

**Land at Elm Grove Nursery
Locking
North Somerset**

MAGNETOMETER SURVEY REPORT

for

CgMs Consulting

Kerry Donaldson & David Sabin

September 2015

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ARCHAEOLOGICAL SURVEYS LTD

**Land at Elm Grove Nursery
Locking
North Somerset**

Magnetometer Survey Report

for

CgMs Consulting

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Report checked by David Sabin

Primary archive location - Archaeological Surveys Ltd, Yatesbury, Wiltshire

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Ordnance Survey Grid Reference – **ST 35725 59815**



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CONTENTS

SUMMARY.....	1
1 INTRODUCTION.....	1
1.1 Survey background.....	1
1.2 Survey objectives and techniques.....	1
1.3 Site location, description and survey conditions.....	1
1.4 Site history and archaeological potential.....	2
1.5 Geology and soils.....	3
2 METHODOLOGY.....	3
2.1 Technical synopsis.....	3
2.2 Equipment configuration, data collection and survey detail.....	4
2.3 Data processing and presentation.....	4
3 RESULTS.....	5
3.1 General assessment of survey results.....	5
3.2 Statement of data quality.....	5
3.3 Data interpretation.....	5
3.4 List of anomalies - Area 1.....	7
3.5 List of anomalies - Area 2.....	8
4 CONCLUSION.....	9
5 REFERENCES.....	10
Appendix A – basic principles of magnetic survey.....	11
Appendix B – data processing notes.....	12
Appendix C – survey and data information.....	12
Appendix D – digital archive.....	13

Appendix E – copyright and intellectual property.....14

LIST OF FIGURES

Figure 01 Map of survey area (1:25 000)
Figure 02 Referencing information (1:2000)
Figure 03 Greyscale plot of minimally processed magnetometer data (1:1250)
Figure 04 Abstraction and interpretation of magnetic anomalies (1:1250)

LIST OF PLATES

Plate 1: Area 1 looking east.....2

LIST OF TABLES

Table 1: List and description of interpretation categories.....6

SUMMARY

A detailed magnetometer survey was carried out at the former Elm Grove Nursery in Locking, North Somerset, ahead of a proposed residential development. The survey located a number of linear, curvilinear and rectilinear anomalies that appear to relate to linear and rectilinear ditches and possible enclosures. The features are generally located towards the north western and south eastern corners of the site, but there are a number of weak and indistinct positive responses in between that may also relate to cut features.

1 INTRODUCTION

1.1 Survey background

- 1.1.1 Archaeological Surveys Ltd was commissioned by CgMs Consulting to undertake a magnetometer survey of an area of land at Elm Grove Nursery, Locking in North Somerset. The site has been outlined for a proposed residential development, and the survey forms part of an archaeological assessment of the site.
- 1.1.2 The geophysical survey was carried out in accordance with a Written Scheme of Investigation (WSI) produced by Archaeological Surveys (2015) and issued to Vince Russett, County Archaeologist for North Somerset Council, prior to commencing the fieldwork.

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 development of the site. The methodology is considered an efficient and effective approach to archaeological prospection.
- 1.2.2 The survey and report generally follow the recommendations set out by: English Heritage (2008) *Geophysical survey in archaeological field evaluation*; and 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 Site location, description and survey conditions

- 1.3.1 The site is located to the south of Elm Tree Road on the western edge of Locking in North Somerset. It is centred on Ordnance Survey National Grid Reference (OS NGR) ST 35725 59815, see Figures 01 and 02.

- 1.3.2 The geophysical survey covers approximately 5.5ha split between two land parcels (Areas 1 and 2, see Figure 02) previously used for cultivation and associated with the former Elm Grove Nursery. The buildings associated with the nursery within the north eastern corner of the site are not included in the survey area. The entire site covers approximately 6.75ha including the unsurveyable areas.
- 1.3.3 The ground cover consisted of short grass with land sloping down towards the north. The dilapidated remains of greenhouses and polytunnels were overgrown by briars and were located immediately to the north east of the survey area. Metal tubing associated with these former structures was considered likely to create considerable magnetic disturbance.



Plate 1: Area 1 looking east

- 1.3.4 The ground conditions across the site were generally considered to be favourable for the collection of magnetometry data. Weather conditions during the survey were fine with occasional showers.

1.4 Site history and archaeological potential

- 1.4.1 An Archaeological Desk-Based Assessment has been carried out by CgMs Consulting (2015). It outlines that there are no designated or undesignated heritage assets within the site, although there are a number of Roman sites and findspots within the wider area. These include a small number of Roman finds to the north, a villa 1km north east at RAF Locking, a Roman pottery kiln 500m east and a number of burials 570m to the south.

- 1.4.2 The medieval settlement of Locking was centred around the 12th century Motte and Bailey castle 1km to the north east; however, there is a record of a medieval farmstead at Elm Tree Farm, 60m to the north east of the site.
- 1.4.3 There are a number of modern records in the area, including a World War II Type 24 pillbox in the north western corner of the site and other wartime infrastructure around the site of Weston Airport, 200m to the north west.
- 1.4.4 There is some potential for the site to contain Roman features due to the proximity of a number of finds to the north and north east, with a lower potential for the site to contain features from other periods. However, there is always potential for the geophysical survey to locate anomalies that may relate to previously unrecorded archaeological remains, should they be present within the site.

1.5 *Geology and soils*

- 1.5.1 The underlying solid geology across the site is interbedded mudstone and limestone from the Langport Member and Blue Lias Formation (BGS, 2015).
- 1.5.2 The overlying soil across the survey area is from the Evesham 1 association and is a typical calcareous pelosol. It consists of a permeable, calcareous, clayey soil (Soil Survey of England and Wales, 1983).
- 1.5.3 Magnetometry carried out over similar geology and soil has produced good results. The site is, therefore, considered suitable for magnetic survey.

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 spaced 0.5m apart with readings recorded at 20Hz. The gradiometers have a range of recording data between 0.1nT and 10,000nT. The system is linked to a Leica GS10 RTK GPS with data recorded by SENSYS MAGNETO@MXPDA software on a rugged computer.
- 2.2.2 Data are collected along a series of parallel survey tracks wherever possible. The length of each track is variable and relates to the size of the survey area and other factors including ground conditions. A visual display aids accurate placing of tracks and their separation.
- 2.2.3 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).

2.3 *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. Survey tracks are analysed and georeferenced raw data (UTM Z30N) are then exported in ASCII format for further analysis and display using TerraSurveyor.
- 2.3.2 The data are collected between limits of ± 10000 nT and clipped for display. Data are interpolated to a resolution of effectively 0.5m between tracks and 0.15m along each survey track. A zero median traverse function is required in order to remove fixed offset values present within the sensors which do not undergo a zeroing procedure in the field. The approach ensures that the gradiometer sensors are very accurately aligned and fixed to the vertical magnetic field and are not influenced by localised magnetic fields or disturbed by vibration. 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 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 any processes, such as clipping, carried out on the data.
- 2.3.4 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.

- 2.3.5 The raster images are combined with base mapping using ProgeCAD Professional 2014, 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.
- 2.3.6 An abstraction and interpretation is also 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.
- 2.3.7 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.
- 2.3.8 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 two survey areas covering approximately 5.5ha.
- 3.1.2 Magnetic anomalies located can be generally classified as positive linear and discrete positive responses of archaeological potential, positive 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 and strong multiple dipolar linear anomalies relating to buried services or pipelines.

3.2 *Statement of data quality*

- 3.2.1 Data are considered representative of the magnetic anomalies present within the site. There are no significant defects within the dataset. Localised magnetic disturbance has been caused by modern ferrous debris and services although this is unlikely to have obscured anomalies of archaeological potential.

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, a basic key is indicated to allow cross referencing to the abstraction and interpretation plot. CAD layer names are included to aid reference to associated digital files (.dwg/.dxf). Sub-headings are then used to group anomalies with similar characteristics for each survey area.







Report sub-heading CAD layer names and plot colour	Description and origin of anomalies
<p>Anomalies with archaeological potential</p> <p>AS-ABST MAG POS LINEAR ARCHAEOLOGY AS-ABST MAG POS DISCRETE ARCHAEOLOGY</p> 	<p>Anomalies have the characteristics (mainly morphological) of a range of archaeological features such as pits, ring ditches, enclosures, etc..</p>
<p>Anomalies with an uncertain origin</p> <p>AS-ABST MAG POS LINEAR UNCERTAIN AS-ABST MAG POS DISCRETE UNCERTAIN AS-ABST MAG POS UNCERTAIN</p> 	<p>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 relatively modern features, geological/pedological features and agricultural features should be considered</u>. 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>
<p>Anomalies relating to land management</p> <p>AS-ABST MAG LAND DRAIN</p> 	<p>Land drains can appear in a classic herringbone pattern of interconnected multiple dipolar linear anomalies, or as parallel linear anomalies.</p>
<p>Anomalies with an agricultural origin</p> <p>AS-ABST MAG AGRICULTURAL</p> 	<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.</p>
<p>Anomalies associated with magnetic debris</p> <p>AS-ABST MAG DEBRIS AS-ABST MAG STRONG DIPOLAR</p> 	<p>Magnetic debris often appears as areas containing many small dipolar anomalies that may range from weak to very strong in magnitude. It often occurs where there has been dumping or ground make-up and is related to magnetically thermoremnant materials such as brick or tile or other small fragments of ferrous material. This type of response is occasionally associated with kilns, furnace structures, or hearths 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>
<p>Anomalies with a modern origin</p> <p>AS-ABST MAG DISTURBANCE AS-ABST MAG SERVICE</p> 	<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 such 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 and with hysteresis adjacent to strong magnetic sources. Buried services may produce characteristic multiple dipolar anomalies dependant upon their construction.</p>

Table 1: List and description of interpretation categories

3.4 List of anomalies - Area 1

Area centred on OS NGR 335670 159825, see Figures 03 & 04.

Anomalies of archaeological potential

(1) - A positive curvilinear anomaly is located in the north western corner of the survey area. The response is generally 2.5nT and approximately 1.2m wide. It is possible that it has some association with anomaly (2) and a number of discrete pit-like anomalies. It has been truncated by a strongly magnetic/dipolar linear response. While this type of response may indicate a large, curvilinear enclosure ditch, it could relate to a ditch surrounding the WWII pillbox located in the north western corner, although no surface expression is visible.

(2) - An "L" shaped positive rectilinear anomaly appears to be associated with anomaly (1) in the north western part of the site. A number of discrete positive responses are also located in the immediate vicinity and these may be associated.

(3) - A positive rectilinear anomaly is located to the south of anomaly (1). This appears likely to continue westwards, beyond the limits of the survey area. It is possible that it is associated with a number of discrete pit-like responses (11) in the vicinity.

(4) - A positive curvilinear anomaly, located between anomalies (1) and (3) may be associated with those features.

Anomalies with an uncertain origin

(5) - A group of positive/dipolar anomalies appear to be associated with magnetic thermoremnance. While this type of response may relate to modern burning, an archaeological origin should also be considered.

(6 & 7) - Positive rectilinear anomalies are poorly defined; however, elements of anomaly (6) are broadly similar to the orientation of anomaly (17) located in Area 2 to the south east. Likewise, the orientation of elements of anomaly (7) are similar with those of anomaly (3). There is also a curvilinear anomaly to the north of anomaly (7) and several pit-like responses in the vicinity of (6) and (7), and despite their lack of coherent morphology, an archaeological origin is possible.

(8) - A weakly positive linear anomaly is oriented north to south and has been truncated by linear anomaly (10) and land drains (12). The anomaly is generally parallel with others of an agricultural origin (13), however its location may indicate a continuation of anomaly (7), but its origin is uncertain.

(9) - The survey area contains a number of weakly positive linear, possible rectilinear and curvilinear anomalies. Their weak and poorly defined response makes it difficult to interpret their origin.

(10) - A moderately strong positive linear anomaly (8nT) extends across the north eastern part of the survey area. There appears to be a gap, and then a continuation as a multiple dipolar and positive response towards the north west where it truncates anomaly (1). It is possible that this relates to a buried pipe or drain.

(11) - The survey area contains a number of discrete positive responses (5-9nT). They appear to relate to pit-like features, and while an archaeological origin is possible, a more modern or natural origin cannot be ruled out.

Anomalies associated with land management

(12) - A series of parallel, negative, linear anomalies extend across the eastern half of the survey area. These relate to land drainage.

Anomalies with an agricultural origin

(13) - A series of parallel linear anomalies, oriented almost north to south relate to agricultural activity. Only the general trend has been shown and not all anomalies have been abstracted.

Anomalies associated with magnetic debris

(14) - Patches of magnetic debris are likely to relate to dumped magnetically thermoremnant material, probably derived from the nursery.

(15) - The entire site contains widespread and numerous strong, discrete, dipolar anomalies which relate ferrous and other magnetically thermoremnant objects within the topsoil.

Anomalies with a modern origin

(16) - A strong, multiple dipolar, linear anomaly extends along the southern part of the survey area and into Area 2. This relates to a buried service.

3.5 List of anomalies - Area 2

Area centred on OS NGR 335850 159770, see Figures 03 & 04.

Anomalies of archaeological potential

(17) - Two parallel positive rectilinear anomalies are located in the south eastern corner of the survey area. They extend for approximately 30m in both directions, and although they end abruptly they appear to relate to rectilinear ditches, possibly associated with an enclosure.

Anomalies with an uncertain origin

(18) - Very weakly positive, broad, linear anomalies can be seen in the centre of the survey area. They are of similar orientation to anomaly (17), and appear to have a number of discrete positive responses (19) associated with them. The very weak response (<1nT) prevents confident interpretation, but this type of anomaly can be associated with former lynchets and field systems.

(19) - A number of discrete positive responses have been located within the survey area. Some appear to be associated with anomalies (19), others are isolated. They have a general response of 5nT and relate to pit-like features, but their origin is uncertain.

Anomalies with an agricultural origin

(20) - A moderately enhanced positive linear anomaly appears to relate to agricultural activity as it is parallel with the north to south cultivation trend within the field.

Anomalies associated with magnetic debris

(21) - A line of strong, discrete, dipolar anomalies extends from north to south along the western part of the survey area. This may relate to a series of removed ferrous posts, or it is possible that it is associated with a buried service (steel coupling collars/flanges).

4 CONCLUSION

- 4.1.1 The detailed magnetometer survey located a number of anomalies with archaeological potential. These are located primarily within the north western and south eastern corners of the site although other anomalies classified as uncertain in origin may also have archaeological potential.
- 4.1.2 In the north western corner of the site there is a curvilinear anomaly with a rectilinear anomaly and several discrete anomalies located in the vicinity. The response may indicate a large enclosure ditch that may form a circle with a 45m radius. However, it is possible that it relates to a perimeter ditch surrounding the WWII pillbox that is located approximately 65-70m to the north west, although there is no corresponding surface expression.
- 4.1.3 In the south eastern corner of the site there are two parallel positive rectilinear anomalies. They have been truncated by a modern service and end abruptly to the west and south. However, it is likely that they relate to cut, rectilinear enclosure ditches. Other weakly positive anomalies with a similar orientation are located to the north. Their response may indicate former land division.

5 REFERENCES

Archaeological Surveys, 2015. *Land at Elm Grove Nursery, Locking, North Somerset, 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, 2015. *Geology of Britain viewer, 1:50 000 scale [online]* available from <http://mapapps.bgs.ac.uk/geologyofbritain/home.html> [accessed 25/7/2015].

CgMs, 2015. *Archaeological Desk-Based Assessment, Land at Elm Grove Nursery, Elm Grove, Locking*. Unpublished typescript document.

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

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

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

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

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 field. The difference between the two sensors will relate to the strength 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 $\pm 5nT$ and $\pm 3nT$ 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 (destripe) 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 and modern agricultural features.

Appendix C – survey and data information

Area 1

COMPOSITE
 Path: C:\Business\Jobs\J627 Locking\Data\Area 1\comps\
 Filename: J627-mag-Area1-proc.xcp
 Description: Imported as Composite from: J627-mag-Area1.asc
 Instrument Type: Sensys DLMGPS
 Units: nT
 UTM Zone: 30U
 Survey corner coordinates (X/Y): OSGB36
 Northwest corner: 335547.651611166, 159922.298814218 m
 Southeast corner: 335773.591611166, 159715.338814218 m
 Collection Method: Randomised
 Sensors: 5
 Dummy Value: 32702
 Source GPS Points: 999300

Dimensions
 Composite Size (readings): 1738 x 1592
 Survey Size (meters): 226 m x 207 m
 Grid Size: 226 m x 207 m
 X Interval: 0.13 m
 Y Interval: 0.13 m

Stats
 Max: 5.53
 Min: -5.50
 Std Dev: 1.35
 Mean: 0.01
 Median: 0.00
 Composite Area: 4.6761 ha
 Surveyed Area: 3.6503 ha

Processes: 1
 1 Base Layer

GPS based Proce4
 1 Base Layer.
 2 Unit Conversion Layer (Lat/Long to OSGB36).
 3 DeStripe Median Traverse:
 4 Clip from -3.00 to 3.00 nT

Area 2

COMPOSITE
 Path: C:\Business\Jobs\J627 Locking\Data\Area 2\comps\
 Filename: J627-mag-Area2-proc.xcp
 Description: Imported as Composite from: J627-mag-Area2.asc
 Instrument Type: Sensys DLMGPS
 Units: nT
 UTM Zone: 30U
 Survey corner coordinates (X/Y): OSGB36
 Northwest corner: 335773.723090858, 159835.088098321 m
 Southeast corner: 335901.523090858, 159696.938098321 m
 Collection Method: Randomised
 Sensors: 5
 Dummy Value: 32702
 Source GPS Points: 366600

Dimensions
 Composite Size (readings): 852 x 921
 Survey Size (meters): 128 m x 138 m
 Grid Size: 128 m x 138 m
 X Interval: 0.15 m
 Y Interval: 0.15 m

Stats
 Max: 5.53
 Min: -5.50
 Std Dev: 1.87
 Mean: -0.01
 Median: 0.01
 Composite Area: 1.7656 ha
 Surveyed Area: 1.3401 ha

Processes: 1
 1 Base Layer

GPS based Proce4
 1 Base Layer.
 2 Unit Conversion Layer (Lat/Long to OSGB36).
 3 DeStripe Median Traverse:
 4 Clip from -3.00 to 3.00 nT

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 PDF copy will be supplied to the North Somerset Historic Environment Record. The report will also be uploaded to the Online Access to the Index of archaeological investigationS (OASIS).

Archive contents:

Geophysical data - path: J627 Locking\Data\				
Path and Filename	Software	Description	Date	Creator
locking1\MX\prm.dgb.disp locking2\MX\prm.dgb.disp	Sensys MXPDA	Proprietary data formats representing magnetometer survey traverses logged to a PDA.	27/08/15 & 28/08/15	D.J.Sabin
locking1\MX\J627-Area1.asc locking2\MX\J627-Area2.asc	Sensys DLMGPS	ASCII CSV (tab) file representing survey Area 1 in eastings, northings (UTM Z30N), magnetic measurement, traverse file and sensor number.	27/08/15 & 28/08/15	D.J.Sabin
Area1\comps\J627-mag-Area1.xcp Area2\comps\J627-mag-Area2.xcp	TerraSurveyor 3.0.23.0	Composite data file derived from ASCII CSV.	27/08/15	D.J.Sabin
Area1\comps\J627-mag-Area1-proc.xcp Area2\comps\J627-mag-Area2-proc.xcp	TerraSurveyor 3.0.23.0	Processed composite data file (zmt and clipping to $\pm 3nT$).	28/08/15	D.J.Sabin
Graphic data - path: J627 Locking\Data\				
Area1\graphics\ J627-mag-Area1-proc.tif	TerraSurveyor 3.0.23.0	TIF file showing a minimally processed greyscale plot clipped to $\pm 3nT$.	28/08/15	D.J.Sabin
Area1\graphics\ J627-mag-Area1-proc.tfw	TerraSurveyor 3.0.23.0	World file for georeferencing TIF to OSGB36.	28/08/15	D.J.Sabin
Area2\graphics\ J627-mag-Area2-proc.tif	TerraSurveyor 3.0.23.0	TIF file showing a minimally processed greyscale plot clipped to $\pm 3nT$.	28/08/15	D.J.Sabin
Area2\graphics\ J627-mag-Area2-proc.tfw	TerraSurveyor 3.0.23.0	World file for georeferencing TIF to OSGB36.	28/08/15	D.J.Sabin
CAD data - path: J627 Locking\CAD\				
J627 version 1.dwg	ProgeCAD 2014	CAD file for creating plots of greyscales, abstraction, interpretation and mapping. Grid coordinates as OSGB. AutoCAD 2010 format.	26/08/15	K.T.Donaldson
Text data - path: J627 Locking\Documentation\				
J627 report.odt	OpenOffice.org 3.0.1 Writer	Report text as an Open Office document.	04/09/15	K.T.Donaldson

Appendix E – copyright and intellectual property

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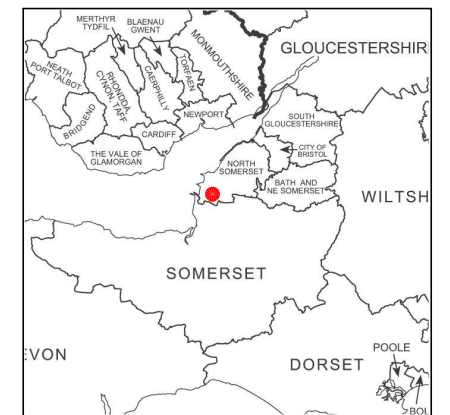
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Geophysical Survey Land at Elm Grove Nursery Locking North Somerset

Map of survey area

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● Survey location

Site centred on OS NGR
ST 35725 59815

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Survey location

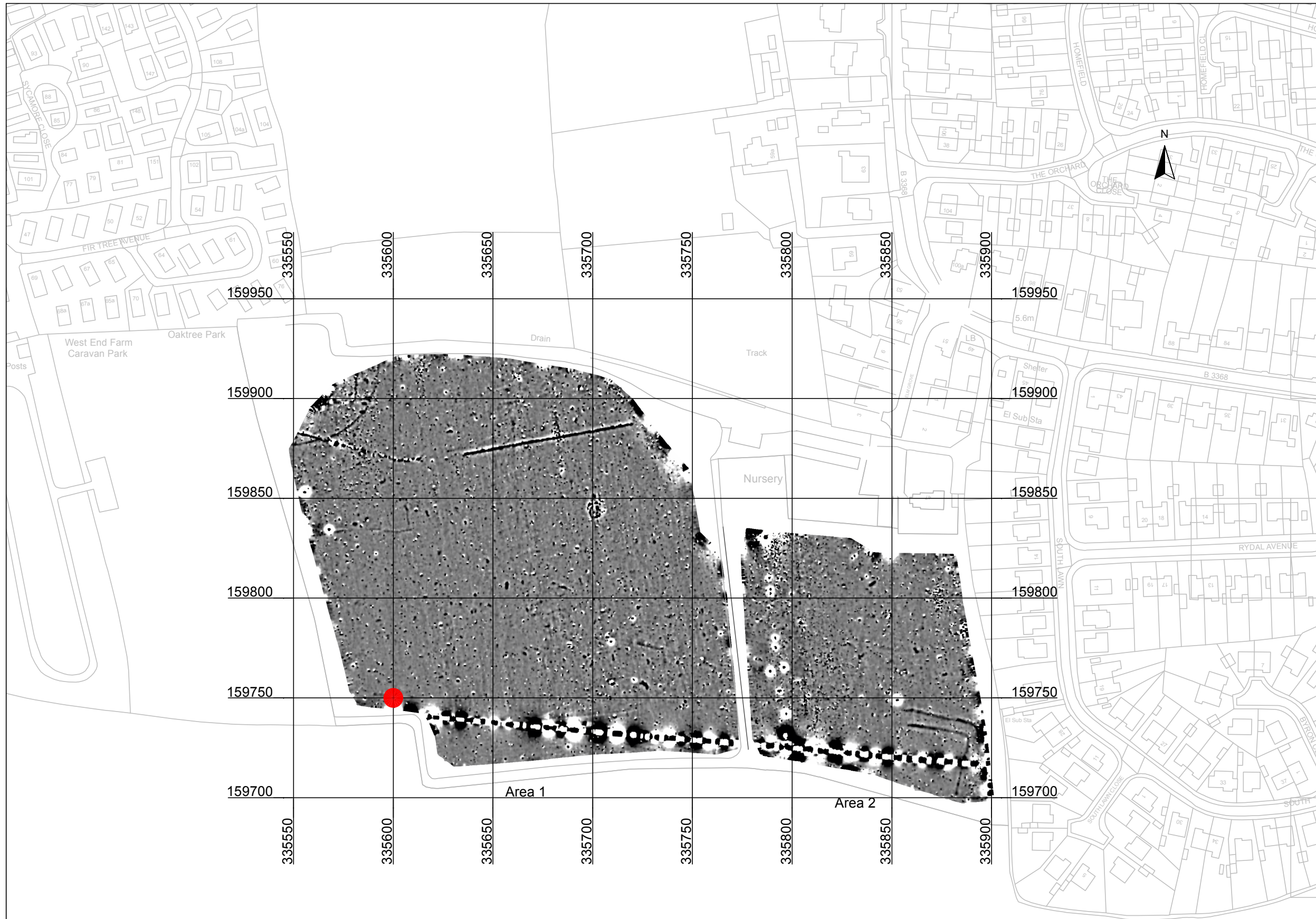
**Geophysical Survey
Land at Elm Grove Nursery
Locking
North Somerset**

Referencing information

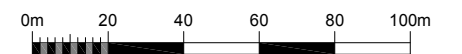
Referencing grid to OSGB36 datum at 50m intervals

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

● 335600 159750



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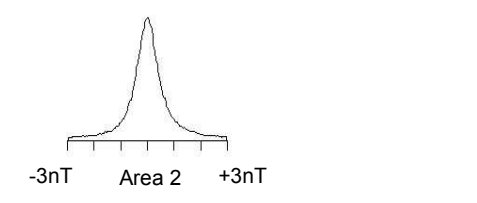
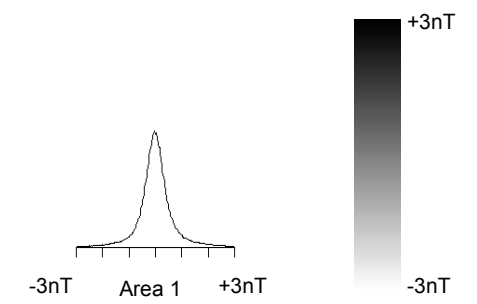
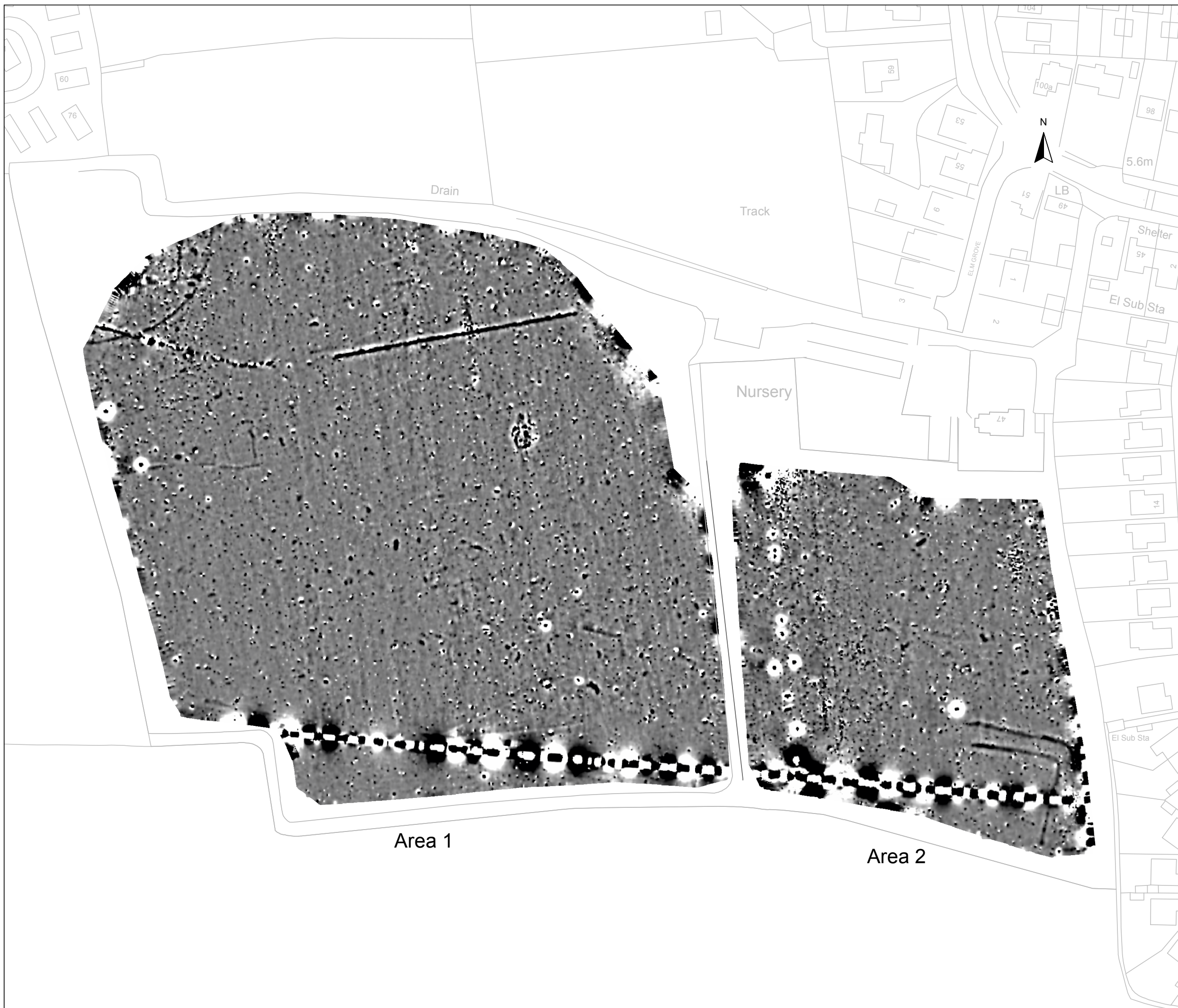


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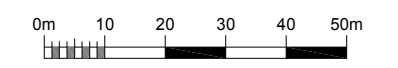
**Greyscale plot of minimally
processed magnetometer data**



Area 1

Area 2

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




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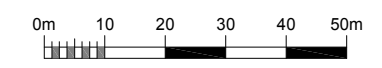
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**Abstraction and interpretation of
magnetometer anomalies**

-  Positive linear anomaly - cut feature of archaeological potential
-  Positive linear anomaly - possible ditch-like feature
-  Linear anomaly - of agricultural origin
-  Positive linear anomaly - possible land drain
-  Discrete positive response - cut feature of archaeological potential
-  Discrete positive response - possible pit-like feature
-  Positive anomaly - magnetically enhanced material
-  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



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