

95/5

52713



WARDELL ARMSTRONG

Mining, Minerals, Engineering & Environmental Consultants

**NORTH KELSEY ROAD,
CAISTOR, LINCOLNSHIRE**

ARCHAEOLOGICAL DESK-BASED ASSESSMENT

**PREPARED FOR
J W HURDISS LIMITED**



WARDELL ARMSTRONG

Mining, Minerals, Engineering & Environmental Consultants

Please note

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Our Ref: AJ/AR/5192

Date: 13 April 1995

EVENTS L12093 L12094 L12095
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PRN 52713 L152713

**NORTH KELSEY ROAD,
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ARCHAEOLOGICAL DESK-BASED ASSESSMENT

**PREPARED FOR
J W HURDISS LIMITED**

Prepared for Wardell Armstrong

NJ N J Coppin - Partner *M. Koff*

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Appendix B	Project Design
Appendix C	Catalogue of Aerial Photographs
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1. INTRODUCTION

- 1.1 Wardell Armstrong were instructed by Mr J Beaumont of J W Hurdiss Ltd, by letter dated 15 February 1995, to undertake an archaeological evaluation of an area of land at North Kelsey Road, Caistor, Lincolnshire.
- 1.2 An application has been made to Lincolnshire County Council for permission to extract sand from the site, the location of which is shown on drawing 1/5192.
- 1.3 In a memorandum from Mr I K George, Assistant Archaeological Officer, to the Director of Highways and Planning, 20 December 1993, it was indicated that there may be some archaeological interest in the proposed site. It was therefore requested that a desk-top study, followed by field evaluation, should be undertaken to enable the County Council Archaeology Section to advise on the mitigation of potential threats to the archaeology. This desk-based assessment forms the first stage of the evaluation.

2. THE SITE

- 2.1 The site lies approximately 2 kilometres west of the town of Caistor, and to the south of the North Kelsey Road. The centre of the site is at grid reference TA095 010. The site is bounded to the west by an existing quarry, to the south by a deeply incised stream with steep banks, and to the east and north by agricultural land and woodland.
- 2.2 The fields within the site boundary are, with one exception, under set aside or pasture. Large areas of these fields are affected by extensive rabbit burrowing. During the site reconnaissance on 28 February 1995, the field in agricultural use had a thin crop cover.
- 2.3 The Soil Survey of England and Wales describes the soils of the site as glaciofluvial drift, comprising deep permeable sand and coarse loamy soils. Groundwater is controlled by ditches.

3. ARCHAEOLOGY AND HISTORY OF THE VICINITY OF THE SITE

- 3.1 The Lincolnshire Sites and Monuments Record (LSMR) lists a number of cropmarks in the vicinity of the site. These may range from prehistoric to post-medieval in date. A particularly extensive area of cropmarks centred on NGR TA 100 010, 0.5km east of the site, may be related to a scatter of flint scrapers recorded on the LSMR. Aerial photographic research at the National Library of Air Photographs, Swindon, has revealed that this complex of cropmarks covers approximately 6ha, with a further 3ha of cropmarks to the east, (NGR TA 102 011). To the south of these areas are further cropmarks of unknown date (NGR TA 098 077 and TA 1015 0075) and an unusual collection of circular cropmarks possibly of geological origin at NGR TA 1015 0060, 0.75km south-east of the site.
- 3.2 Several of the fields near the site have yielded prehistoric flint artefacts, including arrowheads and scrapers.
- 3.3 The Roman town of Caistor lies approximately 2km east of the site. Dating from the late 3rd to late 4th century AD, the town was walled and defended by external towers. Pottery kilns of the same period are also present. The town was sited on a minor road (the High Street) of pre-Roman date, that probably linked the Humber and the Wash *via* the Roman town of Horncastle.
- 3.4 The North Kelsey Road, 0.5km to the north of the site, is shown by the Ordnance Survey as a Roman road. The *Tabula Imperii Romani* also records that the road is of Roman origin, probably linking Caistor with Ermine Street at the Roman settlement of Hibaldstow. However, a watching brief along the road in 1994 found no Roman evidence. The LSMR suggests that whilst the road may be associated with field enclosure of the early 19th century there is '*a strong probability that there is a Roman road in the vicinity*'.

- 3.5 Further evidence for Roman archaeology in the vicinity includes an extensive area of pottery 0.5km west of the site and a possible marching camp 0.75km south-east of the site.
- 3.6 The land to the west of Caistor remained unenclosed until 1814, when Caistor Moor was enclosed and regular, rectangular fields created. Some of the cropmarks and earthworks noted on aerial photographs may belong to the pre-enclosure landscape of open-field furlongs. A remnant of ridge and furrow of this period was found preserved in woodland adjacent to the north-east boundary of the site at NGR TA 0970 0125.

4. **ARCHAEOLOGY AND HISTORY OF THE SITE**

Lincolnshire Sites and Monuments Record (LSMR)

- 4.1 The LSMR has one entry that falls within the boundary of the site. This is at NGR TA 095 009, and is recorded as a scatter of worked flints, scrapers and microliths.

Cartography

- 4.2 The cartographic history of the site is unremarkable. An enclosure plan of the Caistor Moor area would suggest that the site was not enclosed until after 1814. An access road leads from the North Kelsey Road into the site, and Caistor Parish is responsible for its repair. However, unlike the land to the north of the North Kelsey Road, no land divisions are marked within the site area.
- 4.3 Bryant's Map of Lincolnshire (1828), drawing 2/5192, indicates that the access to West Moor Farm has been moved, so that it leaves the North Kelsey Road due north of the farm. The enclosure map, fourteen years earlier, showed a more circuitous route. This may suggest that a regularisation of the landscape in the form of field enclosure has taken place in the intervening years.
- 4.4 The site area is not included in the Tithe Award, which was surveyed in the Caistor area in 1841.

4.5 By 1885, the date of the survey for the Ordnance Survey first edition, the site has been divided into five rectangular fields, drawing 3/5192. A tree-line marks the eastern boundary of the site and a stream, bounded by trees, denotes the southern boundary. The interior of the site is featureless.

4.6 The most recent mappings, for example drawing 1/5192, show that with the exception of the removal of one field boundary, no changes have taken place within the site.

Aerial Photography

4.7 In contrast to the large number of cropmark sites in the area, the site itself has no evidence of archaeological features visible from the air. 58 oblique aerial photographs and 14 vertical photographs were examined at the National Library of Air Photographs at Swindon. These photographs were taken on 11 sorties flown between 1946 and 1993. An enlarged section of a photograph taken in April 1967 is included as Plate 1, and the catalogue of air photographs of the site is appended.

Site Visit

4.8 A reconnaissance of the site and its vicinity was made on 28 February 1995. The site comprised four fields; the two southern fields were in set-aside, the north-western field was under pasture, and the north-eastern field supported a young crop.

4.9 Considerable rabbit activity was evident in the southern part of the site. Spoil generated by burrowing was examined for finds. Frequent sherds of 19th century pottery and some bottle glass were found, and occasional unworked local flint.

4.10 The stream bordering the southern boundary of the site had been recently dredged. The dredgings contained 19th century pottery.

4.11 A rapid scan of the north-eastern field also found 19th century artefacts, together with fragments of field drain and some plastic.

- 4.12 A photo-montage of the site looking southwards from near West Moor Farm is shown on plate 2.

5. GEOPHYSICAL SURVEY

- 5.1 Geophysical Surveys of Bradford undertook a fluxgate gradiometer survey of the whole site in March 1995. Following scanning, five areas were selected for more detailed investigation.
- 5.2 One area (E), adjacent to the southern boundary of the site, produced strong magnetic responses which are interpreted as being "*more likely to be archaeological than geological*". The responses are of a strength consistent with being a kiln or hearth.
- 5.3 Of the other four areas, areas A and B produced responses suggestive of a geological origin, and responses in areas C and D are most likely to indicate the presence of iron objects.
- 5.4 The full report is attached as Appendix D.

6. SUMMARY

- 6.1 The site lies within an area of archaeological interest, with sites of prehistoric and Roman date being particularly numerous. Several cropmark sites of unknown date have been identified locally.
- 6.2 Within the site boundary, however, the desk-based assessment was unable to identify any archaeological features. A scatter of flints is recorded as being found within the site on the LSMR. The site and its vicinity have been extensively photographed from the air. None of the cropmark sites continue into the site, and no discreet cropmarks were identified within the site itself.

- 6.3 The north-eastern field of the site held a young cereal crop. Finds from this field and from spoil generated by rabbit burrowing were of 19th and 20th century date. Some unworked, local flint was found near the southern site boundary.
- 6.4 The geophysical survey revealed one possible area of archaeological interest adjacent to the southern boundary. The responses may represent a hearth or kiln.

7. ACKNOWLEDGMENTS

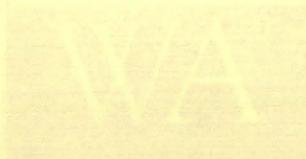
- 7.1 Wardell Armstrong wish to thank Ian George, (Assistant Archaeological Officer, Lincolnshire County Council), Jill Davis (Davis Planning Partnership), Chris Gaffney (Geophysical Surveys of Bradford) and John Beaumont (J W Hurdiss Ltd) for their co-operation and assistance in undertaking this assessment.

DRAWINGS

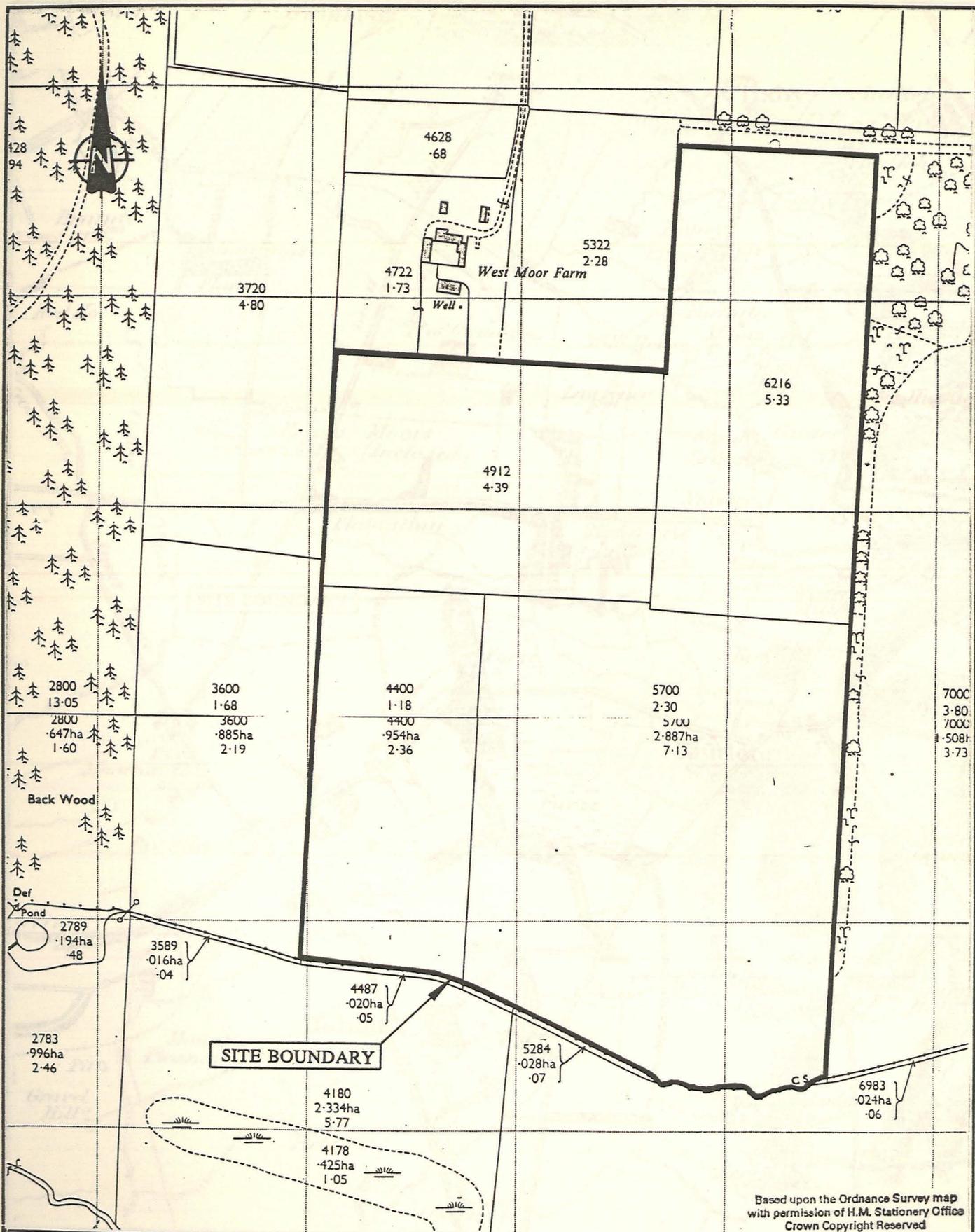
J.W. BIRDSON LIMITED

NORTH KELLEY ROAD

WILLOUGHBY

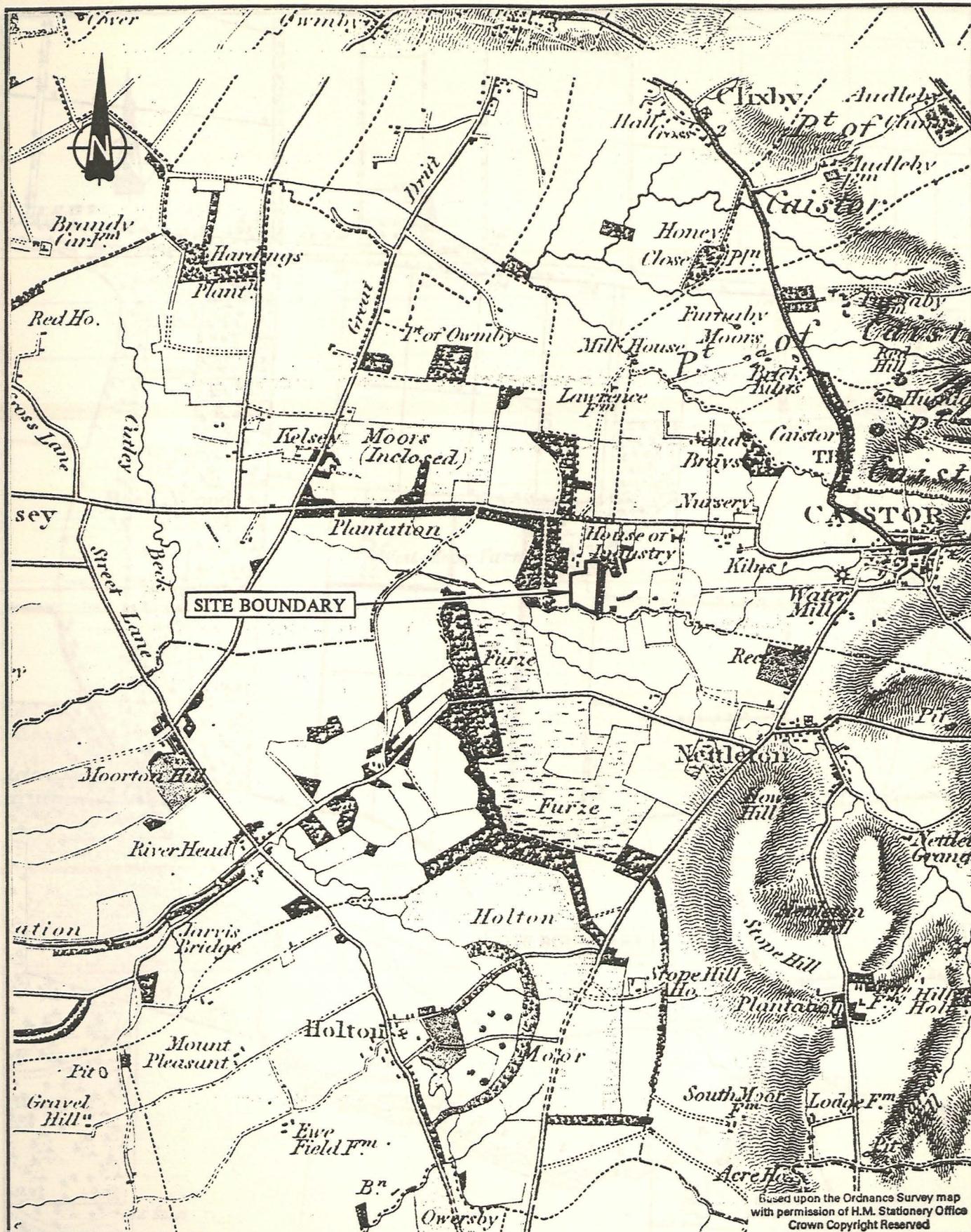


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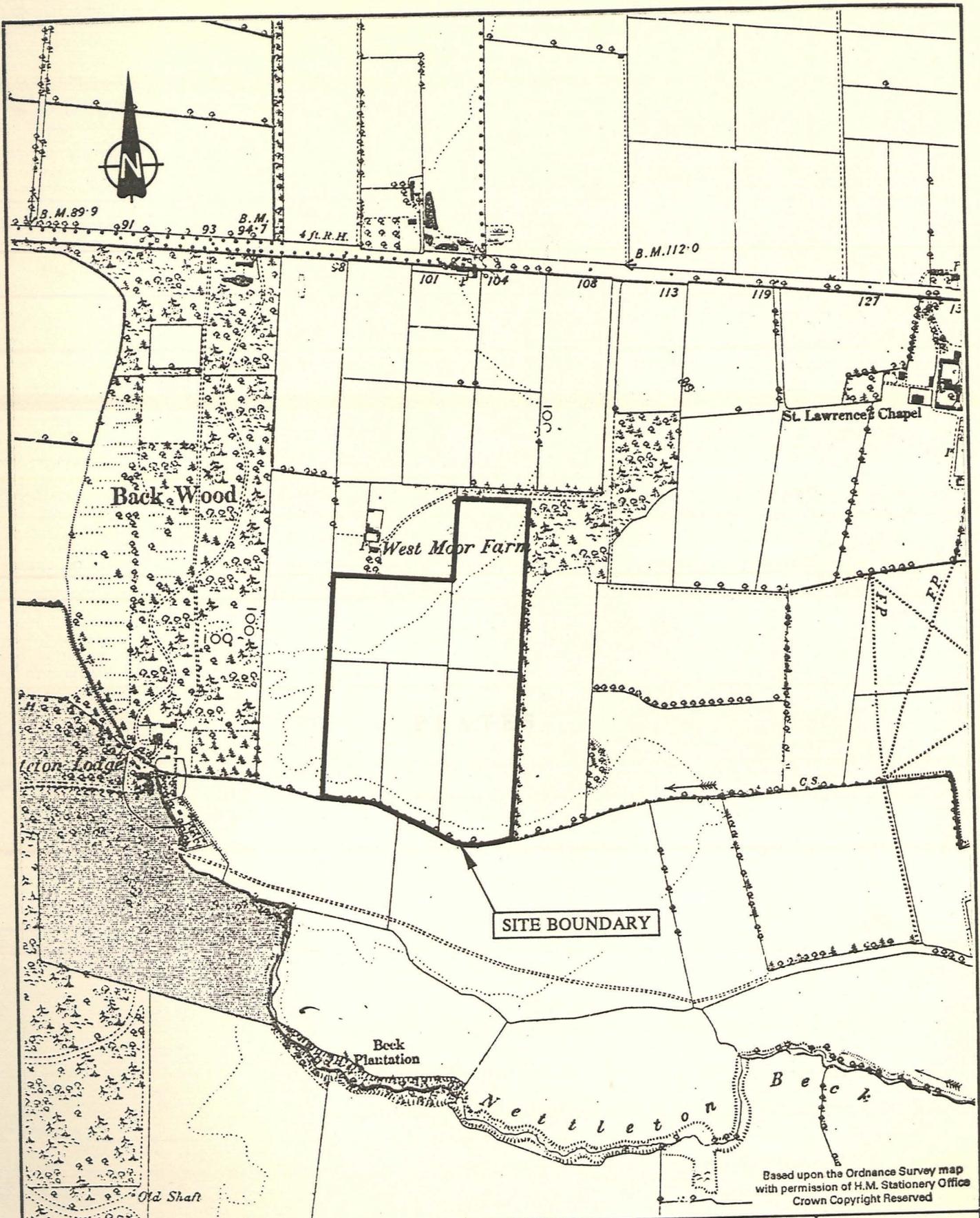
Based upon the Ordnance Survey map with permission of H.M. Stationery Office Crown Copyright Reserved

CLIENT J.W. HURDISS LIMITED	DRG. No. 1/5192	SCALE 1:2500	DATE APRIL 1995
PROJECT NORTH KELSEY ROAD	DRAWN BY M.V.	CHECKED BY A.J.	APPROVED BY N.J.C.
DRAWING TITLE SITE LOCATION	WA		WARDELL ARMSTRONG Mining, Minerals, Engineering & Environmental Consultants Lancaster Building, High Street, Newcastle-under-Lyme, Staffordshire ST5 1PQ Tel: 0782-612626 Telex: 36607 Fax: 0782-662882



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CLIENT	J.W. HURDISS LIMITED	DRG. No.	2/5192	SCALE	N.T.S.	DATE	APRIL 1995
PROJECT	NORTH KELSEY ROAD	DRAWN BY	M.V.	CHECKED BY	A.J.	APPROVED BY	N.J.C.
DRAWING TITLE	BRYANT MAP OF LINCOLNSHIRE 1828				WARDELL ARMSTRONG Mining, Minerals, Engineering & Environmental Consultants Lancaster Building, High Street, Newcastle-under-Lyme, Staffordshire ST5 1PQ Tel: 0782-612626 Telex: 36607 Fax: 0782-662882		



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CLIENT J.W. HURDISS LIMITED	DRG. No. 3/5192	SCALE 6" : 1 MILE	DATE APRIL 1995
PROJECT NORTH KELSEY ROAD	DRAWN BY M.V.	CHECKED BY A.J.	APPROVED BY N.J.C.
DRAWING TITLE ORDNANCE SURVEY 1ST EDITION 1892	WA		WARDELL ARMSTRONG Mining, Minerals, Engineering & Environmental Consultants Lancaster Building, High Street, Newcastle-under-Lyme, Staffordshire ST5 1PQ Tel: 0782-612626 Telex: 36607 Fax: 0782-662882

PLATES



Plate 1 Aerial Photograph of Site, April 1967



Plate 2 Photomontage of Site, looking south from near West Moor Farm

APPENDIX A

References

APPENDIX A

References

Lincolnshire County Record Office reference number in italics

Caistor Moor End Enclosure papers and plan, 1814 *Lindsey Encl. 120*

Caistor Survey and plan, 1825, *SAYE 8/1/2*

Bryant's Map of Lincolnshire, 1828

Survey of Moor, 1832, *YARB 5/1/73*

Land by N Kelsey Road, no date, *TENN 4/1*

Ordnance Survey, 1st Edition, 1:10560 (6":mile)

surveyed 1885, published 1892

Ordnance Survey, 2nd Edition, revised 1905

Lincolnshire Sites and Monuments Record

British Academy, 1983, *Tabula Imperii Romani*, London

APPENDIX B

Project Design

1. INTRODUCTION

Wardell Armstrong were invited by Jill Davis of Davis Planning Partnership to prepare a proposal for an archaeological evaluation of a proposed extension to a quarry at North Kelsey Road, Caistor. The scope of this proposal was discussed with the Lincolnshire County Council Archaeological Officer, Lincolnshire County Council. The proposal was produced in accordance with the Management of Archaeological Projects (English Heritage, 1991) and sets out:

Our Ref: AJ/CC/EN1083

Date: February 1995

- Wardell Armstrong's resources;
- how Wardell Armstrong would approach and undertake the archaeological evaluation;
- the timetable and budget;
- relevant experience.

DAVIS PLANNING PARTNERSHIP

FOR

J W HURDISS LTD

2. WARDLELL ARMSTRONG RESOURCES

ARCHAEOLOGICAL EVALUATION AT

NORTH KELSEY ROAD, CAISTOR, LINCOLNSHIRE

PROPOSALS FOR CONSULTANCY SERVICES

Wardell Armstrong is a Partnership whose primary activity and aim is to provide a comprehensive range of consultancy services encompassing a wide range of multi-disciplinary engineering and professional services to public and private sector clients and has a complement of 17 Partners, 27 Associates and 4 Senior Consultants, supported by over 200 professional, technical and administrative staff.

The Firm's professionally qualified and experienced staff comprise the following broad technical disciplines: Engineering, Environmental Sciences, Geology, Geotechnics, Landscape Architecture and Surveying.

1. INTRODUCTION

Wardell Armstrong were invited by Jill Davis of Davis Planning Partnership to prepare a proposal for an archaeological evaluation of a proposed extension to a quarry at North Kelsey Road, Caistor. The scope of this proposal was discussed with Ian George, Assistant Archaeological Officer, Lincolnshire County Council and has been produced in accordance with the *Management of Archaeological Projects* (English Heritage, 1991) and sets out:

- Wardell Armstrong's resources;
- how Wardell Armstrong would approach and undertake the archaeological evaluation;
- the timetable and staffing;
- relevant experience.

2. WARDELL ARMSTRONG RESOURCES

Wardell Armstrong is a major mining, minerals, engineering and environmental consultancy. The Firm's headquarters are located at Newcastle-under-Lyme, Staffordshire and other offices are located in Newcastle-upon-Tyne, Wigan, Cardiff, Sheffield and the West Midlands.

Wardell Armstrong is a Professional Partnership without limited liability and has no connection or affiliation with any other firm or organisation. The Firm offers a comprehensive range of consultancy services encompassing a wide range of multi-disciplinary engineering and environmental services, to public and private sector clients and has a complement of 19 Partners, 23 Associates and 8 Senior Consultants, supported by over 200 professional, technical and administrative staff.

The Firm's professionally qualified and experienced staff comprise the following broad technical disciplines: Engineering, Environmental Sciences, Geology, Geotechnics, Landscape Architecture and Surveying.

3. ARCHAEOLOGY AT WARDELL ARMSTRONG

Wardell Armstrong were one of the first consultancies in Britain to recognise the importance of being able to offer their clients in-house archaeological advice and service. Wardell Armstrong specialise in desk-based assessments of sites, proposing mitigation measures and liaising between the client and the County Archaeological Officer. We have particular expertise in managing archaeological projects on behalf of clients, and through our many archaeological contacts we can make sure that excavations are carefully budgeted, professionally executed and undertaken to an agreed timetable.

Wardell Armstrong's familiarity with the planning system and their understanding of developer's requirements ensures that clients receive the best possible independent advice. The Firm is also experienced in presenting evidence to public inquiries.

4. APPROACH

This evaluation would be approached in the following main stages:

- desk-based search of archival, photographic and documentary information;
- site visit;
- field walking where appropriate
- earthwork recording where appropriate
- assessment of information;
- consultations;
- reporting.

5. METHODOLOGY

Desk-based assessment The following sources of information will be consulted where available to produce an outline history of the development and land use of the area,

to assess known archaeological and historical features and to locate previously unknown features.

- Sites and Monuments Record (SMR) for Lincolnshire
- historic documents (eg. charters, registers, estate papers);
- cartographic documents (eg. early maps, tithe maps, estate plans, O.S. maps);
- aerial photographs held by the RCHME and Lincolnshire County Council;
- place and field-name evidence;
- geotechnical surveys;
- secondary sources (eg. published local studies, local knowledge);

Aerial photographic survey Features of archaeological and historical interest identified on aerial photographs will be plotted using an AutoCad digital plotting package. Plans can be produced at any scale, but for the purpose of the report a plot at a scale of 1:1000 will be included.

Site visit A walkover survey of the area marked on the enclosed map will be undertaken with the aim of locating sites identified from the desk-based assessment, and identifying potential sites not previously recorded.

Field walking In ploughed areas detailed surface artefact collection will be carried out based on line walking at 20 metre intervals aligned north-south on the National Grid. The location of all finds will be recorded, except those of clearly post-medieval date.

Earthwork recording Previously unrecorded earthworks will be recorded using an Electronic Distance Measuring (EDM) Total Station Theodolite. A plan of these earthworks will be produced for the report at a minimum scale of 1:1000.

Reporting The final report will aim to provide sufficient information to allow an informed planning decision to be taken. The contents will include:

- a description of the methodology used in undertaking the archaeological evaluation;
- a description of sites found within the study area and its vicinity;
- recommendations for further evaluation work;
- consideration of possible mitigation measures to ensure that archaeological deposits are preserved *in situ* where possible;
- a bibliography of sources of evidence used in the assessment;
- maps, plans and photographs as appropriate;
- appendices containing a copy of this project proposal and relevant correspondence.

Project archive The project archive will be deposited in a location agreed with the County Council Archaeological Service.

6. STAFFING

All work will be undertaken or managed by Andrew Josephs, Senior Archaeologist of Wardell Armstrong. His *Curriculum Vitae* is appended. Professionally qualified surveyors will be used where appropriate. Additionally, the diverse nature of the Firm's activities allows in-house consultations on relevant subjects such as soils, geology, ecology and mining.

7. TIMETABLE

Researches could commence immediately upon receiving instructions. It is anticipated that the desk-based assessment will be completed within two weeks. A field-walking survey is dependant upon the state of the field surface and crop cover.

8. RELEVANT EXPERIENCE

A summary project list is appended as part of Andrew Josephs' CV. This section provides more detailed information on a selection of recent, relevant projects.

Client: Ennemix Construction Materials plc
Title: Archaeological Project Management

Project Description

The client was required, upon the recommendation of the County Archaeological Officer, to carry out archaeological investigations of a proposed extension to an existing quarry prior to submitting a planning application. The site, in the Trent Valley, had no known archaeological significance, but lay within an area rich in prehistoric and Roman archaeology.

Services Provided

Wardell Armstrong co-ordinated a staged approach to examining the site which included overseeing the tendering process and monitoring site works. Investigations included a desk-based assessment, geophysical surveying, field-walking and excavation. Discussions were held with the County Archaeological Officer after each stage and a project brief drawn up to guide the next stage of work.

The evaluations revealed an important prehistoric site within the application boundary and a number of ancient channels of the River Trent infilled with organic material and animal remains. Wardell Armstrong devised a comprehensive mitigation strategy that allowed the archaeological remains to be left undisturbed and avoided the high costs of full archaeological excavation.

Client: Lloyds' Quarries and Sand and Gravel Ltd
Title: Archaeological Site Investigations

Project Description

An archaeological evaluation of a proposed extension to a quarry in Clwyd was required to enable the Mineral Planning Authority to reach a decision on the archaeological importance of the site. There had been suggestions that hillocks within the site were prehistoric burial mounds.

Services Provided

The evaluation commenced with a detailed desk-based assessment of the site, which indicated that the hillocks were man-made features of an 18th century parkland landscape. A geophysical survey revealed areas of potential archaeological interest which were investigated by limited area archaeological excavation. One small prehistoric site was excavated and was suggestive of a temporary camp. Wardell Armstrong held discussions with the County Archaeological Officer and a strategy of occasional watching briefs during soil stripping agreed.

Client: Huntsmans' Quarries Ltd
Title: Archaeological investigations and management

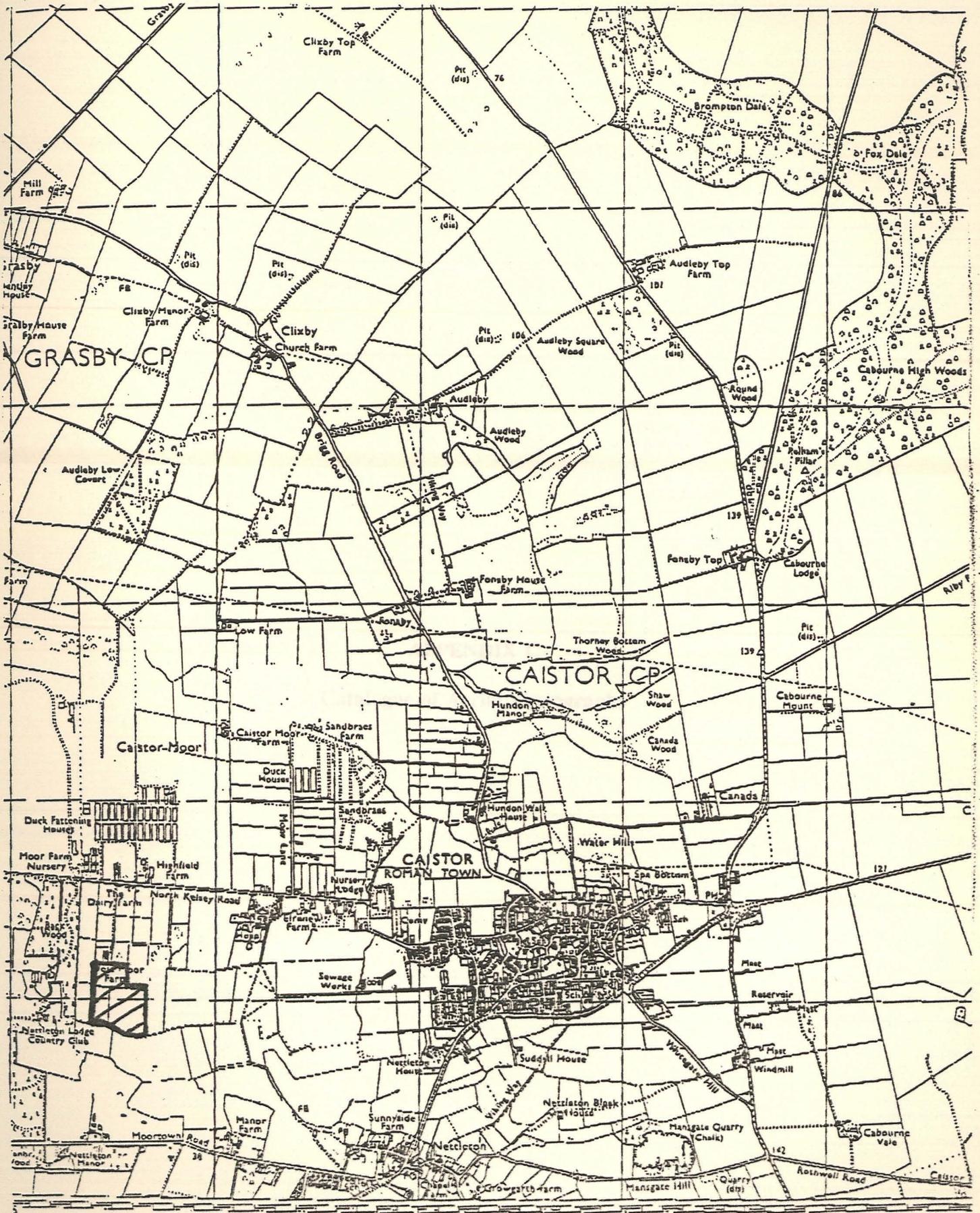
Project Description

An existing permission required that archaeological investigations took place of an area designated for quarry expansion prior to extraction commencing. A field walking survey had indicated concentrations of prehistoric flints and Roman pottery on the site in the Cotswolds.

Services Provided

Wardell Armstrong organised a competitive tender for evaluation excavations of the site which resulted in the client making a considerable saving on his usual archaeological contractor's costs. Wardell Armstrong also monitored the excavations to ensure that they were completed to a high standard, on time and to budget.

Two important sites were discovered: a prehistoric ditched enclosure and a Roman farmstead. The County Archaeological Officer recommended that these sites were a constraint to expansion, and that prior to extraction they would have to be fully excavated. Tenders were again sought, but contractors' costs proved too high to make extraction viable. Wardell Armstrong were able to enlist the help of the University of Sheffield, Department of Archaeology, who took the project on as part of their research programme.



10 11 12 13
 ROUGH CO CONST NETTLETON CP LINCOLNSHIRE EURO CONST

Scale 1:25 000

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1 kilometre = 0.6214 miles

APPENDIX C

Catalogue of Aerial Photographs

NATIONAL MONUMENT RECORD
Air Photographs

Summary report for specialist collection.

Date : 17/02/95 Time : 12:24:28

Customer Enquiry Reference No. CLK9521455AP

NGR Index Number	Accession Number	Frame	Original Number	Copy right	Repos itory	Film Details	Date Flown	DF	6 Fig NGR	
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TA0900/1	GXT 9384	ORACLEC20		GXT	GXT	B Unknown	Black& white			TA095005
TA0900/2	PLE 5157	18	3	PLE	PLE	B 35 mm	Black& white	28-JUL-77	1	TA099004
TA0901/1	PLE 2920	36	5 36	PLE	NMR	B 35 mm	Black& white	24-JUL-76	1	TA098010
TA0901/2	PLE 2921	27	1 27	PLE	NMR	B 35 mm	Black& white	25-JUL-76	1	TA099010
TA0901/3	PLE 5157	19	3	PLE	PLE	B 35 mm	Black& white	28-JUL-77	1	TA099011
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TA0901/5	NMR 12421	20		CRW	NMR	B 35 mm	Colour slide	06-SEP-93	1	TA090019
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TA0901/7	NMR 12421	22		CRW	NMR	B 35 mm	Colour slide	06-SEP-93	1	TA090019
TA0901/8	NMR 12421	23		CRW	NMR	B 35 mm	Colour slide	06-SEP-93	1	TA090019
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TA0902/9	NMR 12416	02		CRW	NMR	B 35 mm	Colour slide	06-SEP-93	1	TA090022
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TA1000/6	PLE 2921	26	1 26	PLE	NMR	B 35 mm	Black& white	25-JUL-76	1	TA100008
TA1000/9	NMR 1851	308		CRW	NMR	B 70mm, 120, 220	Black& white	09-OCT-80	1	TA107000
TA1001/1	PLE 2920	25	5 25	PLE	NMR	B 35 mm	Black& white	24-JUL-76	1	TA101010
TA1001/2	PI E 2920	26	5 26	PLE	NMR	B 35 mm	Black& white	24-JUL-76	1	TA105012
TA1001/3	PLE 2920	27	5 27	PLE	NMR	B 35 mm	Black& white	24-JUL-76	1	TA105012
TA1001/4	PI E 2920	34	5 34	PI F	NMR	B 35 mm	Black& white	24-JUL-76	1	TA105012
TA1001/5	PLE 2920	35	5 35	PI E	NMR	B 35 mm	Black& white	24-JUL-76	1	TA100010
TA1001/6	PI E 2921	28	1 28	PI E	NMR	B 35 mm	Black& white	25-JUL-76	1	TA102010
TA1001/7	PI F 2921	29	1 29	PI E	NMR	B 35 mm	Black& white	25-JUL-76	1	TA105012
TA1001/8	PI F 2921	30	1 30	PI F	NMR	B 35 mm	Black& white	25-JUL-76	1	TA101015
TA1001/10	PI F 2921	32	1 32	PI F	NMR	B 35 mm	Black& white	25-JUL-76	1	TA105012
TA1001/11	PI F 2921	33	1 33	PI E	NMR	B 35 mm	Black& white	25-JUL-76	1	TA103011
TA1001/12	PI F 2921	34	1 34	PI F	NMR	B 35 mm	Black& white	25-JUL-76	1	TA102010
TA1001/13	PI F 2921	35	1 35	PI F	NMR	B 35 mm	Black& white	25-JUL-76	1	TA105012
TA1001/14	NMR 1851	285		CRW	NMR	B 70mm, 120, 220	Black& white	09-OCT-80	1	TA107015
TA1001/18	NMR 12271	06		CRW	NMR	B 35 mm	Colour slide	12-JUN-92	1	TA102013
TA1001/19	NMR 12271	07		CRW	NMR	B 35 mm	Colour slide	12-JUN-92	1	TA101014

NGR Index Number	Accession Number	Frame	Original Number	Copy right	Repos itory	Film Details	Date Flown	DF	6 Fig NGR	
TA1001/20	NMR 12271	08		CRW	NMR	B 35 mm	Colour slide	12-JUN-92	1	TA102014
TA1001/21	NMR 12271	09		CRW	NMR	B 35 mm	Colour slide	12-JUN-92	1	TA102014
TA1001/22	NMR 12257	37		CRW	NMR	B 70mm,120,220	Black& white	12-JUN-92	1	TA102014
TA1001/23	NMR 12257	38		CRW	NMR	B 70mm,120,220	Black& white	12-JUN-92	1	TA102014
TA1001/24	NMR 12257	39		CRW	NMR	B 70mm,120,220	Black& white	12-JUN-92	1	TA102014
TA1001/25	NMR 12257	40		CRW	NMR	B 70mm,120,220	Black& white	12-JUN-92	1	TA102014
TA1001/26	NMR 12257	41		CRW	NMR	B 70mm,120,220	Black& white	12-JUN-92	1	TA102014
TA1001/27	NMR 12257	42		CRW	NMR	B 70mm,120,220	Black& white	12-JUN-92	1	TA102014
TA1001/28	NMR 1851	286		CRW	NMR	B 70mm,120,220	Black& white	09-OCT-80	1	TA107015
TF0899/2	NVR 5071	15	1976/R1	NVR	NVR	B 35 mm	Black& white	01-JAN-76	3	TF088999
TF1099/5	NMR 1851	309		CRW	NMR	B 70mm,120,220	Black& white	09-OCT-80	1	TF106999

Total 58 Records

NATIONAL MONUMENT RECORD
Air Photographs

Summary report for vertical coversearch

Date : 17/02/95 Time : 12:26:30

Customer Enquiry Reference No. CLK9521455AP

Sortie Number	Date	Scale	Quality	Focal Length	Repos itory	Copy Right	Format	Camera Pos	Start Frame	End Frame	Held	Library Number	Royalty
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CPE/UK/1746	21-SEP-46	9800	AC	36.00	MOD	CC	BW87	V	5059	5062	H	469	
CPE/UK/1880	06-DEC-46	10000	AC	36.00	MOD	CC	BW87	RV	6190	6191	H	540	
CPE/UK/2563	28-MAR-48	10000	AB	20.00	MOD	CC	BW87	RP	3182	3183	N	832	
OS/67031	16-APR-67	7500	A	12.00	NMR	CC	BW99	V	42	44	H	9279	

Total 4 Sorties 14 Frames

APPENDIX D

Geophysical Survey Report

SITE SUMMARY SHEET

95 / 30 West Moor Farm, Caistor

NGR: TA 095 013

Location, topography and geology

The site lies approximately 2km due west of Caistor, Lincolnshire and a short distance to the south of a minor road linking Caistor with the village of North Kelsey. Of the four fields investigated with the gradiometer, the southernmost two were set aside at the time of the survey, the northwestern field was under pasture and the northeastern field contained a short cereal crop. The soils are of the Blackwood Association and are deep sandy and coarse loamy soils formed over glaciofluvial sands.

Archaeology

The minor road lying approximately 0.5km to the north of the site follows the course of a Roman road, which extends eastward from the Roman town of Caistor. Other than a flint scatter recorded in a field adjacent to the southeastern part of the site, there is no information regarding the archaeology of the application area.

Aims of Survey

A fluxgate gradiometer survey was undertaken as part of an archaeological assessment being carried out by **Wardell Armstrong**. The work was carried out in advance of a proposal to extend an existing sand quarry lying immediately to the west of the site. The aim of the survey was to try to locate any archaeological remains which may survive within the application area.

Summary of Results *

In general, the scan of the application area found the site to be magnetically quiet, apart from occasional small scale ferrous responses. However, the scan identified clusters of strong responses of archaeological potential in three locations. These and other smaller scale anomalies were subsequently investigated by detailed recorded survey. The results of the detailed survey suggest that the magnetically strong anomalies identified by the scan were likely to be natural in origin. However, one group of anomalies close to the southern edge of the application may be archaeologically significant.

* It is essential that this summary is read in conjunction with the detailed results of the survey.

SURVEY RESULTS

95 / 30 West Moor Farm, Caistor

1. Survey Area

- 1.1 An area of approximately 7ha was examined with a fluxgate gradiometer in scanning mode. Five survey areas, Areas A to E, totalling 1ha, were subjected to detailed recorded survey following the scan.
- 1.2 The extent of the scanned area and the position of the detailed surveys are shown in Figure 1, at a scale of 1:2500.
- 1.3 The survey grid was set out by **Geophysical Surveys of Bradford** and tie-in information has been lodged with the client.

2. Display

- 2.1 The results are displayed as X-Y traces, dot density plots and grey scale images. These display formats are discussed in the *Technical Information* section, at the end of the text.
- 2.2 Figures 2 to 6 are data plots and interpretation diagrams of the survey results, produced at a scale of 1:500.

3. General Considerations - Complicating factors

- 3.1 Ground conditions were generally suitable for survey, the fields were relatively level and free of obstructions. However, it was noted that in the southern part of the area is pock marked by rabbit burrows, indicating considerable disturbance to the topsoil. However, there does not appear to have any significant effect on the results of the survey.
- 3.2 Small scale responses from ferrous debris were recorded by the gradiometer survey. It is considered that these have been produced by objects in the plough soil and are likely to be modern in origin.

Results of Survey

4. Results of Scan

- 4.1 An initial examination of the entire site was carried out with the gradiometer in scanning mode. The variation in magnetic response was observed whilst walking with the instrument along traverses spaced approximately 10m apart. Anomalies encountered by the scan were investigated by a more detailed scan to determine their archaeological potential. The position of any responses considered to be of archaeological interest were marked for recorded survey.

- 4.2 In general, the application area was found to be magnetically very quiet, apart from responses from a scatter of small ferrous objects.
- 4.3 The scan identified three areas producing anomalies which were significantly above the low background noise levels. In addition, several small scale responses were also encountered. It was noted that the anomalies were confined mainly to the central and eastern parts of the site and these areas were targeted for detailed survey.

5. Results of Detailed Survey

5.1 Area A (Figure 2)

- 5.1.1 The results show a spread of broad anomalies, on the northern edge of the site, which do not appear to form a coherent pattern that is recognisably archaeological in character. The scan suggests that the features producing these anomalies do not continue beyond the sample. It was noted that they lie in a visible hollow in the field. They would appear to be natural in origin, possibly representing subsurface irregularities and/or possibly responses from a post glacial/fluvial deposits.

5.2 Area B (Figure 3)

- 5.2.1 Similar, but less substantial, responses to those recorded in Area A were detected in this area, though their full extent could not be determined by the scan. It is possible that these anomalies indicate the presence of archaeological features though, as with Area A, a pattern suggestive of anthropogenic activity is not apparent in the detailed sample. Therefore a geological origin is a possibility for these responses.

5.3 Areas C and D (Figures 4 and 5)

- 5.3.1 Areas C and D were positioned over small scale anomalies considered to be of archaeological potential identified during the initial scan.
- 5.3.2 The detailed survey results show a scatter of small responses most of which are thought to have been produced by ferrous debris. Some have been interpreted as being of possible archaeological interest, though they are in apparent isolation and lack any archaeological context. It is possible that they represent responses produced by ferrous objects also.
- 5.3.3 The results from these two areas serve to indicate the low level of magnetic activity noted by the scan over the majority of the survey area.

5.4 Area E (Figure 6)

- 5.4.1 Area E was positioned over a group of strong magnetic responses identified on the southern edge of the survey and overlooking a stream.

- 5.4.2 A comparison of X-Y trace plots shows that the responses are stronger in this area than those recorded in Areas A and B. The anomalies are more discreet in appearance than the broader anomalies recorded in these previous areas. They are also of a strength that is consistent with responses produced by features such as kilns or hearths. However, the soils in the area are severely disturbed by rabbits and no waste material is present that might indicate industrial activity. Although, the interpretation remains inconclusive, the results would suggest that these anomalies are more likely to be archaeological than geological.

6. Conclusions

- 6.1 The examination of the application area with the gradiometer in scanning mode found the site to be magnetically quiet. However, a number of responses were identified which were considered to be of archaeological potential.
- 6.2 Subsequent detailed recorded survey suggested that the anomalies identified by the scan in the northern part of the survey were produced by underlying geological/pedological variations. However, a group of anomalies on the southern limit of the site may be of archaeological interest.
- 6.3 It is not possible to determine the origin of the features producing the strong magnetic anomalies identified by the survey. The source of these responses will remain unclear unless they are subjected to further investigation by augering or trial trenching.

Project Co-ordinator: D Shiel
Project Assistants: M Copley, N Nemcek & A Shields.

TECHNICAL INFORMATION

The following is a description of the equipment and display formats used in **GEOPHYSICAL SURVEYS OF BRADFORD** reports. It should be emphasised that whilst all of the display options are regularly used, the diagrams produced in the final reports are the most suitable to illustrate the data from each site. The choice of diagrams results from the experience and knowledge of the staff of **GEOPHYSICAL SURVEYS OF BRADFORD**.

All survey reports are prepared and submitted on the basis that whilst they are based on a thorough survey of the site, no responsibility is accepted for any errors or omissions.

Magnetic readings are logged at 0.5m intervals along one axis in 1m traverses giving 800 readings per 20m x 20m grid, unless otherwise stated. Resistance readings are logged at 1m intervals giving 400 readings per 20m x 20m grid. The data are then transferred to portable computers and stored on 3.5" floppy discs. Field plots are produced on a portable Hewlett Packard Thinkjet. Further processing is carried out back at base on computers linked to appropriate printers and plotters.

Instrumentation

(a) Fluxgate Gradiometer - Geoscan FM36

This instrument comprises of two fluxgates mounted vertically apart, at a distance of 500mm. The gradiometer is carried by hand, with the bottom sensor approximately 100-300mm from the ground surface. At each survey station, the difference in the magnetic field between the two fluxgates is conventionally measured in nanoTesla (nT) or gamma. The fluxgate gradiometer suppresses any diurnal or regional effects. Generally features up to one metre deep may be detected by this method.

(b) Resistance Meter - Geoscan RM4 or RM15

This measures the electrical resistance of the earth, using a system of four electrodes (two current and two potential.) Depending on the arrangement of these electrodes an exact measurement of a specific volume of earth may be acquired. This resistance value may then be used to calculate the earth resistivity. The "Twin Probe" arrangement involves the pairing of electrodes (one current and one potential) with one pair remaining in a fixed position, whilst the other measures the resistance variations across a fixed grid. The resistance is measured in Ohms and the calculated resistivity is in Ohm-metres. The resistance method as used for area survey has a depth resolution of approximately 0.75m, although the nature of the overburden and underlying geology will cause variations in this generality. The technique can be adapted to sample greater depths of earth and can therefore be used to produce vertical "pseudo sections".

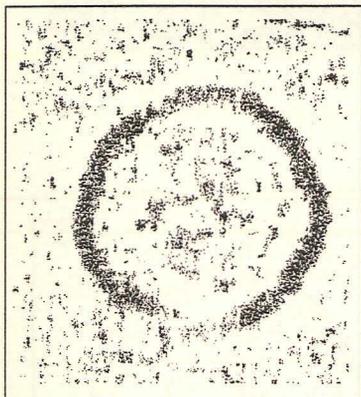
(c) Magnetic Susceptibility

Variations in the magnetic susceptibility of subsoils and topsoils occur naturally, but greater enhanced susceptibility can also be a product of increased human/anthropogenic activity. This phenomenon of susceptibility enhancement can therefore be used to provide information about the "level of archaeological activity" associated with a site. It can also be used in a predictive manner to ascertain the suitability of a site for a magnetic survey. The instrument employed for measuring this phenomenon is either a field coil or a laboratory based susceptibility bridge. For the latter 50g soil samples are collected in the field.

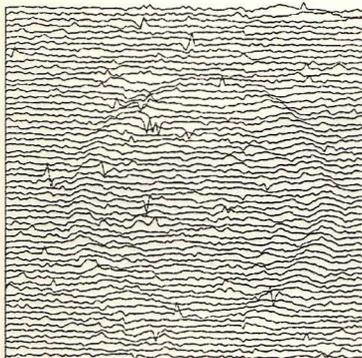
Display Options

The following is a description of the display options used. Unless specifically mentioned in the text, it may be assumed that no filtering or smoothing has been used to enhance the data. For any particular report a limited number of display modes may be used.

(a) Dot-Density



In this display, minimum and maximum cut-off levels are chosen. Any value that is below the minimum cut-off value will appear white, whilst any value above the maximum cut-off value will appear black. Any value that lies between these two cut-off levels will have a specified number of dots depending on the relative position between the two levels. The focus of the display may be changed using different levels and a contrast factor (C.F.). Usually the C.F. = 1, producing a linear scale between the cut-off levels. Assessing a lower than normal reading involves the use of an inverse plot. This plot simply reverses the minimum and maximum values, resulting in the lower values being presented by more dots. In either representation, each reading is allocated a unique area dependent on its position on the survey grid, within which numbers of dots are randomly placed. The main limitation of this display method is that multiple plots have to be produced in order to view the whole range of the data. It is also difficult to gauge the true strength of any anomaly without looking at the raw data values. This display is much favoured for producing plans of sites, where positioning of the anomalies and features is important.



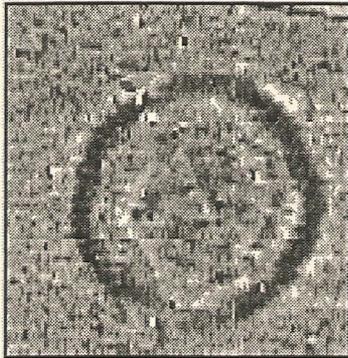
(b) X-Y Plot

This involves a line representation of the data. Each successive row of data is equally incremented in the Y axis, to produce a stacked profile effect. This display may incorporate a hidden-line removal algorithm, which blocks out lines behind the major peaks and can aid interpretation. Advantages of this type of display are that it allows the full range of the data to be viewed and shows the shape of the individual anomalies. Results are produced on a flatbed plotter.

WEST MOOR FARM, CAISTOR

Location of Survey Areas

Display Options cont'd



(c) Grey-Scale

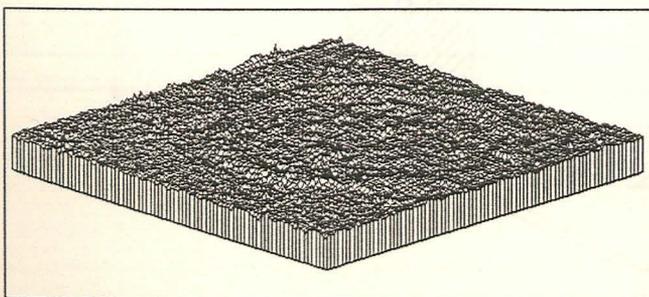
This format divides a given range of readings into a set number of classes. These classes have a predefined arrangement of dots or shade of grey, the intensity increasing with value. This gives an appearance of a toned or grey scale.

Similar plots can be produced in colour, either using a wide range of colours or by selecting two or three colours to represent positive and negative values. While colour plots can look impressive and can be used to highlight certain anomalies, grey-scales tend to be more informative.



(d) Contour

This display format is commonly used in cartographic displays. Data points of equal value are joined by a contour line. Closely packed contours indicate a sharp gradient. The contours therefore highlight an anomalous region. The range of contours and contour interval are selected manually and the display is then generated on the computer screen or plotted directly on a flat bed plotter / inkjet printer.

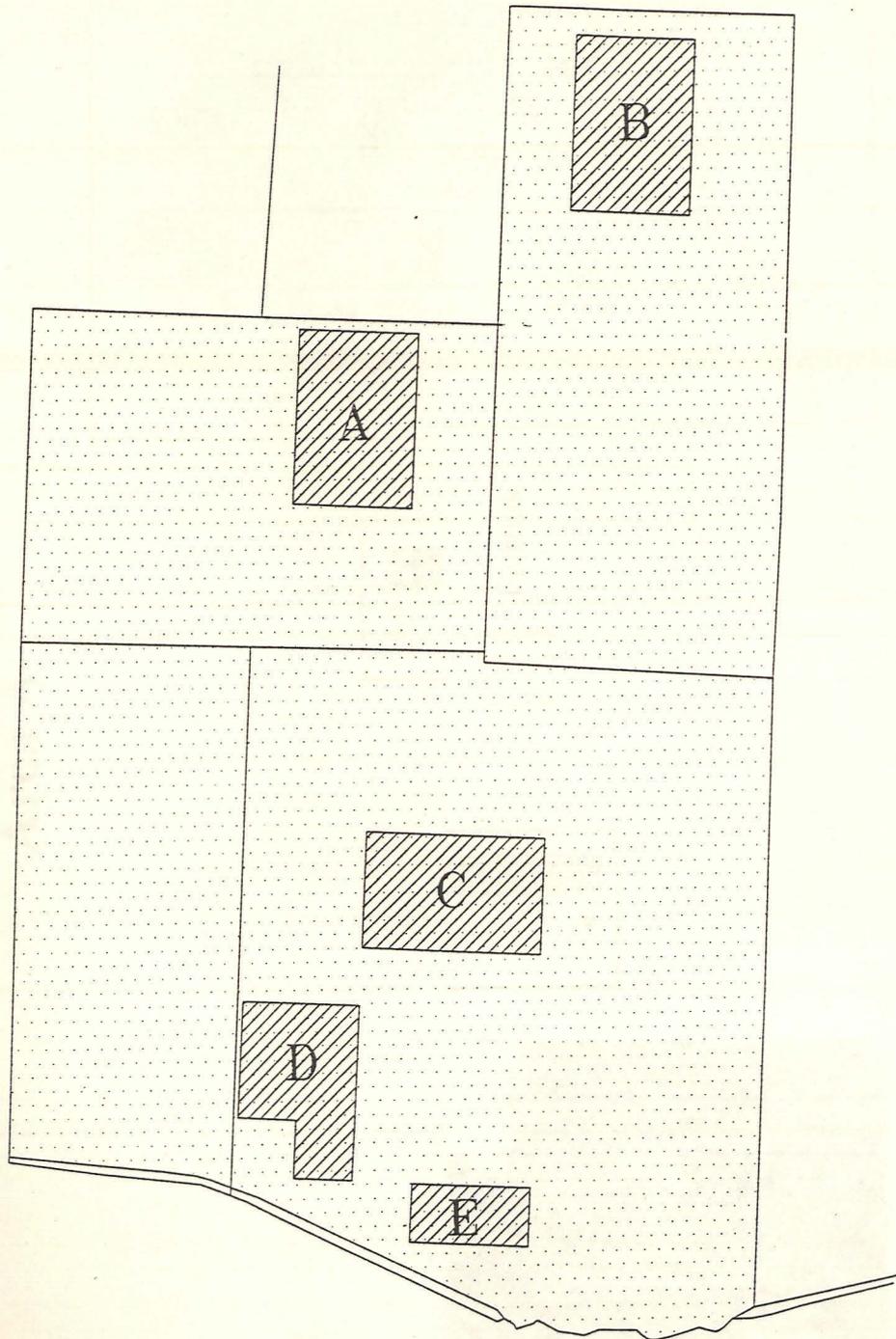


(e) 3-D Mesh

This display joins the data values in both the X and Y axis. The display may be changed by altering the horizontal viewing angle and the angle above the plane. The output may be either colour or black and white. A hidden line option is occasionally used (see (b) above).

WEST MOOR FARM, CAISTOR

Location of Survey Areas



Scanned Area



1:2500

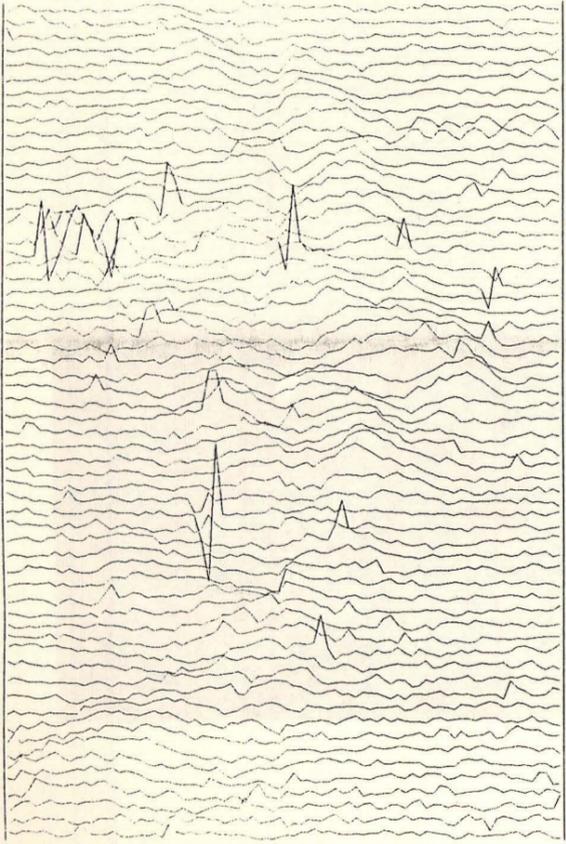


Survey Area

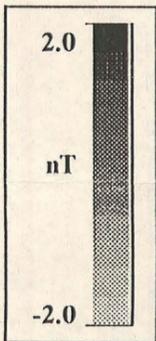
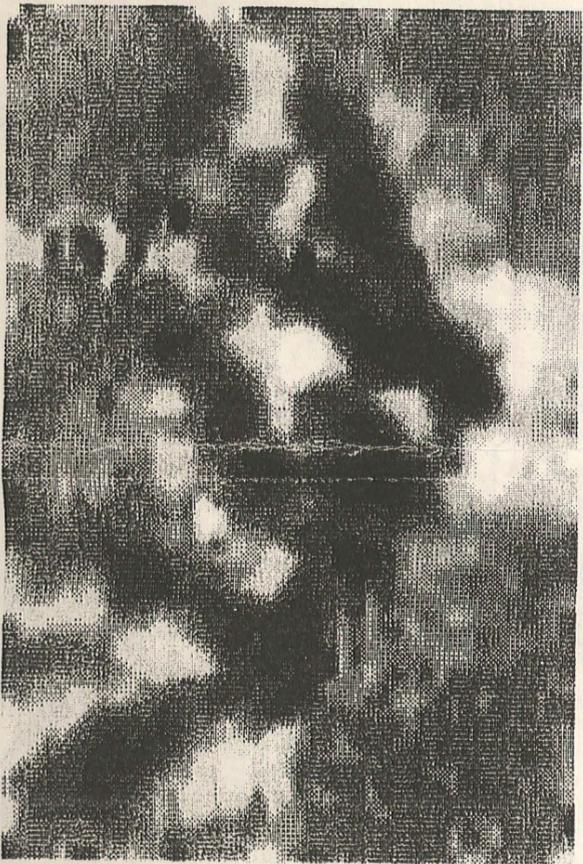
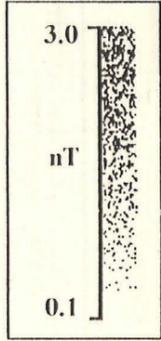
BASED UPON THE ORDNANCE
SURVEY MAP WITH THE PERMISSION
OF THE CONTROLLER OF HMSO
CROWN COPYRIGHT

Figure 1

WEST MOOR FARM
CAISTOR
Area A



15 nT



?Geology



Ferrous

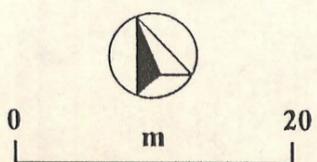
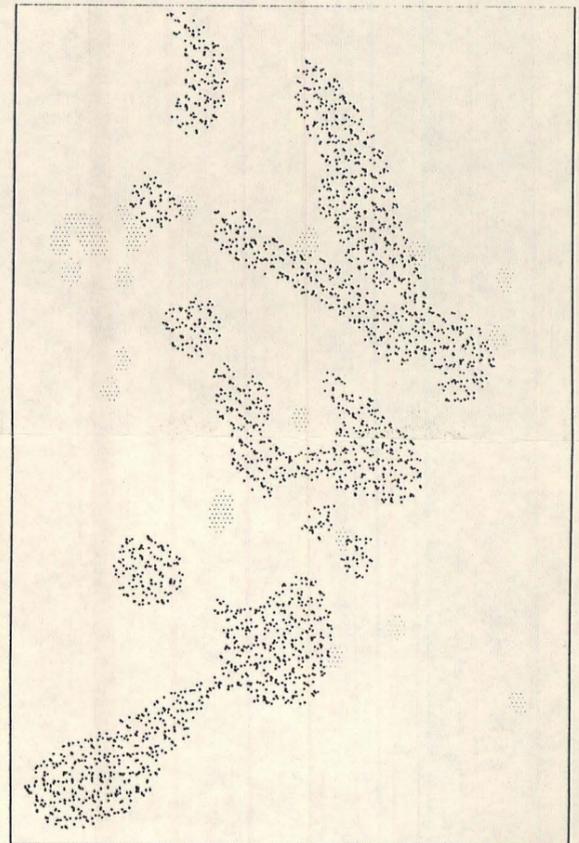
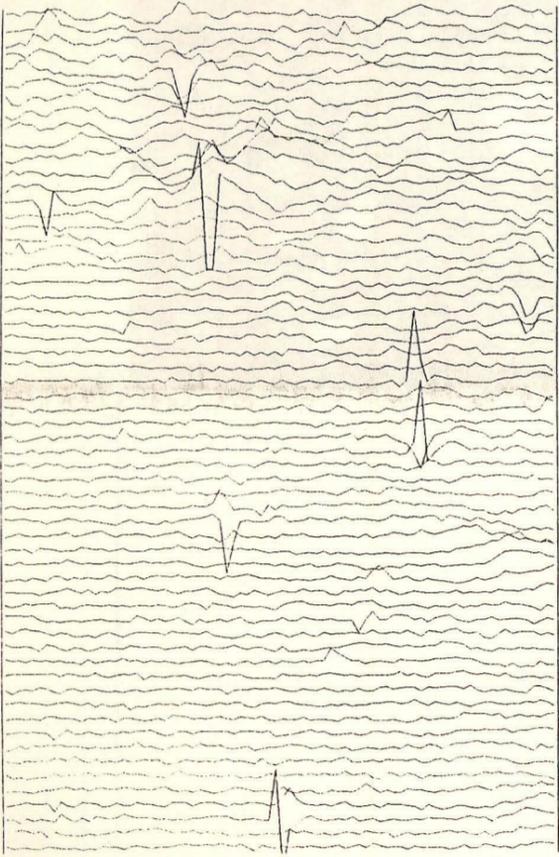
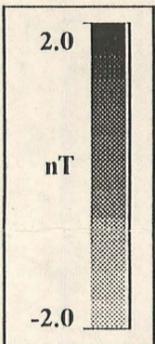
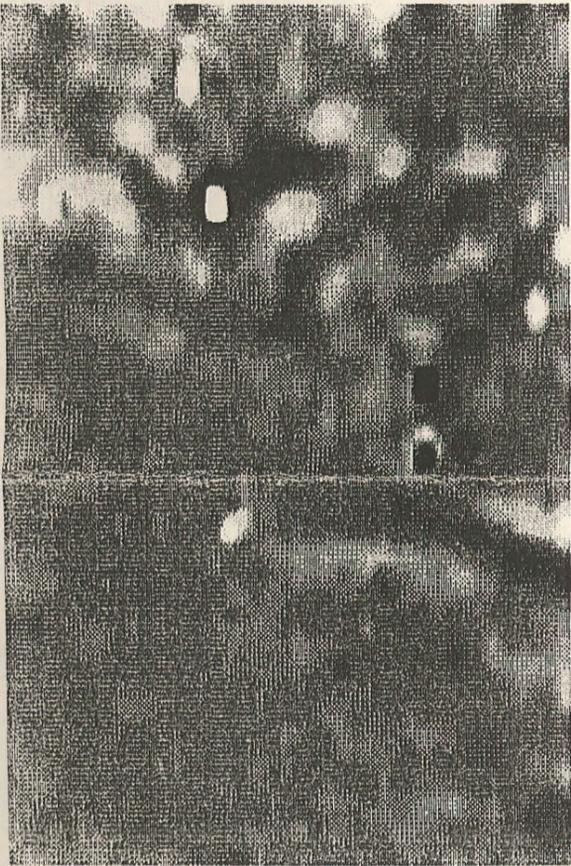
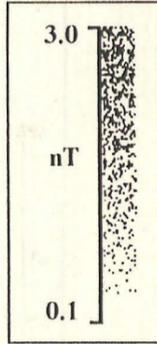


Figure 2

WEST MOOR FARM
CAISTOR
Area B



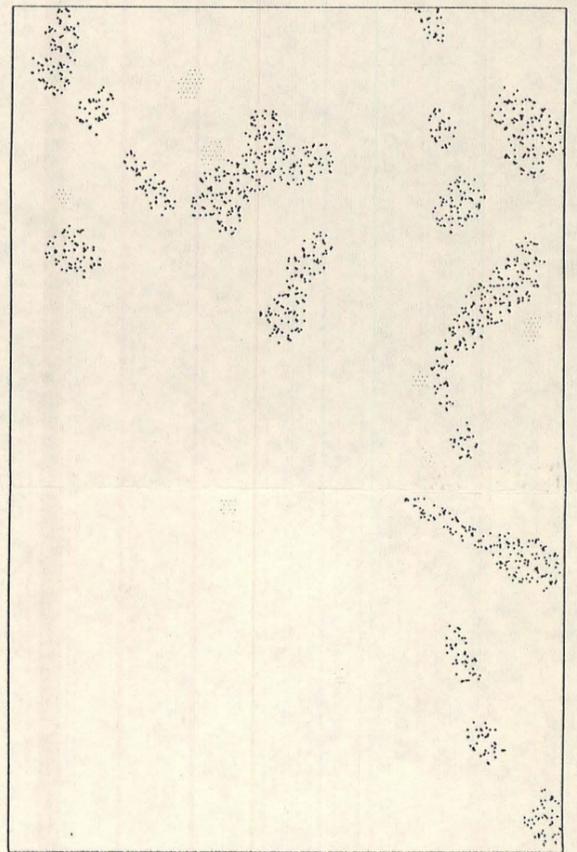
15 nT



?Geology



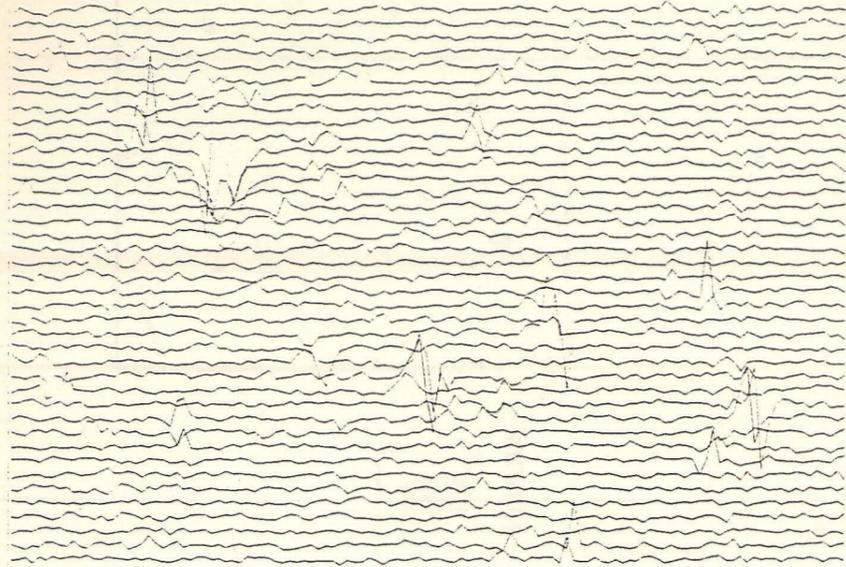
Ferrous



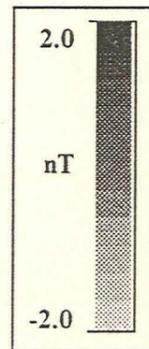
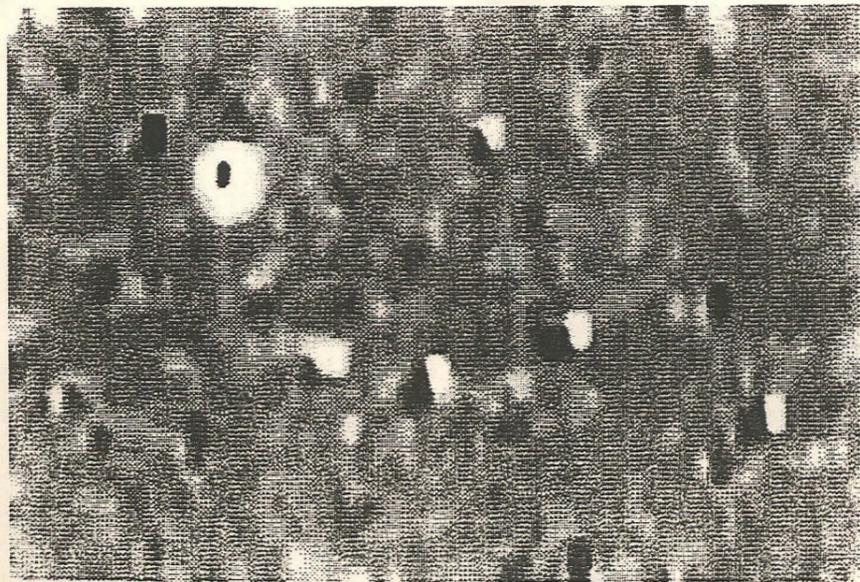
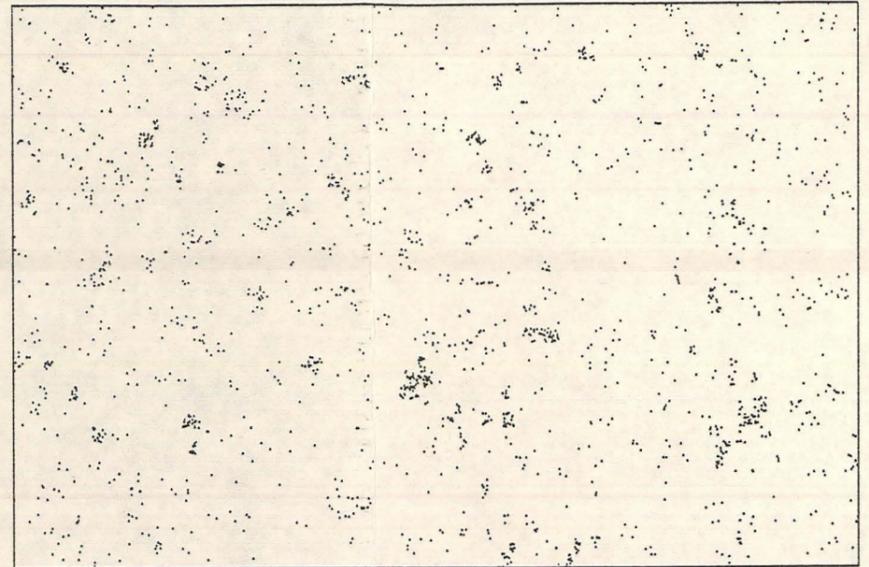
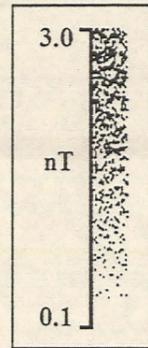
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Figure 3

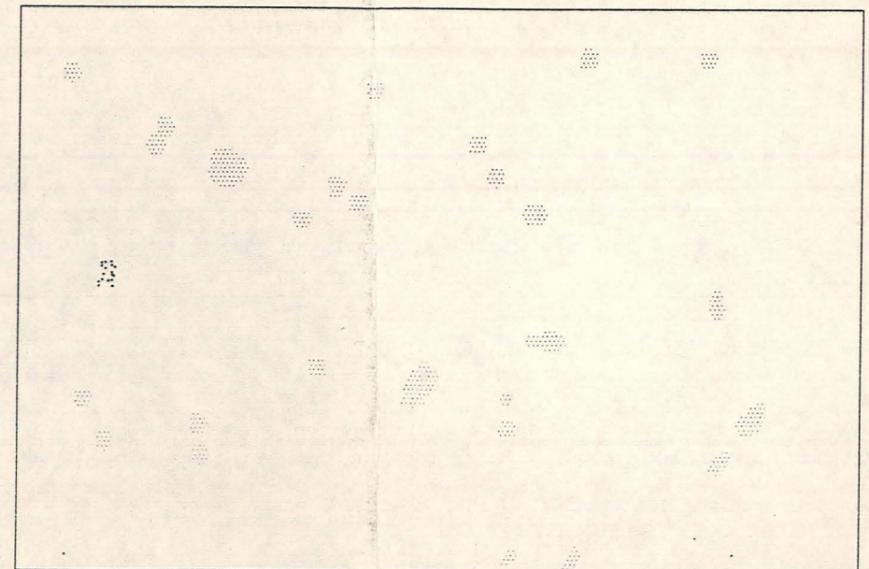
WEST MOOR FARM
CAISTOR
Area C



15 nT



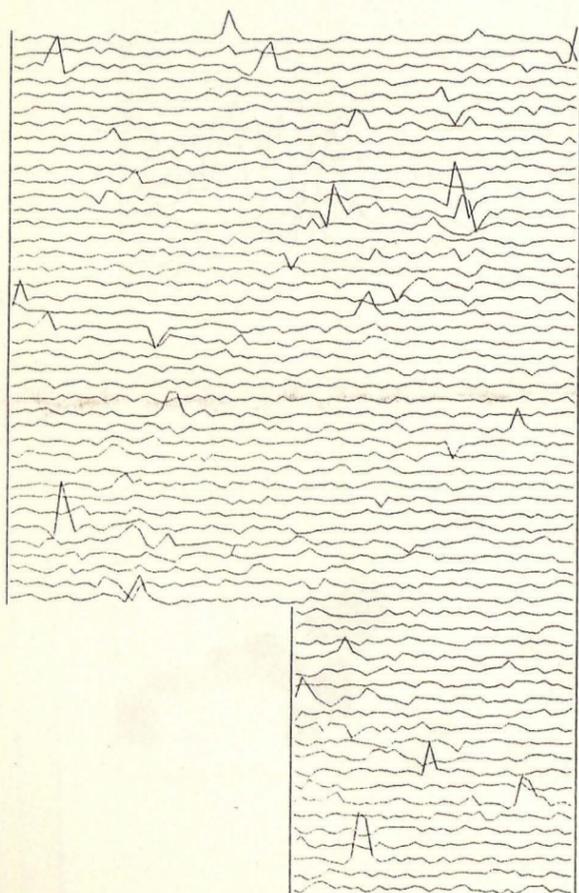
?Geology
Ferrous



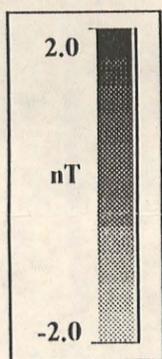
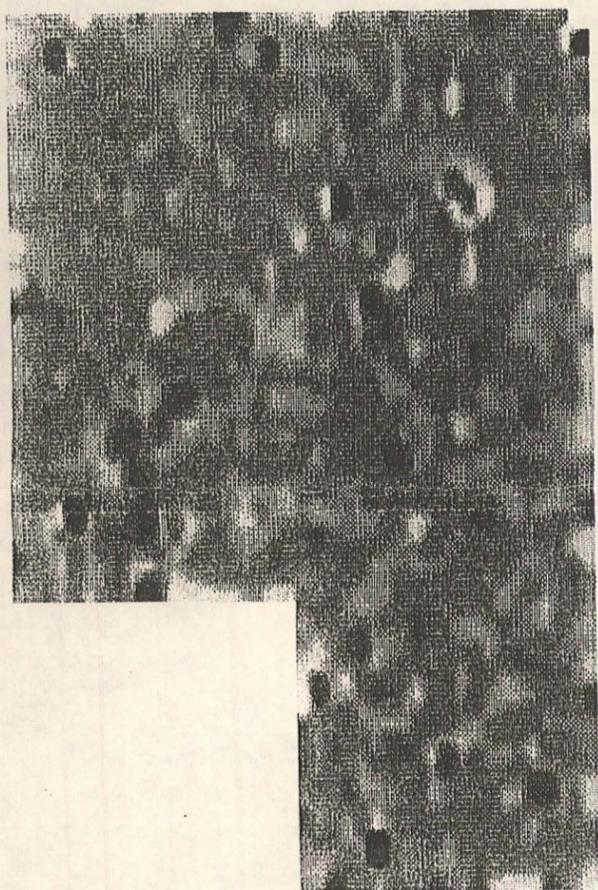
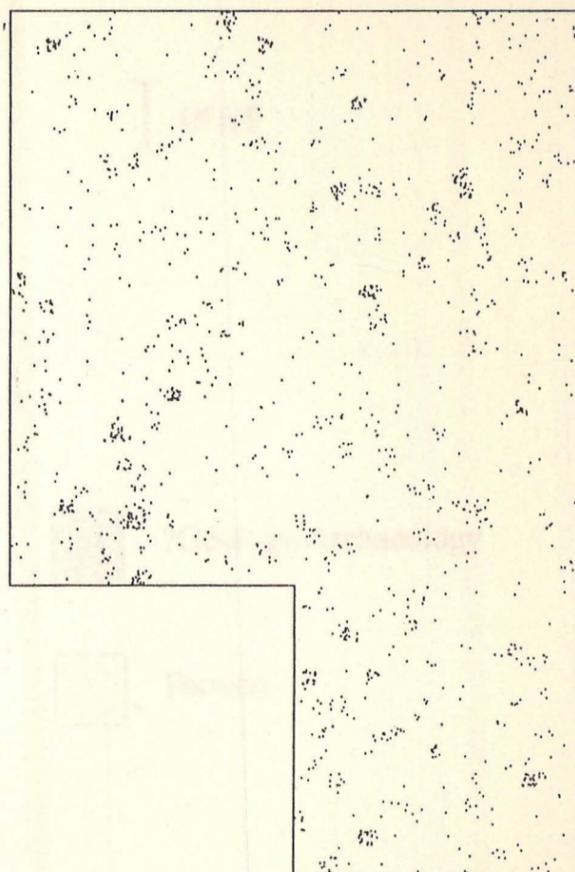
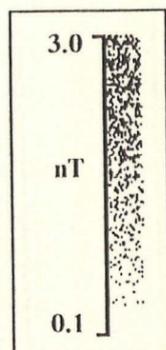
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Figure 4

WEST MOOR FARM CAISTOR Area D



15 nT



?Geology



Ferrous

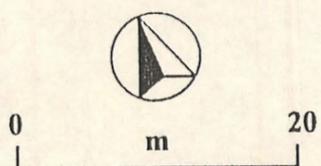
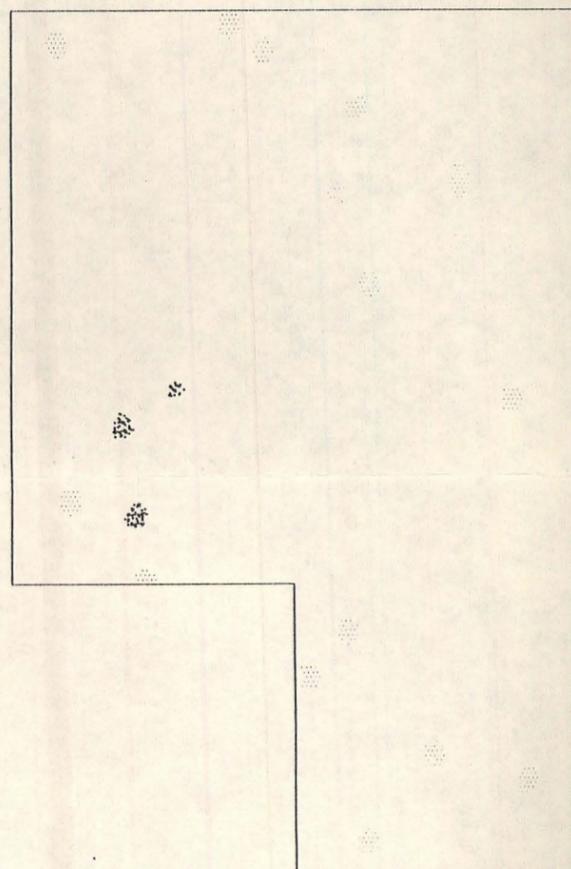
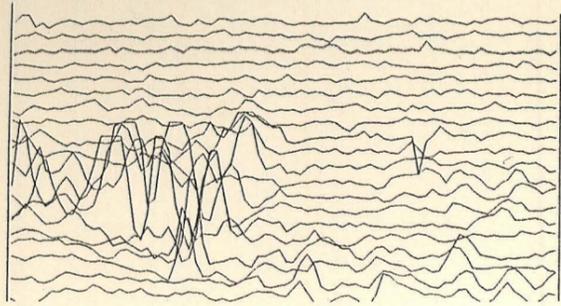
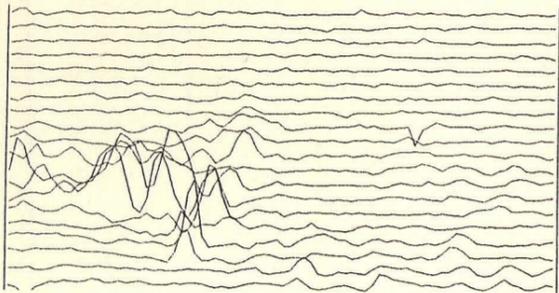


Figure 5

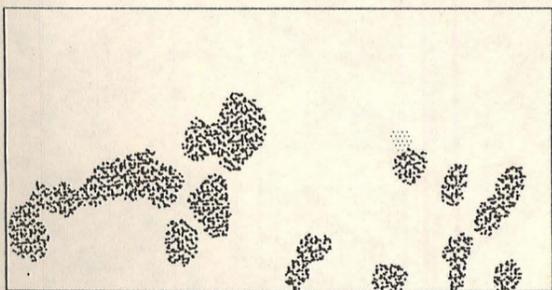
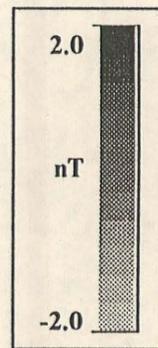
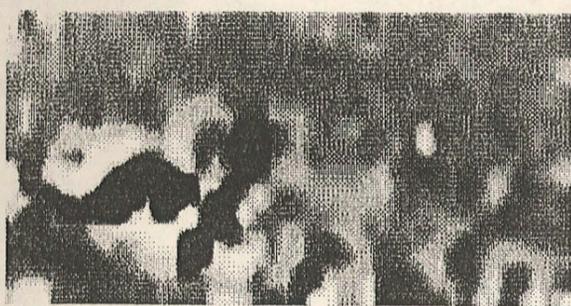
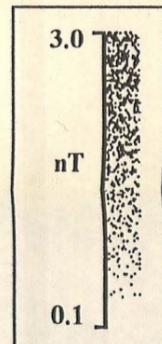
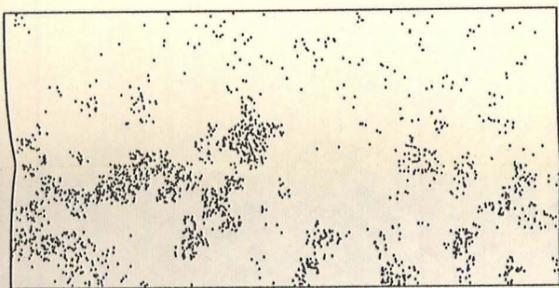
WEST MOOR FARM
CAISTOR
Area E



15 nT



30 nT



?Geology/Archaeology

Ferrous



Figure 6