magnitude surveys

Geophysical Survey Report

of

Land at the NSG European Technical Centre

Lathom, West Lancashire

For

Orion Heritage Ltd

On Behalf Of

Lightsource BP

Magnitude Surveys Ref: MSSD265

April 2018

Unit 17, Commerce Court

Challenge Way

Bradford

BD4 8NW

01274 926020

info@magnitudesurveys.co.uk

Report Written by:

Peter Turner BSc, MSc and Graeme Attwood MSc, MCIfA

Figures Produced by:

Dr Chrys Harris BA, MSc, PhD

Report Checked by:

Finnegan Pope-Carter BSc MSc FGS

Issued:

05 April 2018

Abstract

Magnitude Surveys was commissioned to assess the subsurface archaeological potential of a c. 4.6 ha area of land at the NSG European Technical Centre, Lathom, West Lancashire. A fluxgate gradiometer survey was successfully completed, and extensive anomalies related to the First World War remount depot were identified. The geophysical results primarily reflect concrete or brick roadways serving the structures and/or demolition rubble from the depot buildings. A number or structures have been tentatively identified, including barrack/stable blocks and an exercise track. No evidence has been found which matches the description of the reported horse burials at the site, neither have any anomalies been identified that would be considered a likely candidate.

Contents

List of Figures

1. Introduction

1.1. Magnitude Surveys Ltd (MS) was commissioned by Orion Heritage Ltd. on behalf of Lightsource BP to undertake a geophysical survey on a c. 4.6ha area of land at Lord's Cottage Farm, Lathom, West Lancashire (SD 4583 0830).

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. The survey commenced on Thursday 22 of March and took 1 day to complete.

2. Quality Assurance

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

2.2. Magnitude Surveys is a corporate member of ISAP (International Society of Archaeological Prospection).

2.3. Director Graeme Attwood is a Member of the Chartered Institute for Archaeologists (CIfA), the chartered UK body for archaeologists, as well as the Secretary of GeoSIG, the CIfA Geophysics Special Interest Group. 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. Director Chrys Harris has a PhD in archaeological geophysics from the University of Bradford and is the Vice-Chair of the International Society for Archaeological Prospection.

2.4. 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. Further to this the survey had the specific aim of trying to locate a number of potential horse burials which were purported to be within the survey area.

4. Geographic Background

4.1. The site is located c. 20 km northeast of Liverpool, c. 2km due north of Lathom, Lancashire (Figure 1). Survey was undertaken over an area of pasture to the south of the NSG European Technical Centre. It is surrounded to the north, east, and south by arable fields; to the west is further pasture. The site slopes downwards slightly to the east (Figure 2).

4.2. Survey considerations:

Survey Area	Ground Conditions	Further Notes
1	Pasture, sloping downwards to the east. Considerable waterlogging in parts of the site	Considerable earthworks visible on the ground surface. Concrete rubble is visible on the ground surface at the western end of the field. In the south of the survey area is a metal hut which has caused a ferrous 'halo'. Some parts of the site in the north of the survey area were waterlogged despite pumping of the land prior to survey to reduce the flooding.

4.3. The underlying geology comprises interleaved bands of mudstone, siltstone and sandstone from the Pennine lower coal measures formation with Old Lawrence Rock sandstone running parallel one to each other in a south-west to north-east axis. Superficial deposits are mainly composed of Shirdley Hill sand formation. To the north west of this is a band of Devensian till running in a south-west to north-east axis, (British Geological Survey, 2018).

4.4. The soils consist of slightly acid loamy and clayey soils with impeded drainage with a small pocket of naturally wet very acid sandy and loamy soils (Soilscapes, 2018).

5. Archaeological Background

5.1. The following section provides a brief overview of the archaeological background of the site and its surrounding landscape, summarising information provided in a draft desk-based assessment produced by Orion Heritage Ltd (Bedford, W., 2018).

5.2. Evidence of Roman activity has been uncovered within the wider landscape. This is demonstrated through a Roman coin found by metal detectors at c. 500 meters from the southeast of the southern area (HER MLA28630) and some Roman pottery fragments found on surface by field walkers at c. 500 meters to the southwest of the study area (HER MLA26675) and a single pottery sherd found by OAN while doing an evaluation (OAN 2011).

5.3. The approximately 1,100-acre land, recorded in the Domesday Survey of 1086, conforming the Manor of Lathom and its estate (HER MLA34375, HER MLA759) is partially covered by the northern survey area.

5.4. There is evidence of a "fieldwork" or encampment dating from the civil war in the 1640's situated 500m to the east of the study area (HER MLA62, MLA2821), from the same period it is also likely to find sparse remains from the Lathom House siege such as musket and cannon balls

in the northern area. A possible 17th century gate has been recorded in the southern area but there are no archaeological evidences (HER MLA26671).

5.5. During the First World War the War Office established a Remount Depot for cavalry units on the site, building huts made of timber and corrugated iron, a Kraal and crush for exercising horses and other structures (HER MLA14984), the possible remains can still be seen as earthworks on the surface and as cropmarks through satellite imagery.

5.6. The units at the remount depot were divided into a number of squadrons, each comprising 500 horses and approximately 125 grooms, blacksmiths and other support staff (Lathom & Burscough Military Heritage Society, 2018). A periodical publication known as "The Remount Herald" was produced by and for the squadrons stationed at Lathom, and provides some information on the layout of the structures (Bedford, W., 2018):

5.6.1. An inspection of the site in October 1915 (October 22nd, 1915) named several structures/ elements (location unknown): Terminus Forage Barn, Park Station, Sleeper Road Forage Barn, Guard room, Barbers Shop, Bootmaker known as 'Dickinson's Emporium,' Meat Store.

- The 'A' lines Huts: the space between huts and washhouse round to the boiler were all bricked. The washhouse and latrine had cement floors. A riding school was located in the paddock. The kitchen was whitewashed. Good roads.

- The 'B' Lines Huts: no brick pavements at this date. Kitchen. Brick courtyard and outhouses in the making.

- The 'C' lines huts: A good cinder road and drainage one side and a 'Roman road' in the making. Smart stables. The passage between huts and washhouse bricked and corrugated iron cover overhead. Cement in washhouses rotten.

5.7. A geophysical survey was recently carried out over a large portion of the present site by SUMO Services Ltd. (Gater 2018), and detected clear responses related to the remount depot, however SUMO where unable to survey the entire site due to the presence of standing water, leaving two gaps in the survey.

5.8. Since the SUMO survey occurred, concerns have been raised locally relating to rumours that horses were buried within the site. Local knowledge suggests that this occurred initially in a pit (approximately 5 yards across) which was expanded across the site over the period of the war to approximately 30 yards by 15 yards (Bedford, W. pers. comm. 2018).

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 Hemisphere S321 GNSS Smart Antenna RTK GPS outputting in NMEA mode to ensure high positional accuracy of collected measurements. The Hemisphere S321 GNSS Smart Antenna 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 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 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 have been used for data interpretation. Greyscale images should be viewed alongside the XY trace plot (Figure 9). 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 (2018) was consulted as well, to compare the results with recent land usages.

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), and LiDAR (Figure 8).

7.2.2. The fluxgate gradiometer survey has responded well to the survey area's environment, though it should be noted that in places there is a large volume of strongly magnetic material that reflect remnants of the remount depot; this material has the potential to mask more subtle features, should any be present.

7.2.3. The results show strong responses across most of the site due to brick or concrete roads and services delineating the depot structures. Information from the Remount Herald (see 5.6) suggests that construction at the depot was primarily of brick, concrete, and corrugated iron along with the use of cinder for road surfacing and 'loads of ashes' for

laying out kraals; all of these materials would be highly magnetically enhanced, and capable of producing the strong responses that can be seen at the site.

7.2.4. The results show close agreement with the data collected by SUMO, however small differences in the form, strength, and precise position of recorded anomalies do occur. This is caused by a number of factors, chiefly: sensor type (MS uses Bartington's newer three-axis Grad 13 sensors with a half-meter separation between top and bottom gradiometers, as opposed to the single-axis, meter long Grad 601s in use by SUMO); GNSS positioning (MS's system records positional data in real time alongside the magnetometer data rather than tying in the corners of grids); and survey direction. Survey direction in relation to magnetic north has an influence on the form of the detected anomaly, and features that are in line with the survey direction will tend to appear as a weaker recorded anomaly when compared to a similar feature that lies perpendicular to the survey direction.

7.2.5. No evidence for extensive horse burial can be identified within the survey area. Most of the site is covered with remains related to the remount depot structures and were likely in active use during the war. The remaining clear ground shows no evidence of the kind of excavation described.

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. **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.

7.3.1.3. **Ferrous (Discrete/Spread)** – Discrete ferrous-like, dipolar anomalies are likely to be the result of modern metallic disturbance on or near the ground surface. A ferrous spread refers to a concentrated deposition of these discrete, dipolar anomalies. Broad dipolar ferrous responses from modern metallic features, such as fences, gates, neighbouring buildings and services, may mask any weaker underlying archaeological anomalies should they be present.

7.3.2. Magnetic Results - Specific Anomalies

7.3.2.1. **Kraal Exercise Track** – A strong sub-oval anomaly (**1a**) in the south east of the area is clearly visible and is likely one of the ash built 'kraals' mentioned in the Remount Herald; the ash used in the construction would be a magnetically enhanced material and would account for the strength of this anomaly. A linear and pit-like anomaly inside the track have been denoted as possible archaeology, these may be contemporary and related to the Kraal structure, however a different origin cannot be ruled out.

7.3.2.2. **Barrack/Stable Block** - The two large areas of strong magnetic anomalies in a grid pattern (**1b**) have been detected within the centre and east of the survey area. The information from the Herald suggests that the compounds for many of the squadrons included brick or cinder surfaced paths between the buildings. This contemporary source supports the interpretation that the broad (circa 4m wide) anomalies that form **1b** are pathways between and around the wood and corrugated iron structures of the depot. A separate anomaly (**1c**) runs between these blocks and corresponds to a depression visible on the ground surface and in aerial photographs; this may be a drain like that noted in 5.6.1.

7.3.2.3. **Possible Road/Service** - To the west of **1b** are another set of linear anomalies (**1d**) which (although considerably narrower and weaker) follow the same alignment. These are likely to represent roads or services supplying further buildings perhaps of a different construction.

7.3.2.4. **Yard Surfaces** - In the northern part of the survey are two further rectilinear blocks (**1e**). Detail is harder to make out here due to high levels of noise, though this noise remains restricted within clear boundaries. It is possible that this is caused by ferrous or fired debris from former buildings and floor/road surfaces (brick, concrete, or cinder) in or around a set of structures. Using a wider plotting range (Figure 4) suppresses some of this noise in favour of the stronger anomalies and shows a set of comparatively noise free rectilinear spaces. The eastern portion of **1e** could be a brick or concrete courtyard, with the negative space between the two blocks representing a large structure. Stronger linear responses running through **1e** are similar in response to field drains and are may reflect the extensive drainage reported to have been constructed for the Remount; although an agricultural origin for these anomalies cannot be ruled out.

7.3.2.5. **Possible Road/Service** - In the western-most portion of the site is a final set of linear features (**1f**), these are similar in character to **1d** which are immediately south east. These are also likely to reflect, roads, drains or services associated with the depot. Within this area is a group of strong responses (**1g**) that may reflect ferrous or fired material.

7.3.2.6. **Drain** - A very strong set of linear anomalies (**1i**) dominate the south-western portion of the survey area. This presents as a broad response entering the field from the south-west, before splitting into a northern, central and southern

branch. These are still visible in the field and LiDAR images as narrow raised causeways, and could represent water services to the depot running from the reservoir at Stand Farm to the south; the services are not denoted on the pre-war Ordnance Survey mapping but do appear on the first post wat revision of 1926, which shows the main trunk and southern branch as a pathway extending from the reservoir in the immediate post-war period, but not before (Figure 7).

7.3.2.7. **Drain** - Following the northern-most boundary of the site is a curvilinear feature (**1j**) which appears to delimit the northern boundary of the noise around **1e**. This seems to lead downslope towards the water-logged area around the northern terminus of **1c** and may be a drain or drainage ditch. However, this feature does not seem to respect the alignment of the rest of the structures, and it may not be contemporary with them.

7.3.2.8. **Ferrous –** A strong anomaly orientated northwest southeast has been caused by a service that crosses the site diagonally through the depot remains; this does not respect the alignment of the depot structures and is almost certainly not contemporary with them. A gas main is known to cross the site and this anomaly is almost certainly reflective of this. A handful of smaller linear ferrous anomalies cross parts of the site and may be contemporary with the depot.

7.3.2.9. **Ferrous –** A metal hut (**1k**), extant at the time of survey, towards the centre of the southern boundary as created a large ferrous ‘halo’.

7.3.2.10. **Undetermined –** Linear anomalies in the southeast of the survey area do not have a clear origin, they may be representative of ploughing trends or drainage ditches, either associated with depot or dating from another period. However, the ambiguous nature of the response means that another origin cannot be entirely ruled out.

8. Conclusions

8.1. The magnetometer survey has identified strong, clear anomalies over most of the survey area; the majority of these are related to the First World War Remount Depot, and are interpreted as brick or concrete pathways, courtyards and drains surrounding the now removed wood and corrugated iron depot structures.

8.2. Near the centre of the site are two large rectilinear blocks suggestive of barrack and/or stable blocks, with what is likely to be a large drain running north-south between them. To the east of these is a large, responsive sub-oval feature which is likely one of the ash surfaced 'kraals' used for exercising horses. To the west of the stable blocks are several weaker linear responses on the same alignment that may represent further structures. In the northern section of the survey area is a region of broad rectilinear responses with negative spaces within them. These likely represent further brick pathways and courtyards surrounding smaller depot structures. In the west of the site is a final region of weaker rectilinear responses.

8.3. A number of services cross the site. Contemporary OS mapping suggests that some of these are water services linking the depot to the reservoir at Stand Farm to the south. A strong ferrous response that crosses the site is unlikely to be contemporary with the depot and likely represents a later service.

8.4. The survey has detected no evidence for horse burial pits. Most of the survey area shows signs of infrastructure that would have been extant during the period of the depot's use, leaving limited space for excavation. The only areas of clear ground within the field appear to be in the south-west quadrant, where there are fewer anomalies, however this area is subdivided by the main service and to the south of the kraal where several anomalies have been categorised as undetermined, these anomalies are likely to agricultural in origin and may point to one of the several horticultural areas that are described in the accounts of the depot.

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 all reports to the ADS Grey Literature Library subject to any time embargo dictated by the client.

9.3. Whenever possible, MS has a policy of making data available to view in easy to use forms on its website. This can benefit the client by making all of their reports available in a single repository, while also being a useful resource for research. Should a client wish to impose a time embargo on the availability of data, this can be achieved in discussion with MS.

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, 2018. Geology of Britain. Lathom, West Lancashire. [http://mapapps.bgs.ac.uk/geologyofbritain/home.html/]. [Accessed 23/03/2018].

Bedford, W., 2018. Personal Communication. Telephone call on 28/03/2018

Bedford, W., 2018. Land at the NSG European Technical Centre, Lathom, West Lancashire Archaeological Desk Based Assessment. Produced by Orion Heritage Ltd, Manchester

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

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.

Gater, J., 2018 Geophysical Survey Report: Land at and to the South of the NSG European Technical Centre, Lathom, Lancashire. SUMO Services Limited, Bradford

Google Earth, 2018. Google Earth Pro V 7.1.7.2606.

Lathom & Burscough Military Heritage Society, 2018. History of Lathom Remount Depot [http://lbmhs.co.uk/remount-history]. [Accessed 26/03/2018]

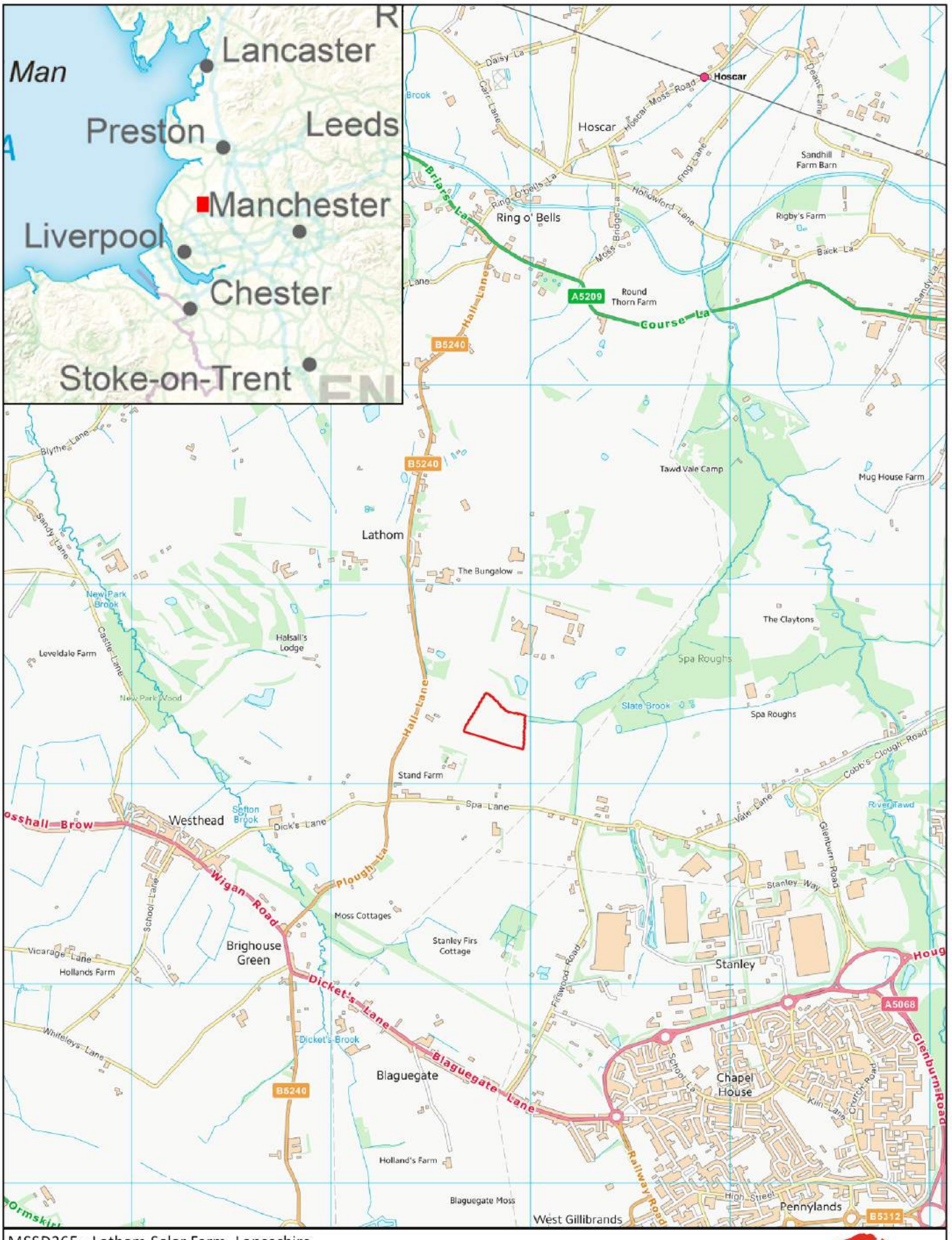
OAN, 2011. Lathom Park Gardens, West Lancashire: Archaeological Evaluation Report

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 ed., 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, 2018. Lathom, West Lancashire. Cranfield University, National Soil Resources Institute [http://landis.org.uk]. [Accessed 23/03/2018].



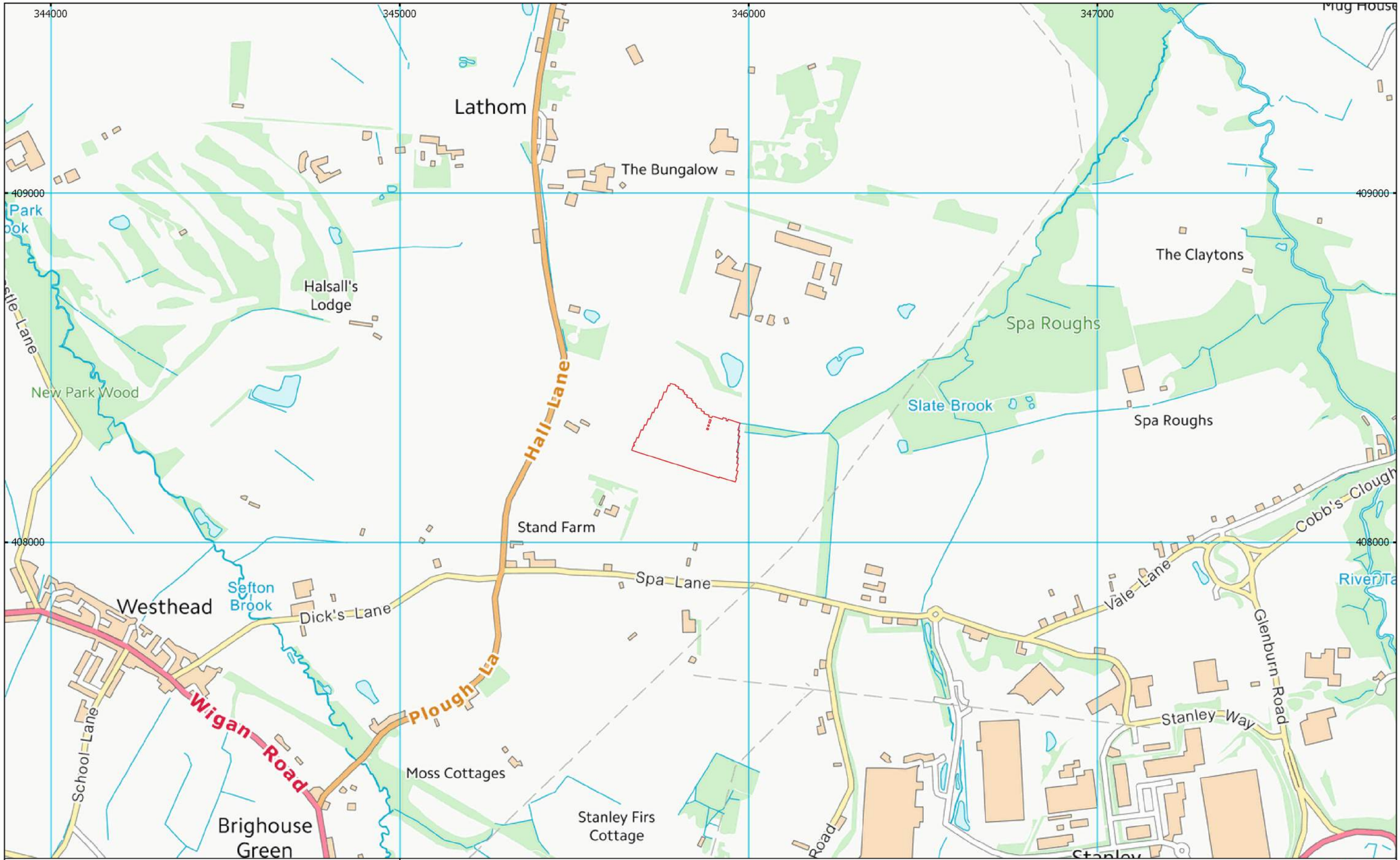
MSSD265 - Lathom Solar Farm, Lancashire
Figure 1 - Site Location
1:25,000 @ A4

Survey Boundary

N

0 0.5 1 km

magnitude surveys



MSSD265 - Lathom Solar Farm, Lancashire
Figure 2 - Location of Survey Area
1:10,000 @ A3

Survey Extent

magnitude surveys

345600
345700
345800
345900
346000
346100
408400
408300
408200

MSSD265 - Lathom Solar Farm, Lancashire
Figure 3 - Magnetic Greyscale (-3 to 5 nT)
1:1,500 @ A3

-3 nT 5

N

0 50 100 150 m

magnitude surveys

345600 345700 345800 345900 346000 346100

408400 408400

408300 408300

408200 408200

MSSD265 - Lathom Solar Farm, Lancashire
Figure 4 - Magnetic Greyscale (-10 to 20 nT)
1:1,500 @ A3

-10 nT 20

N

0 50 100 150 m

magnitude surveys

345600
345700
345800
345900
346000
346100
408400
408300
408200
1a
1b
1c
1d
1e
1f
1g
1h
1i
1j
1k

MSSD265 - Lathom Solar Farm, Lancashire
Figure 5 - Magnetic Interpretation
1:1,500 @ A3

- Kraal Exercise Track
- Barrack/Stable Block
- Road/Service (Strong)
- Road/Service (Weak)
- Yard Surface
- Possible Road/Service (Strong)
- Possible Road/Service (Weak)
- Possible Yard Surface
- Drain
- Ferrous (Dipolar)
- Ferrous Disturbance
- Undetermined (Strong)
- Undetermined (Weak)
- Undetermined (Spread)
- ----- Service

N

0 50 100 150 m

magnitude surveys

345600 345700 345800 345900 346000 346100

408400 408300 408200

1a 1b 1c 1d 1e 1f 1g 1h 1i 1j 1k

MSSD265 - Lathom Solar Farm, Lancashire
Figure 6 - Magnetic Interpretation Over Satellite Imagery
1:1,500 @ A3

- Kraal Exercise Track
- Barrack/Stable Block
- Road/Service (Strong)
- Road/Service (Weak)
- Yard Surface
- Possible Road/Service (Strong)
- Possible Road/Service (Weak)
- Possible Yard Surface
- Drain
- Ferrous (Dipolar)
- Ferrous Disturbance
- Undetermined (Strong)
- Undetermined (Weak)
- Undetermined (Spread)
- Service

N

0 50 100 150 m

magnitude surveys

345300 345400 345500 345600 345700 345800 345900 346000 346100 346200 346300 346400

408600 408500 408400 408300 408200 408100 408000

B.M. 158·8

Walk

The Belt

Temple Wood

Goose Island

Postillion Cap

Goose Island Pond

Shoot

175

B.M. 176·6

Lord's Cottage

1j 1g 1f 1e 1h 1i 1d 1b 1c 1k 1a

182

200

Reservoir

Stand Farm

187

Hirst's Cottages

MSSD265 - Lathom Solar Farm, Lancashire
Figure 7 - Magnetic Interpretation Over Historic Maps
1:3,000 @ A3

Contains historic maps: Ordnance Survey, 6" 2nd edition c. 1882-1913 © National Library of Scotland

- Kraal Exercise Track
- Barrack/Stable Block
- Road/Service (Strong)
- Road/Service (Weak)
- Yard Surface
- Possible Road/Service (Strong)
- Possible Road/Service (Weak)
- Possible Yard Surface
- Drain
- Ferrous (Dipolar)
- Ferrous Disturbance
- Undetermined (Strong)
- Undetermined (Weak)
- Undetermined (Spread)
- ----- Service

N

0 50 100 150 m

magnitude surveys

345600 345700 345800 345900 346000 346100

408400 408300 408200

1a 1b 1c 1d 1e 1f 1g 1h 1i 1j 1k

MSSD265 - Lathom Solar Farm, Lancashire
Figure 8 - Magnetic Interpretation Over LiDAR (Hillshaded DTM)
1:1,500 @ A3

- Kraal Exercise Track
- Barrack/Stable Block
- Road/Service (Strong)
- Road/Service (Weak)
- Yard Surface
- Possible Road/Service (Strong)
- Possible Road/Service (Weak)
- Possible Yard Surface
- Drain
- Ferrous (Dipolar)
- Ferrous Disturbance
- Undetermined (Strong)
- Undetermined (Weak)
- Undetermined (Spread)
- ----- Service

N

0 50 100 150 m

magnitude surveys

345600
345700
345800
345900
346000
346100
408400
408300
408200

MSSD265 - Lathom Solar Farm, Lancashire
Figure 9 - XY Trace Plot
150nT/cm at 1:1,500 @ A3

N

0 50 100 150 m

magnitude surveys