A57 Link Roads
TR010034
6.5 Environmental Statement
Appendix 6.5 Geophysical Survey Report
February 2021

APFP Regulation Regulation 5(2)(a)
Planning Act 2008 Infrastructure Planning (Applications: Prescribed

Forms and Procedure) Regulations 2009

June 2021

magnitude surveys

Geophysical Survey Report

Mottram

Greater Manchester

For

Balfour Beatty Atkins

On Behalf Of

Highways England

Magnitude Surveys Ref: MSSK798B

April 2021

Unit 17, Commerce Court

Challenge Way

Bradford

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Report By:

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Report Approved By:

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Issue Date:

19 April 2021

Abstract

Magnitude Surveys was commissioned to assess the subsurface archaeological potential of c. 18.5ha of land at Mottram, Greater Manchester. A fluxgate gradiometer survey was successfully completed across the survey area although c. 3ha could not be surveyed due to spoil heaps, steep slopes and waterlogged ground. Anomalies of historical and modern agricultural origin have been detected, which include former mapped and unmapped field boundaries, as well as ridge and furrow cultivation, drains and agricultural trends likely relating to modern ploughing trends and tractor tracks. No anomalies suggestive of significant archaeological origin have been identified; however, anomalies undetermined in origin have been identified and, although they are considered more likely to relate to agricultural or modern activities, an archaeological origin cannot be entirely discounted for them. Possible burning activity has been identified, the precise nature of which remains uncertain. The possible location of a former mapped cricket field has also been identified. Beside the anomalies produced by the cricket field, the impact of modern activity is mainly limited to magnetic disturbance from buried services.

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1. Introduction

1.1. Magnitude Surveys Ltd (MS) was commissioned by Balfour Beatty Atkins on behalf of Highways England to undertake a geophysical survey over a c.18.5ha area of at Mottram, Greater Manchester (SK 00630 95587).

1.2. The geophysical survey comprised of a hand-carried GNSS-positioned fluxgate gradiometer survey. Magnetic survey is the standard primary geophysical method for archaeological applications in the UK due to its ability to detect a range of different features. The technique is particularly suited for detecting fired or magnetically enhanced features, such as ditches, pits, kilns, sunken featured buildings (SFBs) and industrial activity (David *et al*., 2008).

1.3. The survey was conducted in line with the current best practice guidelines produced by Historic England (David *et al*., 2008), the Chartered Institute for Archaeologists (CIfA, 2020) and the European Archaeological Council (Schmidt *et al.,* 2015).

1.4. It was conducted in line with a WSI produced by MS (Cantarano, 2021).

1.5. The survey commenced on 24/2/2021 and took 2 days to complete.

2. Quality Assurance

2.1. Magnitude Surveys is a Registered Organisation of CIfA, the chartered UK body for archaeologists, and a corporate member of ISAP (International Society for Archaeological Prospection).

2.2. The directors of MS are involved in cutting edge research and the development of guidance/policy. Specifically, [redacted] has a PhD in archaeological geophysics from the University of Bradford, is a Member of CIfA and is the Vice-Chair of ISAP; [redacted] has an MSc in archaeological geophysics and is a Fellow of the London Geological Society, as well as a member of GeoSIG (CIfA Geophysics Special Interest Group); [redacted] has a PhD in archaeological geophysics from Bournemouth University, is a Member of CIfA, the Editor of ISAP News, and is the UK Management Committee representative for the COST Action SAGA; [redacted] has a PhD in archaeology from the University of Southampton, has been a member of the ISAP Management Committee since 2015, and is currently the nominated representative for the EAA Archaeological Prospection Community to the board of the European Archaeological Association.

2.3. All MS managers, field and office staff have degree qualifications relevant to archaeology or geophysics and/or field experience.

3. Objectives

3.1. The objective of this geophysical survey was to assess the subsurface archaeological potential of the survey area. It was also to help inform the archaeological assessment work required to mitigate potential adverse effects of the proposed A57 Link Roads Scheme.

4. Geographic Background

4.1. The survey area was located c.377m east of Mottram in Longdendale (Figure 1). Gradiometer survey was undertaken across six fields under pasture. The survey area was bounded by the A57 to the north and further fields to the south, east and west (Figure 2). C. 3ha of land could not be surveyed due to spoil heaps, steep slopes and waterlogged ground conditions.

4.2. Survey considerations:

Survey Area	Ground Conditions	Further Notes
1	The area consisted of a pasture field sloped from the southeast to the northwest.	The area was bounded to the north and east by a wire fence, hedges and trees, and by a wire fence and a trackway to the south and west. Powerline cables ran across the south of the area on a northwest to southeast orientation.
2	The area consisted of a pasture field sloped from the east to the west.	The area was bounded to the north, east and south by a wire fence and hedges, the west was bounded by a wire fence and trackway.
3	The area consisted of a flat pasture field.	The area was bounded to the north, east and south by a wire fence and to the west by a wooden fence. A ditch ran alongside the south-eastern boundary of the field. A small unsurveyable area was located in the south of the survey area, which contained a small spoil heap and was waterlogged.
4	The area consisted of a flat pasture field.	The area was bounded in all directions by a wire fence.
5	The area consisted of a pasture field sloped from the southeast to the northwest.	The area was bounded to the north, south and west by a wire fence and by hedges, a wire fence and trackway to the east. A spoil heap prevented survey over a small area of land in the east of the survey area.
6	The area consisted of a pasture field sloped from the west to the east.	The area was bounded to the north and west by trees, to the east by a wire fence and hedges and to the south by a wire fence and trees. Areas within the south and some areas in the east were unsurveyable due to the steep terrain and waterlogged ground conditions.

4.3. The underlying geology comprises grit sandstone from the Fletcher Bank formation in the north and southwest of the survey area, and mudstone and siltstone from the Marsden Formation throughout the centre of the survey area. Superficial deposits consist of till Devensian diamiction in the northwest of the survey area, head diamiction in the centre and alluvium in the southeast (British Geological Survey, 2021).

4.4. The soils mainly consist of slowly permeable seasonably wet acidic loamy and clayey soils. The southeast of the survey area comprises loamy and clayey floodplains soils with naturally high ground water (Soilscapes, 2021).

5. Archaeological Background

5.1. The following is a summary of relevant information contained in the cultural heritage Desk-Based Assessment produced by Highways England (2018) and provided by Oxford Archaeology North.

5.2. A scatter of Mesolithic flints has been found approximately 400m south of the survey area. Evidence for a prehistoric settlement and unspecified agricultural activity is recorded in the wider surroundings of the survey area, c. 1800m northwest from the survey area.

5.3. Unspecified Roman activity is recorded c.400m south of the survey area, close to Melandra Castle.

5.4. C.1,400m northwest of the survey area are the remains of Mottram Old Mill. Documentary evidence suggests this may have medieval origins. Small areas of medieval/post-medieval ridge and furrow cultivation have been recorded on aerial photography and LiDAR data across fields within 500m of the survey area.

5.5. The configuration of the site and its surrounding landscape through the post-medieval and modern periods has been understood through a map regression. Available maps preceding the 2nd edition OS map depict the survey area as divided into four fields, with two tracks running northeast-southwest across the centre of the survey area. Gas works are recorded to the immediate northwest of the survey area starting from the 2nd edition OS map onwards; maps from the 2nd edition onwards also record the site as subdivided into five fields. A "Cricket Ground" is mapped in the northwest of the survey area (Area 6) from the 1910 Cheshire OS County Series map onwards and its removal is tracked through the 1971 OS Plan map.

6. Methodology

6.1. Data Collection

6.1.1. Magnetometer surveys are generally the most cost effective and suitable geophysical technique for the detection of archaeology in England. Therefore, a magnetometer survey should be the preferred geophysical technique unless its use is precluded by any specific survey objectives or the site environment. For this site, no factors precluded the recommendation of a standard magnetometer survey.

6.1.2. Geophysical prospection comprised the magnetic method as described in the following table.

6.1.3. Table of survey strategies:

Method	Instrument	Traverse Interval	Sample Interval
Magnetic	Bartington Instruments Grad-13 Digital Three-Axis Gradiometer	1m	200Hz reprojected to 0.125m

6.1.4. The magnetic data were collected using MS' bespoke hand-carried GNSS-positioned system.

6.1.5. MS' hand-carried system was comprised of Bartington Instruments Grad 13 Digital Three-Axis Gradiometers. Positional referencing was through a multi-channel, multi-constellation GNSS Smart Antenna RTK GPS outputting in NMEA mode to ensure high positional accuracy of collected measurements. The RTK GPS is accurate to 0.008m + 1ppm in the horizontal and 0.015m + 1ppm in the vertical.

6.1.6. Magnetic and GPS data were stored on an SD card within MS' bespoke datalogger. The datalogger was continuously synced, via an in-field Wi-Fi unit, to servers within MS' offices. This allowed for data collection, processing and visualisation to be monitored in real-time as fieldwork was ongoing.

6.1.7. A navigation system was integrated with the RTK GPS, which was used to guide the surveyor. Data were collected by traversing the survey area along the longest possible lines, ensuring efficient collection and processing.

6.2. Data Processing

6.2.1. Magnetic data were processed in bespoke in-house software produced by MS. Processing steps conform to the EAC and Historic England guidelines for 'minimally enhanced data' (see Section 3.8 in Schmidt *et al.*, 2015: 33 and Section IV.2 in David *et al.,* 2008: 11).

Sensor Calibration – The sensors were calibrated using a bespoke in-house algorithm, which conforms to Olsen *et al*. (2003).

Zero Median Traverse – The median of each sensor traverse is calculated within a specified range and subtracted from the collected data. This removes striping effects caused by small variations in sensor electronics.

Projection to a Regular Grid – Data collected using RTK GPS positioning requires a uniform grid projection to visualise data. Data are rotated to best fit an orthogonal grid projection and are resampled onto the grid using an inverse distance-weighting algorithm.

Interpolation to Square Pixels – Data are interpolated using a bicubic algorithm to increase the pixel density between sensor traverses. This produces images with square pixels for ease of visualisation.

6.3. Data Visualisation and Interpretation

6.3.1. This report presents the gradient of the sensors' total field data as greyscale images, as well as the total field data from the lower sensors. The gradient of the sensors minimises external interferences and reduces the blown-out responses from ferrous and other high contrast material. However, the contrast of weak or ephemeral anomalies can be reduced through the process of calculating the gradient. Consequently, some features can be clearer in the respective gradient or total field datasets. Multiple greyscale images of the gradient and total field at different plotting ranges have been used for data interpretation. Greyscale images should be viewed alongside the XY trace plot

(Figures 7 & 10). XY trace plots visualise the magnitude and form of the geophysical response, aiding anomaly interpretation.

6.3.2. Geophysical results have been interpreted using greyscale images and XY traces in a layered environment, overlaid against open street maps, satellite imagery, historical maps, LiDAR data, and soil and geology maps. Google Earth (2021) was also consulted, to compare the results with recent land use.

6.3.3. Geodetic position of results – All vector and raster data have been projected into OSGB36 (ESPG27700) and can be provided upon request in ESRI Shapefile (.SHP) and Geotiff (.TIF) respectively. Figures are provided with raster and vector data projected against OS Open Data.

7. Results

7.1. Qualification

7.1.1. Geophysical results are not a map of the ground and are instead a direct measurement of subsurface properties. Detecting and mapping features requires that said features have properties that can be measured by the chosen technique(s) and that these properties have sufficient contrast with the background to be identifiable. The interpretation of any identified anomalies is inherently subjective. While the scrutiny of the results is undertaken by qualified, experienced individuals and rigorously checked for quality and consistency, it is often not possible to classify all anomaly sources. Where possible, an anomaly source will be identified along with the certainty of the interpretation. The only way to improve the interpretation of results is through a process of comparing excavated results with the geophysical reports. MS actively seek feedback on their reports, as well as reports from further work, in order to constantly improve our knowledge and service.

7.2. Discussion

7.2.1. The geophysical results are presented in combination with satellite imagery and historical maps (Figure 4).

7.2.2. The fluxgate gradiometer survey has generally responded well to the environment of the survey area. Magnetic disturbance produced by buried services may have obscured weaker underlying anomalies if any were present (Figure 3). However, the rest of the survey area exhibits a relatively quiet magnetic background and anomalies relating to the current and historical land use of the survey area have primarily been detected (Figure 4). No anomalies suggestive of significant archaeological activity have been identified within the survey extent. However, anomalies undetermined in origin have been detected throughout the survey area; these are considered more likely to relate to agricultural or modern activities but an archaeological origin cannot be ruled out entirely. The detected buried services located in the northwest of the survey area may be associated with the Gas works mapped on 2nd edition OS mapping (Figure 4). Further magnetic disturbance of modern origin is limited to the field edges and discrete

anomalies identified across the survey area are likely related to buried modern magnetic features.

7.2.3. Former mapped and unmapped field boundaries (Figure 4) have been detected in the centre and north of the survey area and appear to relate to a past field system (Figure 6 & 9). Further anomalies related to historical and modern agricultural practices have been detected across the survey area (Figure 6 & 9). These comprise ridge and furrow cultivation, drains and agricultural trends which likely relate to modern ploughing and tractor tracks.

7.2.4. A discrete anomaly possibly relating to burning activities has also been detected in the southeast of the survey area (Figure 6). Although it is more likely to be of modern origin, an archaeological origin such as a kiln or similar structure which later collapsed or was ploughed away cannot be ruled out. A definitive interpretation of this anomaly cannot be concluded.

7.2.5. Anomalies possibly related to features of a former cricket field have been detected in the north of the survey area (Figure 4). These appear to correspond with the location of a cricket field mapped on 1910 Cheshire OS County Series map. A different, modern origin cannot however be entirely discounted for these anomalies.

7.2.6. Anomalies of undetermined origin have been identified in the north and centre of the survey area (Figure 6 & 9). These exhibit shapes and overall characteristics which suggest an anthropogenic origin and they are likely to relate to agricultural practices or modern activity. However, an archaeological origin cannot be ruled out completely.

7.3. Interpretation

7.3.1. General Statements

7.3.1.1. Geophysical anomalies will be discussed broadly as classification types across the survey area. Only anomalies that are distinctive or unusual will be discussed individually.

7.3.1.2. **Data Artefact** – Data artefacts usually occur in conjunction with anomalies with strong magnetic signals due to the way in which the sensors respond to very strong point sources. They are usually visible as minor ‘streaking’ following the line of data collection. While these artefacts can be reduced in post-processing through data filtering, this would risk removing ‘real’ anomalies. These artefacts are therefore indicated as necessary in order to preserve the data as ‘minimally processed’.

7.3.1.3. **Ferrous (Spike)** – Discrete dipolar anomalies are likely to be the result of isolated pieces of modern ferrous debris on or near the ground surface.

7.3.1.4. **Ferrous/Debris (Spread)** – A ferrous/debris spread refers to a concentrated deposition of discrete, dipolar ferrous anomalies and other highly magnetic material.

7.3.1.5. **Magnetic Disturbance** – The strong anomalies produced by extant metallic structures, typically including fencing, pylons, vehicles and service pipes, have been classified as 'Magnetic Disturbance'. These magnetic 'haloes' will obscure weaker anomalies relating to nearby features, should they be present, often over a greater footprint than the structure causing them.

7.3.1.6. **Undetermined** – Anomalies are classified as Undetermined when the origin of the geophysical anomaly is ambiguous and there is no supporting contextual evidence to justify a more certain classification. These anomalies are likely to be the result of geological, pedological or agricultural processes, although an archaeological origin cannot be entirely ruled out. Undetermined anomalies are generally distinct from those caused by ferrous sources.

7.3.2. Magnetic Results - Specific Anomalies

7.3.2.1. **Agricultural (Strong/Weak)** – Linear and curvilinear anomalies of varying magnetic strengths and lengths have been identified through Areas 2, 3 & 6 (Figures 5, 6, 8, & 9). These anomalies probably relate to the historical land use of the survey area and possibly identify former field boundaries. Anomaly [**2a**] collocates with a former field boundary mapped on 2nd edition OS mapping. Although [**1a** & **5a**] correlate with a mapped footpath (2nd edition OS map, Figure 4), their magnetic signal and similarity with [**2a**] suggest that the magnetic anomaly is produced by a former unmapped field boundary rather than by a footpath. Further curvilinear anomalies have been identified which share similar characteristics with [**1a**, **5a** & **2a**] (Figures 5 & 6) and are considered to relate to former unmapped field boundaries.

7.3.2.2. **Agricultural (Trend)** – Several parallel, faint positive linear anomalies have been detected across Areas 2, 3 & 6 (Figures 5, 6, 8 & 9). These are considered likely to relate to modern ploughing trends and tracks; however, it is not to be excluded that some of these may relate to drains.

7.3.2.3. **Ridge and Furrow (Trend)** – Sets of parallel slightly curvilinear anomalies have been identified in Areas 4 & 5, running on a variety of orientations (Figures 5, 6, 8 & 9). These anomalies are slightly broader in width than the other agricultural trends identified within the survey area and appear to be c.9m spaced apart. This supports their interpretation as historical ridge and furrow trends.

7.3.2.4. **Possible Burning** – A discrete anomaly [**3a**] has been identified in the centre-south of Area 3 (Figures 5 & 6). The anomaly exhibits a positive magnetic signal with a negative peak in the centre and which is most visible in the XY trace plot (Figure 7). Although it is more likely to be of modern origin, an archaeological origin such as a kiln or similar structure cannot be ruled out and it is therefore difficult to provide a definitive interpretation for this anomaly.

7.3.2.5. **Possible Cricket Features** – A group of strongly positive rectilinear, curvilinear and discrete anomalies [**6a**] has been identified in the centre of Area 6 (Figures

8 & 9). The strength and shape of these anomalies suggest a modern anthropogenic origin. The anomalies correspond with the location of a former cricket field identified on historical mapping (1910 Cheshire OS County Series map) and are considered likely to relate to features pertaining to the former cricket ground.

7.3.2.6. **Drainage Feature –** Rectilinear and slightly curvilinear anomalies have been detected throughout Areas 1, 2, 5 and 6 (Figures 6 & 9). Their magnetic signal ranges from negative (Areas 2 & 5, Figure 5), to faint positive (Area 1, Figure 5), to dipolar (Area 6, Figure 8). These are suggestive of possible stone, cut and ceramic drains respectively. In Area 6, these anomalies also display a "herringbone" configuration which is typical of drainage systems.

7.3.2.7. **Service** – Linear anomalies with a strong magnetic signal typical of services have been detected across the survey area (Figures 5, 6, 8 & 9). Gas works marked c.30m north of Area 6 on historical mapping (Figure 4) could suggest that some of the services identified in this area may be related to the gas works.

7.3.2.8. **Undetermined (Strong/Weak/Trend)** – Two parallel negative linear anomalies [**1b**] have been identified in the east of Area 1 (Figures 5 & 6). These appear to align with one of the unmapped field boundaries detected in the east of Area 1, before the unmapped former field boundary curved away in the west. Although a possible origin related to a double-ditched trackway cannot be ruled out, the presence of the former field boundary at the same location prevents a more certain classification than "Undetermined". A group of linear and discrete anomalies [**6b**] has been identified in the east of Area 6 (Figures 8 & 9). Their shape and magnetic signal suggest an anthropogenic origin, possibly modern or agricultural; however, a more specific interpretation has not been possible. A concentration of discrete strong positive anomalies [**3b**] has been detected in the centre-south of Area 3, c.20m south of anomaly [**3a**] interpreted as "Possible Burning" (Figures 5 & 6). They appear to form alignments which would suggest an anthropogenic origin. However, it is difficult to arrive at a more conclusive interpretation and they may also be of natural origin. Further anomalies undetermined in origin have been identified throughout the survey area (Figures 6 & 9); although an agricultural origin is more likely, an archaeological origin cannot be ruled out and thus their origin remains uncertain.

8. Conclusions

8.1. A fluxgate gradiometer survey was successfully undertaken across the majority of the survey area. A range of anomalies relating to historical and modern agricultural practices have been identified, which reflect a change in the land management of the area over time. Modern activity is evident in the results in the form of magnetic disturbance mainly caused by buried services.

8.2. Anomalies that correspond with former mapped and unmapped field boundaries have been detected across the survey area and are suggestive of a past field system. Further historical and modern agricultural activity has been identified in the form of ridge and furrow trends, drains and agricultural trends likely relating to modern ploughing regimes, tractor tracks and possibly further drains.

8.3. Possible burning activity has been identified in the southeast of the survey area. Although it is more likely to have been produced by modern activity, an archaeological origin could not be ruled out.

8.4. Anomalies possibly relating to a former cricket field have been identified in the north of the survey area. These collocate with a cricket field visible on historical mapping.

8.5. Anomalies of undetermined origin have been detected throughout the survey area. These are most likely anthropogenic in origin and may relate to agricultural or modern activities. However, a more confident classification has not been possible for them and an archaeological origin cannot be ruled out completely.

9. Archiving

9.1. MS maintains an in-house digital archive, which is based on Schmidt and Ernenwein (2013). This stores the collected measurements, minimally processed data, georeferenced and un-georeferenced images, XY traces and a copy of the final report.

9.2. MS contributes reports to the ADS Grey Literature Library upon permission from the client, subject to any dictated time embargoes.

10. Copyright

10.1. Copyright and intellectual property pertaining to all reports, figures and datasets produced by Magnitude Services Ltd is retained by MS. The client is given full licence to use such material for their own purposes. Permission must be sought by any third party wishing to use or reproduce any IP owned by MS.

11. References

British Geological Survey, 2021. Geology of Britain. Mottram, Greater Manchester. [http://mapapps.bgs.ac.uk/geologyofbritain/home.html/]. Accessed 22/02/2021.

Chartered Institute for Archaeologists, 2020. Standards and guidance for archaeological geophysical survey. CIfA.

Contarano, J., 2021. Written Scheme of Investigation For a Geophysical Survey of Mottram, Greater Manchester. Magnitude Surveys. Bradford.

David, A., Linford, N., Linford, P. and Martin, L., 2008. Geophysical survey in archaeological field evaluation: research and professional services guidelines (2nd edition). Historic England.

Google Earth, 2021. Google Earth Pro V 7.1.7.2606.

Olsen, N., Toffner-Clausen, L., Sabaka, T.J., Brauer, P., Merayo, J.M.G., Jorgensen, J.L., Leger, J.M., Nielsen, O.V., Primdahl, F., and Risbo, T., 2003. Calibration of the Orsted vector magnetometer. Earth Planets Space 55: 11-18.

Schmidt, A. and Ernenwein, E., 2013. Guide to good practice: geophysical data in archaeology (2nd edition). Oxbow Books: Oxford.

Schmidt, A., Linford, P., Linford, N., David, A., Gaffney, C., Sarris, A. and Fassbinder, J., 2015. Guidelines for the use of geophysics in archaeology: questions to ask and points to consider. EAC Guidelines 2. European Archaeological Council: Belgium.

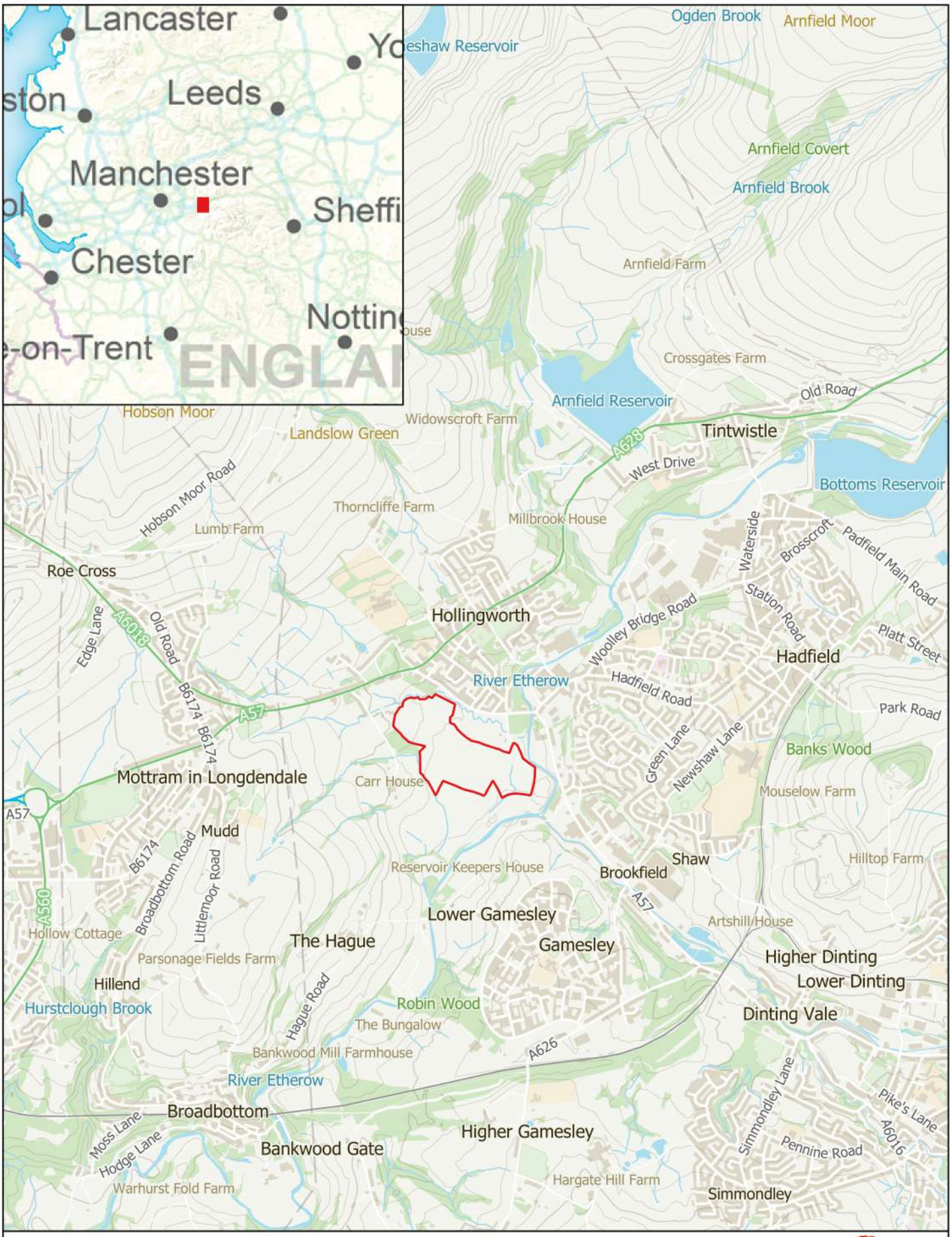
Soilscapes, 2021. Mottram, Greater Manchester. Cranfield University, National Soil Resources Institute. [http://landis.org.uk]. Accessed 22/02/2021.

12. Project Metadata

MS Job Code	MSSK798B
Project Name	Mottram, Greater Manchester
Client	Balfour Beatty Atkins
Grid Reference	SK 00630 95587
Survey Techniques	Magnetometry
Survey Size (ha)	18.5ha (Magnetometry)
Survey Dates	2021-02-24 to 2021-02-25
Project Lead	[redacted]
Project Officer	[redacted]
HER Event No	TBC
OASIS No	TBC
Report Version	1.0

13. Document History

Version	Comments	Author	Checked By	Date
0.1	Initial draft for Project Lead to Review	[redacted]		04 March 2021
0.2	Corrections from Project Lead and Draft for Director Approval	[redacted]		05 March 2021
1.0	Client's Corrections – Issued as Final	[redacted]		19 April 2021



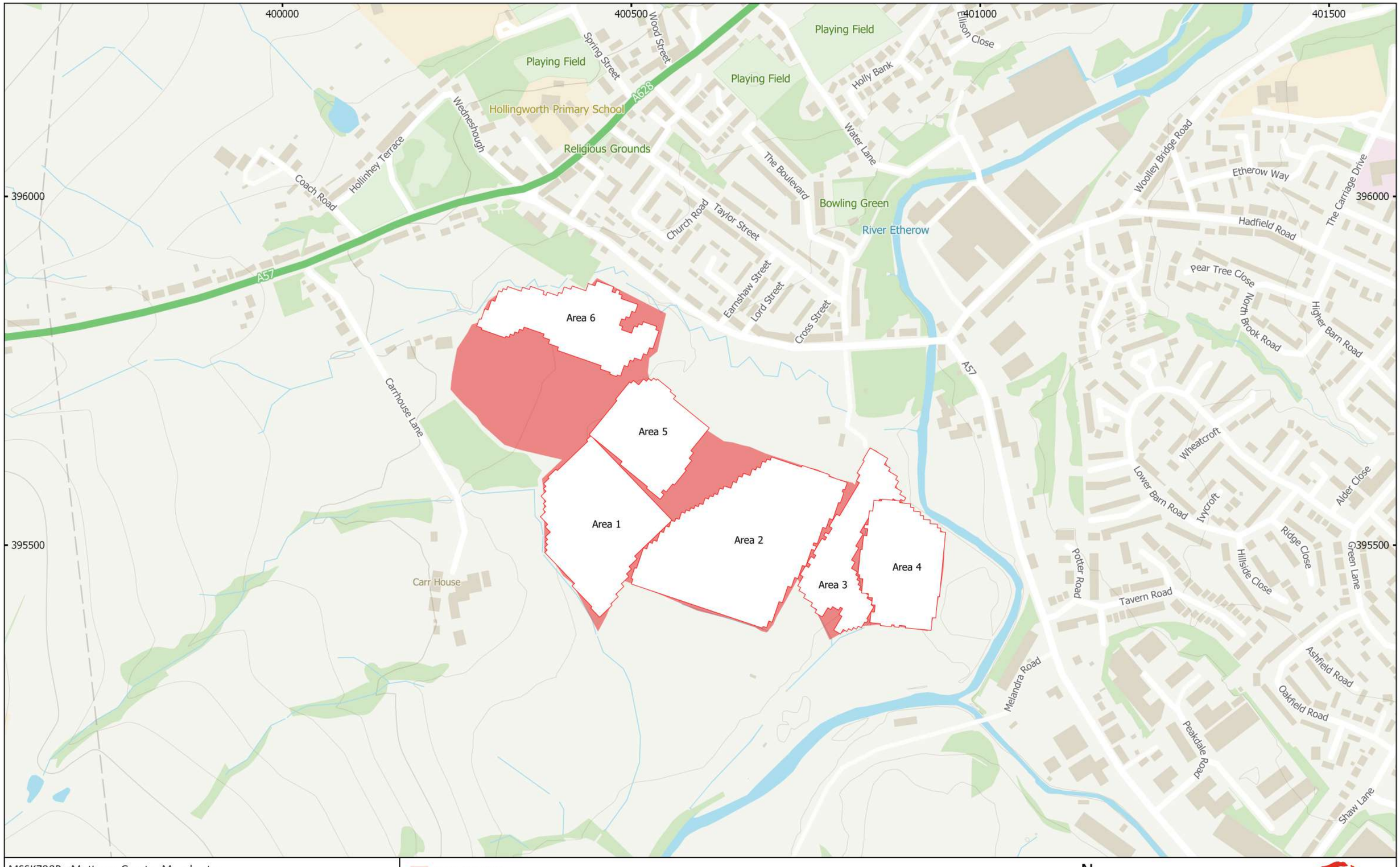
MSSK798B - Mottram, Greater Manchester
Figure 1 - Site Location
1:25,000 @ A4

Site Boundary

N

0 0.5 1 km

magnitude surveys



MSSK798B - Mottram, Greater Manchester
Figure 2 - Location of Survey Areas
1:5,000 @ A3

Survey Extent
Unsurveyable

N

0 100 200 300 m

magnitude surveys

400200
400500
400800
401100
395700
395400
Coach Road
A57
Church Road
Taylor Street
The Boulevard
River Etherow
Water Lane
Woolley Bridge Road
Watkin Avenue
Claylands Close
Earnshaw Street
Lord Street
Cross Street
Wharncliffe Close
Carrhouse Lane
Area 6
Area 5
Area 1
Area 2
Area 3
Area 4
Carr House
Potter Road
Tavern Road
Melandra Road

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Figure 3 - Magnetic Total Field (Lower Sensor) (Overview)
1:3,000 @ A3

48,997 nT 49,005

N

0 50 100 150 m

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Figure 4 - Magnetic Interpretation Over Historical Maps and Satellite Imagery
1:3,000 @ A3

Contains historical maps: Ordnance Survey, 6" 2nd edition c. 1882-1913.
Reproduced with the permission of the National Library of Scotland.

- Agricultural (Strong)
- Agricultural (Weak)
- Possible Burning
- Possible Cricket Features
- Magnetic Disturbance
- Ferrous/Debris (Spread)
- Undetermined (Strong)
- Undetermined (Weak)
- Data Artefact
- Ridge and Furrow (Trend)
- Agricultural (Trend)
- Drainage Feature
- Service
- Undetermined (Trend)
- Ferrous (Spike)

N

0 50 100 150 m

magnitude surveys

400400
400600
400800
Area 5
Area 1
395600
395600
395400
395400
Area 2
Area 3
Area 4

MSSK798B - Mottram, Greater Manchester
Figure 5 - Magnetic Gradient (Areas 1, 2, 3, 4 & 5)
1:1,500 @ A3

-1 nT 2

A57

N

0 50 100 150 m

magnitude surveys

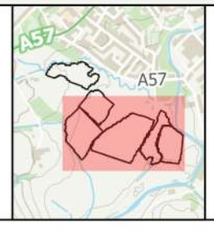
400400
400600
400800
395600
395400

Area 1
Area 5
Area 2
Area 3
Area 4

1a
1b
2a
3a
3b
5a

MSSK798B - Mottram, Greater Manchester
Figure 6 - Magnetic Interpretation (Areas 1, 2, 3, 4 & 5)
1:1,500 @ A3

- Agricultural (Strong)
- Agricultural (Weak)
- Possible Burning
- Magnetic Disturbance
- Ferrous/Debris (Spread)
- Undetermined (Strong)
- Undetermined (Weak)
- Ridge and Furrow (Trend)
- Agricultural (Trend)
- Drainage Feature
- Service
- Undetermined (Trend)
- Ferrous (Spike)



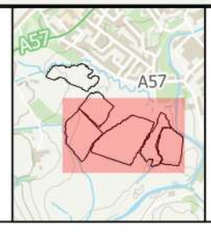
N

0 50 100 150 m

magnitude surveys

400400
400600
400800
Area 5
Area 1
395600
395600
395400
395400
Area 2
Area 3
Area 4

MSSK798B - Mottram, Greater Manchester
Figure 7 - XY Trace Plot (Areas 1, 2, 3, 4 & 5)
30nT/cm at 1:1,500 @ A3



N

0 50 100 150 m

magnitude surveys

400200
400400
400600
395800
395600
Area 6
Area 5
Area 1
A57
Claylands Close
Earnshaw Street
Taylor Street
Lord Street
Cross Street
Carrhouse Lane

MSSK798B - Mottram, Greater Manchester
Figure 8 - Magnetic Gradient (Areas 1, 5 & 6)
1:1,500 @ A3

-1 nT 2

N

0 50 100 150 m

magnitude surveys

400200
400400
400600
395800
395600
Area 6
6a
6b
Area 5
5a
Area 1
A57
Taylor Street
Claylands Close
Earnshaw Street
Lord Street
Cross Street
Carrhouse Lane

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Figure 9 - Magnetic Interpretation (Areas 1, 5 & 6)
1:1,500 @ A3

- Agricultural (Strong)
- Agricultural (Weak)
- Possible Cricket Features
- Magnetic Disturbance
- Undetermined (Strong)
- Undetermined (Weak)
- Data Artefact
- Ridge and Furrow (Trend)
- Agricultural (Trend)
- Drainage Feature
- Service
- Undetermined (Trend)
- Ferrous (Spike)

N
0 50 100 150 m
magnitude surveys

400200
400400
400600
395800
395600
Area 6
Area 5
Area 1
A57
Taylor Street
Claylands Close
Earnshaw Street
Lord Street
Cross Street
Carrhouse Lane

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Figure 10 - XY Trace Plot (Areas 1, 5 & 6)
30nT/cm at 1:1,500 @ A3

N
0
50
100
150 m
magnitude surveys