East Midlands Gateway
Phase 2 (EMG2)

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ENVIRONMENTAL STATEMENT

Volume 2 Technical Appendices

Appendix 12C

Geophysical Survey Report (EMG2 Main Site)

July 2025

12

The East Midlands Gateway Phase 2 and Highway Order 202X and The East Midlands Gateway Rail Freight and Highway (Amendment) Order 202X

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SEGRO

Geophysical Survey Report

Of

East Midlands Gateway Phase 2,

Castle Donington, Leicestershire

For

RPS Group

Magnitude Surveys Ref: MSSK1236

HER Event Number: TBC

June 2022

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Abstract

Magnitude Surveys was commissioned to assess the subsurface potential of a c. 100ha area of land South of East Midlands Airport. A fluxgate gradiometer survey was successfully completed across c. 97ha, with small areas totalling c. 3ha unable to be surveyed due to isolated and small scattered areas of denser vegetation. Anomalies of archaeological origin have been identified in the form of long linear ditched features and partial and full enclosures covering an extensive area. Anomalies of agricultural origin have been identified in the form of former field boundaries, ridge and furrow ploughing, drainage features and a trackway, as well as modern ploughing. In addition, a number of anomalies have been classified as undetermined. These are of uncertain date and origin and have little supporting context. The majority of the south of the survey area is partially obscured by green waste. Natural variations in the superficial deposits have been identified in the north. Modern interference has also been detected but it is generally limited to the extant field boundaries.

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1. Introduction

1.1. Magnitude Surveys Ltd (MS) was commissioned by RPS Group to undertake a geophysical survey over a c. 100.2ha area of land south of Castle Donington, Leicestershire (SK 46459 2502).

1.2. The geophysical survey comprised 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 (Stoddart, 2022).

1.5. The survey was undertaken in two deployments. The first deployment commenced on 03/05/22 and took nine days to complete, the second commenced on 23/05/22 and took four days 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 for Archaeological Prospection).

2.2. The directors of MS are involved in cutting edge research and the development of guidance/policy. Specifically, Dr Chrys Harris has a PhD in archaeological geophysics from the University of Bradford, is a Member of CIfA and has served as the Vice-Chair of the International Society for Archaeological Prospection (ISAP); Finnegan Pope-Carter 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); Dr Paul Johnson has a PhD in archaeology from the University of Southampton, is a Fellow of the Society of Antiquaries of London and a Member of CIfA, 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.

4. Geographic Background

4.1. The survey area was located c. 320m northeast of Diseworth (Figure 1). Gradiometer survey was undertaken across 20 fields under arable cultivation. The survey area was bordered by the A453 to the north, Donington Park services to the east, and further fields to the south and west. East Midlands Airport was situated immediately north of the survey area (Figure 2). Areas across the main survey extent totalling c. 3ha were unable to be surveyed due to isolated and small scattered areas of denser vegetation.

4.2. Survey considerations:

Survey Area	Ground Conditions	Further Notes
1	The survey area consisted of an arable field sloping down to the southeast, with young wheat crop present.	The survey area was bordered by hedgerow in all directions.
2	The survey area consisted of a flat arable field with young wheat crop present.	The survey area was bordered by hedgerow in all directions. A metal gate was present in the northwest of the survey area.
3	The survey area consisted of an arable field sloping down to the south, with young wheat crop present.	The survey area was bordered by hedgerow in all directions.
4	The survey area consisted of a flat arable field with young wheat crop present.	The survey area was bordered by hedgerow in all directions. A metal gate was present in the northeast of the survey area.
5	The survey area consisted of an arable field sloping down to the east, with young wheat crop present.	The survey area was bordered by hedgerow in all directions. A metal gate was present in the northwest of the survey area.
6	The survey area consisted of an undulating arable field with young wheat crop present.	The survey area was bordered by hedgerow to the east and by barbed wire fencing in all other directions. Industrial waste was present in the northeast.
7	The survey area consisted of an undulating arable field with young wheat crop present.	A small area in the west had no physical boundary, and the survey area was bordered by hedgerow. A manure pile was present in the southwest.
8	The survey area consisted of an arable field sloping down and away from the centre to the north and south, with young wheat crop present.	The survey area was bordered by hedgerow and a barbed wire fence in all directions. Pylons and overhead cables were present running along the southern boundary and extending through the south of the survey area on a southeast to northwest orientation.
9	The survey area consisted of an arable field sloping down to the south, with young wheat crop present.	The survey area was bordered by hedgerow and a barbed wire fence in all directions.

10	The survey area consisted of a pasture field sloping down to the south.	The survey area was bordered by wood and wire fencing to the southwest and by hedgerow and barbed wire fence in all other directions.
11	The survey area consisted of an arable field sloping down to the south, with young wheat crop present.	The survey area was bordered by hedgerow in all directions except a small area in the east that was bordered by a wire fence. A radio tower was present beyond this fence. A small pond was present along the northern boundary.
12	The survey area consisted of an arable field sloping down into the centre from the north and south, with young wheat crop present.	The survey area was bordered by hedgerow and a barbed wire fence in all directions. Pylons an overhead cable ran along the western boundary. A metal gate was present on the southern boundary.
13	The survey area consisted of an arable field sloping down from the centre to the north and south, with young wheat crop present.	The survey area was bordered by hedgerow and a treeline to the west, and by hedgerow in all other directions.
14	The survey area consisted of an arable field sloping down to the north, with young wheat crop present. A trackway was present along the western boundary.	The survey area was bordered by hedgerow in all directions.
15	The survey area consisted of an arable field sloping down from the centre to the north and south, with young wheat crop present.	The survey area was bordered by hedgerow and a wooden fence to north, by hedgerow and a treeline to the east, and by hedgerow to the south and west.
16	The survey area consisted of a flat arable field with young wheat crop present.	The survey area was bordered by hedgerow and a wooden fence to north and west, a treeline to the south and had no physical boundary to the east.
17	The survey area consisted of an arable field sloping down to the east. Biodegradable sheeting was laid in strips along the field.	The survey area was bordered by hedgerow on all sides. A metal gate was present on the southern border.
18	The survey area consisted of a flat arable field with strips of biodegradable sheeting laid along it.	The survey area was bordered by hedgerow and ditch on all sides. A strip of land along the western boundary was not surveyable due to tall grass and brambles.
19	The survey area consisted of an undulating arable field with strips of biodegradable sheeting laid along it.	The survey area was bordered by hedgerow on all sides. A ditch was also present along the eastern length of the northern boundary. Metal gates were present in the southwestern and northwestern corners of the survey area.
20	The survey area consisted of an undulating arable field with strips of biodegradable sheeting laid along it.	The survey area was bordered by hedgerow on all sides. A small area was not surveyable on the southeastern border due to tall grass and brambles.

4.3. The underlying geology in the majority of the survey area comprises mudstone of the Gunthorpe Member. Bands of siltstone of the Gunthorpe Member run through areas 1, 2, 5, 9, 10, 17, 19 & 20, and bands of Diseworth Sandstone through areas 1, 3, 4, 7, 9, 12, 14 & 18. There are no superficial deposits recorded in the majority of the southern part of the survey area. A band of glaciofluvial deposits of sand and gravel runs through areas 3, 6, 7, 8, 11, 12, 15 & 16. Bands of Head - clay, silt sand and gravel run through areas 12, 13, 14, 19 & 20 and a band of diamicton of the Oadby Member runs through areas 3, 5, 7 & 15 (British Geological Survey, 2022).

4.4. The soils consist of slightly acidic loamy and clayey soils with impeded drainage (Soilscapes, 2022).

5. Archaeological Background

5.1. The following is a summary of a Desk-Based Assessment, produced and provided by RPS (Clarke, 2022).

5.2. Several isolated Neolithic artefacts have been identified surrounding the survey area. A Neolithic stone axe was recovered c. 200m west of the survey area, with an arrowhead identified c. 1.3km north. Isolated sherds of Iron Age pottery were also found, between 500m and 1km to the southeast of the survey area.

5.3. Roman activity has been identified, with a possible Roman road running northeast to southwest, with its closest point c. 200m northwest of the survey area. A hoard of Roman coins, in proximity to Roman pottery, were also identified, between 500m and 1km southeast of the survey area.

5.4. Place name evidence suggest the location of a possible Early Medieval meeting place c. 300m to the north of the survey area. The Church of St. Michael, located centrally within Diseworth, c. 350m to the west of the survey area, is likely to have been originally constructed in the 10th century AD, while earthworks associated with a Medieval manorial site are located at the western end of the village c. 800m west of the survey area. A recent archaeological watching brief at Clements Gate, approximately 250m to the west of the survey area, recorded multiple pits and postholes in association with a range of domestic artefacts, relating to Medieval settlement occurring within the historic core of the settlement. Several features of archaeological interest lie immediately outside of the survey area boundary to the southwest. A small area of agricultural ridge and furrow earthworks were surveyed in 2010 within existing fields, while an upstanding earthwork mound 30-40ft in diameter representing the remanence of a possible windmill mound located in proximity to the ridge and furrow was also identified and could be roughly contemporary.

5.5. Castle Donnington airfield, located a short distance to the northwest of the survey area, was initially in operation use during the latter part of the First World War, and was then subsequently in use as a Bomber Station between 1942 and 1946. The location of a Star Fish World War II bombing decoy is recorded within the southeast part of the survey area, although a previous site walkover did not identify any features which could be associated with it.

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. Geophysical survey therefore comprised the magnetic method as described in the following section.

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.

6.1.4.1. 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.

6.1.4.2. 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.

6.1.4.3. 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 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 12, 16, 20, 24, 28, 32 & 36). 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 (2022) 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 (Figures 5 & 8).

7.2.2. A fluxgate gradiometer survey was successfully carried out across a c. 97ha area of land South of East Midlands Airport, with small areas totalling c. 3ha unable to be surveyed due to isolated and small scattered areas of denser vegetation. The survey has generally responded well to the environment of the survey area within the north. The majority of the data in the south is however greatly affected by the presence of green waste. 'Green Waste' refers to organic garden waste which is composted and sold as soil fertiliser. Green waste is often contaminated with metal and other domestic waste, and so can impact the effectiveness of a magnetic survey, as this material can exhibit a strong magnetic signal which introduces noise across the results. Due to the strong magnetic enhancement of green waste, it is possible that weaker more ephemeral anomalies may have been masked including archaeological anomalies if present. The strong magnetic enhancement caused by the green waste has made detection and interpretation of anomalies challenging, and it may have obscured other more ephemeral anomalies if present. Modern interference is generally limited to the field boundaries.

7.2.3. The survey has detected multiple areas of possible archaeological activity, including multiple linear and curvilinear anomalies forming linear alignments and multiple possible complete and partial enclosures. These anomalies are more enhanced than the surrounding soil and are typical of ditched features containing an enhanced fill. These anomalies do not respect current field boundaries, crossing over several of the fields, and can be seen from Area 12 running across through to Area 11 (c.710m).

7.2.4. Agricultural activity has been identified across the survey area in the form of mapped former field boundaries, ridge and furrow ploughing, drainage features and a trackway, as well as modern ploughing trends.

7.2.5. Geological variations, detected as enhanced bands and mottling, have been identified in the north of the survey area. These likely relate to changes in the sands and gravels in the superficial deposits.

7.2.6. Multiple anomalies have been identified within the survey area but have been categorised as undetermined. These anomalies do not correspond to any features recorded on historical or satellite imagery and may be the result of modern or agricultural activity, however a possible archaeological origin cannot be excluded.

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

7.3.1.3. **Ferrous/Debris (Spread)** – A ferrous/debris spread refers to a concentration of multiple discrete, dipolar anomalies usually resulting from highly magnetic material such as rubble containing ceramic building materials and ferrous rubbish.

7.3.1.4. **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.

7.3.1.5. **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. **Possible Archaeology (Strong & Weak)** – Strong and weak linear anomalies have been identified within the south of Area 12 [**12a**] (Figures 19 & 23). These anomalies form a partial rectilinear enclosure suggestive of an archaeological origin. Within Area 3 multiple weak and strong linear anomalies have been identified. In the west of Area 3, these seem to have been truncated by mapped historical field boundaries [**3c**]. In the southeast corner of Area 3 a linear ditched feature has been identified measuring c. 82m in length, oriented northeast to southwest. A possible enclosure measuring c. 11m x 8m [**3a**] (Figure 19) has been identified with its western edge being formed by this linear anomaly. To the north of the possible enclosure a weak linear anomaly [**3b**] has been

identified oriented northwest – southeast. It has a similar signal to the linear anomaly further south and given their locations and morphologies they may at one point have formed two sides (meeting at a right angle) of a feature (Figure 19). This anomaly [**3b**] appears to continue into Area 15 (Figure 23), forming a further linear with attached partial and full enclosures [**15a**]. Further linear and curvilinear anomalies have been identified [**15b**] (Figure 23). The anomalies in the southeast of Area 15 [**15b**] extend into Area 11 [**11a**] (Figure 15). Within the southwest of Area 11 multiple weak strong curvilinear and linear anomalies extend from the western boundary on differing alignments [**11a**] [**11b**] with some forming partial rectilinear features [**11c**] (Figures 15). The northernmost of these [**11b**] extends 67m east to west and has possible attached enclosures to its south, however given its alignment it could be an extension of a mapped field boundary visible to the west (Figure 5).

7.3.2.2. **Agricultural (Strong & weak)** – Linear alignments of strong and weak anomalies have been identified within Areas 3, 8, 12, 15, 16 & 18 (Figures 11, 15, 19, 23, 27, 31 & 35). These anomalies collocate with former field boundaries visible on historical OS maps (Figure 5). Within Area 3 an alignment of weak linear anomalies has been identified [**3c**] running to parallel to a mapped former field boundary (Figure 19). These likely relate to a former agricultural trackway or secondary unmapped boundary. Within Area 10 two parallel linear anomalies have been identified [**10a**] in a north south orientation running parallel to identified ridge and furrow (Section 7.3.2.3) (Figure 27). These anomalies are perhaps indicative of a double ditched trackway and are most likely related to the surrounding ridge and furrow, as well as appearing to join with the identified field boundary to the east, so have been classified as 'Agricultural'.

7.3.2.3. **Ridge and furrow (Trend)** – Within Areas 3, 8, 10, 13, 15 & 16, multiple alignments of linear anomalies have been identified (Figures 11, 15, 19 & 27). The anomalies are aligned in various orientations, and with different spacing and shape, possibly indicating multiple historical land divisions. The anomalies comprising each of these groups are indicative of ridge and furrow ploughing trends, due to their morphology and general 8-10m spacing.

7.3.2.4. **Agricultural (Trend)** – Within Areas 3 & 16 weak linear anomalies have been identified running parallel to the northern and southern field boundaries. These correlate with modern agricultural activity visible in satellite imagery (Figure 5).

7.3.2.5. **Drainage Features** – Numerous weak linear anomalies with a positive signal have been identified within Areas 3, 8, 11, 12, 13, 14 & 15 (Figures 15 & 19). These are indicative of cut drains.

7.3.2.6. **Natural (Spread)** – Within Areas 3, 6, 13, 15, & 11 bands of natural anomalies have been identified (Figures 11 & 15). These are visible as enhanced amorphous bands stretching from each to west. In Areas 6 & 13 the magnetic signal appears as more mottled. This is most likely caused by changes in the sand and gravel deposits recorded across the survey area (Section 4.3.).

7.3.2.7. **Ferrous (Spread)** – Within Areas 1, 2 ,4, 5, 7, 9 & 17-20 the survey has identified spreads of strongly enhanced magnetic material (Figures 19, 23, 27, 31 & 35). This spread has been interpreted as a green waste. Small spreads of strongly enhanced magnetic material have also been identified in the north of Areas 6 & 15 (Figures 11 & 15). These are visible as cropmarks in past satellite imagery and were identified within the area at the time of survey. They are most likely caused by agricultural or industrial waste within in survey area.

7.3.2.8. **Undetermined** – Multiple anomalies have been identified across the survey area. These have no distinctive signal or shape to suggest a specific interpretation and may have natural, agricultural, or modern origins, though an archaeological origin cannot be completely ruled out. In Area 3, one linear anomaly [**3d**] appears to form the southern boundary to an area of ridge and furrow cultivation (Figure 19). It may be that this is therefore an agricultural feature such as an old field boundary. However, there is not enough information from the geophysical data alone to confidently ascribe an origin. Within the areas of green waste (Areas 1, 2, 4, 5, 7, 9 & 17-20) multiple linear and curvilinear anomalies have been identified (Figures 18, 22 & 26). These are difficult to distinguish from the strongly enhanced magnetic material they are in proximity with and may be a result of how the green waste was deposited and/or affected by cultivation practices after its deposition. Given the features of a possible archaeological origin in the northern section of the survey area, an archaeological origin should not be ruled out, especially for those anomalies with a more regular morphology where they form right-angles and partial rectilinear shapes [**1a**] [**7a**] [**18a**] [**20a**]. Broader more amorphous anomalies [**9a**] [**9b**] are more likely to have a geological origin.

8. Conclusions

8.1. A fluxgate gradiometer survey was successfully undertaken across c. 97ha of the survey area, with small areas totalling c. 3ha unable to be surveyed due to isolated and small scattered areas of denser vegetation. The survey has primarily detected anomalies of archaeological, agricultural and undetermined origins. Modern interference was generally limited to the field boundaries. Much of the south of the survey area is obscured by the presence of green waste, making interpretation of detected anomalies challenging. Natural variations in the geology are visible in the north of the survey area.

8.2. Archaeological activity has been identified in the form of multiple linear alignments of ditched anomalies, potentially old unmapped field boundaries, and including partial and full enclosures.

8.3. Agricultural activity has been identified in the form of mapped field boundaries, ridge and furrow ploughing, drainage features and a trackway. Anomalies related to modern agricultural activity have also been identified.

8.4. Anomalies of undetermined origins have also been detected throughout the survey area. Numerous anomalies were detected within areas of green waste, obscuring confident interpretations. However, due to features of possible archaeological origin in the northern

section of the survey area an archaeological origin for these should not be ruled out. It has not been possible to definitively determine whether these anomalies are the result of agricultural, geological, or modern practices.

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

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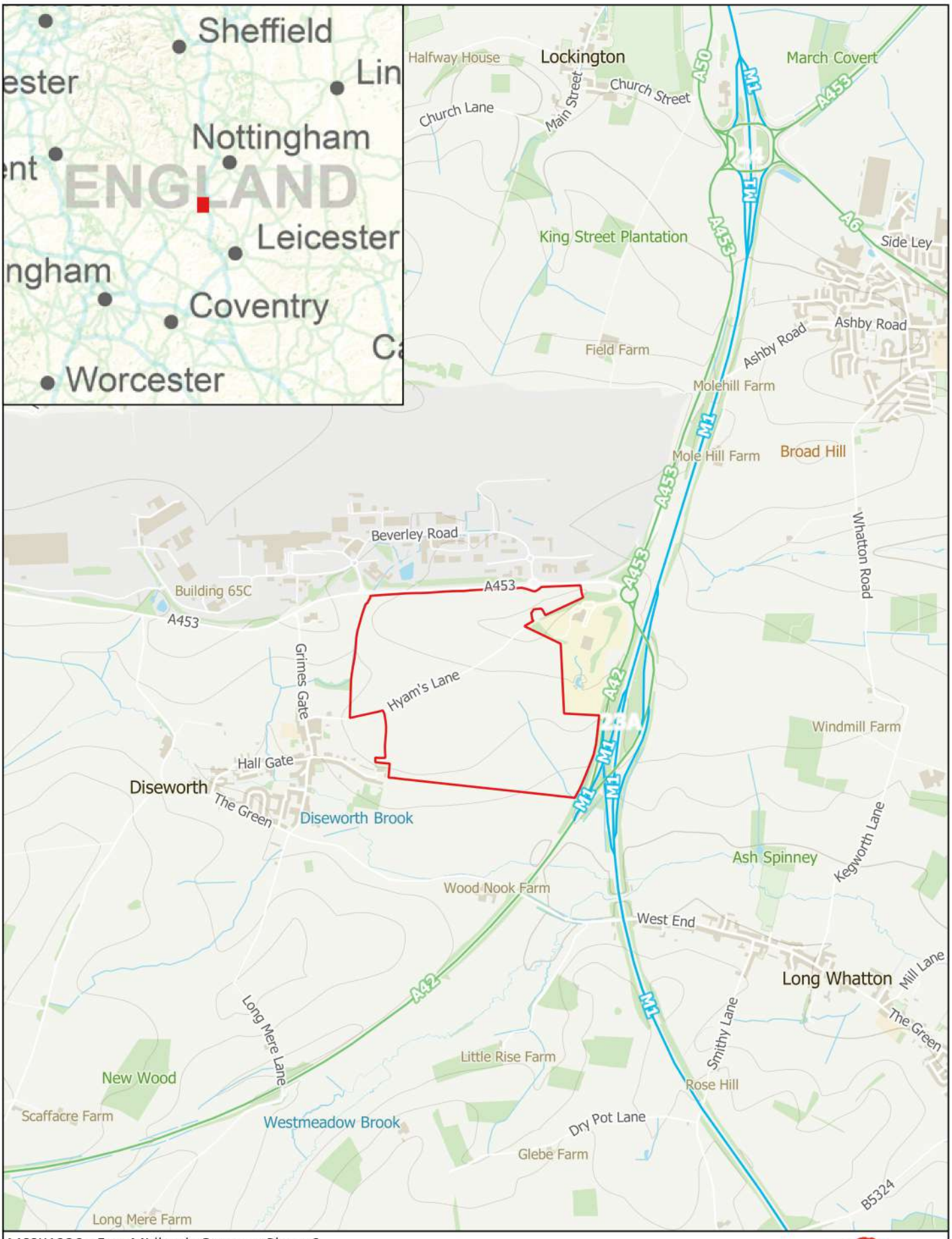
12. Project Metadata

MS Job Code	MSSK1236
Project Name	East Midlands Gateway Phase 2, Castle Donington, Leicestershire
Client	RPS Group
Grid Reference	SK 4645 2502
Survey Techniques	Magnetometry
Survey Size (ha)	100.2ha (Magnetometry)
Survey Dates	2022-05-03 to 2022-05-12; 2022-05-23 to 2022-05-26
Project Lead	Jake Dolan BSc FGS
Project Officer	Jake Dolan BSc FGS
HER Event No	TBC
OASIS No	N/A
S42 Licence No	N/A
Report Version	0.5

13. Document History

Version	Comments	Author	Checked By	Date
0.1	Initial draft	IT	JD	1st June 2022
0.2	Second draft for Project Lead to review	LJ	PT	6th June 2022
0.3	Corrections from Project Officer	AS	PSJ	8th June 2022
0.4	Corrections from Client	AL	AL	9th June 2022
0.5	Addition of two new figures following Client Comments	JD	PJ	29th June 2022



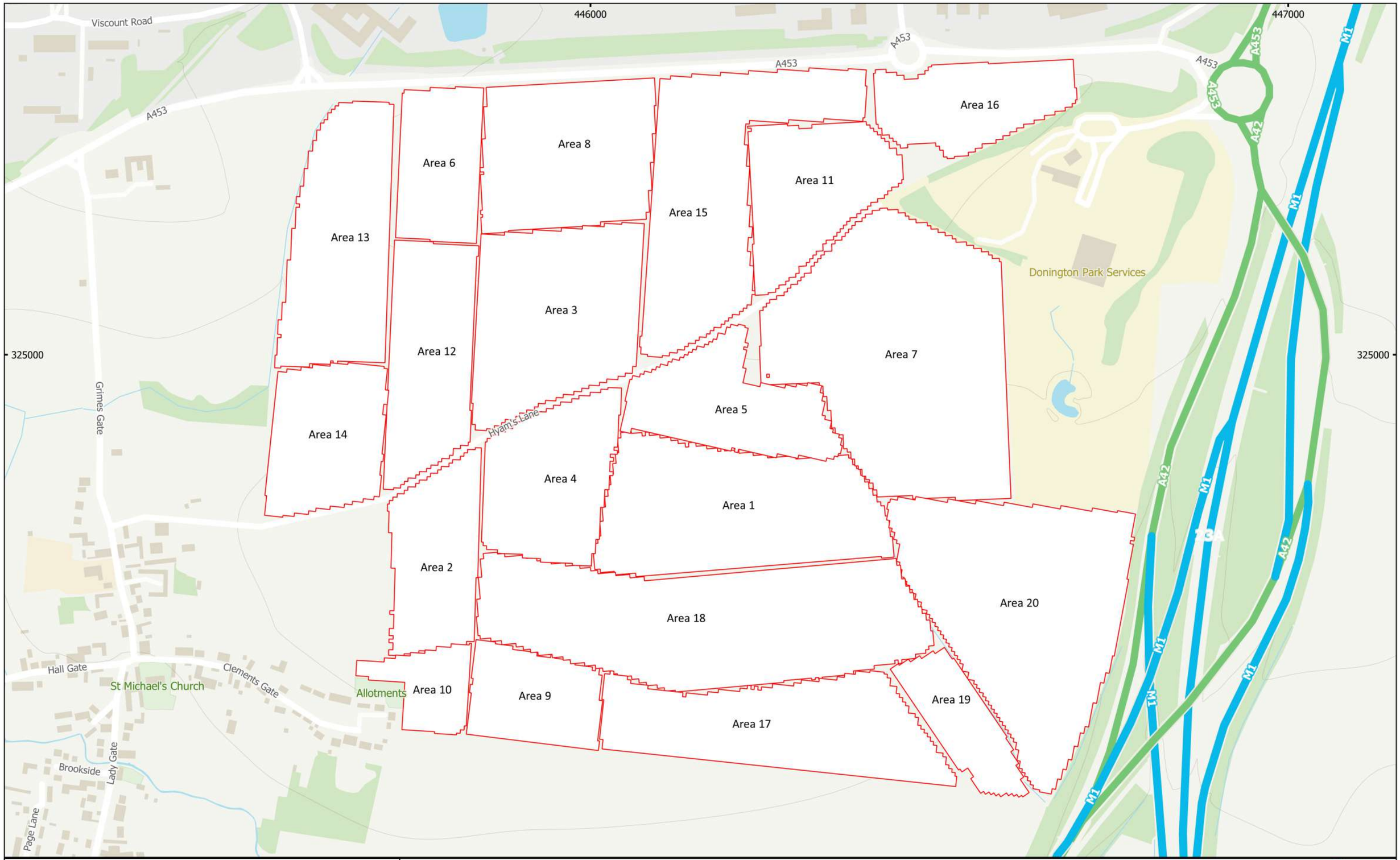
MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 1 - Site Location
1:25,000 @ A4

Site Boundary

N

0 0.5 1 km

magnitude surveys



MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 2 - Location of Survey Area
1:5,000 @ A3

Survey Extent

N

0 120 240 360 m

magnitude surveys

445600
446000
446400
325200
324800
A453
Area 15
Area 6
Area 8
Area 13
Area 16
Area 11
Area 5
Area 3
Area 12
Area 14
Area 2
Area 4
Area 7
Area 20
Hyam's Lane

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 3 - Magnetic Gradient (Overview (North))
1:3,000 @ A3

-1 nT 2

0 50 100 150 m

N

magnitude surveys

445600
446000
446400
A453
Area 15
Area 6
Area 8
Area 13
Area 16
Area 11
325200
325200
Area 5
Area 3
Hyam's Lane
Area 7
Area 12
324800
Area 20
324800
Area 14
Area 2
Area 4

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 4 - Magnetic Total Field (Lower Sensor) (Overview (North))
1:3,000 @ A3

48,990 nT 49,020

N

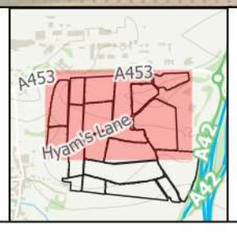
0 50 100 150 m

magnitude surveys

445600
446000
446400
325200
324800
Area 13
Area 6
Area 8
Area 15
Area 16
Area 11
Area 5
Area 7
Area 20
Area 3
Area 12
Area 14
Area 2
Area 4

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 5 - Magnetic Interpretation Over Historical Maps and Satellite Imagery (Overview (North)) 1:3,000 @ A3

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



N

0 50 100 150 m

magnitude surveys

446000
446400
446800
324800
324400
Area 3
Hyam's Lane
Area 12
Area 7
Area 20
Area 2
Area 4
Area 1
Area 18
Area 10
Area 9
Area 17
Area 19
M1
A42

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 6 - Magnetic Gradient (Overview (South))
1:3,000 @ A3

-1 nT 2

N

0 50 100 150 m

magnitude surveys

446000
446400
446800
324800
324400
Area 1
Area 2
Area 3
Area 4
Area 7
Area 9
Area 10
Area 12
Area 17
Area 18
Area 19
Area 20
Hyam's Lane
M1
A42

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 7 - Magnetic Total Field (Lower Sensor) (Overview (South))
1:3,000 @ A3

48,990 nT 49,020

0 50 100 150 m

N

magnitude surveys

446000
446400
446800
324800
324400
Area 1
Area 2
Area 3
Area 4
Area 7
Area 9
Area 10
Area 12
Area 17
Area 18
Area 19
Area 20
Hyam's Lane
A42
M1
MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 8 - Magnetic Interpretation Over Historical Maps and Satellite Imagery (Overview (South)) 1:3,000 @ A3

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

N

0 50 100 150 m

magnitude surveys

445600
445800
446000
325400
325400
A453
Area 6
Area 8
Area 15
Area 13
Area 12
Area 3
325200
325200

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 9 - Magnetic Gradient (Areas 3, 6, 8, 12, 13 & 15)
1:1,500 @ A3

-1 nT 2

A453
Hyam's Lane
A42

N

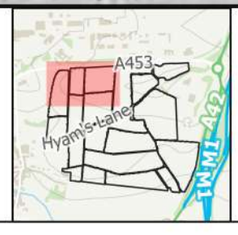
0 25 50 75 m

magnitude surveys

445600
445800
446000
325400
325400
A453
Area 6
Area 8
Area 15
Area 13
Area 12
Area 3
325200
325200

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 10 - Magnetic Total Field (Areas 3, 6, 8, 12, 13 & 15)
1:1,500 @ A3

48,990 nT 49,020



N

0 25 50 75 m

magnitude surveys

445600
445800
446000
325400
325400
A453
Area 6
Area 8
Area 15
Area 13
Area 12
Area 3
325200
325200

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 11 - Magnetic Interpretation (Areas 3, 6, 8, 12, 13 & 15)
1:1,500 @ A3

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

N

0 25 50 75 m

magnitude surveys

445600
445800
446000
325400
325200
Area 6
A453
Area 8
Area 15
Area 13

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 12 - XY Trace Plot (Areas 3, 6, 8, 12, 13 & 15)
30nT/cm at 1:1,500 @ A3

N
0 25 50 75 m

magnitude surveys

446200

446400

446600

A453

A453

Area 15

Area 16

325400

325400

Area 11

Area 7

325200

325200

Hyam's Lane

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 13 - Magnetic Gradient (Areas 7, 11, 15 & 16)
1:1,500 @ A3

-1 nT 2

A453

Hyam's Lane

M1 J24

N

0 25 50 75 m

magnitude surveys

446200

446400

446600

A453

A453

Area 15

Area 16

325400

325400

Area 11

Area 7

325200

325200

Hyam's Lane

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 14 - Magnetic Total Field (Areas 7, 11, 15 & 16)
1:1,500 @ A3

48,990 nT 49,020

N

0 25 50 75 m

magnitude surveys

446200
446400
446600
A453
A453
Area 15
Area 16
325400
325400
Area 11
Area 7
325200
325200
11a
11b
11c
Hyam's Lane

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 15 - Magnetic Interpretation (Areas 7, 11, 15 & 16)
1:1,500 @ A3

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

N

0 25 50 75 m

magnitude surveys

446200

446400

446600

A453

A453

Area 15

325400

325400

Area 16

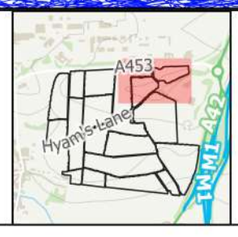
Area 11

325200

325200

Hyam's Lane

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 16 - XY Trace Plot (Areas 7, 11, 15 & 16)
30nT/cm at 1:1,500 @ A3



N

0 25 50 75 m

magnitude surveys

445600
445800
446000
325000
325000
Area 13
Area 14
Area 15
Area 3
Area 12
Area 2
Hyam's Lane
324800
324800

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 17 - Magnetic Gradient (Areas 2, 3, 4, 12, 13 & 14)
1:1,500 @ A3

-1 nT 2

N

0 25 50 75 m

magnitude surveys

445600
445800
446000
325000
Area 13
Area 14
Area 15
Area 3
Area 12
Area 2
Hyam's Lane
324800

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 18 - Magnetic Total Field (Areas 2, 3, 4, 12, 13 & 14)
1:1,500 @ A3

48,990 nT 49,020

A453
Hyam's Lane
A42
M1

N

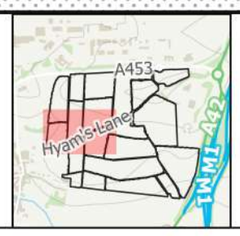
0 25 50 75 m

magnitude surveys

445600
445800
446000
325000
324800
Area 13
Area 14
Area 12
Area 2
Area 3
Area 15
Hyam's Lane
3a
3b
3c
3d
12a

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 19 - Magnetic Interpretation (Areas 2, 3, 4, 12, 13 & 14)
1:1,500 @ A3

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



N
0 25 50 75 m

magnitude surveys

445600
445800
446000
325000
325000
Area 3
Hyam's Lane
Area 12
324800
324800
Area 14

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 20 - XY Trace Plot (Areas 2, 3, 4, 12, 13 & 14)
30nT/cm at 1:1,500 @ A3

N

0 25 50 75 m

magnitude surveys

446200

446400

446600

Area 11

Area 5

Hyam's Lane

325000

Area 15

325000

Area 7

324800

324800

Area 1

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 21 - Magnetic Gradient (Areas 1, 5, 7, 11 & 15)
1:1,500 @ A3

-1 nT 2

N

0 25 50 75 m

magnitude surveys

446200
446400
446600
325000
325000
Area 11
Area 5
Hyam's Lane
Area 15
Area 7
Area 1
324800
324800

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 22 - Magnetic Total Field (Areas 1, 5, 7, 11 & 15)
1:1,500 @ A3

48,990 nT 49,020

N

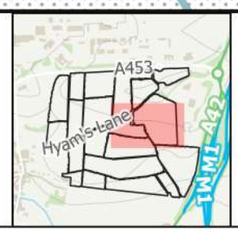
0 25 50 75 m

magnitude surveys

446200
446400
446600
325000
324800
11a
15b
15a
Area 11
Area 5
Area 15
Hyam's Lane
7a
1a
Area 7
Area 1

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 23 - Magnetic Interpretation (Areas 1, 5, 7, 11 & 15)
1:1,500 @ A3

Archaeology Possible (Strong)
Archaeology Possible (Weak)
Undetermined (Weak)
Magnetic Disturbance
Ferrous/Debris (Spread)
Natural (Weak)
Drainage Feature
Ferrous (Spike)



N
0 25 50 75 m

magnitude surveys

446200
446400
446600
325000
325000
Area 5
Hyam's Lane
Area 7
Area 20
324800
324800

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 24 - XY Trace Plot (Areas 1, 5, 7, 11 & 15)
30nT/cm at 1:1,500 @ A3

N
0 25 50 75 m

magnitude surveys

445600

445800

446000

Area 2

Area 4

Area 1

324600

Area 18

324600

Area 10
Allotments

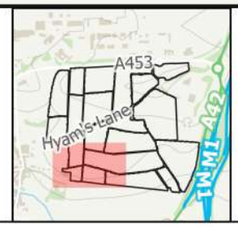
Clements Gate

Area 9

Area 17

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 25 - Magnetic Gradient (Areas 1, 2, 4, 9, 10, 17 & 18)
1:1,500 @ A3

-1 nT 2



N

0 25 50 75 m

magnitude surveys

445600

445800

446000

Area 2

Area 4

Area 1

324600

Area 18

324600

Area 10
Allotments

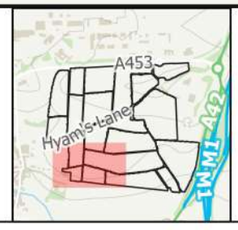
Clements Gate

Area 9

Area 17

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 26 - Magnetic Total Field (Areas 1, 2, 4, 9, 10, 17 & 18)
1:1,500 @ A3

48,990 nT 49,020



N

0 25 50 75 m

magnitude surveys

445600
445800
446000
324600
324600
Area 2
Area 4
Area 1
18a
Area 18
9a
9b
Area 10
Allotments
10a
Clements Gate
Area 9
Area 17

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 27 - Magnetic Interpretation (Areas 1, 2, 4, 9, 10, 17 & 18)
1:1,500 @ A3

Agricultural (Weak)
Undetermined (Weak)
Magnetic Disturbance
Ferrous/Debris (Spread)
Service
Ridge and Furrow (Trend)
Ferrous (Spike)

N
0
25
50
75 m

magnitude surveys

445600 Area 14

445800

446000

Area 2

Area 4

Area 1

324600

324600

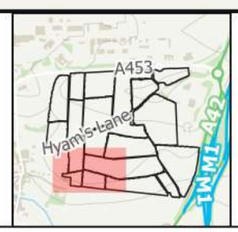
Area 10

Allotments

Clements Gate

Area 9

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 28 - XY Trace Plot (Areas 1, 2, 4, 9, 10, 17 & 18)
30nT/cm at 1:1,500 @ A3

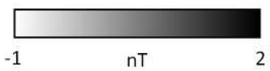


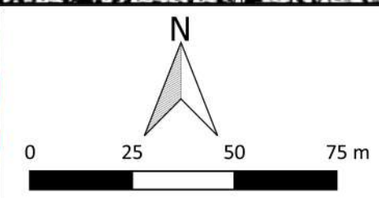
N

0 25 50 75 m

magnitude surveys

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 29 - Magnetic Gradient (Areas 1, 5, 7 & 17)
1:1,500 @ A3





magnitude surveys

324400

324600

324800

446200

446400

Area 17

Area 1

Area 1

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 30 - Magnetic Total Field (Areas 1, 5, 7 & 17)
1:1,500 @ A3

48,990 nT 49,020

N

0 25 50 75 m

magnitude surveys

324400
324600
324800
446200
446400
Area 17
Area 1
1a
Area 1

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 31 - Magnetic Interpretation (Areas 1, 5, 7 & 17)
1:1,500 @ A3

Agricultural (Weak)
Undetermined (Weak)
Ferrous/Debris (Spread)
Magnetic Disturbance

N
0
25
50
75 m

magnitude surveys

324400

324600

Area 1

324800

446200

446200

446400

446400

Area 18

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 32 - XY Trace Plot (Areas 1, 5, 7 & 17)
30nT/cm at 1:1,500 @ A3

N

0 25 50 75 m

magnitude surveys

Area 19

Area 7

Area 20

446600

446800

M1

A42

MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 33 - Magnetic Gradient (Areas 7, 19 & 20)
1:1,500 @ A3

-1 nT 2

N

0 25 50 75 m

magnitude surveys

324400
324600
324800
446600
446800
Area 19
Area 20
Area 7
M1
A42
MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 34 - Magnetic Total Field (Areas 7, 19 & 20)
1:1,500 @ A3

48,990 nT 49,020
A453
Hyam's Lane
N
0 25 50 75 m
magnitude surveys

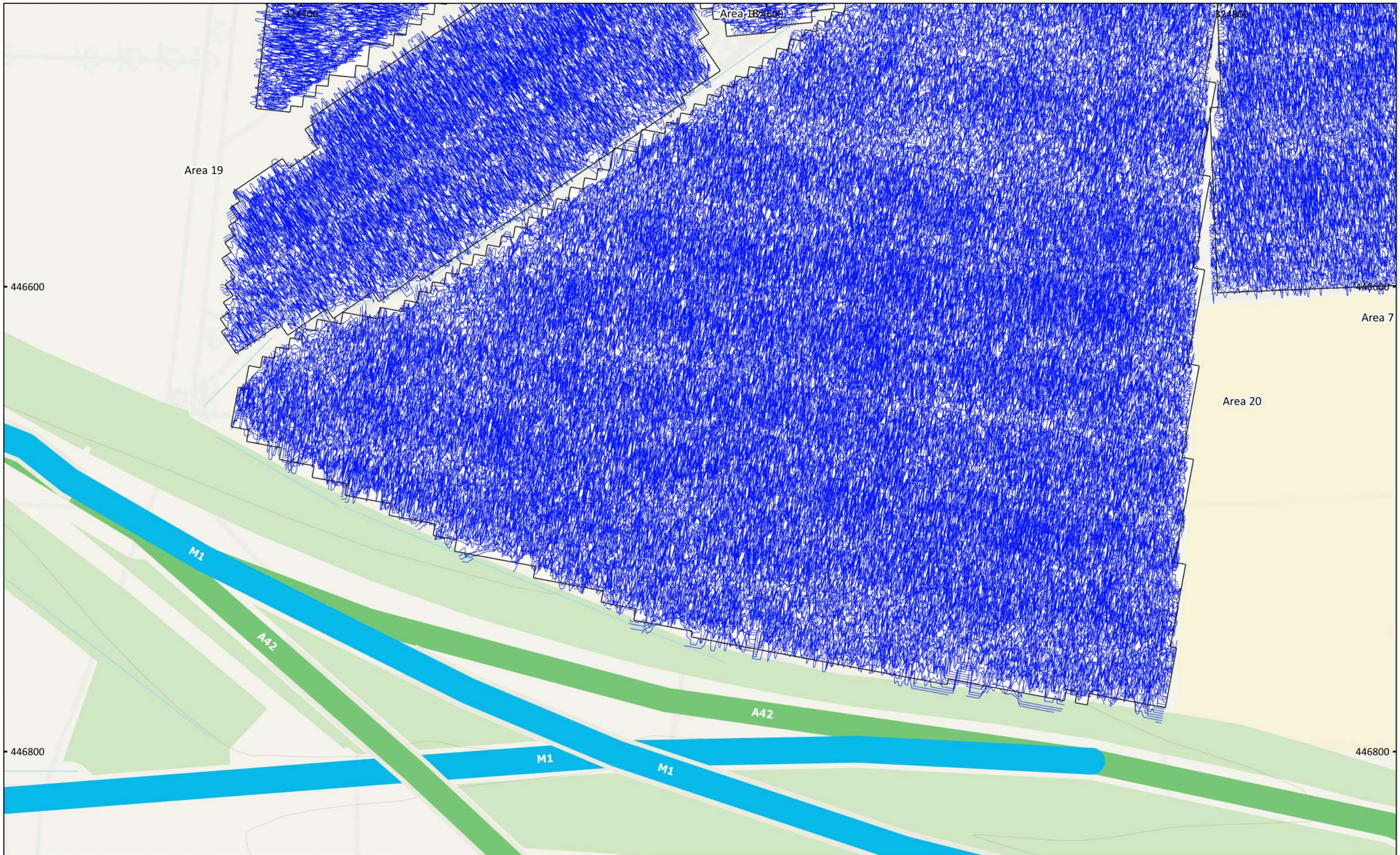
MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 35 - Magnetic Interpretation (Areas 7, 19 & 20)
1:1,500 @ A3

Undetermined (Weak) Magnetic Disturbance Ferrous/Debris (Spread)

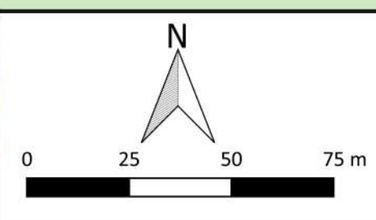
N

0 25 50 75 m

magnitude surveys



MSSK1236 - East Midlands Gateway Phase 2,
Castle Donington, Leicestershire
Figure 36 - XY Trace Plot (Areas 7, 19 & 20)
30nT/cm at 1:1,500 @ A3



magnitude surveys