



**magnitude
surveys**

**Geophysical Survey Report
Bamford, Norden, Rochdale**

**For
Salford University**

Magnitude Surveys Ref: MSSD1116A

HER Event Number: TBC

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**magnitude
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Abstract

Magnitude surveys was commissioned to assess the subsurface archaeological potential of c. 34ha of land at Bamford Norden, Rochdale, c. 3.5ha could not be surveyed due to difficult ground conditions and horses. Another c. 7.4ha was de-scoped from the survey. Possible archaeological activity has been identified, with anomalies of linear morphology. Anomalies relating to the agricultural use of the area were also detected in the form of ploughing trends, ditches and drainage. Anomalies likely relating to building debris and a reservoir have also been recorded, as well as a possible area of extraction. Some anomalies classified as 'Undetermined' were identified within the survey area and archaeological interpretations for these cannot be excluded. The impact of modern activity on the site is visible as magnetic interference around field perimeters and that caused by pylons, service lines and overhead cables.

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1. Introduction

- 1.0. Magnitude Surveys Ltd (MS) was commissioned by Salford University to undertake a geophysical survey over a c. 34ha area of land near Bamford, Norden, Rochdale (SD 86031 12697).
- 1.1. 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).
- 1.2. 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).
- 1.3. It was conducted in line with a WSI produced by MS (Chmielowska, 2021).
- 1.4. The survey commenced on 31/01/2022 and took 4 days to complete.

2. Quality Assurance

- 2.0. 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).
- 2.1. 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 is 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, 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.
- 2.2. All MS managers, field and office staff have degree qualifications relevant to archaeology or geophysics and/or field experience.

3. Objectives

- 3.0. The objective of this geophysical survey was to assess the subsurface archaeological potential of the survey area.

4. Geographic Background

4.0. The survey area was located c. 100 m west of Bamford, Rochdale (Figure 1). Gradiometer survey was undertaken across 16 fields used for pasture and sport fields. The survey area was located East of Furbarn Road and Jowkin Lane, South housing estate, west of housing estate and Norden Road (Figure 2). An area of c. 3.35ha could not be surveyed due to ground conditions and horses. Another c. 7.5ha were de-scoped from the survey.

4.1. Survey considerations:

Survey Area	Ground Conditions	Further Notes
1	The area consisted of flat pasture. The southwest corner was unable to be surveyed due to very wet and boggy with long grass.	The survey area was bordered by a hedge with a wire fence on the north and west sides, hedges in the northeast and southwest sides, and had no boundary in the east and southeast sides. There was a metal fence located on the west side of the survey area and two pylons located on the east side with overhead cables running northwest – southeast.
2	The area consisted of flat pasture. In the south surveying was not possible due to being very wet and boggy, with long grass.	The survey area was surrounded by hedge and a wire fence on the west, south and southeast side, hedge on the north side and had no boundary in the northeast side.
3	The area consisted of flat pasture. Due to being very wet and boggy, with long grass present, a small area in the west was unable to be surveyed.	The survey area was confined by a hedge and wire fence in the northwest, east and south sides, wire fence with metal doors in the northeast, hedges in the northwest and had no boundary in the west. In the northwest corner there was a metal pipe.
4	The area consisted of slightly sloped pasture.	The survey area was bordered by a wooden and wire fence in the north with hedge and wire fence on the east, south and west sides with three trial pits located in the northwest, southeast and southwestern corner of the survey area. Overhead cables were running north-south across the central area.
5	The area consisted of a flat pasture.	The survey area was enclosed by a wire fence on all sides with trial pits located in the northwest, northeast and the southeast corners and overhead cables running north-south in the centre of the survey area.
6	The area consisted of pasture with a slope dipping towards the south in the southern part of the survey area. The south and northwest areas were unable to be surveyed due to the presence of standing water.	The survey area was enclosed by a wire fence on all sides with overhead cable running north – south in the centre of the area.

7	The area consisted of a flat pasture.	The area was surrounded by a wire fence as well as a hedge on the north, east and south sides with metal gates in the north and southwest sides. There was a wooden and wire fence on the west side. A pylon was located in the south with cables running north – south.
8	The area consisted of pasture on a shallow slope dipping to the northeast.	The survey area was enclosed by a hedge and a wire fence on all sides with two metal gates located in the west and one in the north side. A pylon was located in the west corner of the survey area with cable running north - south.
9	The area consists of a pasture with a steep slope located in the centre of the survey area sloping towards the north. Two areas were unable to be surveyed. One was boggy, the other due to a fallen tree.	The survey area was bordered by a wire fence in the north, south and northwest sides, hedge and wire fence in the east and a wooden fence in the southwest side. There were metal gates located in the northwest and southwest corners and two on the west side of the survey area. There was a pylon located in the southwest corner with overhead cables running northwest – southeast.
10	The survey area consists of a pasture with undulating ground sloping towards the northwest.	The area was surrounded by a wire fence on the east side, hedge and wire fence on the south and west sides and hedge in the north. There was a pylon located outside the wire fence in the southeast corner with overhead cables running northwest – southeast.
11	The area consists of a pasture with a very steep slope located in the south.	The survey area was enclosed by a hedge on the east, south and west sides and a hedge with a wire fence in the north. There was a metal door located in the southeast corner.
12	The area consists of undulating pasture generally trending southeast but undulating downslope.	The Survey area was surrounded by a stone wall with a wire fence in the north and a metal fence to the northwest, a wire fence and hedge on the east, wire fence to the south and hedge to the west. There was a metal gate in the southwest corner.
13	The area is a sport field with a shallow, short slope in the north. The west side of the study area is a concrete car park which was not surveyed.	The survey area is surrounded by a wooden fence in the north and a hedge on the south. There is a footpath in the northeast and no boundary on the west and east sides. There are six floodlights located in the area, three in the north and three in the south.
14	The area is a sport field with a small east dipping slope located in the northern part of the survey area. The south part of the survey area was unable to be surveyed due to overgrowth in the southeast and boggy and wet patch on the west.	The survey area had no boundary in the north and east side and hedges on the west and south side. Overhead cables were running across the survey area in the north – south direction.
15	The area is a flat sports field.	The survey area was surrounded by hedges in the northwest, west and southwest, wooden

		fence in the southeast and a ditch in the northeast with no boundary in the southeast and northeast. A shipping container was located in the northeaster corner of the survey area. Overhead cables were running across the survey area from the southeast to the northwest corner.
16	The area is a flat sports field with a steep slope on the north and northwest sides dipping towards the south and southeast.	The survey area was surrounded by a wooden fence and a hedge in the north, a metal fence in the northeast, a wooden fence in the southeast. There is a ditch located in the south and no boundary in the southwest with a shipping container located in the southwest corner. In the north a stone wall with wire fencing forms a boundary.

- 4.2. The underlying geology comprises of sandstone of the Riddle Scout Rock in the centre of the survey area forming three layers surrounded by mudstone, siltstone and sandstone of the Pennine Lower Coal Measures Formation (British Geological Survey, 2022).
- 4.3. Superficial deposits in the southwest part of the survey area consist of Glaciofluvial Deposits, Devensian of sands and gravel, in the rest of the survey area diamiction till of unsorted sediments with gravel in a fine mud matrix is recorded. (British Geological Survey, 2022).
- 4.4. In the northwestern part of the survey area slowly permeable, wet and very acidic upland soil with a peaty surface is recorded. In the southwestern part of the survey area the soil is freely draining, slightly acidic and sandy. The soil on the east side of the survey area consists of slowly permeable, seasonally wet, acid loamy and clayey soil (Soilscapes, 2022).

5. Archaeological Background

- 5.0. The following is a summary of an Archaeological desk-based assessment produced and provided by University of Salford. (Brogan, 2021).
- 5.1. Across the Rochdale borough and Greater Manchester various artifacts ranging from prehistoric to Industrial period have been identified, recorded outside the survey area.
- 5.2. A homestead labelled Lower Jowkin is shown on the Ordinance Survey map of 1851, with evidence showing that it dates to the 17th century. The Tithe Map of Spotland shows the building was ruined by 1853.
- 5.3. On the 1851 Ordinance Survey map a mill with workers' housing as well as a reservoir and gasometer were mapped. The mill was demolished between 1930 and 1957. A secondary reservoir was constructed in the eastern part of the survey area and was filled c. 1960.

- 5.4. From the 1851 Ordinance Survey map, a water pipe running north to south was located and is thought to have been constructed at the beginning of the 19th century.
- 5.5. During the 19th and 20th century many field boundaries within the site were changed/removed.

6. Methodology

6.0.Data Collection

6.0.1.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.

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

6.0.3.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

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

6.0.4.1. 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.

6.0.4.2. 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.

6.0.4.3. 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.

6.1.Data Processing

6.1.1.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.

6.2.Data Visualisation and Interpretation

6.2.1.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 (Figure 7, 10, 13). XY trace plots visualise the magnitude and form of the geophysical response, aiding anomaly interpretation.

6.2.2.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.

6.2.3.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

7.0. Qualification

7.0.1. 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.

7.1. Discussion

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

7.1.2. A fluxgate gradiometer survey was successfully carried out over c. 23.2ha of land at Bamford, Norden Rochdale. An area of c. 3.5ha could not be surveyed due to ground conditions and another c. 7.2ha were de-scoped from the survey. The gradiometer survey has responded well to the environment of the survey area. Modern interference is also present in the form of service pipelines, overhead cables, pylons, and field boundaries. Anomalies with a possible archaeological origin have been detected, as well as anomalies of undetermined origin for which an archaeological explanation cannot be excluded.

7.1.3. Possible archaeological anomalies have been detected within Area 1, 10 and 9. The anomalies visible in Area 1, could represent a double ditched feature. All these anomalies follow former Parish boundaries visible on historical mapping. The ages of those boundaries are difficult to pinpoint, and are possibly Medieval, or earlier, in origin.

7.1.4. Anomalies relating to the agricultural use of the land have been detected in the form of ploughing trends, ditches, and drainage schemes.

7.1.5. Evidence of industrial activity has been identified by a possible area of extraction in Area 10, as well as, an infilled reservoir in Area 16. The latter may relate to the mill which used to be situated in the east of the survey area (Figure 4). Anomalies likely relating to other demolished buildings which used to be situated in Areas 11, 5 and 6 have also been identified. These anomalies correlate with features on historical mapping (see section 5).

7.1.6. Anomalies of an undetermined origin have been recorded across the survey area. All of these anomalies have limited context or lack any clear pattern or morphology to enable a confident interpretation. Nevertheless, an archaeological origin cannot be excluded.

7.2. Interpretation

7.2.1. General Statements

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

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

7.2.1.3. **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.

7.2.1.4. **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.

7.2.1.5. **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 agricultural or geological processes, although an archaeological origin cannot be entirely ruled out.

7.2.2. Magnetic Results - Specific Anomalies

7.2.2.1. **Possible Archaeology (Weak)** – Within Area 1, two curvilinear anomalies have been detected. The magnetic signal suggests that they are two ditch features. The diffuse nature may suggest they have been damaged due to ploughing. The anomalies correlate with a mapped field boundary and parish boundary (Figure 4). Within Area 10 and 9 a linear ditch feature does not follow a mapped field boundary, but does appear to correlate with the mapped parish boundary (Figure 4). A possible archaeological category was used to differentiate these from anomalies which may be just regular field boundaries, as these ditch anomalies follow parish boundaries. The age of the parish boundaries is unknown, and therefore these features have the potential for containing archaeological material.

7.2.2.2. **Agricultural (Trend)** – Through the survey area linear anomalies have been recorded as being agricultural in origin. Many of these appear to correlate with modern ploughing trends others may be part of drainage schemes.

7.2.2.3. **Drainage Feature** – Throughout the survey area linear anomalies have been identified as being part of drainage schemes. Within Areas 4, 5, 7, 13 & 16 parallel series of anomalies have been identified spaced c. 6–9m. The morphology of the anomalies and their magnetic signal suggest that they are part of drainage systems. Within Area 16 the anomalies also form a herringbone shape, which is typical of drainage schemes.

7.2.2.4. **Possible Extraction** – Within Area 11 strong, ferrous anomaly with a defined edge has been recorded [11a]. This type of signal is typical of an area of extraction, like quarry or coal pit which there is evidence for in the wider landscape (Figure 4). The strong signal could be due to an infilling of an area of extraction with highly magnetic materials.

7.2.2.5. **Undetermined (Strong & Weak)** – Throughout the survey area anomalies have been recorded as undermined, these are normally curvy linear, sub-circular or linear. The morphology of these anomalies could suggest that they are cut features, which may have an archaeological origin; however, the isolation of the anomalies precludes a confident categorisation as they could also have an agricultural or natural origin.

7.2.2.6. **Overhead Cables** – In some areas across the survey area, the Total Field and gradient appear mottled. This is likely due to interference from the overhead cables which pass over these areas (Figure 4).

7.2.2.7. **Magnetic Disturbance** – Within Area 16, large strongly magnetic anomalies [16a] have been interpreted as relating to the reservoir which can be seen on OS mapping from 1950. The nature of the anomalies is likely a reflection of the infilling of the reservoir with ferrous material (See section 5). Within Areas 5 and 6, strong, ferrous anomalies [5a] & [6a] have been interpreted as being part of either the rubble from a building, seen on historical mapping (Figure 4), or an area of extraction, or an area of made ground for the new building adjacent to the anomalies. Within Area 11, anomalies with a typical magnetic signal of building rubble [11b] has been identified. The anomalies correlate with the area where Lower Jowkin Farm was situated on the OS map of 1851 (see Section 5).

8. Conclusions

8.0. A Fluxgate gradiometer survey was successfully completed across the majority of the survey area with c. 3.5ha unable to be surveyed due to difficult ground conditions and the presence of horses. Another c. 7.4ha was de-scoped from the survey. Modern interference was detected from services, pylons, overhead cables, and from fencing around the borders of the survey area.

8.1. Anomalies of a possible archaeological origin have been detected in the form of ditch features which follow Parish boundaries and have the potential to contain archaeological materials. Anomalies recorded as undetermined could have a natural, agricultural, or archaeological origin.

- 8.2. Anomalies relating to the agricultural use of the survey area has also been detected in the form of ploughing trends, ditch and drainage schemes.
- 8.3. Evidence of industrial use of the survey area has been detected in the northwest in the form of a possible extraction area, and in the east in the form of an infilled reservoir. Anomalies likely relating to debris of former mapped buildings within Areas 11, 6 & 5 have also been detected.



9. Archiving

- 9.0. 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.
- 9.1. MS contributes reports to the ADS Grey Literature Library upon permission from the client, subject to any dictated time embargoes.

10. Copyright

- 10.0. 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

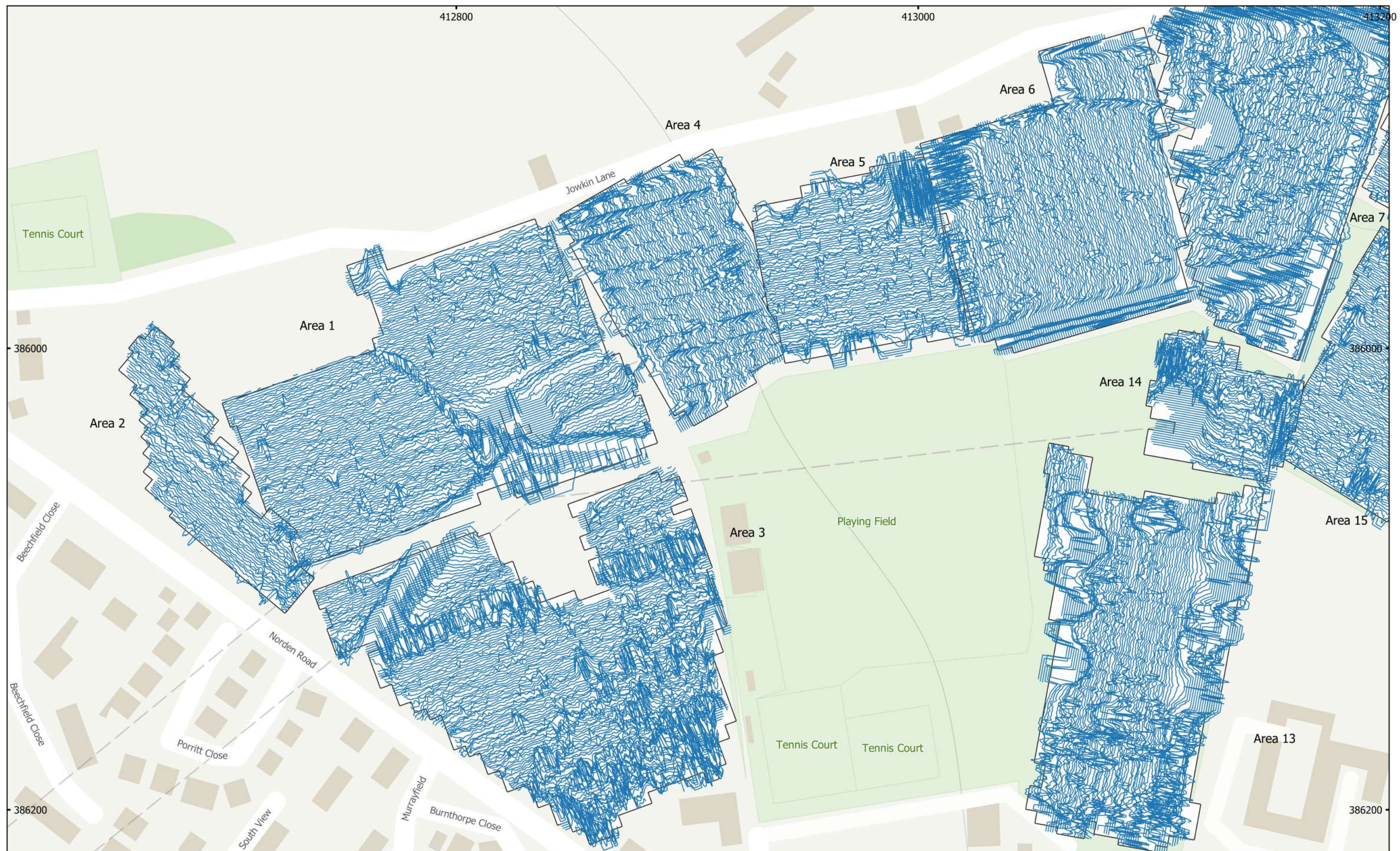
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12. Project Metadata

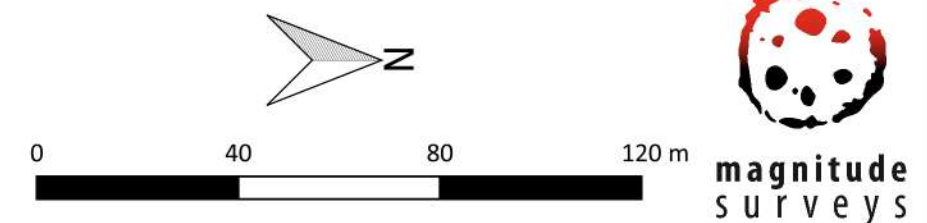
MS Job Code	MSSD1116A
Project Name	Bamford, Norden, Rochdale
Client	Salford University – Centre for Applied Archaeology
Grid Reference	DS 86031 12697
Survey Techniques	Magnetometry
Survey Size (ha)	34ha (Magnetometry)
Survey Dates	2021-10-05 to 2021-10-15
Project Lead	Dr. Anna Chmielowska PCIfA
Project Officer	Dr. Anna Chmielowska PCIfA
HER Event No	N/A
OASIS No	N/A
S42 Licence No	N/A
Report Version	0.2

13. Document History

Version	Comments	Author	Checked By	Date
0.1	Initial draft for Project Lead to Review	FC, VK	AC	09 February 2022
0.2	Draft for Director's Approval	FC, VK	PSJ	09 February 2022



MSSD1116 - Bamford, Norder, Rochdale
Figure 13 - XY Trace Plot (Area 1, 2, 3, 4, 5, 6, 7, 13, 14 & 15)
30nT/cm at 1:1,500 @ A3
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Contains Ordnance Survey data © Crown Copyright and database right 2022





MSSD1116 - Bamford, Nordern, Rochdale

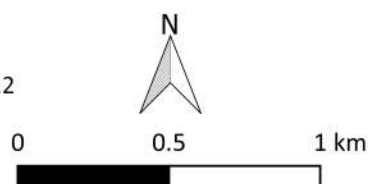
Figure 1 - Site Location

1:25,000 @ A4

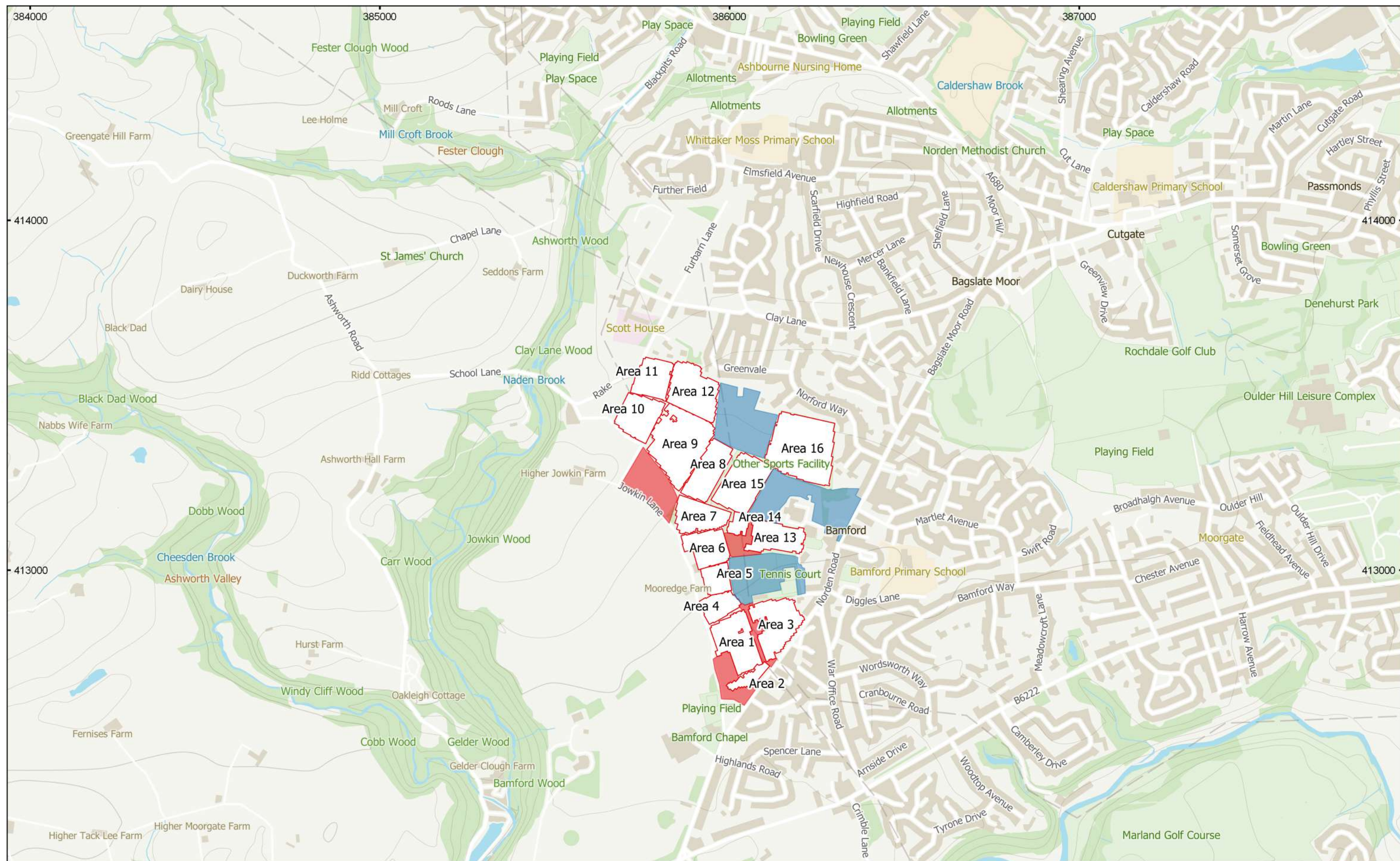
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 Survey Area

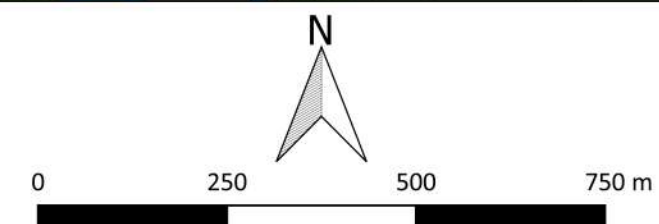


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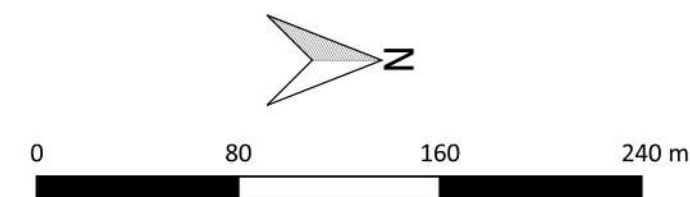
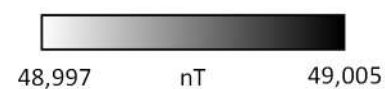
MSSD1116 - Bamford, Norder, Rochdale
Figure 2 - Location of Survey Area
1:10,000@ A3
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- Survey Area
- De-scoped Area
- Unsurveyable Area





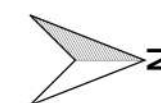
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 Figure 3 - Total Field (Lower Sensor)
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 Figure 4 - Magnetic Interpretation Over Historical Maps and Satellite Imagery
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 Contains historical mapping © CLS Data 2022: Ordnance Survey, 6" 2nd
 edition c. 1882-1913
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|-------------------------------|-------------------------|----------------------|
| Agricultural (Weak) | Ferrous/Debris (Spread) | Agricultural (Trend) |
| Archaeology Possible (Spread) | Undetermined (Strong) | Undetermined (Trend) |
| Archaeology Possible (Strong) | Undetermined (Weak) | Service |
| Archaeology Possible (Weak) | Possible Extraction | Drainage Feature |
| Magnetic Disturbance | Overhead Cables | Ferrous (Spike) |

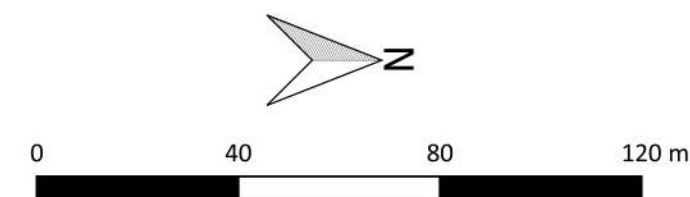
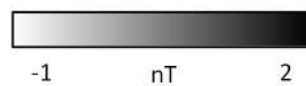


0 80 160 240 m





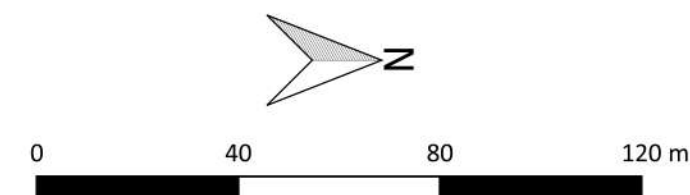
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 Figure 5 - Magnetic Gradient (Area 6, 7, 8, 9, 10, 11, 12, 14 & 15)
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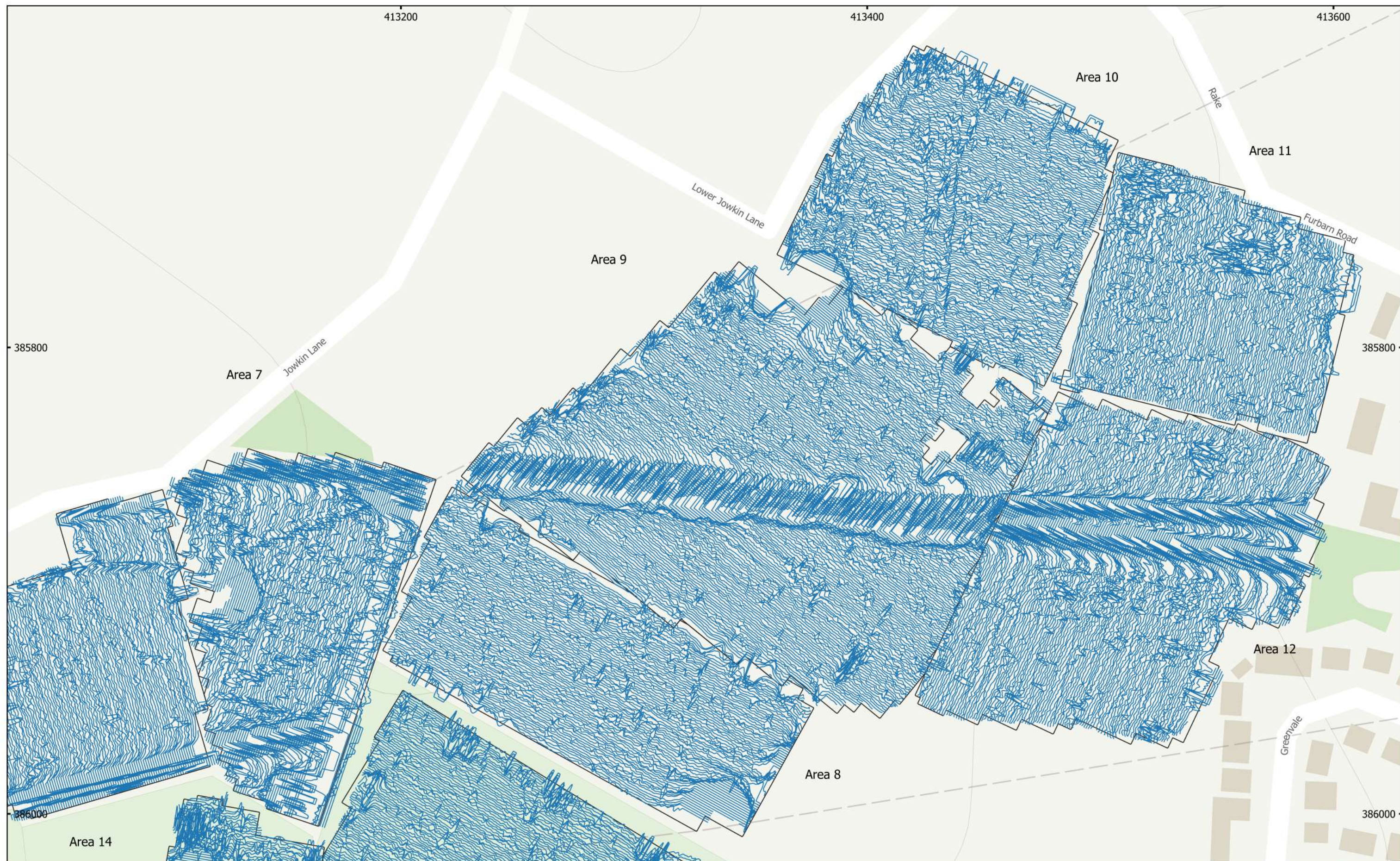




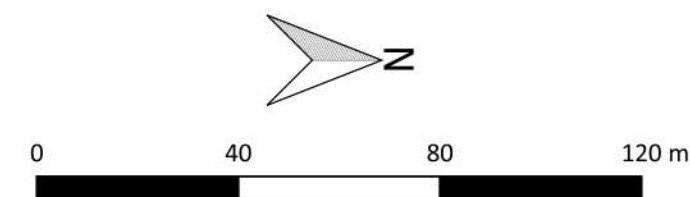
MSSD1116 - Bamford, Norder, Rochdale
 Figure 6 - Magnetic Interpretation (Area 6, 7, 8, 9, 10, 11, 12, 14 & 15)
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|-----------------------------|----------------------|------------------|
| Archaeology Possible (Weak) | Possible Extraction | Drainage Feature |
| Magnetic Disturbance | Overhead Cables | Ferrous (Spike) |
| Ferrous/Debris (Spread) | Agricultural (Trend) | |
| Undetermined (Weak) | Service | |



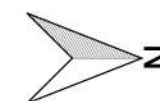
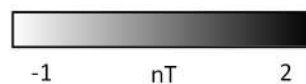


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Figure 7 - XY Trace Plot (Area 6, 7, 8, 9, 10, 11, 12, 14 & 15)
30nT/cm at 1:1,500 @ A3
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Figure 8 - Magnetic Gradient (Area 13, 14, 15 & 16)
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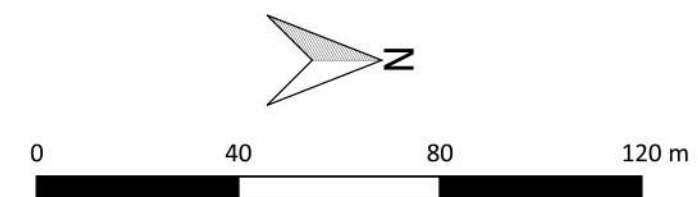


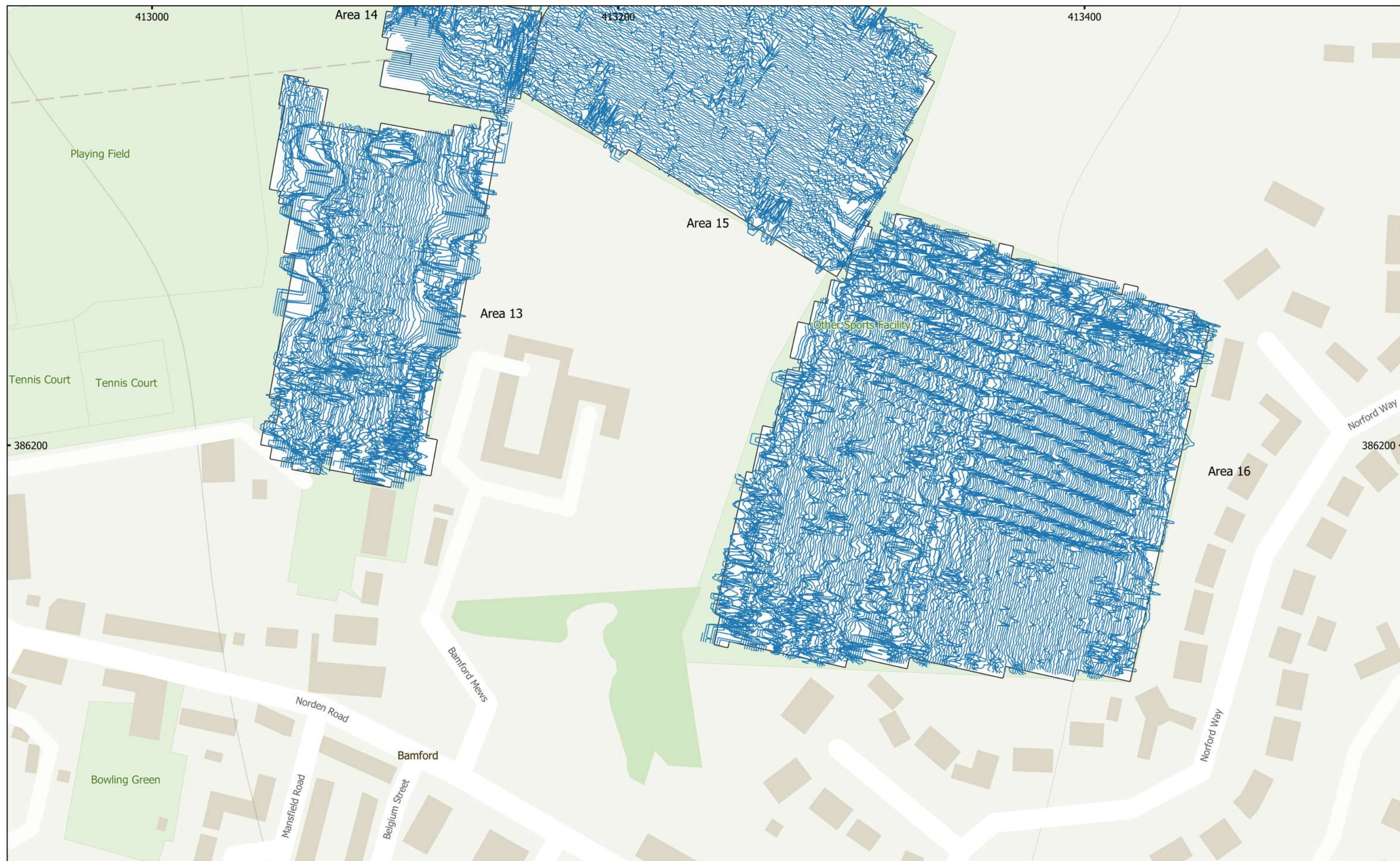
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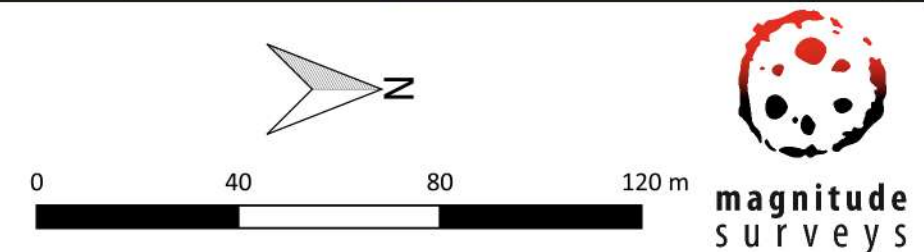
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 Figure 9 - Magnetic Interpretation (Area 13, 14, 15 & 16)
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|---------------------------|----------------------------|-------------------|
| ■ Magnetic Disturbance | Undetermined (Trend) | • Ferrous (Spike) |
| ■ Ferrous/Debris (Spread) | --- Service | |
| — Agricultural (Trend) | — Drainage Feature | |



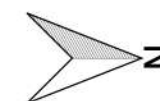
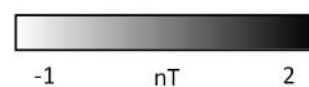


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Figure 10 - XY Trace Plot (Area 13, 14, 15 & 16)
30nT/cm at 1:1,500 @ A3
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 Figure 11 - Magnetic Gradient (Area 1, 2, 3, 4, 5, 6, 7, 13, 14 & 15)
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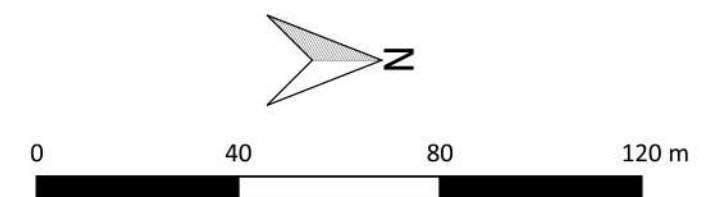


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 Figure 12 - Magnetic Interpretation (Area 1, 2, 3, 4, 5, 6, 7, 13, 14 & 15)
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|-----------------------------|-----------------------|------------------|
| Archaeology Possible (Weak) | Undetermined (Strong) | Service |
| Magnetic Disturbance | Undetermined (Weak) | Drainage Feature |
| Ferrous/Debris (Spread) | Agricultural (Trend) | Ferrous (Spike) |



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