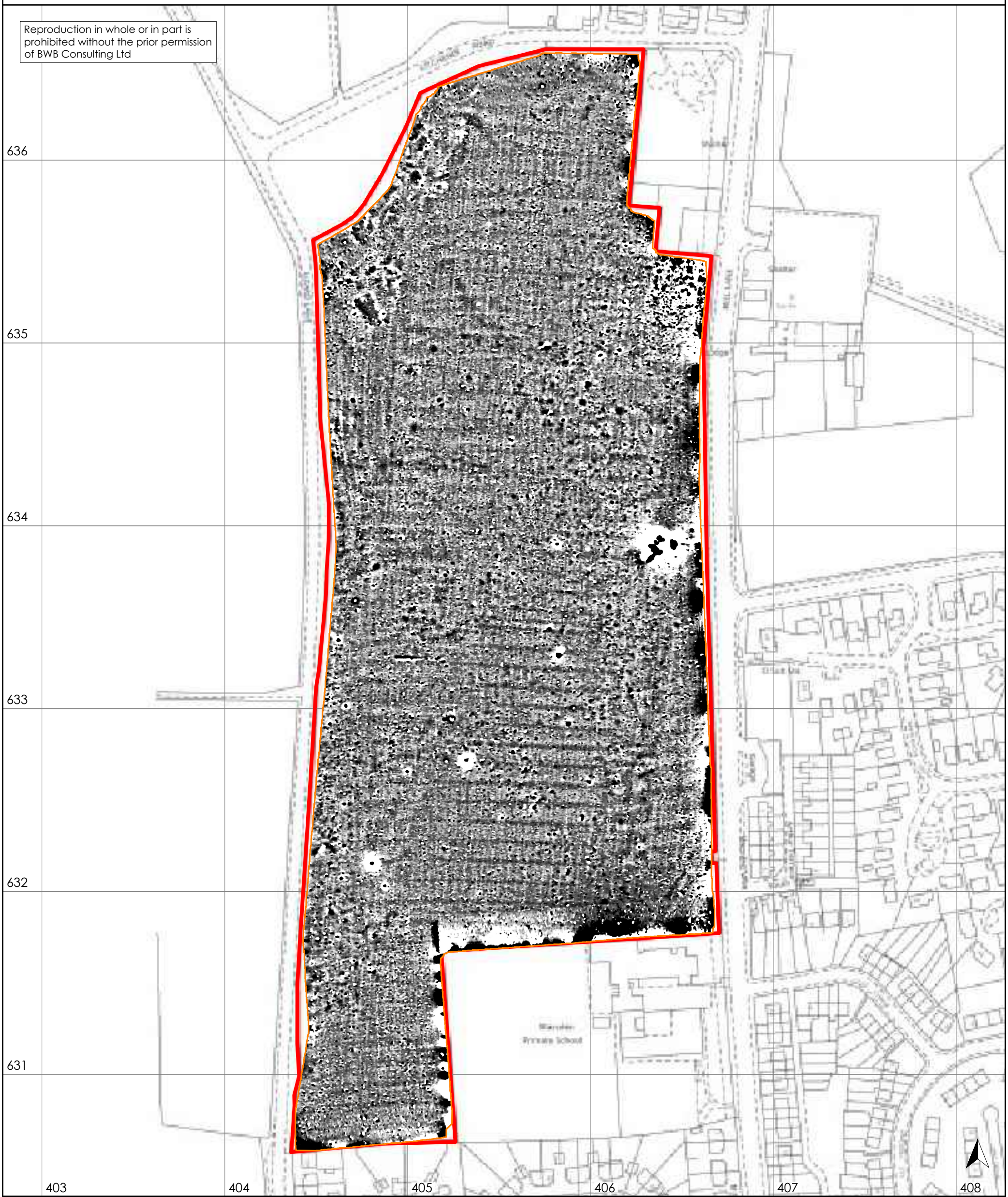
site boundary

0 1km
scale 1:20 000 for A4 plot

site boundary

magnetometer survey

-4 nT 6



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0 100m
scale 1:2000 for A3 plot

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Figure 2: Magnetometer survey (unfiltered data)

637
636
635
634
633
632
631
404
405
406
407

site boundary

magnetometer survey

-4 nT 6

0 50m
scale 1:1000 for A1 plot

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Figure 3: Magnetometer survey (filtered data)

637
636
635
634
633
632
631
404
405
406
407

site boundary
magnetometer survey
dipolar magnetic anomaly
positive magnetic anomaly

0 50m
scale 1:1000 for A1 plot

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Figure 4: Geophysical interpretation

637
636
635
634
633
632
631
404
405
406
407

A
B
C
D
E
F
G

site boundary
magnetometer survey
possible soil-filled feature
disturbed area
ferrous object
land drain
possible utility
possible ridge and furrow
former ploughing

0 50m
scale 1:1000 for A1 plot

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Figure 5: Archaeological interpretation