

**Land off Moseley Wood Gardens** 

Cookridge

**West Yorkshire** 

**Geophysical Survey** 

Report no. 2828 November 2015

**Client:** AECOM Infrastructure &

Environment UK, Ltd.





# Land off Moseley Wood Gardens, Cookridge, West Yorkshire

**Geophysical Survey** 

#### **Summary**

A geophysical (magnetometer) survey, covering approximately 4.5 hectares, was carried out on pasture located north-west of Moseley Wood Gardens in the suburb of Cookridge, Leeds, West Yorkshire. The survey was undertaken prior to the proposed development of the site. Large areas of magnetic disturbance were present caused by modern services and boundary fencing. Anomalies corresponding to geological variation and former field boundaries/ footpaths were also noted. No anomalies of obvious archaeological potential have been identified within the survey area. Consequently the archaeological potential of this site is deemed to be low.



# **Report Information**

Client: **AECOM Ltd** 

Address: 2 City Walk, Leeds, West Yorkshire,

**LS11 9AR** 

Geophysical Survey Report Type: Location: Cookridge, Leeds County: West Yorkshire Grid Reference: SE 24441 40350

Period(s) of activity: Modern Report Number: 2828 5271 **Project Number:** Site Code: MWG15

**OASIS ID:** Archaeol11-232674

Planning Application No.: 14/04270/OT

Museum Accession No.: N/A

Date of fieldwork: November 2015 Date of report: November 2015

**Project Management:** Chris Sykes BA MSc

Fieldwork: Chris Sykes

Rebecca Goulding, BSc MSc

Ashely Green, BS

Pulliam

Emma Brunning BSc MCIfA

Report: Ashely Green Illustrations: Ashely Green Photography: Chris Sykes

Research: N/A

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Authorisation for



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> Telephone: 0113 383 7500. Email: admin@aswyas.com



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#### 1 Introduction

Archaeological Services WYAS (ASWYAS) was commissioned by AECOM Infrastructure & Environment UK Ltd. (the Client), on behalf of Taylor Wimpey Ltd, to undertake a geophysical (magnetometer) survey at land off Moseley Wood Gardens, Cookridge, Leeds. The site has outline planning permission for residential housing, associated infrastructure and landscaping, subject to an archaeological planning condition which states: "Development shall not commence until the developer has secured the implementation of a programme of archaeological recording. This recording must be carried out by an appropriately qualified and experienced archaeological consultant or organisation, in accordance with a written scheme of investigation which has been submitted by the developer and approved in writing by the Local Planning Authority" (Planning application number 14/04270/OT). The work was undertaken in accordance with a Written Scheme of Investigation for Archaeological Geophysical Survey prepared by (AECOM 2015) as well as following current national planning policy and good practice standards and guidance (CIfA 2014; David et al. 2008). The survey was carried out on 10 November 2015, to provide additional information on the archaeological resource of the site.

#### Site location, topography and land-use

The Proposed Development Area (PDA) is located within the administrative boundary of Leeds City Council. It is located on the western side of Cookridge village and occupies agricultural land between Moseley Wood Gardens, Smithy Lane and the Leeds and Thirsk Railway Line (centered at SE24441 40350). The site is bounded to the south and east by residential housing built in the 1960's, and Gab Wood (which abuts Smithy Lane) to the north. The western side of the site is formed by the Moseley Beck beyond which is a narrow tongue of farmland located to the Leeds and Thirsk railway line (AECOM 2015).

The PDA occupies four connected fields, separated by dry-stone walls and in various states of preservation, and in parts incorporates natural outcroppings of rock. The site slopes from 152m above Ordnance Datum (aOD) in the north-east, to 126m aOD to the south.

#### Soils and geology

The majority of the site is located on the Pennine Lower Coal Measures Formation, comprising of interbedded grey mudstone, siltstone and pale grey sandstone commonly with mudstones in the lower area, with thicker and numerous coal seams in the upper part (AECOM 2015). To the east, a smaller area of Millstone Grit which consists of fine to very coarse-grained feldspathic sandstones, interbedded with grey siltstones and mudstones (British Geological Survey 2015)

The site is overlain with superficial deposits of glacial till (clay, sandy clay, and clayey sand with gravel and boulders) with interbedded sand, gravel and laminated clay. (Cranfield University 2015)

# 2 Archaeological Background

Whilst no known archaeological evidence of activity are located within the immediate survey area, within a 1km radius of the site, archaeological evidence of activity from a number of periods has been chronicled and is outlined, by period below;

#### **Prehistoric Period**

There are scatters of flints, suggesting Mesolithic activity, yet the closest scattering of material has been recorded, approximately 1km north of the survey area.

Furthermore, in Gab Wood, there is evidence of rock art, carved into boulders. These represent circular, decorated cup marks and are likely to date from the Late Neolithic to the Bronze Age (2800BC – 500BC). These form an important part of the prehistoric landscape of the Aire Valley. It is possible that the Gab Wood Rock art is an outlying group, related to the carved rocks of Rombalds Moor.

Within a garden, to the west of the site, near to Otley Road, a sherd of Early Bronze Age Beaker pottery and flint were discovered.

#### **Roman and Saxon Periods**

To the south-east of the site, close to Adel Mill Farm, Roman remains have been discovered which may be associated with a Roman fort (AECOM 2015). A variety of Roman material, gathered in the 18th century by antiquarians include Roman coins which date to the mid and late 1<sup>st</sup> century as well as the early 2<sup>nd</sup> century AD.

By the later 5<sup>th</sup> century the area was part of the Kingdom of Elmet, a kingdom which extended across both West and South Yorkshire, this area was later conquered by the Kingdom of Northumbria.

In the 9<sup>th</sup> century the Northumbrian Kingdom succumbed to the invading Viking army, and by 886AD the entirety of the north of England was under Scandinavian rule.

The Doomsday book provides evidence for occupation at Cookridge in the later Saxon period. In 1086 the manor of Cookridge was held by Alward, who also held the manors of Adel, Arthrington, Burden Head and Ecupp.

#### **Medieval Period**

The manor of Cookridge was laid to waste during the Conquest, and alongside the other manors previously held by Alward they were given to Count Robert of Mortain. By the 11<sup>th</sup> century the manor had passed to Ralph Paynel, and by the 12<sup>th</sup> century much of the land in Cookridge had passed to Kirkstall Abbey, where a grange was established on the land now occupied by Cookridge Hall.

#### **Post-Medieval to Modern Periods**

Examination of historic mapping of the site suggests that the land has remained in agricultural use, and sits within an agricultural landscape where many of the farms and their buildings originate in the 17<sup>th</sup> century (AECOM 2015).

The Leeds to Thirsk railway was constructed between 1845 and 1849. The line became known as the Leeds Northern Railway in 1852, and two years later it became part of the North Eastern Railway.

Cookridge became part of Leeds in 1926. During the late 1950s and 1960s the development of the Moseley Wood housing estate took place, it is this which bounds the current PDA.

# 3 Aims and Methodology

The main aim of the geophysical survey was to provide sufficient information to enable an assessment to be made of the impact of the development on potential sub-surface archaeological remains and for further evaluation or mitigation proposals, if appropriate, to be recommended. To achieve this aim, a magnetometer survey covering all amenable parts of the PDA was undertaken (see Fig. 2).

The general objectives of the geophysical survey were:

- to establish the presence/absence of any anomalies which may be of archaeological origin within the PDA, in order to determine the archaeological potential of the site
- to define the extent of any anomalies identified
- to characterise, if possible, the features or anomalies identified
- to inform the requirement for further archaeological work (if required), of key target areas that could be investigated by archaeological trial trench evaluation.

#### **Magnetometer survey**

The site grid was laid out using a Trimble VRS differential Global Positioning System (Trimble 5800 model). The survey was undertaken using Bartington Grad601 magnetic gradiometers. These were employed taking readings at 0.25m intervals on zig-zag traverses 1.0m apart within 30m by 30m grids, so that 3600 readings were recorded in each grid. These readings were stored in the memory of the instrument and later downloaded to computer for processing and interpretation. Geoplot 3 (Geoscan Research) software was used to process and present the data. Further details are given in Appendix 1.

#### Reporting

A general site location plan, incorporating the 1:50000 Ordnance Survey (OS) mapping, is shown in Figure 1. Figure 2 displays processed magnetometer data at a scale of 1:2500. An

overall interpretation of data is shown in Figure 3, again at a scale of 1:2500. The processed and minimally processed data, together with an interpretation of the survey results are presented in Figures 4 to 12 inclusive at a scale of 1:1000.

Technical information on the equipment used, data processing and survey methodologies are given in Appendix 1. Technical information on locating the survey area is provided in Appendix 2. Appendix 3 describes the composition and location of the archive.

The survey methodology, report and any recommendations comply with guidelines outlined by English Heritage (David *et al.* 2008) and by the Chartered Institute for Archaeologists (CIfA 2014). All figures reproduced from Ordnance Survey mapping are with the permission of the controller of Her Majesty's Stationery Office (© Crown copyright).

The figures in this report have been produced following analysis of the data in 'raw' and processed formats and over a range of different display levels. All figures are presented to most suitably display and interpret the data from this site based on the experience and knowledge of Archaeological Services staff.

### **4 Results and Discussion** (see Figures 3 to 12)

#### Ferrous anomalies

Ferrous anomalies, as individual 'spikes', or as large discrete areas are typically caused by ferrous (magnetic) material, either on the ground surface or in the plough-soil, or the proximity of the survey area to magnetic material in boundary fences, buildings, or other above ground features. Little importance is normally given to such anomalies, unless there is any supporting evidence for an archaeological interpretation, as modern ferrous debris or material is common on rural sites, often being present as a consequence of manuring or tipping/infilling. There is no obvious pattern or clustering to their distribution in relation to the geophysical survey undertaken within the PDA, to suggest anything other than a random background scatter of ferrous debris in the plough-soil.

A significant service pipe dominated the PDA (Areas A, B, E, and F), delineated by a pattern of high magnitude responses. This service pipe caused areas of magnetic disturbance in areas close to the service route, demonstrated by the 'speckled' appearance of the data. Magnetic disturbance caused by manhole covers, alongside interference from metal boundary fences and discarded modern material can be found in several areas.

#### Geological anomalies

In Areas C and D discrete low magnitude anomalies (areas of magnetic enhancement) have been identified. These are interpreted as geological in origin and are thought to be caused by variations in the depth and composition of the soils and the superficial deposits from which they derive. In this instance, these anomalies are likely to be a result of topographical changes or geological formations associated with waterlogged areas.

#### **Agricultural anomalies**

A former footpath can be seen crossing through Areas A, B, and F. This linear feature is differentiated from the service based on the morphology and strength of the magnetic response. As indicated by first edition and 1963 OS mapping, the footpath was no longer in use by 1963.

The results and subsequent interpretation of data from geophysical surveys should not be treated as an absolute representation of the underlying archaeological and non-archaeological remains. Confirmation of the presence or absence of archaeological remains can only be achieved by direct investigation of sub-surface deposits.

#### **5 Conclusions**

The survey has not detected anomalies that can be considered to be of definitive archaeological origin. Large areas of magnetic disturbance that have been identified are attributed to above and below ground services (i.e. manhole covers and service pipes). A disused footpath was identified crossing Areas A, B, and F as indicated by OS mapping dated 1893. Responses consistent with variations in the underlying geology have also been identified. Consequently the archaeological potential of this site is deemed to be low.

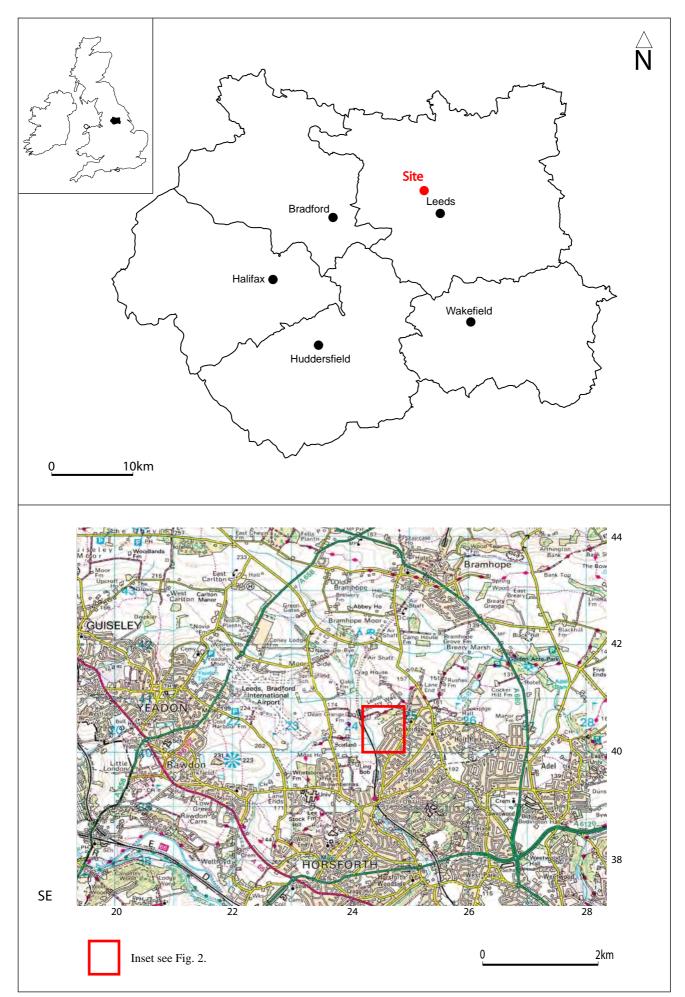
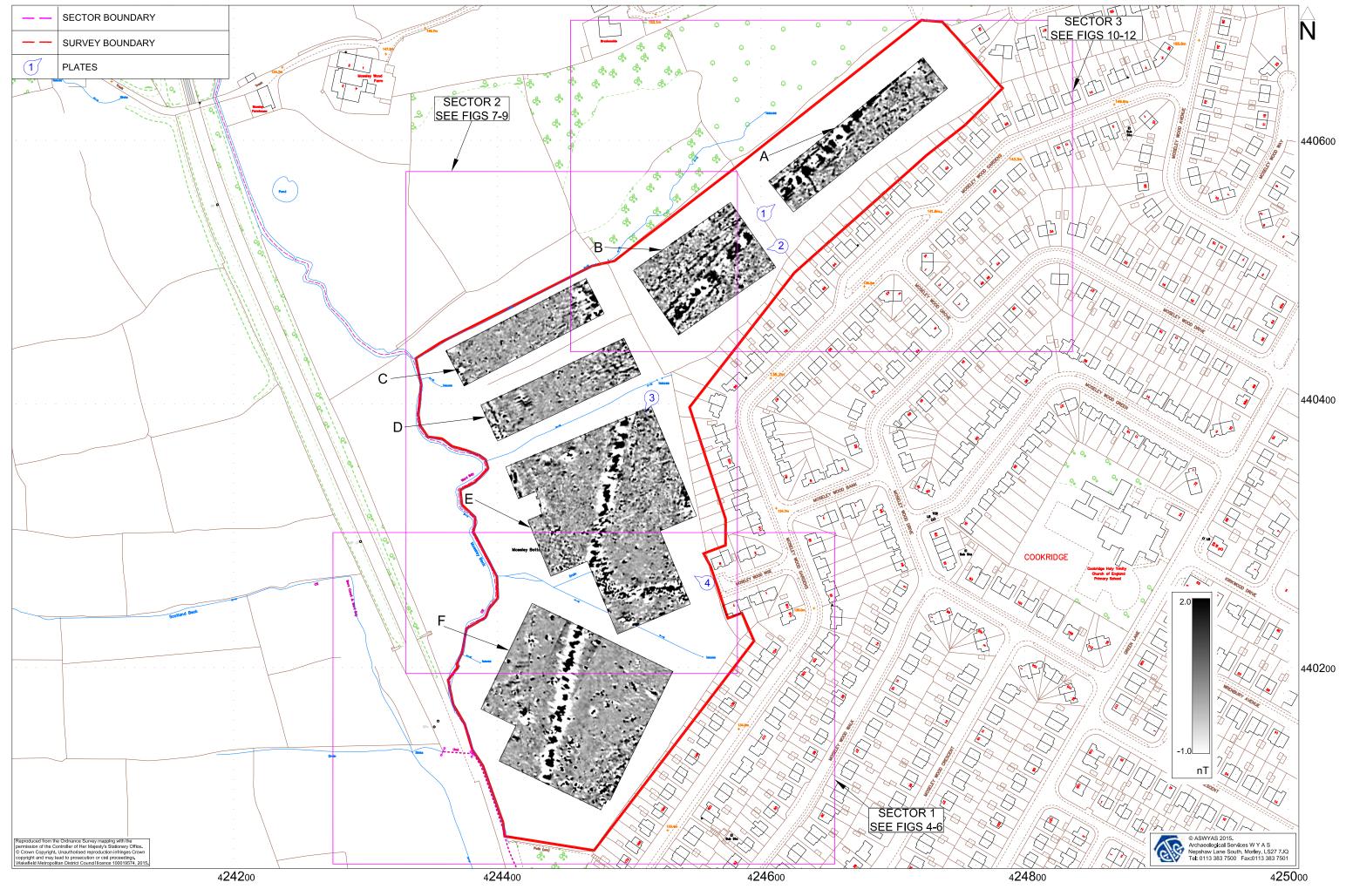


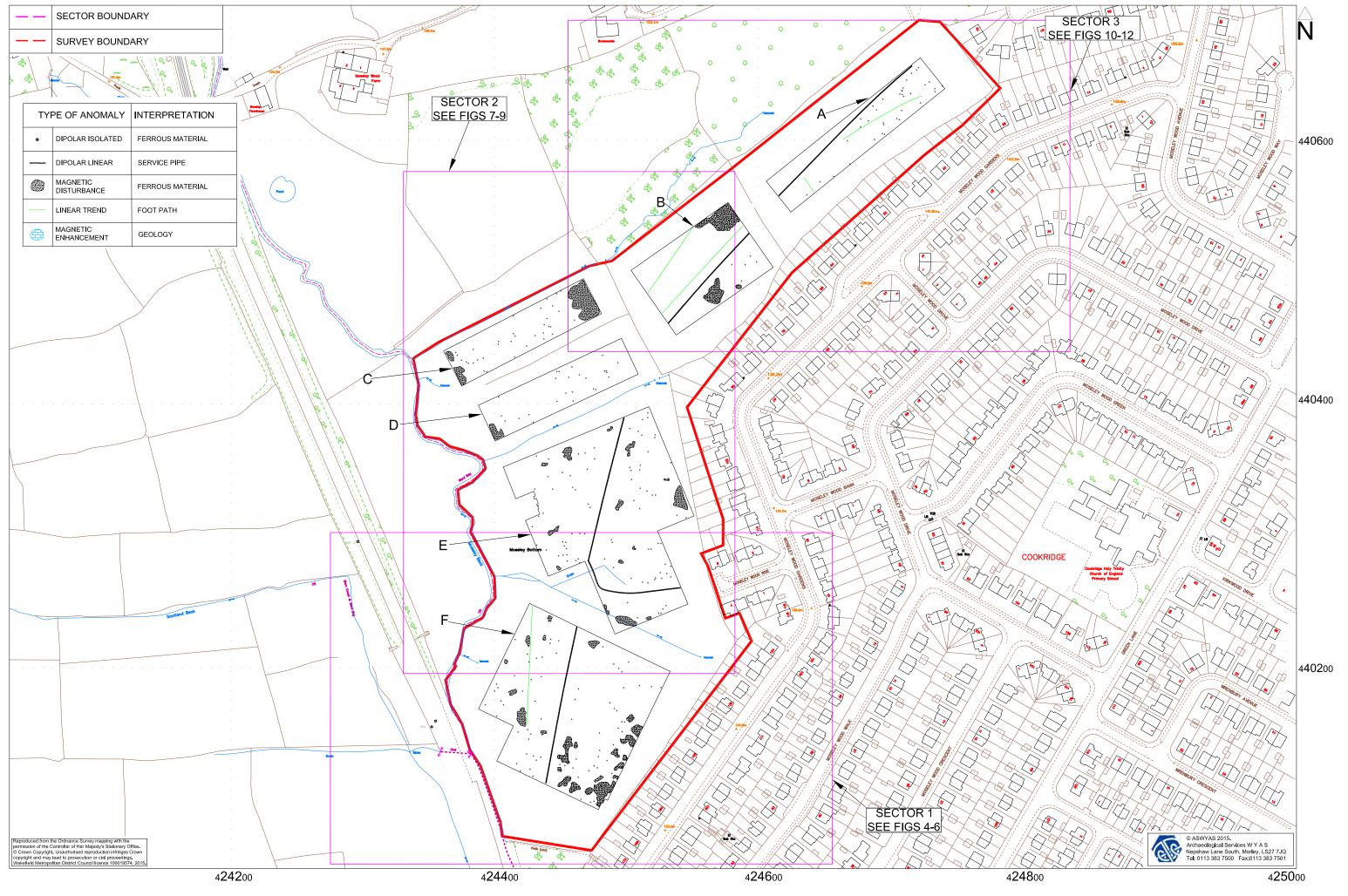
Fig. 1. Site location

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100m

Fig. 2. Survey location showing greyscale magnetometer data (1:2500 @ A3)



100m

Fig. 3. Overall interpretation of magnetometer data (1:2500 @ A3)



Fig. 4. Processed greyscale magnetometer data; Sector 1 (1:1000 @ A3)





Fig. 6. Interpretation of magnetometer data; Sector 1 (1:1000 @ A3)

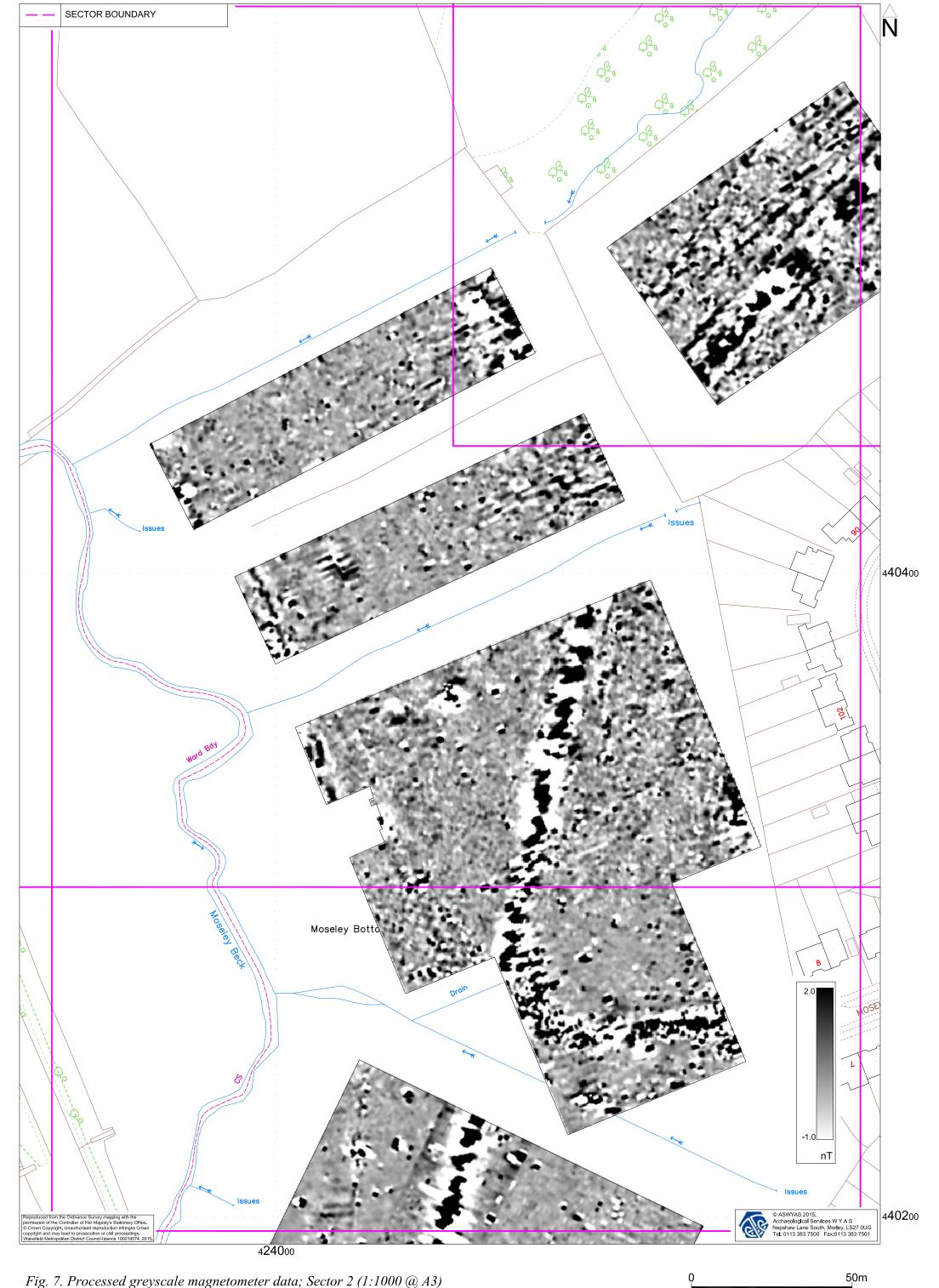


Fig. 7. Processed greyscale magnetometer data; Sector 2 (1:1000 @ A3)



Fig. 8. XY trace plot of minimally processed magnetometer data; Sector 2 (1:1000 @ A3)

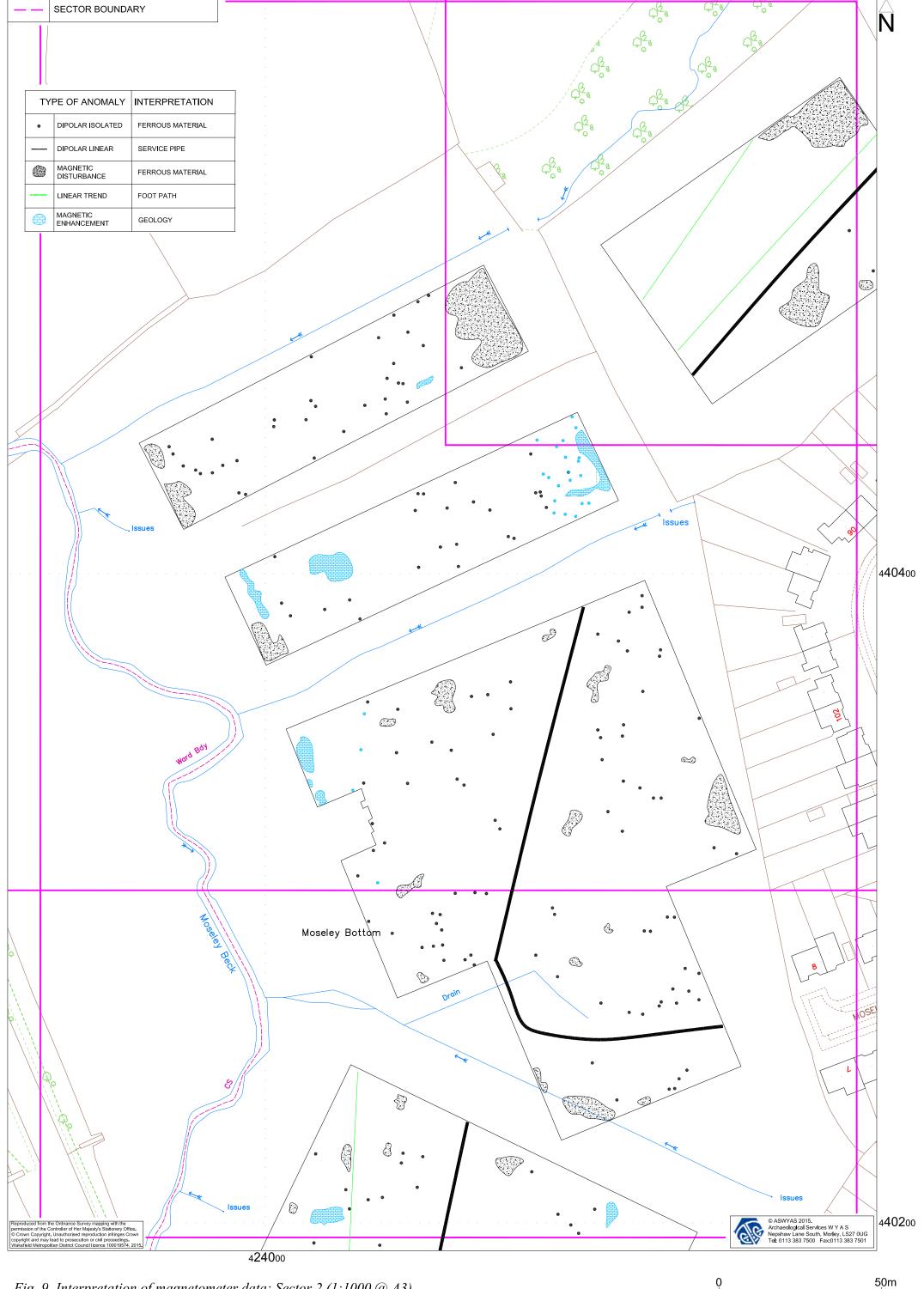




Fig. 10. Processed greyscale magnetometer data; Sector 3 (1:1000 @ A3)

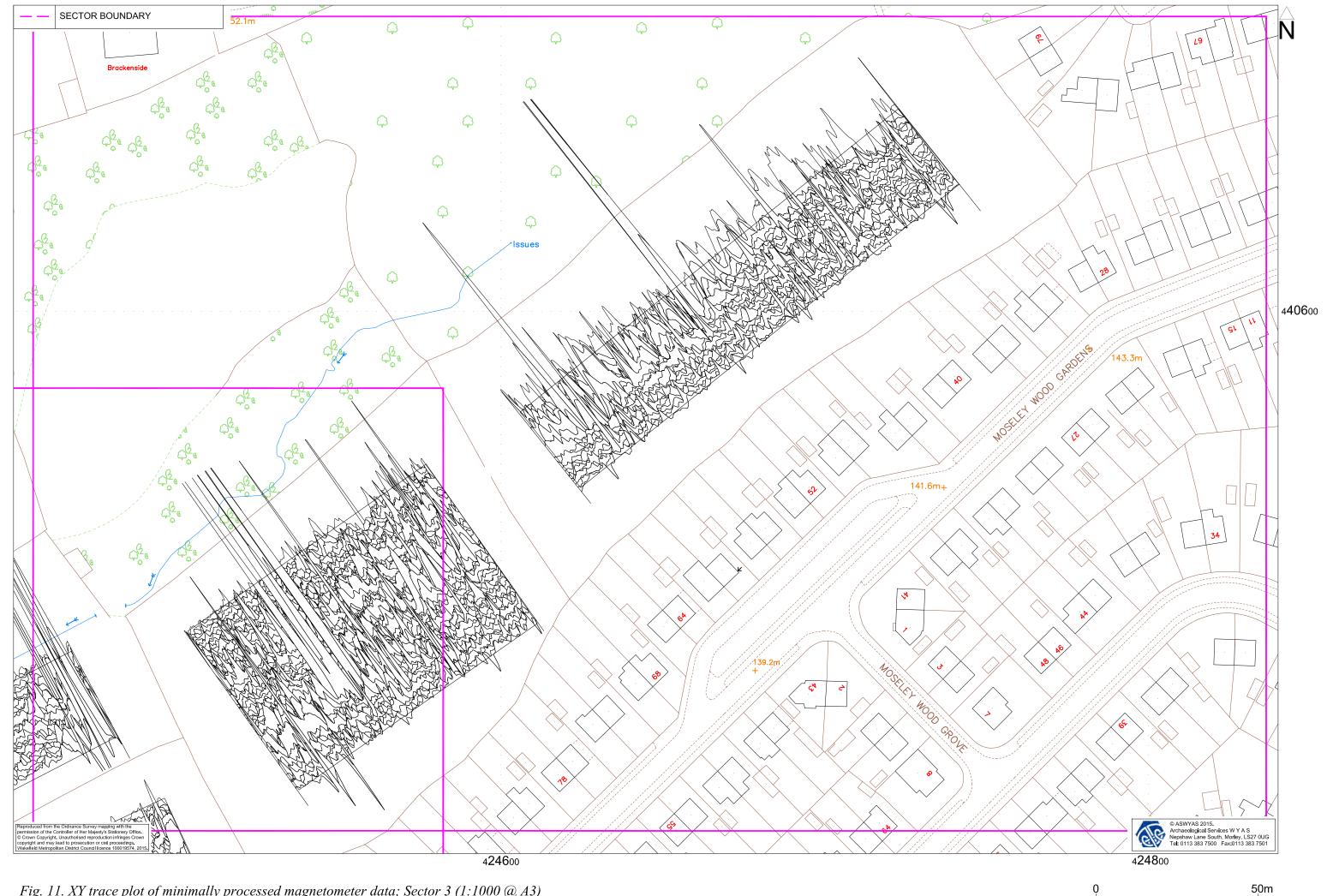


Fig. 11. XY trace plot of minimally processed magnetometer data; Sector 3 (1:1000 @ A3)

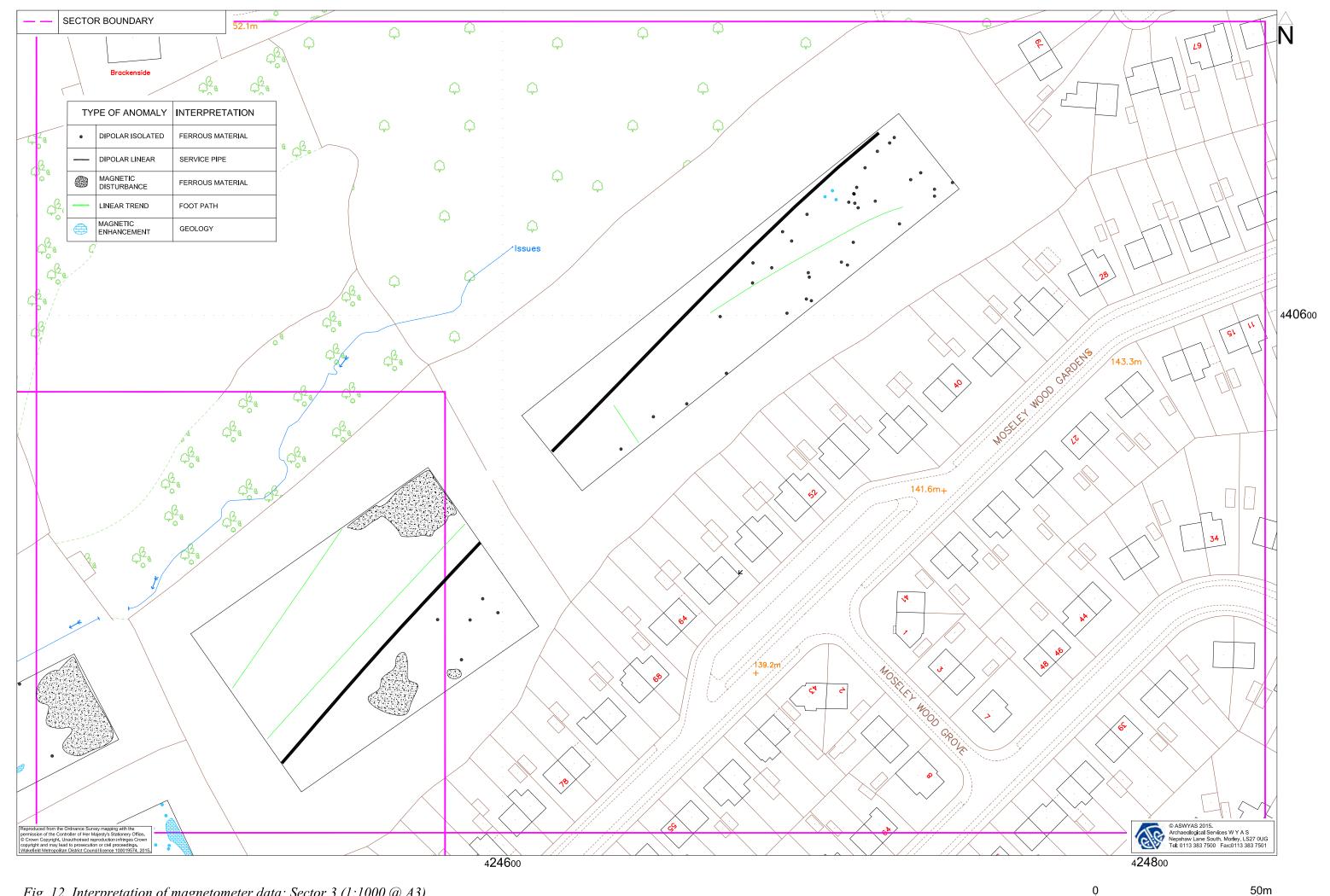


Fig. 12. Interpretation of magnetometer data; Sector 3 (1:1000 @ A3)



Plate 1. General view of Area A, looking east



Plate 2. General view of Area B, looking west



Plate 3. General view of Areas D and E, looking south-west



Plate 4. General view of Areas E and F, looking north-west

Country England

Site location WEST YORKSHIRE LEEDS HORSFORTH Land off Moseley Gardens, Cookridge

Postcode **LS167HS** 

Study area 4.5 Hectares

Site coordinates SE 24441 40350 53.858590512472 -1.628358606265 53 51 30 N 001 37 42 W

Point

#### **Project creators**

Name of Organisation Archaeological Services WYAS

Project brief originator

West Yorkshire Archaeological Advisory Service

Project design originator

Archaeological Services WYAS

**Project** 

director/manager

C. Sykes

Project supervisor

C. Sykes

Type of

sponsor/funding

body

Exists?

Developer

#### Project archives

Physical Archive

No

Digital Archive

**ADS** 

recipient **Digital Contents** 

"Survey"

Digital Media

available

"Geophysics", "Images raster / digital photography"

Paper Archive

recipient

**ADS** 

**Paper Contents** 

"Survey"

Paper Media available

"Map", "Report", "Survey"

#### **Project** bibliography 1

Grey literature (unpublished document/manuscript)

Publication type

Title Land off Moseley Gardens, Cookridge, Leeds

Author(s)/Editor(s) Green, A

Other 2828, report number

bibliographic details

Date 2015

Issuer or publisher ASWYAS

Place of issue or

publication

Morley, Leeds

# **Appendix 1: Magnetic survey - technical information**

#### **Magnetic Susceptibility and Soil Magnetism**

Iron makes up about 6% of the Earth's crust and is mostly present in soils and rocks as minerals such as maghaemite and haemetite. These minerals have a weak, measurable magnetic property termed magnetic susceptibility. Human activities can redistribute these minerals and change (enhance) others into more magnetic forms. Areas of human occupation or settlement can then be identified by measuring the magnetic susceptibility of the topsoil because of the attendant increase (enhancement) in magnetic susceptibility. If the enhanced material subsequently comes to fill features, such as ditches or pits, localised isolated and linear magnetic anomalies can result whose presence can be detected by a magnetometer (fluxgate gradiometer).

In general, it is the contrast between the magnetic susceptibility of deposits filling cut features, such as ditches or pits, and the magnetic susceptibility of topsoils, subsoils and rocks into which these features have been cut, which causes the most recognisable responses. This is primarily because there is a tendency for magnetic ferrous compounds to become concentrated in the topsoil, thereby making it more magnetic than the subsoil or the bedrock. Linear features cut into the subsoil or geology, such as ditches, that have been silted up or have been backfilled with topsoil will therefore usually produce a positive magnetic response relative to the background soil levels. Discrete feature, such as pits, can also be detected. The magnetic susceptibility of a soil can also be enhanced by the application of heat and the fermentation and bacterial effects associated with rubbish decomposition. The area of enhancement is usually quite large, mainly due to the tendency of discard areas to extend beyond the limit of the occupation site itself, and spreading by the plough.

#### **Types of Magnetic Anomaly**

In the majority of instances anomalies are termed 'positive'. This means that they have a positive magnetic value relative to the magnetic background on any given site. However some features can manifest themselves as 'negative' anomalies that, conversely, means that the response is negative relative to the mean magnetic background.

Where it is not possible to give a probable cause of an observed anomaly a '?' is appended.

It should be noted that anomalies interpreted as modern in origin might be caused by features that are present in the topsoil or upper layers of the subsoil. Removal of soil to an archaeological or natural layer can therefore remove the feature causing the anomaly.

The types of response mentioned above can be divided into five main categories that are used in the graphical interpretation of the magnetic data:

#### Isolated dipolar anomalies (iron spikes)

These responses are typically caused by ferrous material either on the surface or in the topsoil. They cause a rapid variation in the magnetic response giving a characteristic 'spiky' trace. Although ferrous archaeological artefacts could produce this type of response, unless there is supporting evidence for an archaeological interpretation, little emphasis is normally given to such anomalies, as modern ferrous objects are common on rural sites, often being present as a consequence of manuring.

#### Areas of magnetic disturbance

These responses can have several causes often being associated with burnt material, such as slag waste or brick rubble or other strongly magnetised/fired material. Ferrous structures such as pylons, mesh or barbed wire fencing and buried pipes can also cause the same disturbed response. A modern origin is usually assumed unless there is other supporting information.

#### Linear trend

This is usually a weak or broad linear anomaly of unknown cause or date. These anomalies are often caused by agricultural activity, either ploughing or land drains being a common cause.

#### Areas of magnetic enhancement/positive isolated anomalies

Areas of enhanced response are characterised by a general increase in the magnetic background over a localised area whilst discrete anomalies are manifest by an increased response on two or three successive traverses. In neither instance is there the intense dipolar response characteristic exhibited by an area of magnetic disturbance or of an 'iron spike' anomaly (see above). These anomalies can be caused by infilled discrete archaeological features such as pits or post-holes or by kilns. They can also be caused by pedological variations or by natural infilled features on certain geologies. Ferrous material in the subsoil can also give a similar response. It can often therefore be very difficult to establish an anthropogenic origin without intrusive investigation or other supporting information.

#### Linear and curvilinear anomalies

Such anomalies have a variety of origins. They may be caused by agricultural practice (recent ploughing trends, earlier ridge and furrow regimes or land drains), natural geomorphological features such as palaeochannels or by infilled archaeological ditches.

#### **Methodology: Gradiometer Survey**

The main method of using the fluxgate gradiometer for commercial evaluations is referred to as *detailed survey* and requires the surveyor to walk at an even pace carrying the instrument within a grid system. A sample trigger automatically takes readings at predetermined points, typically at 0.25m intervals, on traverses 1m apart. These readings are stored in the memory of the instrument and are later dumped to computer for processing and interpretation.

During this survey a Bartington Grad601 magnetic gradiometer was used taking readings on the 0.1nT range, at 0.25m intervals on zig-zag traverses 0.5m apart within 30m by 30m square grids. The instrument was checked for electronic and mechanical drift at a common point and calibrated as necessary. The drift from zero was not logged.

The gradiometer data have been presented in this report in processed greyscale format. The data in the greyscale images have been interpolated and selectively filtered to remove the effects of drift in instrument calibration and other artificial data constructs and to maximise the clarity and interpretability of the archaeological anomalies.

The results and subsequent interpretation of data from geophysical surveys should not be treated as an absolute representation of the underlying archaeological and non-archaeological remains. Confirmation of the presence or absence of archaeological remains can only be achieved by direct investigation of sub-surface deposits

# **Appendix 2: Survey location information**

An initial survey station was established using a Trimble VRS differential Global Positioning System (Trimble R6 model). The data was geo-referenced using the geo-referenced survey station with a Trimble RTK differential Global Positioning System (Trimble R6 model). The accuracy of this equipment is better then 0.01m. The survey grids were then super-imposed onto a base map provided by the client to produce the displayed block locations. However, it should be noted that Ordnance Survey positional accuracy for digital map data has an error of 0.5m for urban and floodplain areas, 1.0m for rural areas and 2.5m for mountain and moorland areas. This potential error must be considered if co-ordinates are measured off hard copies of the mapping rather than using the digital co-ordinates.

Archaeological Services WYAS cannot accept responsibility for errors of fact or opinion resulting from data supplied by a third party.

# **Appendix 3: Geophysical archive**

The geophysical survey archive comprises:-

- an archive disk containing compressed (WinZip 8) files of the raw data, report text (Microsoft Word 2000), and graphics files (Adobe Illustrator CS2 and AutoCAD 2008) files; and
- a full copy of the report.

At present the archive is held by Archaeological Services WYAS although it is anticipated that it may eventually be lodged with the Archaeology Data Service (ADS). Brief details may also be forwarded for inclusion on the English Heritage Geophysical Survey Database after the contents of the report are deemed to be in the public domain (i.e. available for consultation in the West Yorkshire Environment Record).

# **Appendix 4: Oasis form**

# OASIS DATA COLLECTION FORM: England

List of Projects | Manage Projects | Search Projects | New project | Change your details | HER coverage | Change country | Log out

#### Printable version

OASIS ID: archaeol11-232674

#### Project details

Project name Land off Moseley Wood Gardens, Cookridge, Leeds

Short description of the project

A geophysical (magnetometer) survey, covering approximately 4.5 hectares, was carried out on pasture located north-west of Moseley Wood Gardens in the suburb of Cookridge, Leeds, West Yorkshire. The survey was undertaken prior to the proposed development of the site. Large areas of magnetic disturbance were

present caused by modern services and boundary fencing. Anomalies

corresponding to geological variation and former field boundaries/ footpaths were also noted. No anomalies of obvious archaeological potential have been identified within the survey area. Consequently the archaeological potential of this site is

deemed to be low.

Project dates Start: 01-11-2015 End: 30-11-2015

Previous/future

work

No / Not known

Any associated project reference

codes

5271 - Sitecode

Type of project Field evaluation

Current Land use Grassland Heathland 2 - Undisturbed Grassland

Monument type FIELD BOUNDARIES Modern

Significant Finds N/A Modern

Methods & techniques

"Geophysical Survey"

Development type Housing estate

Prompt National Planning Policy Framework - NPPF

Position in the planning process

Not known / Not recorded

Solid geology (other)

Pennine Lower Coal Measures Formation

Drift geology GLACIAL SAND AND GRAVEL

Techniques Magnetometry

**Project location** 

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