

GEOPHYSICAL SURVEY OF LAND AT GRANGE FARM, MAIN ROAD, FILBY, NORFOLK



GEOPHYSICAL SURVEY REPORT

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Quality Assurance

This report covers works as outlined in the brief for the above-named project as issued by the relevant authority, and as outlined in the agreed programme of works. Any deviation to the programme of works has been agreed by all parties. The works have been carried out according to the guidelines set out in the Institute for Archaeologists (IfA) Standards, Policy Statements and Codes of Conduct. The report has been prepared in keeping with the guidance set out by North Pennines Archaeology Ltd on the preparation of reports.

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SUMMARY

In December 2009, North Pennines Archaeology Ltd, commissioned by NAU Archaeology, undertook a geophysical survey of land to the southwest of Grange Farm, Main Road, Filby, Norfolk (centred on Ordnance Survey grid reference TG 4723 1279), prior to the construction of a new irrigation reservoir. It was believed that archaeological remains could survive at the site, as there is cropmark evidence for a Bronze Age ring ditch, multi-period enclosures and field boundaries in the vicinity. Artefacts of prehistoric, Roman and medieval had also been found in the area.

The objective of the geophysical surveys was to determine the presence/absence, nature and extent of potential archaeological features within the study area, and the presence/absence of any known modern features within the survey area, which may affect the results. The results of the geophysical survey were to be used to inform the need for further archaeological work, in the form of a trial trench evaluation, should potential significant archaeological remains be identified during the project.

Geomagnetic survey covering 2.25ha of land was conducted within the southeast corner of an arable field, covering the proposed location of the new irrigation reservoir. A number of features were detected which could be attributed to modern agricultural practices and visible topographic features. However, a number of possible archaeological features were also detected, which extended outside of the survey area to the north and west. Further geophysical survey in this area could help to clarify the nature and extent of these features.

The potential archaeological features detected during the survey included two probable ditches of a former field system, and other possible soil-filled features. Given the archaeological background of the site it is likely that these features are prehistoric, Roman or later in date.

The most notable feature detected during the geophysical survey was a discrete negative magnetic anomaly, interpreted as a possible stone cairn. The cropmark of a double ring ditch, of possible Bronze Age date, has been identified to the north of the study area. It is therefore possible that this anomaly is also a prehistoric feature.

It is recommended that the results of the geophysical surveys are tested through the excavation of a series of trial trenches across the site, targeting both the geophysical anomalies, and also testing areas apparently devoid of archaeological features.

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North Pennines Archaeology Ltd would also like to extend their thanks to Ed Wharton of Grange Farm, for his assistance during the fieldwork.

The geophysical surveys were undertaken by Angus Clark and Kevin Mounsey. The report was written by, and the drawings were produced by Martin Railton. The project was managed by Martin Railton, Project Manager for NPA Ltd.

1 INTRODUCTION

1.1 CIRCUMSTANCES OF THE PROJECT (FIGURES 1 & 2)

- 1.1.1 On 3rd December 2009, North Pennines Archaeology Ltd, undertook a geophysical survey of land at Grange Farm, Main Road, Filby, Norfolk at the request of NAU Archaeology (Figure 1). This followed a proposal for a new irrigation reservoir on land to the southwest of Grange Farm (Planning Application No. 06/09/0588/F). The archaeological work was undertaken in accordance with a brief for archaeological evaluation by geophysical survey (Norfolk Landscape Archaeology 2009). This was in line with government advice as set out in the DoE Planning Policy Guidance on Archaeology and Planning (PPG 16).
- 1.1.2 The study area comprised part of a single arable field, measuring 2.25ha in total. It was located in the southeast corner of the field, situated 500m to the southwest of Grange Farm, and 500m southeast of All Saint's Church on the south side of Filby (Figure 2). The site is centred on Ordnance Survey grid reference TG 4723 1279.
- 1.1.3 It was believed that archaeological remains could survive at the site, including cropmark evidence for a Bronze Age ring ditch, multi-period enclosures and field boundaries. Artefacts of prehistoric, Roman and medieval have also been found in the immediate vicinity.
- 1.1.4 The objective of the geophysical surveys was to determine the presence/absence, nature and extent of potential archaeological features within the survey area, and the presence/absence of any known modern features within the survey area, which may affect the results. The results of the project were to be used to inform the need for further archaeological work, in the form of a trial trench evaluation, should potential significant archaeological remains be identified during the project.
- 1.1.5 This report outlines the results of the geophysical survey, and includes an interpretation of the geophysical survey results, in light of the archaeological and historical background of the site, with recommendations for further work where necessary.

2 METHODOLOGY

2.1 STANDARDS

2.1.1 The project design was adhered to in full, and the work was consistent with the relevant standards and procedures of the Institute for Archaeologists (IfA 2002), English Heritage Guidelines (English Heritage 2008), and with *Standards for Field Archaeology in the East of England* (Gurney 2004).

2.2 GEOPHYSICAL SURVEY

2.2.1 **Technique Selection:** geomagnetic survey was selected as the most appropriate technique, given the non-igneous environment, and the expected presence of cut archaeological features at depths of no more than 1.5m. This technique involves the use of hand-held gradiometers, which measure variations in the vertical component of the earth's magnetic field. These variations can be due to the presence of sub-surface archaeological features. Data were recorded by the instruments and downloaded into a laptop computer for initial data processing in the field using specialist software.

2.2.2 **Field Methods:** the geophysical study area measured c.2.25ha. A series of 30m grids were established over this area, and tied-in to known Ordnance Survey points using a Trimble 3605DR Geodimeter total station with datalogger.

2.2.3 Geomagnetic measurements were determined using a Bartington Grad601-2 dual gradiometer system, with twin sensors set 1m apart. It was expected that significant archaeological features at a depth of up to 1.5m would be detected using this arrangement. The survey was undertaken using a zig-zag traverse scheme, with data being logged in 30m grid units. A sample interval of 0.25m was used, with a traverse interval of 1m, providing 3600 sample measurements per grid unit. The data were downloaded on site into a laptop computer for processing and storage.

2.2.4 The geophysical survey was completed in one day. One 30m grid was selected as a control grid, and surveyed twice during the geophysical survey as a means of demonstrating the repeatability of the results.

2.2.5 **Data Processing:** geophysical survey data were processed using ArchaeoSurveyor II software, which was used to produce a 'grey-scale' image of the raw data. Positive magnetic anomalies are displayed as dark grey, and negative magnetic anomalies are displayed as light grey. A palette bar shows the relationship between the grey shades and geomagnetic values in nT.

2.2.6 Raw data were processed in order to further define and highlight the archaeological features detected. The following basic data processing functions were used:

Destripe: to reduce the striping effect sometimes seen in the gradiometer data when using a dual gradiometer system (a median value was applied to traverses using a threshold of 2 standard deviations).

Despike: to locate and suppress random iron spikes in the gradiometer data (a mean value was applied using a 4x8 window and 1.5 *despike* threshold).

Clip: to clip data to specified maximum and minimum values, in order to limit large noise spikes in the geophysical data (data was clipped between 2nT and -3nT in the greyscale image seen in Figure 3).

Destagger: to reduce the effect of staggered gradiometer data, sometimes caused by difficult working conditions, topography, or operator error (Grids 1-5 *destaggered* by -4 intervals/-1m).

Interpolate: to match the traverse and sample intervals in the gradiometer data (traverse intervals doubled to match 0.25m sample intervals).

2.2.7 **Interpretation**: three types of geophysical anomaly were detected in the gradiometer data:

positive magnetic: regions of anomalously high or positive magnetic data, which may be associated with the presence of high magnetic susceptibility soil-filled features, such as pits or ditches.

negative magnetic: regions of anomalously low or negative magnetic data, which may be associated with features of low magnetic susceptibility, such as stone-built features, geological features, land-drains or sub-surface voids.

dipolar magnetic: regions of paired positive and negative magnetic anomalies, which typically reflect ferrous or fired materials, including fired/ferrous debris in the topsoil, modern services, metallic structures, or fired structures, such as kilns or hearths.

2.2.8 **Presentation**: the grey-scale image was combined with site survey data and Ordnance Survey data to produce the geophysical survey plan. A colour-coded geophysical interpretation diagrams is provided, showing the locations and extent of positive, negative, and dipolar geomagnetic anomalies.

2.2.9 An archaeological interpretation diagram is provided, which is based on the interpretation of the geophysical survey results, in light of the archaeological and historical background of the site.

2.2.10 A trace plot of the unprocessed geophysical data is included in Appendix 1. Grey-scale plots of the unprocessed control grids (Control Grids 1 and 2) are included in Appendix 2.

2.3 ARCHIVE

2.3.1 The data archive for the geophysical survey has been created in accordance with the recommendations of the Archaeology Data Service (ADS 2001). This archive is currently held at the company offices at Nenthead, Cumbria. A copy of the data will also be deposited with the Norfolk Historic Environment Record.

2.3.2 One copy of the final report will be deposited with the County Historic Environment Record, where viewing will be available on request. The project is also registered with the Online Access to the Index of archaeological investigations (OASIS), where a digital copy of the report will be made available.

2.3.3 The OASIS reference for this project is **northpen3-68629**.

3 BACKGROUND

3.1 LOCATION AND GEOLOGICAL CONTEXT

- 3.1.1 Filby lies on the eastern edge of the Norfolk Broads, close to the northeast Norfolk coast, approximately 10km to the northwest of Great Yarmouth. The countryside of the Broad margins is a mixture of pasture and arable land, with blocks of woodland and small copses (Countryside Commission 1999). The study area lies at a height of approximately 10m AOD and is situated c.700m to the south of Main Road, Filby in the southwest corner of a large arable field. A small woodland is located to the southeast.
- 3.1.2 The underlying geology comprises sand and gravel (British Geological Survey 2001) with overlying Glaciofluvial and Aeolian drift and till. The overlying soils are known as Wick 2 soils, which are deep well-drained coarse loamy soils (SSEW 1980).

3.2 HISTORICAL CONTEXT

- 3.2.1 *Introduction:* this historical background is compiled mostly from secondary sources, and is intended only as a brief summary of historical developments specific to the study area. References to the Norfolk Historic Environment Record (NHER) are included where known.
- 3.2.2 *Prehistoric:* the earliest evidence of prehistoric activity in the area comprises a number of isolated finds of flint tools. A Neolithic flint scraper or knife was recovered during metal detecting near Thringby in 2004 (NHER 41011). Prehistoric flint tools have also been recovered from fields to the northeast of the study area (NHER 16336). Iron Age coins have reputedly been found in a field to the north of the study area by metal detectorists, although none has been reported (NHER 31050). The cropmark of a double ring ditch of possible Bronze Age date has been identified to the north of the study area (NHER 27684).
- 3.2.3 *Roman:* the cropmarks of a possible Roman enclosure and field boundaries have been identified in the adjacent field to the east of the site (NHER 27685 and 27689). A number of other undated cropmarks have been identified immediately to the north and west of the study area, indicating the presence of enclosure ditches and field boundaries (NHER 27686 and 27688).
- 3.2.4 *Medieval:* the village of Filby is recorded as 'Filebey' in the Domesday Book of 1086. The name is believed to be derived from the Old Norse or Old Danish personal name 'Fili' and 'byr', meaning Fili's enclosure or settlement. It is likely that the present village began to develop in the Late Saxon period, possibly on the site of an earlier settlement.

- 3.2.5 Cropmarks of possible medieval or earlier linear ditches have been identified to the east of the church in Filby (NHER 27648). A possible medieval or post-medieval mill has also been identified as a cropmark to the southwest of the church (NHER 27646). A number of other undated cropmarks have been identified to the southwest of the study area, which have been interpreted as possible Middle Saxon, medieval or post-medieval boundary ditches (NHER 27682). A possible medieval or post-medieval rectangular enclosure, aligned with the modern field pattern, has also been identified to the west of the site (NHER 27683).
- 3.2.6 Filby has a medieval parish church, which dates mainly from the 14th century with later additions. It fell into disrepair in the 18th century and was restored in the 19th century. All Saint's Church is a Grade II* Listed Building and is situated 500m to the northwest of the study area (NHER 8653).
- 3.2.7 A complex of medieval peat-cuttings, known as the Rollesby Broad complex, is shown on Saxton's map of 1574 to the west of Filby (NHER 13509). These were flooded in the late medieval and post-medieval periods to form Filby Broad and Rollesby Broad.
- 3.2.8 *Post-medieval*: in 1845 Filby was described as "a small parish with straggling village on the Norwich turnpike". It had 553 inhabitants and 1191 acres of land, including 100 acres of plantation and about 106 acres in Filby Broad, which abounded with fish and ducks (White 1845).
- 3.2.9 Faden's Map of Norfolk (published 1797) shows Filby as a dispersed village, with houses situated either side of the turnpike road (now Main Road), and a toll gate adjacent to Filby Broad. The study area was enclosed in 1802, before which date it would have been part of an open field system associated with the village. The 1st Edition Ordnance Survey Map of 1885 (1:2500 scale) shows the study area within a landscape of enclosed fields very similar to that of today. A small area of woodland is illustrated to the southwest, which has been reduced in size slightly since this date. A footpath to All Saint's Church is shown crossing the northeast corner of the study area.
- 3.2.10 Grange Farmhouse dates to 1741 and is a Listed Building (NHER 42870). An adjacent 18th brick barn with a thatched roof at Grange Farm is also Listed (NHER 42869).
- 3.2.11 *Modern*: the study area appears to have remained agricultural land up to the present, the only notable change being the removal of some field boundaries in nearby fields, to create larger agricultural units.
- 3.2.12 A World War II hide was constructed in the woods to the southeast of the study area, which was used by auxiliary troops (NHER 28935). This has now

been backfilled. World War II military buildings relating to a temporary camp are also known to have existed at Filby Hall (NHER 27647). Documentary evidence indicates the camp was in use during 1940.

3.3 PREVIOUS ARCHAEOLOGICAL WORK

- 3.3.1 A number of artefacts have previously been recovered from fields immediately to the northeast of the study area (NHER 16336). These included prehistoric flint tools, and pottery dating from the Roman to post-medieval periods. Metal detecting in this area also recovered a Roman gold ring, and coins dating from the Roman, medieval and post-medieval periods. Further metal detecting to the southeast of the study area produced Roman coins, a Middle Saxon hooked tag, and a medieval strap end, buckle and harness pendant (NHER 33348). A Roman seal box lid was recovered in a field to the south of the study area (NHER 37475), as well as a Late Saxon bridle cheek piece (NHER 39963), a prehistoric flint, a Roman coin, and other medieval and post-medieval metal finds (NHER 37425).
- 3.3.2 Further metal detecting on the outskirts of Filby, 500m to the northwest of the study area, has recovered medieval silver coins, a medieval seal matrix and post-medieval object (NHER 25087). An Early Saxon brooch, and post-medieval finger ring, token and sword belt mount have also been recovered in the area (NHER 31050). Iron Age, Roman and medieval pottery, a Roman brooch and medieval and post-medieval metal objects were recovered from a field to the west of All Saint's Church in 2007 (NHER 50276). Two medieval coins and a medieval strap end have been found near Grange Farm (NHER 33483).
- 3.3.3 In 1996 the Norfolk Archaeology Unit carried out fieldwalking and metal detecting in a field to the northwest of the present study area, in advance of a proposed new reservoir. The work recovered medieval building material, pottery, clay pipes, a buck and a seal (NHER 31804).
- 3.3.4 These finds indicate occupation of the area from the prehistoric period onwards, probably continuing throughout the Roman, Saxon, medieval and post-Roman periods. Similar assemblages of objects have been recovered during metal detecting near Runham (NHER 34669), Thringby (NHER 41011), and Mautby (NHER 35722).

4 THE GEOPHYSICAL SURVEYS

4.1 INTRODUCTION (FIGURE 2)

- 4.1.1 The geophysical survey was undertaken on 3rd December 2009 in wet conditions. Geomagnetic survey was undertaken over 2.25ha of land to cover the area of the proposed new irrigation reservoir (Figure 2). The land had recently been ploughed at the time of the survey making walking difficult. On the south and east sides of the survey area were field boundaries consisting of hedges, some of which incorporated post and wire fences. These fences produced strong dipolar magnetic anomalies around the periphery of the survey areas and so were given a clearance of c.3m.
- 4.1.2 Small discrete dipolar magnetic anomalies were detected across the whole of the study area. These are almost certainly caused by fired/ferrous litter in the topsoil, which is typical for modern agricultural land. These anomalies are indicated on the geophysical interpretation drawing, but not referred to again in the subsequent interpretation.
- 4.1.3 The control grid was surveyed twice during the course of the geophysical survey. There were no notable differences in the results between these two surveys, apart from some variance in the range of values visible in the gradiometer data, which can be attributed to the presence of fired/ferrous material in the topsoil.
- 4.1.4 The numbers in the following text refer to possible archaeological features illustrated in Figure 5.

4.2 GEOMAGNETIC SURVEY (FIGURES 3-5)

- 4.2.1 A linear negative magnetic anomaly was detected on the southern edge of the survey area, aligned with the field boundary, which corresponded to the limit of modern cultivation. A number of weak linear positive magnetic anomalies were also detected along the east side of the survey area, which were also attributed to modern cultivation practices. Further weak linear positive magnetic anomalies were detected on the north side of the site, which are probably also agricultural features. A very weak linear negative magnetic anomaly was detected crossing the centre of the survey area, aligned northwest to southeast, which may also be an agricultural feature, although this was uncertain.
- 4.2.2 A discrete sub-circular negative magnetic anomaly was detected at the northwest corner of the survey area, around which was an area of anomalously positive magnetic gradient. The negative anomaly measured between c.8m and c.10m in diameter, and may correspond to the location of

- a stone-built feature (1). The surrounding positive magnetic anomaly measured approximately 20m across, and was interpreted as a possible soil-filled feature. It is possible that these anomalies correspond to the location of a plough-truncated stone cairn or platform surrounded by a ditch.
- 4.2.3 A c.60m-long c.2.5m-wide positive linear magnetic anomaly was detected on the northern edge of the survey area, aligned approximately east to west, which was interpreted as a possible soil-filled ditch (2). Another possible positive linear magnetic anomaly was detected c.50m to the south. This anomaly was less well defined, but was parallel with the previous feature, and may indicate the location of another soil-filled ditch (3).
- 4.2.4 A negative magnetic anomaly and discrete positive magnetic anomaly were detected on the west side of the survey area. The nature of these features was uncertain. However, the positive magnetic anomaly be archaeological in nature and may indicate the presence of a soil-filled feature (4). A number of other positive magnetic anomalies were detected on the northeast side of the survey area, which may also indicate the locations of further soil-filled features, but these were less distinct.
- 4.2.5 A broad weak positive magnetic anomaly was detected on the west side of the survey area, which corresponded to an area of low water-logged ground. This anomaly may correspond to the location of a natural topographic feature or soil-filled hollow (5).

4.3 DISCUSSION

- 4.3.1 At least two potential linear features were detected by the geophysical survey (2 and 3), which may indicate the presence of soil-filled ditches. Given the extensive crop-mark evidence for enclosures and field boundaries in the surrounding area, it is possible that these represent former field boundary ditches of prehistoric, Roman or later date. Some of the other positive anomalies detected may also correspond to sections of soil-filled ditches or pits.
- 4.3.2 The most notable feature detected during the geophysical survey was a discrete negative magnetic anomaly, interpreted as a possible stone cairn (1). The cropmark of a double ring ditch, of possible Bronze Age date, has been identified to the north of the study area. It is therefore possible that this anomaly is also a prehistoric feature. It is recommended that this be investigated further through the excavation of an archaeological trial trench.

5 CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

- 5.1.1 Geomagnetic survey covering 2.25ha of land has been conducted within an arable field to the southwest of Grange Farm, Filby, covering the proposed location of a new irrigation reservoir.
- 5.1.2 A number of features were detected which can be attributed to modern agricultural practices and visible topographic features. However, a number of possible archaeological features were also detected, which extended outside of the survey area to the north and west. Further geophysical survey in this area could help to clarify the nature and extent of these features.
- 5.1.3 The potential archaeological features detected during the survey included two probable ditches of a former field system, a possible stone cairn, and other possible soil-filled features. Given the archaeological background of the site it is likely that these features are prehistoric, Roman or later in date.

5.2 RECOMMENDATIONS

- 5.2.1 It is recommended that the results of the geophysical surveys are tested through the excavation of a series of trial trenches across the site, targeting the most notable geophysical anomalies (1-4), and a sample of the possible soil-filled features, as well as testing areas apparently devoid of archaeological features.

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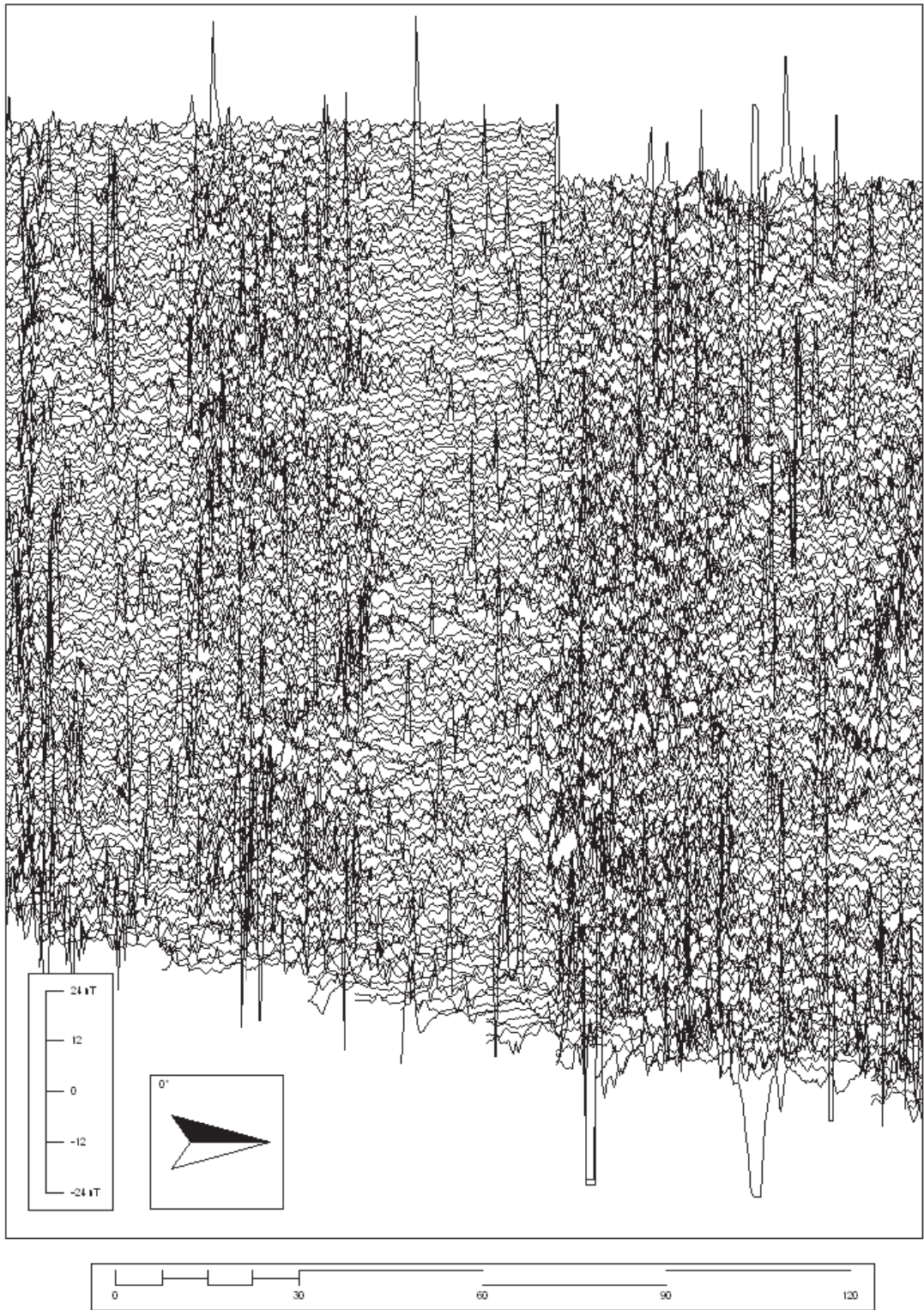
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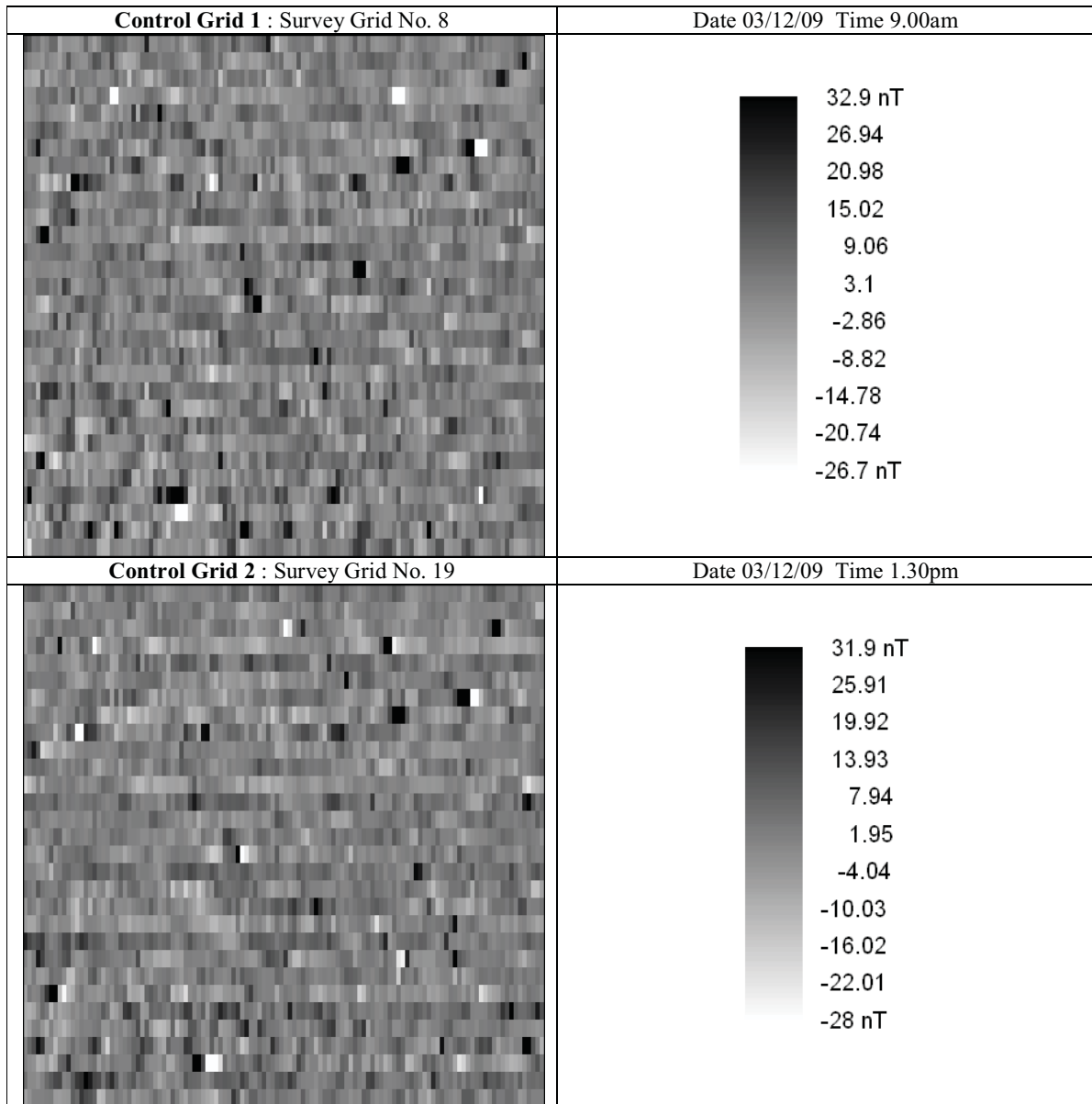
Faden's Map of Norfolk: <http://www.fadensmapofnorfolk.co.uk>

APPENDIX 1: TRACE PLOT

Grange Farm, Filby



APPENDIX 2: CONTROL GRID PLOTS



APPENDIX 3: FIGURES
