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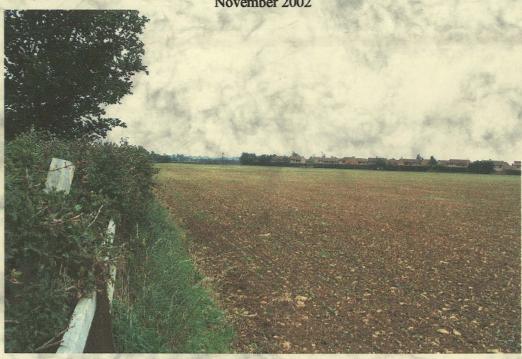
ARCHAEOLOGICAL DESK-BASED ASSESSMENT & GEOPHYSICAL SURVEY:

ON LAND OFF WOLSEY WAY, LINCOLN, LINCOLNSHIRE PLANNING APPLICATION: W/65/0566/95 SITE CODE: WWL02

ACCESSION NO.: LCNCC 2002.460

NGR: TF 0000 7370

November 2002



COMMISSIONED BY:

LINDSEY SECURITIES LTD.

465 High Street Lincoln LN5 8JB

PREPARED BY

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ARCHAEOLOGICAL DESK-BASED ASSESSMENT & GEOPHYSICAL

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SURVEY:

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Archaeological Desk-Based Assessment & Geophysical Survey on Land off Wolsey Way, Lincoln, Lincolnshire

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SUMMARY

- 1.1 Lindsey Securities Ltd. are seeking to develop approximately 13ha of agricultural land off Wolsey Way, Lincoln. Following discussions with the Archaeological Advisor to West Lindsey District Council, a programme of archaeological works is requested to prior to the determination of the outline planning application (Ref. W65/0566/95).
- 1.2 The first stage of work requested is a desk-based assessment and geophysical survey. A specification was prepared for the geophysical survey and agreed with the Conservation Service Team, LCC prior to the survey being undertaken.
- 1.3 The desk-based assessment established that the site lies in an area of high archaeological potential, particularly of a prehistoric and Roman. This is confirmed by the prehistoric barbed and tanged arrowhead and the Roman black burnished ware pottery and glass recorded during the geophysical survey.
- 1.4 The geophysical survey recorded very few features of archaeological potential and soil conditions were not ideal. A quarry indicated on the Ordnance Survey 2nd Edition map was located by the survey. A north-south and east-west features were identified. However, their condition, date, depth and importance is currently unknown.

2.0 SITE LOCATION & DESCRIPTION

- 2.1 The site is located on the northern side of Lincoln approximately 5km northeast of the city centre. The site is located on the southern side of the A46/A158 bypass with Wolsey Way to the south (see Figure 1). The development area is centred on NGR TF 0000 7370 and lies at an approximate altitude of 35m AOD.
- 2.2 Soils at the site are Elmton 1 Association (343g), well drained brashy calcareous fine loamy soils over limestone (SSEW 1983).

3.0 PLANNING BACKGROUND

- 3.1Lindsey Securities Ltd. are seeking to develop approximately 13ha of agricultural land off Wolsey Way, Lincoln. Following discussions with the Archaeological Advisor to West Lindsey District Council, a programme of archaeological works is required to prior to the determination of an outline planning application (Ref. W65/0566/95). This includes a desk-based assessment and geophysical survey.
- 3.2 A specification detailing the methodology to be maintained during the geophysical survey was prepared and agreed with the Conservation Services Team, Lincolnshire County Council and in accordance with current best archaeological practices and the appropriate national standards and guidance including:

Management of Archaeological Projects (English Heritage 1991);

Archaeological Desk-Based Assessment & Geophysical Survey on Land off Wolsey Way, Lincoln, Lincolnshire

Code of Conduct (Institute of Field Archaeologists 1999); Standard and Guidance for Archaeological Field Evaluation (IFA 1994); Geophysical Survey in Archaeological Field Evaluation (EH, David 1995); Lincolnshire Archaeological Handbook (LCC 1998).

4.0 ARCHAEOLOGICAL BACKGROUND

- 4.1 The closest remains to the site date from the Bronze Age period and later. A multiple ditched system southeast of the site has been excavated and recorded and dates from the Bronze Age-Iron Age (SMR 50348) and is overlain by Roman settlement. Within the parish, a Wilburton phase bronze hoard has been recorded (May 1976, p. 103). To the east and north of the site prehistoric enclosures have also been identified by aerial photography (SMR 52417, 52418, 52419, 52420, 54422 & 52423). These have not been excavated.
- 4.2 To the north of the site a north-south linear crop mark representing a boundary has been recorded (SMR 50357). The crop mark runs from Nettleham Glebe to Danby Hill and was excavated in 1979. It is possible that it continues into the southern most part of the site A further linear crop mark is recorded immediately east of Danby Hill but discontinues to the north and outside the site (SMR 50358).
- 4.3 The Roman period is represented not only by cropmarks but also by chance finds. A bronze Roman fitment, possibly representing the god Mars, has been recorded to the east of the site (SMR 52416). Within Nettleham, an arch dedicated to the God Mars has also been recorded (Whitwell 1970, p124). To the south of the site, the A15/Wragby Road is a known Roman Road.
- 4.4 The site lies within Nettleham parish, although located on its southwestern boundary. The name Nettleham derives from the Old English *netel* and *hām*. 'Netel' represents nettles, which is thought to be indicative of a place past human settlement and 'ham' meaning settlement (Cameron 1998).
- 4.5 Nettleham is first mentioned historically in the Domesday Survey of 1086AD. Queen Edith, Gilbert of Ghent and Bishop Remigius are listed as holders of land. Twenty-eight villagers, 12 smallholders and 1 freeman resided in the parish (Morris 1986).
- 4.6 A site of medieval date has been recorded as part of an evaluation prior to quarrying to the south of the site (SMR 54248 & 54280). The finds have been linked to manuring of the fields between the 12th-20th centuries.
- 4.7 Cartographic evidence suggests that the site has generally been agricultural land during the post-medieval period. The enclosure plan and award for Nettleham parish dated 1777 & 1778 respectively show that the majority of the site was one large field divided by the ?Guntithe drain under the ownership of Sir Francis Bernard (see Figure 3). The remainder of the site was under the ownership of the Reverend Doctor Stintin.
- 4.8 By 1857, the land under Sir Francis Bernard ownership, has been sub-divided into smaller parcels of land (Figure 4). Megg House is first illustrated. By the early

20th century, the Ordnance Survey 6" Series shows the site much the same (Figure 5). However, at the north western corner of the site, an old quarry is shown.

5.0 GEOPHYSICAL SURVEY

5.1 AIMS

The aim of the geophysical survey was to:

- a) to identify past human activity on the site;
- b) to identify areas of archaeological potential so that a programme of intrusive archaeological works may be defined;
- c) to report on the results of the geophysical survey and place them within their Local, Regional or National context

5.2 METHODOLOGY & RESULTS

- 5.2.1 A magnetometer survey of the site was undertaken by Dr. Ian Brooks and R. Cleary, Engineering Archaeological Services. A fluxgate gradiometer was used which detects magnetic anomalies caused by changes in the composition of the subsoil or the underlying geology to a depth of approximately 1m below the ground surface. A rapid scan of the whole site was made initially. Those features identified as of archaeological potential were subject to a detailed survey. Magnetic susceptibility was also measured. The results are presented in Appendix A, along with the survey undertaken in connection with Planning Application 98/P/0284. The methodology is also presented in more detail.
- 5.2.2 The southernmost portion of the site is referred to as Field 2 in the report (Appendix A, p. 3). Two very feint anomalies were recorded and may or may not represent archaeology. The results of the magnetic susceptibility samples taken suggest that the conditions were suitable for survey but not ideal.
- 5.2.3 The northernmost and largest part of the site is referred to as Field 3 (Appendix A, p. 4). At the southernmost part of the site, a north-south linear was recorded and a large ferromagnetic response also recorded. A linear anomaly, possibly representing a metal pipe or electricity cable was also encountered. At the northernmost tip of the site, various ferromagnetic responses were also recorded. A large anomaly was also recorded at the northernmost tip of the site and is thought to represent the quarry illustrated on the 2nd Edition OS (Figure 5). The results of the magnetic susceptibility samples taken suggest that the conditions were not ideal for survey.

6.0 DISCUSSION

6.1 The desk-based assessment exercise has established that the site lies in an area of high archaeological potential. The proximity of prehistoric activity and cropmarks, as well as Roman road, would suggest that this is the case. This is confirmed by the prehistoric barbed and tanged arrowhead (Plate 4) found in LF3, and the Roman black burnished ware pottery and glass recorded during the

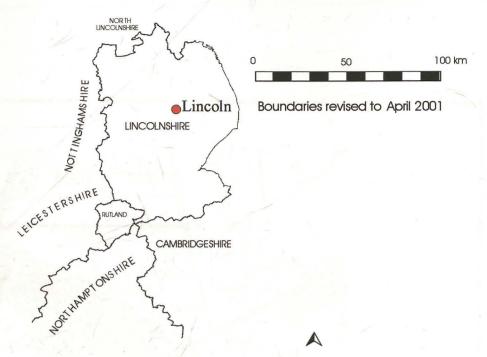
Archaeological Desk-Based Assessment & Geophysical Survey on Land off Wolsey Way, Lincoln, Lincolnshire

geophysical survey. The potential for remains of a later date to be present is considered to be low.

- 6.2 In comparison, the geophysical survey has recorded few features of archaeological interest. However, the underlying soils do not provide a suitable background contrast for survey.
- 6.3 North-south and east-west anomalies have been identified by the survey but their condition, date, depth and importance is currently unknown. Consideration should also be given to the effect of the construction of the A158, on deposits on the northern boundary.

7.0 FIGURES

- Figure 1. Site Location Plan.
- Figure 2. SMR distribution plot
- Figure 3. Nettleham Enclosure Plan 1777 (tracing)
- Figure 4. Bishopric Estate 1857 (tracing)
- Figure 5. Ordnance Survey 6" County Series (photocopy)



Map based on Ordnance Survey with the sanction of the Controller of H.M. Stationery Office,
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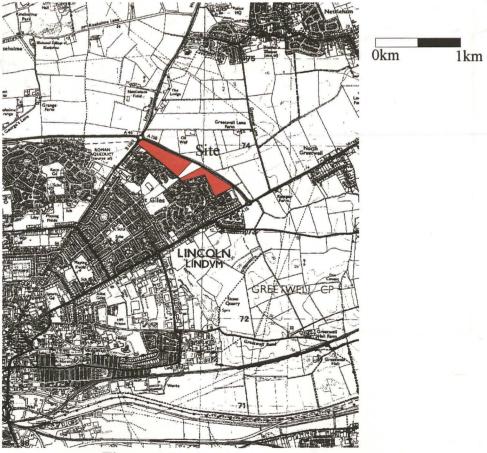
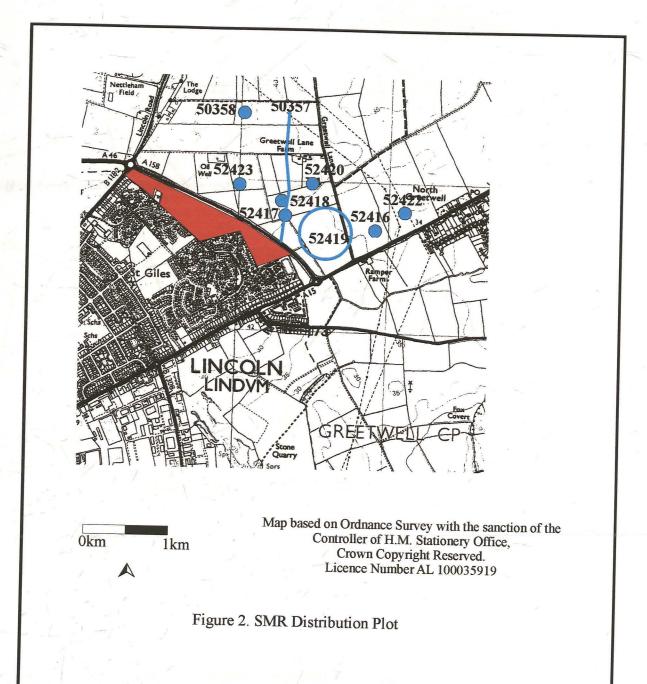
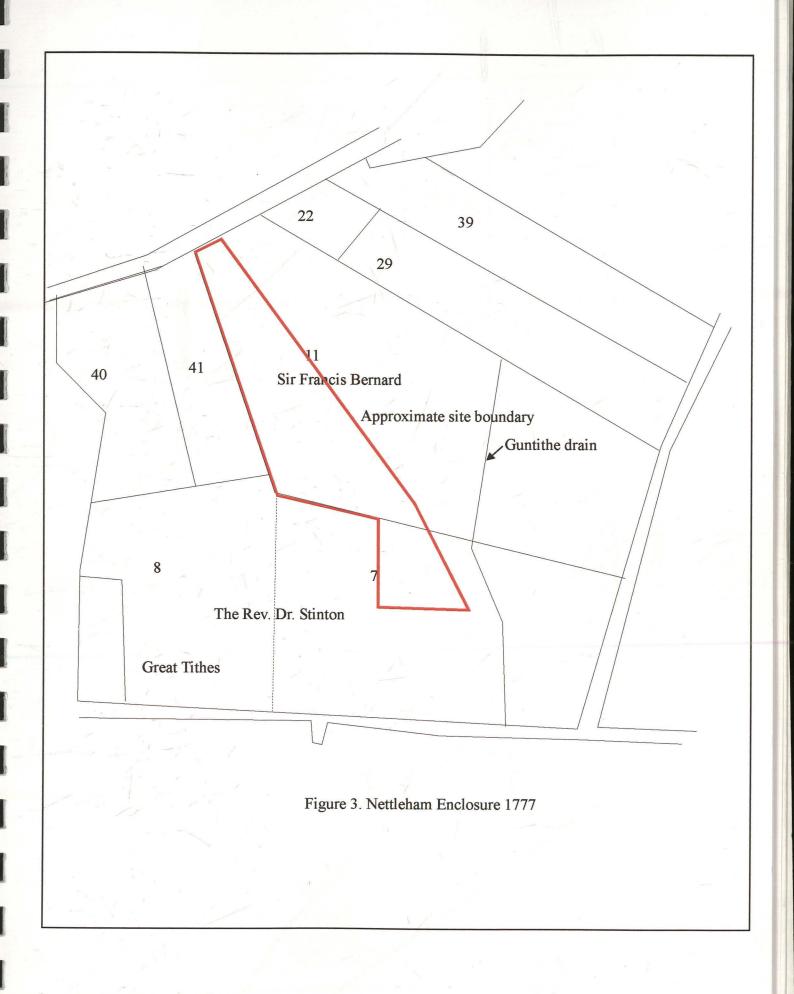


Figure 1. Site location





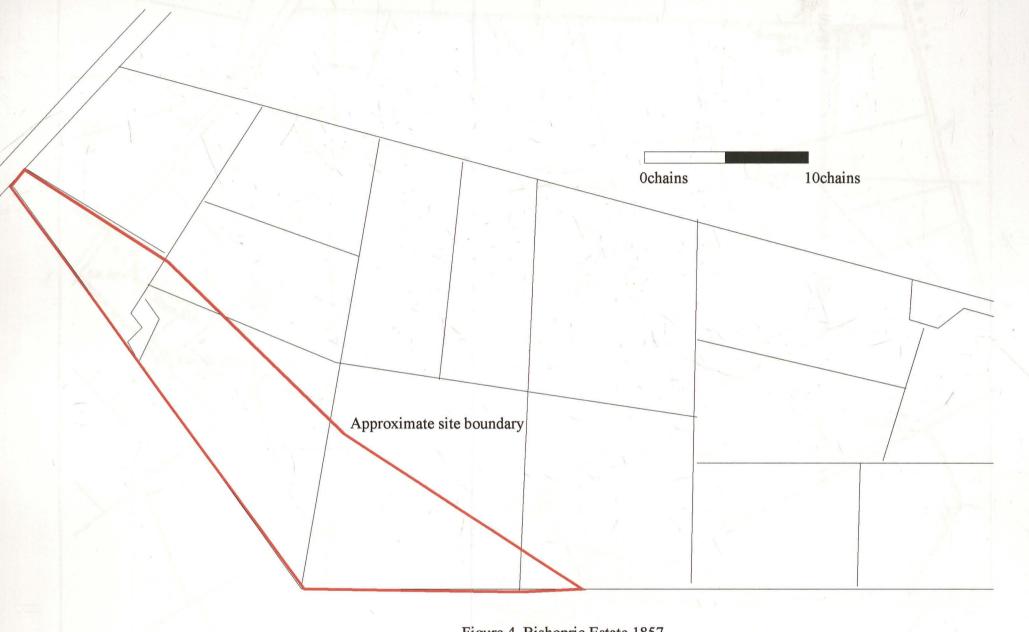
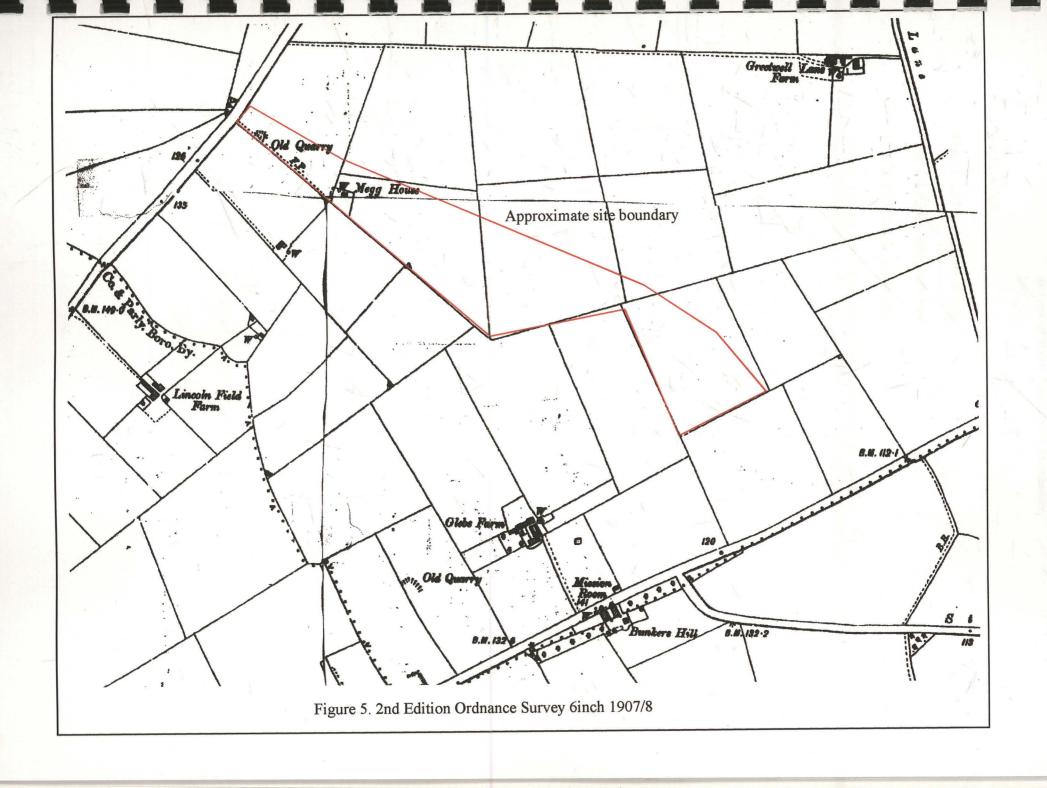


Figure 4. Bishopric Estate 1857



Archaeological Desk-Based Assessment & Geophysical Survey on Land off Wolsey Way, Lincoln, Lincolnshire

8.0 PLATES

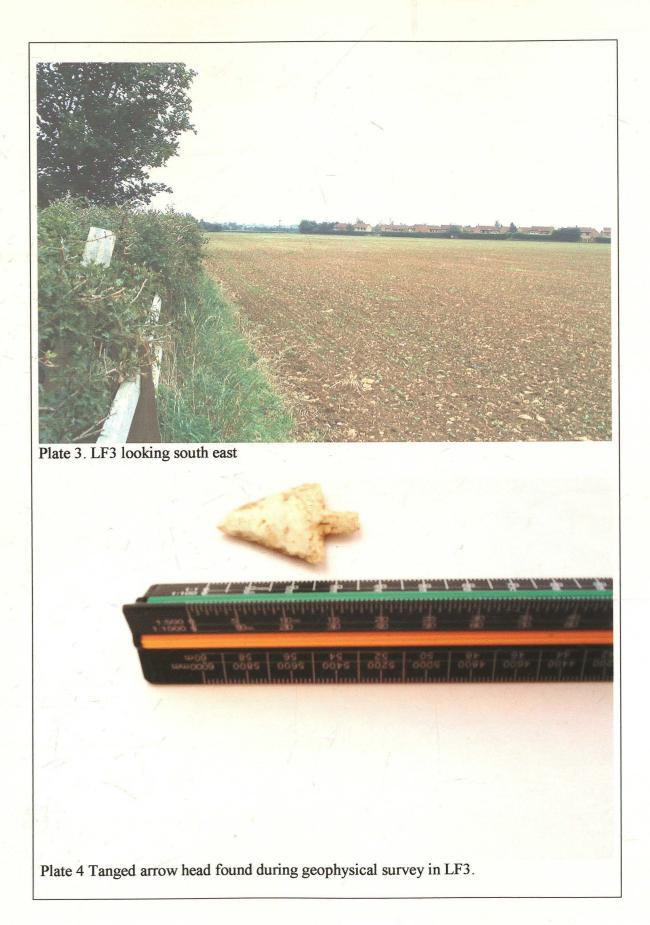
- Plate 1. LF2 looking north east.
- Plate 2. LF3 looking south west.
- Plate 3. LF3 looking south east
- Plate 4. Tanged arrow head found during geophysical survey in LF3.



Plate 1. LF 2 looking north east.



Plate 2. LF3 looking south west



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Nettleham Encloshure Award 1778 - D C CV/17/2/1

Nettleham Field 1816 – 3 DIXON 4/16 (does not show the site)

Bishopric Estate 1857 – 2CC 58/1264

Ordnance Survey 6" County Series Sheet 70NE 2nd Edition 1908

Ordnance Survey 6" County Series Sheet 61SE 2nd Edition 1907

English Heritage

The relevant English Heritage County Series was searched for:

Scheduled Ancient Monuments

Registered Parks and Gardens

Registered Battlefields

APPENDIX A:

GEOPHYSICAL SURVEY

Survey Commissioned by M and M Archaeology

Surveyed
by
I.P. Brooks and R. Cleary
Engineering Archaeological Services Ltd.

registered in England Nº 2869678

Lindsey Securities Development, Lincoln Geophysical Survey

October 2002

EAS Client Report 2002/28

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NGR

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Figure 5: Field 1 Grey Scale Plots

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Figure 8: Field 2 Grey Scale Plot

Figure 9: Field 2 X - Y Plot

Figure 10: Field 2 Interpretation

Figure 11: Field 3 Grey Scale Plots

Figure 12: Field 3 X - Y Plots

Figure 13: Field 3 Interpretation

Technical Information:

Techniques of Geophysical Survey

Instrumentation

Methodology

Copyright

Lindsey Securities, Geophysical Survey - Introduction:

NGR

Centred on TF 00544 73143 (Field 1) TF 00120 73597 (Field 2) SK 99672 73803 (Field 3)

Location and Topography

The proposed Lindsey Securities development covers three fields in the north east corner of Lincoln (Figure 1).

Field 1 was immediately south of the roundabout between the A15 and the A158. Roughly triangular in shape, it was bounded on the north by the A15, on the south by Hawthorn Road, on the west by houses facing onto Hawthorn Chase and on the east by open fields. The boundary to the east was only marked by a line of yellow painted concrete posts. There was also a new housing development in the south western corner of the development area. At the time of survey the area was under stubble. The field was flat.

Field 2 was approximately 500 m to the north west of Field 1. Roughly triangular in shape it was bounded on the north by the A158 and to the south by houses. The field was planted with cereals which had sprouted. The field was flat.

Field 3 was adjacent to Field 2. Once again it was roughly triangular in shape, but this time it had an area removed from its western edge for Megg House. The field runs from the B1182 to Field 2 and was bounded on the north by the A158 and by houses to the south. The north west end of the field was slightly rolling, however the south east end was basically flat. The field was under a crop of brassicas at the time of survey.

Aims of Survey

To gather sufficient information to establish the location and extent of any archaeological features within the development area and, if possible, to characterise the archaeology located.

SUMMARY OF RESULTS

Only a limited number of magnetic anomalies were located within the development area. The majority of these were probably of modern origins with only three clear anomalies likely to be archaeological.

The magnetic regime within the three fields was very quiet with the background magnetic field having a standard deviation of less than 1 nT.

The magnetic susceptibility samples taken as part of the survey suggest that although not ideal the magnetic condition were acceptable for magnetic survey.

Lindsey Securities, Geophysical Survey -Results:

Methods

The three fields were scanned with a Geoscan FM 36 Fluxgate Gradiometer. Transects were walked at approximately 10 m intervals across the fields and magnetic anomalies \pm 2 nT were sketch plotted onto 1:2500 maps of the development area.

The detailed survey was undertaken using twenty-three 30 x 30 m grid squares laid out as in Figures 2 - 4. Readings were taken at 0.5 m intervals along transects 1 m apart. These transects were walked in a zigzag pattern.

The survey was carried out using a Geoscan FM 36 Fluxgate Gradiometer with a ST 1 sample trigger. Grey Scale and X - Y Plots were produced using Geoscan Research "Geoplot" v. 3.00e.

The selection of the areas for detailed survey took into consideration two factors. Firstly the presence of anomalies located in the scanning and secondly the need to test apparent blank areas in order to evaluate the magnetic scanning.

Survey Results:

Area

The proposed development area covers approximately 21.7 Ha of this 2.07 Ha were subjected to detailed geophysical survey.

Within Field 1, two areas were investigated, one consisted of four grids (Area 1) and the other of two grids (Area 2) (Figure 2). Area 1 was designed to sample a possible linear anomaly located in the scanning and Area 2 a blank area.

Field 2 had a single area of five grids (Area 3) laid out as in Figure 3.

Three areas were investigated in Field 3, each of four grids (Areas 4, 5 and 6). Areas 4 and 5 were designed to sample anomalies recorded in the scanning, whereas Area 6 sampled an apparent blank area along side the access track to Megg

House. The locations of Areas 4 - 6 is shown in Figure 4.

Display

The results are displayed as Grey Scale Image and as X-Y Trace Plots. Figures 2 - 5.

Results:

Field 1.

Scanning

Only five magnetic anomalies were located by the scanning. Four of these were relatively high value, discrete anomalies which may be the response to large metal objects within the plough zone. The other anomaly, however, was a broad, linear, low level anomaly, only 2 or 3 nT above the background. This ran from the eastern boundary of the survey area west for approximately 40 m before turning south west.

The magnetic anomalies located in the scanning are shown in orange on Figure 7.

Area 1

Area I was designed to sample the possible linear anomaly recorded in the scanning. The magnetic variability within the sample area was very small with a standard deviation of less than 1 nT.

Two, parallel, linear anomalies were recorded crossing Grid 3. These were only 2 - 3 nT above the background level and could be related to the linear anomaly noted in the scanning. The magnetic anomalies of potential archaeological character are shown in red on Figure 7.

A series of very feint anomalies running NNE -SSW are assumed to be the result of modern agricultural practice, possibly drainage. These are shown in green on Figure 7.

Lindsey Securities, Geophysical Survey - Field 2:

Area 2

This area was designed to sample an apparent. Blank area within the scanning. Once again the magnetic variability was very slight with a standard deviation of less than 1 nT.

Two very feint anomalies were noted. One runs SW - NE and the other NW - SE.

The only other anomaly recorded was an area of ferromagnetic response in the SW corner of Grid 6. This is a response to the metal fencing around the housing development in this part of the field. The ferromagnetic responses are shown in blue on Figure 7.

Magnetic Susceptibility

It was possible to take soil samples in order to assess the magnetic susceptibility of the soils. It was also possible to obtain a subsoil sample for comparison.

Sample	Volume susceptibility	Mass susceptibility
	χ _v	χm
Grid 1	- 66	54.5
Grid 3	67	52.3
Grid 5	- 81	67.5
Subsoil	6	5.4

The susceptibilities as measured are consistent and moderately low. The subsoil levels are also very low suggesting that conditions were not ideal for magnetic survey.

Field 2.

Scanning

No anomalies were noted in the scanning of this field.

Area 3

Area 3 samples the middle of the field. The magnetic variability within the survey area was very small with a standard deviation of less than 1 nT.

Two very feint anomalies were recorded. These were only 1 - 2 nT above the background level. One of the possible anomalies ran roughly eastwest through Grid 8, before curving to the south. The other ran NW - SE through Grid 9. These anomalies were very indistinct and may be the result of geological variations or archaeological features. The anomalies are shown in red on Figure 10.

Magnetic Susceptibility

It was possible to take soil samples in order to assess the magnetic susceptibility of the soils. It was not possible, however, to obtain a subsoil sample for comparison.

Sample	Volume susceptibility χ_v	Mass susceptibility χ _m
L7	120	98.4
L9	95	78.5

The susceptibilities as measured are consistent and moderate suggesting that conditions were suitable, although not ideal for magnetic survey.

Lindsey Securities, Geophysical Survey - Field 3:

Field 3.

Scanning

Only a limited number of magnetic anomalies were noted in the scanning. A large area of magnetic disturbance adjacent to the track to Megg House was distinct. Magnetic values varied between ± 100 nT above/below the background. It was associated with a spread of modern brick and tile and therefore probably represent a building adjacent to the track.

To the east of the large anomaly another anomaly was noted. This was approximately 10×5 m in size and varied ± 7 nT from the background.

Near to Megg House two large, high valued anomalies were recorded. The first of these was a broad linear running WNW - ESE . This probably represents a modern service. The second was an irregular anomaly running from the western side of the garden into the field. The magnetic field varied by ± 70 nT suggesting the presence of highly magnetic materials such as metal or ceramic materials (brick and tile).

Another large anomaly was noted in the southern corner of the field. This was approximately 20 x 10 m in size and the magnetic field varied by \pm 100 nT suggesting the presence of highly magnetic material within the anomaly.

Area 4

This area sampled the anomaly in the southern corner of Field 3. The large anomaly recorded in the scanning was recorded in Grid 15 and is shown in blue on Figure 13.

A linear anomaly running roughly north - south, through Grids 12 and 13, was also recorded. The anomaly was of a low level with the magnetic field only being 2-3 nT above the background field. This is shown in red on Figure 13.

Area 5

Located alongside the eastern side of the garden to Megg House, this Area was designed to sample the anomalies located in the scanning. Both the linear anomaly and the irregular anomaly are shown within the plots together with four, small ferromagnetic responses.

The linear anomaly has the character of a metal pipe or electricity cable confirming the interpretation from the scanning of a modern service. The large anomaly is also of high variability suggesting the presence of metal or ceramic materials.

The four small anomalies are probably the result of discrete metal object within the plough zone. These anomalies are shown in blue on Figure 13.

Area 6

Aligned on the track to Megg House this Area was designed to sample an apparent blank area in the scanning whilst sampling an area alongside the track where archaeology may be expected. The magnetic variability within the sample area was very small with a standard deviation of approximately 1 nT.

Only two small ferromagnetic anomalies were located. These are shown in blue on Figure 13.

Magnetic Susceptibility

It was possible to take soil samples in order to assess the magnetic susceptibility of the soils. It was not possible, however, to obtain a subsoil sample for comparison.

Sample	Volume susceptibility	Mass susceptibility
	χ _v	χ_{m}
L12	57	47.1
L15	42	35.0
L16	. 39	31.4
L18	48	39.3

Lindsey Securities, Geophysical Survey - Conclusions:

Sample	Volume susceptibility	Mass susceptibility χ _m
L20	39	34.2
L22	36	29.8

The susceptibilities as measured are consistent and moderately low suggesting that conditions were not ideal for magnetic survey.

Conclusions

It is a fundamental axiom of archaeological geophysics that the absence of features in the survey data does not mean that there is no archaeology present in the survey area only that the techniques used have not detected it.

Very few anomalies were located in any of the three fields surveyed. Indeed, the background magnetic field would appear to be very quiet with a standard deviation of approximately 1 nT.

In Field 1 only the parallel anomalies in Grid 3 are most likely to be of archaeological origins. The other anomalies are either the result of agricultural origins or are so feint as to be uncertain.

In Field 2 only two anomalies were located these are very feint and are probably geological in nature.

In Field 3, apart from a feint anomaly in Grid 12 no anomalies of archaeological origins were located. Those anomalies in the northern half of the field would appear to relate to areas of probable modern disturbance as does the large anomaly in the Grid 15.

Whilst carrying out the scanning and survey very few finds were noted. The exception was a flint, barbed and tanged arrowhead found in Field 3 (Figure 13) and a sherd of black burnished ware and a fragment of Roman style glass in Field 2.

Lindsey Securities, Geophysical Survey - Technical Information:

Techniques of Geophysical Survey:

Magnetometry:

This relies on variations in soil magnetic susceptibility and magnetic remenance which often result from past human activities. Using a Fluxgate Gradiometer these variations can be mapped, or a rapid evaluation of archaeological potential can be made by scanning.

Resistivity:

This relies on variations in the electrical conductivity of the soil and subsoil which in general is related to soil moisture levels. As such, results can be seasonally dependant. Slower than Magnetometry this technique is best suited to locating positive features such as buried walls that give rise to high resistance anomalies.

Resistance Tomography

Builds up a vertical profile or pseudosection through deposits by taking resistivity readings along a transect using a range of different probe spacings

Magnetic Susceptibility:

Variations in soil magnetic susceptibility occur naturally but can be greatly enhanced by human activity. Information on the enhancement of magnetic susceptibility can be used to ascertain the suitability of a site for magnetic survey and for targeting areas of potential archaeological activity when extensive sites need to be investigated. Very large areas can be rapidly evaluated and specific areas identified for detailed survey by gradiometer.

Instrumentation:

- 1. Fluxgate Gradiometer Geoscan FM36
- 2. Resistance Meter Geoscan RM4/DL10
- 3. Magnetic Susceptibility Meter Bartington MS2
- 4. Geopulse Imager 25 Campus

Methodology:

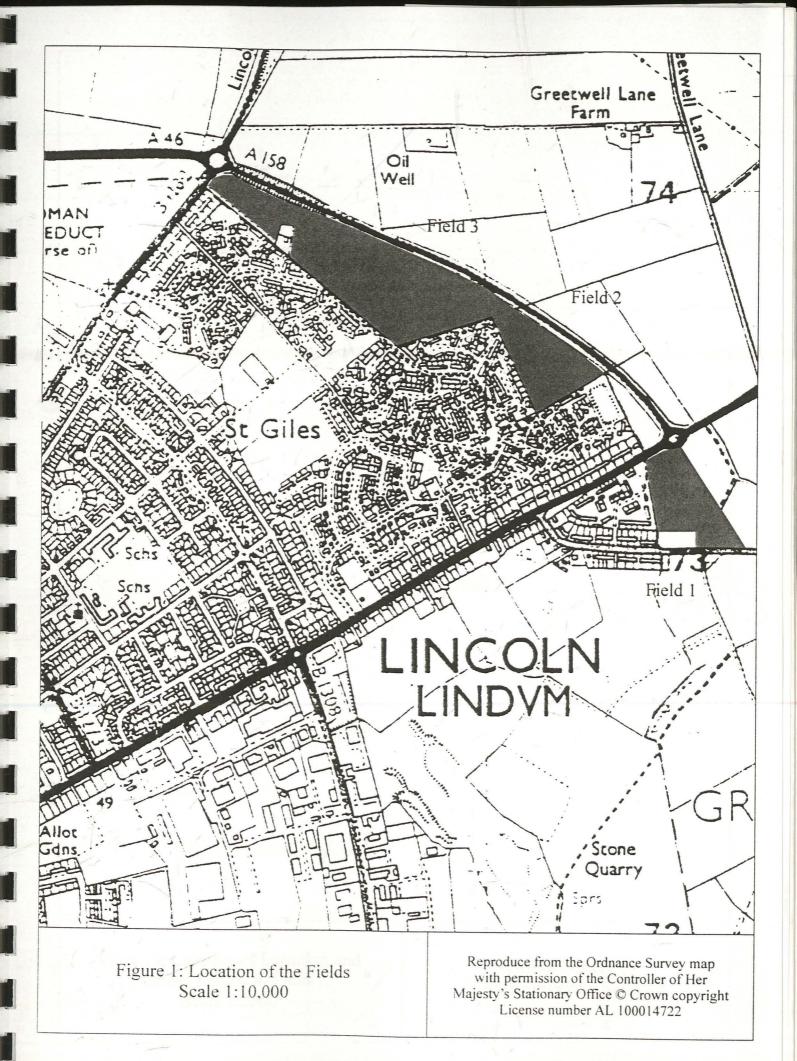
For Gradiometer and Resistivity Survey 20m x 20m or 30m x 30m grids are laid out over the survey area. Gradiometer readings are logged at either 0.5m or 1m intervals along traverses 1m apart. Resistance meter readings are logged at 1m intervals. Data is down-loaded to a laptop computer in the field for initial configuration and analysis. Final analysis is carried out back at base.

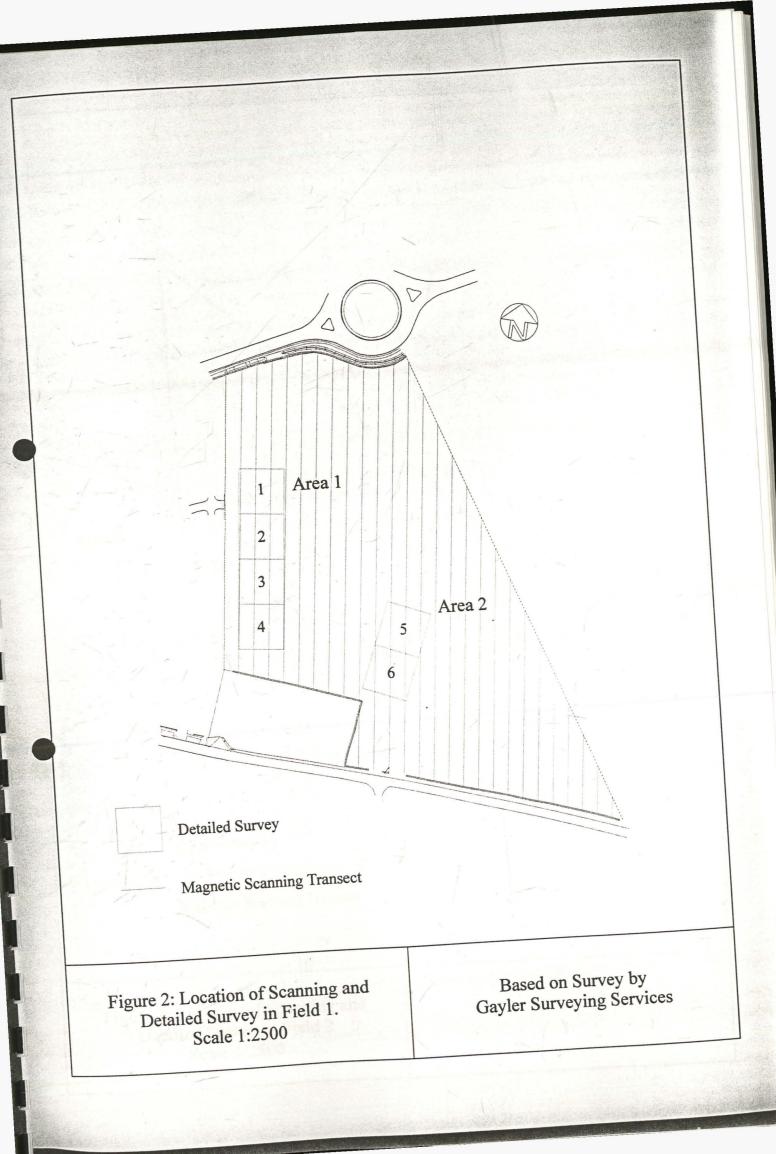
For scanning transects are laid out at 10m intervals. Any anomalies noticed are where possible traced and recorded on the location plan.

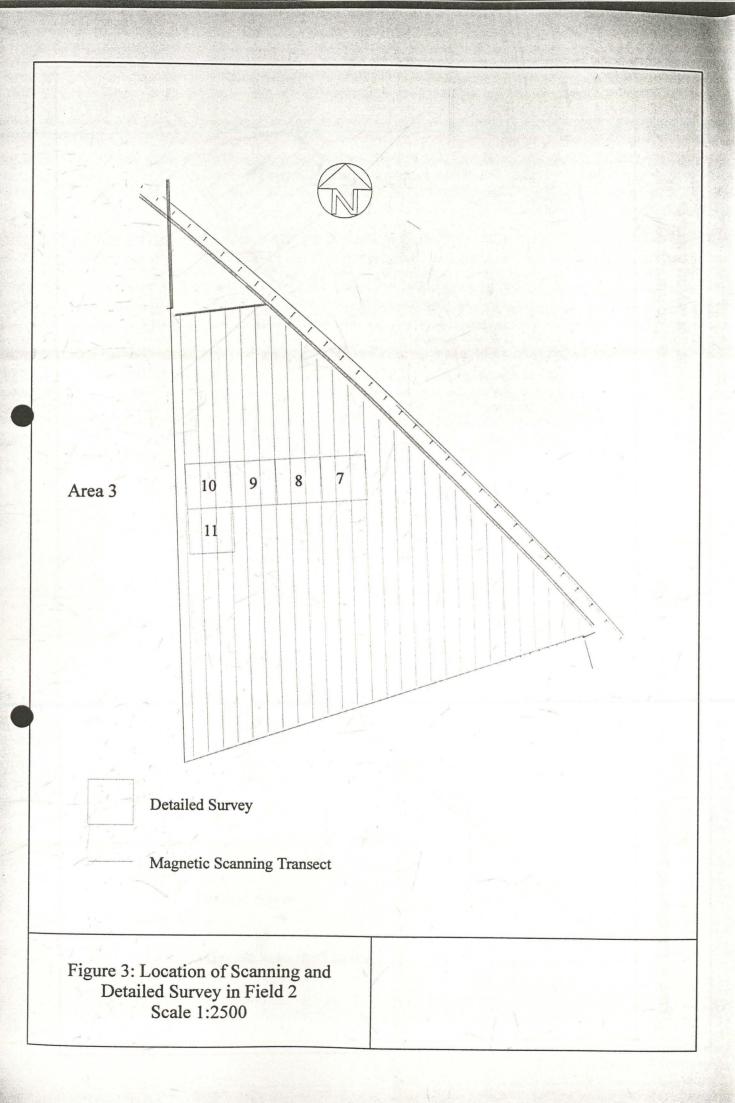
For Magnetic Susceptibility survey a large grid is laid out and readings logged at 20m intervals along traverses 20m apart, data is again configured and analysed on a laptop computer.

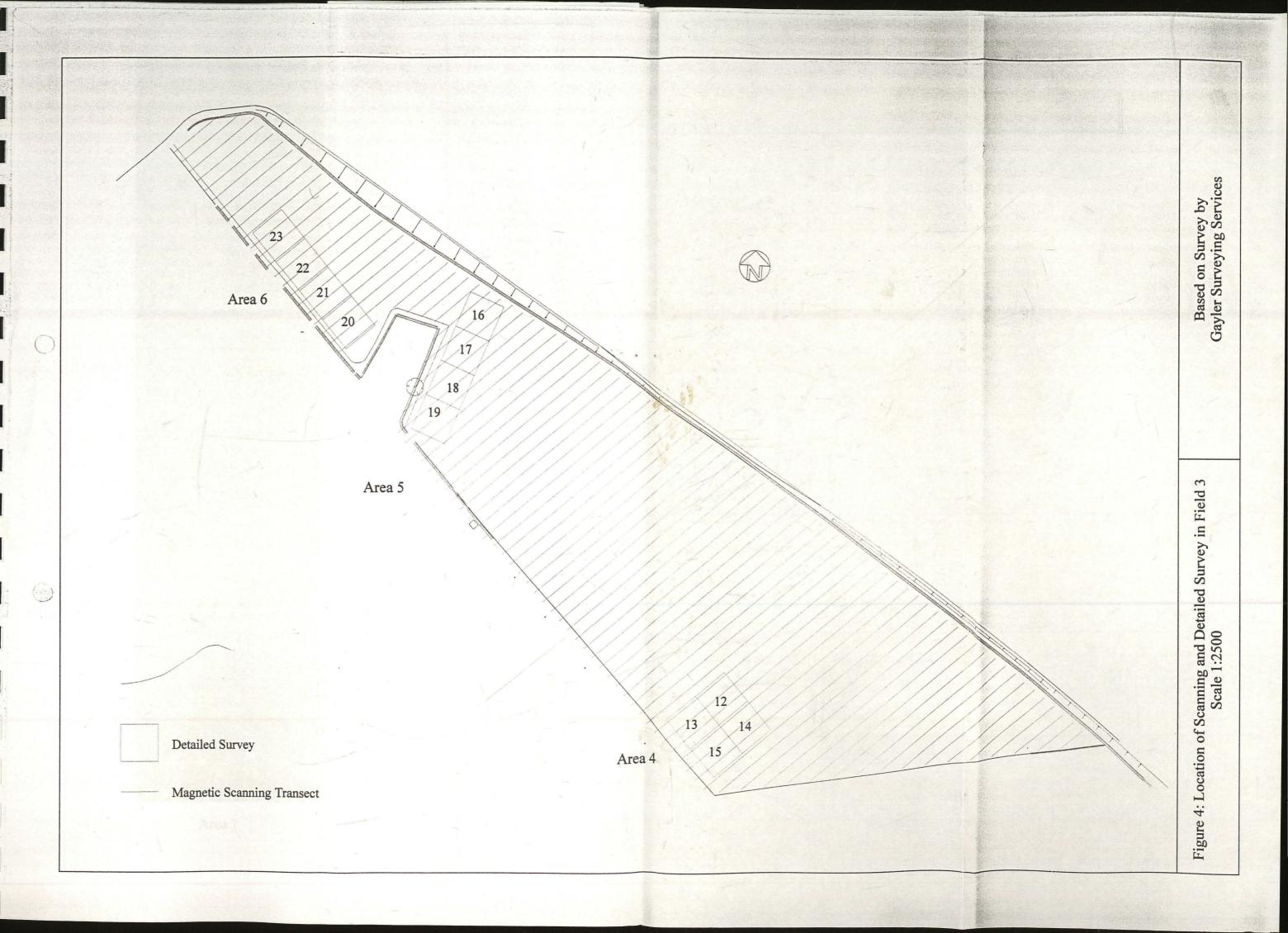
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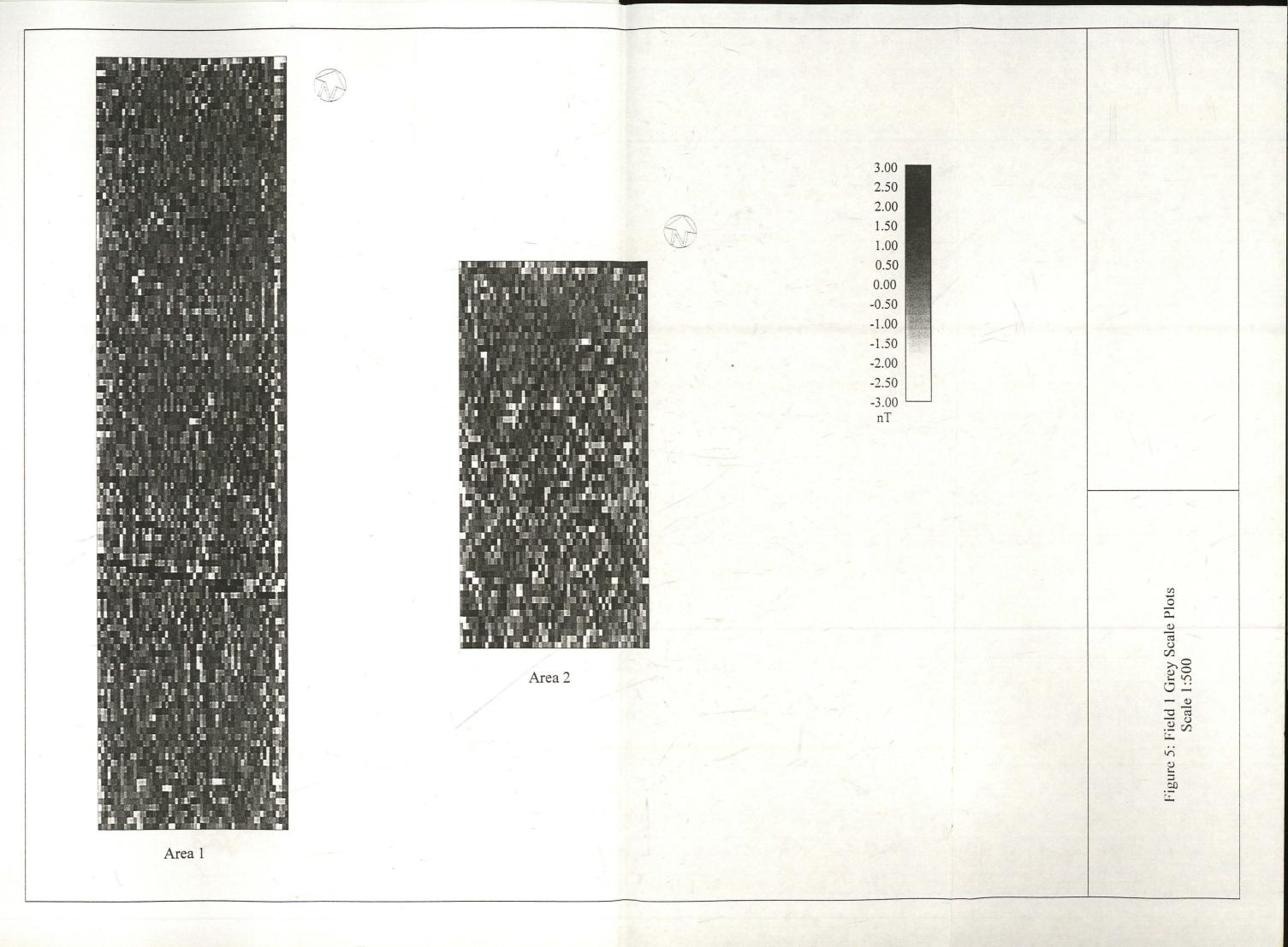
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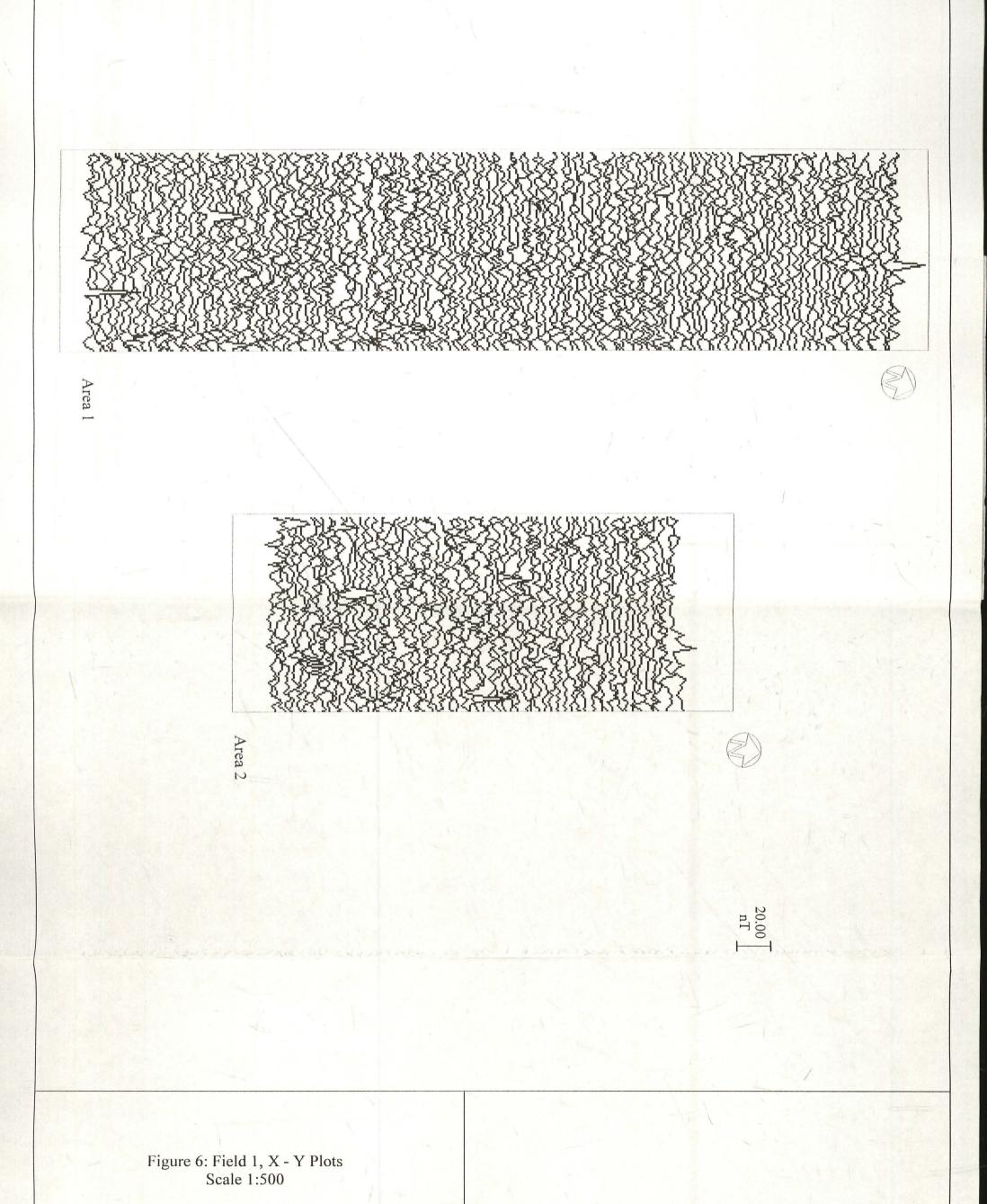


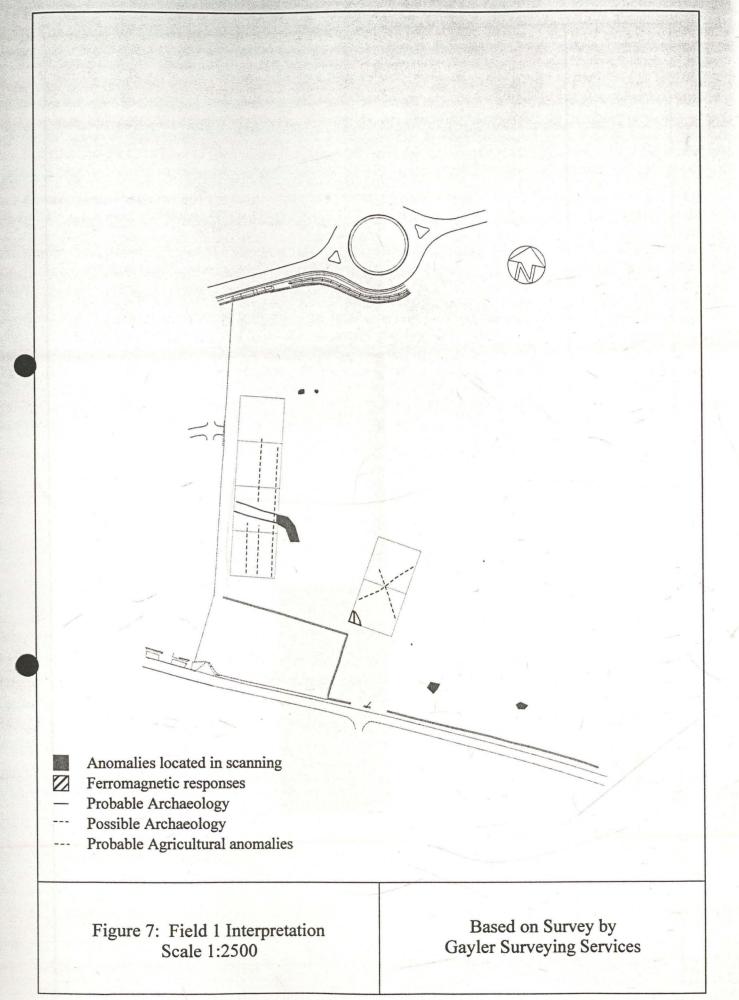


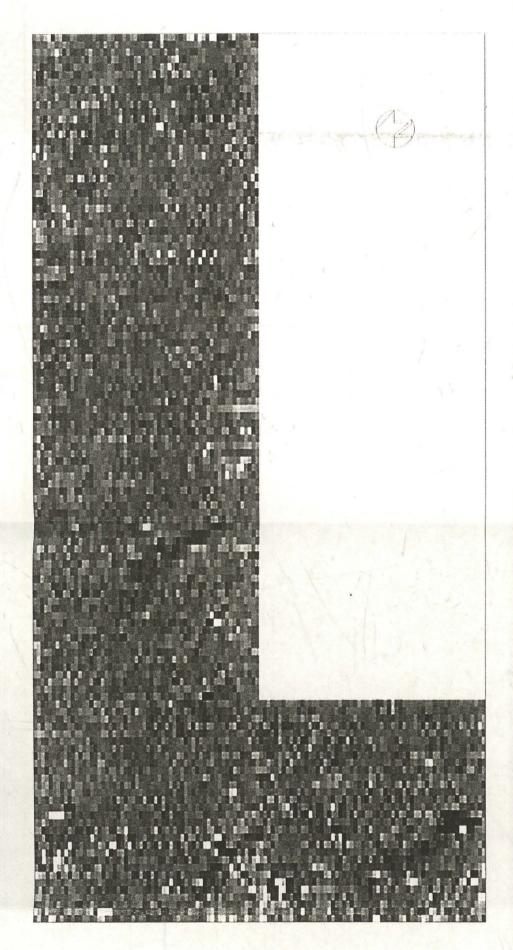












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-3.00 nT

Area 3

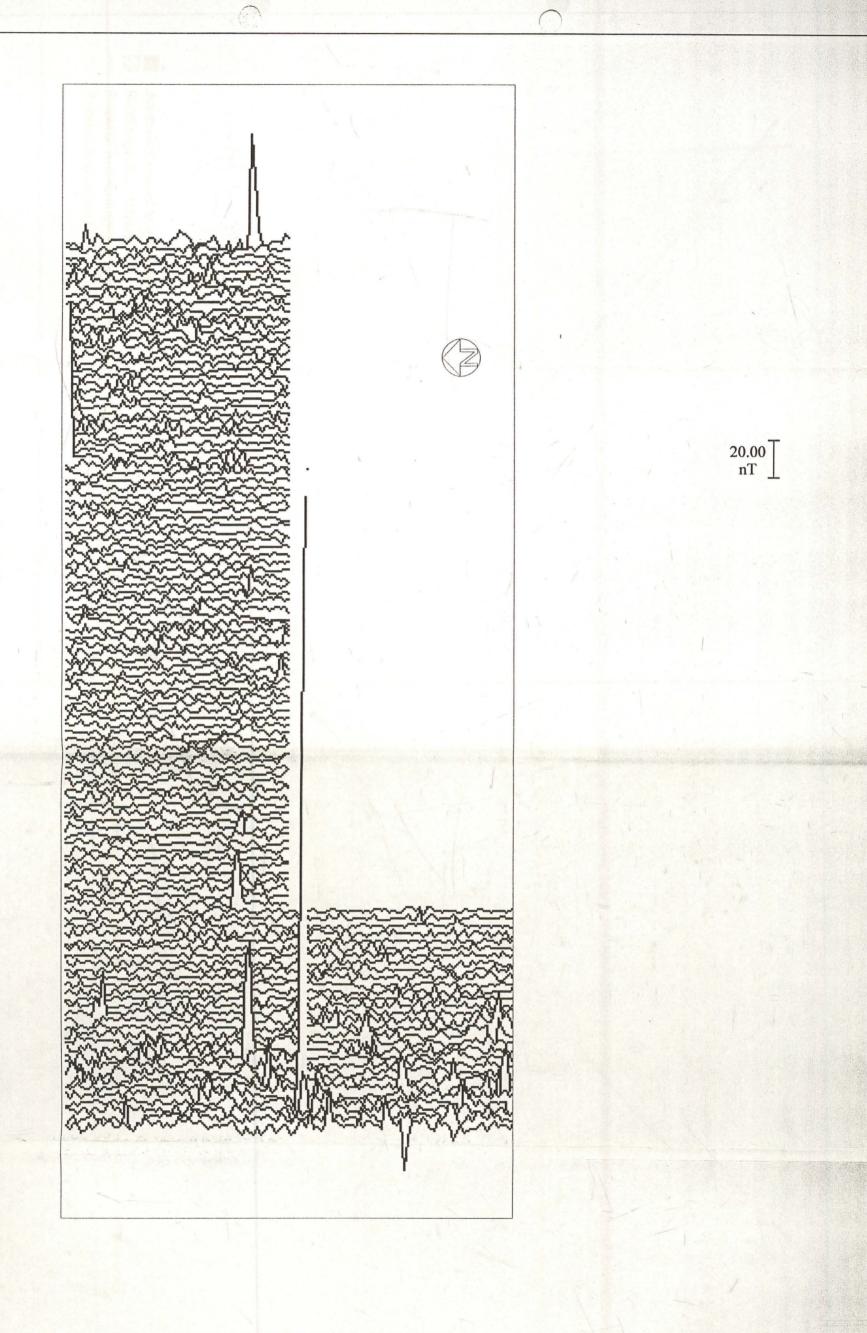


Figure 9: Field 2, X - Y Plot Scale 1:500

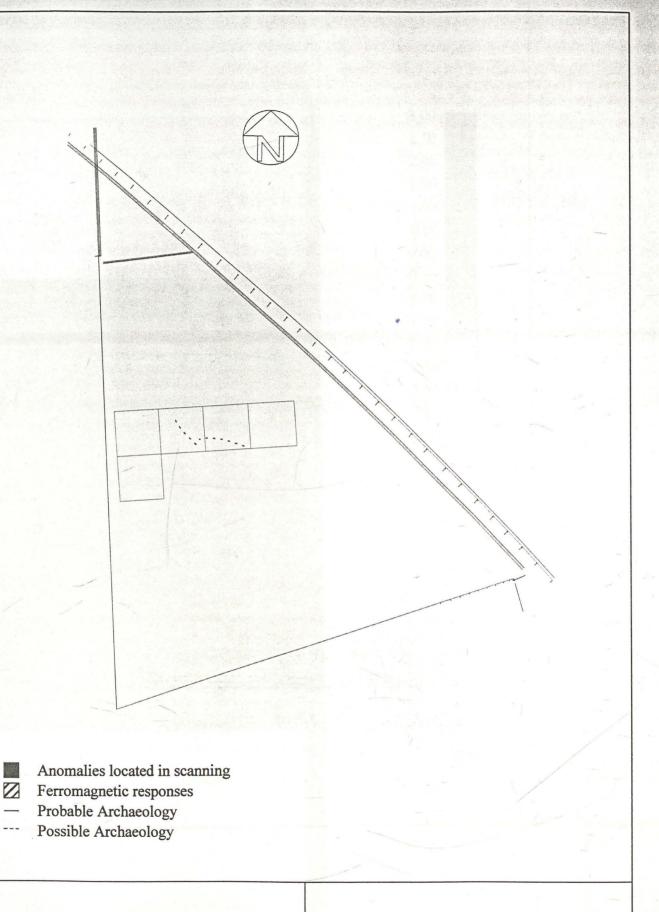


Figure 10: Field 2 Interpretation Scale 1:2500 Based on Survey by Gayler Surveying Services

