WYAS Archaeological Services

Bromley Farm Quarry
Upper Cumberworth
West Yorkshire

Geophysical Survey

Report no. 4401
November 2025

Client: Silkstone Environmental Ltd

Bromley Farm Quarry
Upper Cumberworth
West Yorkshire

Geophysical Survey

Summary

A geophysical (magnetometer) survey was undertaken on approximately 5 hectares of land located to the south of Cumberland Lane, Upper Cumberworth, West Yorkshire. Anomalies of both a definite and a possible archaeological origin have been detected including part an enclosure and other ditch responses. Medieval or post-medieval ridge and furrow cultivation has also been detected along with a former field boundary and modern ploughing. Geological responses can be seen throughout and are especially strong and widespread in places. Based on the geophysical survey, the archaeological potential of this Site is deemed to be high in the northwest and unknown elsewhere due to the possible masking of features by the geology.

WYAS
Archaeological Services

Report Information

Client:	Silkstone Environmental Ltd
Report Type:	Geophysical Survey
Location:	Upper Cumberworth
County:	West Yorkshire
Grid Reference:	SE 21698 09113
Period(s) of activity:	?Prehistoric
Report Number:	4401
Project Number:	XS55
Site Code:	BRQ25
OASIS ID:	archaeol11-538545
Date of fieldwork:	October 2025
Date of report:	November 2025
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Fieldwork:	Amy Chatterton BSc MA
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Illustrations:	Emma Brunning
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Contents

List of Figures

List of Plates

1 Introduction

Archaeological Services ASWYAS has been commissioned by Silkstone Environmental Ltd to undertake a geophysical survey on land to the north of the former Bromley Farm Quarry, to the northeast of Upper Cumberworth, West Yorkshire. This was undertaken in line with current best practice (CIfA 2020; Schmidt *et al.* 2015). The survey was carried out on the 30th October 2025 to provide additional information on the archaeological resource of the Site.

Site location, topography and land-use

The Site is located at SE 21698 09113 (approximate centre), comprising *c.* 5 ha over three fields situated to the northeast of Upper Cumberworth and the southwest of Lower Cumberworth (see Fig. 1).

The Site is situated to the south of Cumberland Lane with land consisting of pasture (see Plates 1-4). It is bounded on all sides with further pasture fields. The site lies at 229m (above Ordnance Datum) aOD in the northeast, falling to approximately 227m aOD in the southwest.

Soils and geology

The recorded bedrock geology comprises mainly Pennine Lower Coal Measures Formation – sandstone, a sedimentary bedrock that formed between 319 and 318 million years ago during the Carboniferous period. In the southwest of Site Pennine Lower Coal Measures Formation is also present but with a composition of mudstone, siltstone and sandstone. Superficial geology has not been recorded (BGS 2025).

Soils in the northern half of the Site are described as slowly permeable seasonally wet acid loamy and clayey soils (Soilscape 17) and in the south as freely draining slightly acid loamy soils (Soilscape 6) (Landis 2025).

2 Archaeological Background

The archaeological background below is taken from an archaeological Desk-based Assessment (Horn 2022). Heritage assets and previous archaeological investigations were obtained from the West Yorkshire Environment Record (WYHER).

The earliest settlement around Upper Cumberworth has been discovered behind the Sovereign public house, approximately 2.75km to the west of the Site. This area known as ‘Burnt Cumberworth’ contained the remains of a floor and ridges thought to be of British Celtic origin.

Some of the earliest documentary evidence of Upper and Lower Cumberworth is contained within the Domesday Survey of 1086. Here it is described as being in the hundred of Staincross and the county of Yorkshire. It had no recorded population, sometimes the case even for large towns, as well as scattered or abandoned settlements. The Tenant-in-chief in 1086 is listed as Ilbert of Lacy.

The place name 'Cumberworth' is derived from the element cumbra (a personal name) and the Old English element word for enclosure (MWY1592).

The next discernible reference to settlement within Cumberworth revolves around the church. It is not known exactly when Christianity arrived within the village, but a chapel was in existence by 1299 as mentioned in the Chartulary of St John of Pontefract.

There is a possible medieval settlement of Byrke, on the original site of Birk House located 1km west of the Site.

Earthworks and cropmarks in the study area include a circular feature visible as a cropmark 950m west of the Site. This is possibly a former pit shaft or a small bell pit or pond (MWY393). A ploughed-out field boundary, probable ridge and furrow and two short lengths of curvilinear ditch are visible as a cropmarks 450m west of Site (MWY426). Further linear cropmarks are visible 325m north of the Site (MWY475).

3 Aims, Methodology and Presentation

The aims and objectives of the programme of geophysical survey were to gather sufficient information to establish the presence/absence, character and extent, of any archaeological remains within the specific area and to inform an assessment of the archaeological potential of the site. To achieve this aim, a magnetometer survey covering all amenable parts of the Site was undertaken (see Fig. 2).

The general aims of the geophysical survey were:

- to provide information about the nature and possible interpretation of any magnetic anomalies identified;
- to therefore determine the presence/absence and extent of any buried archaeological features; and
- to prepare a report summarising the results of the survey.

Magnetometer survey

The cart-based survey was undertaken using an eight channel SenSYS MX V3 system containing eight FGM650 sensors. Readings are taken every 20MHz (between 0.05 and 0.1m). Data were recorded onto a device, using a Carlson GNSS Smart antenna, for

centimetre accuracy. These readings were stored in the memory of the instrument and downloaded for processing and interpretation. DLMGPS and MAGNETO software, alongside bespoke in-house 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. Processed and minimally processed data, together with interpretation of the survey results are presented in Figures 3 to 5 inclusive at a scale of 1:1500.

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. A copy of the completed OASIS form is included in Appendix 4.

The survey methodology, report and any recommendations comply with guidelines outlined by the European Archaeological Council (Schmidt *et al*. 2015) and by the Chartered Institute for Archaeologists (CIfA 2020). All figures reproduced from Ordnance Survey mapping are with the permission of the controller of His Majesty's Stationery Office (© Crown copyright).

The figures in this report have been produced following analysis of the data in 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 5)

Ferrous anomalies and magnetic disturbance

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. 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 present as a consequence of manuring or tipping/infilling. There is no obvious pattern or clustering to their distribution in this survey to suggest anything other than a random background scatter of ferrous debris in the plough-soil.

Ferrous response **F1** to the immediate southeast of an enclosure (**A1**) is likely to be of modern origin, but due its location an archaeological origin cannot be dismissed such as an area of intense burning or a large pit.

Other ferrous responses such as those at **F2** are again likely to be buried modern debris or associated with the bedrock geology.

Magnetic disturbance along the limits of the survey areas is due to metal fencing within the field boundaries and interference from the adjacent roads.

Geological anomalies

The survey has detected anomalies throughout that have been interpreted as geological in origin, the north-eastern field being completely dominated by strong responses associated with the sandstone bedrock.

It is likely that any weak anomalies will have been masked by the geology.

Agricultural anomalies

A former field boundary (**FB1**) has been recorded in the south-eastern field and is recorded on Ordnance Survey (OS) mapping published 1854 and remains extant until at least 1906 (NLS 2025). Boundaries shown on historic mapping in the northern fields are not visible in the survey data, perhaps due to being masked by the geology.

Possible medieval or post-medieval ridge and furrow cultivation has been recorded within the north of the Site. Other parallel linear trends can be seen throughout and are associated with modern ploughing. Only a selection of these have been highlighted on the interpretation diagrams to show the direction of the plough lines.

Possible and definite archaeological anomalies

Anomalies of both a definite and possible archaeological origin have been recorded within the dataset. In the northwest of the Site, part of an enclosure (**A1**) can be seen measuring approximately 41m along its north to south axis. There is also a possible entrance in the east.

To the east of **A1**, a linear ditch (**A2**) has been recorded and along with possible archaeological anomalies **P1** may form a larger enclosure or field. Anomalies **P1** have been interpreted as possible archaeology due to similar geological responses in the immediate area. It is also possible that linear response **P2** may relate to **P1** forming an elongated oval, but this is speculative.

Linear response **P3** is on the same orientation as **P1** and may therefore be related to a boundary ditch of some sort.

Within the main area of geology, a handful of anomalies have been highlighted that may be of some archaeological interest. Linear ditch **P4** may be associated with **P3** forming a larger boundary. Anomalies **P5** and **P6** appear to form parts of circular features, but they may also be geological.

5 Conclusions

The geophysical survey has detected magnetic anomalies of both a definite and a possible archaeological origin including part an enclosure and other ditch responses. A handful of other anomalies have been highlighted as possible archaeological features, although a geological origin is also likely.

Medieval or post-medieval ridge and furrow cultivation has also been detected along with a former field boundary and modern ploughing. Geological responses can be seen throughout and are especially strong and widespread in places.

Based on the geophysical survey, the archaeological potential of this Site is deemed to be high in the northwest and unknown elsewhere due to the possible masking of features by the geology.

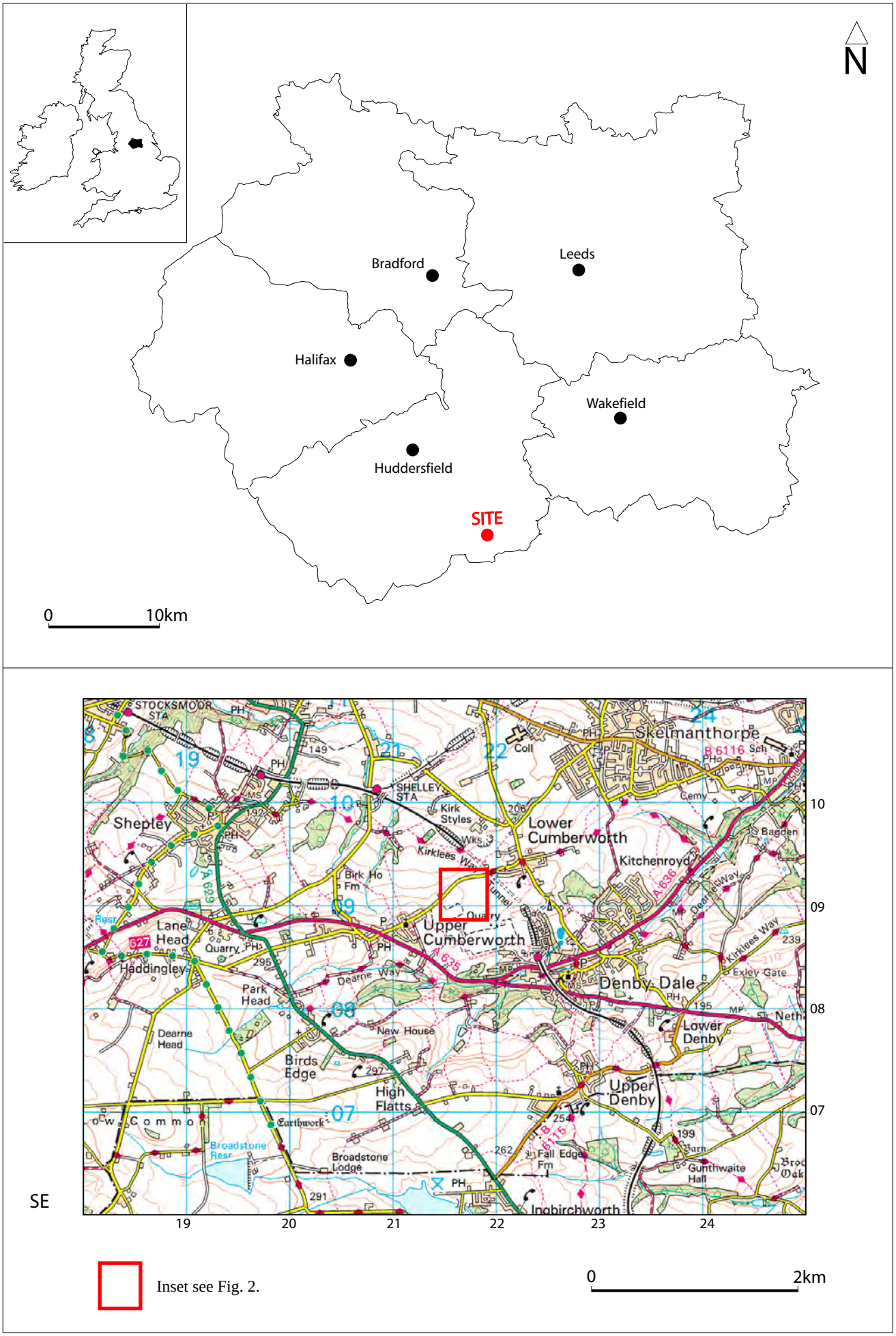

Fig. 1. Site location

Archaeological Services W Y A S,
Nepshaw Lane South, Morley, LS27 7JQ
Tel: 0113 535 3007 Email: archaeology@wyjs.org.uk www.aswyas.com

Project ID: XS55_BRQ25

Survey location showing processed greyscale magnetometer data

Fig. 2

Title

SURVEY AREA

SECTOR BOUNDARY

1 PHOTO LOCATIONS

nT -1.0 2.0

0 100m

1:2500 @ A3

Archaeological Services W Y A S,
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Tel: 0113 535 3007 Email: archaeology@wyjs.org.uk www.aswyas.com

Project ID: XS55_BRQ25

Processed greyscale magnetometer data

Fig. 3

nT -1.0 2.0

0 50m

1:1500 @ A3

Archaeological Services W Y A S,
Nepshaw Lane South, Morley, LS27 7JQ

Tel: 0113 535 3007 Email: archaeology@wyjs.org.uk www.aswyas.com

Project ID: XS55_BRQ25

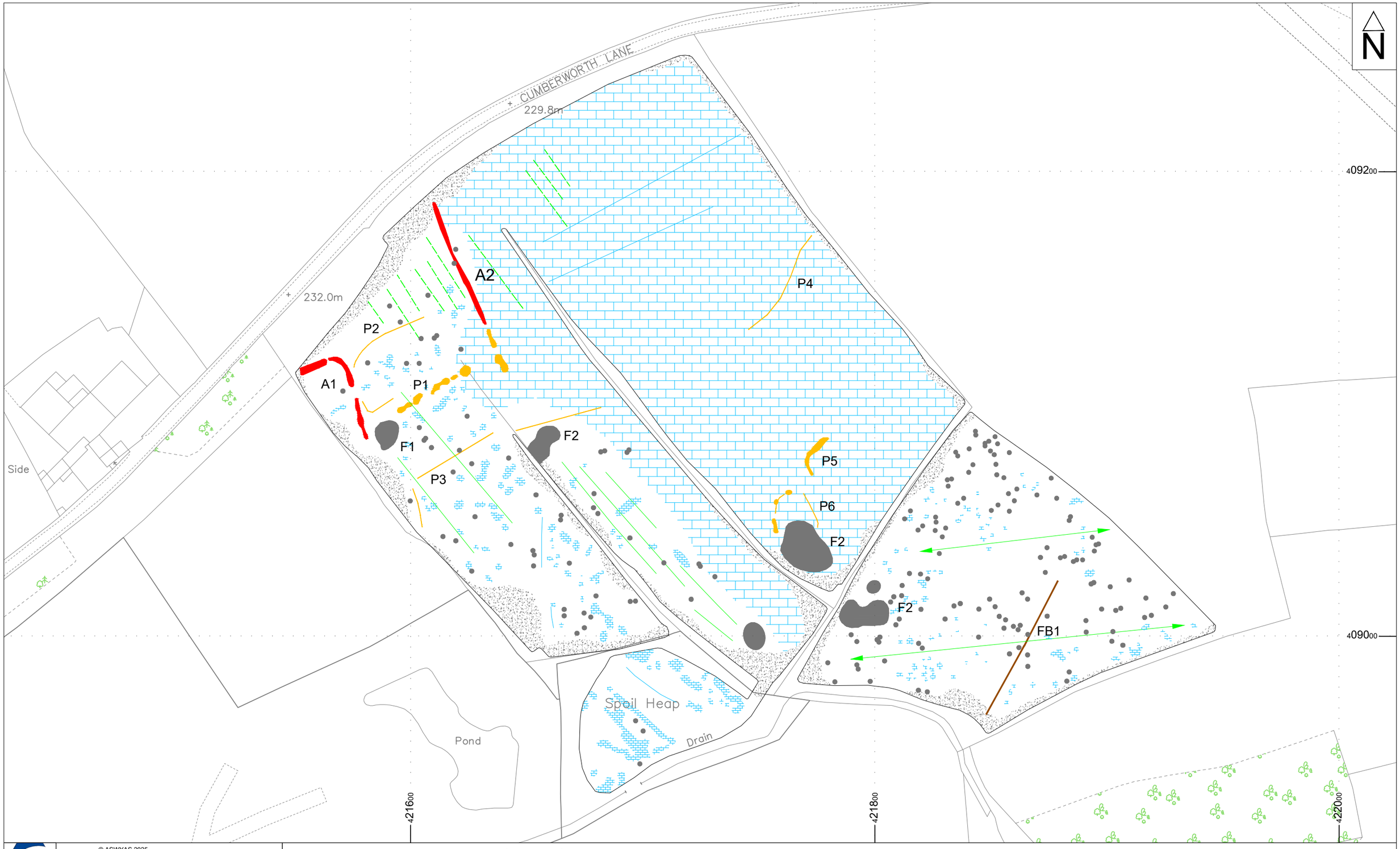
XY trace plot of minimally processed magnetometer data

Fig. 4

15.0 nT/cm

0 50m

1:1500 @ A3



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Project ID: XS55_BRQ25

Interpretation of magnetometer data

Fig. 5

Interpretation

FERROUS	AGRICULTURAL	ARCHAEOLOGY?
MAGNETIC DISTURBANCE	FORMER FIELD BOUNDARY	ARCHAEOLOGY
RIDGE & FURROW	GEOLOGY	

0 50m

1:1500 @ A3

Plate 1. General view of survey area, looking south

Plate 2. General view of survey area, looking southwest

Plate 3. General view of survey area, looking south

Plate 4. General view of survey area, looking northeast

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 an eight channel Sensys MX V3 system containing eight FGM650 sensors was also used which was towed across the area using an ATV. Readings were taken every 20MHz (between 0.05 and 0.1m). Data was be recorded onto a device, using a Carlson GNSS Smart antenna, for centimetre accuracy. These readings were stored in the memory of the instrument and downloaded for processing and interpretation.

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.

Appendix 2: Survey location information

Data was recorded onto a device, using a Carlson GNSS BRx7 Smart antenna, for centimetre accuracy. These readings were stored in the memory of the instrument and downloaded for processing and interpretation. The accuracy of the BRx7 is between 0.15cm – 0.8cm. The BRx7 has a built-in tilt sensor to correct collected point coordinates to within 2cm.

The survey data were then super-imposed onto a base map provided by the client to produce the displayed 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 and metadata

The geophysical archive comprises:-

- an archive disk containing compressed (WinZip 8) files of the raw data, report text (Microsoft Word 2003), and graphics files (Adobe Illustrator CS6 and AutoCAD 2017) 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 Historic Environment Record).

Appendix 4: Oasis form

OASIS ID (UID)	archaeol11-538545
Project Name	Geophysical Survey at Bromley Farm Quarry
Sitename	Bromley Farm Quarry
Sitecode	BRQ25
Activity type	Geophysical Survey, MAGNETOMETRY SURVEY
Planning Id	
Reason For Investigation	Planning: Pre application
Organisation Responsible for work	Archaeological Services WYAS
Project Dates	30-Oct-2025 - 30-Oct-2025
Location	**Bromley Farm Quarry** NGR: SE 21698 09113 LL: 53.578168511060376, -1.673768625178224 12 Fig: 421698,409113
Administrative Areas	Country: England County/Local Authority: Kirklees Local Authority District: Kirklees Parish: Denby Dale
Project Methodology	The cart-based survey was undertaken using an eight channel SenSYS MX V3 system containing eight FGM650 sensors. Readings are taken every 20MHz (between 0.05 and 0.1m). Data were recorded onto a device, using a Carlson GNSS Smart antenna, for centimetre accuracy. These readings were stored in the memory of the instrument and downloaded for processing and interpretation. DLMGPS and MAGNETO software, alongside bespoke in-house software was used to process and present the data.
Project Results	A geophysical (magnetometer) survey was undertaken on approximately 5 hectares of land located to the south of Cumberland Lane, Upper Cumberworth, West Yorkshire. Anomalies of both a definite and a possible archaeological origin have been detected including part an enclosure and other ditch responses. Medieval or post-medieval ridge and furrow cultivation has also been detected along with a former field boundary and modern ploughing. Geological responses can be seen throughout and are especially strong and widespread in places. Based on the geophysical survey, the archaeological potential of this Site is deemed to be high in the northwest and unknown elsewhere due to the possible masking of features by the geology.
Funder	Private or public corporation Silkstone Environmental Ltd
HER	West Yorkshire HER - unRev - STANDARD
Person Responsible for work	Emma Brunning

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