Geophysical Survey Report

of

Land off Woodward Avenue, Bacton Stowmarket

For

The Environment Partnership (TEP)

On Behalf Of

Gladman Developments

Magnitude Surveys Ref: MSTM527

HER Parish Code: BAC 055

Oasis Number: magnitud1-361375

August 2019

Unit 17, Commerce Court

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Version	Purpose/Revision	Author	Interpretation/Figures	Checked By	Date Issued
Draft 1.0	First draft to line manager.	Isabella Carli BA MA	Isabella Carli BA MA	Marta Fortuny BA MA	02 August 2019
1.1	Comments from line manager	Isabella Carli BA MA	Isabella Carli BA MA	Kayt Armstrong BA MSc PhD MCIfA	05 August 2019
2.0	Comment from client	Marta Fortuny BA MA	na	Marta Fortuny BA MA	05 August 2019

Abstract
Magnitude Surveys was commissioned to assess the subsurface archaeological potential of a c.6.11ha area of land off Woodward Avenue, Bacton Stowmarket. A fluxgate gradiometer survey was successfully completed across the site. The geophysical results have recorded former mapped field boundaries, an old track also shown on historic maps, and an unmapped field boundary and ploughing trends. Anomalies related to modern activity have been detected, but these have had minimal impact on the magnetic data. No anomalies suggestive of significant archaeological remains were detected within the survey area.

Contents

List of Figures

1. Introduction

1.1. Magnitude Surveys Ltd (MS) was commissioned by The Environment Partnership (TEP) on behalf of Gladman Developments to undertake a geophysical survey on a c.6.11ha area of land off Woodward Avenue, Bacton Stowmarket, Suffolk (TM 0555 6745).

1.2. The geophysical survey comprised hand-carried GNSS-positioned fluxgate gradiometer survey.

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, 2014) and the European Archaeological Council (Schmidt et al., 2015).

1.4. It was conducted in line with a WSI produced by MS in July 2019 (Magnitude Surveys 2019).

1.5. The survey commenced on 31/07/2019 and took one day to complete.

2. Quality Assurance

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

2.2. Director Dr. Chrys Harris is a Member of CIfA, has a PhD in archaeological geophysics from the University of Bradford and is the Vice-Chair of ISAP. Director Finnegan Pope-Carter is a Fellow of the London Geological Society, the chartered UK body for geophysicists and geologists, as well as a member of GeoSIG, the CIfA Geophysics Special Interest Group. Reporting Analyst Dr. Kayt Armstrong has a PhD in archaeological geophysics from Bournemouth University, is the Vice Conference Secretary and Editor of ISAP News for ISAP and is the UK Management Committee representative for the COST Action SAGA.

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

3. Objectives

3.1. The geophysical survey aimed to assess the subsurface archaeological potential of the survey area.

4. Geographic Background

4.1. The site is located c.300m northeast of Bacton, Stowmarket, Suffolk (Figure 1). Survey was undertaken across two fields under arable use. The site is bounded by agricultural land to the north, northeast and west, with housing bounding the site to the southeast and south (Figure 2). A c.0.5ha corridor area along the western boundary of Area 1 could not be surveyed due to uneven ground conditions.

4.2. Survey considerations:

Survey Area	Ground Conditions	Further Notes
1	Flat arable field with a mature beet crop.	Bounded by a hedge to the north and west, and fencing to the east and south. At the centre-south of the area are two manhole covers.
2	Flat arable field with mature beet crop.	Bounded by ditches to the north, east and south, and by a ditch and a footpath to the west.

4.3. The underlying geology comprises sand from the Crag group. Superficial deposits are characterised by diamicton of the Lowestoft formation (British Geological Survey, 2019).

4.4. Area 1 and the east half of Area 2 are comprised of slightly acid loamy and clayey soils with impeded drainage; the western portion of Area 2 is instead characterised by slowly permeable seasonally wet slightly acid but base-rich loamy and clayey soils (Soilscapes, 2019).

5. Archaeological Background

5.1. The following is a summary of a Desk-based assessment produced and provided by TEP (TEP, 2019).

5.2. No features of archaeological origin were identified within the survey area itself; however, archaeological activity has been recorded in the wider landscape.

5.3. An Iron Age enclosure with round houses (NDHA3) and an adjacent possible Roman Villa (NDHA4) have been identified approximately 500m to the northwest of the survey area.

5.4. Within the wider environs of the survey area, a number of Medieval designated buildings have been recorded, including churches and cottages. A D-shaped medieval moated site is recorded c.700m south of the site, close to Pulman's Farm, and two other moats are known at The Manor and Elm Grove Farm, further south of the survey area. Several churches and cottages are recorded in the wider landscape for the post medieval times as well.

5.5. The survey area has been used as agricultural land since at least the mid-18th century. A hedgerow visible on 19th century mapping still forms part of the southwestern and eastern boundaries to the survey area.

6. Methodology

6.1. Data Collection

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

6.1.2. 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

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

6.1.3.1. 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.

6.1.3.2. 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.

6.1.3.3. 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 Historic England's standards for "raw or minimally processed data" (see sect 4.2 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 at different plotting ranges have been used for data interpretation. Greyscale images should be viewed alongside the XY trace plot (Figure 8). XY trace plots visualise the magnitude and form of the geophysical response, aiding in 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, historic maps, LiDAR data, and soil and geology maps. Google Earth (2019) was consulted as well, to compare the results with recent land usages.

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 of further work in order to constantly improve our knowledge and service.

7.2. Discussion

7.2.1. The geophysical results are presented in consideration with satellite imagery (Figure 6) and historic maps (Figure 7).

7.2.2. The fluxgate gradiometer survey has responded well to the environment of the survey area and the identification of weaker, more ephemeral anomalies has been possible. The magnetic data are mainly characterised by a relatively quiet background. Interference from modern sources is limited to extant field edges, made-up ground at the southwest corner of the survey area and a service running across the southeast portion of the survey area (Figures 3,4).

7.2.3. Throughout the survey area, a series of former field boundaries have been identified (Figure 5). The one located at the centre-east is unmapped but visible as cropmark on satellite imagery (Google Satellite 2007 and 2018; Figure 6); the others correspond with known boundaries and with an old track showed in the 2nd edition OS Map (Figure 7).

7.2.4. Evidence of ploughing trends has been found across the survey area.

7.2.5. There are no anomalies suggestive of significant archaeological remains within the survey area.

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. **Magnetic Disturbance** – The strong anomalies produced by extant metallic structures along the edges of the field have been classified as 'Magnetic Disturbance'. These magnetic 'haloes' will obscure the response of any weaker underlying features, should they be present, often over a greater footprint than the structure they are being caused by.

7.3.1.3. **Ferrous (Spike)** – Discrete ferrous-like, dipolar anomalies are likely to be the result of isolated modern metallic 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. **Undetermined** – Anomalies are classified as Undetermined when the anomaly origin is ambiguous through the geophysical results and there is no supporting or correlative evidence to warrant 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 not ferrous in nature.

7.3.2. Magnetic Results - Specific Anomalies

7.3.2.1. **Agricultural (Spread/Strong/Weak)** – At the north, centre and south of Area 1 and at the northwest and southeast of Area 2, five elongated anomalies **[1a]**,**[1b]**,**[1c]** and **[2a]** have been identified, some of which show a spread shape (Figure 5). They exhibit a weak magnetic signal most explicit in the Total Field data (Figure 3), with **[1a]** and **[2a]** showing discrete enhanced anomalies within. They are recorded running on a variety of orientations. **[1a]**,**[1b]** and **[2a]**-south correspond with mapped field boundaries visible on 2nd edition OS Map (Figure 7). **[2a]-**north correlates with a mapped track also visible on 2nd edition OS Map (Figure 7). **[1c]** is visible as cropmark on satellite imagery (Google Satellite 2007 and 2018; Figure 6) but does not correlate with any available maps and has therefore been interpreted as a former unmapped field boundary.

8. Conclusions

8.1. A fluxgate gradiometer survey has successfully been undertaken across the site. The geophysical survey has detected different types of anomalies of agricultural and modern origin. Modern interference is limited to a spread ferrous anomaly and magnetic disturbance located around the perimeter of the survey area and along a service, which follows the line of a former field boundary and has been clearly mapped.

8.2. Historic land use has been detected across the survey area in the form of former mapped field boundaries, a former mapped track and an unmapped boundary. There are no anomalies suggestive of significant archaeological remains within the survey area.

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 the any dictated time embargoes.

10. Copyright

10.1. Copyright and the 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, 2019. Geology of Britain. Stowmarket, Suffolk. [http://mapapps.bgs.ac.uk/geologyofbritain/home.html/]. [Accessed 29/07/2019].

Chartered Institute for Archaeologists, 2014. Standards and guidance for archaeological geophysical survey. CIfA.

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MSTM527 - Land off Woodward Avenue, Bacton Stowmarket

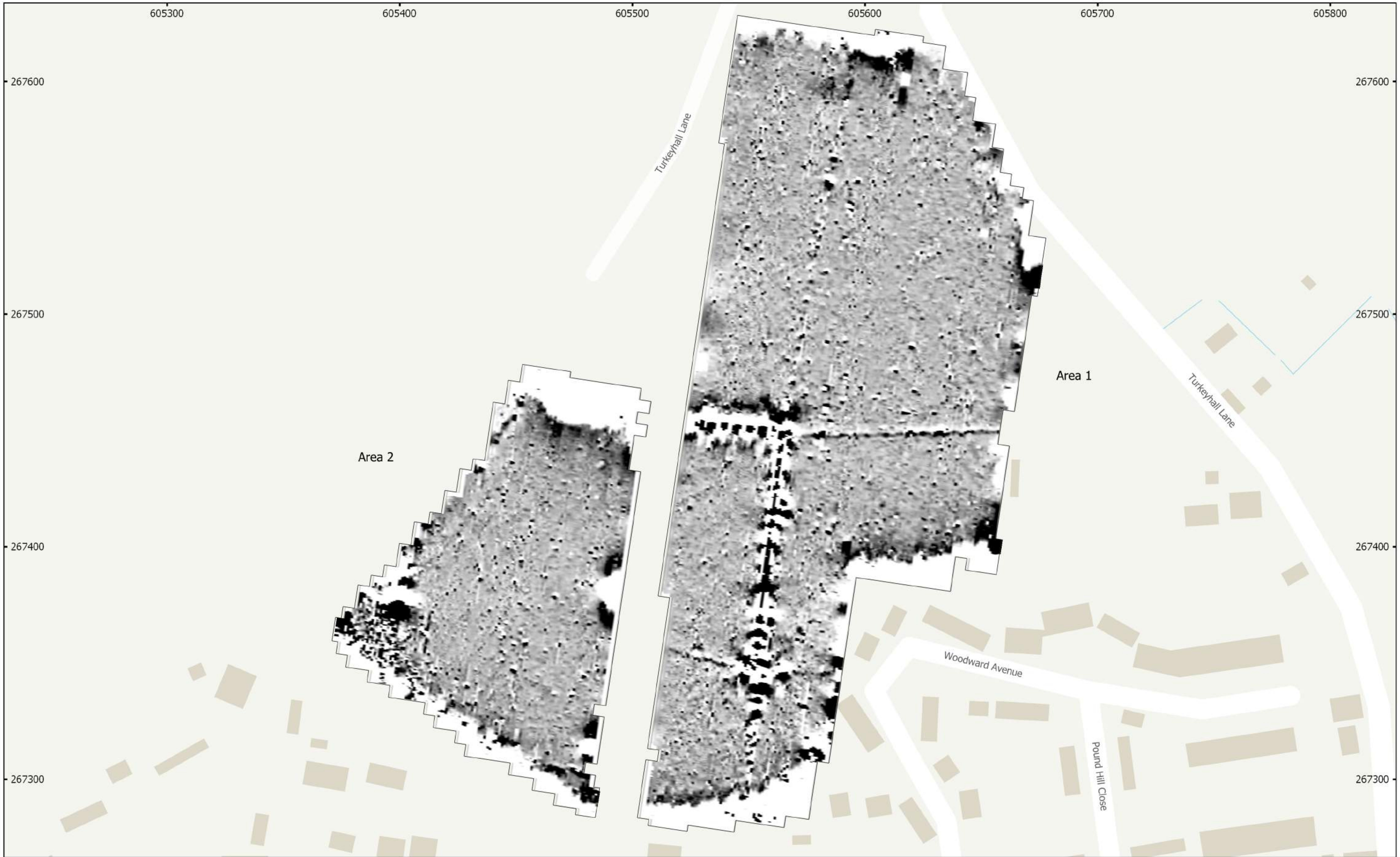
Figure 1 - Site Location

1:25,000 @ A4

Site Boundary

MSTM527 - Land off Woodward Avenue, Bacton Stowmarket
Figure 2 - Location of Survey Areas
1:4,000 @ A3

magnitude surveys



MSTM527 - Land off Woodward Avenue, Bacton Stowmarket
Figure 3 - Total Field (Lower Sensor)
1:1,500 @ A3

48,997 nT 49,005

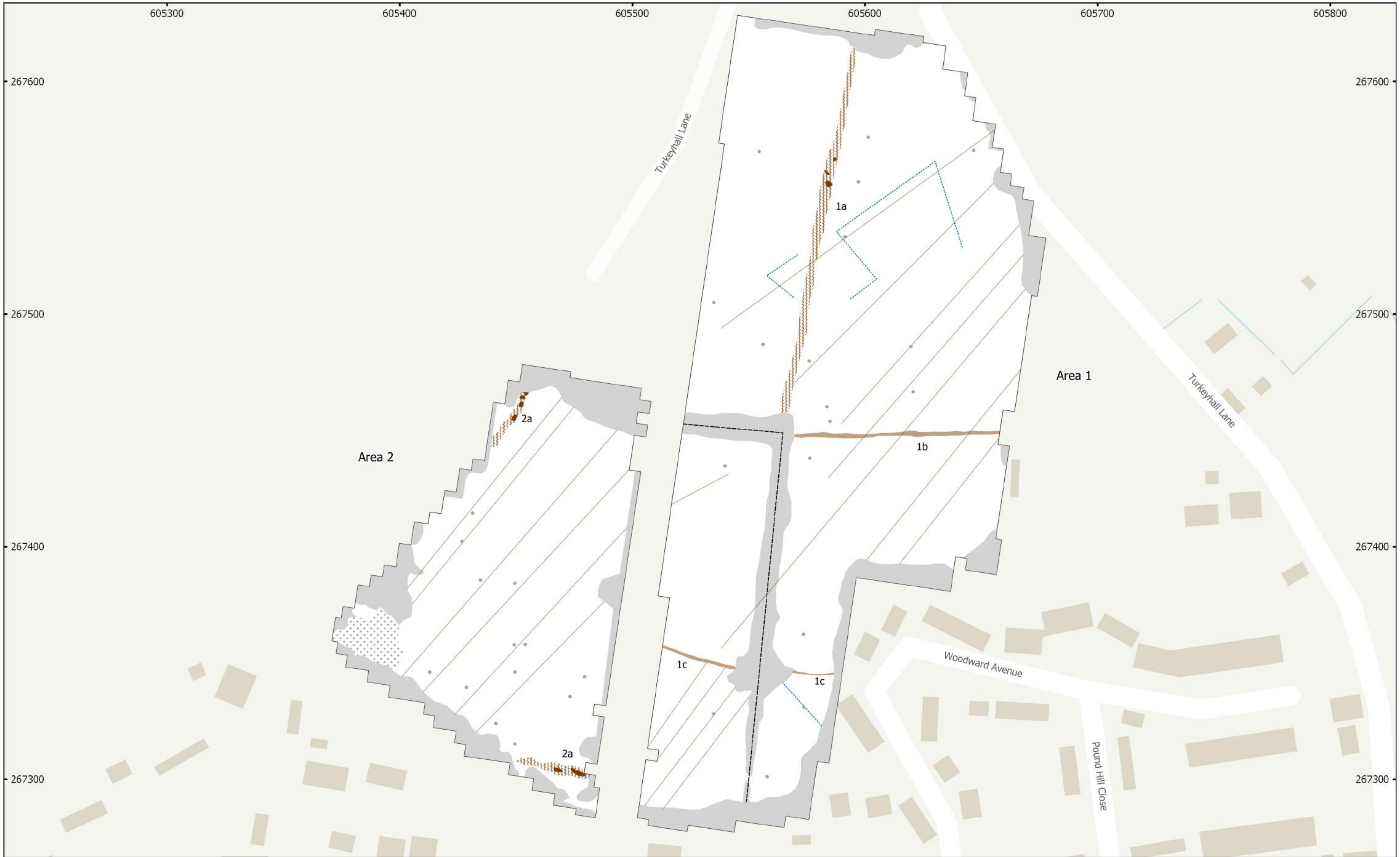
N

0 50 100 150 m

magnitude surveys

MSTM527 - Land off Woodward Avenue, Bacton Stowmarket
Figure 4 - Magnetic Gradient
1:1,500 @ A3

magnitude surveys



MSTM527 - Land off Woodward Avenue, Bacton Stowmarket
Figure 5 - Magnetic Interpretation
1:1,500 @ A3
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MSTM527 - Land off Woodward Avenue, Bacton Stowmarket
Figure 6 - Magnetic Interpretation Over Satellite Imagery
1:4,000 @ A3

Agricultural (Spread)
Agricultural (Strong)
Agricultural (Weak)
Magnetic Disturbance
Ferrous/Debris (Spread)
Agricultural (Trend)
Undetermined (Trend)
Service

N

0 100 200 300 m

magnitude surveys

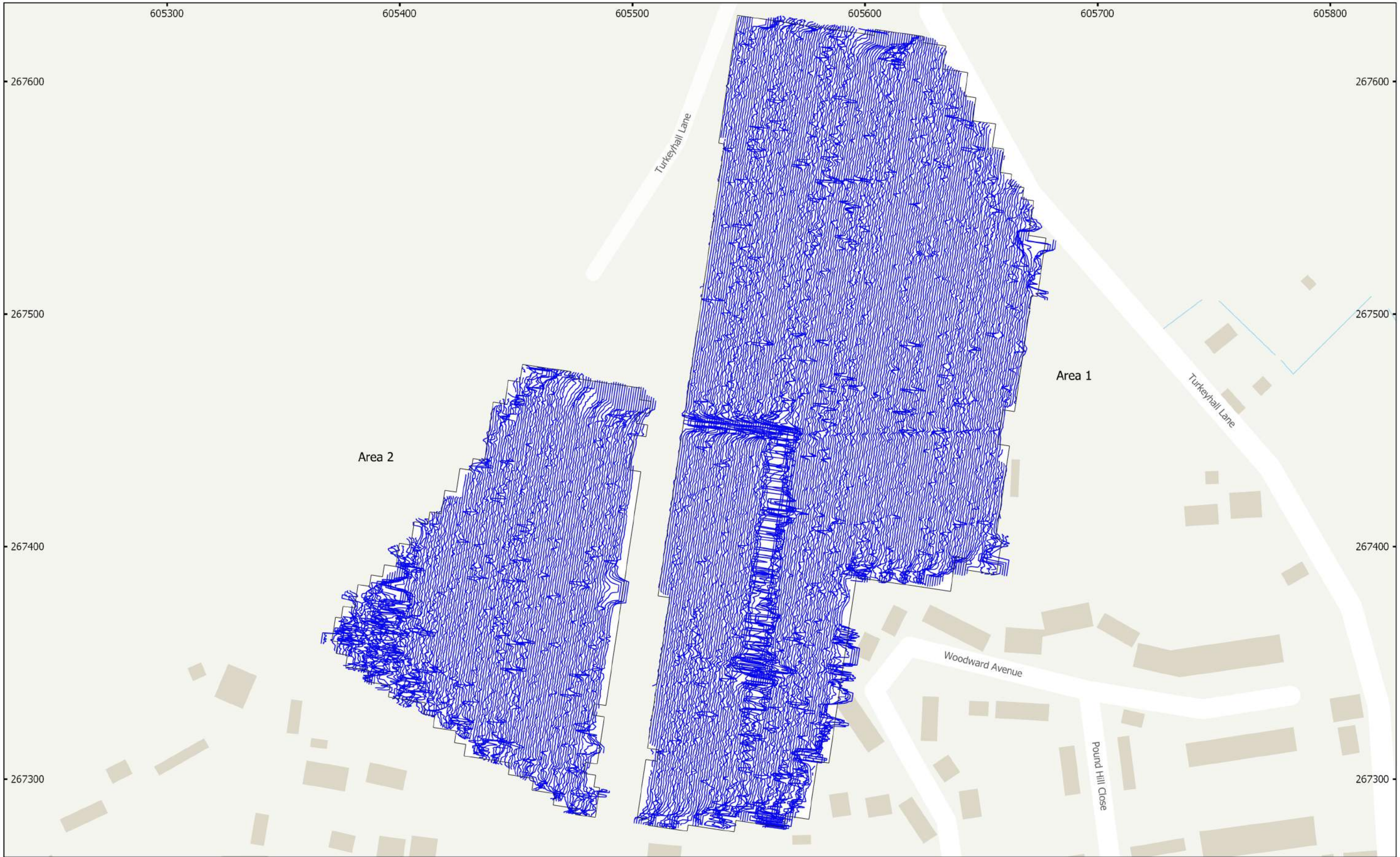
MSTM527 - Land off Woodward Avenue, Bacton Stowmarket
Figure 7 - Magnetic Interpretation Over Historic Maps
1:4,000 @ A3

Agricultural (Spread)
Agricultural (Strong)
Agricultural (Weak)
Magnetic Disturbance
Ferrous/Debris (Spread)
Agricultural (Trend)
Undetermined (Trend)
Service

N

0 100 200 300 m

magnitude surveys



MSTM527 - Land off Woodward Avenue, Bacton Stowmarket
Figure 8 - XY Trace Plot
30nT/cm at 1:1,500 @ A3

magnitude surveys

Written Scheme of Investigation

For a Geophysical Survey

of

Bacton

Suffolk

For

The Environment Partnership (TEP)

Magnitude Surveys Ref: MSTM527

July 2019

Unit 17, Commerce Court

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Version	Purpose/Revision	Author	Figures	Approved By	Date Issued
1.0	WSI	Julia Cantarano Ingénieur PCIfA	Julia Cantarano Ingénieur PCIfA	Julia Cantarano Ingénieur PCIfA	25 July 2019
1.1	Minor Comments from Client	Julia Cantarano Ingénieur PCIfA	N/A	Julia Cantarano Ingénieur PCIfA	26 July 2019

Print Name:	Signature:	Role:	Date:

Contents

1. Introduction

1.1. This document details a Written Scheme of Investigation for a geophysical survey by Magnitude Surveys Ltd (MS) for The Environment Partnership (TEP). The survey comprises a c.6.11 ha area of land at Bacton, Suffolk (TM 05554 67452).

1.2. The geophysical survey will comprise a hand-carried GNSS-positioned fluxgate gradiometer survey. Magnetic survey is the standard primary geophysical method for archaeological applications in the UK for 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 earth houses, and industrial activity (David *et al*., 2008).

1.3. The survey will be conducted in line with the current best practice guidelines produced by Historic England (David et al., 2008), the Chartered Institute for Archaeologists (2014) and the European Archaeological Council (Schmidt et al., 2015).

2. Objective

2.1. The objective of this geophysical survey is to assess the subsurface archaeological potential of the survey area.

3. Quality Assurance

3.1. Project management, survey work, data processing and report production have been carried out by qualified and professional geophysicists to standards exceeding the current best practice (CIfA, 2014; David *et al*., 2008, Schmidt *et al*., 2015). All MS managers, field and office staff have relevant degree qualifications to archaeology or geophysics and/or field experience.

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

3.3. Director Dr. Chrys Harris is a Member of CIfA, has a PhD in archaeological geophysics from the University of Bradford and is the Vice-Chair of ISAP. Director Finnegan Pope-Carter is a Fellow of the London Geological Society, the chartered UK body for geophysicists and geologists, as well as a member of GeoSIG, the CIfA Geophysics Special Interest Group. Reporting Analyst Dr. Kayt Armstrong has a PhD in archaeological geophysics from Bournemouth University, is the Vice Conference Secretary and Editor of ISAP News for ISAP, and is the UK Management Committee representative for the COST Action SAGA.

3.4. MS has developed a bespoke geophysical system whereby data is live-streamed from the field back to the office while fieldwork is ongoing. This allows for data to be regularly monitored not only in the field, but by managers in a controlled office environment. Coverage gaps or small errors within the data can be quickly identified and rectified, improving quality control of field survey. The live data streaming allows MS to provide processed data to the client at regular intervals, allowing all parties to be informed of the field survey's progress. Should it become apparent that the survey is being compromised by local conditions, such as the spreading of green waste, this will be reported back to the client and a mitigation strategy can be devised if necessary.

4. Risk Assessment

4.1. MS' standard magnetic fieldwork risk assessment and site-specific risk assessment have been appended to the end of this document. Before geophysical survey will commence, a brief walkover will be undertaken to identify any additional hazards of an unusual or site-specific nature. If any additional hazards are identified, the site-specific risk assessment will be updated to include these hazards and all surveyors will be informed of the risk. If appropriate mitigation factors cannot be put in place, then the field or part thereof will not be surveyed.

4.2. Field staff will attend a site induction if required. Necessary PPE will be supplied and worn. Wet and cold/hot weather protection is also supplied.

4.3. All surveyors have been issued company mobile phones. Survey teams are expected to make regular contact with the office to keep all parties updated with survey progress. Any change in conditions that may affect the health and safety of the survey team must be reported immediately.

4.4. The survey van contains suitable welfare facilities. Antiseptic hand gel is provided, as is bottled drinking water. A first aid kit is stored in the cab of the van, with a second kit near personnel within the survey area.

4.5. The nearest NHS urgent care centre is at West Suffolk Hospital, Hardwick Lane, Hardwick Lane, Bury St. Edmunds, Suffolk, IP33 2QZ. Should toilets be unavailable on site the nearest public accessible toilet is located at Meadow Croft, The St, Rickinghall, Diss IP22 1DZ.

5. Methodology

5.1. Data Collection

5.1.1. Geophysical survey will comprise the magnetic method as described in the following table.

5.1.2. Table of survey strategies:

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

5.1.3. Magnitude Surveys employs a modular cart system, which can easily be configured to be towed by quad, pulled by hand, or carried depending on what is most suitable for the site configuration and conditions. Consisting of a cart frame, and backpack system survey can be undertaken should conditions preclude survey with the wheels. The hand carried system retains all of the advantages of a cart system because it is still GNSS positioned and the sensors are maintained at a consistent height.

5.1.4. Magnetic data will be collected using MS' bespoke, hand-carried GNSS-positioned system. MS' hand-carried system will be comprised of Bartington Instruments Grad 13 Digital Three-Axis Gradiometers. Positional referencing will be 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.

5.1.5. Magnetic and GPS data will be stored on an SD card within MS' bespoke datalogger. The datalogger is continuously synced, via an in-field Wi-Fi unit, to servers within MS' offices. This allows data collection, processing and visualisation to be monitored in real-time as fieldwork is ongoing (see 3.6).

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

5.2. Data Processing

5.2.1. Magnetic data will be processed in bespoke in-house software produced by MS. Processing steps conform to Historic England's standards for "raw or minimally processed data" (see sect 4.2 in David et al., 2008: 11). Data plots contained within the report conform to Historic England's standards for minimally processed data.

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

Zero Median Traverse – The median of each sensor traverse will be 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 will be 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 will be interpolated using a bicubic algorithm to increase the pixel density between sensor traverses. This produces images with square pixels for ease of visualisation.

5.3. Data Visualisation and Interpretation

5.3.1. The report will present the gradient of the sensors' total field data as greyscale images, as well as the total field data from the upper and/or 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 at different plotting ranges will be used for data interpretation.

5.3.2. Geophysical results will be interpreted using greyscale images and XY traces in a layered environment, overlaid against OS Open Data, satellite imagery, historic maps, LiDAR data, and soil and geology maps. Google Earth (2019) will be consulted as well, to compare the results with recent land usages.

5.3.3. Geodetic position of results - All vector and raster data will be projected into OSGB36 (ESPG27700) and provided upon request in ESRI Shapefile (.SHP) and Geotiff (.TIF) respectively. Figures will be provided with raster and vector data projected against OS Master Mapping.

6. Reporting

6.1. A detailed report of the survey will be produced after data collection is completed. The Planning Archaeologist will be provided with a draft report for approval, and the approved report will be submitted to the HER. The final report will include as standard:

- Abstract
- Introduction – Details site location and client details.
- Quality Assurance – Details the expertise of Magnitude Surveys and Magnitude Surveys employees undertaking the work.
- Objectives—Details survey objectives.
- Geographic Background – Details the soils and geology of the survey area, as well as providing a general summary of site conditions at time of survey.
- Archaeological Background – Details a brief summary of the archaeological and historical background of the site and its immediate environs. While this will not be an exhaustive assessment of the known sites, it will draw on elements relevant to the results obtained during survey.
- Methodology—Details survey strategy employed, instruments used, data collection strategy, data processing and visualisation methods.
- Survey Considerations – Details specific points of note for each survey area, including topography, upstanding obstructions or neighbouring objects.
- Results—Details the results and interpretation of the geophysical survey, both in a general context and discusses specific anomalies of archaeological interest. Geophysical reports will be discussed in consideration with satellite imagery, historic mapping and LiDAR data—if freely available—as supporting interpretative evidence.
- Conclusions
- Archiving
- Copyright
- References
- Figures—The site location and individual survey areas will be presented. Georeferenced greyscale images of the minimally processed data, XY traces and corresponding interpretations will be displayed at appropriate scales. Interpretations will also be displayed over satellite imagery, historic mapping and LiDAR—as applicable—to provide further context to the interpretations. All figures will include a detailed scale bar, north arrow and key.

7. Archiving

7.1. MS maintains an in-house digital archive, which is based on Schmidt and Ernenwein (2013). This archive stores the collected measurements, minimally processed data, georeferenced and un-georeferenced images, XY traces and a copy of the final report. A copy of this archive will be included in a disk with the final printed report.

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

7.3. An OASIS form will be filled in on completion of the survey, providing permission from the client.

8. Copyright

8.1. Copyright and the 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.

9. References

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MSTM527 - Bacton, Suffolk
Figure 1 - Site Location
1:25,000 @ A4

magnitude surveys

MSTM527 - Bacton, Suffolk
Figure 2 - Location of Survey Area
1:4,000 @ A3

magnitude surveys

STANDARD MAGNETIC FIELDWORK RISK ASSESSMENT

Likelihood of Accident/Incident Occurring	Severity of Consequences
1. Highly improbable 2. Probable – annually 3. Infrequent – 2-3 times/year 4. Occasional – monthly 5. Frequent – weekly	1. Minor injury minor damage to plant/equipment/buildings 2. Injury (no time lost) damage repair costs are low 3. Injury (time lost) high damage repair costs 4. Major reportable injury very high damage repair costs 5. Fatality major damage and major costs

Details of tasks to be carried out	Potential Hazard	A Likelihood	B Severity Rating	Overall Risk Rating A x B	Control Measures	Action	Revised Risk Rating
Driving company vehicle	Losing control of vehicle, sudden breaking or swerving. Hitting another road user, pedestrian or stationary object.	2 2	5 5	10 Moderate 10 Moderate	Do not drive vehicle if feeling unwell or tired. Take regular breaks on long journeys. Take turns driving when working in groups. Try to avoid driving in adverse weather	If weather is severe pull over. Stay in a hotel if work has been delayed or weather conditions are extreme.	1x5=5 Low 1x5=5 Low
Parking company vehicle	Parking in an unsafe location, such as a blind corner or hidden dip or on the side of a major highway. Pausing while farm gates are opened in order to exit highway.	3 4	5 4	15 High 16 High	Where possible park off-road in car parks, farm yards, fields or lay-bys. If it is not possible to access a survey area in a safe manner, stop and make new arrangements, such as obtaining keys or codes to locked gates. Use vehicle lights, such as dipped headlights, and hazards. Avoid packing or unpacking the vehicles in the dark. When performing reversing procedures while entering or exiting fields, position a colleague in a safe place where they can be seen and heard in order to direct and	Wear high visibility clothing when working around vehicles. Use the floodlight when necessary and safe to do so. Return early during winter months to prevent working in dusk conditions Only stop on highway if safe to do so. Use hazard lights.	1x5=5 Low 1x4=4 Low

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					communicate information on the road traffic.		
Loading and unloading the cart	Muscle strain, dropping equipment, slips trips and falls.	4	2	8 Moderate	Work in a pair, never lift the cart in or out on your own. Move the cart to the edge of the van and then lower to the ground. Never step out the van while lowering to the floor. Follow manual handling training.	Clear both the interior and surrounding van area before attempting to lift the cart in or out the van.	2x1=2 Low
Entering and commencing work in a new survey area	Coming into contact with unknown hazards in a new survey area.	4	2	8 Moderate	Where possible, arrange for livestock to be removed from survey areas before work is begun. Liaise with farmer with regard to livestock. Complete a walkover survey and dynamic risk assessment of the survey area to identify any hidden or unusual hazards, remove or reduce the hazard as best as possible and inform all other staff members of both the hazard and the measures that are being implemented to minimise the risk.	Provide a project questionnaire a to be completed by the client before commencement of fieldwork to reduce or eliminate hazards before commencing fieldwork.	2x1=2 Low
Balancing the magnetic sensors	To complete the sensors' calibration requires the cart to be lifted and turned upside down.	4	3	12 Moderate	When the cart must be lifted, ensure it is set up by two people. Before the cart is lifted, a set of steps and commands should be agreed, who will perform each step and when. If either party feels uncomfortable with the procedure, they should immediately let their partner now and safely put the cart down together.		3x2=6 Low

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					The cart should not be lifted in high winds or when the ground is slippery underfoot.		
Surveying with the cart	Slips, trips and falls while walking with instrument. Strains to muscles while pulling cart.	4	3	12 Moderate	Care taken when working in field. Work not to be undertaken where there are poor field conditions, such as heavy plough or thick vegetation - where a clear view of the underfoot condition is not possible.	Safety survey boots to be worn while walking. Warm up/ down in cold conditions.	3x2=6 Low
Working in all weather conditions.	Hypothermia and heat stroke.	3	3	9 Moderate	Stop survey and take shelter in heavy rain and strong wind to avoid accidents and illness. Take regular breaks in hot weather.	Appropriate PPE to be worn, full waterproofs and safety boots are provided. Make use of the provided, water, sun tan lotion and aftersun. Wear a hat.	3x1=3 Low

Site Specific Risk Assessment

Project Name:

Project No:

Client:

Assessor:

Date of Survey:

Signature:

Description:

Hazard	Who could be harmed?	Mitigation strategies?	Any further action required?	Who should take action? When?	Has the hazard been resolved?

COSHH FORM

Task **Use of Lithium Polymer Batteries**	
Location of activity: On Site	**Assessment Reference: MAGCOSHH - 4**
Who is at Risk:	Staff undertaking task survey.
Material	**Hazard**
Lithium Polymer Batteries	Electrolyte may irritate skin or eyes. Fire Hazard if battery is damaged, incorrectly charged or exposed to excessive heat.

Control Measures and storage procedures

Batteries are designed to be recharged, use only charging equipment provided.

Use Lipo fire proof bags provided when charging. Do not leave unattended when charging.

Place charging equipment and batteries on a level, non-flammable surface.

Inspect cables in advance of use and charging, do not use or charge batteries **if a fault is found, quarantine the item and report to management.**

Never disassemble a battery, do not puncture or crush.

Do not store above 60® C

Protect terminals when storing

Flammables and explosives

Is there a substance used or formed that might give rise to a fire? Yes

Damaged cells may leak flammable vapours.

Foam, dry powder and carbon dioxide extinguishers can be used.

Personal Protective Equipment [*gloves, safety glasses*]
No PPE is required for the handling and use of batteries which have not been damaged.
The handling of damaged batteries should be avoided, if it is necessary to move a damaged battery chemical resistant gloves should be used, and safety glasses worn. No skin should be exposed.

Monitoring

Not required.

Health surveillance required

None.
Storage Keep away from heat, sparks, open flame and combustible materials. Store only in the provided containers, within lipo fire proof bags.
Waste disposal [general waste, recyclable] Arrange for hazardous waste collection through Bradford City Council
First Aid If cell becomes ruptured or damaged and material from within the cell comes in to contact with skin, flush immediately with water. If contact with eyes occurs, then flush with copious amounts of water for 15 minutes. Seek medical advice.

Assessment Summary The risk posed from the use of Lithium Polymer baterries is medium. Using the appropriate control measures and PPE this risk is reduced from medium to low.

Assessor: Ed Burton

Signed: Edward Burton

Date: 7/3/19

Review date: 31/3/20

magnitude surveys

OASIS DATA COLLECTION FORM: England

Printable version

OASIS ID: magnitud1-361375

Project details

Project name	Land off Woodward Avenue, Bacton Stowmarket
Any associated project reference codes	MSTM527 - Contracting Unit No.

Project location

Country	England
Site location	SUFFOLK MID SUFFOLK BACTON Geophysical Survey on land off Woodward Avenue, Bacton Stowmarket
Postcode	IP14 4LJ
Study area	6.11 Hectares

Project creators

Name of Organisation	Magnitude Surveys Ltd
Entered by	Julia Cantarano (j.cantarano@magnitudesurveys.co.uk)
Entered on	26 July 2019

OASIS: