

**Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**MAGNETOMETER SURVEY REPORT**

for

**SMB JV**

Kerry Donaldson & David Sabin

May 2018

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ARCHAEOLOGICAL SURVEYS LTD

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Water Main Replacement  
Highworth  
Swindon**

Magnetometer Survey Report

for

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Ordnance Survey Grid Reference – **SU 22780 95068 to SU 18109 92155**



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## SUMMARY

A geophysical survey, comprising detailed magnetometry, was carried out by Archaeological Surveys Ltd along a 5.8km survey corridor for a new Thames Water pipeline between Pennyswick Farm, Coleshill, Oxfordshire and Nell Hill, Hannington, Swindon. At the far eastern end of the route (Area 1) there are a number of positive linear anomalies; however, they lack a coherent morphology but could indicate former ditch-like features. Many of the survey areas within the floodplain of the River Cole contain land drains, with ridge and furrow evident on higher ground as the corridor heads westwards. To the north of Highworth, Area 11 contains widespread evidence for prehistoric and possibly Roman settlement, with ring ditches, linear ditches and enclosures. To the east of this, within Area 10, are a number of weakly positive anomalies that appear to have been truncated by ridge and furrow and further archaeological features are possible. To the west of Highworth, the majority of the survey areas contain ridge and furrow, with a small number of positive linear and discrete responses also located within Areas 16 and 20. While it is possible that they may relate to cut, ditch-like and pit-like features, they are generally isolated. A single positive linear anomaly within Area 21 appears to have been truncated by a possible former land boundary, suggesting it pre-dates it. A number of positive linear anomalies have been located adjacent to the Bydemill Brook in Area 22. It is possible that they relate to water management. At the western end of the survey corridor within Area 24 there appears to be evidence for possible former quarrying.

## 1 INTRODUCTION

### 1.1 *Survey background*

- 1.1.1 Archaeological Surveys Ltd was commissioned by SMB JV, on behalf of Thames Water, to undertake a magnetometer survey of a 5.8km survey corridor between Snowswick Lane, Coleshill, Oxfordshire and Nell Hill, Hannington to the west of Highworth, Swindon. The survey corridor is Phase 1 of a proposed new high density polyethylene (HDPE) water main to replace an existing glass-reinforced plastic (GRP) pipe which has been subject to metallic bolt corrosion causing joint failures. The existing infrastructure, which also includes an asbestos cement (AC) pipe, interconnected in several places with the GRP pipe, runs from Faringdon Water Booster Station to the Blunsdon Reservoir and forms a strategic component of the water transmission system to Swindon. This survey considers only Phase 1 of the scheme between Pennyswick Farm, Coleshill and Nell Hill, Hannington.
- 1.1.2 The geophysical survey was carried out in accordance with a Written Scheme of Investigation (WSI) produced by Archaeological Surveys (2018) and issued to county archaeologists Melanie Pomeroy-Kellinger for Wiltshire Council, representing Swindon Borough, and Hugh Coddington, for Oxfordshire County Council.

## 1.2 Survey objectives and techniques

- 1.2.1 The objective of the survey was to use magnetometry to locate geophysical anomalies that may be archaeological in origin so that they may be assessed prior to groundworks associated with the new pipeline.
- 1.2.2 The methodology is considered an efficient and effective approach to archaeological prospection.
- 1.2.3 Geophysical survey can provide useful information on the archaeological potential of a site; however, the outcome of any survey relies on a number of factors and as a consequence results can vary. The success in meeting the aims and objectives of a survey is, therefore, often impossible to predetermine.

## 1.3 Standards, guidance and recommendations for the use of this report

- 1.3.1 The survey and report generally follow the recommendations set out by: English Heritage (2008) *Geophysical survey in archaeological field evaluation*; European Archaeological Council (2015) *Guidelines for the Use of Geophysics in Archaeology*; Institute for Archaeologists (2002) *The use of Geophysical Techniques in Archaeological Evaluations*. The work has been carried out to the Chartered Institute for Archaeologists (2014) *Standard and Guidance for Archaeological Geophysical Survey*.
- 1.3.2 Archaeological Surveys Ltd provide a detailed geophysical survey report and it is recommended that where possible the contents should be considered in full. The Summary provides a brief overview of the results with more detail available in the Discussion and/or Conclusion. The *List of anomalies* within the Results provides a detailed assessment of the anomalies within separate categories which can be useful in inferring a level of confidence to the interpretation. Quality and factors influencing the interpretation of anomalies is also set out within the results.
- 1.3.3 It is recommended that the full report should always be considered when using data and interpretation plots; where this is not possible, in the field for example, the abstraction and interpretation plots should retain their colour coding and be used with a corresponding legend.
- 1.3.4 Where targeting of anomalies by excavation is to be carried out, care should be taken to place trenches over solid lines or features visible on the abstraction and interpretation plots. Archaeological Surveys abstraction and interpretation avoids the use of dashed or dotted lines; broken or fragmented anomalies may well correspond closely with subsurface truncation.

## 1.4 Site location, description and survey conditions

- 1.4.1 The survey corridor is located between Pennyswick Farm, Snowswick Lane, Coleshill, Oxfordshire and Nell Hill, Hannington to the west of Highworth,



Swindon. It extends from east to west - Ordnance Survey National Grid Reference (OS NGR) SU 22780 95068 to SU 18109 92155, see Figs 01 to 03.

1.4.2 The geophysical survey covers approximately 28ha within 24 land parcels, see Table 1 and Figures 02 & 03. A small area at the far eastern end of the site did not have access at the time of survey, and another at Roundhill Farm, east of the A361 north of Highworth was too rough to survey. The corridor extended over 5.8km with a working width of 40m. The full extent of the easement was surveyed where possible, along with several site compounds where not already in use.

Area	OS NGR	Ground cover	Ground conditions
1	422780 195068 - 422579 194996	Emerging rape	Extremely poor – partly flooded
2	422571 194989 - 422465 194888	Emerging rape	Extremely poor – partly flooded
3	422455 194885 - 422258 194710	Emerging rape	Extremely poor – partly flooded
4	422251 194705 - 422027 194639	Emerging rape	Extremely poor – partly flooded
5	422000 194630 - 421693 194508	Grass	Poor - waterlogged
6	421669 194499 - 421287 194346	Grass	Poor - waterlogged
7	421260 194331 - 421658 194210	Grass	Good
8	421050 194204 - 420867 194101	Grass	Good
9	420681 194097 - 420617 193983	Grass	Good
10	420452 193897 - 420301 193826	Grass	Poor - waterlogged
11	420271 193830 - 419809 193813	Rough grass	Poor due to uneven ground, open trenches and spoil – some waterlogging also
12	419774 193809 - 419721 193682	Emerging arable crop	Poor – partly waterlogged
13	419723 193657 - 419603 193511	Rough grass and small area of trees (unsurveyable)	Poor – partly waterlogged
14	419590 193500 - 419375 193284	Rough grass and small area of trees (unsurveyable)	Poor
15	419346 193254 - 419188 193096	Rough grass	Poor – partly waterlogged
16	419172 193081 - 419070 193012	Grass	Good but partly waterlogged
17	419002 193007 - 418845 192858	Soil	Poor – partly waterlogged and rutted
18	418811 192835 - 418789 192812	Soil	Poor – partly waterlogged
19	418837 192852 - 418827 192845	Soil	Poor – partly waterlogged
20	418785 192804 - 418649 192622	Soil	Poor – partly waterlogged
21	418645 192616 - 418445 192467	Soil	Good – (well drained sandy soil)
22	418421 192445 - 418384 192404	Grass	Poor – partly waterlogged and rutted
23	418373 192388 - 418241 192255	Soil	Poor – partly waterlogged
24	418234 192251 - 418109 192155	Roughly ploughed soil	Poor due to very uneven surface

Table 1: Ground cover and survey conditions

1.4.3 The ground conditions across the site were very variable and generally very difficult to traverse due to wet conditions, lack of vegetative cover on arable fields and often clayey nature of the soil. Survey was, therefore, often carried out in less than optimum conditions. Weather conditions during the survey were frequently wet and with no indication of drier conditions in the near future, there was no alternative but to proceed with survey across the frequently appalling surface conditions.

## 1.5 Site history and archaeological potential

- 1.5.1 The survey corridor comprises approximately 900m in Oxfordshire, with approximately 4800m in Wiltshire. Previous archaeological investigation along an earlier pipeline route, similar to that outlined, recorded a sub-rectangular enclosure, 50m long and 8m wide, possibly associated with a medieval sheep enclosure just to the east of the current survey area at Pennyswick Farm, Coleshill, Oxfordshire.
- 1.5.2 To the north and east of Highworth and the survey area there are a number of circular earthwork enclosures, with diameters of between 40-90m, although some are sub-circular and others sub-rectangular. All have a flat bottomed ditch with an external bank, similar to Neolithic henge monuments. There has been limited excavation of them and their location almost exclusively within the Hundred of Highworth may suggest a medieval date, possibly for stock management. Between the A361, near Roundhill Farm, and the River Cole, 130m north of the survey area, is the site of a probable medieval circular earthwork enclosure identified from aerial photographs (MWI20365). An undated field system, underlying the ridge and furrow has also been identified 440m to the north (MWI20358). An undated square shaped earthwork lies 200m to the south (MWI20466).
- 1.5.3 Immediately west of the A361, recent geophysical survey and evaluation has revealed evidence for an Iron Age/Romano British settlement, with a number of rectangular enclosures containing ring ditches indicative of Iron Age round houses. Part of this area lies within the survey corridor, and current excavations by Thames Valley Archaeological Services prevented survey over parts of the area.
- 1.5.4 In the south western part of the survey corridor several fields contain extant ridge and furrow and a probable medieval settlement indicated by stone foundations, 12-14<sup>th</sup> century pottery, bone fragments, platforms and holloways (MW16800). The former leat, supplying water to Bydemill at Hannington divides Areas 22 and 23 in the western part of the survey corridor.
- 1.5.5 The surface conditions within the site were occasionally suitable for the observation of cultural material during the course of the survey. No significant material was noted on the arable land east of the River Cole within

Oxfordshire (Areas 1 – 4). Burnt clay fragments were widespread within Area 16 to the north west of Highworth, although it is possible that the material relates to soil conditioning. A small number of flint flakes and medieval pottery sherds were noted further to the south west within Areas 20 & 21, to the east of Bydemill. A single greyware sherd, likely to be Romano-British, was noted within Area 24 at the far south western end of the corridor.

## 1.6 *Geology and soils*

- 1.6.1 The underlying solid geology across the majority of the survey area is mudstone from the Oxford Clay Formation with overlying alluvial deposits either side of the River Cole (Areas 2 to 6). Areas 7 to 20 are also Oxford Clay with no overlying drift deposits. Areas 21 to 24 have underlying sandstone, siltstone and mudstone from the Hazelbury Bryan Formation and Kingston Formation. There is also a narrow band of limestone from the Highworth Limestone Member towards the western end of the survey corridor within Area 24 (BGS, 2017).
- 1.6.2 The overlying soil across much of the survey area is from the Denchworth association and is a pelo-stagnogley. It consists of a slowly permeable, seasonally waterlogged, clayey soil. To the west of Highworth the soil is from the Evesham 2 association which is a typical calcareous pelosol and consists of a slowly permeable, calcareous clayey soil. At the far western end of the corridor the soil is from the Fyfield 4 association which is a typical argillic brown earth consisting of a deep, well drained, often stoneless, coarse, loamy and sandy soil (Soil Survey of England and Wales, 1983).
- 1.6.3 Magnetometry survey carried out across similar soils has produced good results, although there can be low magnetic contrast within Oxford Clay and Denchworth soils. Low lying areas subject to frequent waterlogging can produce poor results due very low levels of magnetic susceptibility and a lack of enhancement associated with anthropogenic activity.

## 2 METHODOLOGY

### 2.1 *Technical synopsis*

- 2.1.1 Magnetometry survey records localised magnetic fields that can be associated with features formed by human activity. Magnetic susceptibility and magnetic thermoremnance are factors associated with the formation of localised fields. Additional details are set out below and within Appendix A.
- 2.1.2 Iron minerals within the soil may become altered by burning and the break down of biological material; effectively the magnetic susceptibility of the soil is increased, and the iron minerals become magnetic in the presence of the Earth's magnetic field. Accumulations of magnetically enhanced soils within features, such as pits and ditches, may produce magnetic anomalies that can

be mapped by magnetic prospection.

- 2.1.3 Magnetic thermoremnance can occur when ferrous minerals have been heated to high temperatures such as in a kiln, hearth, oven etc. On cooling, a permanent magnetisation may be acquired due to the presence of the Earth's magnetic field. Certain natural processes associated with the formation of some igneous and metamorphic rock may also result in magnetic thermoremnance.
- 2.1.4 The localised variations in magnetism are measured as sub-units of the Tesla, which is a SI unit of magnetic flux density. These sub-units are nano Teslas (nT), which are equivalent to  $10^{-9}$  Tesla (T).

## *2.2 Equipment configuration, data collection and survey detail*

- 2.2.1 The detailed magnetic survey was carried out using a SENSYS MAGNETO®MXPDA 5 channel cart-based system. The instrument has 5 fluxgate gradiometers (FGM650) spaced 0.5m apart with readings recorded at 20 Hz. The cart is pushed at walking speed and not towed. Each sensor is not zeroed in the field as the vertical axis alignment is precisely fixed leaving sensor offsets that are removed during data processing. The fixing of the vertical alignment ensures the sensors are not unduly influenced by localised magnetic fields and that the vertical component of a magnetic anomaly is measured. The gradiometers have a range of recording data between  $\pm 0.1$ nT and  $\pm 10,000$ nT. They are linked to a Leica GS10 RTK GPS with data recorded by SENSYS MAGNETO®MXPDA software on a rugged PDA computer system.
- 2.2.2 Due to the fixed offsets within the fluxgate sensors, as a result of the manufacturing and tensioning process, the survey data do not provide a visually useful dataset until a zero median traverse algorithm is applied. It is recognised that this has the potential to affect some anomalies detrimentally by removing linear features orientated parallel to survey transects. However, this has not been noted as a particular problem with the system due to the high resolution data collection, generally long length of traverses and variability within the magnetic characteristics of a linear anomaly.
- 2.2.3 Data are collected along a series of parallel survey transects to achieve 100% coverage of the surveyable land. The length of each transect is variable and relates to the size of the survey area and other factors including ground conditions. A visual display allows accurate placing of transects and helps maintain the correct separation between adjacent traverses. Data are not collected within fixed grids and data points are considered to be random even though the data are collected in a systematic manner covering all accessible areas (Aspinall, Gaffney and Schmidt, 2009).
- 2.2.4 Fluxgate sensors are highly sensitive to temperature change and this manifests as drift during the course of a survey. This can be particularly noticeable during the morning as temperatures rise and the equipment warms or cools. Sensor drift within the course of a traverse will appear as a line trending from negative to positive after

processing with a zero median traverse algorithm. To remove the potential for temperature drift, data were collected after a 20 minute stabilisation period and traverses were limited to a time of generally <100s.

### 2.3 Data processing and presentation

- 2.3.1 Magnetic data collected by the MAGNETO®MXPDA cart-based system are initially prepared using SENSYS MAGNETO®DLMGPS software. The software effectively allocates a geographic position for each data point and can compensate for fixed offsets present within the FGM650 sensors. The offsets are positive or negative values present on all fluxgate gradiometer sensors. Some systems use manual or electronic balancing to effectively zero the sensors; however, this is a short term measure that is prone to drift through temperature changes and vibration and can easily be incorrectly set due to localised magnetic fields. The FGM650 sensors are very accurately aligned to the vertical magnetic gradient and are highly stable showing negligible drift on long traverses. The offset values are removed using TerraSurveyor software.
- 2.3.2 Survey tracks are analysed and georeferenced raw data (UTM Z30N) are then exported in ASCII format for further analysis and display within TerraSurveyor. The removal of offset values (compensation) of the sensors is also carried out in TerraSurveyor using a zero median traverse function. Data are then considered to be minimally processed. Note: without the zero median traverse function it is not possible to create a meaningful data plot as all sensors have a different offset value. Although a zero median traverse algorithm can remove anomalies aligned with the survey tracks, in practice this rarely occurs due to the use of long traverses, high resolution measurement and variability within the magnetic susceptibility of long linear features.
- 2.3.3 The minimally processed data are collected between limits of  $\pm 10000\text{nT}$  and clipped for display at  $\pm 2\text{nT}$ . Data are interpolated to a resolution of effectively 0.5m between tracks and 0.15m along each survey track.
- 2.3.4 Additional data processing has been carried out in the form of high pass filtering. This effectively removes low frequency variation along a traverse that has been caused by large magnetic bodies, cultivation or rapid temperature change. Low pass filtering has also been applied. This effectively removes high frequency variation along a traverse that has been caused by uneven ground and associated vibration. Data treated to additional processing has been compared to unprocessed data to ensure that no significant anomalies have been removed.
- 2.3.5 Appendix C contains metadata concerning the survey and data attributes and is derived directly from TerraSurveyor. Reference should be made to Appendix B for further information on processing.
- 2.3.6 A TIF file is produced by TerraSurveyor software along with an associated

world file (.TFW) that allows automatic georeferencing (OSGB36 datum) when using GIS or CAD software. The main form of data display used in the report is the minimally processed greyscale plot. With regard to the Sensys MXPDA, minimally processed data are considered by the manufacturer to be data that are compensated by SENSYS MAGNETO DLMGPS software, see 2.3.1 and 2.3.2. Note: traceplots are not considered to be appropriate as they do not provide an accurate or useful assessment of the magnetic anomalies due to the very high density of data collection.

- 2.3.7 The raster images are combined with base mapping using ProgeCAD Professional 2016, creating DWG (2010) file formats. All images are externally referenced to the CAD drawing in order to maintain good graphical quality. The CAD plots are effectively georeferenced facilitating relocation of features using GPS, resection method, etc.
- 2.3.8 An abstraction and interpretation is drawn and plotted for all geophysical anomalies located by the survey. Anomalies are abstracted using colour coded points, lines and polygons. All plots are scaled to landscape A3 for paper printing. Appendix E sets out CAD layer names with colour and graphic content for each interpretation category, see 3.3.
- 2.3.9 A brief summary of each anomaly, with an appropriate reference number, is set out in list form within the results (Section 3) to allow a rapid and objective assessment of features within each survey area. Where further interpretation is possible, or where a number of possible origins should be considered, more subjective discussion is set out in Section 4.
- 2.3.10 The abstraction and interpretation procedure has been supported by analysis of a digital terrain model derived from the Environment Agency's LiDAR data, but as the dataset is incomplete for the eastern part of the survey corridor, it has not been shown.
- 2.3.11 A digital archive is produced with this report, see Appendix D below. The main archive is held at the offices of Archaeological Surveys Ltd.

## 3 RESULTS

### 3.1 *General assessment of survey results*

- 3.1.1 The detailed magnetic survey was carried out over a total of 24 survey areas covering approximately 28ha.
- 3.1.2 Magnetic anomalies located can be generally classified as positive responses of archaeological potential, positive and negative anomalies of an uncertain origin, anomalies associated with land management, linear anomalies of an agricultural origin, areas of magnetic debris and disturbance, strong discrete dipolar anomalies relating to ferrous objects, strong multiple dipolar linear

anomalies relating to buried services or pipelines, anomalies with a natural origin and anomalies possibly associated with quarrying.

3.1.3 Anomalies located within each survey area have been numbered and are described in 3.4 to 3.27 below with subsequent discussion in Section 4.

### 3.2 Statement of data quality and factors influencing the interpretation of anomalies

3.2.1 Data are considered representative of the magnetic anomalies present within the survey areas. Localised zones of magnetic disturbance have the potential to obscure weak anomalies of archaeological potential; however, these have been minimised by additional high pass filtering where necessary. Both filtered and unfiltered data are assessed and analysed to ensure no significant anomalies have been altered or removed by the additional processing.

3.2.2 The interpretation of anomalies within a restricted survey corridor is often problematic as their full extent may not be visible. Where anomalies of archaeological potential are confidently interpreted survey has been extended, where possible, in order to delimit their full extent and provide additional detail. However, any additional survey is carried out with regard to access arrangements, physical barriers (e.g. field boundaries) and ground conditions.

3.2.3 Areas subject to frequent waterlogging often have very low levels of magnetic susceptibility and, as a consequence, archaeological features may produce very little or no magnetic contrast. However, these areas may also be less suited to former settlement and activity. During the course of the survey Areas 1 – 4, to the east of the River Cole within Oxfordshire, were all partly flooded due to their low lying topography, and it is likely that the soil magnetic susceptibility is very low within alluvial deposits. Similar very low magnetic susceptibility alluvial deposits are also likely to exist immediately west of the River Cole within Areas 5 & 6.

### 3.3 Data interpretation

3.3.1 The list of sub-headings below attempts to define a number of separate categories that reflect the range and type of features located during the survey. A basic explanation of the characteristics of the magnetic anomalies is set out for each category in order to justify interpretation, see Table 2.

Interpretation category	Description and origin of anomalies
<b>Anomalies with archaeological potential</b>	Anomalies have the characteristics (mainly morphological) of a range of archaeological features such as pits, ring ditches, enclosures, etc. The category is used where there is a high level of confidence which may be due to additional supporting information where morphology is unclear or uncharacteristic.
<b>Anomalies with an uncertain origin</b>	The category applies to a range of anomalies where <u>there is not enough evidence to confidently suggest an origin</u> . Anomalies in this category <u>may well be related to archaeologically significant features, but equally</u>

	<p><u>relatively modern features, geological/pedological features and agricultural features should be considered.</u> Morphology may be unclear or uncharacteristic and there may be a lack of additional supporting information. Positive anomalies are indicative of magnetically enhanced soils that may form the fill of 'cut' features or may be produced by accumulation within layers or 'earthwork' features; soils subject to burning may also produce positive anomalies. Negative anomalies are produced by material of comparatively low magnetic susceptibility such as stone and subsoil.</p>
<b>Anomalies relating to land management</b>	<p>Anomalies are mainly linear and may be indicative of the magnetically enhanced fill of cut features (i.e. ditches). The anomalies may be long and/or form rectilinear elements and they may relate to topographic features or be visible on early mapping. Associated agricultural anomalies (e.g. headlands, plough marks and former ridge and furrow) may support the interpretation. Land drains can appear in a classic herringbone pattern of interconnected multiple dipolar linear anomalies, or as parallel linear anomalies. The multiple dipolar response indicates ceramic land drains.</p>
<b>Anomalies with an agricultural origin</b>	<p>The anomalies are often linear and form a series of parallel responses or are parallel to extant land boundaries. Where the response is broad, former ridge and furrow is likely; narrow response is often related to modern ploughing. This category does not include agricultural features of early date or considered to be of archaeological potential (e.g. animal stockades, enclosures, farmsteads, etc).</p>
<b>Anomalies associated with magnetic debris</b>	<p>Magnetic debris often appears as areas containing many small dipolar anomalies that may range from weak to very strong in magnitude. They often occur where there has been dumping or ground make-up and are related to magnetically thermoremanent materials such as brick or tile or other small fragments of ferrous material. This type of response is occasionally associated with kilns, furnace structures, hearths and nail spreads from former wooden structures or rooves and <u>may, therefore, be archaeologically significant.</u> It is also possible that the response may be caused by natural material such as certain gravels and fragments of igneous or metamorphic rock. Strong discrete dipolar anomalies are responses to ferrous objects within the topsoil.</p>
<b>Anomalies with a modern origin</b>	<p>The magnetic response is often strong and dipolar indicative of ferrous material and may be associated with extant above surface features such as wire fencing, cables, pylons etc.. Often a significant area around these features has a strong magnetic flux which may create magnetic disturbance; such disturbance can effectively obscure low magnitude anomalies if they are present. Fluxgate sensors may respond erratically adjacent to strong magnetic sources. Buried services may produce characteristic multiple dipolar anomalies dependant upon their construction.</p>
<b>Anomalies with a natural origin</b>	<p>Naturally formed magnetic anomalies are caused by localised variability in the magnetic susceptibility of soils, subsoils and other drift or solid geologies. Anomalies may be amorphous, linear or curvilinear and may appear 'fluvial' or discrete; the latter are <u>almost impossible to distinguish from pit-like anomalies with an anthropogenic origin.</u> Fluvial, glacial and periglacial processes may be responsible for their formation within drift material and subsoil. Igneous and metamorphic activity can lead to anomalies within more solid geology.</p>
<b>Anomalies associated with quarrying</b>	<p>Magnetically variable anomalies which may be negative indicating a response to geology/drift deposits and/or positive indicating an increased depth of topsoil. Very strongly magnetic anomalies are a response to highly magnetic material of modern origin which can be used to infill a quarry depression. <u>It should be considered that former quarry pits may be of archaeological potential.</u></p>

Table 2: List and description of interpretation categories



### 3.4 List of anomalies - Area 1 (Oxfordshire)

Area lies between OS NGR 422780 195068 and 422579 194996, see Figs 04 & 05.

#### *Anomalies with an uncertain origin*

(1) - The survey area contains several positive linear anomalies that may relate to cut features.

(2) - Other very weakly positive, short or fragmented positive linear anomalies can also be seen, but these lack a coherent morphology. Some may relate to agricultural activity.

#### *Anomalies with an agricultural origin*

(3) - Parallel linear anomalies appear to relate to former ridge and furrow.

### 3.5 List of anomalies - Area 2 (Oxfordshire)

Area lies between OS NGR 422571 194989 and 422465 194888, see Figs 04 & 05.

#### *Anomalies with an uncertain origin*

(4) - A small number of weakly positive linear and curvilinear anomalies can be seen in the centre of the survey area, together with a number of discrete positive responses. It is not possible to determine if they relate to cut features.

### 3.6 List of anomalies - Area 3 (Oxfordshire)

Area lies between OS NGR 422455 194885 and 422258 194710, see Figs 06 & 07.

Area 3 contains a number of land drains, magnetic debris along the northern edge and a possible pit-like anomaly.

### 3.7 List of anomalies - Area 4 (Oxfordshire)

Area lies between OS NGR 422251 194705 and 422027 194639, see Figs 06 & 07.

#### *Anomalies with an uncertain origin*

(5) - A positive linear anomaly extends from the northern edge of the survey area towards the centre. It may relate to a cut feature, but this is uncertain. A much weaker but parallel linear anomaly is located to the east.

(6 & 7) - A small number of very weakly curvilinear responses (6) and discrete responses (7) have been located. Their origin cannot be determined.

### 3.8 *List of anomalies - Area 5*

Area lies between OS NGR 422000 194630 and 421693 194508, see Figs 08 & 09.

Area 5 contains a small number of linear anomalies likely to relate to land drainage. Variable magnetic response at the eastern end of the area is likely to relate to alluvial deposits.

### 3.9 *List of anomalies - Area 6*

Area lies between OS NGR 421669 194499 and 421287 194346, see Figs 10 & 11.

Area 6 contains land drains, including an existing drainage channel.

### 3.10 *List of anomalies - Area 7*

Area lies between OS NGR 421260 194331 and 421658 194210, see Figs 12 & 13.

Area 7 contains ridge and furrow, a land drain, magnetic debris and a large buried steel/iron object at the western end.

### 3.11 *List of anomalies - Area 8*

Area lies between OS NGR 421050 194204 and 420867 194101, see Figs 12 & 13.

Area 8 contains ridge and furrow and a possible pit-like feature.

### 3.12 *List of anomalies - Area 9*

Area lies between OS NGR 420681 194097 and 420617 193983, see Figs 14 & 15.

#### *Anomalies with an uncertain origin*

(8) - A small number of positive linear anomalies are located at the eastern end of the survey area. While one of the anomalies is parallel with the ridge and furrow (9), it is possible that they relate to former ditch-like features.

### *Anomalies with an agricultural origin*

(9) – A series of parallel linear anomalies relates to former ridge and furrow.

### 3.13 *List of anomalies - Area 10*

Area lies between OS NGR 420452 193897 and 420301 193826, see Figs 16 & 17.

### *Anomalies with an uncertain origin*

(10) – A fragmented positive linear anomaly situated in the south western part of the survey area. It appears to have been truncated by ridge and furrow, indicating a potential cut feature that pre-dates this type of agriculture. It is situated 100m south east of archaeological features within Area 11 and could be associated.

(11) - Several other very weakly positive linear, curvilinear and discrete anomalies have been located primarily in the western and northern parts of the survey area. These could relate to further cut features.

### *Anomalies with an agricultural origin*

(12) - The survey area contains ridge and furrow. It is oriented north north west to south south east throughout the majority of the site, but others are oriented north east to south west in the north western part.

### 3.14 *List of anomalies - Area 11*

Area lies between OS NGR 420271 193830 and 419809 193813, see Figs 18 & 19.

### *Anomalies of archaeological potential*

(13) - A ring ditch, with a width of 2m and a diameter of 14m, appears to overlie a smaller but squarer feature to the north and either cut, or be cut by another to the south. Although it appears to have entrances on the eastern and western sides, the ring ditch has been truncated by a water pipe which extends through its centre.

(14) - A ring ditch with a 3m width and a 21m diameter is located 8m north east of anomaly (13). The northern side cannot be seen in the data and is likely to have been obscured by the magnetic debris used to backfill another water pipe (21) extending along the northern part of the site.

(15) - Situated to the north west of anomaly (13) is evidence for at least 14 further ring ditches, many of them overlie one another, indicating several phases of construction and use. They are generally between 7m and 15m in diameter and indicative of Iron Age round houses.

(16) - The survey area contains a number of small enclosures appearing more triangular or square than the ring ditches.

(17) - Positive linear and rectilinear anomalies relate to linear ditches and enclosures. Some may be contemporary with the ring ditches, others appear to cut them indicating a later, possibly Roman, phase.

*Anomalies with an uncertain origin*

(18) - There are a number of positive linear anomalies that are oriented north north west to south south east. This is the same as the ridge and furrow (20) that also extends across the site and through the archaeological features, as well as the general trend for other linear ditches. It is, therefore, not clear if some of the weak linear anomalies relate to ridge and furrow or further archaeological features.

(19) - Two weakly positive linear anomalies flank a negative linear response. This type of response could relate to vehicle ruts, but the origin is uncertain.

*Anomalies with an agricultural origin*

(20) - A series of linear anomalies, oriented north north west to south south east, relate to former ridge and furrow. This has in places truncated the archaeology.

*Anomalies associated with magnetic debris*

(21) – A broad, linear zone of very strongly magnetic debris relates to ferrous and other magnetically thermoremanent material associated with the construction of a water pipeline. The material is so highly magnetic and widespread that it has obscured weaker archaeological anomalies. The pipe trench will also have truncated the archaeology.

*Anomalies with a modern origin*

(22) - A weakly dipolar linear anomaly relates to a water pipe that has partially truncated the archaeology in a very narrow slot.

### 3.15 *List of anomalies - Area 12*

Area lies between OS NGR 419774 193809 and 419721 193682, see Figs 20 & 21.

Area 12 contains a small number of very weakly positive linear anomalies at the northern end. At the southern end is another, stronger response, but it is close to magnetic disturbance and cannot be interpreted. Magnetic debris and a water pipe are also visible in the data.

### 3.16 *List of anomalies - Area 13*

Area lies between OS NGR 419723 193657 and 419603 193511, see Figs 20 & 21.

Area 13 contains ridge and furrow. There is evidence that they contain land drains.

### 3.17 *List of anomalies - Area 14*

Area lies between OS NGR 419590 193500 and 419375 193284, see Figs 22 & 23.

Area 14 contains a positive linear anomaly. It is parallel with others that relate to ridge and furrow or later agricultural activity and, therefore, may be associated. A small number of discrete positive responses have also been located, but it is not possible to determine their origin.

### 3.18 *List of anomalies - Area 15*

Area lies between OS NGR 419346 193254 and 419188 193096, see Figs 22 & 23.

Area 15 contains ridge and furrow as well as a number of discrete, pit-like responses. It is not possible to determine if they relate to natural pits, ground disturbance through agriculture or if they have any archaeological potential.

### 3.19 *List of anomalies - Area 16*

Area lies between OS NGR 419172 193081 and 419070 193012, see Figs 24 & 25.

#### *Anomalies with an uncertain origin*

(23) - A positive linear anomaly crosses the centre of the survey area and is oriented north north west to south south east. The response could indicate a cut, ditch-like feature and an archaeological origin is possible.

(24) - A weakly positive curvilinear anomaly of uncertain origin.

(25) - The survey area contains a number of discrete positive responses that may relate to pits and an archaeological origin is possible.

### 3.20 *List of anomalies - Area 17*

Area lies between OS NGR 419002 193007 and 418845 192858, see Figs 24 & 25.

Area 17 has ridge and furrow and also more modern cultivation marks.

### 3.21 *List of anomalies - Area 18*

Area lies between OS NGR 418811 192835 and 418789 192812, see Figs 24 & 25.

Area 18 has ridge and furrow, modern cultivation marks and a patch of magnetic debris at the south eastern corner.

### 3.22 *List of anomalies - Area 19*

Area lies between OS NGR 418837 192852 and 418827 192845, see Figs 24 & 25.

Area 19 contains a number of discrete positive anomalies of uncertain origin.

### 3.23 *List of anomalies - Area 20*

Area lies between OS NGR 418785 192804 and 418649 192622, see Figs 26 & 27.

#### *Anomalies with an uncertain origin*

(26) - A positive linear anomaly crosses the centre of the survey area. Another weaker anomaly is parallel with it and located further south, and both are parallel with the northern and southern field boundaries. While it is possible that they relate to cut, linear ditches, an agricultural origin is also possible.

(27) - An L-shaped positive linear anomaly is located close to the southern edge of the survey area. It could relate to a cut feature; however, its full extent has not been defined.

### 3.24 *List of anomalies - Area 21*

Area lies between OS NGR 418645 192616 and 418445 192467, see Figs 26 & 27.

#### *Anomalies with an archaeological origin*

(28) - A positive linear anomaly appears to have been truncated by anomaly (30). It may, therefore, relate to an earlier linear ditch and may be of archaeological potential.

*Anomalies with an uncertain origin*

(29) - The survey area contains a small number of discrete positive responses. They may relate to natural pit-like anomalies.

*Anomalies associated with land management*

(30) - A positive linear anomaly lies on the line of a mapped footpath. However, the response is to an infilled ditch, and early mapping shows a line of trees close by. This may, therefore, be a former field boundary ditch.

*Anomalies with an agricultural origin*

(31) - The survey area contains a series of ridge and furrow.

*Anomalies with a natural origin*

(32) - Magnetically variable responses relate to the underlying shallow sandstone geology.

**3.25 List of anomalies - Area 22**

Area lies between OS NGR 418421 192445 and 418384 192404, see Figs 28 & 29.

*Anomalies with an uncertain origin*

(33) - A broad, strongly positive, linear anomaly with a negative response to the south extends across the survey area. Although it could relate to a ditch-like feature, a modern feature, such as a pipe or cable, could be responsible for the anomaly. To the south and elevated is the former leat leading to Bydemill; however, it is not possible to determine if there is an association.

(34) - A weakly positive linear response is located at the southern edge of the survey area and is uncertain in origin. The former leat is situated immediately to the south.

(35) - The survey area contains several small, weakly positive, circular anomalies with a 3-4m diameter. It is not clear if they relate to features with an anthropogenic origin, or if they relate to naturally formed features, within the floodplain of the Bydemill Brook to the north.

*Anomalies with a natural origin*

(36) - Small patches of magnetic enhancement relate to alluvial deposits within the Bydemill Brook floodplain.

### 3.26 *List of anomalies - Area 23*

Area lies between OS NGR 418373 192388 and 418241 192255, see Figs 28 & 29.

Area 23 contains a single weakly positive linear anomaly, two discrete anomalies and ridge and furrow.

### 3.27 *List of anomalies - Area 24*

Area lies between OS NGR 418234 192251 and 418109 192155, see Figs 28 & 29.

Area 24 contains an area of what appears to be former quarrying. Two linear anomalies appear to lead towards it, but an association is uncertain. The survey area also contains ridge and furrow and a single discrete positive response.

## 4 DISCUSSION

- 4.1.1 At the eastern end of the survey area, to the east of the River Cole (Oxfordshire), there are a number of weakly positive linear anomalies. It is possible that some relate to cut features, others could relate to agricultural activity. However, they lack a coherent morphology and their origin is uncertain.
- 4.1.2 Many of the anomalies within the floodplain of the River Cole relate to land drainage, and some ridge and furrow is evident within many of the survey areas further west on higher land away from the river. Within Area 10, immediately east of the A361 Lechlade Road, are a number of weakly positive linear anomalies that appear to have been truncated by ridge and furrow. While they are not clearly defined, it is possible that they have some archaeological potential.
- 4.1.3 Within Area 11 to the west of the A361 is a zone of approximately 300m by 60m that contains evidence for at least 21 ring ditches with linear ditches and enclosures. The ring ditches often overlie one another, showing phases of occupation, and several have been truncated by other cut features. The majority of the ring ditches have diameters of between 7m and 15m, which is indicative of Iron Age and possibly early Roman round houses. There are a number of gaps within the data as this part of the site was being evaluated for a separate project by Thames Valley Archaeological Services at the time of the survey and part had already been subject to geophysical survey by them. The current survey extended across the full easement where possible in order to ascertain the extent and morphology of the features. They had already been truncated by two earlier water pipelines with the southernmost pipe



barely visible as an anomaly, and the northernmost unfortunately associated with highly magnetic material that has obscured many of the anomalies.

- 4.1.4 In the western part of the survey corridor, the majority of the survey areas contained evidence for ridge and furrow. Area 16 contained a single positive linear anomaly crossing the centre of the survey area and a number of discrete responses which could relate to cut features. Positive linear anomalies within Area 20 also appear ditch-like, but an agricultural origin is possible for those parallel with existing field boundaries.
- 4.1.5 In Area 21, there is a single positive linear anomaly that appears to have been truncated by a possible former boundary ditch and may, therefore, be of archaeological potential. The boundary ditch runs along an existing footpath which continues to Bydemill. It does, however, appear to overlie former ridge and furrow.
- 4.1.6 Within Area 22, situated between the Bydemill Brook and the leat to Bydemill, there is a strongly positive response with a negative response to the south. It is not possible to determine if the anomaly is anthropogenic or natural. There are several naturally formed anomalies within this survey area, with several circular responses, which could also relate to natural features.

## 5 CONCLUSION

- 5.1.1 The detailed magnetometer survey located a number of positive linear anomalies at the far eastern end of the survey corridor within Oxfordshire. It is possible that some relate to cut, ditch-like features; however, they lack a coherent morphology, and it is not possible to provide a confident interpretation. Within land either side of the River Cole, the majority of the responses are to land drainage within the floodplain, but ridge and furrow can be seen on the higher land to the west.
- 5.1.2 Evidence for archaeology has only been located within one main survey area (Area 11) to the west of the A361. Within Area 11 there are at least 21 ring ditches, with linear ditches and enclosures indicating Iron Age and possibly Roman settlement with evidence of phases of construction and occupation. Many of the ring ditches overly one another. Within Area 10, to the east, there are a number of weakly positive linear anomalies that appear to have been truncated by ridge and furrow, and it is possible that these relate to further former ditch-like features.
- 5.1.3 The majority of the survey areas to the west of Highworth contain evidence for former ridge and furrow, some extant, others ploughed out. Crossing some of the survey areas are other linear anomalies (Areas 16 and 20); however, it is not possible to determine if they relate to agricultural activity or possible linear ditches. Within Area 21, a possible former boundary ditch, which runs along

an existing footpath, appears to have truncated an earlier linear feature. To the south of this, within Area 22, there are a number of positive anomalies of uncertain origin.

## 6 REFERENCES

Archaeological Surveys, 2018. *Faringdon to Blunsdon Phase 1, Highworth, Swindon, Geophysical Survey Written Scheme of Investigation*. Unpublished typescript document.

Aspinall, A., Gaffney, C. and Schmidt, A. 2009. *Magnetometry for Archaeologists*. Lanham (US), AltaMira Press.

British Geological Survey, 2017. *Geology of Britain viewer, 1:50 000 scale [online]* available from <http://mapapps.bgs.ac.uk/geologyofbritain/home.html> [accessed 29/3/2018].

Chartered Institute for Archaeologists, 2014. *Standard and Guidance for archaeological geophysical survey*. CfA, University of Reading.

English Heritage, 2008. *Geophysical survey in archaeological field evaluation. Research and Professional Service Guideline No. 1*. 2<sup>nd</sup> ed. Swindon: English Heritage.

European Archaeological Council, 2015. *EAC Guidelines for the Use of Geophysics in Archaeology: Questions to Ask and Points to Consider*. Europae Archaeologia Consilium and Association Internationale sans But Lucratif, Belgium.

Institute for Archaeologists, 2002. *The use of Geophysical Techniques in Archaeological Evaluations*. IfA Paper No. 6. IfA, University of Reading.

Schmidt, A., 2013. *Geophysical Data in Archaeology: A Guide to Good Practice*. Oxbow Books.

Soil Survey of England and Wales, 1983. *Soils of England and Wales, Sheet 5 South West England*.

## Appendix A – basic principles of magnetic survey

Iron minerals are always present to some degree within the topsoil and enhancement associated with human activity is related to increases in the level of magnetic susceptibility and thermoremanent material. Magnetic susceptibility is an induced magnetism within a material when it is in the presence of a magnetic field. This can be thought of as effectively permanent due to the presence of the Earth's magnetic field. Thermoremanent magnetism occurs when ferrous material is heated beyond a specific temperature known as the Curie Point. Demagnetisation occurs at this temperature with re-magnetisation by the Earth's magnetic field upon cooling.

Enhancement of magnetic susceptibility can occur in areas subject to burning and complex fermentation processes on biological material; these are frequently associated with human settlement. Thermoremanent features include ovens, hearths, and kilns. In addition thermoremanent material such as tile and brick may also be associated with human activity and settlement.

Silting and deliberate infilling of ditches and pits with magnetically enhanced soil can create an area of enhancement compared with surrounding soils and subsoils into which the feature is cut. Mapping enhanced areas will produce linear and discrete anomalies allowing an assessment and characterisation of hidden subsurface features.

It should be noted that areas of negative enhancement can be produced from material having lower magnetic properties compared to the topsoil. This is common for many sedimentary bedrocks and subsoils which were often used in the construction of banks and walls etc. Mapping these 'negative' anomalies may also reveal archaeological features.

Magnetic survey or magnetometry can be carried out using a fluxgate gradiometer and may be referred to as gradiometry. The SENSYS gradiometer is a passive instrument consisting of two fluxgate sensors mounted vertically 65cm apart. The instrument is carried about 10-20cm above the ground surface and the upper sensor measures the Earth's magnetic field as does the lower sensor but this is influenced to a greater degree by any localised buried magnetic field. The difference between the two sensors will relate to the strength of the magnetic field created by the buried feature.

There are a number of factors that may affect the magnetic survey and these include soil type, local geology and previous human activity. Situations arise where magnetic disturbance associated with modern services, metal fencing, dumped waste material etc., obscures low magnitude fields associated with archaeological features.

## Appendix B – data processing notes

### *Clipping*

Minimum and maximum values are set and replace data outside of the range with those values. Extreme values are removed improving colour or greyscale contrast associated with data values that may be archaeologically significant. It has been found that clipping data to ranges between  $\pm 5\text{nT}$  and  $\pm 3\text{nT}$  often improves the appearance of features associated with archaeology. Different ranges are applied to data in order to determine the most suitable for anomaly abstraction and display.

### *Zero (dstrip) Median/Mean Traverse*

The median (or mean) of each traverse is calculated ignoring data outside a threshold value, the median (or mean) is then subtracted from the traverse. The process is used to equalise differences between the baseline value of gradiometer sensors.

### *High Pass Filtering*

A mathematical process used to remove low frequency anomalies relating to survey tracks, modern agricultural features and other large magnetic bodies within or adjacent to survey areas.

### *Low Pass Filtering*

A mathematical process used to remove high frequency anomalies relating to uneven ground, vibration, etc.

## Appendix C – survey and data information

Area 1  
 Filename: J748-mag-Area1-proc-hpf-lpf.xcp  
 Description: Imported as Composite from: J748-  
 mag-Area8.asc  
 Instrument Type: Sensys DLMGPS  
 Units: nT  
 UTM Zone: 30U  
 Survey corner coordinates (X/Y): OSGB36  
 Northwest corner: 422579.229, 195109.981 m  
 Southeast corner: 422786.379, 194969.281 m  
 Collection Method: Randomised  
 Sensors: 5  
 Dummy Value: 32702  
 Source GPS Points: 406900  
 Dimensions  
 Composite Size (readings): 1381 x 938  
 Survey Size (meters): 207 m x 141 m  
 Grid Size: 207 m x 141 m  
 X Interval: 0.15 m  
 Y Interval: 0.15 m  
 Stats  
 Max: 2.21  
 Min: -2.20  
 Std Dev: 0.56  
 Mean: 0.02  
 Median: 0.00  
 Composite Area: 2.9146 ha  
 Surveyed Area: 1.1299 ha  
 PROGRAM  
 Name: TerraSurveyor  
 Version: 3.0.23.0  
 GPS based Proce6  
 1 Base Layer.  
 2 Unit Conversion Layer (Lat/Long to OSGB36).  
 3 DeStripe Median Traverse:  
 4 High pass Uniform (median) filter: Window dia: 300  
 5 Lo pass Uniform (median) filter: Window dia: 13  
 6 Clip from -2.00 to 2.00 nT

Area 2  
 COMPOSITE  
 Path: C:\BusinessJobs\J748  
 Highworth\Data\Mag\Area 2\comps\  
 Filename: J748-mag-Area2-proc-lpf.xcp  
 Description: Imported as Composite from: J748-  
 mag-Area11.asc  
 Survey corner coordinates (X/Y): OSGB36  
 Northwest corner: 422456.277, 195003.9946 m  
 Southeast corner: 422576.7276, 194870.4946 m  
 Source GPS Points: 255400  
 Dimensions  
 Composite Size (readings): 803 x 890  
 Survey Size (meters): 120 m x 134 m  
 Grid Size: 120 m x 134 m  
 X Interval: 0.15 m  
 Y Interval: 0.15 m  
 Stats  
 Max: 2.21  
 Min: -2.20  
 Std Dev: 0.53  
 Mean: 0.02  
 Median: 0.02  
 Composite Area: 1.608 ha  
 Surveyed Area: 0.55655 ha  
 GPS based Proce5  
 1 Base Layer.  
 2 Unit Conversion Layer (Lat/Long to OSGB36).  
 3 DeStripe Median Traverse:  
 4 Lo pass Uniform (median) filter: Window dia: 13  
 5 Clip from -2.00 to 2.00 nT

Area 3  
 Filename: J748-mag-Area3-proc-hpf-lpf.xcp  
 Description: Imported as Composite from: J748-  
 mag-Area10.asc  
 Northwest corner: 422253.686, 194897.532 m  
 Southeast corner: 422467.436, 194680.0318 m  
 Source GPS Points: 422600  
 Dimensions  
 Composite Size (readings): 1425 x 1450  
 Survey Size (meters): 214 m x 218 m  
 Grid Size: 214 m x 218 m  
 X Interval: 0.15 m  
 Y Interval: 0.15 m  
 Stats  
 Max: 2.21  
 Min: -2.20  
 Std Dev: 0.53  
 Mean: 0.01

Median: 0.01  
 Composite Area: 4.6491 ha  
 Surveyed Area: 1.0227 ha  
 GPS based Proce6  
 1 Base Layer.  
 2 Unit Conversion Layer (Lat/Long to OSGB36).  
 3 DeStripe Median Traverse:  
 4 High pass Uniform (median) filter: Window dia: 300  
 5 Lo pass Uniform (median) filter: Window dia: 13  
 6 Clip from -2.00 to 2.00 nT

Area 4  
 Filename: J748-mag-Area4-proc-lpf.xcp  
 Description: Imported as Composite from: J748-  
 mag-Area9.asc  
 Northwest corner: 422022.255, 194722.125 m  
 Southeast corner: 422258.205, 194595.975 m  
 Source GPS Points: 337200  
 Dimensions  
 Composite Size (readings): 1573 x 841  
 Survey Size (meters): 236 m x 126 m  
 Grid Size: 236 m x 126 m  
 X Interval: 0.15 m  
 Y Interval: 0.15 m  
 Stats  
 Max: 2.21  
 Min: -2.20  
 Std Dev: 0.56  
 Mean: -0.01  
 Median: 0.01  
 Composite Area: 2.9765 ha  
 Surveyed Area: 0.99237 ha  
 GPS based Proce5  
 1 Base Layer.  
 2 Unit Conversion Layer (Lat/Long to OSGB36).  
 3 DeStripe Median Traverse:  
 4 Lo pass Uniform (median) filter: Window dia: 13  
 5 Clip from -2.00 to 2.00 nT

Area 5  
 Filename: J748-mag-Area5-proc-lpf.xcp  
 Description: Imported as Composite from: J748-  
 mag-Area13.asc  
 Northwest corner: 421672.781, 194649.005 m  
 Southeast corner: 422005.481, 194480.555 m  
 Source GPS Points: 421100  
 Dimensions  
 Composite Size (readings): 2218 x 1123  
 Survey Size (meters): 333 m x 168 m  
 Grid Size: 333 m x 168 m  
 X Interval: 0.15 m  
 Y Interval: 0.15 m  
 Stats  
 Max: 2.21  
 Min: -2.20  
 Std Dev: 0.39  
 Mean: 0.00  
 Median: 0.01  
 Composite Area: 5.6043 ha  
 Surveyed Area: 1.5326 ha  
 GPS based Proce5  
 1 Base Layer.  
 2 Unit Conversion Layer (Lat/Long to OSGB36).  
 3 DeStripe Median Traverse:  
 4 Lo pass Uniform (median) filter: Window dia: 13  
 5 Clip from -2.00 to 2.00 nT

Area 6  
 Filename: J748-mag-Area6-proc-lpf.xcp  
 Description: Imported as Composite from: J748-  
 mag-Area12.asc  
 Northwest corner: 421272.161, 194531.926 m  
 Southeast corner: 421693.661, 194312.476m  
 Dummy Value: 32702  
 Source GPS Points: 494200  
 Dimensions  
 Composite Size (readings): 2810 x 1463  
 Survey Size (meters): 422 m x 219 m  
 Grid Size: 422 m x 219 m  
 X Interval: 0.15 m  
 Y Interval: 0.15 m  
 Stats  
 Max: 2.21  
 Min: -2.20  
 Std Dev: 0.38  
 Mean: -0.01

Median: 0.01  
 Composite Area: 9.2498 ha  
 Surveyed Area: 1.9766 ha  
 GPS based Proce5  
 1 Base Layer.  
 2 Unit Conversion Layer (Lat/Long to OSGB36).  
 3 DeStripe Median Traverse:  
 4 Lo pass Uniform (median) filter: Window dia: 13  
 5 Clip from -2.00 to 2.00 nT

Area 7  
 Filename: J748-mag-Area7-proc-hpf-lpf.xcp  
 Description: Imported as Composite from: J748-  
 mag-Area7.asc  
 Northwest corner: 421040.579, 194376.254 m  
 Southeast corner: 421294.229, 194194.754 m  
 Source GPS Points: 305500  
 Dimensions  
 Composite Size (readings): 1691 x 1210  
 Survey Size (meters): 254 m x 182 m  
 Grid Size: 254 m x 182 m  
 X Interval: 0.15 m  
 Y Interval: 0.15 m  
 Stats  
 Max: 2.21  
 Min: -2.20  
 Std Dev: 0.81  
 Mean: -0.03  
 Median: 0.01  
 Composite Area: 4.6037 ha  
 Surveyed Area: 1.0717 ha  
 GPS based Proce6  
 1 Base Layer.  
 2 Unit Conversion Layer (Lat/Long to OSGB36).  
 3 DeStripe Median Traverse:  
 4 Lo pass Uniform (median) filter: Window dia: 13  
 5 High pass Uniform (median) filter: Window dia: 300  
 6 Clip from -2.00 to 2.00 nT

Area 8  
 Filename: J748-mag-Area8-proc-lpf.xcp  
 Description: Imported as Composite from: J748-  
 mag-Area6.asc  
 Northwest corner: 420860.965, 194218.724 m  
 Southeast corner: 421067.815, 194067.674 m  
 Source GPS Points: 283100  
 Dimensions  
 Composite Size (readings): 1379 x 1007  
 Survey Size (meters): 207 m x 151 m  
 Grid Size: 207 m x 151 m  
 X Interval: 0.15 m  
 Y Interval: 0.15 m  
 Stats  
 Max: 2.21  
 Min: -2.20  
 Std Dev: 0.49  
 Mean: 0.00  
 Median: 0.01  
 Composite Area: 3.1245 ha  
 Surveyed Area: 1.0091 ha  
 GPS based Proce5  
 1 Base Layer.  
 2 Unit Conversion Layer (Lat/Long to OSGB36).  
 3 DeStripe Median Traverse:  
 4 Lo pass Uniform (median) filter: Window dia: 13  
 5 Clip from -2.00 to 2.00 nT

Area 9  
 Filename: J748-mag-Area9-proc-lpf.xcp  
 Description: Imported as Composite from: J748-  
 mag-Area5.asc  
 Northwest corner: 420612.273, 194125.268 m  
 Southeast corner: 420867.793, 193961.908 m  
 Source GPS Points: 324000  
 Dimensions  
 Composite Size (readings): 1597 x 1021  
 Survey Size (meters): 256 m x 163 m  
 Grid Size: 256 m x 163 m  
 X Interval: 0.16 m  
 Y Interval: 0.16 m  
 Stats  
 Max: 2.21  
 Min: -2.20  
 Std Dev: 0.55  
 Mean: -0.01  
 Median: 0.02  
 Composite Area: 4.1742 ha  
 Surveyed Area: 1.2475 ha

GPS based Proce5

- 1 Base Layer.
- 2 Unit Conversion Layer (Lat/Long to OSGB36).
- 3 DeStripe Median Traverse:
- 4 Lo pass Uniform (median) filter: Window dia: 13
- 5 Clip from -2.00 to 2.00 nT

Area 10

Filename: J748-mag-Area10-proc-hpf-lpf.xcp  
 Description: Imported as Composite from: J748-mag-Area4.asc  
 Northwest corner: 420300.108, 193915.766 m  
 Southeast corner: 420459.258, 193734.866m  
 Source GPS Points: 614200  
 Dimensions  
 Composite Size (readings): 1061 x 1206  
 Survey Size (meters): 159 m x 181 m  
 Grid Size: 159 m x 181 m  
 X Interval: 0.15 m  
 Y Interval: 0.15 m  
 Stats  
 Max: 2.21  
 Min: -2.20  
 Std Dev: 0.59  
 Mean: 0.02  
 Median: 0.01  
 Composite Area: 2.879 ha  
 Surveyed Area: 2.1266 ha

GPS based Proce7

- 1 Base Layer.
- 2 Unit Conversion Layer (Lat/Long to OSGB36).
- 3 DeStripe Median Traverse:
- 4 High pass Uniform (median) filter: Window dia: 300
- 5 Lo pass Uniform (median) filter: Window dia: 13
- 6 Clip from -3.00 to 3.00 nT
- 7 Clip from -2.00 to 2.00 nT

Area 11

Filename: J748-mag-Area11-proc-hpf.xcp  
 Description: Imported as Composite from: J748-mag-Area17.asc  
 Northwest corner: 419800.979, 193891.076 m  
 Southeast corner: 420274.2293, 193689.476 m  
 Source GPS Points: 980500  
 Dimensions  
 Composite Size (readings): 3155 x 1344  
 Survey Size (meters): 473 m x 202 m  
 Grid Size: 473 m x 202 m  
 X Interval: 0.15 m  
 Y Interval: 0.15 m  
 Stats  
 Max: 2.21  
 Min: -2.20  
 Std Dev: 1.19  
 Mean: 0.00  
 Median: 0.00  
 Composite Area: 9.5407 ha  
 Surveyed Area: 2.9338 ha

GPS based Proce5

- 1 Base Layer.
- 2 Unit Conversion Layer (Lat/Long to OSGB36).
- 3 DeStripe Median Traverse:
- 4 High pass Uniform (median) filter: Window dia: 300
- 5 Clip from -2.00 to 2.00 nT

Area 12

Filename: J748-mag-Area12-hpf-lpf.xcp  
 Description: Imported as Composite from: J748-mag-Area24.asc  
 Northwest corner: 419689.822, 193832.849 m  
 Southeast corner: 419781.022, 193675.199 m  
 Dummy Value: 32702  
 Source GPS Points: 222000  
 Dimensions  
 Composite Size (readings): 608 x 1051  
 Survey Size (meters): 91.2 m x 158 m  
 Grid Size: 91.2 m x 158 m  
 X Interval: 0.15 m  
 Y Interval: 0.15 m  
 Stats  
 Max: 2.21  
 Min: -2.20  
 Std Dev: 0.92  
 Mean: -0.07  
 Median: 0.01  
 Composite Area: 1.4378 ha  
 Surveyed Area: 0.82322 ha

GPS based Proce6

- 1 Base Layer.
- 2 Unit Conversion Layer (Lat/Long to OSGB36).
- 3 DeStripe Median Traverse:
- 4 High pass Uniform (median) filter: Window dia: 300
- 5 Lo pass Uniform (median) filter: Window dia: 13
- 6 Clip from -2.00 to 2.00 nT

Area 13

Filename: J748-mag-Area13-proc-lpf.xcp  
 Description: Imported as Composite from: J748-mag-Area14.asc  
 Northwest corner: 419597.700, 193660.859 m  
 Southeast corner: 419778.150, 193490.759 m  
 Source GPS Points: 275200  
 Dimensions  
 Composite Size (readings): 1203 x 1134  
 Survey Size (meters): 180 m x 170 m  
 Grid Size: 180 m x 170 m  
 X Interval: 0.15 m  
 Y Interval: 0.15 m  
 Stats  
 Max: 2.21  
 Min: -2.20  
 Std Dev: 0.52  
 Mean: 0.01  
 Median: 0.00  
 Composite Area: 3.0695 ha  
 Surveyed Area: 1.074 ha

GPS based Proce5

- 1 Base Layer.
- 2 Unit Conversion Layer (Lat/Long to OSGB36).
- 3 DeStripe Median Traverse:
- 4 Lo pass Uniform (median) filter: Window dia: 11
- 5 Clip from -2.00 to 2.00 nT

Area 14

Filename: J748-mag-Area14-proc-lpf.xcp  
 Northwest corner: 419358.091, 193520.403 m  
 Southeast corner: 419591.3431, 193266.303 m  
 Source GPS Points: 346200  
 Composite Size (readings): 1555 x 1694  
 Survey Size (meters): 233 m x 254 m  
 Grid Size: 233 m x 254 m  
 X Interval: 0.15 m  
 Y Interval: 0.15 m  
 Stats  
 Max: 2.21  
 Min: -2.20  
 Std Dev: 0.57  
 Mean: 0.00  
 Median: 0.00  
 Composite Area: 5.9269 ha  
 Surveyed Area: 1.2813 ha

GPS based Proce5

- 1 Base Layer.
- 2 Unit Conversion Layer (Lat/Long to OSGB36).
- 3 DeStripe Median Traverse:
- 4 Lo pass Uniform (median) filter: Window dia: 13
- 5 Clip from -2.00 to 2.00 nT

Area 15

Filename: J748-mag-Area15-proc-lpf.xcp  
 Description: Imported as Composite from: J748-mag-Area15.asc  
 Northwest corner: 419184.880, 193261.947 m  
 Southeast corner: 419369.680, 193067.847 m  
 Source GPS Points: 274300  
 Composite Size (readings): 1232 x 1294  
 Survey Size (meters): 185 m x 194 m  
 Grid Size: 185 m x 194 m  
 X Interval: 0.15 m  
 Y Interval: 0.15 m  
 Stats  
 Max: 2.21  
 Min: -2.20  
 Std Dev: 0.42  
 Mean: 0.01  
 Median: 0.01  
 Composite Area: 3.587 ha  
 Surveyed Area: 1.0551 ha

GPS based Proce5

- 1 Base Layer.
- 2 Unit Conversion Layer (Lat/Long to OSGB36).
- 3 DeStripe Median Traverse:
- 4 Lo pass Uniform (median) filter: Window dia: 13
- 5 Clip from -2.00 to 2.00 nT

Area 16

Filename: J748-mag-Area16-proc-lpf.xcp  
 Description: Imported as Composite from: J748-mag-Area22.asc  
 Northwest corner: 419051.011, 193105.521m  
 Southeast corner: 419174.461, 192999.471 m  
 Source GPS Points: 151600  
 Dimensions  
 Composite Size (readings): 823 x 707  
 Survey Size (meters): 123 m x 106 m  
 Grid Size: 123 m x 106 m  
 X Interval: 0.15 m  
 Y Interval: 0.15 m

Stats

Max: 2.21  
 Min: -2.20  
 Std Dev: 0.44  
 Mean: 0.00  
 Median: 0.00  
 Composite Area: 1.3092 ha  
 Surveyed Area: 0.53484 ha

GPS based Proce5

- 1 Base Layer.
- 2 Unit Conversion Layer (Lat/Long to OSGB36).
- 3 DeStripe Median Traverse:
- 4 Lo pass Uniform (median) filter: Window dia: 13
- 5 Clip from -2.00 to 2.00 nT

Area 17

Path: C:\BusinessJobs\J748  
 Highworth\Data\Mag\Area 17\comps\  
 Filename: J748-mag-Area17-proc-lpf.xcp  
 Survey corner coordinates (X/Y):  
 Northwest corner: 418835.794, 193020.5491 m  
 Southeast corner: 419081.194 192845.949 m  
 Source GPS Points: 430900  
 Dimensions  
 Composite Size (readings): 1636 x 1164  
 Survey Size (meters): 245 m x 175 m  
 Grid Size: 245 m x 175 m  
 X Interval: 0.15 m  
 Y Interval: 0.15 m  
 Stats  
 Max: 3.32  
 Min: -3.30  
 Std Dev: 1.17  
 Mean: 0.04  
 Median: -0.04  
 Composite Area: 4.2847 ha  
 Surveyed Area: 1.1744 ha

GPS based Proce5

- 1 Base Layer.
- 2 Unit Conversion Layer (Lat/Long to OSGB36).
- 3 DeStripe Median Traverse:
- 4 Lo pass Uniform (median) filter: Window dia: 13
- 5 Clip from -3.00 to 3.00 nT

Area 18

Filename: J748-mag-Area18-proc-lpf.xcp  
 Description: Imported as Composite from: J748-mag-Area21.asc  
 Northwest corner: 418771.446, 192870.809 m  
 Southeast corner: 418829.046, 192807.509 m  
 Source GPS Points: 48800  
 Dimensions  
 Composite Size (readings): 384 x 422  
 Survey Size (meters): 57.6 m x 63.3 m  
 Grid Size: 57.6 m x 63.3 m  
 X Interval: 0.15 m  
 Y Interval: 0.15 m  
 Stats  
 Max: 2.21  
 Min: -2.20  
 Std Dev: 0.85  
 Mean: 0.05  
 Median: 0.00  
 Composite Area: 0.36461 ha  
 Surveyed Area: 0.15377 ha

GPS based Proce5

- 1 Base Layer.
- 2 Unit Conversion Layer (Lat/Long to OSGB36).
- 3 DeStripe Median Traverse:
- 4 Lo pass Uniform (median) filter: Window dia: 13
- 5 Clip from -2.00 to 2.00 nT

Area 19

Filename: J748-mag-Area19-proc-lpf.xcp  
 Description: Imported as Composite from: J748-mag-Area23.asc  
 Northwest corner: 418809.708, 192854.328 m  
 Southeast corner: 418856.954, 192805.578 m  
 Source GPS Points: 30300  
 Dimensions  
 Composite Size (readings): 315 x 325  
 Survey Size (meters): 47.3 m x 48.8 m  
 Grid Size: 47.3 m x 48.8 m  
 X Interval: 0.15 m  
 Y Interval: 0.15 m  
 Stats  
 Max: 2.21  
 Min: -2.20  
 Std Dev: 0.55  
 Mean: 0.03  
 Median: 0.02  
 Composite Area: 0.23034 ha  
 Surveyed Area: 0.090835 ha

GPS based Proce5

- 1 Base Layer.
- 2 Unit Conversion Layer (Lat/Long to OSGB36).

<p>3 DeStripe Median Traverse:                  4 Lo pass Uniform (median) filter: Window dia: 13                  5 Clip from -2.00 to 2.00 nT</p> <p>Area 20                  Filename: J748-mag-Area20-proc-lpf.xcp                  Description: Imported as Composite from: J748-                  mag-Area19.asc                  Northwest corner: 418617.007, 192820.6394 m                  Southeast corner: 418795.807, 192616.789 m                  Source GPS Points: 361000                  Dimensions                  Composite Size (readings): 1192 x 1359                  Survey Size (meters): 179 m x 204 m                  Grid Size: 179 m x 204 m                  X Interval: 0.15 m                  Y Interval: 0.15 m                  Stats                  Max: 2.21                  Min: -2.20                  Std Dev: 0.50                  Mean: 0.00                  Median: 0.00                  Composite Area: 3.6448 ha                  Surveyed Area: 1.3058 ha                  GPS based Proce5                  1 Base Layer.                  2 Unit Conversion Layer (Lat/Long to OSGB36).                  3 DeStripe Median Traverse:                  4 Lo pass Uniform (median) filter: Window dia: 13                  5 Clip from -2.00 to 2.00 nT</p> <p>Area 21                  Filename: J748-mag-Area21-proc-hpf-lpf.xcp                  Description: Imported as Composite from: J748-                  mag-Area18.asc                  Northwest corner: 418381.384, 192624.899 m                  Southeast corner: 418668.7849, 192447.749 m                  Source GPS Points: 435600                  Dimensions                  Composite Size (readings): 1916 x 1181                  Survey Size (meters): 287 m x 177 m                  Grid Size: 287 m x 177 m                  X Interval: 0.15 m                  Y Interval: 0.15 m                  Stats                  Max: 2.21                  Min: -2.20</p>	<p>Std Dev: 0.71                  Mean: 0.01                  Median: 0.00                  Composite Area: 5.0913 ha                  Surveyed Area: 1.4764 ha                  GPS based Proce6                  1 Base Layer.                  2 Unit Conversion Layer (Lat/Long to OSGB36).                  3 DeStripe Median Traverse:                  4 High pass Uniform (median) filter: Window dia: 300                  5 Lo pass Uniform (median) filter: Window dia: 13                  6 Clip from -2.00 to 2.00 nT</p> <p>Area 22                  Filename: J748-mag-Area22-proc-lpf.xcp                  Description: Imported as Composite from: J748-                  mag-Area3.asc                  Northwest corner: 418350.304, 192457.393 m                  Southeast corner: 418447.679, 192398.393 m                  Source GPS Points: 140700                  Dimensions                  Composite Size (readings): 779 x 472                  Survey Size (meters): 97.4 m x 59 m                  Grid Size: 97.4 m x 59 m                  X Interval: 0.125 m                  Y Interval: 0.125 m                  Stats                  Max: 3.32                  Min: -3.30                  Std Dev: 1.50                  Mean: 0.03                  Median: -0.01                  Composite Area: 0.57451 ha                  Surveyed Area: 0.34251 ha                  GPS based Proce5                  1 Base Layer.                  2 Unit Conversion Layer (Lat/Long to OSGB36).                  3 DeStripe Median Traverse:                  4 Lo pass Uniform (median) filter: Window dia: 13                  5 Clip from -3.00 to 3.00 nT</p> <p>Area 23                  Filename: J748-mag-Area23-proc-lpf.xcp                  Description: Imported as Composite from: J748-                  mag-Area2.asc                  Northwest corner: 418230.870, 192391.478 m                  Southeast corner: 418406.07, 192233.078 m                  Source GPS Points: 334800                  Dimensions</p>	<p>Composite Size (readings): 1168 x 1056                  Survey Size (meters): 175 m x 158 m                  Grid Size: 175 m x 158 m                  X Interval: 0.15 m                  Y Interval: 0.15 m                  Stats                  Max: 3.32                  Min: -3.30                  Std Dev: 0.90                  Mean: 0.04                  Median: 0.01                  Composite Area: 2.7752 ha                  Surveyed Area: 0.91371 ha                  GPS based Proce5                  1 Base Layer.                  2 Unit Conversion Layer (Lat/Long to OSGB36).                  3 DeStripe Median Traverse:                  4 Lo pass Uniform (median) filter: Window dia: 13                  5 Clip from -3.00 to 3.00 nT</p> <p>Area 24                  Filename: J748-mag-Area24-proc-hpf-lpf.xcp                  Description: Imported as Composite from: J748-                  mag-Area1.asc                  Northwest corner: 418083.438, 192273.168 m                  Southeast corner: 418246.078, 192094.758 m                  Source GPS Points: 740400                  Dimensions                  Composite Size (readings): 856 x 939                  Survey Size (meters): 163 m x 178 m                  Grid Size: 163 m x 178 m                  X Interval: 0.19 m                  Y Interval: 0.19 m                  Stats                  Max: 3.32                  Min: -3.30                  Std Dev: 1.07                  Mean: -0.01                  Median: -0.01                  Composite Area: 2.9017 ha                  Surveyed Area: 1.5204 ha                  GPS based Proce6                  1 Base Layer.                  2 Unit Conversion Layer (Lat/Long to OSGB36).                  3 DeStripe Median Traverse:                  4 High pass Uniform (median) filter: Window dia: 300                  5 Lo pass Gaussian filter: Window dia: 13                  6 Clip from -3.00 to 3.00 nT</p>
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## Appendix D – digital archive

Archaeological Surveys Ltd hold the primary digital archive at their offices in Wiltshire. Data are backed-up onto an on-site data storage drive and at the earliest opportunity data are copied to CD ROM for storage on-site and off-site.

A draft digital copy of the summary report (in PDF format) shall be supplied to the office of the County Archaeological Officer; for verification and assessment by the CAO or his representative; when the report has been agreed a final digital copy will then be supplied to the Oxfordshire Historic Environment Record (HER) at [archaeology@oxfordshire.gov.uk](mailto:archaeology@oxfordshire.gov.uk) on the understanding that it will become a public document after an appropriate period of time (generally not exceeding six months). The report will also be uploaded to the Online AccesS to the Index of archaeological investigationS (OASIS). A printed copy of the report and a PDF copy will be supplied to the Wiltshire Historic Environment Record.

Archive contents:

File type	Naming scheme	Description
Data	J748-mag-[area number/name].asc J748-mag-[area number/name].xcp J748-mag-[area number/name]-proc.xcp J748-mag-[area number/name]-proc-hpf-lpf.xcp	Raw data as ASCII CSV TerraSurveyor raw data TerraSurveyor minimally processed data
Graphics	J748-mag-[area number/name]-proc-hpf-lpf.tif	Image in TIF format
Drawing	J748-[version number].dwg	CAD file in 2010 dwg format
Report	J748 report.odt	Report text in Open Office odt format

Table 3: Archive metadata

## Appendix E – CAD layers for abstraction and interpretation plots

The table below sets out Archaeological Surveys Ltd CAD layer names with associated colours and graphical content. Where CAD files are available layers may be extracted for further CAD/GIS use. Note: hatched polygon boundaries are contained within layers with the RGB colour code 254, 255, 255 (near white) in order to prevent their visibility.

















Report sub-heading and associated CAD layer names	Colour with RGB index	Layer content
<b>Anomalies with archaeological potential</b>		
AS-ABST MAG POS DISCRETE ARCHAEOLOGY	 Red 255,0,0	Solid donut, point or polygon (solid)
AS-ABST MAG POS ARCHAEOLOGY	 Red 255,0,0	Polygon (cross hatched ANSI37)
AS-ABST MAG POS CURVILINEAR RING DITCH	 Magenta 255,0,255	Polyline or polygon (solid)
<b>Anomalies with an uncertain origin</b>		
AS-ABST MAG POS LINEAR UNCERTAIN	 255,127,0	Line, polyline or polygon (solid)
AS-ABST MAG NEG LINEAR UNCERTAIN	 Blue 0,0,255	Line, polyline or polygon (solid)
AS-ABST MAG POS DISCRETE UNCERTAIN	 255,127,0	Solid donut, point or polygon (solid)
AS-ABST MAG POS UNCERTAIN	 255,127,0	Polygon (cross hatched ANSI37)
<b>Anomalies relating to land management</b>		
AS-ABST MAG BOUNDARY	 127,0,0	Line, polyline or polygon (solid or cross hatched ANSI37)
<b>Anomalies with an agricultural origin</b>		
AS-ABST MAG AGRICULTURAL	 Green 0,255,0	Line or polyline
AS-ABST MAG RIDGE & FURROW	 0, 127,63	Line or polyline
<b>Anomalies associated with magnetic debris</b>		
AS-ABST MAG DEBRIS	 132, 132, 132	Polygon (cross hatched ANSI37)
AS-ABST MAG STRONG DIPOLAR	 132, 132, 132	Solid donut, point or polygon (solid)
<b>Anomalies with a modern origin</b>		
AS-ABST MAG DISTURBANCE	 132, 132, 132	Polygon (hatched ANSI31)
AS-ABST MAG SERVICE	 132, 132, 132	Line or polyline
<b>Anomalies with a natural origin</b>		
AS-ABST MAG NATURAL FEATURES	 Yellow 255,255,0	Polygon (cross hatched ANSI37)
<b>Anomalies associated with ground disturbance/quarrying</b>		
AS-ABST MAG QUARRYING/ GROUND DISTURBANCE	 255,255, 127 or 255,223,127	Polygon (net)

Table 4: CAD layering

## Appendix F – copyright and intellectual property

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### Geophysical Survey Faringdon to Blunston Phase 1 Water Main Replacement Highworth Swindon

#### Map of survey area

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— Survey location

Pipeline corridor between OS NGR  
SU 22749 95180 & SU 18105 92151

SCALE 1:25 000





SCALE TRUE AT A3

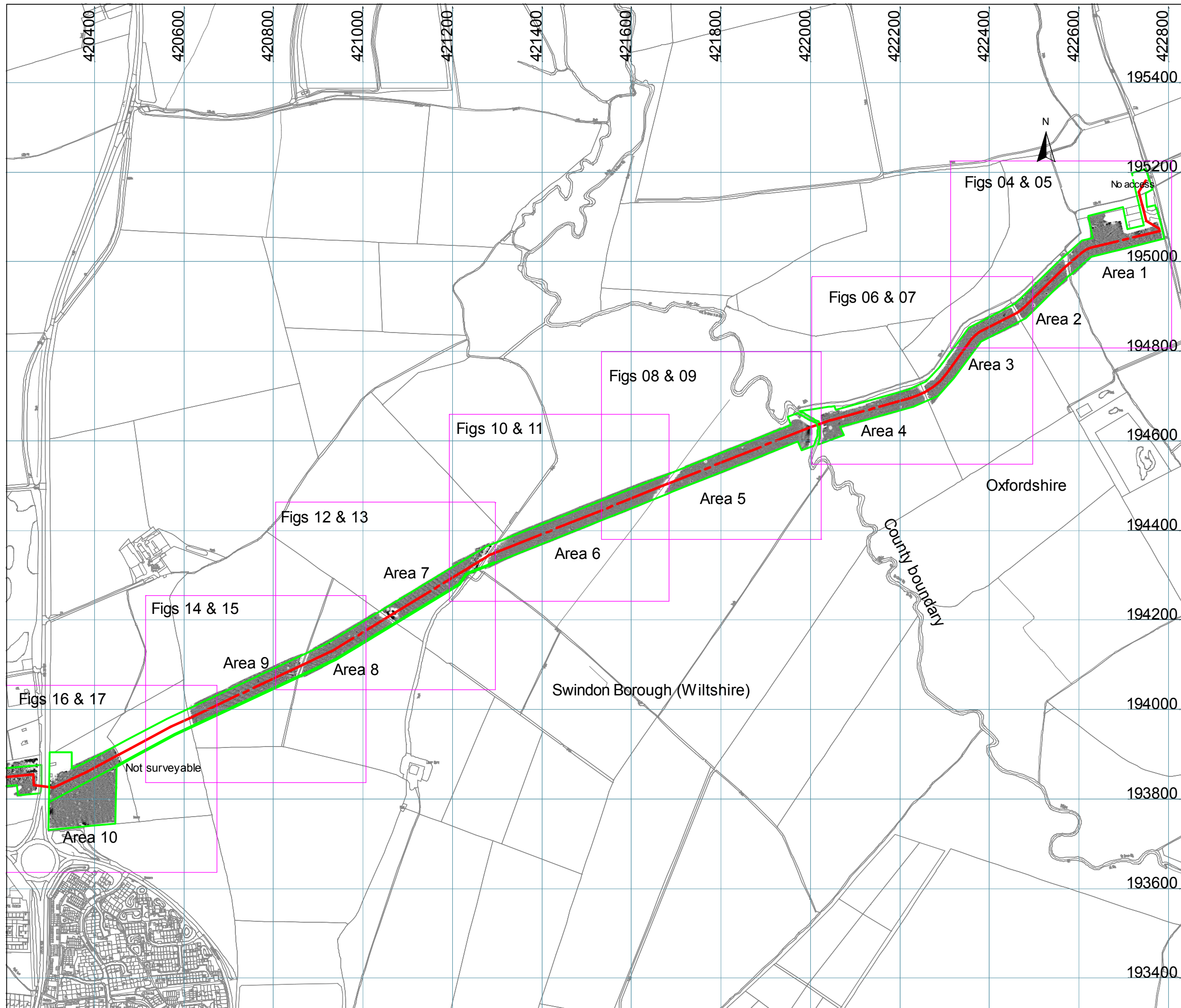
**Geophysical Survey  
Farington to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**Referencing information - east**

Referencing grid to OSGB36 datum at 200m intervals

Data collected at 20Hz and georeferenced to ETRS89 zone 30 with conversion to OSGB36 using OSTN02

-  Easement
-  Proposed pipeline



SCALE 1:8000



SCALE TRUE AT A3



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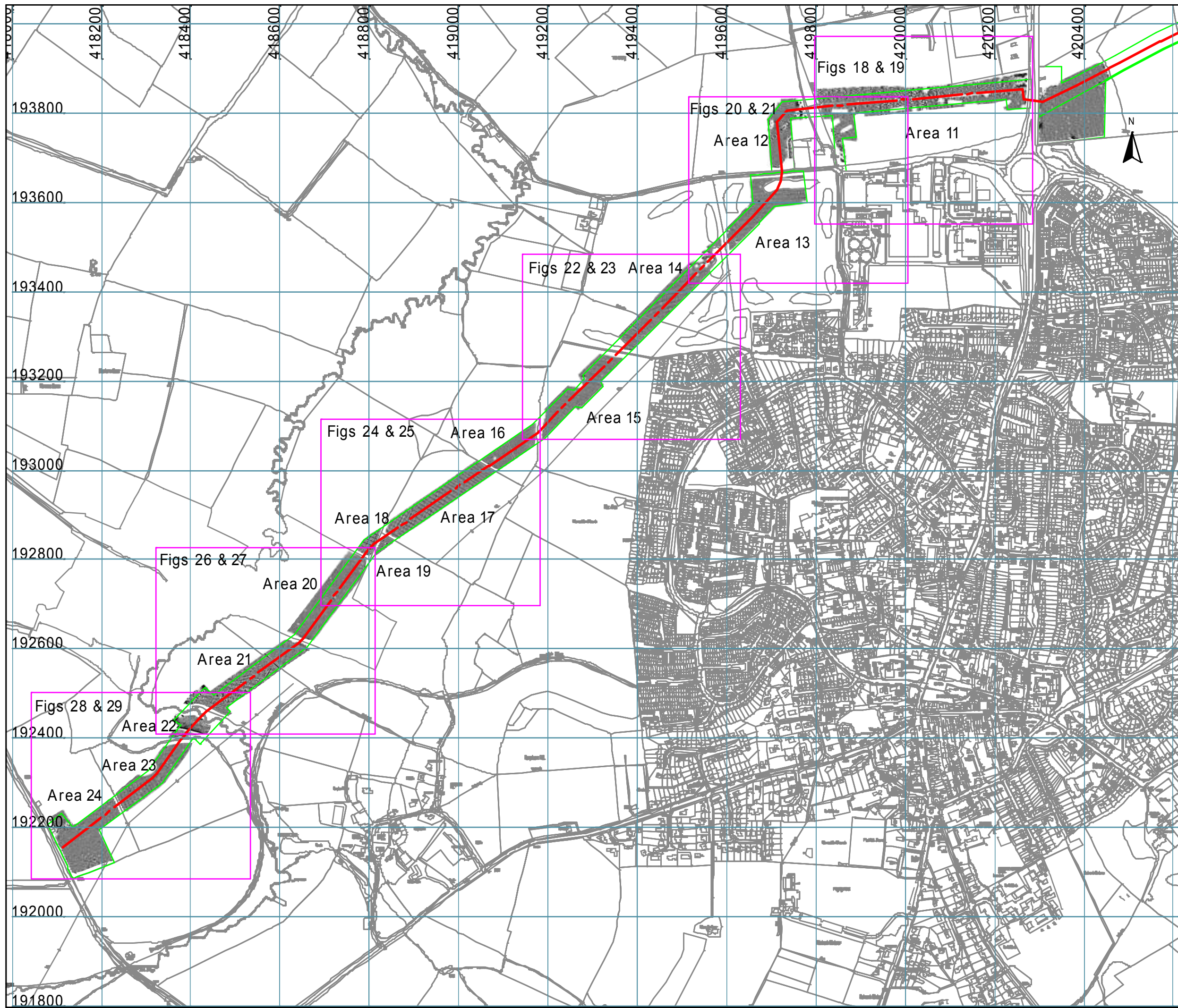
**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**Referencing information - west**

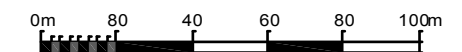
Referencing grid to OSGB36 datum at 200m intervals

Data collected at 20Hz and georeferenced to ETRS89 zone 30 with conversion to OSGB36 using OSTN02

-  Easement
-  Proposed pipeline



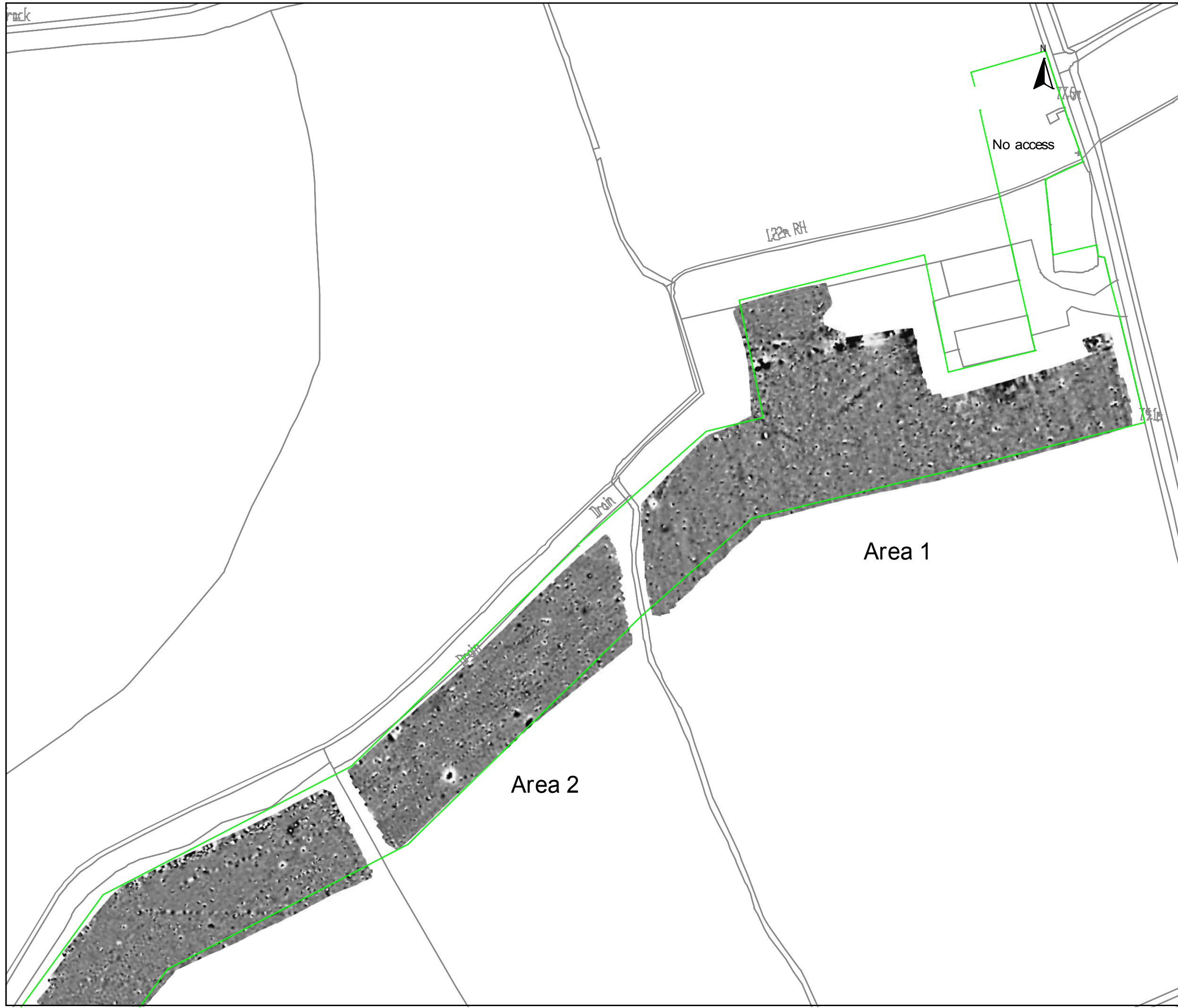
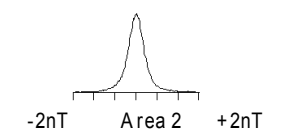
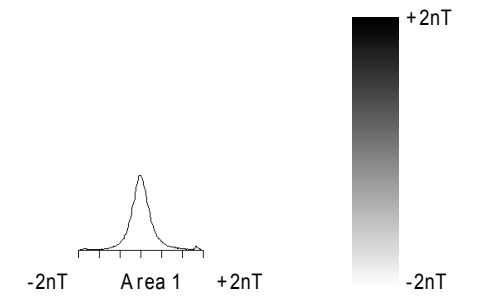
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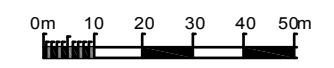
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**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**Greyscale plot of filtered  
magnetometer data - Areas 1 & 2  
(Oxfordshire)**



SCALE 1:1500











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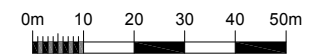


**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**Abstraction and interpretation of  
magnetic anomalies - Areas 1 & 2  
(Oxfordshire)**

-  Positive linear anomaly - possible ditch-like feature
-  Linear anomaly - ridge and furrow
-  Linear anomaly - land drain
-  Discrete positive response - possible pit-like feature
-  Magnetic debris - spread of magnetically thermoremnant/ferrous material
-  Magnetic disturbance from ferrous material
-  Strong multiple dipolar linear anomaly - pipeline / cable / service
-  Strong dipolar anomaly - ferrous object

SCALE 1:1500

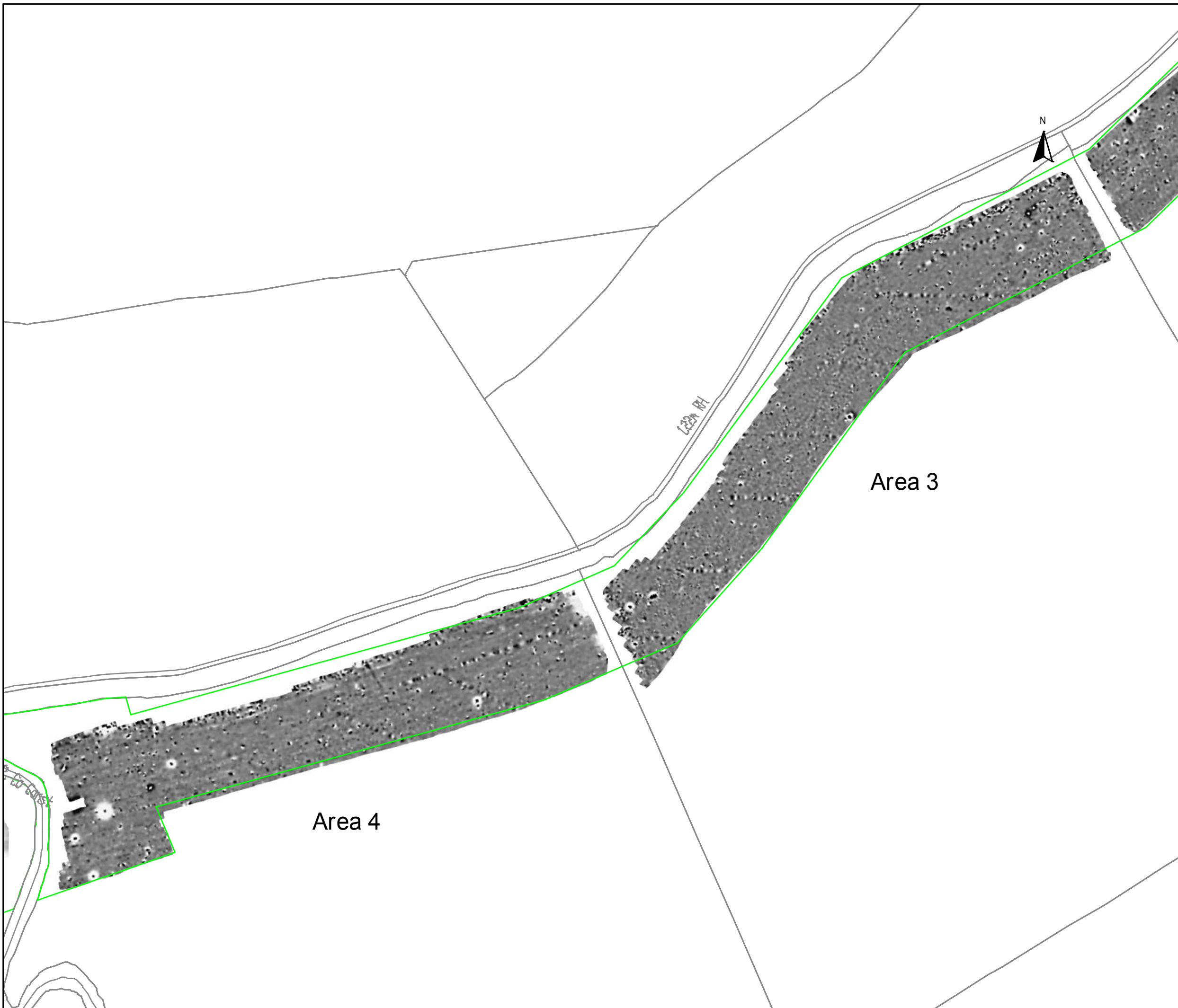
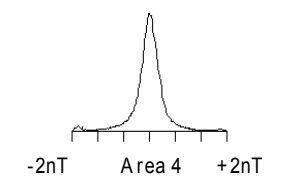
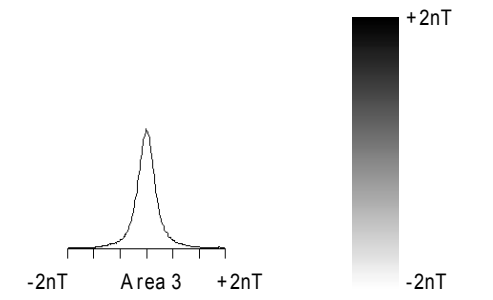


SCALE TRUE AT A3

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**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

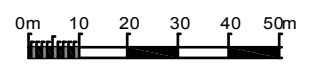
**Greyscale plot of filtered  
magnetometer data - Areas 3 & 4  
(Oxfordshire)**



Area 4

Area 3






SCALE 1:1500

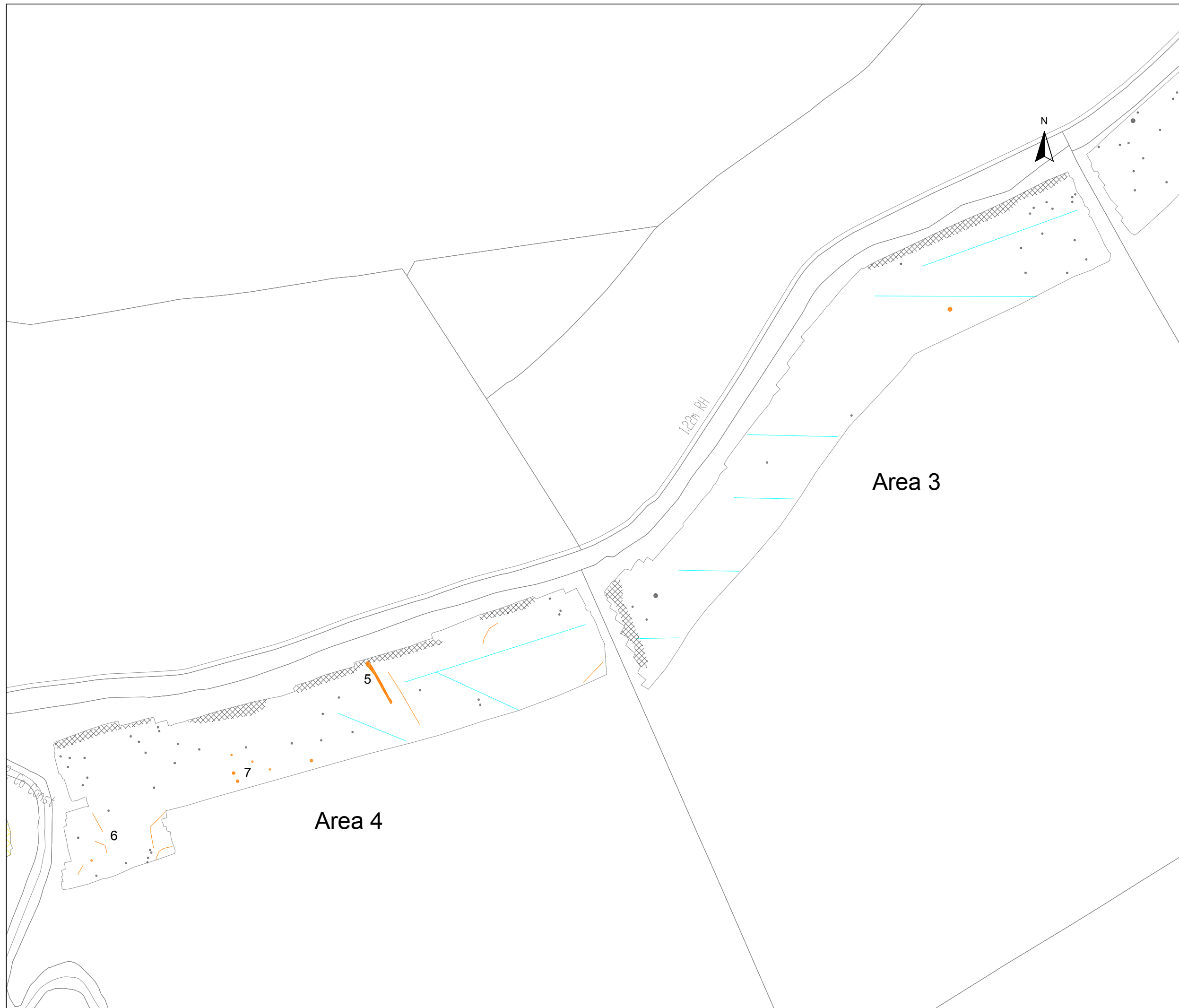


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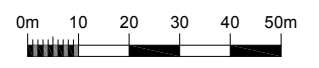
**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**Abstraction and interpretation of  
magnetic anomalies - Areas 3 & 4  
(Oxfordshire)**

-  Positive linear anomaly - possible ditch-like feature
-  Linear anomaly - land drain
-  Discrete positive response - possible pit-like feature
-  Magnetic debris - spread of magnetically thermoremnant/ferrous material
-  Strong dipolar anomaly - ferrous object



SCALE 1:1500



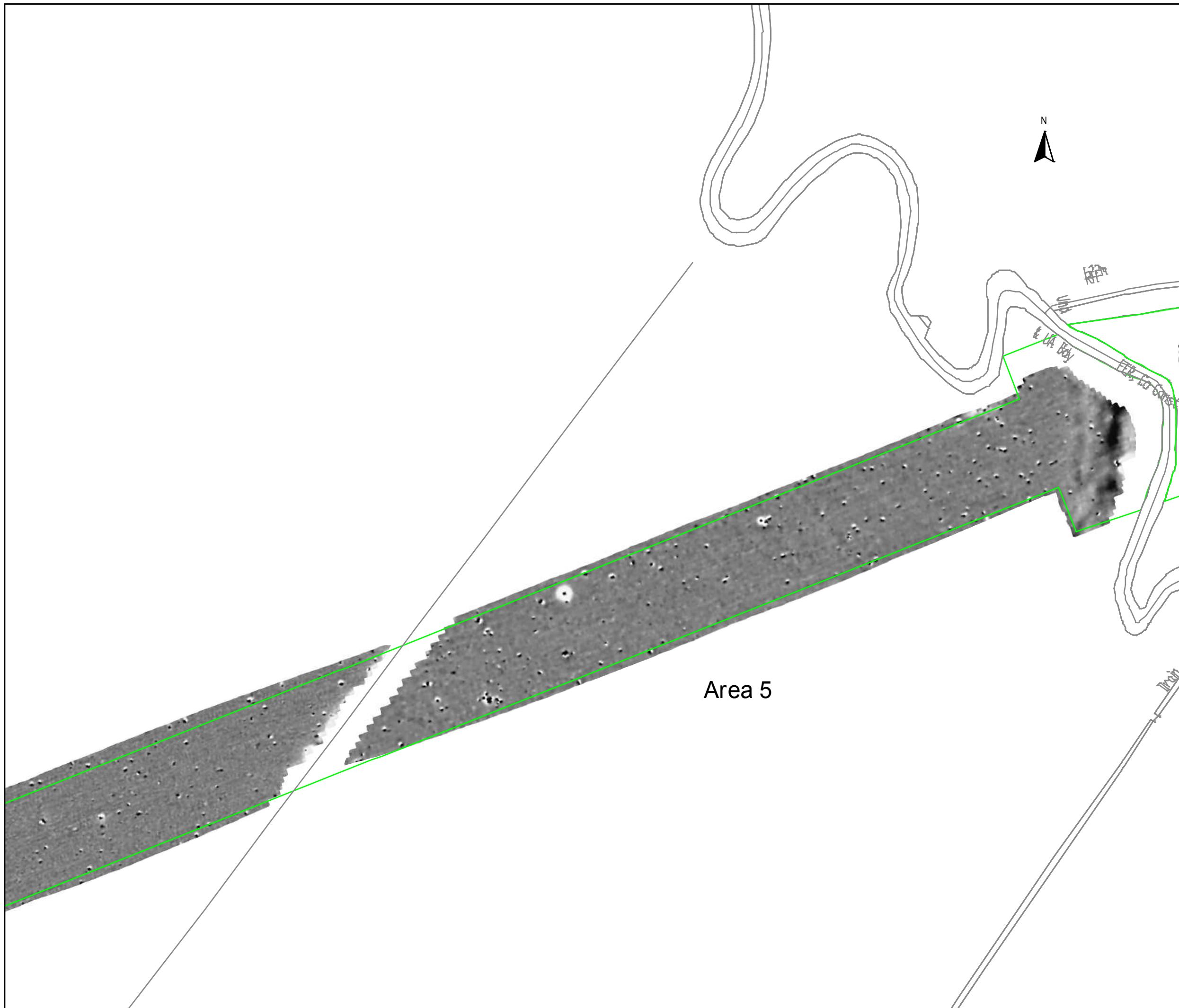
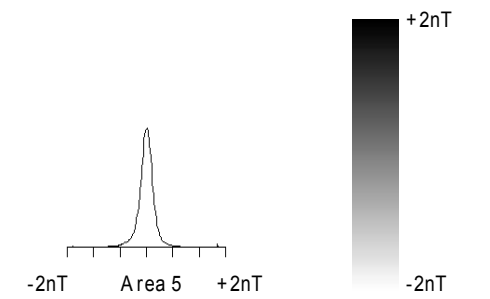
SCALE TRUE AT A3

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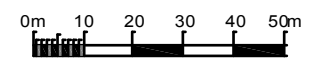
FIG 07

**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**Greyscale plot of filtered  
magnetometer data - Area 5**



SCALE 1:1500






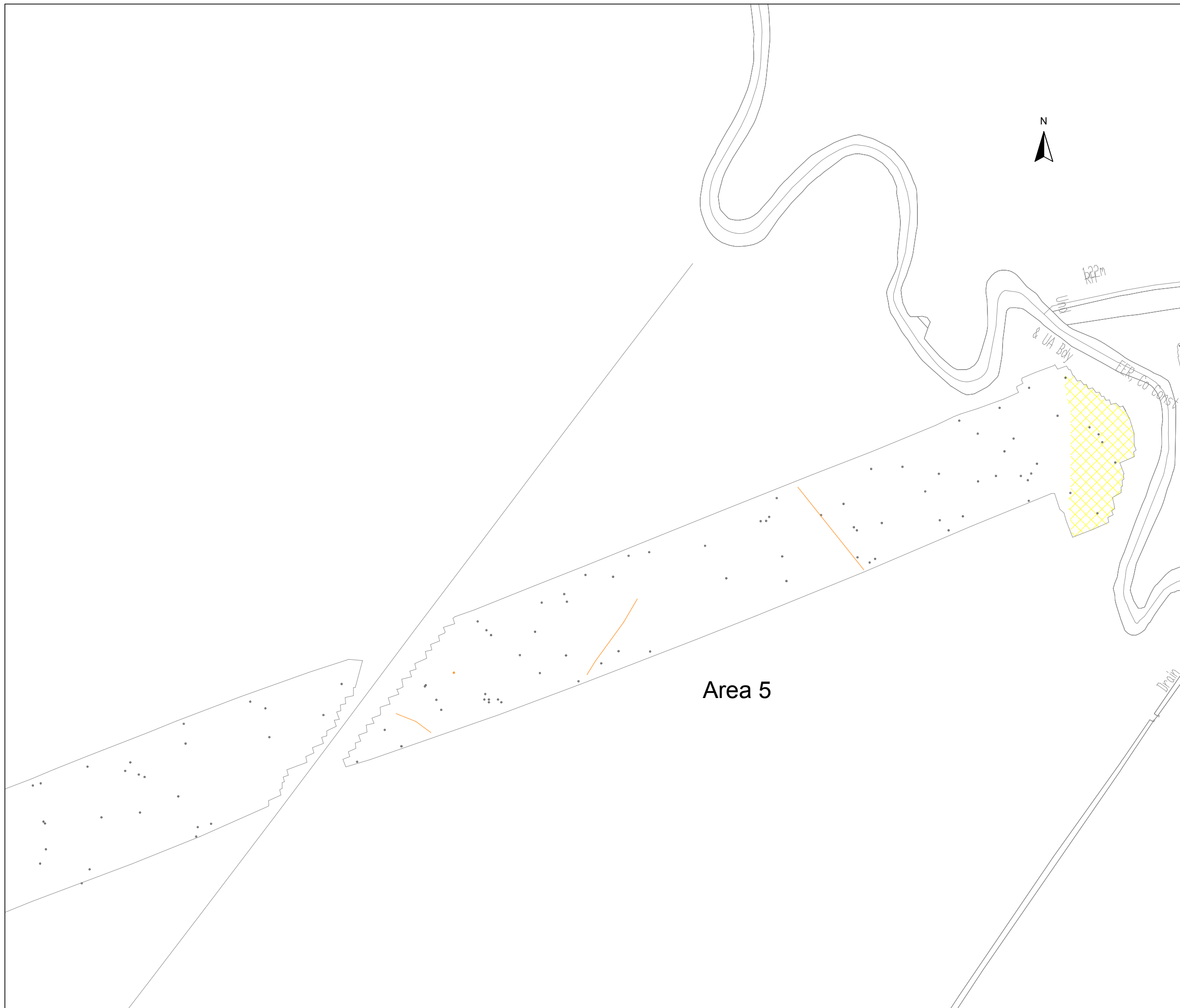
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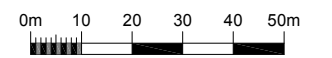
**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**Abstraction and interpretation of  
magnetic anomalies - Area 5**

-  Positive linear anomaly - possible ditch-like feature
-  Variable magnetic response - of natural origin (palaeochannel)
-  Strong dipolar anomaly - ferrous object



SCALE 1:1500

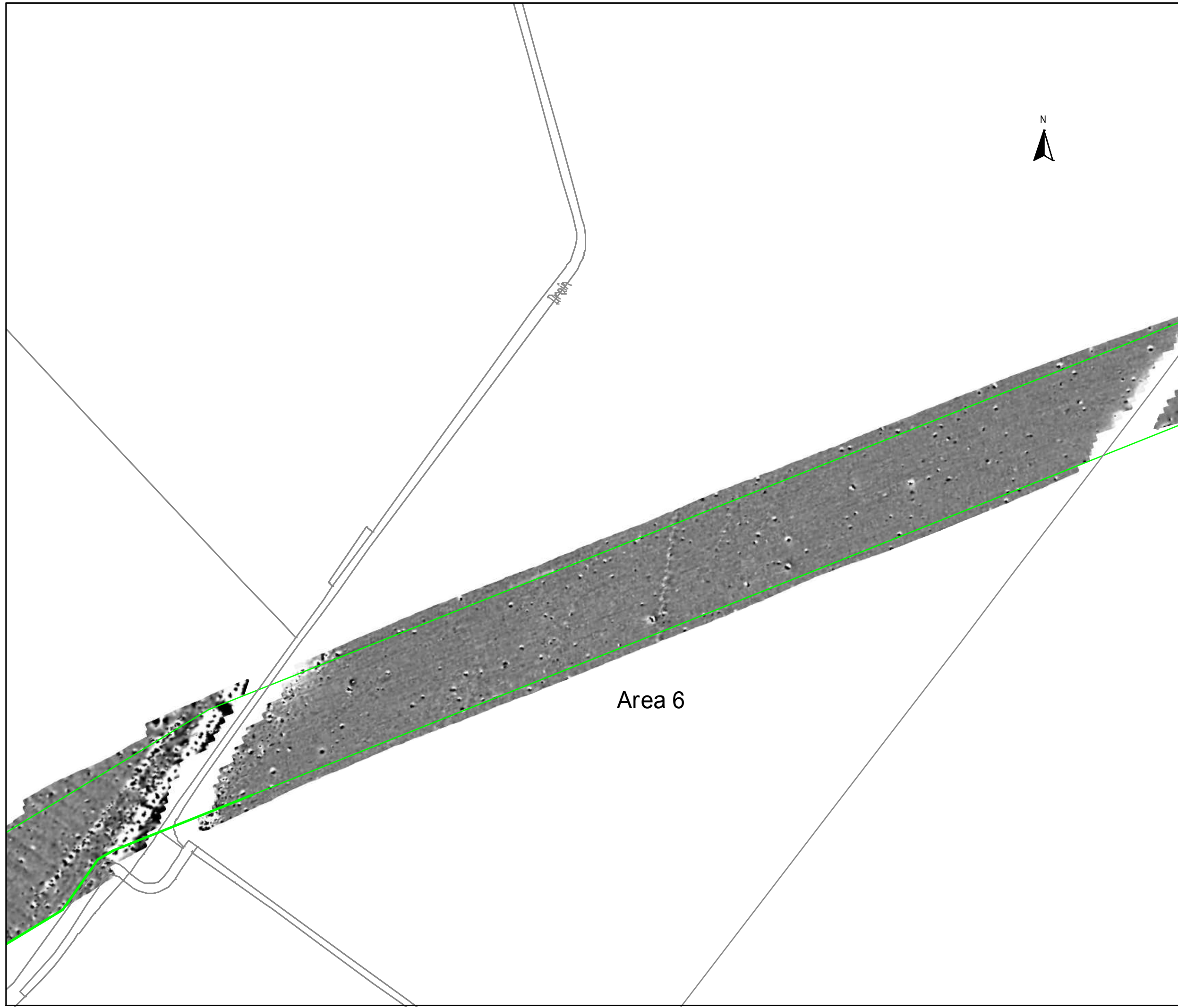
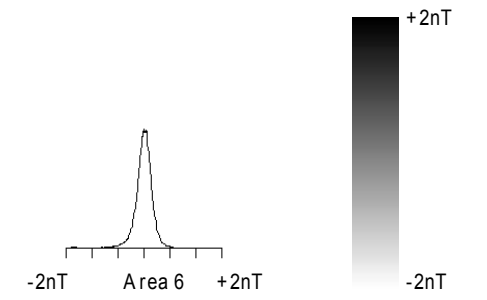


SCALE TRUE AT A3

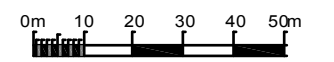
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**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**Greyscale plot of filtered  
magnetometer data - Area 6**



SCALE 1:1500





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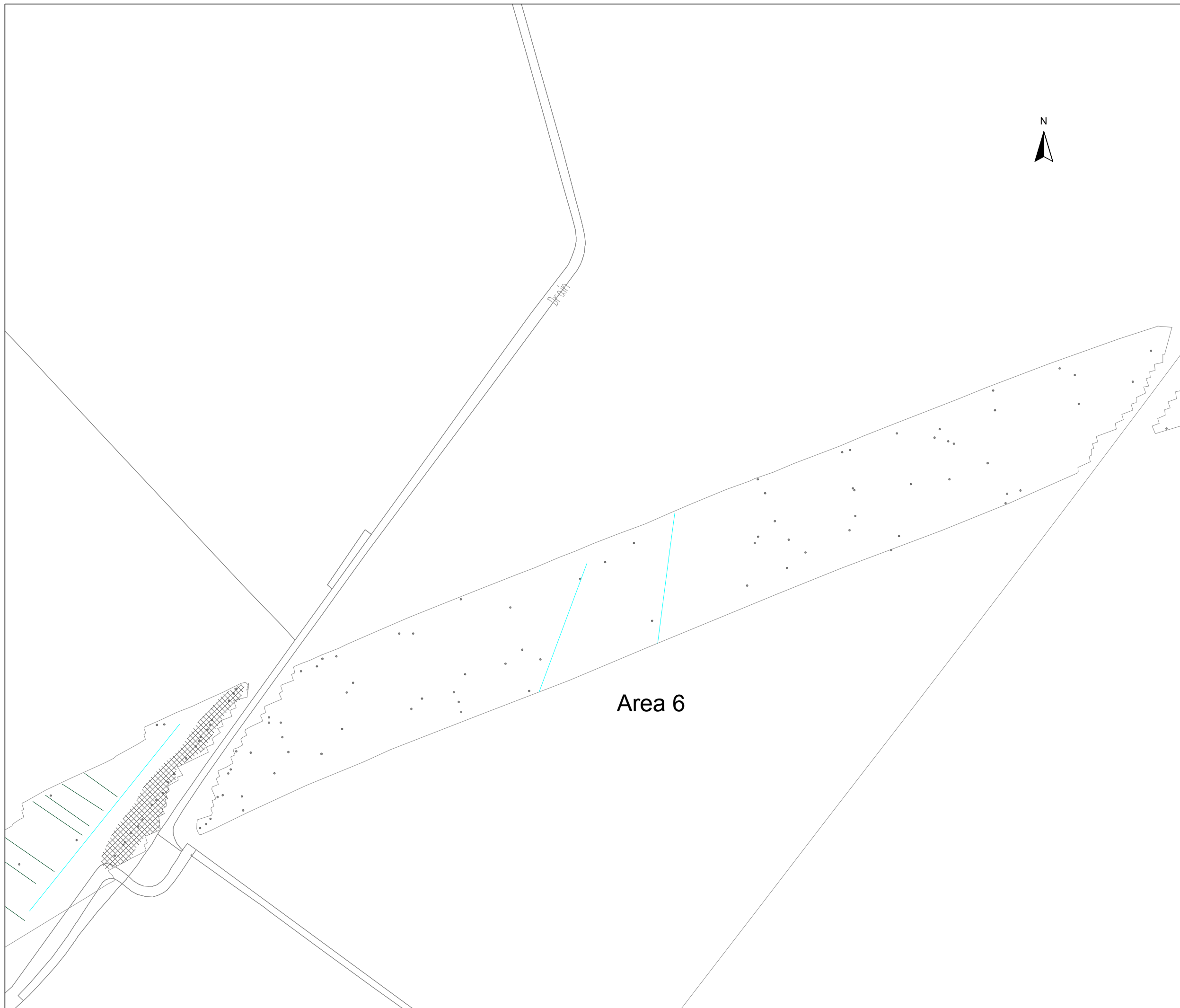
FIG 10

**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**Abstraction and interpretation of  
magnetic anomalies - Area 6**

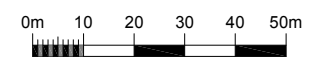


-  Negative linear anomaly - land drainage ditch
-  Strong dipolar anomaly - ferrous object



Area 6

SCALE 1:1500

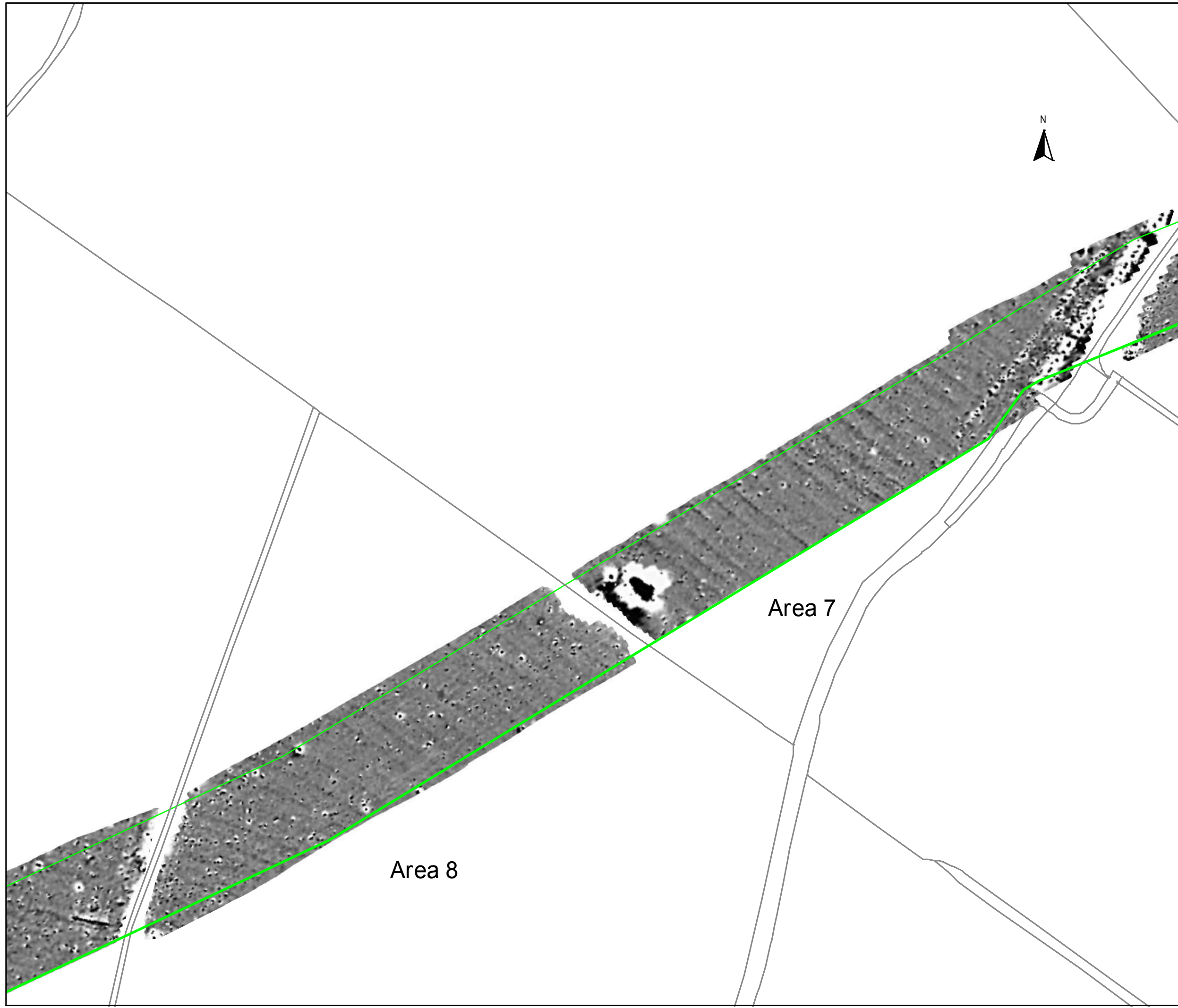
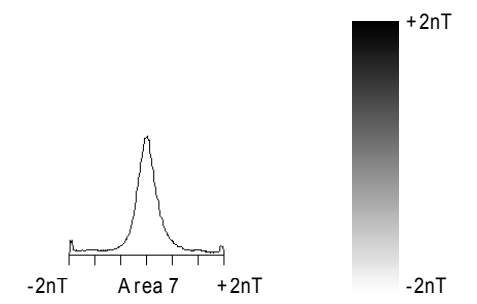


SCALE TRUE AT A3

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**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

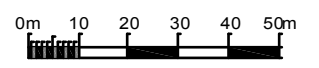
**Greyscale plot of filtered  
magnetometer data - Areas 7 & 8**



Area 7

Area 8

SCALE 1:1500









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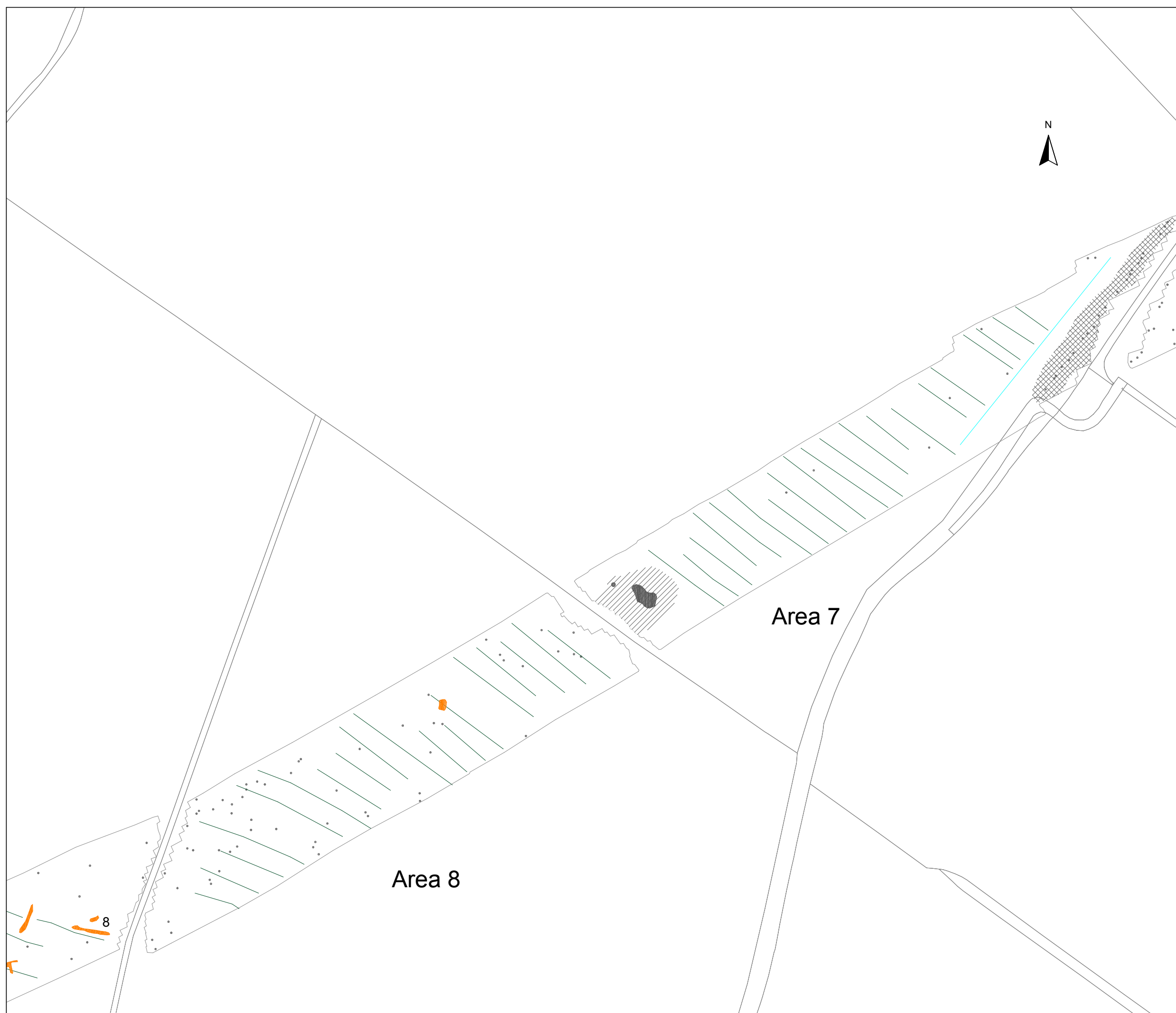
FIG 12

**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**Abstraction and interpretation of  
magnetic anomalies - Areas 7 & 8**



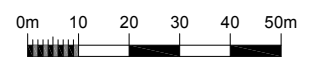
-  Linear anomaly - ridge and furrow
-  Multiple dipolar linear anomaly - land drain
-  Discrete positive response - possible pit-like feature
-  Magnetic debris - spread of magnetically thermoremnant/ferrous material
-  Magnetic disturbance from ferrous material
-  Strong dipolar anomaly - ferrous object



Area 7

Area 8

SCALE 1:1500



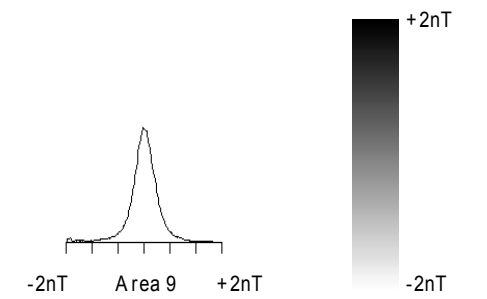
SCALE TRUE AT A3

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FIG 13

**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**Greyscale plot of filtered  
magnetometer data - Area 9**

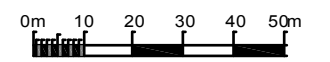


Area 8

Area 9

Unsurveyable

SCALE 1:1500







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FIG 14

**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**Abstraction and interpretation of  
magnetic anomalies - Area 9**

-  Positive linear anomaly - possible ditch-like feature
-  Linear anomaly - ridge and furrow
-  Discrete positive response - possible pit-like feature
-  Strong dipolar anomaly - ferrous object

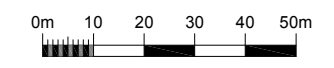


Area 8

Area 9

Unsurveyable

SCALE 1:1500



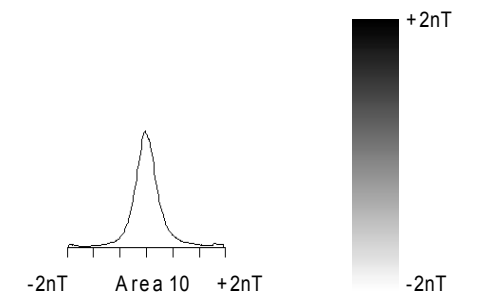
SCALE TRUE AT A3

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FIG 15

**Geophysical Survey  
Farington to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**








**Greyscale plot of filtered  
magnetometer data - Area 10**





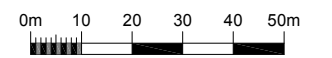
**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**Abstraction and interpretation of  
magnetic anomalies - Area 10**

-  Positive linear anomaly - possible ditch-like feature
-  Linear anomaly - of agricultural origin
-  Linear anomaly - ridge and furrow
-  Discrete positive response - possible pit-like feature
-  Magnetic debris - spread of magnetically thermoremnant/ferrous material
-  Magnetic disturbance from ferrous material
-  Strong dipolar anomaly - ferrous object



SCALE 1:1500



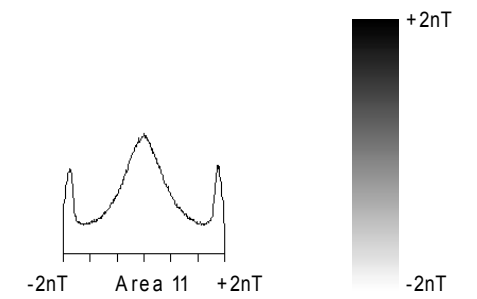
SCALE TRUE AT A3

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FIG 17

**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

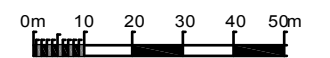
**Greyscale plot of filtered  
magnetometer data - Area 11**



Area 11













SCALE 1:1500



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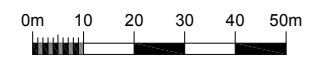
**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**Abstraction and interpretation of  
magnetic anomalies - Area 11**

-  Positive linear anomaly - cut feature of archaeological potential
-  Positive curvilinear anomaly - ring ditch
-  Positive linear anomaly - possible ditch-like feature
-  Negative linear anomaly - material of low magnetic susceptibility (eg sub-soil/stone)
-  Linear anomaly - ridge and furrow
-  Discrete positive response - cut feature of archaeological potential
-  Magnetic debris - spread of magnetically thermoremanent/ferrous material
-  Magnetic disturbance from ferrous material
-  Strong multiple dipolar linear anomaly - pipeline / cable / service
-  Strong dipolar anomaly - ferrous object



SCALE 1:1500

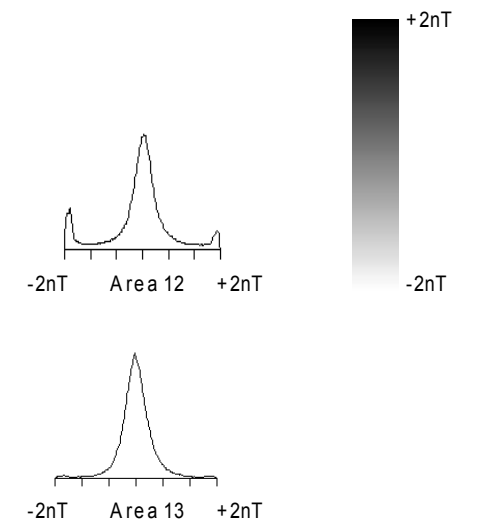


SCALE TRUE AT A3

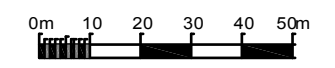
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**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**Greyscale plot of filtered  
magnetometer data -  
Areas 12 & 13**









SCALE 1:1500

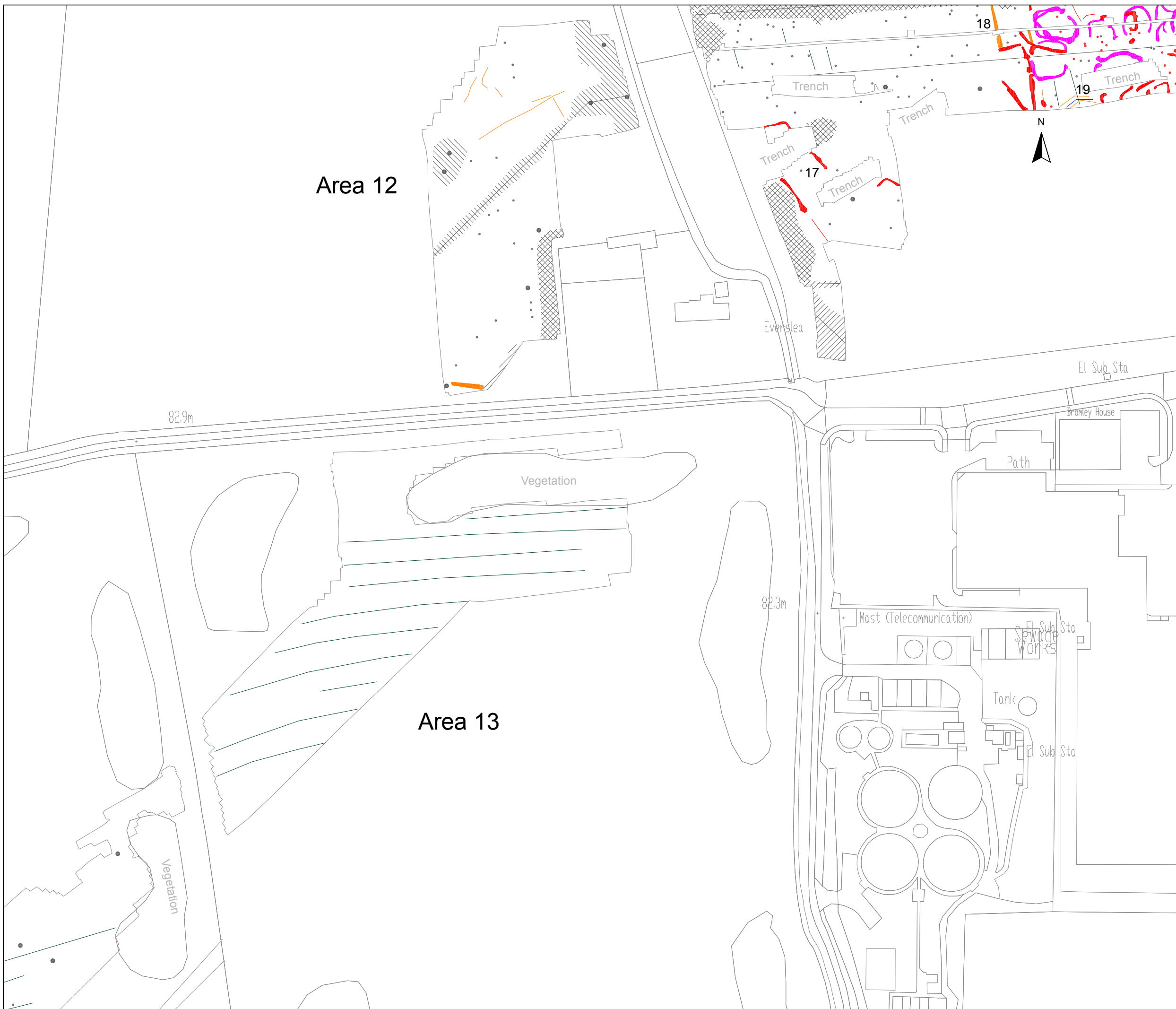


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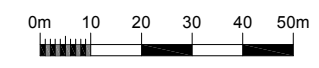
**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**Abstraction and interpretation of  
magnetic anomalies -  
Areas 12 & 13**

-  Positive linear anomaly - possible ditch-like feature
-  Linear anomaly - ridge and furrow
-  Magnetic debris - spread of magnetically thermoremnant/ferrous material
-  Magnetic disturbance from ferrous material
-  Strong multiple dipolar linear anomaly - pipeline / cable / service
-  Strong dipolar anomaly - ferrous object



SCALE 1:1500



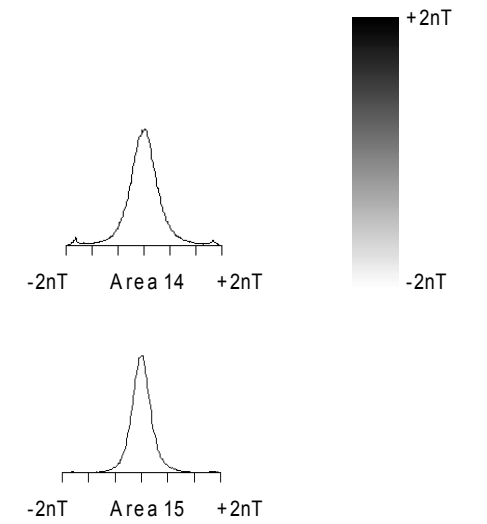
SCALE TRUE AT A3

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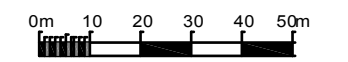
FIG 21

**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**Greyscale plot of filtered  
magnetometer data -  
Areas 14 & 15**



SCALE 1:1500

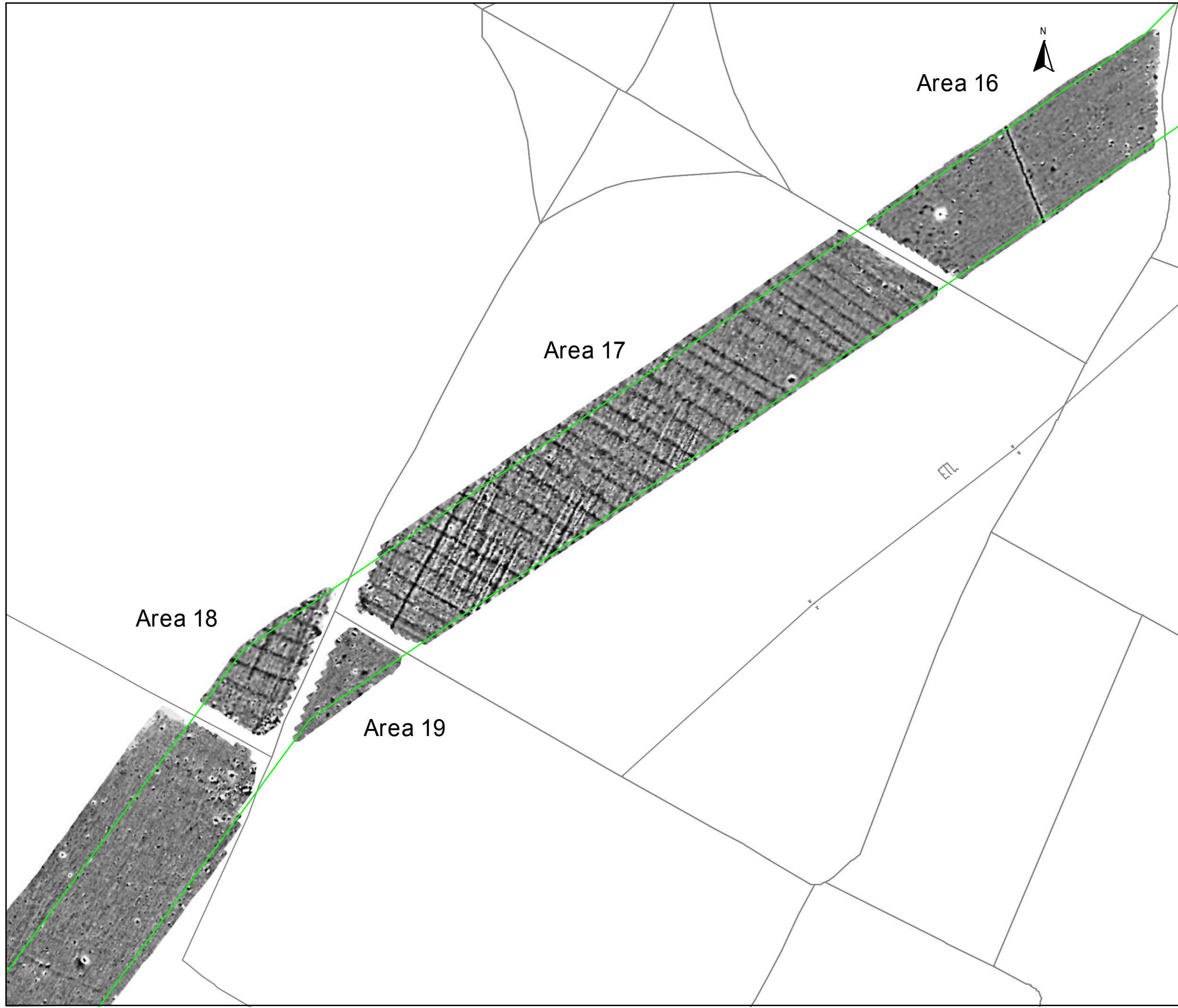
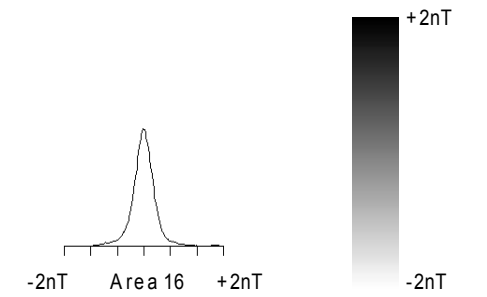


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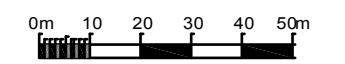


**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**Greyscale plot of filtered  
magnetometer data -  
Areas 16 to 19**









SCALE 1:1500



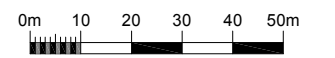


**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**Abstraction and interpretation of  
magnetic anomalies -  
Areas 16 to 19**

-  Positive linear anomaly - possible ditch-like feature
-  Linear anomaly - of agricultural origin
-  Linear anomaly - ridge and furrow
-  Discrete positive response - possible pit-like feature
-  Magnetic debris - spread of magnetically thermoremnant/ferrous material
-  Strong dipolar anomaly - ferrous object

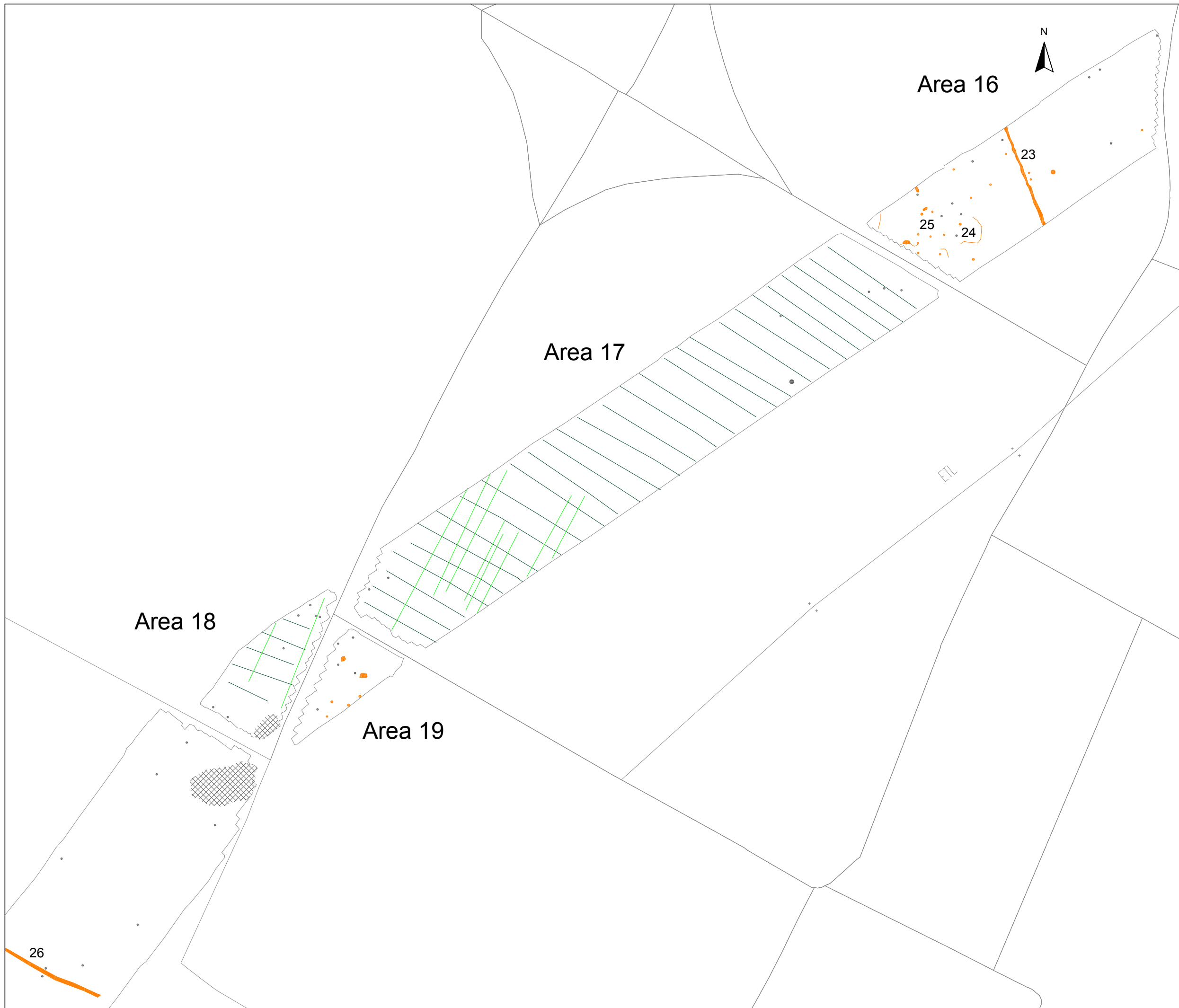
SCALE 1:1500



SCALE TRUE AT A3

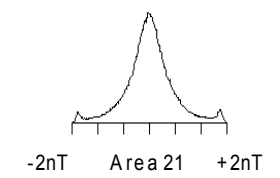
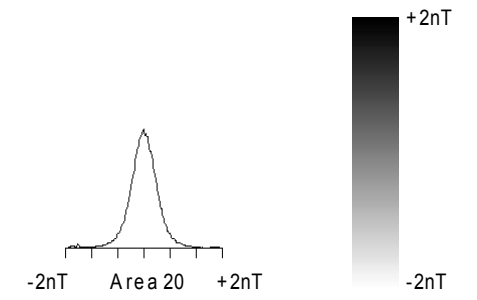
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FIG 25

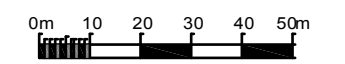


**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**Greyscale plot of filtered  
magnetometer data -  
Areas 20 & 21**



SCALE 1:1500













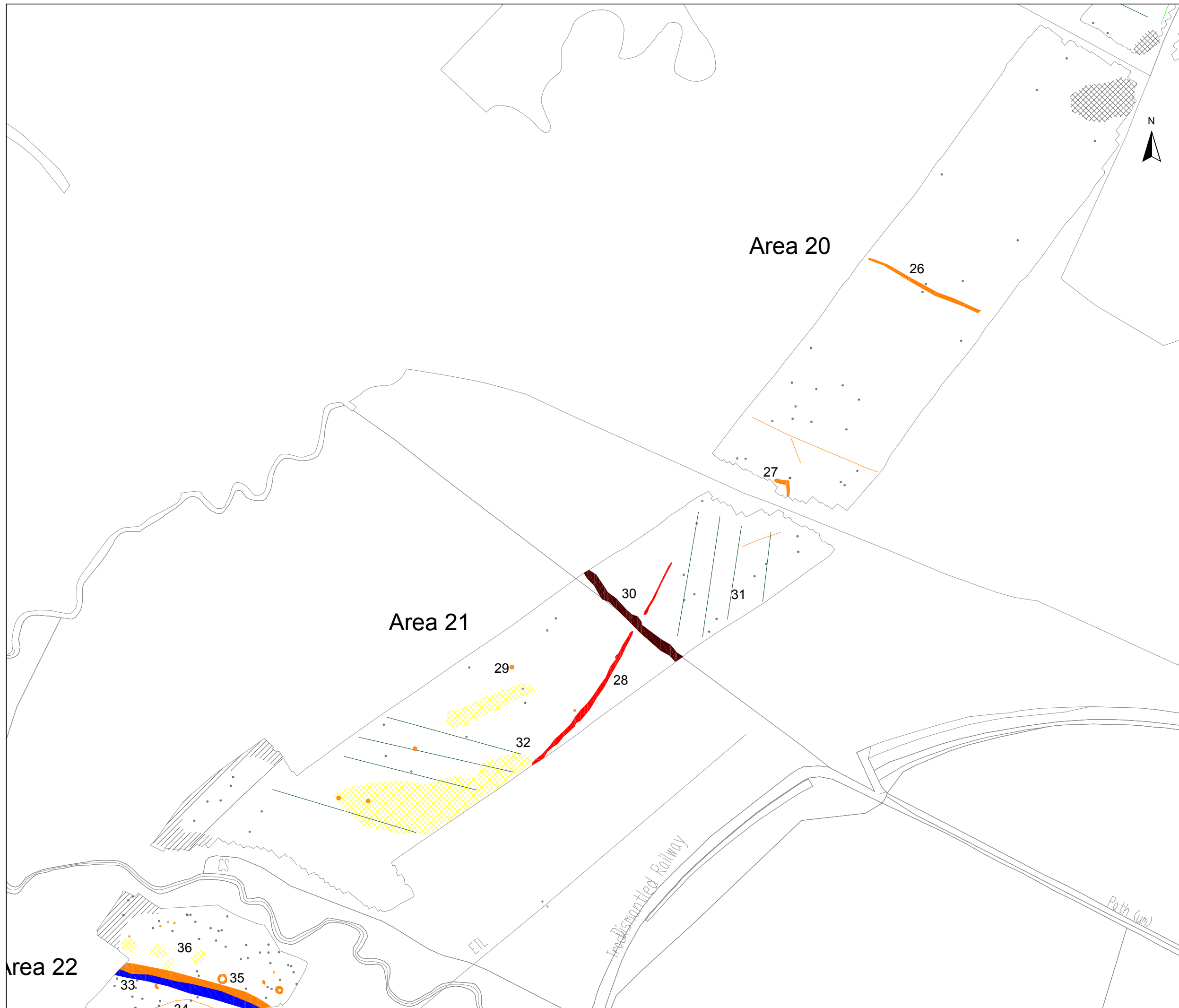
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FIG 26

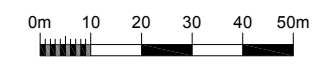
**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**Abstraction and interpretation of  
magnetic anomalies -  
Areas 20 & 21**

-  Positive linear anomaly - cut feature of archaeological potential
-  Positive linear anomaly - possible ditch-like feature
-  Linear anomaly - ridge and furrow
-  Positive linear anomaly - possible former field boundary
-  Discrete positive response - possible pit-like feature
-  Variable magnetic response - of natural origin
-  Magnetic debris - spread of magnetically thermoremanent/ferrous material
-  Magnetic disturbance from ferrous material
-  Strong multiple dipolar linear anomaly - pipeline / cable / service
-  Strong dipolar anomaly - ferrous object



SCALE 1:1500



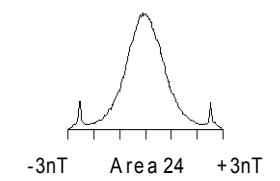
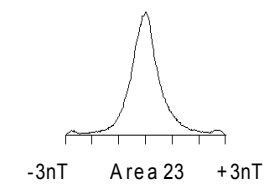
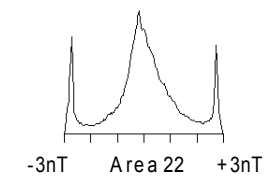
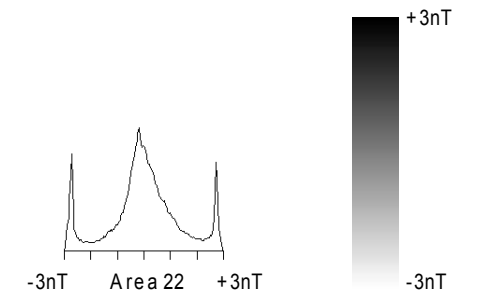
SCALE TRUE AT A3

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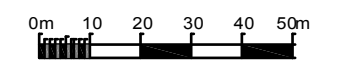
FIG 27

**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**Greyscale plot of filtered  
magnetometer data -  
Areas 22 to 24**



SCALE 1:1500

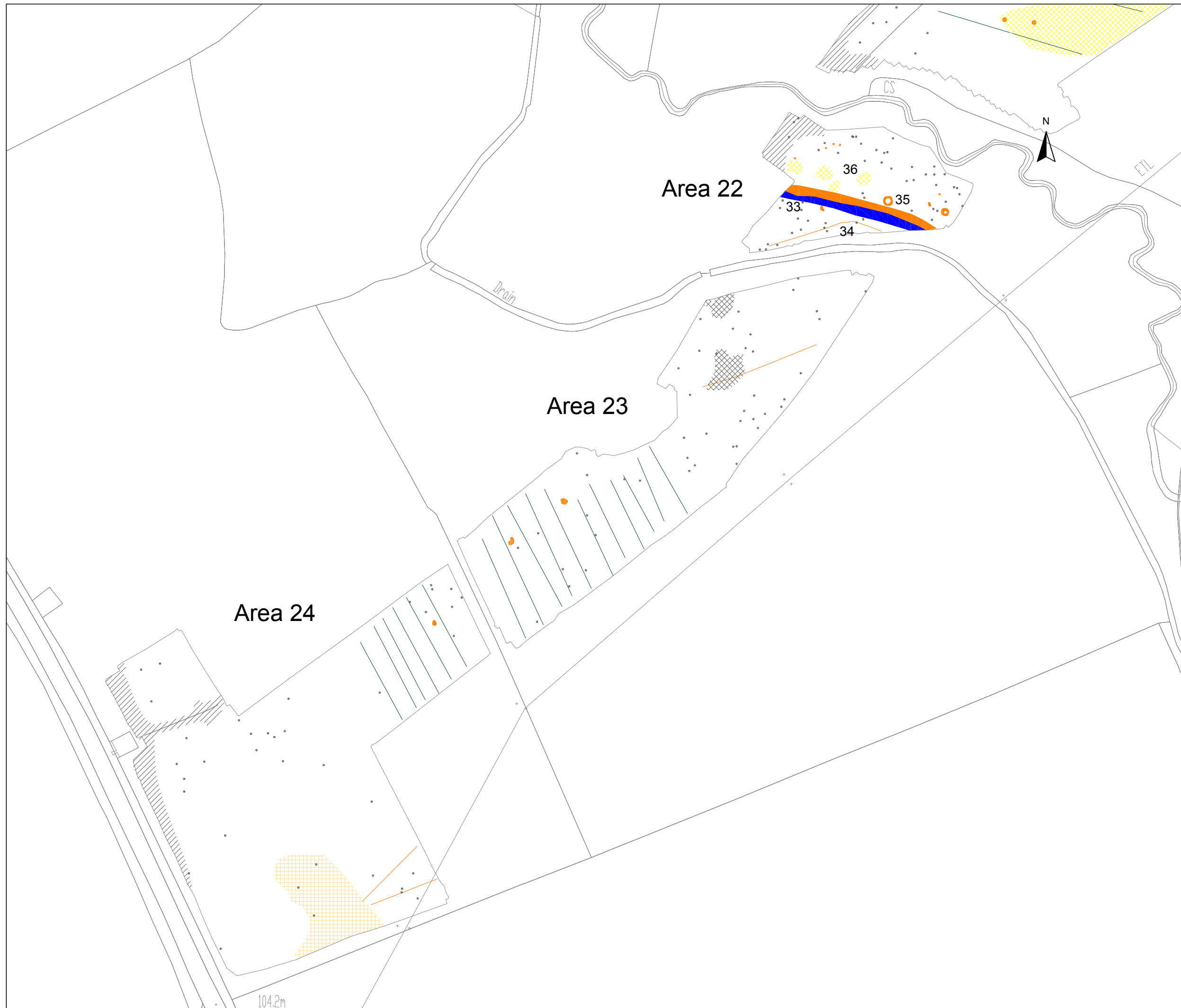












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FIG 28

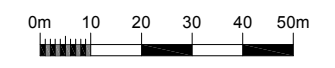
**Geophysical Survey  
Faringdon to Blunsdon Phase 1  
Water Main Replacement  
Highworth  
Swindon**

**Abstraction and interpretation of  
magnetic anomalies -  
Areas 22 to 24**



-  Positive linear anomaly - possible ditch-like feature
-  Linear anomaly - ridge and furrow
-  Negative linear anomaly - material of low magnetic susceptibility
-  Discrete positive response - possible pit-like feature
-  Variable magnetic response - possible quarrying
-  Variable magnetic response - of natural origin
-  Magnetic debris - spread of magnetically thermoremanent/ferrous material
-  Magnetic disturbance from ferrous material
-  Strong multiple dipolar linear anomaly - pipeline / cable / service
-  Strong dipolar anomaly - ferrous object

SCALE 1:1500



SCALE TRUE AT A3

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FIG 29