M42 Junction 6 Improvement
Scheme Number TR010027
Volume 6
6.3 Environmental Statement
Appendix 7.3 Archaeological Geophysical Survey

Regulation 5(2)(a)

Planning Act 2008

Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

January 2019

Infrastructure Planning

Planning Act 2008

The Infrastructure Planning (Applications: Prescribed Forms and Procedure) Regulations 2009

M42 Junction 6 Improvement

Development Consent Order 201[-]

6.3 Environmental Statement
Appendix 7.3 Archaeological Geophysical Survey

Regulation Number	Regulation 5(2)(a)
Planning Inspectorate Scheme Reference	TR010027
Application Document Reference	6.3
Author	M42 Junction 6 Improvement Project Team and Highways England

Version	Date	Status of Version
1	January 2019	DCO Application

M42 Junction 6 Improvement Scheme Warwickshire

Archaeological geophysical survey

Project No. ARC/2317/849

OASIS reference number: phasesit1-319458

May 2018

M42 Junction 6 Improvement Scheme
Warwickshire

Archaeological geophysical survey

Project No. ARC/2317/849

Report prepared by		Report checked by	
Name	Mark Whittingham BSc MA MCIfA	Name	Nicola Fairs BSc MSc DIC CGeol FGS
Signature	[redacted]	Signature	[redacted]
Date	11/06/18	Date	12/06/18

Table of Contents

1. SUMMARY

Phase Site Investigations Ltd was commissioned to carry out a magnetic gradient survey over a number of areas for the proposed M42 Junction 6 Improvement Scheme. The aim of the survey was to help establish the presence / absence, extent, character, relationships and date (as far as circumstances and the inherent limitations of the technique permits) of archaeological features within the survey area.

The survey was undertaken using a combination of a Phase Site Investigations Ltd multi-sensor array cart system (MACS) and a Bartington Grad 601-2 gradiometer. The MACS comprised 8 Foerster 4.032 Ferex CON 650 gradiometers with a control unit and data logger. The MACS data was collected on profiles spaced 0.5 m apart with readings taken at between 0.1 and 0.15 m intervals. The Bartington component was collected at 1 m by 0.25 m intervals over a series of 30 m grids.

Access issues and ground conditions meant that all of the survey areas could not be covered by the magnetic survey. For those areas that were surveyed the majority of the anomalies identified by this survey relate to modern material / objects, agricultural activity (including some ridge and furrow) and geological / pedological variations.

There are numerous linear / curvi-linear anomalies of uncertain origin. Many of these do not form any clear patterns or relationships that would indicate an archaeological origin and the majority of them are considered more likely to be associated with agricultural activity, drainage features or natural features / variations. There are however a number of responses that could be related to infilled features and as such could possibly be associated with archaeological features / activity but generally these anomalies are too weak or fragmented for a reliable interpretation to be made. In the south-east of the site there is a curvi-linear anomaly that could be associated with an archaeological ditch.

There are a number of areas where very strong responses or magnetic disturbance from modern features / material dominate the surrounding data. Some of these areas are suggestive of made ground /fill material, while others could be caused by a surface / near-surface scatter / spread of modern material. It should be recognised that the strength of the strong responses could mask anomalies from other sub-surface features in the area.

The data collected by the MACS generally has a more uniform background than the data collected by the Bartington due to the greater stability of the sensors during data collection. This has allowed a slightly more reliable identification of isolated responses in the MACS areas, although the interpretation of many of these responses is still uncertain.

It is worth noting that the anomalies associated with agricultural activity that have been detected are all relatively weak. This could mean that the soils across the site have a relatively low magnetic susceptibility and if this is the case then it is possible that infilled features would only produce weak responses, which may not be detectable by a magnetic survey in certain ground conditions. It is not certain therefore if the absence of anomalies related to definite archaeological features / activity is due to a lack of such features / activity or an inability to detect them.

2. INTRODUCTION

2.1 Overview

Phase Site Investigations Ltd was commissioned by AECOM to carry out an archaeological geophysical survey over a number of areas for the proposed M42 Junction 6 Improvement Scheme, utilising magnetic gradiometers.

The aim of the survey was to help establish the presence / absence, extent, character, relationships and date (as far as circumstances and the inherent limitations of the technique permits) of archaeological features within the survey area.

The location of the site is shown in drawing ARC_2317_849_01.

2.2 Site description

The survey covered a number of areas along the route of the proposed M42 Junction 6 Improvement Scheme, near Bickenhill, West Midlands, approximately 15 km to the east of Birmingham (approximate centre at NGR SP 185 824). The total size of all the survey areas was approximately 50.2 ha.

The site encompassed parts of 25 fields. Each area had been given a number by the client, which has been adopted for this survey, as shown in drawing ARC_2317_3849_02. The survey areas encompassed a variety of land uses including pasture and arable fields, areas of scrub / rough pasture, sports (rugby) pitches, a residential garden and some areas with dense vegetation.

The geology varies across the site. In the north and west there is Branscombe Mudstone Formation (Areas A1, A2 and majority of A4), the eastern part of A5, southern part of A7 and southern part of A22 are underlain by the Arden Sandstone Formation (sandstones, siltstones and mudstones) with the rest of the site underlain by the Sidmouth Mudstone Formation. The majority of the areas do not have any recorded superficial deposits, although there are patches of glaciofluvial deposits which may lie within parts of some areas (British Geological Survey, 2018). The soils of the site are described as slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (Soilscapes, 2018).

2.3 Archaeological background

A detailed archaeological background of the survey area is not available at the time of writing this report.

It is understood that an archaeological assessment is being prepared by AECOM (in prep.) as part an environmental impact assessment. The results of this geophysical survey will form part of that document and, where relevant will be discussed in the context of the wider archaeological assessment within that document.

2.4 Scope of work

The survey areas were specified by the client.

Some survey areas contained dense vegetation and either could not be surveyed, or only partial coverage was possible, one field contained a mature oil seed rape crop and another field was under plough and these could not be surveyed. There were also some areas where

access could not be obtained and these were not surveyed. Due to these access / ground condition issues the area accessible for survey was reduced to approximately 41 ha, the extents of which is shown in drawing ARC_2317_849_02.

No other problems were encountered during the survey which was carried out between 03 April 2018 and 24 April 2018.

3. SURVEY METHODOLOGY

3.1 Magnetic survey

The survey was undertaken using a combination of a Phase Site Investigations Ltd multi-sensor array cart system (MACS) and Bartington Grad601-02 magnetic gradiometers. The MACS was used for larger areas where there was suitable access and Bartingtons were used for smaller areas or where access / ground conditions were not suitable for a MACS.

Areas A1, A2, A5, A7, A10, A13, A14, A17, A18, A19, A20, A21, A22 and A23 were surveyed with the MACS and areas A4, A6, A8, A15 and A16 were surveyed with the Bartington.

MACS

The MACS comprised 8 Foerster 4.032 Ferex CON 650 gradiometers with a control unit and data logger. The Foerster gradiometers do not require balancing as each sensor is automatically 'zeroed' using the control unit software.

The MACS utilises an RTK GNSS system which means that survey grids do not have to be established. Instead an area is surveyed over a series of continuous profiles and the position of each data point is recorded using an RTK GNSS system. The sensors have a separation of 0.5 m which means that data was collected on profiles spaced at 0.5 m apart. Readings were taken at between 0.1 m and 0.15 m intervals.

Data is collected on zig-zag profiles along the full length or width of a field, although fields can be sub-divided if they are particularly large. Marker canes are set-out along field boundaries at set intervals and these are used to align the profiles. The survey profiles are usually offset from field boundaries, buildings and other metallic features by several metres to reduce the detrimental effect that these surface magnetic features have on the data. The location of the MACS data is converted direct to Ordnance Survey co-ordinates using the UK OSTN 02 projection. As the survey is referenced direct to Ordnance Survey National Grid co-ordinates temporary survey stations are not established.

Bartington

The Bartington Grad601-02 comprises of two gradiometer spaced 1 m apart with integral data logger. The instrument is balanced and 'zeroed' on site in a magnetically uniform area at the start of each day's survey. The instrument is regularly checked for instrument drift during the course of each day and rebalanced as required.

The data is collected over a series of 30 m by 30 m survey grids. All data is collected at 0.25 m intervals over profiles spaced 1 m apart and stored in the instrument for download at the end of the day.

Major grid points on the survey areas are established using a Sokkia GRX-1 RTK GNSS system direct to the Ordnance Survey National Grid system, to an accuracy better than 0.03 m.

Bamboo canes or tent pegs are used to mark the grid points. Intermediate grid points are established using tape measures and the position of each profile is established by stringing either a pre-marked rope or a 100 m tape measure between grid points. Bamboo canes are then used to mark profiles and the operator walks between these at a constant pace.

The location of the survey grids is recorded directly to Ordnance Survey National Grid co-ordinates using the UKO OSTN2 projection to an accuracy better than 0.03 m. As the survey is related direct to Ordnance Survey National Grid co-ordinates temporary survey stations are not established.

3.2 Data processing and presentation

The MACS data was stored direct to a laptop using in-house software which automatically corrects for instrument drift and calculates a mean value for each profile. A positional value is assigned to each data point based on the sensor number and recorded GNSS co-ordinates. The data is gridded using in-house software and parameters are set based on the sensor spacing and mean values. No additional processing is required. The gridded data is then displayed in Surfer 9 (Golden Software) and image files of the data are created.

The Bartington gradiometer data was downloaded and gridded using Archaeosurveyor v 1.5.13. Where required, the data were minimally processed or improved to remove errors caused by instrument drift and / or collection errors (See Appendix 1.4).

The data was exported as raster images (PNG files) and are presented in greyscale format with accompanying interpretations at a scale of 1:1500. All greyscale plots were clipped at -2 nT to 3 nT. Greyscale plots have been 'smoothed' using a visual interpolation but the data itself has not been interpolated.

The data has been displayed relative to a digital Ordnance Survey base plan provided by the client as drawing *'OS data.dwg'*. The base plan was in the National Grid co-ordinate system and as the survey grids / data were referenced directly to National Grid co-ordinates the data could be simply superimposed onto the base plan in the correct position.

X-Y trace plots were examined for all of the data and overlain onto the greyscale plot to assist in the interpretation, primarily to help identify dipolar and bipolar responses that will probably be associated with surface / near-surface iron objects. However, X-Y trace plots have not been presented here as they do not show any additional anomalies that are not visible in the greyscale data. A digital drawing showing the X-Y trace plot overlain on the greyscale plot is provided in the digital archive.

All isolated responses have been assessed using a combination of greyscale and X-Y trace plots. There are a large number of 'iron spike', isolated dipolar anomalies present in the data. There is little evidence to suggest that they are associated with archaeological features and so the majority of these have not been shown in the interpretation.

Anomalies associated with agricultural regimes are present in the data but each individual anomaly has not been shown on the interpretation. Instead the general orientation of the regime is indicated.

The data was examined over several different ranges during the interpretation to ensure that the maximum information possible was obtained from the data.

The anomalies have been categorised based on the type of response that they exhibit and an interpretation as to the cause(s) or possible cause(s) of each anomaly type is also provided.

A general discussion of the anomalies is provided for the entire site and then the results are discussed on an area by area basis. A discussion of the general categories of anomaly which have been identified by the survey is provided in Appendix 1.6.

The geophysical interpretation drawing must be used in conjunction with the relevant results section and appendices of this report.

4. RESULTS

4.1 General

The data quality across the majority of the site is very good / good allowing the data to be viewed at a narrow range of readings to better identify weak anomalies. There are areas that have a more disturbed or variable magnetic background but this is due to the presence of magnetic material in the topsoil or sub-surface, rather than low data quality.

It is worth noting that the anomalies related to agricultural activity have generally only produced weak magnetic anomalies. This suggests that the soils have a relatively weak magnetic susceptibility that may not be sufficiently high enough to produce measureable magnetic responses for some types of infilled features. This could mean that some infilled features may only produce weak or intermittent responses or may not produce measureable magnetic responses.

There are numerous **isolated dipolar** responses (iron spikes) across the site. These contain a strong positive and negative component and are indicative of ferrous or fired material on or near to the surface. **Isolated bipolar** responses are also present. These have strong positive and negative components (but are not technically magnetic dipoles) and tend to be caused by ferrous or fired material on or near to the surface. Isolated bipolar responses are usually produced from larger, or more strongly magnetic, objects, compared to dipolar anomalies, or a concentration of strongly magnetic smaller objects. In the large majority of cases these two types of isolated responses will be caused by modern material. However, the potential for some of these to be associated with archaeological features / material may be increased slightly by their proximity to other anomalies / features. As such some isolated dipolar anomalies have been shown on the interpretation (where they are located in proximity to potential archaeological activity). These are all probably related to modern material but they may have a slight chance of being caused by archaeological material.

Isolated dipolar and smaller isolated bipolar responses located away from the clear archaeological activity are all assumed not to be of archaeological significance and have not been shown on the interpretation. In some instances larger bipolar responses have been shown on the interpretation because they are considered to be more likely to be associated with more significant sub-surface features or material (although in this instance they are not thought to be of archaeological interest). For these responses the main positive component(s) of the response is shown (as this will better represent where an underlying feature / material may be located) and the overall extent of the response is also shown. The latter will usually extend well beyond the underlying feature but may indicate an area where the strong bipolar anomaly could mask responses from any other underlying features.

There are numerous **isolated positive responses** across the site. This type of anomaly can have a variety of causes. They are most commonly related to geological / pedological variations or deeper buried ferrous material and modern fired material but they can be caused by infilled archaeological features, areas of burning (including hearths), industrial archaeological features, such as kilns. Some larger or stronger areas of positive response have been shown on the interpretation. A large majority, if not all, of these anomalies will be associated with geological / pedological variations or relatively modern material but their size or strength could, in some rare cases, mean that they are associated with other activity / features.

4.2 Area A1

Basic topography: Sloping downwards to the south.

Survey area description: Scrub. Relatively firm but uneven underfoot. Bounded to the west by dense vegetation, fences and the M42 and to the south by a stream. No fixed boundaries to the north and east. Dense vegetation limited the survey coverage in places throughout the area.

Survey method: MACS.

Interpretation drawing(s): ARC_2317_849_04 and ARC_2317_849_06.

Summary of anomalies: This area is dominated by magnetic disturbance associated with relatively modern magnetic material.

Several trends of uncertain origin.

Further discussion / additional information:

The strength of the magnetic disturbance in this area indicates a significant amount of relatively modern material. The depth extent of this cannot be determined but it will be more than just a near-surface scatter of material. The strength of the magnetic disturbance is such that responses from any underlying archaeological features, if any such features were present, are unlikely to be identified.

Within the magnetic disturbance in the north of the area there are suggestions of linear anomalies, which have been shown as trends (**Anomalies A1A**). It is not certain if these are a product of responses within the disturbance, that coincidently appear to form linear patterns, or if they may be related to features / variations which underlie the spread of modern material. The regularity and strength of the responses is such that if they are caused by sub-surface features they are unlikely to be archaeological in origin and are probably caused by the remains of relatively modern structures / features.

4.3 Area A2

Basic topography: Relatively level.

Survey area description: Scrub. Relatively firm underfoot. Bounded to the west by dense vegetation, fences and the M42, to the south by dense vegetation and an embankment for a bridge, to the north by a stream with no fixed boundary to the east. Dense vegetation limited the survey coverage in the south. An electricity pylon was present in the east.

Survey method: MACS.

Interpretation drawing(s): ARC_2317_849_06.

Summary of anomalies: Numerous isolated dipolar and small bipolar responses are present, which will be associated with relatively modern material. These have not been shown on the interpretation.

This majority of this area is dominated by magnetic disturbance associated with relatively modern magnetic material.

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

Numerous isolated positive responses. These will be related to relatively modern deeper buried ferrous / fired material. Only larger / stronger responses of this type have been shown.

Further discussion / additional information:

The strength of the magnetic disturbance in this area indicates a significant amount of relatively modern material. The depth extent of this cannot be determined but it will be more than just a near-surface scatter of material. The strength of the magnetic disturbance is such that responses from any underlying archaeological features, if any such features were present, are unlikely to be identified.

The remaining anomalies are all also thought to be related to modern material.

4.4 Area A3

Survey of this area was not required.

4.5 Area A4

Basic topography: Relatively level.

Survey area description: Arable with an immature crop. Relatively soft underfoot. Bounded to the north by a fence, and hedges to the east and west with no fixed boundary to the south. A mobile phone mast was present in the north-east corner of the survey area.

Survey method: Bartington.

Interpretation drawing(s): ARC_2317_849_08.

Summary of anomalies: Numerous isolated dipolar and small bipolar responses are present, which will be associated with relatively modern material. These have not been shown on the interpretation.

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

Several trends of uncertain origin.

Numerous isolated positive responses, the majority of which are probably geological / pedological in origin or related to relatively modern deeper buried ferrous / fired material. Only larger / stronger responses of this type have been shown.

Further discussion / additional information:

There are a number of very weak or diffuse trends in this area. These are too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features. There is no evidence to suggest that the trends in this area are related to archaeological activity. The responses could be caused by natural accumulations of material that is slightly more magnetic

than the surrounding soil, be associated with agricultural or modern features / activity or even be random collections of responses that appear to be linear.

4.6 Area A5

Basic topography: Gradual slope upwards towards the east.

Survey area description: Arable with an immature crop. Generally firm underfoot, soft in places. Bounded by hedges to the north, east and west. Area A7 is to the south. There was no fixed field boundary between the two areas but a line of electricity poles may have demarcated a former field boundary.

Survey method: MACS.

Interpretation drawing(s): ARC_2317_849_08 and ARC_2317_849_10.

Summary of anomalies: Numerous isolated dipolar and small bipolar responses are present, which will be associated with relatively modern material. These have not been shown on the interpretation.

A larger isolated bipolar responses has been shown. This will be related to a concentration, or larger object, of relatively modern ferrous or fired material. It is not thought to be archaeologically significant but has been shown to highlight where there may be significant relatively modern material / object.

Areas of magnetic disturbance associated with relatively modern features / material.

A linear bipolar anomaly associated with modern sub-surface utility apparatus (pipe or cable).

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

A series of positive curvi-linear anomalies associated with ridge and furrow.

A curvi-linear trend with some isolated dipolar responses. Probable former field boundary or headland.

Numerous trends of uncertain origin.

Numerous isolated positive responses, the majority of which are probably geological / pedological in origin or related to relatively modern deeper buried ferrous / fired material. Only larger / stronger responses of this type have been shown.

Further discussion / additional information:

There are two large areas of magnetic disturbance in the north-west of this area. The strength of these responses indicates a significant spread of relatively modern material and is such that responses from any underlying archaeological features, if any such features were present, are

unlikely to be identified. The depth extent of this cannot be determined but it will be more than just a near-surface scatter of material.

There are a numerous weak or diffuse trends in this area. The majority of these are too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features. In the majority of cases there is no evidence to suggest that the trends are related to archaeological activity and the responses could be caused by natural accumulations of material that is slightly more magnetic than the surrounding soil, be associated with agricultural or modern features / activity or even be random collections of responses that appear to be linear.

In the west of the area there are weak trends that are broadly parallel to each other (**Anomalies A5A**). Although these responses are weak their apparent alignment is suggestive of anthropogenic activity and there are slightly stronger trends with a similar alignment in Area A7 to the south. The exact cause of these anomalies is not known but it is possible that they are caused by infilled features and as such could be related to archaeological features.

There are a large number of isolated positive responses in this area. There is no pattern to their distribution or other evidence to suggest that these are caused by archaeological features and they are likely to all be related to geological / pedological variations or to relatively modern deeper buried ferrous / fired material.

4.7 Area A6

Basic topography: Relatively level.

Survey area description: Pasture. Firm underfoot. Bounded by fencing and hedges to the north-west, north and east with no fixed boundary to the south / south-west.

Survey method: Bartington.

Interpretation drawing(s): ARC_2317_849_10.

Summary of anomalies: Numerous isolated dipolar and small bipolar responses are present, which will be associated with relatively modern material. These have not been shown on the interpretation.

Areas of magnetic disturbance associated with relatively modern features / material.

A linear bipolar anomaly associated with modern sub-surface utility apparatus (pipe or cable).

Trends of uncertain origin.

Numerous isolated positive responses, the majority of which are probably geological / pedological in origin or related to relatively modern deeper buried ferrous / fired material. Only larger / stronger responses of this type have been shown.

Further discussion / additional information:

A weak, fragmented trend is present in this area (**Anomaly A6A**). The cause of this anomaly is not known. It could be related to agricultural /drainage activity or it could be caused by an infilled feature of unknown date and function.

4.8 Area A7

Basic topography: Gradual slope upwards to the east.

Survey area description: Arable with immature crop. Relatively firm underfoot. Bounded by fencing and hedges to the south and west with no fixed boundary to the east and west. Area A5 is to the north. There was no fixed field boundary between the two areas but a line of electricity poles may have demarcated a former field boundary.

Survey method: MACS.

Interpretation drawing(s): ARC_2317_849_10.

Summary of anomalies: Numerous isolated dipolar and small bipolar responses are present, which will be associated with relatively modern material. These have not been shown on the interpretation.

A number of larger isolated bipolar responses has been shown. These form regular patterns / groupings and will be related to modern surface / near-surface objects / features.

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

Numerous trends of uncertain origin.

Numerous isolated positive responses, the majority of which are probably geological / pedological in origin or related to relatively modern deeper buried ferrous / fired material. Only larger / stronger responses of this type have been shown.

Positive linear anomalies of uncertain origin.

Further discussion / additional information:

Groups of isolated bipolar responses such as those in this area can be caused by buried structures, such as former electricity pylon bases. However, it was noted at the time of the survey that there were a number of flags / markers within the field in regular patterns. It is not certain if the observed anomalies are caused by the flags / markers or by underlying features that they may have been marking. In either instance they are not archaeologically significant.

There are a numerous weak or diffuse trends in this area. Many of these are too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features. However there are several alignments of trends that are suggestive of anthropogenic features / activity, some of which are in association with stronger positive linear anomalies.

Anomalies A7A form two alignments of broadly parallel linear responses. Although these responses are weak their apparent alignment is suggestive of anthropogenic activity and the underlying feature(s) appear to continue into Area A5. The exact cause of Anomalies A7A is not known but it is possible that they are caused by infilled features and as such could be related to archaeological features.

In the west of the area there are alignments of fragmented / slightly irregular positive linear anomalies and trends (**Anomalies A7B**). Again these anomalies are suggestive of

anthropogenic activity but their exact cause is not known. It is possible that they are caused by infilled features and as such could be related to archaeological features, although they could also be caused by later features / activity.

There are two alignments of trends (**Anomalies A7C**) that run broadly perpendicular to Anomalies A7B. These may be caused by related features / activity but again their exact cause cannot be determined.

There are a large number of isolated positive responses in this area. There is no pattern to their distribution or other evidence to suggest that these are caused by archaeological features and they are likely to all be related to geological / pedological variations or to relatively modern deeper buried ferrous / fired material.

4.9 Area A8

Basic topography: Level.

Survey area description: Scrub. Relatively firm but uneven underfoot. Bounded on all sides by hedges, dense vegetation and wooden fences. Dense vegetation limited the survey coverage around the edges of the survey area.

Survey method: Bartington.

Interpretation drawing(s): ARC_2317_849_12.

Summary of anomalies: This field is dominated by magnetic disturbance associated with relatively modern magnetic material.

Further discussion / additional information:

The strength of the magnetic disturbance in this area indicates a significant spread of relatively modern material. The depth extent of this cannot be determined but it will be more than just a near-surface scatter of material. The strength of the magnetic disturbance is such that responses from any underlying archaeological features, if any such features were present, are unlikely to be identified.

4.10 Area A9

Not surveyed due to access issues. Area was also overgrown with very dense vegetation.

4.11 Area A10

Basic topography: Relatively level in the north. Sloping downwards relatively steeply to the south from the centre and south of the area.

Survey area description: Scrub. Relatively firm but uneven underfoot. Bounded by hedges and fences in the north, south and east. There was dense vegetation, but no fixed boundary in the west. Dense vegetation limited the survey coverage in places.

Survey method: MACS.

Interpretation drawing(s): ARC_2317_849_12.

Summary of anomalies: A large amount of isolated dipolar and small bipolar responses are present, which will be associated with relatively modern

material. These have contributed to a general disturbed magnetic background.

A larger isolated bipolar responses has been shown. This will be related to a concentration, or larger object, of relatively modern ferrous or fired material. It is not thought to be archaeologically significant but has been shown to highlight where there may be significant relatively modern material / object.

An area of a greater concentration of magnetic disturbance associated with a spread of relatively modern features / material.

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

Trends of uncertain origin.

Further discussion / additional information:

There is a much greater concentration of isolated dipolar / bipolar responses in this area, than is usual on greenfield sites. These will be caused by a spread of modern magnetic material across the entire area and have contributed to a general disturbed magnetic background. The responses are suggestive of a surface / nears-surface spread of material, rather than significant made ground being present but are still of a sufficient concentration and strength that they could mask responses from any underlying features, if any such features were present.

There are a number of trends in this area but it cannot be determined if they are caused by infilled features, are related to agricultural, drainage or other modern activity or are a product of the magnetic disturbance.

It has not been possible to identify individual isolated positive anomalies amongst the general disturbed magnetic background and any such anomalies that are present will be related to modern material.

4.12 Areas A11 and A12

Not surveyed due to access issues.

4.13 Area A13

Basic topography: Relatively level.

Survey area description: Pasture. Relatively firm but uneven underfoot. Bounded by hedges with wooden posts and metal wire in the east and south. To the west there was no defined boundary and in the north a metal wire fence.

Survey method: MACS.

Interpretation drawing(s): ARC_2317_849_14.

Summary of anomalies: Areas of magnetic disturbance associated with relatively modern features / material.

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

Trends of uncertain origin.

Numerous isolated positive responses, the majority of which are probably geological / pedological in origin or related to relatively modern deeper buried ferrous / fired material. Only larger / stronger responses of this type have been shown.

Further discussion / additional information:

The strength of the magnetic disturbance in the south and east of the area indicates a significant spread of relatively modern material. The depth extent of this cannot be determined but it will be more than just a near-surface scatter of material. The strength of the magnetic disturbance is such that responses from any underlying archaeological features, if any such features were present, are unlikely to be identified.

There are a number of weak or diffuse trends in this area. The majority of these are too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features. In the majority of cases there is no evidence to suggest that the trends are related to archaeological activity and the responses could be caused by natural accumulations of material that is slightly more magnetic than the surrounding soil, be associated with agricultural or modern features / activity or even be random collections of responses that appear to be linear.

There is an alignment of trends that are slightly stronger (**Anomalies A13A**). The exact cause of these anomalies is not known but it is possible that they are caused by an infilled feature and as such could possibly be related to archaeological features, although equally it could be caused by an agricultural or drainage feature.

There are a large number of isolated positive responses in this area. There is no pattern to their distribution or other evidence to suggest that these are caused by archaeological features and they are likely to all be related to geological / pedological variations or to relatively modern deeper buried ferrous / fired material.

4.14 Area A14

Basic topography: Level.

Survey area description: Rugby field. Bonded to the north and east by a trackway, to the south by dense vegetation and to the west by a line of metal posts. Goal posts present in the north and south of the area.

Survey method: MACS.

Interpretation drawing(s): ARC_2317_849_14.

Summary of anomalies: Numerous isolated dipolar and small bipolar responses are present, which will be associated with relatively modern material. These have not been shown on the interpretation.

Two larger isolated bipolar responses have been shown. These will be related to concentrations, or larger objects or features, of relatively modern ferrous or fired material. They are not thought to be archaeologically significant but have been shown

to highlight areas where there may be significant relatively modern material / objects.

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

A series of weak positive curvi-linear anomalies probably associated with relatively modern ploughing or other agricultural activity.

Several trends of uncertain origin.

Numerous isolated positive responses, the majority of which are probably geological / pedological in origin or related to relatively modern deeper buried ferrous / fired material. Only larger / stronger responses of this type have been shown.

Further discussion / additional information:

There are a number of very weak or diffuse trends in this area. These are too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features. There is no evidence to suggest that the trends in this area are related to archaeological activity. The responses could be caused by natural accumulations of material that is slightly more magnetic than the surrounding soil, be associated with agricultural or modern features / activity or even be random collections of responses that appear to be linear.

4.15 Area A15

Basic topography: Relatively level.

Survey area description: Pasture. Hedges with fences to the south, west and north-west with no fixed boundaries to the north-east and east.

Survey method: Bartington.

Interpretation drawing(s): ARC_2317_849_14.

Summary of anomalies: A number of isolated dipolar and small bipolar responses are present, which will be associated with relatively modern material. These have not been shown on the interpretation.

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

Several trends of uncertain origin.

Numerous isolated positive responses, the majority of which are probably geological / pedological in origin or related to relatively modern deeper buried ferrous / fired material. Only larger / stronger responses of this type have been shown.

Further discussion / additional information:

There are a number of very weak or diffuse trends in this area. These are too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features. There is no evidence to suggest that the trends in this area are related to archaeological activity. The

responses could be caused by natural accumulations of material that is slightly more magnetic than the surrounding soil, be associated with agricultural or modern features / activity or even be random collections of responses that appear to be linear.

4.16 Area A16

Basic topography: Relatively level nut uneven underfoot in places.

Survey area description: Garden. No fixed boundaries to the survey but a house was present to the north-west and there was farm / garden equipment present as well as a number of bushes and the remains of a hedge partially dividing the area.

Survey method: Bartington.

Interpretation drawing(s): ARC_2317_849_14.

Summary of anomalies: A number of isolated dipolar and small bipolar responses are present, which will be associated with relatively modern material. These have not been shown on the interpretation.

Areas of magnetic disturbance associated with relatively modern features / material.

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

Several trends of uncertain origin.

Numerous isolated positive responses, the majority of which are probably geological / pedological in origin or related to relatively modern deeper buried ferrous / fired material. Only larger / stronger responses of this type have been shown.

Further discussion / additional information:

Large parts of this area are dominated by responses from modern material / objects. The strength of these responses is such that responses from any underlying archaeological features, if any such features were present, are unlikely to be identified.

There are a number of very weak or diffuse trends in this area. These are too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features. There is no evidence to suggest that the trends in this area are related to archaeological activity. The responses could be caused by natural accumulations of material that is slightly more magnetic than the surrounding soil, be associated with agricultural or modern features / activity or even be random collections of responses that appear to be linear.

4.17 Area A17

Basic topography: Gradual slope downward towards the west.

Survey area description: Arable with immature crop. Relatively firm underfoot. Bounded by hedges and fences to the north, south-east, south and west with no fixed boundary to the north-east.

Survey method: MACS.

Interpretation drawing(s): ARC_2317_849_14 and ARC_2317_849_16

Summary of anomalies: A large amount of isolated dipolar and small bipolar responses are present, which will be associated with relatively modern material. These have contributed to a general disturbed magnetic background.

An area of magnetic disturbance (where there is a greater concentration of dipolar / bipolar anomalies) associated with a relatively modern material.

A linear bipolar anomaly associated with modern sub-surface utility apparatus (pipe or cable).

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

Several series of relatively weak positive linear responses are present associated with modern ploughing regime(s).

Linear trends (positive, negative or bipolar) that are associated with drainage features.

Trends of uncertain origin.

Further discussion / additional information:

There is a much greater concentration of isolated dipolar / bipolar responses in this area, than is usual on greenfield sites. These will be caused by a spread of modern magnetic material across the entire area and have contributed to a general disturbed magnetic background. The responses are suggestive of a surface / nears-surface spread of material, rather than significant made ground being present but are still of a sufficient concentration and strength that they could mask responses from any underlying features, if any such features were present.

There are several very weak or diffuse trends in this area. These are too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features. There is no evidence to suggest that the trends in this area are related to archaeological activity. The responses could be caused by natural accumulations of material that is slightly more magnetic than the surrounding soil, be associated with agricultural or modern features / activity or even be random collections of responses that appear to be linear.

It has not been possible to identify individual isolated positive anomalies amongst the general disturbed magnetic background and any such anomalies that are present will be related to modern material.

4.18 Area A18

Basic topography: Gradual slope downward towards the west.

Survey area description: Arable with immature crop. Relatively firm underfoot. Bounded by hedges and fences.

Survey method: MACS.

Interpretation drawing(s): ARC_2317_849_16

Summary of anomalies: Numerous isolated dipolar and small bipolar responses are present, which will be associated with relatively modern material. These have not been shown on the interpretation.

A group of larger isolated bipolar responses has been shown. These form a regular pattern / grouping and will be related to modern surface / near-surface objects / features.

Areas of magnetic disturbance associated with relatively modern features / material.

A linear bipolar anomaly associated with modern sub-surface utility apparatus (pipe or cable).

Several series of relatively weak positive linear responses are present associated with modern ploughing regime(s).

Numerous trends of uncertain origin.

Numerous isolated positive responses, the majority of which are probably geological / pedological in origin or related to relatively modern deeper buried ferrous / fired material. Only larger / stronger responses of this type have been shown.

Further discussion / additional information:

Groups of isolated bipolar responses such as those in this area can be caused by buried structures, such as former electricity pylon bases. However, it was noted at the time of the survey that there was a group of flags / markers within the field in a regular pattern. It is not certain if the observed anomalies are caused by the flags / markers or by an underlying features that they may have been marking. In either instance they are not archaeologically significant.

There are numerous very weak or diffuse trends in this area. These are too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features. There is no evidence to suggest that the trends in this area are related to archaeological activity. The responses could be caused by natural accumulations of material that is slightly more magnetic than the surrounding soil, be associated with agricultural or modern features / activity or even be random collections of responses that appear to be linear. There are suggestions that some of the trends may form curving patterns (**Anomalies A18A**) or have a similar linear orientation (**Anomalies A18B**) and these could possibly be related to anthropogenic activity but the anomalies are too weak to reliably interpret.

4.19 Area A19

Basic topography: Gradual slope downward towards the west.

Survey area description: Arable with immature crop. Relatively firm underfoot. Bounded by hedges and fences to the north and west with no fixed boundaries to the east and south.

Survey method: MACS.

Interpretation drawing(s): ARC_2317_849_16 and ARC_2317_849_18

Summary of anomalies: A large amount of isolated dipolar and small bipolar responses are present, which will be associated with relatively modern

material. These have contributed to a general disturbed magnetic background.

Two linear bipolar anomalies associated with modern sub-surface utility apparatus (pipes or cables).

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

Several series of relatively weak positive linear responses are present associated with modern ploughing regime(s).

Trends of uncertain origin.

Further discussion / additional information:

There is a much greater concentration of isolated dipolar / bipolar responses in this area, than is usual on greenfield sites. These will be caused by a spread of modern magnetic material across the entire area and have contributed to a general disturbed magnetic background. The responses are suggestive of a surface / nears-surface spread of material, rather than significant made ground being present but are still of a sufficient concentration and strength that they could mask responses from any underlying features, if any such features were present.

Groups of isolated bipolar responses such as those in this area can be caused by buried structures, such as former electricity pylon bases. However, it was noted at the time of the survey that there was a group of flags / markers within the field in a regular pattern. It is not certain if the observed anomalies are caused by the flags / markers or by an underlying features that they may have been marking. In either instance they are not archaeologically significant.

There are several very weak or diffuse trends in this area. These are too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features. There is no evidence to suggest that the trends in this area are related to archaeological activity. The responses could be caused by natural accumulations of material that is slightly more magnetic than the surrounding soil, be associated with agricultural or modern features / activity or even be random collections of responses that appear to be linear.

It has not been possible to identify individual isolated positive anomalies amongst the general disturbed magnetic background and any such anomalies that are present will be related to modern material.

4.20 Area A20

Basic topography: Gradual slope upwards towards the north.

Survey area description: Arable with immature crop. Relatively firm underfoot. Bounded by hedges and fences to the north-east and west with no fixed boundary to the south.

Survey method: MACS.

Interpretation drawing(s): ARC_2317_849_16, ARC_2317_849_18 and ARC_2317_849_20

Summary of anomalies: A large amount of isolated dipolar and small bipolar responses are present, which will be associated with relatively modern

material. These have contributed to a general disturbed magnetic background.

Several series of relatively weak positive linear responses are present associated with modern ploughing regime(s).

Trends of uncertain origin.

Further discussion / additional information:

There is a much greater concentration of isolated dipolar / bipolar responses in this area, than is usual on greenfield sites. These will be caused by a spread of modern magnetic material across the entire area and have contributed to a general disturbed magnetic background. The responses are suggestive of a surface / nears-surface spread of material, rather than significant made ground being present but are still of a sufficient concentration and strength that they could mask responses from any underlying features, if any such features were present.

There are several very weak or diffuse trends in this area. These are too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features. There is no evidence to suggest that the trends in this area are related to archaeological activity. The responses could be caused by natural accumulations of material that is slightly more magnetic than the surrounding soil, be associated with agricultural or modern features / activity or even be random collections of responses that appear to be linear.

It has not been possible to identify individual isolated positive anomalies amongst the general disturbed magnetic background and any such anomalies that are present will be related to modern material.

4.21 Area A21

Basic topography: Gradual slope upwards towards the north.

Survey area description: Pasture. Relatively firm underfoot. Bounded by hedges with wooden and metal fences on all sides. Rough ground and tractor tracks limited the survey coverage in places throughout the area.

Survey method: MACS.

Interpretation drawing(s): ARC_2317_849_16 and ARC_2317_849_20

Summary of anomalies: Numerous isolated dipolar and small bipolar responses are present, which will be associated with relatively modern material. These have not been shown on the interpretation.

This majority of this area is dominated by magnetic disturbance and strong bipolar responses associated with relatively modern magnetic material.

The larger isolated bipolar responses that have been shown. These will be related to concentrations, or larger objects or features, of relatively modern ferrous or fired material. In this instance they are probably related to an infilled features, such as a former quarry or pond.

A linear bipolar anomaly associated with modern sub-surface utility apparatus (pipe or cable).

Very strong responses associated with strongly magnetic, usually above ground, modern feature / material. Feature may be / are located beyond the survey area.

Trends of uncertain origin

Numerous isolated positive responses. Many of these are probably geological / pedological in origin or related to relatively modern deeper buried ferrous / fired material.

Further discussion / additional information:

The larger isolated bipolar responses that have been shown (**Anomalies A21A**) relate to an infilled feature, such as a former quarry or pond.

The strength of the magnetic disturbance in the north of the area indicates a significant amount of relatively modern material. The depth extent of this cannot be determined but it will be more than just a near-surface scatter of material and could be related to an infilled feature or made ground. The strength of the magnetic disturbance is such that responses from any underlying archaeological features, if any such features were present, are unlikely to be identified.

Within the magnetic disturbance there are suggestions of linear anomalies, which have been shown as trends. It is not certain if these are a product of responses within the disturbance, that coincidently appear to form linear patterns, or if they may be related to features / variations which underlie the spread of modern material. The regularity and strength of the responses is such that if they are caused by sub-surface features they are unlikely to be archaeological in origin and are probably caused by the remains of relatively modern structures / features.

4.22 Area A22

Basic topography: Gradual slope upwards towards the north.

Survey area description: Arable with immature crop. Relatively firm underfoot but uneven in places. Bounded by hedges and fences to the north, north-east, south, south-east and south-west with no fixed boundaries to the remaining side. Very uneven / rutted ground limited the survey coverage in places.

Survey method: MACS.

Interpretation drawing(s): ARC_2317_849_20

Summary of anomalies: Numerous isolated dipolar and small bipolar responses are present, which will be associated with relatively modern material. These have not been shown on the interpretation. In the north and centre of the area there are a large number of isolated responses are present, which have contributed to a general disturbed magnetic background.

Several larger isolated bipolar responses have been shown. These will be related to concentrations, or larger objects or features, of ferrous or fired material. Anomalies of this type are usually related to relatively modern material but there is a

possibility that some of the anomalies in this area could be related to areas of burnt or fired material.

An area of magnetic disturbance associated with relatively modern features / material.

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

A series of positive linear anomalies possibly associated with ridge and furrow, although the responses could be related to later agricultural activity.

A linear trend possibly related to a former field boundary.

A number of trends of uncertain origin.

Numerous isolated positive responses, the majority of which are probably geological / pedological in origin or related to relatively modern deeper buried ferrous / fired material. Only larger / stronger responses of this type have been shown in the south of the area. It has not been possible to indentify individual isolated positive anomalies in the north and centre of the area.

Further discussion / additional information:

There is a much greater concentration of isolated dipolar / bipolar responses in the north and centre this area, than is usual on greenfield sites. These will be caused by a spread of modern magnetic material across the entire area and have contributed to a general disturbed magnetic background. The responses are suggestive of a surface / nears-surface spread of material, rather than significant made ground being present but are still of a sufficient concentration and strength that they could mask responses from any underlying features, if any such features were present.

A number of larger isolated bipolar anomalies are present. Anomalies of this type are usually related to relatively modern material. Some of these responses are relatively regular in shape and could be associated with distinct features, as opposed to tipped or randomly deposited material (**Anomalies A22A**). These features are probably relatively modern but there is a possibility that some of the responses could be related to burnt or fired material and so it is possible that they may be older.

The strength of the magnetic disturbance in the south of the area indicates a significant amount of relatively modern material. The depth extent of this cannot be determined but it will be more than just a near-surface scatter of material and could be related to an infilled feature or made ground. The strength of the magnetic disturbance is such that responses from any underlying archaeological features, if any such features were present, are unlikely to be identified.

Within the magnetic disturbance there are suggestions of linear anomalies, which have been shown as trends (**Anomalies A22B**). It is not certain if these are a product of responses within the disturbance, that coincidently appear to form linear patterns, or if they may be related to features / variations which underlie the spread of modern material. The regularity and strength of the responses is such that if they are caused by sub-surface features they are

unlikely to be archaeological in origin and are probably caused by the remains of relatively modern structures / features.

There are a number of very weak or diffuse trends in this area. These are too weak to allow a definite interpretation or even ascertain if they are caused by sub-surface features. There is no evidence to suggest that the trends in this area are related to archaeological activity. The responses could be caused by natural accumulations of material that is slightly more magnetic than the surrounding soil, be associated with agricultural or modern features / activity or even be random collections of responses that appear to be linear. There are several trends present in proximity to Anomalies A22A in the south-west of the area and it is possible that these are related to the activity / features causing the A22A responses but their exact cause is not known.

4.23 Area A23

Basic topography: Generally level.

Survey area description: Arable with immature crop. Relatively firm underfoot. Bounded by hedges and fences to the south and west with no fixed boundaries to the north and east. Intrusive work, involving heavy plant was being undertaken in the east of the area which limited the survey coverage in places.

Survey method: MACS.

Interpretation drawing(s): ARC_2317_849_22

Summary of anomalies: Numerous isolated dipolar and small bipolar responses are present, which will be associated with relatively modern material. These have not been shown on the interpretation. In the north, centre and south of the area there are a large number of isolated responses are present, which have contributed to a general disturbed magnetic background.

An area of a greater concentration of magnetic disturbance associated with a spread of relatively modern features / material.

Very strong responses associated with strongly magnetic modern features / material. The feature / material causing the response may be located beyond the survey area.

A series of very weak positive linear anomalies possibly associated with a relatively modern ploughing regime.

A number of trends of uncertain origin.

Numerous isolated positive responses, the majority of which are probably geological / pedological in origin or related to relatively modern deeper buried ferrous / fired material. Only larger / stronger responses of this type have been shown in the south of the area. It has not been possible to indentify individual isolated positive anomalies in the north and centre of the area.

Positive curvi-linear responses and trends associated with an infilled feature.

Further discussion / additional information:

There is a much greater concentration of isolated dipolar / bipolar responses in the north and centre of this area, than is usual on greenfield sites. These will be caused by a spread of modern magnetic material across the entire area and have contributed to a general disturbed magnetic background. The responses are suggestive of a surface / nears-surface spread of material, rather than significant made ground being present but are still of a sufficient concentration and strength that they could mask responses from any underlying features, if any such features were present.

The strength of the magnetic disturbance in the south of the area indicates a significant amount of relatively modern material. The depth extent of this cannot be determined but it will be more than just a near-surface scatter of material and could be related to an infilled feature. The strength of the magnetic disturbance is such that responses from any underlying archaeological features, if any such features were present, are unlikely to be identified.

In the east of the area there are positive curvi-linear anomalies and trends that form a curving pattern (**Anomaly A23A**). This anomaly is suggestive of an infilled feature and could be related to an archaeological ditch. However, the anomalies may respect an area of magnetic disturbance and so it is possible that Anomaly A23A is related to a relatively modern feature, although it is possible that the area of magnetic cuts through an older feature and Anomaly A23A may not be related to it.

There is a relatively large, strong isolated positive anomaly (**Anomaly A23B**) that stands out from the general disturbed background. This anomaly could also be related to modern material activity but it could possibly be associated with an infilled feature or localised area of burning.

4.24 Areas A24 and A25

Not surveyed due to access issues / ground conditions. Area A24 was under plough and Area A25 was under a mature oil seed rape crop.

5. DISCUSSION AND CONCLUSIONS

Access issues and ground conditions meant that all of the survey areas could not be covered by the magnetic survey. For those areas that were surveyed the majority of the anomalies identified by this survey relate to modern material / objects, agricultural activity (including some ridge and furrow) and geological / pedological variations.

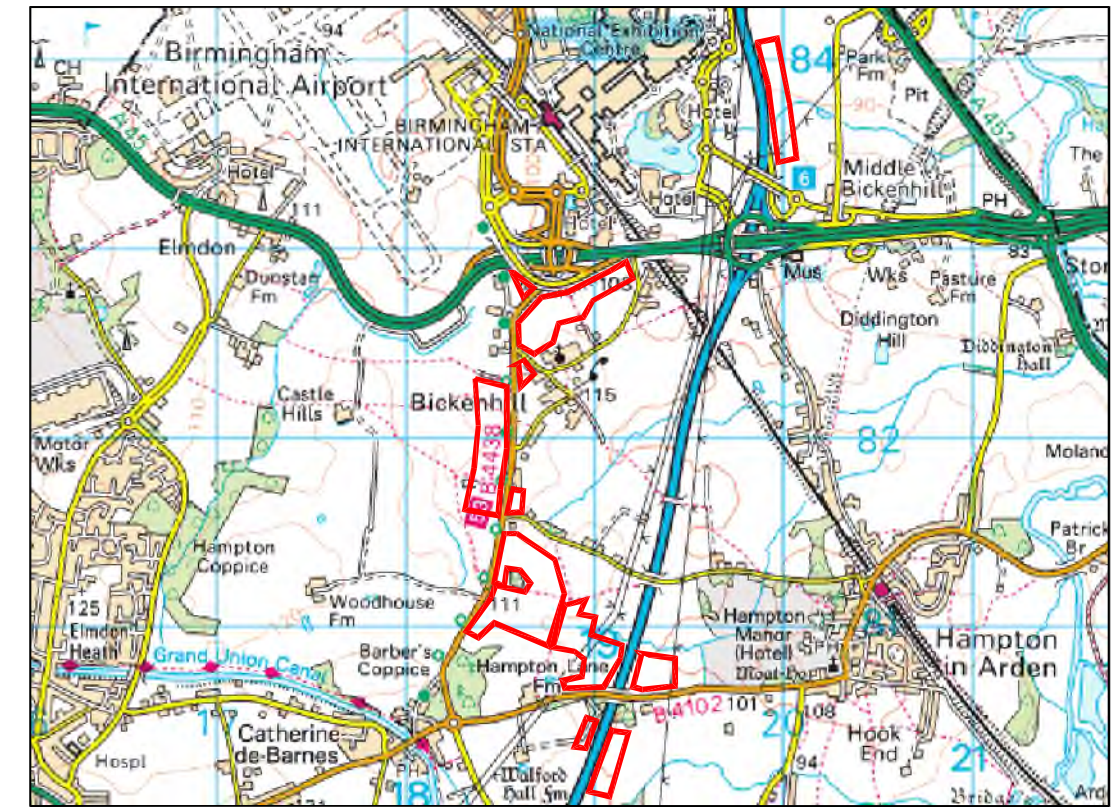
There are numerous linear / curvi-linear anomalies of uncertain origin. Many of these do not form any clear patterns or relationships that would indicate an archaeological origin and the majority of them are considered more likely to be associated with agricultural activity, drainage features or natural features / variations. There are however a number of responses that could be related to infilled features and as such could possibly be associated with archaeological features / activity but generally these anomalies are too weak or fragmented for a reliable interpretation to be made. In the south-east of the site there is a curvi-linear anomaly that could be associated with an archaeological ditch.

There are a number of areas where very strong responses or magnetic disturbance from modern features / material dominate the surrounding data. Some of these areas are suggestive of made ground /fill material, while others could be caused by a surface / near-surface scatter / spread of modern material. It should be recognised that the strength of the strong responses could mask anomalies from other sub-surface features in the area.

The data collected by the MACS generally has a more uniform background than the data collected by the Bartington due to the greater stability of the sensors during data collection. This has allowed a slightly more reliable identification of isolated responses in the MACS areas, although the interpretation of many of these responses is still uncertain.

It is worth noting that the anomalies associated with agricultural activity that have been detected are all relatively weak. This could mean that the soils across the site have a relatively low magnetic susceptibility and if this is the case then it is possible that infilled features would only produce weak responses, which may not be detectable by a magnetic survey in certain ground conditions. It is not certain therefore if the absence of anomalies related to definite archaeological features / activity is due to a lack of such features / activity or an inability to detect them.

It should be noted that a geophysical survey does not directly locate sub-surface features - it identifies variations or anomalies in the background response caused by features. The interpretation of geophysical anomalies is often subjective and it is rarely possible to identify the cause of all such anomalies. Not all features will produce a measurable anomaly and the effectiveness of a geophysical survey is also dependant on the site-specific conditions. The main factors that may limit whether a feature can be detected are the composition of a feature, its depth and size and the surrounding material. It is not possible to guarantee that a geophysical survey will identify all sub-surface features. Confirmation on the identification of anomalies and the presence or absence of sub-surface features can only be achieved by intrusive investigation.



SITE LOCATION

SCALE

0m 1000m 2000m

NOTE

THIS DRAWING AND THE INFORMATION CONTAINED THEREIN IS ISSUED IN CONFIDENCE AND IS THE COPYRIGHT OF PHASE SITE INVESTIGATIONS LIMITED. DISCLOSURE OF THIS INFORMATION TO THIRD PARTIES AND UNAUTHORISED COPYING OR REPLICATION OF THIS DATA WITHOUT APPROVAL IS FORBIDDEN.

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe, County Durham, DL5 6AU

T: +44 [0] 01325 311 751
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A4 Sheet]	Drawing	Status
AS SHOWN	ARC_2317_849_01	FINAL

Client: AECOM LEEDS

Site: M42 JUNCTION 6 IMPROVEMENT SCHEME WARWICKSHIRE

Title: SITE LOCATION MAP

Job No: ARC_2317_849

		Drawn	CA
Chk.	NF	Date	10/05/2018

NOTES

1. THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE ACCOMPANYING REPORT (ARC_2317_849_RPT.DOC) WHICH PROVIDES DETAILS OF THE TECHNIQUES EMPLOYED, THEIR INHERENT LIMITATIONS AND ANY SITE SPECIFIC ISSUES.
2. THIS DRAWING IS BASED UPON AN EXTRACT FROM DRAWING 'OS data.dwg' PROVIDED BY THE CLIENT. THE ORDNANCE SURVEY CO-ORDINATES OBTAINED FOR THIS SURVEY WERE MEASURED USING THE UKOSTN02 PROJECTION. THIS PROJECTION SHOULD BE TAKEN INTO ACCOUNT IF THE SURVEY GRID IS RELOCATED.
3. PHASE SITE INVESTIGATIONS CANNOT ACCEPT RESPONSIBILITY FOR THE RELIABILITY OR ACCURACY OF ANY INFORMATION PROVIDED BY A THIRD PARTY.
4. THIS DRAWING AND THE INFORMATION CONTAINED THEREIN IS ISSUED IN CONFIDENCE AND IS THE COPYRIGHT OF PHASE SITE INVESTIGATIONS LIMITED. DISCLOSURE OF THIS INFORMATION TO THIRD PARTIES AND UNAUTHORISED COPYING OR REPLICATION OF THIS DATA WITHOUT APPROVAL IS FORBIDDEN.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING

KEY

————	EXTENT OF MAGNETIC GRADIENT SURVEY AREA
A19	AREA NUMBER USED FOR THIS SURVEY

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe, County Durham, DL5 6AU

T: +44 [0] 01325 311 751
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A3 Sheet]	Drawing	Status
1:15000	ARC_2317_849_02	FINAL

Client
AECOM
LEEDS

Site
M42 JUNCTION 6 IMPROVEMENT SCHEME
WARWICKSHIRE

Title
LOCATION OF SURVEY AREAS AND EXTENTS OF MAGNETIC GRADIENT SURVEY

Job No
ARC_2317_849

Surveyed	JW, CA	Drawn	MW
Chk.	NF	Date	25/04/2018

NOTES

1. THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE ACCOMPANYING REPORT (ARC_2317_849_RPT.DOC) WHICH PROVIDES DETAILS OF THE TECHNIQUES EMPLOYED, THEIR INHERENT LIMITATIONS AND ANY SITE SPECIFIC ISSUES.
2. THIS DRAWING IS BASED UPON AN EXTRACT FROM DRAWING 'OS data.dwg' PROVIDED BY THE CLIENT. THE ORDNANCE SURVEY CO-ORDINATES OBTAINED FOR THIS SURVEY WERE MEASURED USING THE UKOSTN02 PROJECTION. THIS PROJECTION SHOULD BE TAKEN INTO ACCOUNT IF THE SURVEY GRID IS RELOCATED.
3. PHASE SITE INVESTIGATIONS CANNOT ACCEPT RESPONSIBILITY FOR THE RELIABILITY OR ACCURACY OF ANY INFORMATION PROVIDED BY A THIRD PARTY.
4. THIS DRAWING AND THE INFORMATION CONTAINED THEREIN IS ISSUED IN CONFIDENCE AND IS THE COPYRIGHT OF PHASE SITE INVESTIGATIONS LIMITED. DISCLOSURE OF THIS INFORMATION TO THIRD PARTIES AND UNAUTHORISED COPYING OR REPLICATION OF THIS DATA WITHOUT APPROVAL IS FORBIDDEN.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING

N

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe, County Durham, DL5 6AU

T: +44 [0] 01325 311 751
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2317_849_03	FINAL

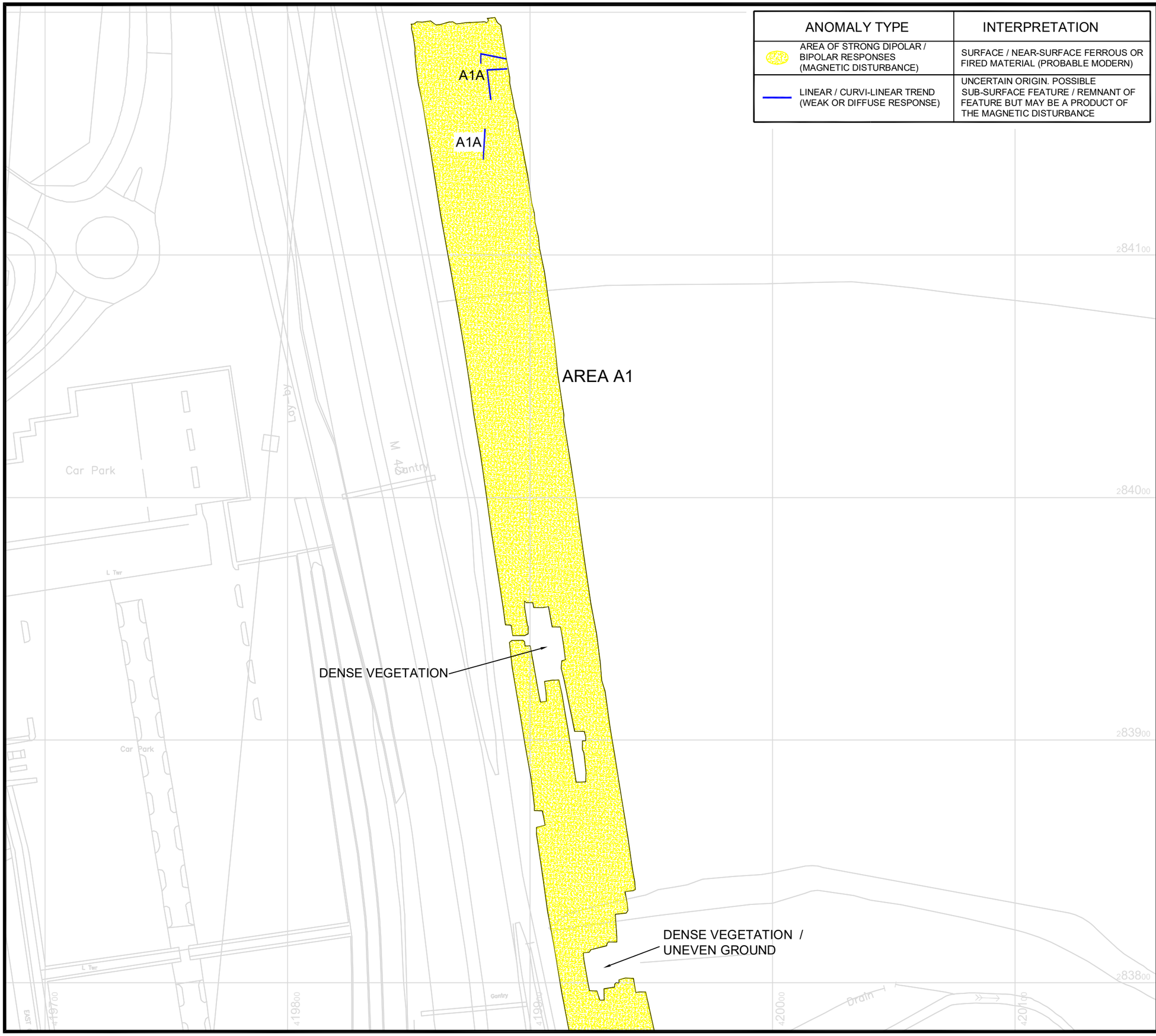
Client
AECOM
LEEDS

Site
M42 JUNCTION 6 IMPROVEMENT SCHEME
WARWICKSHIRE

Title
GREYSCALE PLOT OF MAGNETIC GRADIENT DATA: NORTHERN AND CENTRAL PARTS OF A1

Job No
ARC_2317_849

Surveyed	JW, CA	Drawn	MW
Chk.	NF	Date	25/04/2018



ANOMALY TYPE	INTERPRETATION
AREA OF STRONG DIPOLAR / BIPOLAR RESPONSES (MAGNETIC DISTURBANCE)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE SUB-SURFACE FEATURE / REMNANT OF FEATURE BUT MAY BE A PRODUCT OF THE MAGNETIC DISTURBANCE

NOTES

1. THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE ACCOMPANYING REPORT (ARC_2317_849_RPT.DOC) WHICH PROVIDES DETAILS OF THE TECHNIQUES EMPLOYED, THEIR INHERENT LIMITATIONS AND ANY SITE SPECIFIC ISSUES.
2. THIS DRAWING IS BASED UPON AN EXTRACT FROM DRAWING 'OS data.dwg' PROVIDED BY THE CLIENT. THE ORDNANCE SURVEY CO-ORDINATES OBTAINED FOR THIS SURVEY WERE MEASURED USING THE UKOSTN02 PROJECTION. THIS PROJECTION SHOULD BE TAKEN INTO ACCOUNT IF THE SURVEY GRID IS RELOCATED.
3. PHASE SITE INVESTIGATIONS CANNOT ACCEPT RESPONSIBILITY FOR THE RELIABILITY OR ACCURACY OF ANY INFORMATION PROVIDED BY A THIRD PARTY.
4.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING

N

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe, County Durham, DL5 6AU

T: +44 [0] 01325 311 751
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2317_849_04	FINAL

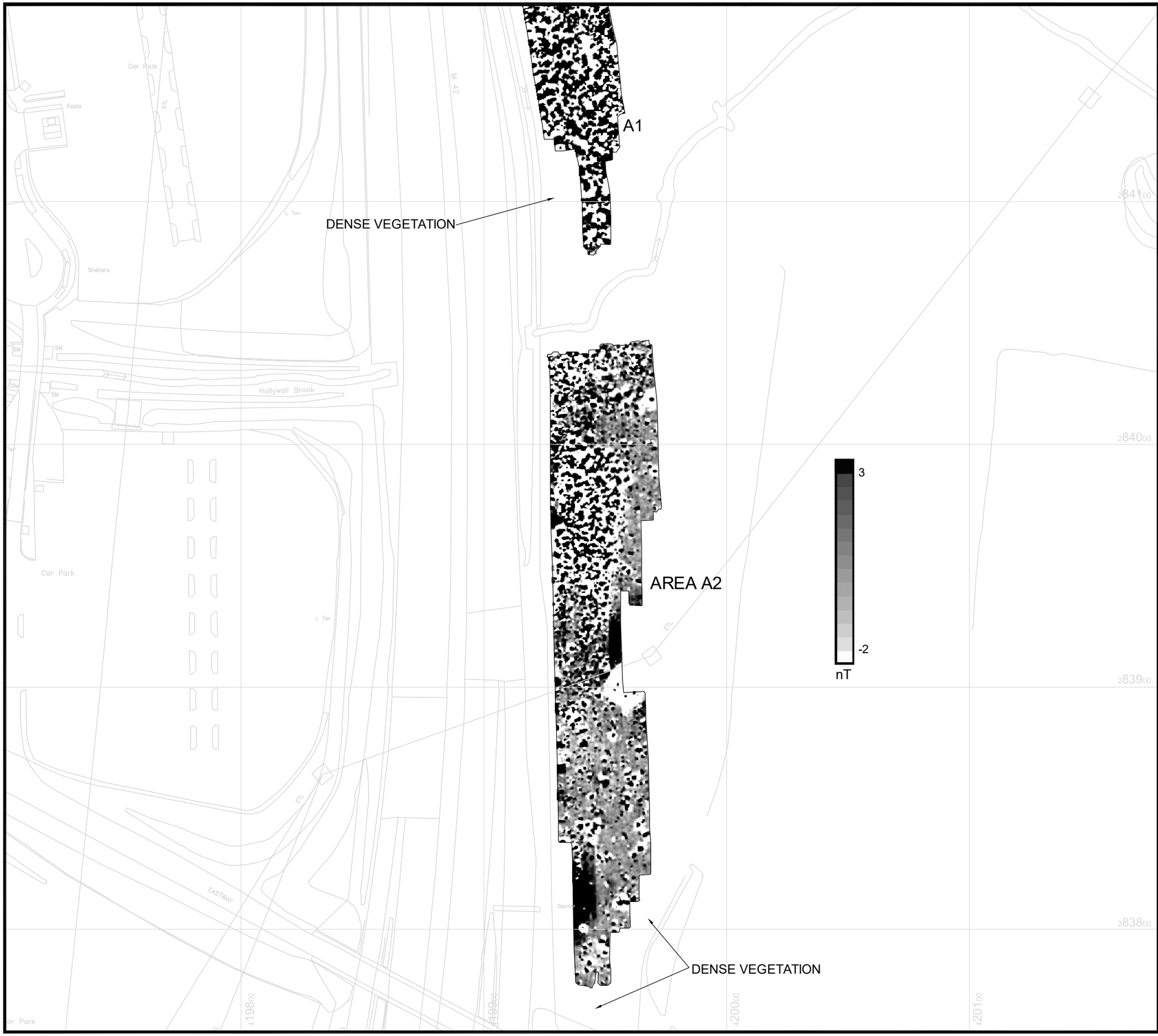
Client: AECOM LEEDS

Site: M42 JUNCTION 6 IMPROVEMENT SCHEME WARWICKSHIRE

Title: INTERPRETATION OF MAGNETIC GRADIENT DATA: NORTHERN AND CENTRAL PARTS OF A1

Job No: ARC_2317_849

Surveyed	JW, CA	Drawn	MW
Chk.	NF	Date	25/04/2018



NOTES

1. THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE ACCOMPANYING REPORT (ARC_2371_849_RPT.DOC) WHICH PROVIDES DETAILS OF THE TECHNIQUES EMPLOYED, THEIR INHERENT LIMITATIONS AND ANY SITE SPECIFIC ISSUES.
2. THIS DRAWING IS BASED UPON AN EXTRACT FROM DRAWING 'Geophysical_Survey_Data_M42.DWG.dwg' PROVIDED BY THE CLIENT. THE ORDNANCE SURVEY CO-ORDINATES OBTAINED FOR THIS SURVEY WERE MEASURED USING THE UKOSTN02 PROJECTION. THIS PROJECTION SHOULD BE TAKEN INTO ACCOUNT IF THE SURVEY GRID IS RELOCATED.
3. PHASE SITE INVESTIGATIONS CANNOT ACCEPT RESPONSIBILITY FOR THE RELIABILITY OR ACCURACY OF ANY INFORMATION PROVIDED BY A THIRD PARTY.
4. THIS DRAWING AND THE INFORMATION CONTAINED THEREIN IS ISSUED IN CONFIDENCE AND IS THE COPYRIGHT OF PHASE SITE INVESTIGATIONS LIMITED. DISCLOSURE OF THIS INFORMATION TO THIRD PARTIES AND UNAUTHORISED COPYING OR REPLICATION OF THIS DATA WITHOUT APPROVAL IS FORBIDDEN.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING

N

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe, County Durham, DL5 6AU

T: +44 [0] 01325 311 751
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2317_849_05	FINAL

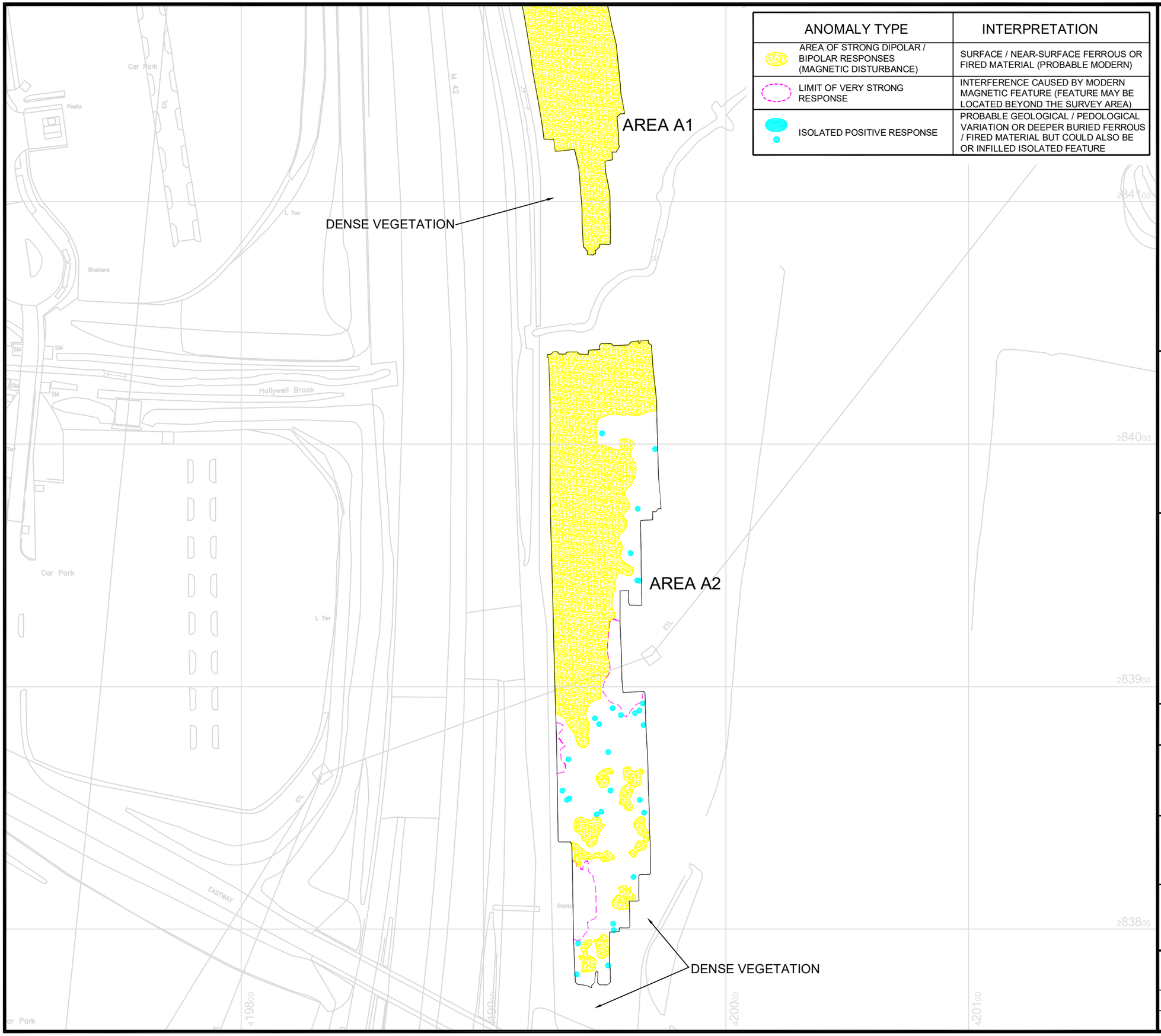
Client
AECOM
LEEDS

Site
M42 JUNCTION 6 IMPROVEMENT SCHEME
WARWICKSHIRE

Title GREYSCALE PLOTS OF MAGNETIC GRADIENT DATA: A2 AND SOUTHERN PART OF A1

Job No
ARC_2317_849

Surveyed	JW, CA	Drawn	MW
Chk.	NF	Date	25/04/2018



ANOMALY TYPE	INTERPRETATION
AREA OF STRONG DIPOLAR / BIPOLAR RESPONSES (MAGNETIC DISTURBANCE)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
LIMIT OF VERY STRONG RESPONSE	INTERFERENCE CAUSED BY MODERN MAGNETIC FEATURE (FEATURE MAY BE LOCATED BEYOND THE SURVEY AREA)
ISOLATED POSITIVE RESPONSE	PROBABLE GEOLOGICAL / PEDOLOGICAL VARIATION OR DEEPER BURIED FERROUS / FIRED MATERIAL BUT COULD ALSO BE OR INFILLED ISOLATED FEATURE

NOTES

1. THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE ACCOMPANYING REPORT (ARC_2317_849_RPT.DOC) WHICH PROVIDES DETAILS OF THE TECHNIQUES EMPLOYED, THEIR INHERENT LIMITATIONS AND ANY SITE SPECIFIC ISSUES.
2. THIS DRAWING IS BASED UPON AN EXTRACT FROM DRAWING 'OS data.dwg' PROVIDED BY THE CLIENT. THE ORDNANCE SURVEY CO-ORDINATES OBTAINED FOR THIS SURVEY WERE MEASURED USING THE UKOSTN02 PROJECTION. THIS PROJECTION SHOULD BE TAKEN INTO ACCOUNT IF THE SURVEY GRID IS RELOCATED.
3. PHASE SITE INVESTIGATIONS CANNOT ACCEPT RESPONSIBILITY FOR THE RELIABILITY OR ACCURACY OF ANY INFORMATION PROVIDED BY A THIRD PARTY.
4. THIS DRAWING AND THE INFORMATION CONTAINED THEREIN IS ISSUED IN CONFIDENCE AND IS THE COPYRIGHT OF PHASE SITE INVESTIGATIONS LIMITED. DISCLOSURE OF THIS INFORMATION TO THIRD PARTIES AND UNAUTHORISED COPYING OR REPLICATION OF THIS DATA WITHOUT APPROVAL IS FORBIDDEN.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING

N

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe, County Durham, DL5 6AU

T: +44 [0] 01325 311 751
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2317_849_06	FINAL

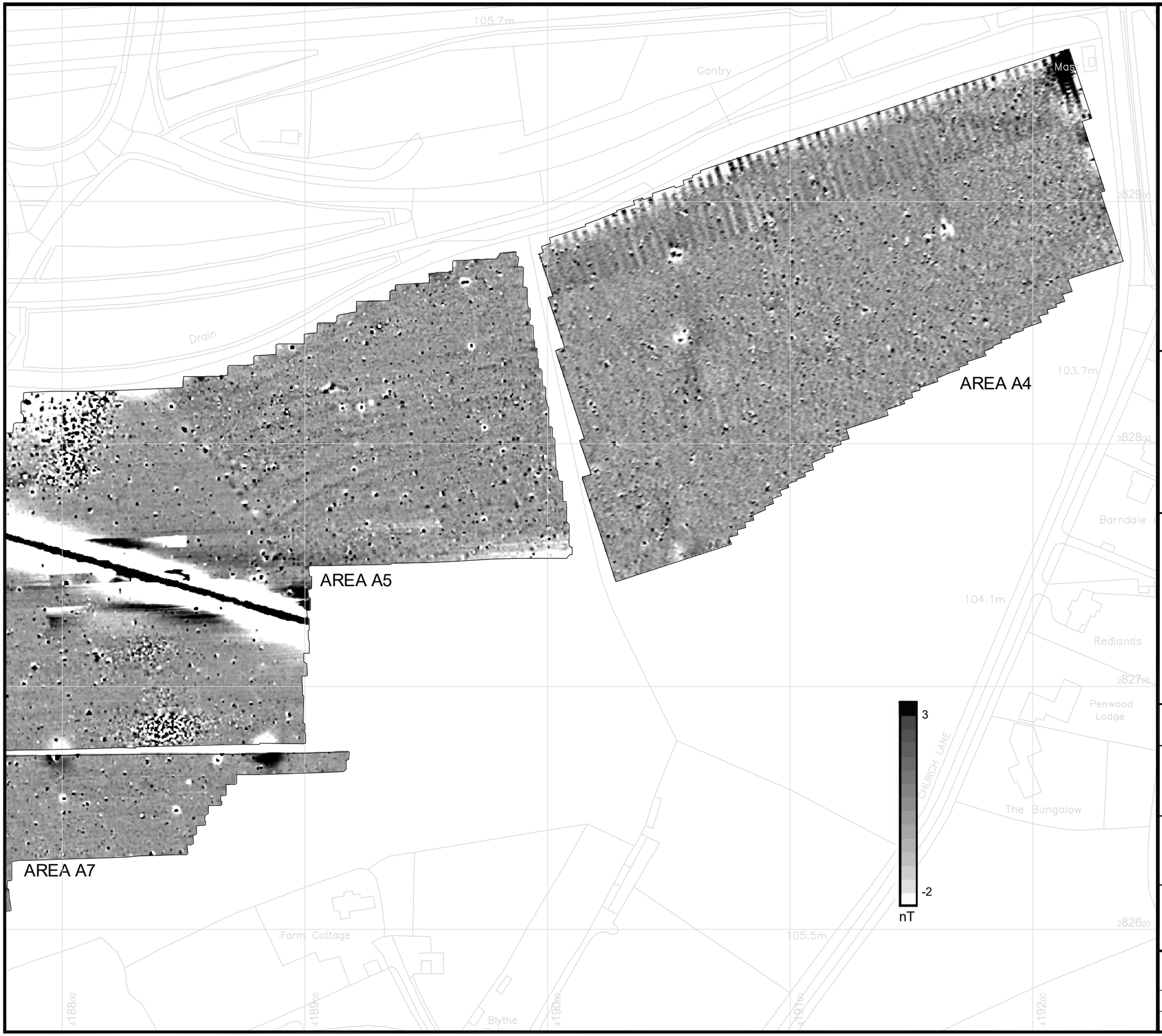
Client: AECOM LEEDS

Site: M42 JUNCTION 6 IMPROVEMENT SCHEME WARWICKSHIRE

Title: INTERPRETATION OF MAGNETIC GRADIENT DATA: A2 AND SOUTHERN PART OF A1

Job No: ARC_2317_849

Surveyed	JW, CA	Drawn	MW
Chk.	NF	Date	25/04/2018



NOTES

1. THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE ACCOMPANYING REPORT (ARC_2317_849_RPT.DOC) WHICH PROVIDES DETAILS OF THE TECHNIQUES EMPLOYED, THEIR INHERENT LIMITATIONS AND ANY SITE SPECIFIC ISSUES.
2. THIS DRAWING IS BASED UPON AN EXTRACT FROM DRAWING 'OS data.dwg' PROVIDED BY THE CLIENT. THE ORDNANCE SURVEY CO-ORDINATES OBTAINED FOR THIS SURVEY WERE MEASURED USING THE UKOSTN02 PROJECTION. THIS PROJECTION SHOULD BE TAKEN INTO ACCOUNT IF THE SURVEY GRID IS RELOCATED.
3. PHASE SITE INVESTIGATIONS CANNOT ACCEPT RESPONSIBILITY FOR THE RELIABILITY OR ACCURACY OF ANY INFORMATION PROVIDED BY A THIRD PARTY.
4. THIS DRAWING AND THE INFORMATION CONTAINED THEREIN IS ISSUED IN CONFIDENCE AND IS THE COPYRIGHT OF PHASE SITE INVESTIGATIONS LIMITED. DISCLOSURE OF THIS INFORMATION TO THIRD PARTIES AND UNAUTHORISED COPYING OR REPLICATION OF THIS DATA WITHOUT APPROVAL IS FORBIDDEN.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING

N

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe, County Durham, DL5 6AU

T: +44 [0] 01325 311 751
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2317_849_07	FINAL

Client
AECOM
LEEDS

Site
M42 JUNCTION 6 IMPROVEMENT SCHEME
WARWICKSHIRE

Title
GREYSCALE PLOTS OF MAGNETIC GRADIENT DATA: A4 AND EASTERN PARTS OF A5 AND A7

Job No
ARC_2317_849

Surveyed	JW, CA	Drawn	MW
Chk.	NF	Date	25/04/2018

105.7m
Gantry
(Mast)
Drain
RF
RF
AREA A4
AREA A5
AREA A7
103.7m
Barndale
104.1m
Redlands
Penwood Lodge
Farm Cottage
Blythe

NOTES

1. THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE ACCOMPANYING REPORT (ARC_2317_849_RPT.DOC) WHICH PROVIDES DETAILS OF THE TECHNIQUES EMPLOYED, THEIR INHERENT LIMITATIONS AND ANY SITE SPECIFIC ISSUES.
2. THIS DRAWING IS BASED UPON AN EXTRACT FROM DRAWING 'OS data.dwg' PROVIDED BY THE CLIENT. THE ORDNANCE SURVEY CO-ORDINATES OBTAINED FOR THIS SURVEY WERE MEASURED USING THE UKOSTN02 PROJECTION. THIS PROJECTION SHOULD BE TAKEN INTO ACCOUNT IF THE SURVEY GRID IS RELOCATED.
3. PHASE SITE INVESTIGATIONS CANNOT ACCEPT RESPONSIBILITY FOR THE RELIABILITY OR ACCURACY OF ANY INFORMATION PROVIDED BY A THIRD PARTY.
4. THIS DRAWING AND THE INFORMATION CONTAINED THEREIN IS ISSUED IN CONFIDENCE AND IS THE COPYRIGHT OF PHASE SITE INVESTIGATIONS LIMITED. DISCLOSURE OF THIS INFORMATION TO THIRD PARTIES AND UNAUTHORISED COPYING OR REPLICATION OF THIS DATA WITHOUT APPROVAL IS FORBIDDEN.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING

N

ANOMALY TYPE	INTERPRETATION
AREA OF STRONG DIPOLAR / BIPOLAR RESPONSES (MAGNETIC DISTURBANCE)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
BIPOLAR LINEAR (SHOWING LINEAR RESPONSE AND EXTENT OF ANOMALY WHERE PRESENT)	MODERN LINEAR MAGNETIC FEATURE. PROBABLE PIPE OR CABLE
LIMIT OF VERY STRONG RESPONSE	INTERFERENCE CAUSED BY MODERN MAGNETIC FEATURE (FEATURE MAY BE LOCATED BEYOND THE SURVEY AREA)
RF APPROXIMATE ORIENTATION OF BROADLY PARALLEL POSITIVE CURVI-LINEAR ANOMALIES	AGRICULTURAL FEATURES. RIDGE AND FURROW
LINEAR / CURVI-LINEAR TREND (MAY HAVE ASSOCIATED DIPOLAR / BIPOLAR RESPONSES	AGRICULTURAL FEATURE. POSSIBLE HEADLAND OR FORMER FIELD BOUNDARY
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE SUB-SURFACE FEATURE / REMNANT OF FEATURE
ISOLATED POSITIVE RESPONSE	PROBABLE GEOLOGICAL / PEDOLOGICAL VARIATION OR DEEPER BURIED FERROUS / FIRED MATERIAL BUT COULD ALSO BE OR INFILLED ISOLATED FEATURE

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe, County Durham, DL5 6AU

T: +44 [0] 01325 311 751
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2317_849_08	FINAL

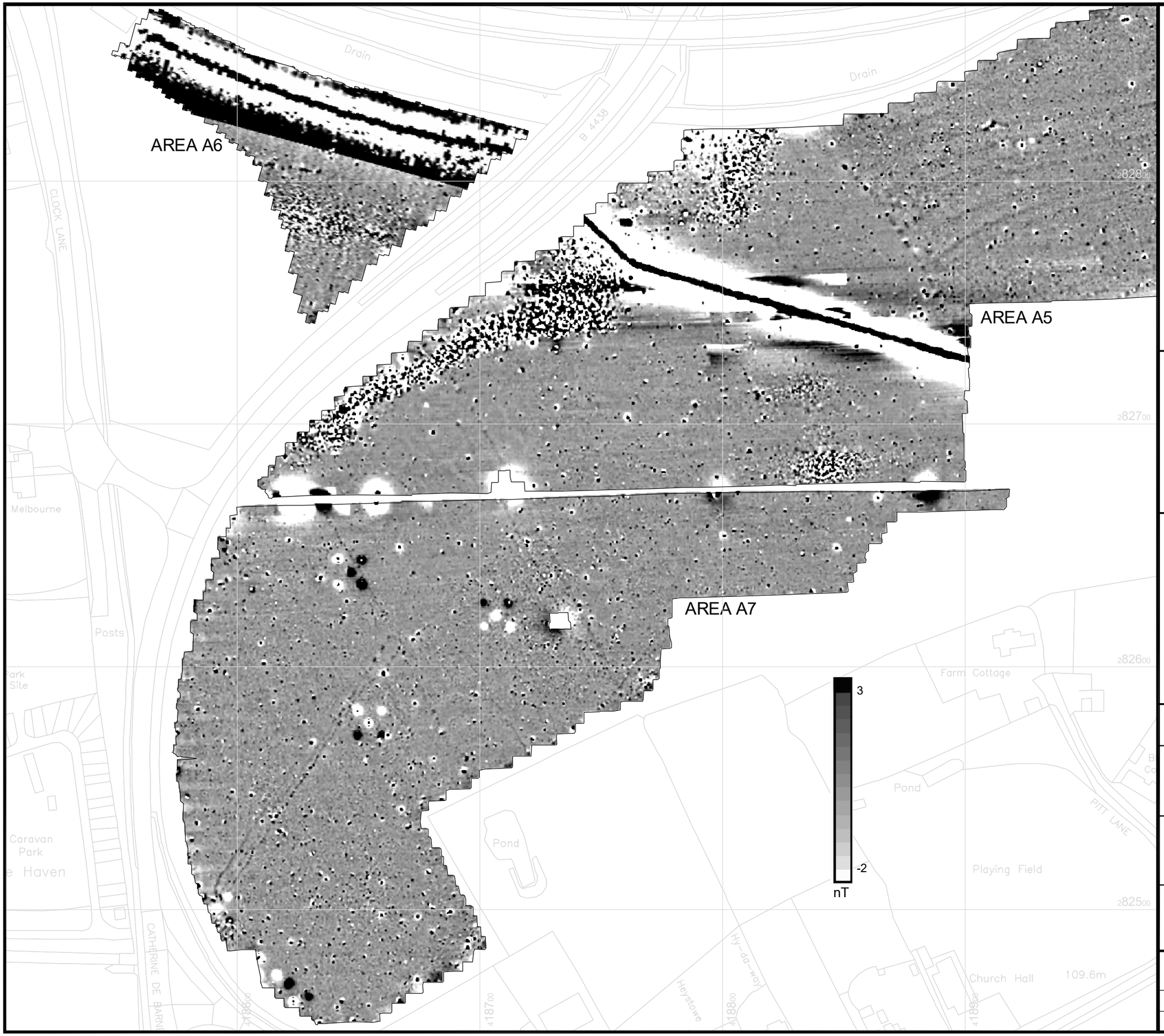
Client
AECOM
LEEDS

Site
M42 JUNCTION 6 IMPROVEMENT SCHEME
WARWICKSHIRE

Title
INTERPRETATION OF MAGNETIC GRADIENT DATA: A4 AND EASTERN PARTS OF A5 AND A7

Job No
ARC_2317_849

Surveyed	JW, CA	Drawn	MW
Chk.	NF	Date	25/04/2018



NOTES

1. THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE ACCOMPANYING REPORT (ARC_2317_849_RPT.DOC) WHICH PROVIDES DETAILS OF THE TECHNIQUES EMPLOYED, THEIR INHERENT LIMITATIONS AND ANY SITE SPECIFIC ISSUES.
2. THIS DRAWING IS BASED UPON AN EXTRACT FROM DRAWING 'OS data.dwg' PROVIDED BY THE CLIENT. THE ORDNANCE SURVEY CO-ORDINATES OBTAINED FOR THIS SURVEY WERE MEASURED USING THE UKOSTN02 PROJECTION. THIS PROJECTION SHOULD BE TAKEN INTO ACCOUNT IF THE SURVEY GRID IS RELOCATED.
3. PHASE SITE INVESTIGATIONS CANNOT ACCEPT RESPONSIBILITY FOR THE RELIABILITY OR ACCURACY OF ANY INFORMATION PROVIDED BY A THIRD PARTY.
4. THIS DRAWING AND THE INFORMATION CONTAINED THEREIN IS ISSUED IN CONFIDENCE AND IS THE COPYRIGHT OF PHASE SITE INVESTIGATIONS LIMITED. DISCLOSURE OF THIS INFORMATION TO THIRD PARTIES AND UNAUTHORISED COPYING OR REPLICATION OF THIS DATA WITHOUT APPROVAL IS FORBIDDEN.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING

N

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe, County Durham, DL5 6AU

T: +44 [0] 01325 311 751
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2317_849_09	FINAL

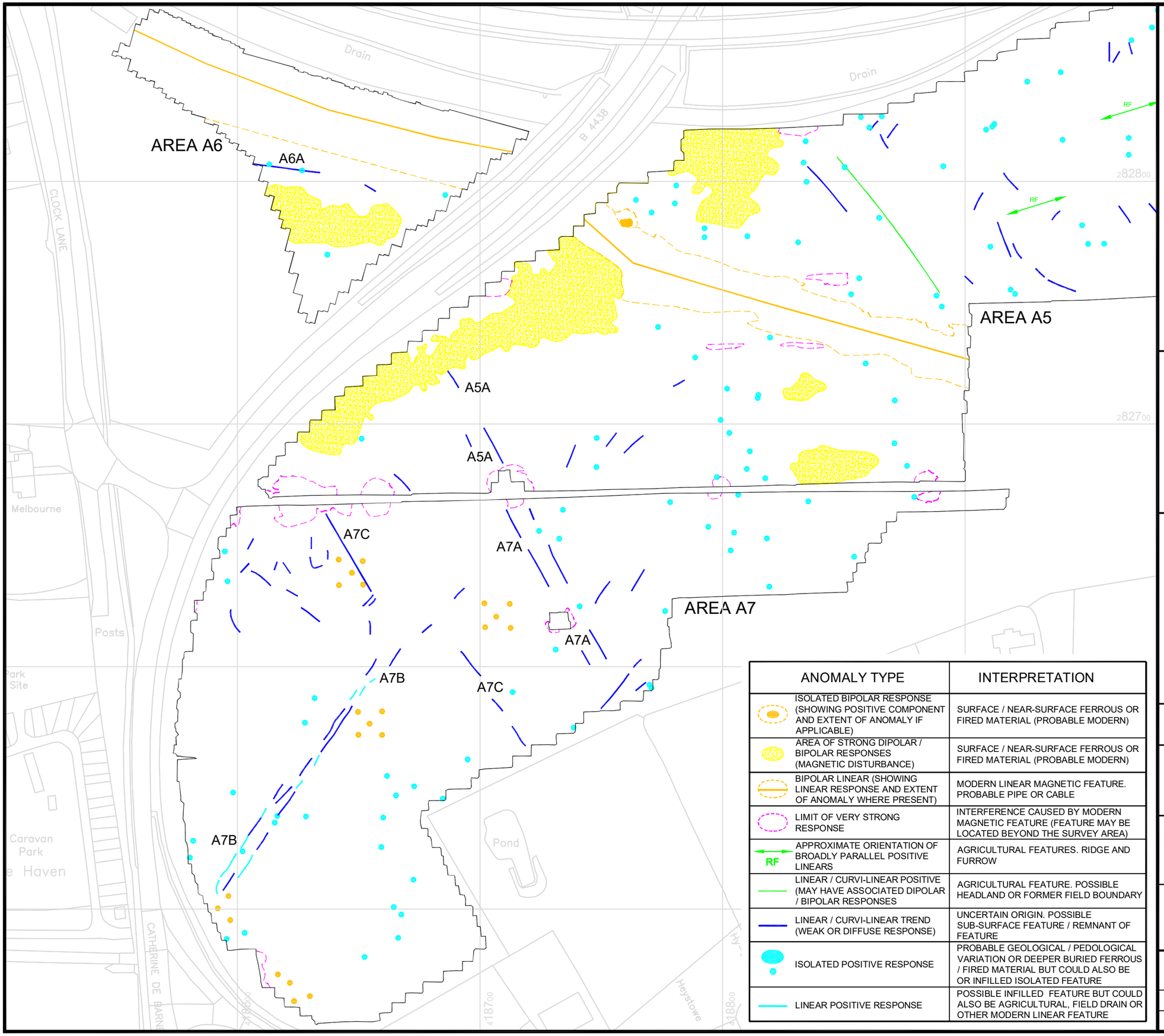
Client
AECOM
LEEDS

Site
M42 JUNCTION 6 IMPROVEMENT SCHEME
WARWICKSHIRE

Title
GREYSCALE PLOTS OF MAGNETIC GRADIENT DATA: A6 AND A7 AND WESTERN PART OF A5

Job No
ARC_2317_849

Surveyed	JW, CA	Drawn	MW
Chk.	NF	Date	25/04/2018



NOTES

1. THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE ACCOMPANYING REPORT (ARC_2317_849_RPT.DOC) WHICH PROVIDES DETAILS OF THE TECHNIQUES EMPLOYED, THEIR INHERENT LIMITATIONS AND ANY SITE SPECIFIC ISSUES.
2. THIS DRAWING IS BASED UPON AN EXTRACT FROM DRAWING 'OS data.dwg' PROVIDED BY THE CLIENT. THE ORDNANCE SURVEY CO-ORDINATES OBTAINED FOR THIS SURVEY WERE MEASURED USING THE UKOSTN02 PROJECTION. THIS PROJECTION SHOULD BE TAKEN INTO ACCOUNT IF THE SURVEY GRID IS RELOCATED.
3. PHASE SITE INVESTIGATIONS CANNOT ACCEPT RESPONSIBILITY FOR THE RELIABILITY OR ACCURACY OF ANY INFORMATION PROVIDED BY A THIRD PARTY.
4. THIS DRAWING AND THE INFORMATION CONTAINED THEREIN IS ISSUED IN CONFIDENCE AND IS THE COPYRIGHT OF PHASE SITE INVESTIGATIONS LIMITED. DISCLOSURE OF THIS INFORMATION TO THIRD PARTIES AND UNAUTHORISED COPYING OR REPLICATION OF THIS DATA WITHOUT APPROVAL IS FORBIDDEN.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING

N

ANOMALY TYPE	INTERPRETATION
ISOLATED BIPOLAR RESPONSE (SHOWING POSITIVE COMPONENT AND EXTENT OF ANOMALY IF APPLICABLE)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
AREA OF STRONG DIPOLAR / BIPOLAR RESPONSES (MAGNETIC DISTURBANCE)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
BIPOLAR LINEAR (SHOWING LINEAR RESPONSE AND EXTENT OF ANOMALY WHERE PRESENT)	MODERN LINEAR MAGNETIC FEATURE. PROBABLE PIPE OR CABLE
LIMIT OF VERY STRONG RESPONSE	INTERFERENCE CAUSED BY MODERN MAGNETIC FEATURE (FEATURE MAY BE LOCATED BEYOND THE SURVEY AREA)
RF APPROXIMATE ORIENTATION OF BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. RIDGE AND FURROW
LINEAR / CURVI-LINEAR POSITIVE (MAY HAVE ASSOCIATED DIPOLAR / BIPOLAR RESPONSES	AGRICULTURAL FEATURE. POSSIBLE HEADLAND OR FORMER FIELD BOUNDARY
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE SUB-SURFACE FEATURE / REMNANT OF FEATURE
ISOLATED POSITIVE RESPONSE	PROBABLE GEOLOGICAL / PEDOLOGICAL VARIATION OR DEEPER BURIED FERROUS / FIRED MATERIAL BUT COULD ALSO BE OR INFILLED ISOLATED FEATURE
LINEAR POSITIVE RESPONSE	POSSIBLE INFILLED FEATURE BUT COULD ALSO BE AGRICULTURAL, FIELD DRAIN OR OTHER MODERN LINEAR FEATURE

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe, County Durham, DL5 6AU

T: +44 [0] 01325 311 751
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2317_849_10	FINAL

Client
AECOM
LEEDS

Site
M42 JUNCTION 6 IMPROVEMENT SCHEME
WARWICKSHIRE

Title
INTERPRETATION OF MAGNETIC GRADIENT DATA: A6 AND A7 AND WESTERN PART OF A5

Job No
ARC_2317_849

Surveyed	JW, CA	Drawn	MW
Chk.	NF	Date	25/04/2018

NOTES

1. THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE ACCOMPANYING REPORT (ARC_2317_849_RPT.DOC) WHICH PROVIDES DETAILS OF THE TECHNIQUES EMPLOYED, THEIR INHERENT LIMITATIONS AND ANY SITE SPECIFIC ISSUES.
2. THIS DRAWING IS BASED UPON AN EXTRACT FROM DRAWING 'OS data.dwg' PROVIDED BY THE CLIENT. THE ORDNANCE SURVEY CO-ORDINATES OBTAINED FOR THIS SURVEY WERE MEASURED USING THE UKOSTN02 PROJECTION. THIS PROJECTION SHOULD BE TAKEN INTO ACCOUNT IF THE SURVEY GRID IS RELOCATED.
3. PHASE SITE INVESTIGATIONS CANNOT ACCEPT RESPONSIBILITY FOR THE RELIABILITY OR ACCURACY OF ANY INFORMATION PROVIDED BY A THIRD PARTY.
4. THIS DRAWING AND THE INFORMATION CONTAINED THEREIN IS ISSUED IN CONFIDENCE AND IS THE COPYRIGHT OF PHASE SITE INVESTIGATIONS LIMITED. DISCLOSURE OF THIS INFORMATION TO THIRD PARTIES AND UNAUTHORISED COPYING OR REPLICATION OF THIS DATA WITHOUT APPROVAL IS FORBIDDEN.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING

N

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe, County Durham, DL5 6AU

T: +44 [0] 01325 311 751
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2317_849_11	FINAL

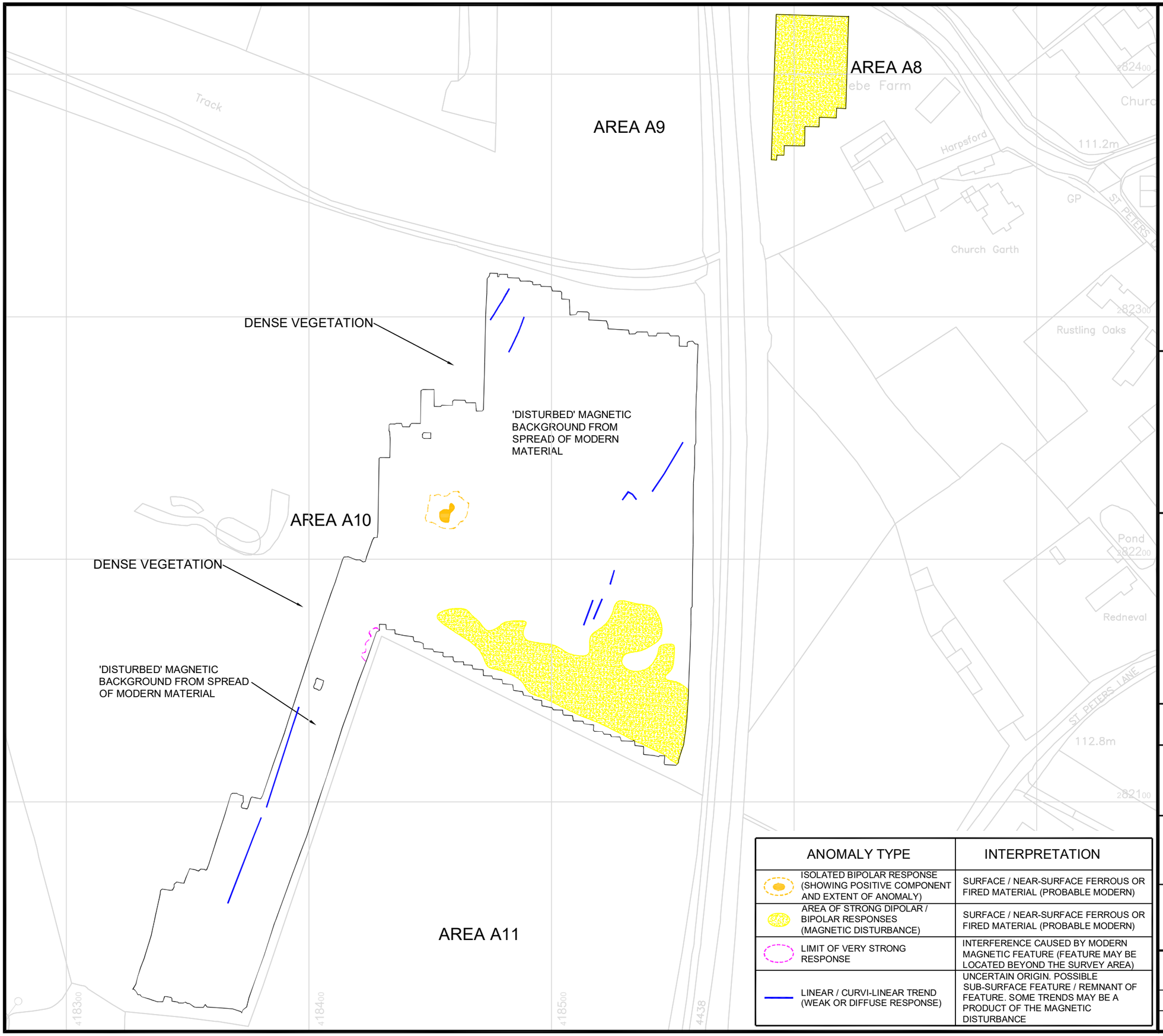
Client
AECOM
LEEDS

Site
M42 JUNCTION 6 IMPROVEMENT SCHEME
WARWICKSHIRE

Title
GREYSCALE PLOTS OF MAGNETIC GRADIENT DATA:
A8 AND A10

Job No
ARC_2317_849

Surveyed	JW, CA	Drawn	MW
Chk.	NF	Date	25/04/2018



NOTES

1. THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE ACCOMPANYING REPORT (ARC_2317_849_RPT.DOC) WHICH PROVIDES DETAILS OF THE TECHNIQUES EMPLOYED, THEIR INHERENT LIMITATIONS AND ANY SITE SPECIFIC ISSUES.
2. THIS DRAWING IS BASED UPON AN EXTRACT FROM DRAWING 'OS data.dwg' PROVIDED BY THE CLIENT. THE ORDNANCE SURVEY CO-ORDINATES OBTAINED FOR THIS SURVEY WERE MEASURED USING THE UKOSTN02 PROJECTION. THIS PROJECTION SHOULD BE TAKEN INTO ACCOUNT IF THE SURVEY GRID IS RELOCATED.
3. PHASE SITE INVESTIGATIONS CANNOT ACCEPT RESPONSIBILITY FOR THE RELIABILITY OR ACCURACY OF ANY INFORMATION PROVIDED BY A THIRD PARTY.
4. THIS DRAWING AND THE INFORMATION CONTAINED THEREIN IS ISSUED IN CONFIDENCE AND IS THE COPYRIGHT OF PHASE SITE INVESTIGATIONS LIMITED. DISCLOSURE OF THIS INFORMATION TO THIRD PARTIES AND UNAUTHORISED COPYING OR REPLICATION OF THIS DATA WITHOUT APPROVAL IS FORBIDDEN.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING

N

ANOMALY TYPE	INTERPRETATION
ISOLATED BIPOLAR RESPONSE (SHOWING POSITIVE COMPONENT AND EXTENT OF ANOMALY)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
AREA OF STRONG DIPOLAR / BIPOLAR RESPONSES (MAGNETIC DISTURBANCE)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
LIMIT OF VERY STRONG RESPONSE	INTERFERENCE CAUSED BY MODERN MAGNETIC FEATURE (FEATURE MAY BE LOCATED BEYOND THE SURVEY AREA)
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE SUB-SURFACE FEATURE / REMNANT OF FEATURE. SOME TRENDS MAY BE A PRODUCT OF THE MAGNETIC DISTURBANCE

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe, County Durham, DL5 6AU

T: +44 [0] 01325 311 751
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2317_849_12	FINAL

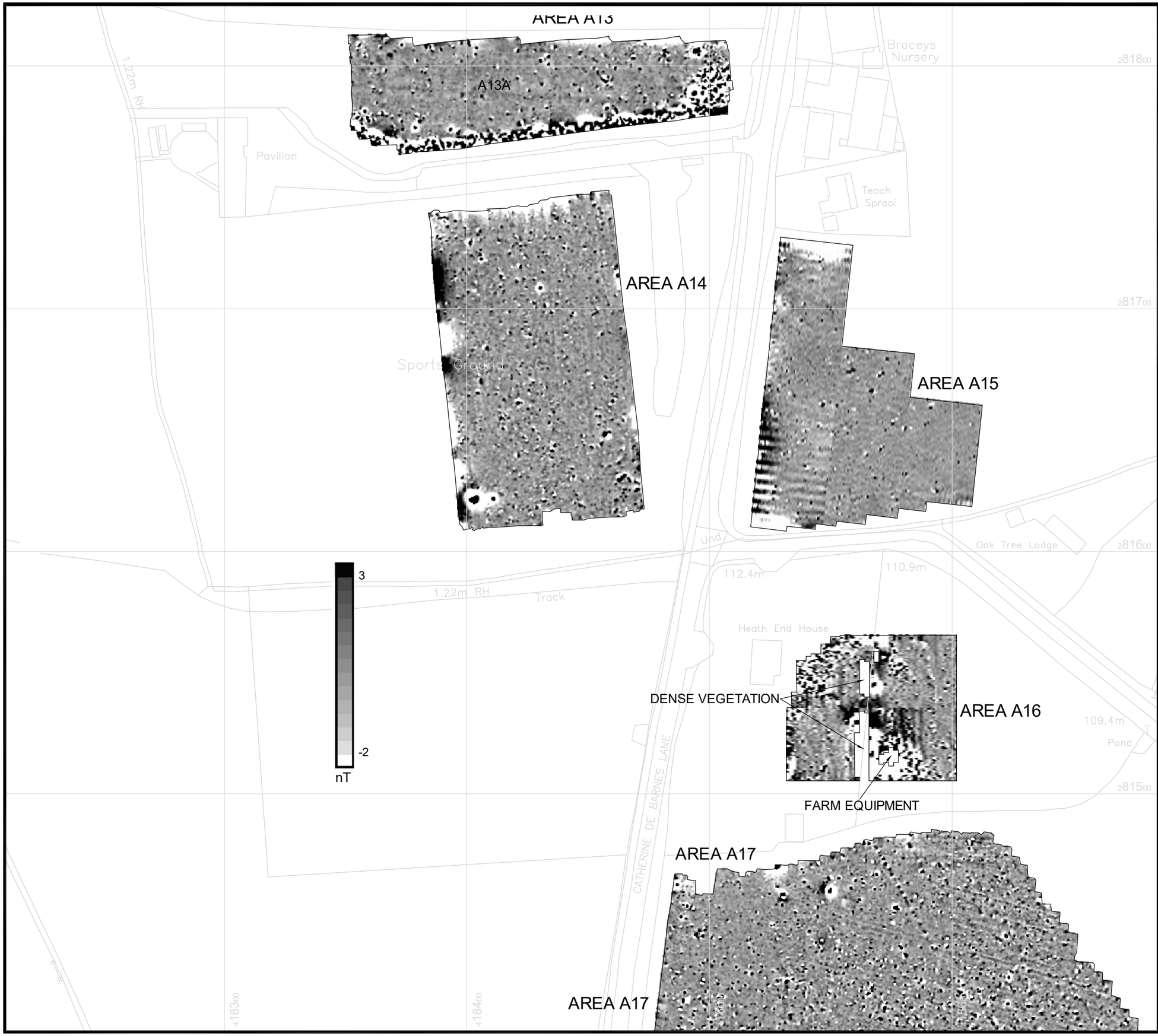
Client: AECOM LEEDS

Site: M42 JUNCTION 6 IMPROVEMENT SCHEME WARWICKSHIRE

Title: INTERPRETATION OF MAGNETIC GRADIENT DATA: A8 AND A10

Job No: ARC_2317_849

Surveyed	JW, CA	Drawn	MW
Chk.	NF	Date	25/04/2018



NOTES

1. THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE ACCOMPANYING REPORT (ARC_2317_849_RPT.DOC) WHICH PROVIDES DETAILS OF THE TECHNIQUES EMPLOYED, THEIR INHERENT LIMITATIONS AND ANY SITE SPECIFIC ISSUES.
2. THIS DRAWING IS BASED UPON AN EXTRACT FROM DRAWING 'OS data.dwg' PROVIDED BY THE CLIENT. THE ORDNANCE SURVEY CO-ORDINATES OBTAINED FOR THIS SURVEY WERE MEASURED USING THE UKOSTN02 PROJECTION. THIS PROJECTION SHOULD BE TAKEN INTO ACCOUNT IF THE SURVEY GRID IS RELOCATED.
3. PHASE SITE INVESTIGATIONS CANNOT ACCEPT RESPONSIBILITY FOR THE RELIABILITY OR ACCURACY OF ANY INFORMATION PROVIDED BY A THIRD PARTY.
4. THIS DRAWING AND THE INFORMATION CONTAINED THEREIN IS ISSUED IN CONFIDENCE AND IS THE COPYRIGHT OF PHASE SITE INVESTIGATIONS LIMITED. DISCLOSURE OF THIS INFORMATION TO THIRD PARTIES AND UNAUTHORISED COPYING OR REPLICATION OF THIS DATA WITHOUT APPROVAL IS FORBIDDEN.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING

N

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe, County Durham, DL5 6AU

T: +44 [0] 01325 311 751
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2317_849_13	FINAL

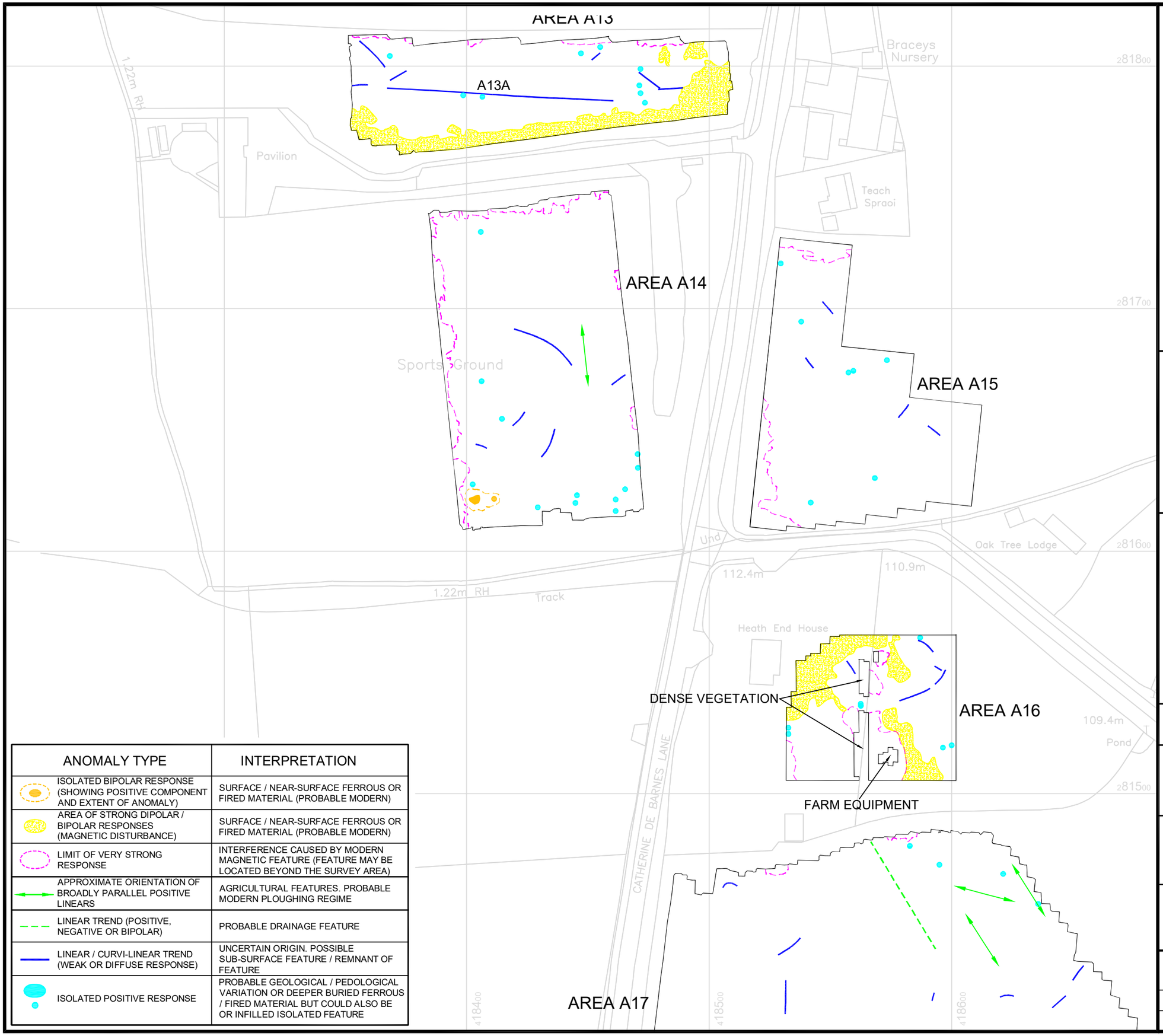
Client
AECOM
LEEDS

Site
M42 JUNCTION 6 IMPROVEMENT SCHEME
WARWICKSHIRE

Title GREYSCALE PLOTS OF MAGNETIC GRADIENT DATA: A13, A14, A15, A16 AND NORTHERN PART OF A17

Job No
ARC_2317_849

Surveyed	JW, CA	Drawn	MW
Chk.	NF	Date	25/04/2018



ANOMALY TYPE	INTERPRETATION
ISOLATED BIPOLAR RESPONSE (SHOWING POSITIVE COMPONENT AND EXTENT OF ANOMALY)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
AREA OF STRONG DIPOLAR / BIPOLAR RESPONSES (MAGNETIC DISTURBANCE)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
LIMIT OF VERY STRONG RESPONSE	INTERFERENCE CAUSED BY MODERN MAGNETIC FEATURE (FEATURE MAY BE LOCATED BEYOND THE SURVEY AREA)
APPROXIMATE ORIENTATION OF BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. PROBABLE MODERN PLOUGHING REGIME
LINEAR TREND (POSITIVE, NEGATIVE OR BIPOLAR)	PROBABLE DRAINAGE FEATURE
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE SUB-SURFACE FEATURE / REMNANT OF FEATURE
ISOLATED POSITIVE RESPONSE	PROBABLE GEOLOGICAL / PEDOLOGICAL VARIATION OR DEEPER BURIED FERROUS / FIRED MATERIAL BUT COULD ALSO BE OR INFILLED ISOLATED FEATURE

NOTES

1. THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE ACCOMPANYING REPORT (ARC_2317_849_RPT.DOC) WHICH PROVIDES DETAILS OF THE TECHNIQUES EMPLOYED, THEIR INHERENT LIMITATIONS AND ANY SITE SPECIFIC ISSUES.
2. THIS DRAWING IS BASED UPON AN EXTRACT FROM DRAWING 'OS data.dwg' PROVIDED BY THE CLIENT. THE ORDNANCE SURVEY CO-ORDINATES OBTAINED FOR THIS SURVEY WERE MEASURED USING THE UKOSTN02 PROJECTION. THIS PROJECTION SHOULD BE TAKEN INTO ACCOUNT IF THE SURVEY GRID IS RELOCATED.
3. PHASE SITE INVESTIGATIONS CANNOT ACCEPT RESPONSIBILITY FOR THE RELIABILITY OR ACCURACY OF ANY INFORMATION PROVIDED BY A THIRD PARTY.
4. THIS DRAWING AND THE INFORMATION CONTAINED THEREIN IS ISSUED IN CONFIDENCE AND IS THE COPYRIGHT OF PHASE SITE INVESTIGATIONS LIMITED. DISCLOSURE OF THIS INFORMATION TO THIRD PARTIES AND UNAUTHORISED COPYING OR REPLICATION OF THIS DATA WITHOUT APPROVAL IS FORBIDDEN.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING

N

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe, County Durham, DL5 6AU

T: +44 [0] 01325 311 751
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2317_849_14	FINAL

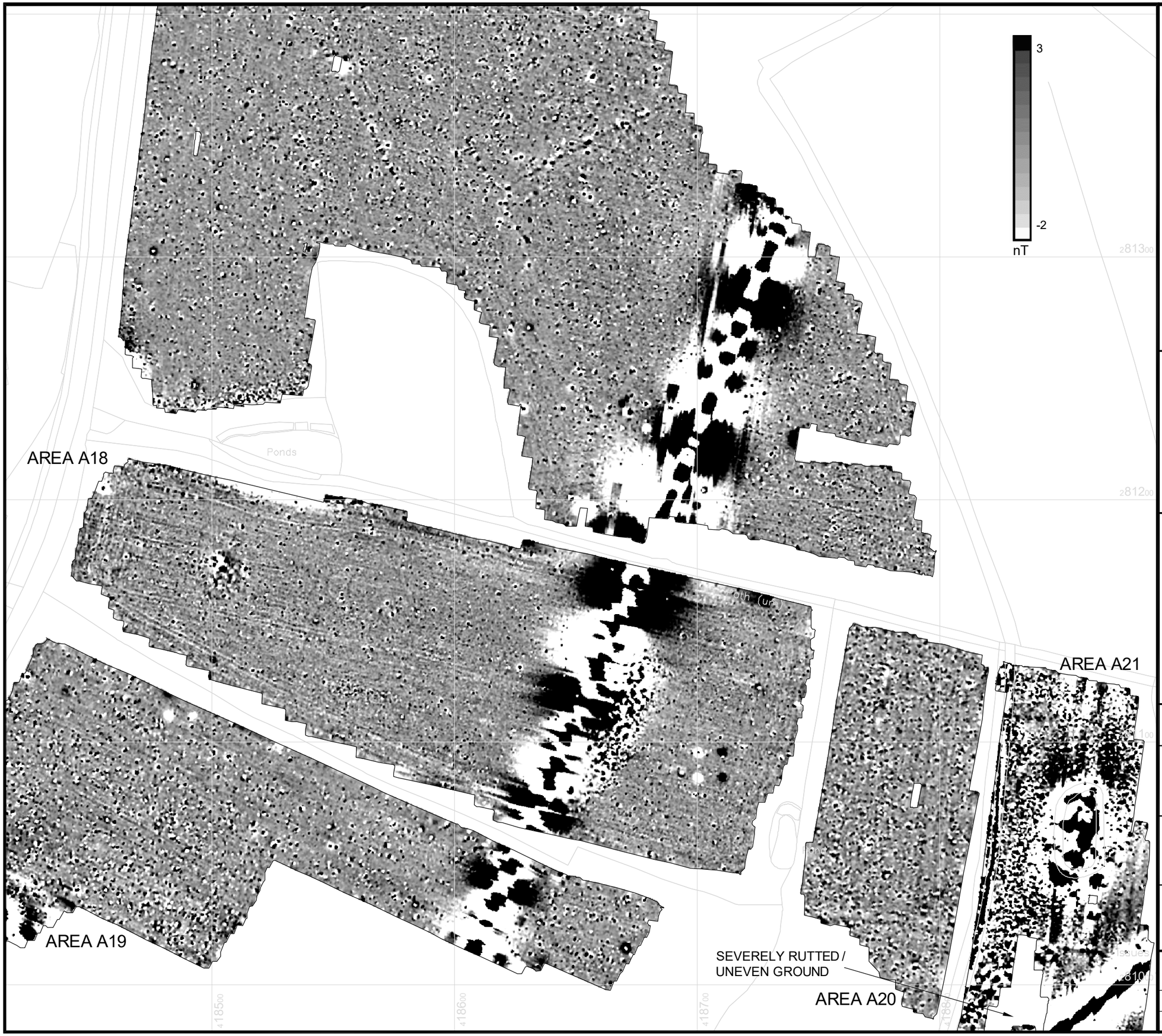
Client
AECOM
LEEDS

Site
M42 JUNCTION 6 IMPROVEMENT SCHEME
WARWICKSHIRE

Title
INTERPRETATION OF MAGNETIC GRADIENT DATA: A13, A14, A15, A16 AND NORTHERN PART OF A17

Job No
ARC_2317_849

Surveyed	JW, CA	Drawn	MW
Chk.	NF	Date	25/04/2018



NOTES

1. THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE ACCOMPANYING REPORT (ARC_2317_849_RPT.DOC) WHICH PROVIDES DETAILS OF THE TECHNIQUES EMPLOYED, THEIR INHERENT LIMITATIONS AND ANY SITE SPECIFIC ISSUES.
2. THIS DRAWING IS BASED UPON AN EXTRACT FROM DRAWING 'OS data.dwg' PROVIDED BY THE CLIENT. THE ORDNANCE SURVEY CO-ORDINATES OBTAINED FOR THIS SURVEY WERE MEASURED USING THE UKOSTN02 PROJECTION. THIS PROJECTION SHOULD BE TAKEN INTO ACCOUNT IF THE SURVEY GRID IS RELOCATED.
3. PHASE SITE INVESTIGATIONS CANNOT ACCEPT RESPONSIBILITY FOR THE RELIABILITY OR ACCURACY OF ANY INFORMATION PROVIDED BY A THIRD PARTY.
4. THIS DRAWING AND THE INFORMATION CONTAINED THEREIN IS ISSUED IN CONFIDENCE AND IS THE COPYRIGHT OF PHASE SITE INVESTIGATIONS LIMITED. DISCLOSURE OF THIS INFORMATION TO THIRD PARTIES AND UNAUTHORISED COPYING OR REPLICATION OF THIS DATA WITHOUT APPROVAL IS FORBIDDEN.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING

N

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe, County Durham, DL5 6AU

T: +44 [0] 01325 311 751
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2317_849_15	FINAL

Client
AECOM
LEEDS

Site
M42 JUNCTION 6 IMPROVEMENT SCHEME
WARWICKSHIRE

Title
GREYSCALE PLOTS OF MAGNETIC GRADIENT DATA: A18 AND A20 AND PARTS OF A17, A19 AND A21

Job No
ARC_2317_849

Surveyed	JW, CA	Drawn	MW
Chk.	NF	Date	25/04/2018

'DISTURBED' MAGNETIC BACKGROUND FROM SPREAD OF MODERN MATERIAL

AREA A17

AREA A18

AREA A19

A18A

A18B

A18B

A18B

Ponds

Path (Ludy)

AREA A21

A21A

'DISTURBED' MAGNETIC BACKGROUND FROM SPREAD OF MODERN MATERIAL

Pond

AREA A20

Issues

ANOMALY TYPE	INTERPRETATION
ISOLATED BIPOLAR RESPONSE (SHOWING POSITIVE COMPONENT AND EXTENT OF ANOMALY)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
AREA OF STRONG DIPOLAR / BIPOLAR RESPONSES (MAGNETIC DISTURBANCE)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
BIPOLAR LINEAR (SHOWING LINEAR RESPONSE AND EXTENT OF ANOMALY WHERE PRESENT)	MODERN LINEAR MAGNETIC FEATURE. PROBABLE PIPE OR CABLE
LIMIT OF VERY STRONG RESPONSE	INTERFERENCE CAUSED BY MODERN MAGNETIC FEATURE (FEATURE MAY BE LOCATED BEYOND THE SURVEY AREA)
LINEAR TREND (POSITIVE, NEGATIVE OR BIPOLAR)	PROBABLE DRAINAGE FEATURE

ANOMALY TYPE	INTERPRETATION
APPROXIMATE ORIENTATION OF BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. PROBABLE MODERN PLOUGHING REGIME
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE SUB-SURFACE FEATURE / REMNANT OF FEATURE
ISOLATED POSITIVE RESPONSE	PROBABLE GEOLOGICAL / PEDOLOGICAL VARIATION OR DEEPER BURIED FERROUS / FIRED MATERIAL BUT COULD ALSO BE OR INFILLED ISOLATED FEATURE

NOTES

1. THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE ACCOMPANYING REPORT (ARC_2317_849_RPT.DOC) WHICH PROVIDES DETAILS OF THE TECHNIQUES EMPLOYED, THEIR INHERENT LIMITATIONS AND ANY SITE SPECIFIC ISSUES.
2. THIS DRAWING IS BASED UPON AN EXTRACT FROM DRAWING 'OS data.dwg' PROVIDED BY THE CLIENT. THE ORDNANCE SURVEY CO-ORDINATES OBTAINED FOR THIS SURVEY WERE MEASURED USING THE UKOSTN02 PROJECTION. THIS PROJECTION SHOULD BE TAKEN INTO ACCOUNT IF THE SURVEY GRID IS RELOCATED.
3. PHASE SITE INVESTIGATIONS CANNOT ACCEPT RESPONSIBILITY FOR THE RELIABILITY OR ACCURACY OF ANY INFORMATION PROVIDED BY A THIRD PARTY.
4. THIS DRAWING AND THE INFORMATION CONTAINED THEREIN IS ISSUED IN CONFIDENCE AND IS THE COPYRIGHT OF PHASE SITE INVESTIGATIONS LIMITED. DISCLOSURE OF THIS INFORMATION TO THIRD PARTIES AND UNAUTHORISED COPYING OR REPLICATION OF THIS DATA WITHOUT APPROVAL IS FORBIDDEN.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING

N

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe, County Durham, DL5 6AU

T: +44 [0] 01325 311 751
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2317_849_16	FINAL

Client
AECOM
LEEDS

Site
M42 JUNCTION 6 IMPROVEMENT SCHEME
WARWICKSHIRE

Title
INTERPRETATION OF MAGNETIC GRADIENT DATA: A18 AND A20 AND PARTS OF A17, A19 AND A21

Job No
ARC_2317_849

Surveyed	JW, CA	Drawn	MW
Chk.	NF	Date	25/04/2018

NOTES

1. THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE ACCOMPANYING REPORT (ARC_2317_849_RPT.DOC) WHICH PROVIDES DETAILS OF THE TECHNIQUES EMPLOYED, THEIR INHERENT LIMITATIONS AND ANY SITE SPECIFIC ISSUES.
2. THIS DRAWING IS BASED UPON AN EXTRACT FROM DRAWING 'OS data.dwg' PROVIDED BY THE CLIENT. THE ORDNANCE SURVEY CO-ORDINATES OBTAINED FOR THIS SURVEY WERE MEASURED USING THE UKOSTN02 PROJECTION. THIS PROJECTION SHOULD BE TAKEN INTO ACCOUNT IF THE SURVEY GRID IS RELOCATED.
3. PHASE SITE INVESTIGATIONS CANNOT ACCEPT RESPONSIBILITY FOR THE RELIABILITY OR ACCURACY OF ANY INFORMATION PROVIDED BY A THIRD PARTY.
4. THIS DRAWING AND THE INFORMATION CONTAINED THEREIN IS ISSUED IN CONFIDENCE AND IS THE COPYRIGHT OF PHASE SITE INVESTIGATIONS LIMITED. DISCLOSURE OF THIS INFORMATION TO THIRD PARTIES AND UNAUTHORISED COPYING OR REPLICATION OF THIS DATA WITHOUT APPROVAL IS FORBIDDEN.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING

N

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe, County Durham, DL5 6AU

T: +44 [0] 01325 311 751
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2317_849_17	FINAL

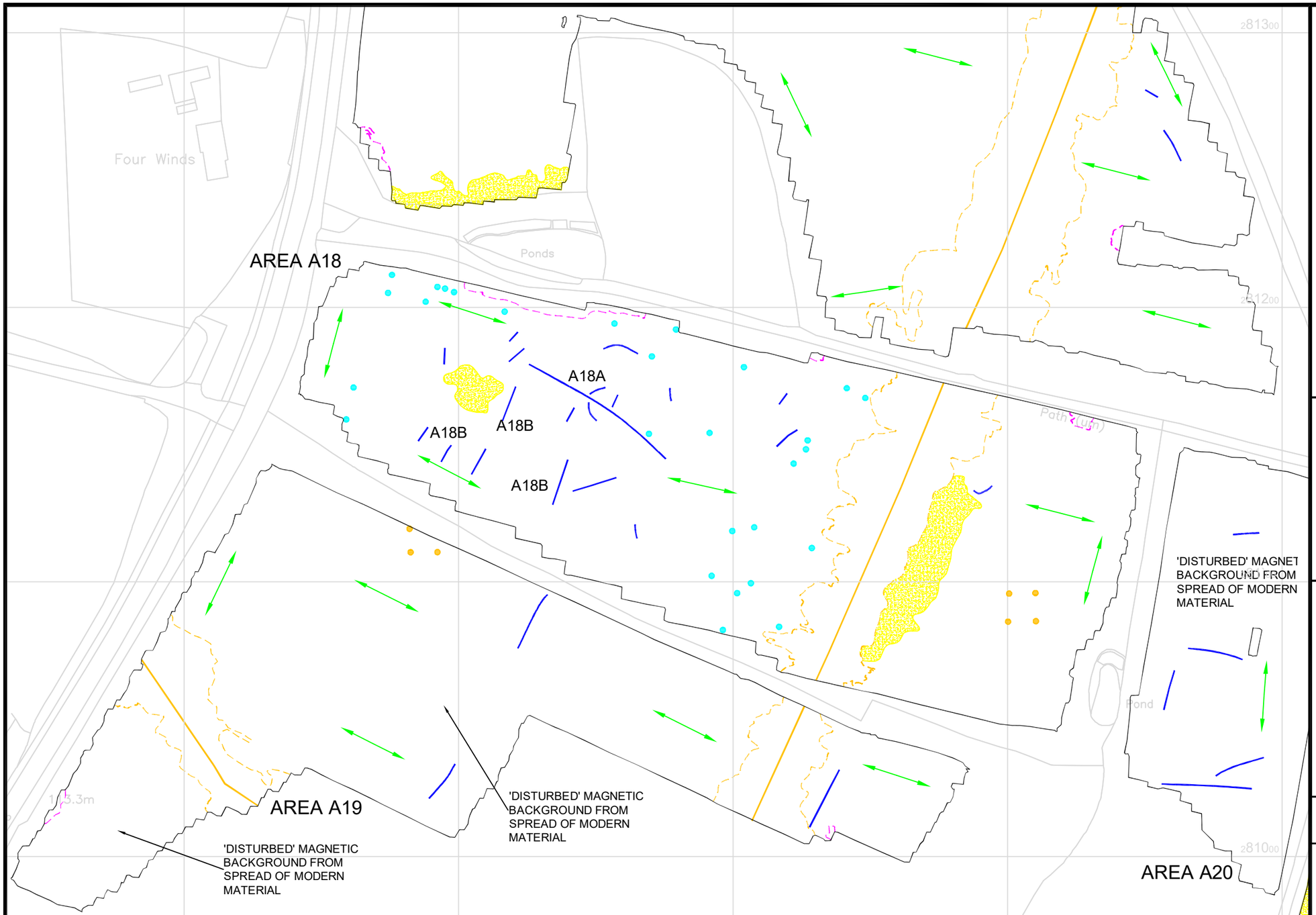
Client
AECOM
LEEDS

Site
M42 JUNCTION 6 IMPROVEMENT SCHEME
WARWICKSHIRE

Title GREYSCALE PLOTS OF MAGNETIC GRADIENT DATA: A18 AND A19 AND PARTS OF A17 AND A20

Job No
ARC_2317_849

Surveyed	JW, CA	Drawn	MW
Chk.	NF	Date	25/04/2018



ANOMALY TYPE	INTERPRETATION
BIPOLAR LINEAR (SHOWING LINEAR RESPONSE AND EXTENT OF ANOMALY WHERE PRESENT)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
AREA OF STRONG DIPOLAR / BIPOLAR RESPONSES (MAGNETIC DISTURBANCE)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
BIPOLAR LINEAR (SHOWING LINEAR RESPONSE AND EXTENT OF ANOMALY WHERE PRESENT)	MODERN LINEAR MAGNETIC FEATURE. PROBABLE PIPE OR CABLE
LIMIT OF VERY STRONG RESPONSE	INTERFERENCE CAUSED BY MODERN MAGNETIC FEATURE (FEATURE MAY BE LOCATED BEYOND THE SURVEY AREA)
LINEAR TREND (POSITIVE, NEGATIVE OR BIPOLAR)	PROBABLE DRAINAGE FEATURE

ANOMALY TYPE	INTERPRETATION
APPROXIMATE ORIENTATION OF BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. PROBABLE MODERN PLOUGHING REGIME
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE SUB-SURFACE FEATURE / REMNANT OF FEATURE
ISOLATED POSITIVE RESPONSE	PROBABLE GEOLOGICAL / PEDOLOGICAL VARIATION OR DEEPER BURIED FERROUS / FIRED MATERIAL BUT COULD ALSO BE OR INFILLED ISOLATED FEATURE

NOTES

1. THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE ACCOMPANYING REPORT (ARC_2317_849_RPT.DOC) WHICH PROVIDES DETAILS OF THE TECHNIQUES EMPLOYED, THEIR INHERENT LIMITATIONS AND ANY SITE SPECIFIC ISSUES.
2. THIS DRAWING IS BASED UPON AN EXTRACT FROM DRAWING 'OS data.dwg' PROVIDED BY THE CLIENT. THE ORDNANCE SURVEY CO-ORDINATES OBTAINED FOR THIS SURVEY WERE MEASURED USING THE UKOSTN02 PROJECTION. THIS PROJECTION SHOULD BE TAKEN INTO ACCOUNT IF THE SURVEY GRID IS RELOCATED.
3. PHASE SITE INVESTIGATIONS CANNOT ACCEPT RESPONSIBILITY FOR THE RELIABILITY OR ACCURACY OF ANY INFORMATION PROVIDED BY A THIRD PARTY.
4. THIS DRAWING AND THE INFORMATION CONTAINED THEREIN IS ISSUED IN CONFIDENCE AND IS THE COPYRIGHT OF PHASE SITE INVESTIGATIONS LIMITED. DISCLOSURE OF THIS INFORMATION TO THIRD PARTIES AND UNAUTHORISED COPYING OR REPLICATION OF THIS DATA WITHOUT APPROVAL IS FORBIDDEN.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING

N

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe, County Durham, DL5 6AU

T: +44 [0] 01325 311 751
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2317_849_18	FINAL

Client
AECOM
LEEDS

Site
M42 JUNCTION 6 IMPROVEMENT SCHEME
WARWICKSHIRE

Title
INTERPRETATION OF MAGNETIC GRADIENT DATA: A18 AND A19 AND PARTS OF A17 AND A20

Job No
ARC_2317_849

Surveyed	JW, CA	Drawn	MW
Chk.	NF	Date	25/04/2018

AREA A20

SEVERELY RUTTED / UNEVEN GROUND

AREA A21

AREA A22

VERY UNEVEN / RUTTED GROUND

VERY UNEVEN / RUTTED GROUND

VERY UNEVEN / RUTTED GROUND

3

-2

nT

Pond

Track

Pond

Rainbow Place

B 4102

2810 00

2809 00

2808 00

2807 00

4187 00

4188 00

4189 00

4190 00

4191 00

NOTES

1. THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE ACCOMPANYING REPORT (ARC_2317_849_RPT.DOC) WHICH PROVIDES DETAILS OF THE TECHNIQUES EMPLOYED, THEIR INHERENT LIMITATIONS AND ANY SITE SPECIFIC ISSUES.
2. THIS DRAWING IS BASED UPON AN EXTRACT FROM DRAWING 'OS data.dwg' PROVIDED BY THE CLIENT. THE ORDNANCE SURVEY CO-ORDINATES OBTAINED FOR THIS SURVEY WERE MEASURED USING THE UKOSTN02 PROJECTION. THIS PROJECTION SHOULD BE TAKEN INTO ACCOUNT IF THE SURVEY GRID IS RELOCATED.
3. PHASE SITE INVESTIGATIONS CANNOT ACCEPT RESPONSIBILITY FOR THE RELIABILITY OR ACCURACY OF ANY INFORMATION PROVIDED BY A THIRD PARTY.
4. THIS DRAWING AND THE INFORMATION CONTAINED THEREIN IS ISSUED IN CONFIDENCE AND IS THE COPYRIGHT OF PHASE SITE INVESTIGATIONS LIMITED. DISCLOSURE OF THIS INFORMATION TO THIRD PARTIES AND UNAUTHORISED COPYING OR REPLICATION OF THIS DATA WITHOUT APPROVAL IS FORBIDDEN.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING

N

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe, County Durham, DL5 6AU

T: +44 [0] 01325 311 751
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2317_849_19	FINAL

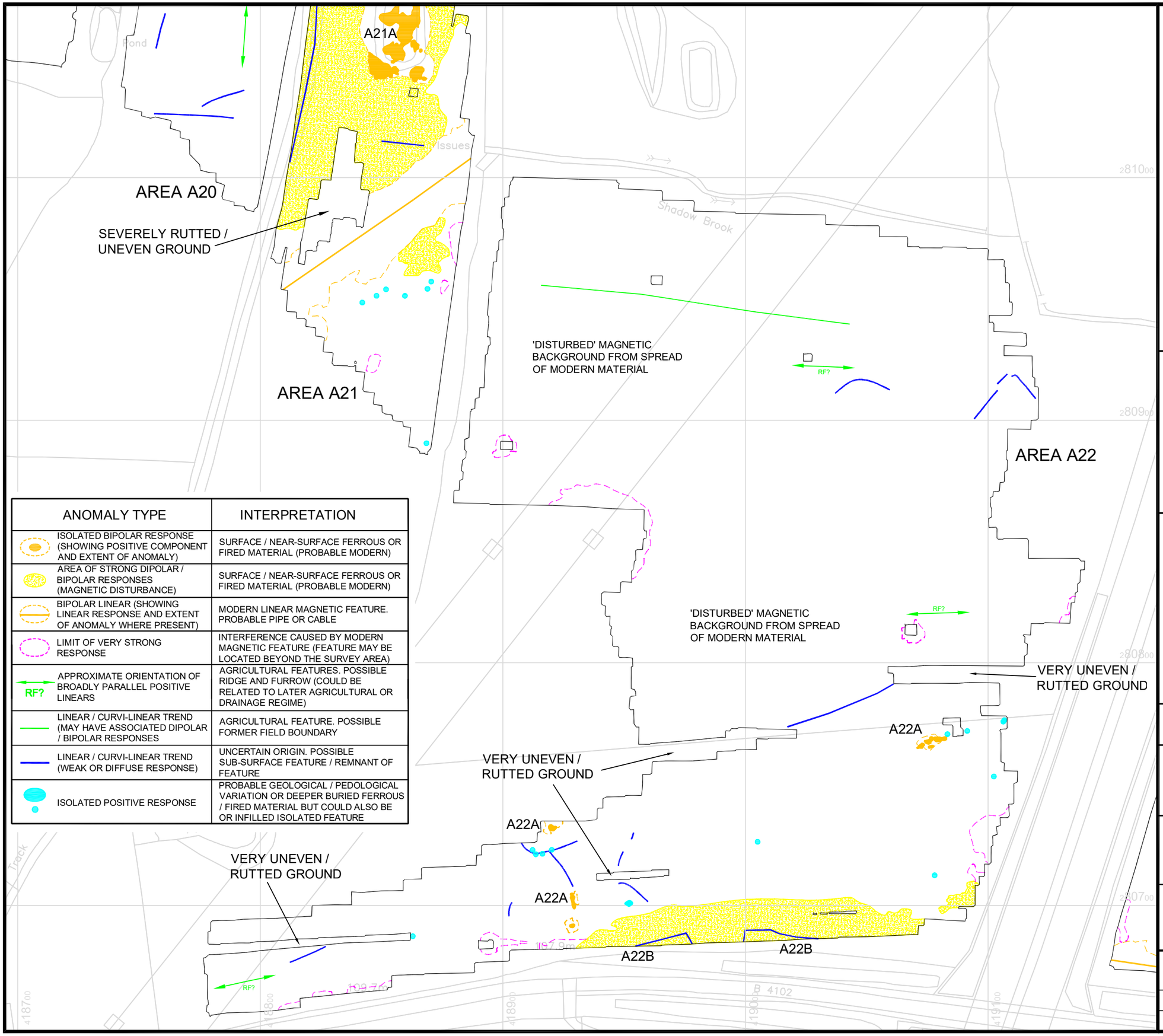
Client: AECOM LEEDS

Site: M42 JUNCTION 6 IMPROVEMENT SCHEME WARWICKSHIRE

Title: GREYSCALE PLOTS OF MAGNETIC GRADIENT DATA: A22 AND PARTS PARTS OF A20 AND A21

Job No: ARC_2317_849

Surveyed	JW, CA	Drawn	MW
Chk.	NF	Date	25/04/2018



ANOMALY TYPE	INTERPRETATION
ISOLATED BIPOLAR RESPONSE (SHOWING POSITIVE COMPONENT AND EXTENT OF ANOMALY)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
AREA OF STRONG DIPOLAR / BIPOLAR RESPONSES (MAGNETIC DISTURBANCE)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
BIPOLAR LINEAR (SHOWING LINEAR RESPONSE AND EXTENT OF ANOMALY WHERE PRESENT)	MODERN LINEAR MAGNETIC FEATURE. PROBABLE PIPE OR CABLE
LIMIT OF VERY STRONG RESPONSE	INTERFERENCE CAUSED BY MODERN MAGNETIC FEATURE (FEATURE MAY BE LOCATED BEYOND THE SURVEY AREA)
RF? APPROXIMATE ORIENTATION OF BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. POSSIBLE RIDGE AND FURROW (COULD BE RELATED TO LATER AGRICULTURAL OR DRAINAGE REGIME)
LINEAR / CURVI-LINEAR TREND (MAY HAVE ASSOCIATED DIPOLAR / BIPOLAR RESPONSES	AGRICULTURAL FEATURE. POSSIBLE FORMER FIELD BOUNDARY
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE SUB-SURFACE FEATURE / REMNANT OF FEATURE
ISOLATED POSITIVE RESPONSE	PROBABLE GEOLOGICAL / PEDOLOGICAL VARIATION OR DEEPER BURIED FERROUS / FIRED MATERIAL BUT COULD ALSO BE OR INFILLED ISOLATED FEATURE

NOTES

1. THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE ACCOMPANYING REPORT (ARC_2317_849_RPT.DOC) WHICH PROVIDES DETAILS OF THE TECHNIQUES EMPLOYED, THEIR INHERENT LIMITATIONS AND ANY SITE SPECIFIC ISSUES.
2. THIS DRAWING IS BASED UPON AN EXTRACT FROM DRAWING 'OS data.dwg' PROVIDED BY THE CLIENT. THE ORDNANCE SURVEY CO-ORDINATES OBTAINED FOR THIS SURVEY WERE MEASURED USING THE UKOSTN02 PROJECTION. THIS PROJECTION SHOULD BE TAKEN INTO ACCOUNT IF THE SURVEY GRID IS RELOCATED.
3. PHASE SITE INVESTIGATIONS CANNOT ACCEPT RESPONSIBILITY FOR THE RELIABILITY OR ACCURACY OF ANY INFORMATION PROVIDED BY A THIRD PARTY.
4. THIS DRAWING AND THE INFORMATION CONTAINED THEREIN IS ISSUED IN CONFIDENCE AND IS THE COPYRIGHT OF PHASE SITE INVESTIGATIONS LIMITED. DISCLOSURE OF THIS INFORMATION TO THIRD PARTIES AND UNAUTHORISED COPYING OR REPLICATION OF THIS DATA WITHOUT APPROVAL IS FORBIDDEN.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING

N

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe, County Durham, DL5 6AU

T: +44 [0] 01325 311 751
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2317_849_20	FINAL

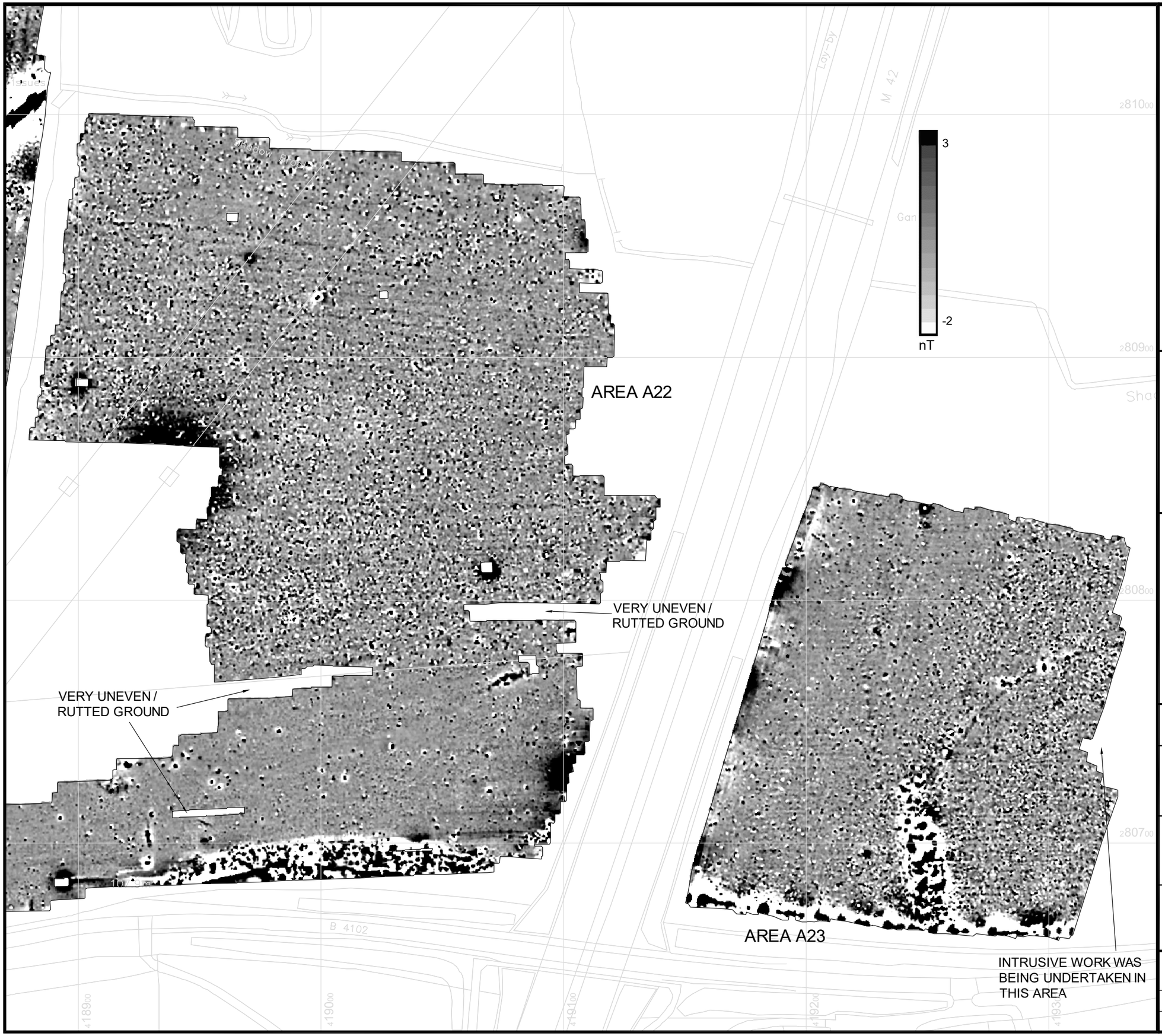
Client: AECOM LEEDS

Site: M42 JUNCTION 6 IMPROVEMENT SCHEME WARWICKSHIRE

Title: INTERPRETATION OF MAGNETIC GRADIENT DATA: A22 AND PARTS PARTS OF A20 AND A21

Job No: ARC_2317_849

Surveyed	JW, CA	Drawn	MW
Chk.	NF	Date	25/04/2018



NOTES

1. THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE ACCOMPANYING REPORT (ARC_2317_849_RPT.DOC) WHICH PROVIDES DETAILS OF THE TECHNIQUES EMPLOYED, THEIR INHERENT LIMITATIONS AND ANY SITE SPECIFIC ISSUES.
2. THIS DRAWING IS BASED UPON AN EXTRACT FROM DRAWING 'OS data.dwg' PROVIDED BY THE CLIENT. THE ORDNANCE SURVEY CO-ORDINATES OBTAINED FOR THIS SURVEY WERE MEASURED USING THE UKOSTN02 PROJECTION. THIS PROJECTION SHOULD BE TAKEN INTO ACCOUNT IF THE SURVEY GRID IS RELOCATED.
3. PHASE SITE INVESTIGATIONS CANNOT ACCEPT RESPONSIBILITY FOR THE RELIABILITY OR ACCURACY OF ANY INFORMATION PROVIDED BY A THIRD PARTY.
4. THIS DRAWING AND THE INFORMATION CONTAINED THEREIN IS ISSUED IN CONFIDENCE AND IS THE COPYRIGHT OF PHASE SITE INVESTIGATIONS LIMITED. DISCLOSURE OF THIS INFORMATION TO THIRD PARTIES AND UNAUTHORISED COPYING OR REPLICATION OF THIS DATA WITHOUT APPROVAL IS FORBIDDEN.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING

N

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe, County Durham, DL5 6AU

T: +44 [0] 01325 311 751
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2317_849_21	FINAL

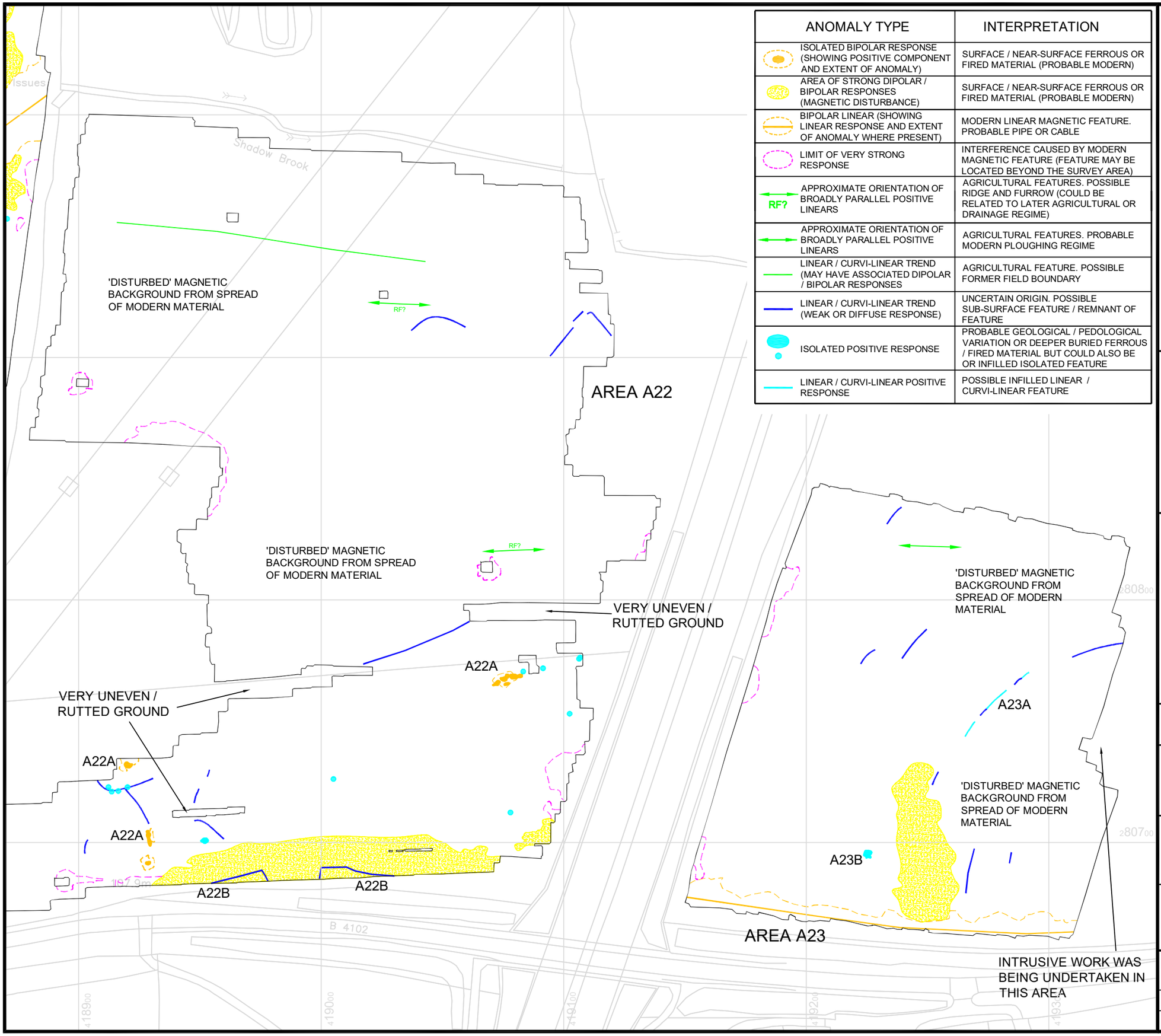
Client: AECOM LEEDS

Site: M42 JUNCTION 6 IMPROVEMENT SCHEME WARWICKSHIRE

Title: GREYSCALE PLOTS OF MAGNETIC GRADIENT DATA: A23 AND PART OF A22

Job No: ARC_2317_849

Surveyed	JW, CA	Drawn	MW
Chk.	NF	Date	25/04/2018



ANOMALY TYPE	INTERPRETATION
ISOLATED BIPOLAR RESPONSE (SHOWING POSITIVE COMPONENT AND EXTENT OF ANOMALY)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
AREA OF STRONG DIPOLAR / BIPOLAR RESPONSES (MAGNETIC DISTURBANCE)	SURFACE / NEAR-SURFACE FERROUS OR FIRED MATERIAL (PROBABLE MODERN)
BIPOLAR LINEAR (SHOWING LINEAR RESPONSE AND EXTENT OF ANOMALY WHERE PRESENT)	MODERN LINEAR MAGNETIC FEATURE. PROBABLE PIPE OR CABLE
LIMIT OF VERY STRONG RESPONSE	INTERFERENCE CAUSED BY MODERN MAGNETIC FEATURE (FEATURE MAY BE LOCATED BEYOND THE SURVEY AREA)
RF? APPROXIMATE ORIENTATION OF BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. POSSIBLE RIDGE AND FURROW (COULD BE RELATED TO LATER AGRICULTURAL OR DRAINAGE REGIME)
APPROXIMATE ORIENTATION OF BROADLY PARALLEL POSITIVE LINEARS	AGRICULTURAL FEATURES. PROBABLE MODERN PLOUGHING REGIME
LINEAR / CURVI-LINEAR TREND (MAY HAVE ASSOCIATED DIPOLAR / BIPOLAR RESPONSES	AGRICULTURAL FEATURE. POSSIBLE FORMER FIELD BOUNDARY
LINEAR / CURVI-LINEAR TREND (WEAK OR DIFFUSE RESPONSE)	UNCERTAIN ORIGIN. POSSIBLE SUB-SURFACE FEATURE / REMNANT OF FEATURE
ISOLATED POSITIVE RESPONSE	PROBABLE GEOLOGICAL / PEDOLOGICAL VARIATION OR DEEPER BURIED FERROUS / FIRED MATERIAL BUT COULD ALSO BE OR INFILLED ISOLATED FEATURE
LINEAR / CURVI-LINEAR POSITIVE RESPONSE	POSSIBLE INFILLED LINEAR / CURVI-LINEAR FEATURE

NOTES

1. THIS DRAWING MUST BE USED IN CONJUNCTION WITH THE ACCOMPANYING REPORT (ARC_2317_849_RPT.DOC) WHICH PROVIDES DETAILS OF THE TECHNIQUES EMPLOYED, THEIR INHERENT LIMITATIONS AND ANY SITE SPECIFIC ISSUES.
2. THIS DRAWING IS BASED UPON AN EXTRACT FROM DRAWING 'OS data.dwg' PROVIDED BY THE CLIENT. THE ORDNANCE SURVEY CO-ORDINATES OBTAINED FOR THIS SURVEY WERE MEASURED USING THE UKOSTN02 PROJECTION. THIS PROJECTION SHOULD BE TAKEN INTO ACCOUNT IF THE SURVEY GRID IS RELOCATED.
3. PHASE SITE INVESTIGATIONS CANNOT ACCEPT RESPONSIBILITY FOR THE RELIABILITY OR ACCURACY OF ANY INFORMATION PROVIDED BY A THIRD PARTY.
4. THIS DRAWING AND THE INFORMATION CONTAINED THEREIN IS ISSUED IN CONFIDENCE AND IS THE COPYRIGHT OF PHASE SITE INVESTIGATIONS LIMITED. DISCLOSURE OF THIS INFORMATION TO THIRD PARTIES AND UNAUTHORISED COPYING OR REPLICATION OF THIS DATA WITHOUT APPROVAL IS FORBIDDEN.

ALWAYS EXERCISE CAUTION WHEN EXCAVATING

N

PHASE SITE INVESTIGATIONS

Phase Site Investigations Ltd, 703A Whinfield Drive, Aycliffe Business Park, Newton Aycliffe, County Durham, DL5 6AU

T: +44 [0] 01325 311 751
E: enquiries@PhaseSI.com
W: www.PhaseSI.com

Scale [A3 Sheet]	Drawing	Status
1:1500	ARC_2317_849_22	FINAL

Client: AECOM LEEDS

Site: M42 JUNCTION 6 IMPROVEMENT SCHEME WARWICKSHIRE

Title: INTERPRETATION OF MAGNETIC GRADIENT DATA: A23 AND PART OF A22

Job No: ARC_2317_849

Surveyed	JW, CA	Drawn	MW
Chk.	NF	Date	25/04/2018

REFERENCES

British Geological Survey, 2018, online resource - www.bgs.ac.uk

Soilscapes, 2018, online resource - www.landis.org.uk/soilscapes

APPENDIX 1

Magnetic survey: technical information

1.1 Theoretical background

1.1.1 Magnetic instruments measure the value of the Earth's magnetic field; the units of which are nanoTeslas (nT). The presence of surface and sub-surface features can cause variations or anomalies in this magnetic field. The strength of the anomaly is dependent on the magnetic properties of a feature and the material that surrounds it. The two magnetic properties that are of most interest are magnetic susceptibility and thermoremnant magnetism.

1.1.2 Magnetic susceptibility indicates the amount of ferrous (iron) minerals that are present. These can be redistributed or changed (enhanced) by human activity. If enhanced material subsequently fills in features such as pits or ditches then these can produce localised increases in magnetic responses (anomalies) which can be detected by a magnetic gradiometer even when the features are buried under additional soil cover.

1.1.3 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. Less magnetic material such as masonry or plastic service pipes which intrude into the topsoil may give a negative magnetic response relative to the background level. The strength of magnetic responses that a feature will produce will depend on the background magnetic susceptibility, how rapidly the feature has been infilled, the level and type of human activity in the area and the size and depth of a feature. Not all infilled features can be detected and natural variations can also produce localised positive and negative anomalies.

1.1.4 Thermoremnant magnetism indicates the amount of magnetism inherent in an object as a result of heating. Material that has been heated to a high temperature (fired), such as brick, can acquire strong magnetic properties and so although they may not appear to have a high iron content they can produce strong magnetic anomalies

1.1.5 The magnetic survey method is highly sensitive to interference from surface and near-surface magnetic 'contaminants'. Surface features such as metallic fencing, reinforced concrete, buildings or walls all have very strong magnetic signatures that can dominate readings collected adjacent to them. Identification of anomalies caused by sub-surface features is therefore more difficult, or even impossible, in the vicinity of surface magnetic features. The presence of made ground also has a detrimental effect on the magnetic data quality as this usually contains magnetic material in the form of metallic scrap and brick. Identification of features beneath made ground is still possible if the target feature is reasonably large and has a strong magnetic response but smaller features or magnetically weak features are unlikely to be identified.

1.1.6 The interpretation of magnetic anomalies is often subjective and it is rarely possible to identify the cause of all magnetic anomalies. Not all features will produce a measurable magnetic response and the effectiveness of a magnetic survey is also dependant on the site-specific conditions. The main factors that may limit whether a feature can be detected are the

composition of a feature, its depth and size and the surrounding material. It is not possible to guarantee that a magnetic survey will identify all sub-surface features.

1.1.7 Most high resolution, near surface magnetic surveys utilise a magnetic gradiometer. A gradiometer is a hand-held instrument that consists of two magnetic sensors, one positioned directly above the other, which allows measurement of the magnetic gradient component of the magnetic field. A gradiometer configuration eliminates the need for applying corrections due to natural variations in the overall field strength that occur during the course of a day but it only measures relative variations in the local magnetic field and so comparison of absolute values between sites is not possible.

1.1.8 Features that are commonly located using magnetic surveys include archaeological ditches and pits, buried structures or foundations, mineshafts, unexploded ordnance, metallic pipes and cables, buried piles and pile caps. The technique can also be used for geological mapping; particularly the location of igneous intrusions.

1.2 Instrumentation

1.2.1 A multi-sensor array cart system (MACS) utilising 8 Foerster 4.032 Ferex CON 650 gradiometers, spaced at 0.5 m intervals, with a control unit and data logger was used for the magnetic survey to survey part of the site.

1.2.2 A Bartington Grad601-2 magnetic gradiometer was used for the magnetic survey to survey part of the site. The Bartington Grad601-2 is a dual sensor instrument, incorporating two Grad-01-1000 gradiometers set at a distance of 1 m apart.

1.3 Survey methodology - MACS

1.3.1 The MACS utilises an RTK GNSS system which means that survey grids do not have to be established. Instead an area is surveyed over a series of continuous profiles and the position of each data point is recorded using an RTK GNSS system. The sensors have a separation of 0.5 m which means that data was collected on profiles spaced at 0.5 m apart. Readings were taken at between 0.1 m and 0.15 m intervals.

1.3.2 Data is collected on zig-zag profiles along the full length or width of a field, although fields can be sub-divided if they are particularly large. Marker canes are set-out along field boundaries at set intervals and these are used to align the profiles. The survey profiles are usually offset from field boundaries, buildings and other metallic features by several metres to reduce the detrimental effect that these surface magnetic features have on the data. The location of the MACS data is converted direct to Ordnance Survey co-ordinates using the UK OSTN 02 projection. As the data is related direct to Ordnance Survey National Grid co-ordinates temporary survey stations are not established.

1.3.3 The Foerster gradiometers have a resolution of 0.2 nT but the stability of the cart system significantly reduces noise caused by instrument tilt and movement when compared with a traditional hand-held gradiometer system and the increased data intervals provide a higher resolution data set. The sensors have a range of ± 10,000nT and readings are taken at 0.1 nT resolution.

1.4 Survey methodology - Bartington

1.4.1 The Bartington magnetic survey is carried out on a series of regular 30 m grids. Data is collected on zig-zag profiles (walking along a profile and then returning up the adjacent profile in the opposite direction) that are 2 m apart (the dual sensor array means that this

equates to 1 m profile intervals). All data is collected at 0.25 m intervals and stored in the instrument for download at the end of the survey.

1.4.2 Readings were taken on 100 nT range (0.1 nT sensitivity). The instrument is balanced and 'zeroed' at a base station that is established on site in a magnetically quiet and uniform location. The instrument is checked for electronic and mechanical drift at this base station at regular intervals during the course of the survey.

1.4.3 Major grid points for the survey areas are established using a Sokkia GRX-1 RTK GNSS system direct to the Ordnance Survey National Grid system, to an accuracy better than 0.03 m.

1.4.4 Bamboo canes or tent pegs are used to mark the grid points. Intermediate grid points are established using tape measures and the position of each profile is established by stringing either a pre-marked rope or a 100 m tape measure between grid points. Bamboo canes are then used to mark profiles and the operator walks between these at a constant pace.

1.4.5 The location of the survey grids is recorded directly to Ordnance Survey National Grid co-ordinates using the UKO OSTN2 projection to an accuracy better than 0.03 m. As the survey are related direct to Ordnance Survey National Grid co-ordinates temporary survey stations are not established.

1.5 Data processing and presentation

1.5.1 The MACS data is stored direct to a laptop using in-house software which automatically corrects for instrument drift and calculates a mean value for each profile. A positional value is assigned to each data point based on the sensor number and recorded GNSS co-ordinates. The data is gridded using in-house software and parameters are set based on the sensor spacing and mean values. No additional processing is required. The gridded data is then displayed in Surfer 9 (Golden Software) and image files of the data are created.

1.5.2 The Bartington gradiometer data was downloaded and gridded using Archaeosurveyor v 1.5.13.

1.5.3 Where required the data was destriped and destaggered to remove errors caused by instrument drift and heading errors. This data has been classed as minimally processed data as no other processing steps were used.

1.5.4 The following processing schedule was applied to all Bartington data presented within the report.

- Zero median sensor
- Destagger (selected grids) - outbound and inbound -2
- The data presented in the greyscale plots has been 'smoothed' using the Grad. Shade option clipped at -2 nT to 3 nT.

1.5.5 The data was exported as raster images (PNG files), and are presented in greyscale format with accompanying interpretations at 1:1500.

1.5.6 The data has been displayed relative to a digital Ordnance Survey base plan provided by the client as drawing *'OS data.dwg'*. The base plan was in the National Grid co-ordinate system and as the survey grids were set-out directly to National Grid co-ordinates the data could be simply superimposed onto the base plan in the correct position.

1.6 Interpretation

1.6.1 The anomalies have been categorised based on the type of response that they have and an interpretation as to the cause(s) or possible cause(s) of each anomaly type is also provided. The following anomaly types may be present within the data:

Dipolar and bipolar responses

Dipolar and bipolar responses are those that have a sharp variation between strongly positive and negative components.

In the majority of cases these responses are usually caused by modern ferrous features / objects, although fired material (such as brick), some ferrous or industrial archaeological features and strongly magnetic gravel could also produce dipolar and bipolar responses.

Isolated dipolar responses are those that have a single positive and negative element. They are usually caused by isolated, ferrous or fired material on or near to the surface. The objects that cause dipolar responses are usually relatively small, such as spent shotgun cartridges, iron nails and horseshoes (hence they are often referred to as 'iron spikes') or pieces of modern brick or pot. Some types of archaeological artefacts can also produce this type of response but unless there is strong supporting evidence to the contrary they are assumed not to be of archaeological significance.

Bipolar anomalies have strong positive and negative components but are not technically magnetic dipoles. The majority of **isolated bipolar responses** are caused by ferrous or fired material on or near to the surface. These responses tend to be produced from larger objects, compared to dipolar anomalies, or a concentration of smaller objects. Some archaeological features/ activity, including areas of burning or industrial activity can also produce this type of response but unless there is strong supporting evidence to the contrary they are assumed not to be of archaeological significance.

Bipolar linear anomalies are usually produced by buried pipes / cables that are usually metallic, although in some instances ceramic pipes can also produce popular anomalies. In some instances the anomaly can extend for a sigfncaint distance beyond the feature that produces the anomaly. Bipolar anomalies are often very strong and can potentially mask responses from other sub-surface features in the vicinity of the pipe or cable.

Areas containing numerous **strong dipolar / bipolar responses (magnetic disturbance)** are usually caused by greater concentrations of ferrous or fired material and are often found adjacent to field boundaries where such material tends to accumulate. Above ground metallic or strongly magnetic features, such as fences, gates, pylons and buildings can also produce very strong bipolar responses. If an area of magnetic disturbance is located away from existing field boundaries then it could indicate a former field boundary, several large isolated objects in close proximity, an area where modern material has been tipped or an infilled cut feature, such as a quarry pit. Areas of dipolar / bipolar response can occasionally be caused by features / material associated with archaeological industrial activity or natural deposits that have varying magnetic properties but they are usually caused by modern activity. Responses in areas of magnetic disturbance can sometimes be so strong that archaeological features located beneath them may not be detected.

Very strong responses, notably bipolar anomalies, from modern features can dominate the data for a significant distance beyond the feature. The extent of these areas is usually shown either as part of the bipolar anomaly or as a **limit of very strong response.** It should be noted that this effect extends beyond the feature and so the limit of the response does not correspond to the actual size or location of the feature within it. In many cases where these strong responses are present at the edge of survey area the feature causing the

anomaly be actually be located beyond the survey area. It should be recognised that other sub-surface features located within these areas may not be detected.

Negative linear anomalies

Negative linear anomalies occur when a feature has lower magnetic readings than the surrounding material and can often be associated with ploughing regimes or plastic / concrete pipes or natural features.

They can also indicate the presence of a feature that cuts into magnetic soils or bedrock and which is infilled with less magnetic material and in certain geologies can be associated with archaeological features.

There are no significant negative linear anomalies in this data set.

Linear / curvi-linear anomalies (probable agricultural)

In many geological / pedological conditions agricultural features / regimes can produce magnetic anomalies due to the accumulation / alignment of magnetic topsoil. In most cases these are exhibited as a series of **broadly parallel positive linear** anomalies. The majority of these responses are associated with modern ploughing regimes but in some instances, where the responses are broader and more widely spaced, they can indicate the presence of the remnants of ridge and furrow.

Field drain systems can also produce linear anomalies, usually where the drains are made from fired ceramic or infilled with magnetic gravels.

Where a series of parallel anomalies are present then the approximate orientation of the anomalies are shown on the interpretation drawing to indicate the direction of the agricultural regime but for the sake of clarity individual anomalies have not been shown.

Individual anomalies may be shown if the response is not part of a regime.

Broad area of positive / negative responses

Broad areas of positive / negative responses can have a variety of causes. If the areas are generally quite large and irregular in shape then they are usually suggestive of natural features, such as lenses of sand and gravel deposits, palaeochannels or other natural features / variations where the natural material differs from the surrounding sub-surface. In some instances anomalies of this type can be associated with anthropogenic (usually modern) activity.

There are no anomalies of this type in this data set.

Linear / curvi-linear trends

An anomaly is categorised as a **trend** if it is not certain that the response is associated with an extant sub-surface feature. Trends are usually weak, irregular, diffuse or discontinuous and it is usually not certain what their cause is, if they represent significant sub-surface features or even if they are associated with definite features.

It is possible that some of the trends are associated with geological / pedological variations. Others may be produced by artificial constructs within the data, either caused by processing or in some instances by intersecting anomalies (usually different agricultural regimes) that give the appearance of curving or regular shapes. Many trends are a product

of weak, naturally occurring responses that happen to form a regular pattern but which are not associated with a sub-surface feature.

In some instances former features that have been severely truncated can still produce broad, diffuse or weak responses even if the underlying feature has been removed. This is due to the presence of magnetic soils associated with the former feature still being present along its route. In other instances the magnetic properties of the soils filling a feature may vary and so the magnetic signature of the feature can change, even if the sub-surface feature itself remains uniform. If a response from a feature becomes significantly weak or diffuse then part of the anomaly may be shown as a trend as it is uncertain if the feature is still present or has been severely truncated or removed.

Isolated positive responses

Isolated positive responses can occur if the magnetism of a feature, area or material has been enhanced or if a feature is naturally more magnetic than the surrounding material. It is often difficult to determine which of these factors causes any given responses and so the origin of this type of anomaly can be difficult to determine. They can have a variety of causes including geological variations, infilled archaeological features, areas of burning (including hearths), industrial archaeological features, such as kilns, or deeper buried ferrous material and modern fired material.

The large number of isolated responses and lack of an obvious pattern to their distribution suggests that the majority anomalies are probably associated with geological / pedological variations. Only the larger or stronger areas of positive response have been shown on the interpretation.

Positive linear / curvi-linear anomalies

Positive magnetic anomalies indicate an increase in magnetism and if the resulting anomaly is linear or curvi-linear then this can indicate the presence of a man-made feature. **Positive or enhanced linear / curvi-linear** anomalies can be associated with agricultural activity, drainage features but they can also be caused by ditches that are infilled with magnetically enhanced material and as such can indicate the presence of archaeological features. Some natural infilled features can also produce positive anomalies.

1.6.2 Several different ranges of data were used in the interpretation to ensure that the maximum information possible is obtained from the data.

1.6.3 X-Y trace plots were examined for all of the data and overlain onto the greyscale plot to assist in the interpretation, primarily to help identify dipolar / bipolar responses that will probably be associated with surface / near-surface iron objects. X-Y trace plots have not been used in the report as they do not show any additional anomalies that are not visible in the greyscale data. A digital drawing showing the X-Y trace plot overlain on the greyscale plot has been provided in the digital archive.

1.6.4 All isolated responses have been assessed using a combination of greyscale and X-Y trace plots.

1.6.5 Anomalies associated with agricultural regimes are present in the data. The general orientation of these regimes has been shown on the interpretation but, for the sake of clarity, each individual anomaly has not been shown.

1.6.6 The greyscale plots and the accompanying interpretations of the anomalies identified in the magnetic data are presented as 2D AutoCAD drawings. The interpretation is made based on

the type, size, strength and morphology of the anomalies, coupled with the available information on the site conditions. Each type of anomaly is displayed in separate, easily identifiable layers annotated as appropriate.

1.7 Limitations of magnetic surveys

1.7.1 The magnetic survey method requires the operator to walk over the site at a constant walking pace whilst holding the instrument. The presence of an uneven ground surface, dense, high or mature vegetation or surface obstructions may mean that some areas cannot be surveyed.

1.7.2 The depth at which features can be detected will vary depending on their composition, size, the surrounding material and the type of magnetometer used for the survey. In good conditions large, magnetic targets, such as buried drums or tanks can be located at depths of more than 4 m. Smaller targets, such as buried foundations or archaeological features can be located at depths of between 1 m and 2 m.

1.7.3 A magnetic survey is highly sensitive to interference from surface and near-surface magnetic 'contaminants'. Surface features such as metallic fencing, reinforced concrete, buildings or walls all have very strong magnetic signatures that can dominate readings collected adjacent to them. Identification of anomalies caused by sub-surface features is therefore more difficult or even not possible in the vicinity of surface and near-surface magnetic features.

1.7.4 The presence of made ground also has a detrimental effect on the magnetic data quality as this usually contains magnetic material in the form of metallic scrap and brick. Identification of features beneath made ground is still possible if the target feature is reasonably large and has a strong magnetic response but smaller features or magnetically weak features are unlikely to be identified.

1.7.5 It should be noted that anomalies that are interpreted as modern in origin may 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.

1.7.6 A magnetic survey does not directly locate sub-surface features - it identifies variations or anomalies in the local magnetic field caused by features. It can be possible to interpret the cause of anomalies based on the size, shape and strength of response but it should be recognised that a magnetic survey produces a plan of magnetic variations and not a plan of all sub-surface features. Interpretation of the anomalies is often subjective and it is rarely possible to identify the cause of all magnetic anomalies. Geological or pedological (soil) variations or features can produce responses similar to those caused by man-made (anthropogenic) features.

1.7.7 Anomalies identified by a magnetic survey are located in plan. It is not usually possible to obtain reliable depth information on the features that cause the anomalies.

1.7.8 Not all features will produce a measurable magnetic response and the effectiveness of a magnetic survey is also dependant on the site-specific conditions. It is not possible to guarantee that a magnetic survey will identify all sub-surface features. A magnetic survey is often most-effective at identifying sub-surface features when used in conjunction with other complementary geophysical techniques.

APPENDIX 2

OASIS reference form