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ARCHAEOLOGICAL DESK TOP ASSESSMENT AND PHASE I FIELD EVALUATION

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PRE-CONSTRUCT ARCHAEOLOGY (Lincoln)

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24/11/95

LAND OFF GRANTHAM ROAD

AN ARCHAEOLOGICAL ASSESSMENT AND PHASE I EVALUATION REPORT

FOR

PLOUGHSOUND LTD.

BY

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October 1995

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I.0 Non-technical summary

Ploughsound Limited requested that a pre-determination programme of assessment and evaluation be undertaken on c. 3.0 hectares of land situated on the east side of Grantham Road, Navenby, Lincolnshire. The request follows an assessment and evaluation of a site located in the angle of Chapel Lane and Ermine Street: on which archaeological remains of potentially national significance were recorded in 1994 (Palmer-Brown, unpublished).

The present study is a combined desk-based and field-based assessment which considers the results of recent field walking and a geophysical survey. It may or may not be followed by a limited programme of archaeological trenching.

It is suggested that the site, which may be used for future housing development, is, for the most part, of limited archaeological potential; though there exists some evidence of occupation within dispersed areas.

The central National Grid Reference is SK 9890 5730.

2.0. Introduction

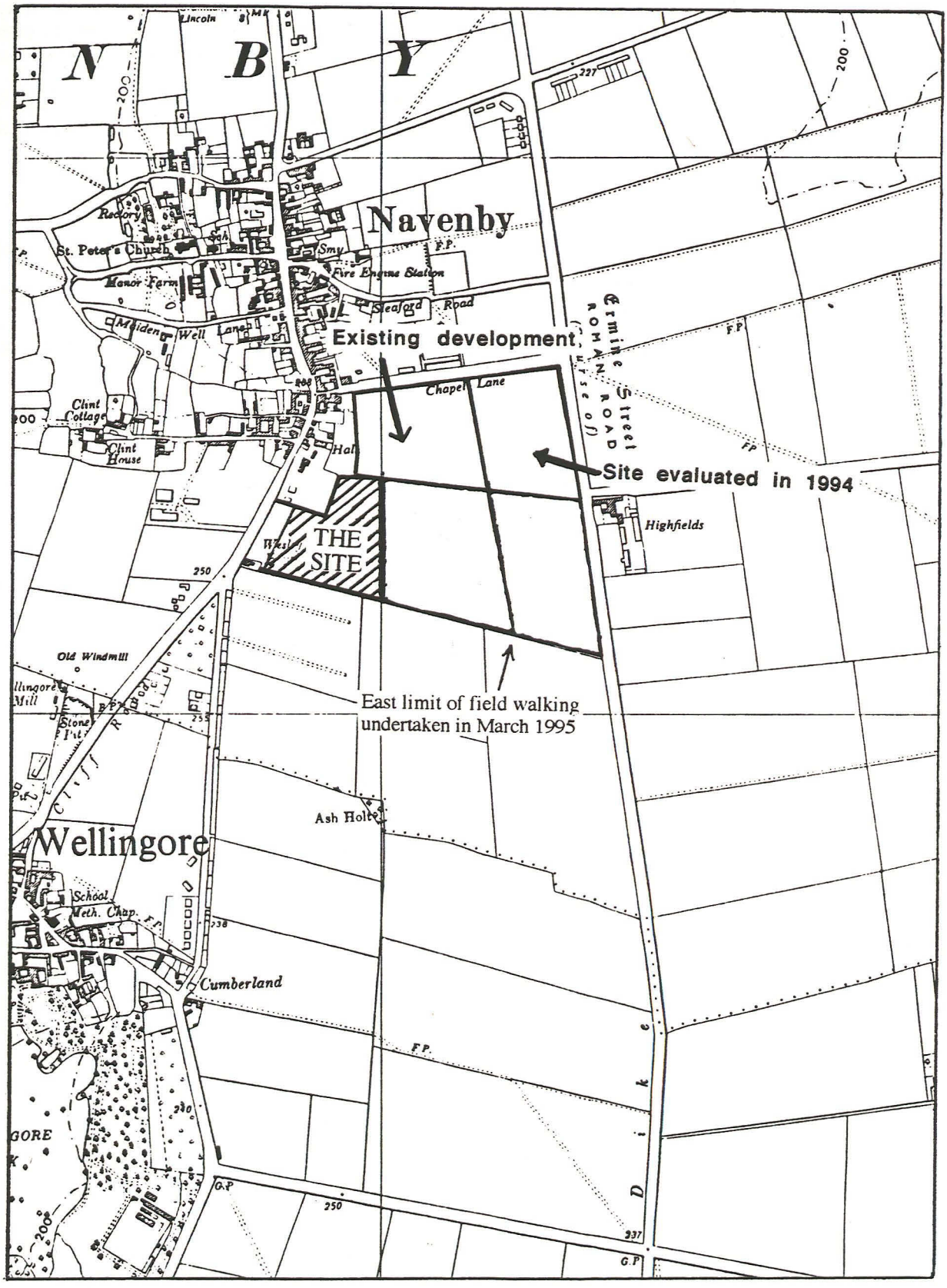
This desk-based and field-based assessment was commissioned by Ploughsound Ltd. in advance of possible housing development on c. 3.0 hectares of land situated on the south side of Navenby, Lincolnshire (Fig. 1). The commission was requested on a voluntary basis before a formal application is made to North Kesteven District Council.

During the compilation of the report, arrangements were made for preliminary field investigations to take place: namely, a geophysical survey (Appendix 1), which now complements a more extensive programme of field walking, undertaken in March 1995 (Palmer-Brown, unpublished).

The report was researched and written intermittently between August 10th and October 11th, 1995 by Colin Palmer- Brown of Pre-Construct Archaeology (Lincoln).

Desk-based research included a visual inspection of the site; inspection of the County Sites and Monuments Record (SMR) at the City and County Museum, Lincoln; records held by Heritage Lincolnshire; the Local Studies Library, Lincoln and the Lincolnshire Archives Office. Aerial photographic cover-searches were requested from Cambridge University Dept. of Aerial Photography and the National Monuments Record Aerial Photographic Library.

Fig. 1 Site location



3.0. Location and description

The proposal site is situated on the south-east side of Navenby, less than 350m north of the parish boundary, which Navenby shares with Wellingore. It encompasses an irregular land unit of approximately 3.0 hectares; bound, on the north side by Winton Road and on the west side by the rears of properties fronting Grantham Road. The south boundary is formed by a field hedge and the east boundary is artificial.

Ploughsound Ltd are considering submitting an application for housing development, as an existing development north of Winton Road nears completion.

4.0 Geology and topography

The site is located within an area of relatively flat land which lies at a point approximately 75.0m above modern sea level. To the east, between Navenby and Scopwick, heathlands predominate and the lie of the land gently fluctuates between 70 and 30m OD. Immediately west of Navenby is the steep drop of the Lincoln Edge where the land falls dramatically to 20m OD as it nears the base of the Witham valley. The River Witham is approximately 7.5km west of Navenby; the closest natural water source being the River Brant, a tributary of the Witham,s approximately 4.5km west of Navenby.

The parent geology is Oolitic Limestone (British Geological Survey; Sheet 114, 1:50 000). Archaeological trial excavations in the angle of Chapel Lane and Ermine Street showed that drift deposits of limestone brash and silty clay can exceed 1.0m in depth.

No borehole surveys have taken place on the site of the proposed development, and site-specific deposit descriptions are not available.

5.0. Planning background

5.1 Archaeology in North Kesteven and the Local Plan

North Kesteven District Council recognises the importance of buried archaeological resources and has included within its Local Plan (1992) various conditions regarding the protection or otherwise of archaeological deposits, when potentially at risk from development (Sections C4 - C6).

Policy C4

Development proposals which are likely to adversely affect a Scheduled Ancient Monument will not normally be approved.

Policy C5

Development proposals which are likely to adversely affect a site of archaeological interest will normally be subject to a condition of planning permission requiring archaeological investigations to take place before and/or during development.

Policy C6

Development proposals which are likely to adversely affect a site of potential archaeological interest will normally be subject to a condition of planning permission allowing a watching brief to be maintained during development.

The District Local Plan mirrors advice contained in a Department of the Environment document, *Planning Policy Guidance: Archaeology And Planning* (PPG16). This document identifies the need for early consultation in the planning process to determine the impact of construction schemes upon buried archaeological deposits.

This assessment/evaluation forms a significant part of a strategic process of elimination. Using the results of this assessment and, if necessary, follow-up evaluation procedures, informed decisions may be made on the requirement (or otherwise) of further archaeological intervention. Where archaeology remains a requirement, beyond assessment stage, further management strategies for safeguarding the resource may be developed, including; preservation *in situ* (usually the preferred option by interested parties), excavation (preservation by record), or a watching brief.

5.2 Report Objectives

The report aims to identify and assess archaeological deposits which may be threatened by construction works associated with development, should a scheme of development be proposed to the District Council in due course. It has worked, in essence, towards the gathering of sufficient information to provide all interested parties with a set of data from which a reasoned and informed judgement may be made regarding future archaeological resource management.

5.3 Methods

The desk-top assessment is based largely on information contained in the files held by the North Kesteven District Planning Archaeologist, the County Sites and Monuments Record (SMR); published, unpublished and cartographic sources and the Draft Local Development Plan for North Kesteven. Other sources relating to the geological, historical, and archaeological heritage of Navenby have been consulted, including full cover-searches from all aerial photographic sources. The study also follows and considers a programme of gridded field walking (Palmer-Brown 1995, unpublished) and incorporates the results of a geophysical survey; undertaken by GeoQuest Associates on behalf of Pre-Construct Archaeology (Lincoln).

6.0 Archaeological and historical background

6.1 Introduction

Remains from almost every cultural period occur within the parish. Details relating to pre-Roman settlement have, until recently, been sketchy, though an increasing body of unpublished data suggests that, by the late Iron Age, settlement may have been dense. The significance for the Roman period has been long-established, though the nature of immediate post-Conquest development remains largely unexplored and is the subject of much academic speculation. Likewise, the phase between the end of the Roman period and high medieval period has been little explored, though occasional Saxon/Saxo-Norman finds have been reported; most notably, during a recent field evaluation off Church Lane (unpublished).

This section of the report will aim to provide a general account on the historical development of, and archaeological background to, Navenby. Site-specific information will be examined in the light of the more general statement presented below; with a view to assessing the overall potential of the Grantham Road site.

6.2 Pre-Roman

Until recently, our knowledge of Navenby in the pre-Roman periods was based, almost entirely, on a catalogue of artefacts which had been discovered largely by chance: the recovery of a Middle Bronze Age stone adze and a Late Bronze Age socketed spearhead from somewhere within the parish demonstrates (or confirms) that some kind of settlement was taking place during these periods, though such findings can do little without a stratigraphic or more informative geographical context.

A significant scatter of worked flints was plotted by Allison Peach (former Community Archaeologist) in 1991 on the recently-evaluated site, set in the angle of Chapel Lane and Ermine Street. Worked flints were similarly encountered during trenching on the same site but none were found *in-situ* on that occasion. During field walking, Peach identified fragments of Late Iron Age pottery, both on the above site, and on land east of Ermine Street.

In 1994, a magnetometer survey on the Chapel Lane site identified a series of native-type enclosures. Within the largest of these, the plans of at least three substantial circular buildings were picked-out. One of these ?eves-drip gullies was sectioned during evaluation, as was a small part of the enclosure ditch. In the base of the latter were sherds of pottery which may be dated somewhere within the Middle to late Iron Age (c. C3rd BC - early C1st AD). The occurrence of very late, wheel-thrown pottery on the same (general) site could imply that the main thrust of Iron Age occupation occurred during the more developed phases; perhaps synonymous with a scheme of population and settlement growth which is common to late Iron Age Britain and contemporary Continental Europe (May 1984, 20).

On balance, the nature and development of the pre-Roman settlement remains unclear, though what is becoming clearer is that settlement in the Iron Age, at least on the west side of Ermine Street south of Chapel Lane was not confined to a single enclosure: the extent of the settlement complex is not known, though must remain a future research priority - an apparent clustering of Remains close to the later Roman road, Ermine Street, could imply the proximity of a less extensive precursor (which could have connected the potentially large Iron Age settlements known to have existed at Lincoln and Ancaster.

6.3 Roman

The archaeological potential for Navenby in the Roman period was first realised in 1965 when extensive field walking was undertaken by pupils at the local primary school, under the supervision of their head teacher. In fields to the north, south and west of Chapel Lane (including the evaluated site), large quantities of Roman finds were picked-up, including pottery, coins and other metallic objects.

Most authorities are of the opinion that the Roman settlement at Navenby was first established in the years following the Conquest and the subsequent occupation of lands belonging to a tribe known as the *Corieltauvi* (eg Whitwell 1992). Navenby is located exactly ten Roman miles from the important military installations at Lincoln (*Lindum*) and Ancaster, and it is likely that a timber fort was sited at Navenby which, perhaps, lay on the boundary of the *territorium* of Lincoln (*ibid*). However, as noted above, the siting of military installations at both Navenby and Ancaster may have been influenced by a substantial native presence. Whether or not the native populations were purposely uprooted, as the evidence from Ancaster could be taken to imply (May 1976, 176), is a situation worthy of further consideration.

The military presence at the legionary fortress of *Lindum* ceased approximately AD78, after which the settlement took on the status of a *Colonia* (Jones 1980, 287). The strategic importance attached to a fort at Navenby would similarly have declined and the settlement must have taken-on a new role (or enhanced its otherwise peripheral ones) - the evidence from field walking and excavation suggests that occupation on some considerable scale continued throughout the Roman period.

Whatever its initial status, there can be little doubt that a Roman military presence at Navenby would have presented attractive commercial possibilities; initially, perhaps, to cater for troops, whose needs may not always have been provided by the military machine. Military withdrawal need not (and clearly did not) signal the demise of a settlement, the roots of which appear to lie deeply-embedded in prehistory.

In October/November 1994, trial trenching established the presence of an extensive ribbon development on the west side of Ermine Street, south of Chapel Lane. The limits of this development could not be determined within the remit of the evaluation, though surface remains suggest that the settlement extended at least 60.0m south of the area investigated. Well-preserved stone foundations were exposed in association with mortar floors and painted, plastered walls. Associated finds indicated occupation during the later Roman period (C3rd/ AD), though the earliest levels were not investigated, as this would have involved needless destruction. There was little evidence on the site of deposits and features which could be exclusively associated with the Conquest period, and it is suggested that the site of the fort may be found on land somewhere north of Chapel Lane.

Human remains, possibly dating within the Roman period have been recorded on the north-east side of the village (at Dial House) and just north of Chapel Lane, adjacent to Ermine Street. Further human remains were recently exposed at No. 60 East Road (D Herkes, pers. comm.).

6.4 Saxon and Medieval

The Roman settlement at Navenby appears to have been finally abandoned in the late C4th/early C5th AD (ie the end of the Roman period) and the site was not reoccupied until relatively recent times - a theme associated more with modern expansion beyond the fringes of the medieval settlement.

In the Domesday Book of 1086, Navenby is recorded as *Navenebi*, translating 'farmstead or village of a man called Nafni' (Mills 1993, 238). *Navenebi* is a Danish name, as is neighbouring Coleby and Boothby (Hill 1965, 24).

There have been few reported Saxon finds, though two buckles (of a distinctively zoomorphic nature) could be taken as evidence of a Germanic presence; possibly German mercenaries or *foederati* (Leahy 1993, 42). A recent watching brief on land lying north of Church Lane exposed a cluster of settlement features dating to the late Saxon period (late C9th/earlyC10th) - middle and early Saxon finds were present in small numbers (Palmer-Brown 1995, unpublished).

The core of the medieval settlement was sited c. 400m west of Ermine Street in an area chosen probably for its proximity to a reliable water supply, as opposed to a strategic/military route.The size of the Saxo-Norman settlement has not been determined: few medieval buildings remain to leave a physical record of this prosperous market town turned prosperous, large village, the oldest surviving monument being the Church of St Peter. This has undergone several periods of modification and repair, though the earliest surviving fragments date to the C13th (Pevsner and Harris 1989).

7.0 Archaeological potential

This section will summarise overall potential, based on site-specific information.

7.1 Gridded field walking

In March 1995, an area measuring approximately 8.0 hectares, incorporating the proposed development site, was systematically walked-over, working within 20.0m grids (unpublished). A

relatively small collection of widely-dispersed artefacts were picked-up; 218 sherds of pottery and 23 worked flints. A single Roman coin was found in one grid square and a bronze ?button from another.

Within the pottery assemblage, 81 sherds were Romano-British. They were sometimes highly-abraded and widely-dispersed. However, there was a slight cluster of freshly-broken, sometimes large, sherds in grid squares more than 150m south-east of the area being assessed for the purpose of this report.

Within the defined proposed development area, a negligible quantity of finds were recovered on the west side; a small quantity on the east - four worked flints, seven Romano-British sherds, one possible Iron Age sherd and three medieval. As these finds were recovered from within an area measuring c. 100m x 80m, they constitute a rather small group. Assessed in conjunction with the results obtained during geophysical survey, however, it would now seem **possible** that they reflect the presence of sub-surface remains (below, Section 7.2).

7.2 Geophysical Survey

During August 10th and 11th, 1995, a magnetometer survey was undertaken by GeoQuest Associates. The full report may be read in Appendix 1 below, though a summary of the main findings is presented thus:-

> GeoQuest Associates were instructed to selectively survey by magnetometry approximately 2.0 hectares of the 3.0 hectare area, and that the selection should be based on the use of transects; with an emphasis on the east side of the site.
>
> The survey has indicated the presence of some, mainly weak, magnetic anomalies.
>
> The most positive anomalies, which are not altogether clear, occur on the north-east side of the site. Other, far more widespread anomalies are probably natural, though clarification of this position may require some limited trenching.

On balance, the combined field walking/geophysical survey results appear to suggest that archaeological remains may be found in the north-eastern part of the site; as reflected by the dark areas shown on the grey scale image and the interpretative plot, Fig. 3. The extensive east-west lines are the result of modern ploughing and the reticulated background is likely to represent geological variation rather than archaeological features. However, it is noted in the survey report that further definition would be dependent on the use of strategically-sited test trenches.

7.3 Aerial photographs.

The County Sites and Monuments Record contains no aerial photographs of this site.

A request was made to the National Monuments Record (RCHME) for a full aerial photographic cover-search to be undertaken. The request was for both vertical and oblique cover, though there are no oblique photographs available. There are seven photographs within the National Archive which incorporate the current site:-

Ref.	Scale
597	9800
597	9800
3742	13000
8192	12500
9216	10600
10371	7500
21271	11000

Although photocopies of the above were supplied, no crop or soil marks could be seen on any of the prints studied. The copies have been retained as part of the site archive.

On at least three occasions, cover-searches were requested from the Dept. of Aerial Photography at the University of Cambridge. No information has been provided for the purpose of this study.

7.4 Historical Maps (Appendix 3)

As part of this assessment, a check was made of the maps held at the Lincolnshire Archives Office. Those consulted were as follows:-

Ordnance Survey 1st edition, 1887 (LAO ref. PL 2/1; 2/3)
Ordnance Survey 2nd edition, 1906
1771 Enclosure map (copy 1847) (LAO ref. 2cc 62/12670)
?Mid-C19th plan of village (LAO ref. 2cc 62/13688)

Based on the information contained in each of these sources, the site was, from the late C18th onwards, open and was presumably, as now, used for agricultural purposes. In 1771, the land was in the possession of Sir Beaumont Hotham: a small area immediately north-west of the site was in the possession of Henry Winton: the name from which Winton Road no-doubt originates. Some reorganisation of field boundaries has taken place, though this is considered to be of limited archaeological importance in respect of this study.

7.5 The Sites and Monuments Record (SMR)

Although a significant body of entries constitute the SMR for Navenby, most of the records relate to finds made in areas to the north-east and east of the proposed development site. The implications of these finds have been variously considered within this text and will not be reiterated here. For the purpose of this report, the results of recent field walking are considered to be of greater direct relevance, and have been considered above in Section 7.1.

The SMR contains no aerial photographs of relevance to this project.

7.6 Summary of potential

Taken together, the above data-sets suggest that the archaeological potential of the site is not negligible, though it is considered unlikely that there will be widespread archaeological deposits and features. Taken together, the geophysical survey and field walking results appear to indicate a potential focus of settlement in the north-east part of the site (anomaly groups A and D on the geophysical survey report in Appendix 1); probably dating to within the Roman period. Elsewhere, the site may be archaeologically sterile, though it may be wise to clarify the status of some of the more poorly-defined anomalies expressed during geophysical survey.

8.0 Impacts to buried archaeological resources

Limited impacts to buried archaeological deposits (if present) may already have occurred within this development site. There is little indication that disturbance has resulted from previous building development, though some measure of impact will undoubtedly have occurred as a result of ploughing.

If housing development does take place, it would seem likely that some impacts may occur, should archaeological resources prove to be present; unless areas of sensitivity were to be avoided altogether. On present evidence, the area most at risk would appear to lie in the north-east part of the site.

9.0 Mitigations

As stated above, the District Local Plan contains procedural details for dealing with archaeological heritage. These procedures are based on advice contained within the Department of the Environment's *Planning Policy Guidance; Archaeology and Planning* . (PPG 16), November 1990. English Heritage in their publication, *Exploring Our Past* (Wainwright. et al. 1991) have summarised the key points of this document:

i)"that archaeological remains should be seen as a finite, non-renewable resource, in many cases highly fragile and vulnerable to damage and destruction;

ii) that development plans should reconcile the need for development with the interests of conservation including archaeology - and that detailed development plans should include policies for the protection, enhancement and preservation of sites of archaeological interest and their settings:

iii) that where nationally important remains, whether scheduled or not, and their settings are affected by proposed development, there should be a presumption in favour of their preservation - and that in such cases preservation by record (excavation) should be regarded as the second best option after physical preservation *in situ*;

iv) that the needs of archaeology can be reconciled, and potential conflict very much reduced, if developers discuss their preliminary plans for development with the planning authority at an early stage (the PPG gives detailed guidance on how this can be achieved);

v) that decisions by planning authorities on whether to preserve archaeological remains *in situ* in the face of proposed development are to be taken on merit, taking account of development plan policies and all other material considerations - including the importance of the remains - and weighing these against the need for development;

vi) that planning authorities, when they propose to allow development which is damaging to archaeological remains, must ensure that the developer has satisfactorily provided for excavation and recording, either through voluntary agreement with the archaeologists or, in the absence of agreement, by imposing an appropriate condition on the planning permission."

Where archaeological features, as identified by the Desk Top Study, are likely to be encountered, strategies should be developed to deal with them. These may include preservation *in situ*, by limiting the archaeological impact, redesigning building plans or raising floor levels, or preservation by record. If the latter is the favoured or apposite course for sub-surface deposits, archaeological trial excavations to assess the nature, depth, level of survival etc. may be conducted. This would usually involve the cutting of archaeological trenches in one or more locations, usually not exceeding 10% of the area to be developed.

The Department of the Environment's Planning Policy Guidance Note 16 states that, where preliminary research suggests survival of important archaeological remains,

"it is reasonable for the planning authority to request the prospective developer to arrange for an archaeological field evaluation to be carried out before any decision on the planning application is taken. This sort of evaluation is quite distinct from full archaeological excavation. It is normally a rapid and inexpensive operation, involving ground survey and small scale trial trenching, but it should be carried out by a professionally qualified archaeological organisation or archaeologist. Evaluations of this kind help to define the character and extent of the archaeological remains that exist in the area of a proposed development, and thus indicate the weight which ought to be attached

to their preservation. They also provide information useful for identifying potential options for minimising or avoiding damage. On this basis, an informed and reasonable planning decision can be taken."

It continues,

"Local planning authorities can reasonably expect developers to provide this information as part of their application for sites where there is good reason to believe there are remains of archaeological importance. If developers are not prepared to do so, the planning authority may wish to consider whether it is appropriate to direct the applicant to supply further information under the provisions of Article 4 of the Town and Country Planning (Applications) Regulations 1988".

The results of trial work may lead to a redesign or realignment of the proposed scheme, further trial or survey work or open area archaeological excavations.

10.0 Acknowledgements

Pre-Construct Archaeology (Lincoln) would like to express sincere thanks to Ploughsound Ltd. for commissioning this report: in particular, Mr R Overton and Mr D Herkes. Thanks are expressed also to Nicola Nuttall, the (former) Community Archaeologist, and to the curatorial staff at the City and County Museum, Lincoln. Thank you to GeoQuest Associates for undertaking the geophysical survey.

11.0 Appendices

11.1 Geophysical survey report by GeoQuest Associates

11.2 Information extracted from the Sites and Monuments Record

11.3 Selected historical maps

11.4 References

Appendix 11.1

GEOPHYSICAL SURVEY OF A SITE AT NAVENBY LINCOLNSHIRE

A PROGRAMME OF RESEARCH CARRIED OUT
ON BEHALF OF

PRE-CONSTRUCT ARCHAEOLOGY (LINCOLN)

By

GeoQuest Associates

INTRODUCTION

This report presents the results of a geophysical survey of a site at Navenby, in Lincolnshire, where it is proposed to construct new housing. The work was undertaken on behalf of Pre-Construct Archaeology (Lincoln) with the aim of establishing whether Iron Age and Roman archaeological activity detected in fields to the E and NE continued into the development area.

GEOLOGICAL AND TOPOGRAPHIC SETTING

The study area comprises a 3 hectare portion of a field lying to the east of Grantham Road, between the Sports Ground and telephone exchange, in the village of Navenby. At the time of the survey the ground cover comprised cereal stubble.

Information provided by the Geological Survey shows that the solid geology consists of Great Oolite limestone of the Middle Jurassic. There are no rock outcrops on the site which is presumably mantled by deposits of drift and alluvium. The site is approximately level at an altitude of about 75m od.

THE GEOPHYSICAL SURVEY

The geomagnetic survey was carried out using an enhanced Geoscan FM36 fluxgate gradiometer with ST1 sample trigger, in order to detect contrasts in subsoil magnetic susceptibility and remanence which might be associated with pits, ditches and areas of burning associated with industrial processes. A zig-zag traverse scheme was employed and data were logged in units of 20 x 20 metres at 1.0 x 1.5 metre intervals. Three north-south aligned transects of 60m, 40m and 20m width were surveyed as shown in Figure 1. This strategy was adopted in order to provide the greatest emphasis of assessment towards the eastern limit of the site where the archaeological potential was judged to be highest by Pre-Construct Archaeology.

The GeoQuest *InSite* Windows program was used to process and filter the geophysical data and produce a grey-scale image at a scale of 1:500. The results are shown in Figure 2 on a basemap digitised from the 1:2500 Ordnance Survey.

INTERPRETATION

General

The first stage in the interpretation has been to extract significant anomalies in the geomagnetic data and present them using coded colours (Figure 3). The classes of anomalies which have been distinguished are as follows:

Green: Significant regions of anomalously high magnetic field gradient which might be associated with high susceptibility soil-filled structures such as *pits* and *ditches*.

Blue: Areas of anomalously low magnetic field gradient, corresponding to material with low magnetic susceptibility, such as *limestone rubble*.

Red: Strong dipolar anomalies (paired positive-negative) which almost certainly reflect *ferrous litter* on the surface of the field.

An interpretation of the anomalies detected by the geophysical survey is presented in Figure 4.

Discussion

The following subsoil features have been detected in the study area (Figures 2-4):

1 A set of positive magnetic anomalies forming distinct polygonal patterns within each of the sample transects. The average diameter of the polygons is about 15m. On close examination, most of the polygon sides are seen to comprise lines of linked, sub-circular, positive anomalies suggesting that they comprise alignments of soil-filled pits or depressions. This unusual geophysical pattern almost certainly reflects the distribution of joints in the underlying limestone although origins due to permafrost effects or archaeological features cannot be ruled out.

2 Several, more distinct polygonal anomalies whose form is more suggestive of an archaeological origin, labelled A-D in Figures 3 and 4. This is particularly the case for feature D which appears to form a rectangular 'enclosure'. It may be prudent to examine these features further via a programme of selective trial trenching.

No other features of archaeological interest were detected in the study area.

CONFIDENCE RATINGS

The following are the levels of confidence which we assign to the features inferred from the geophysical data:

Polygons (Less A-D): As geological features 70%; As archaeological features 30%
Polygons A-D: As geological features 60%; As archaeological features 40%

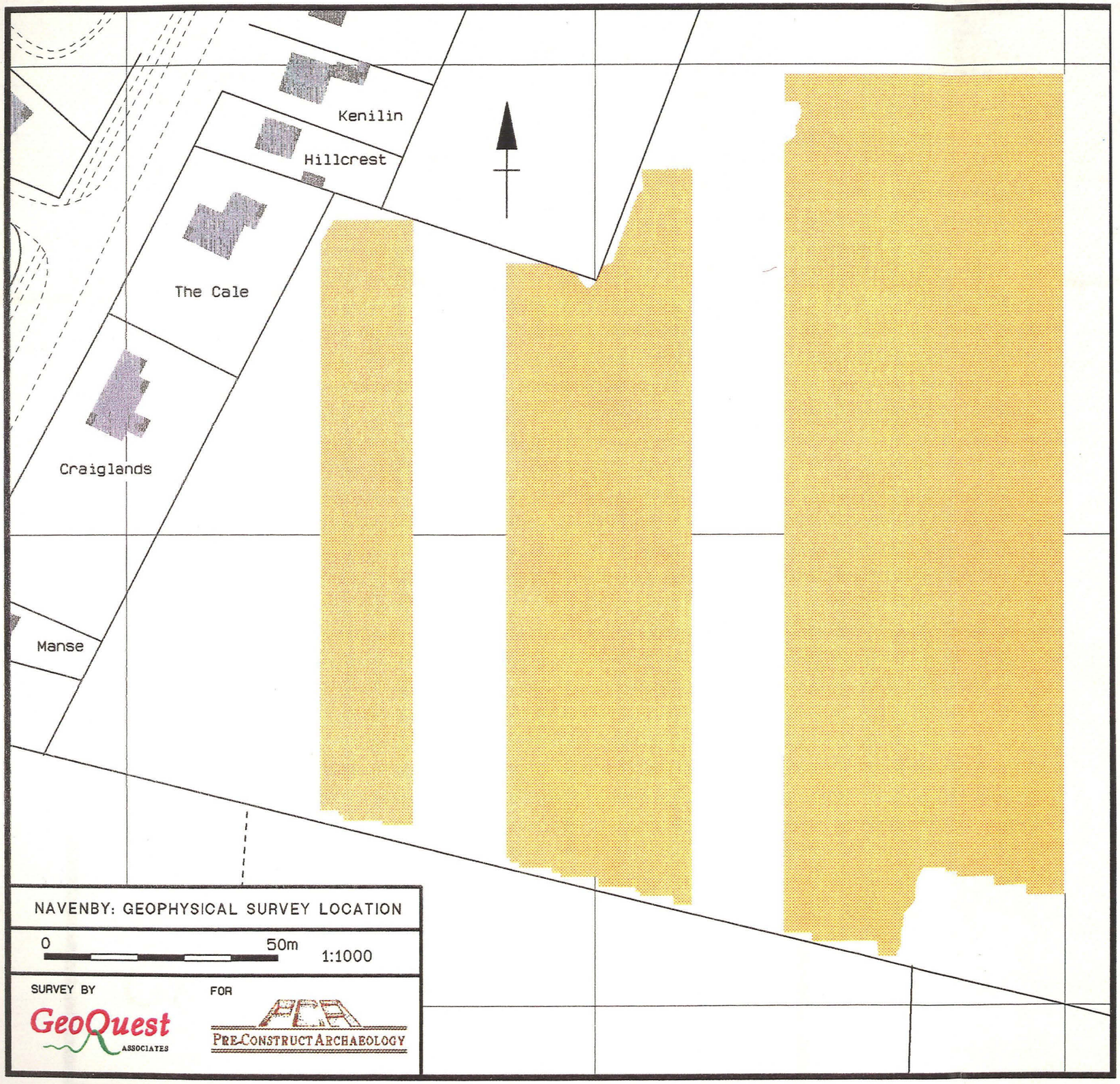
CONCLUSIONS

The following are the principal findings of this research programme:

1 Geomagnetic survey of 3 transects within the study area has detected a pattern of polygonal magnetic anomalies interpreted as being almost certainly due to geological structures. However, several of these geophysical features have magnitudes and geometries consistent with archaeological remains in the subsoil and hence assessment via a limited programme of trial trenching may be advisable.

2 No other features of archaeological interest were detected in the study area.

Credits
Survey: R. Grove, D.N. Hale
Report: M.J. Noel 20/8/95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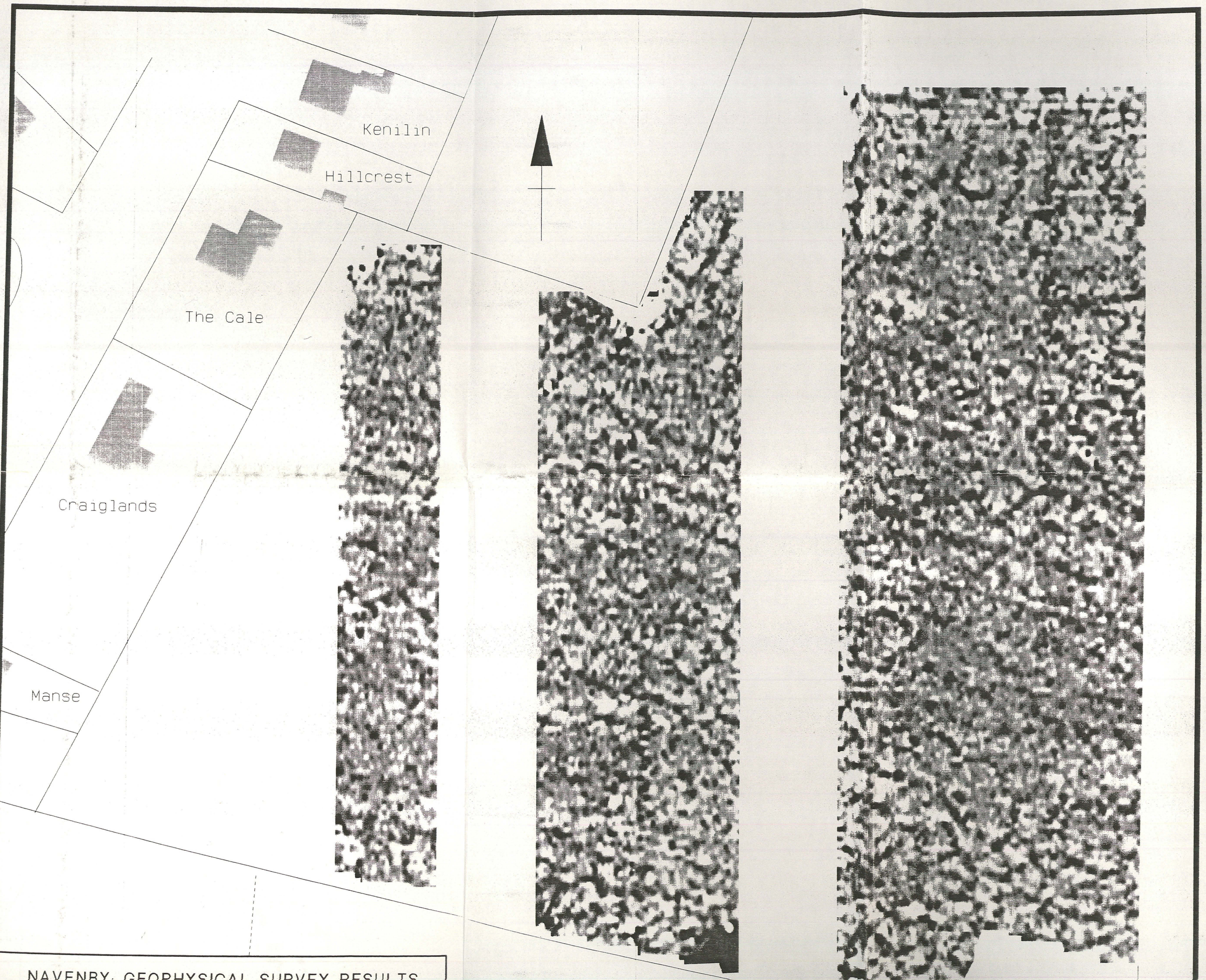
GeoQuest
ASSOCIATES
FOR
PRE-CONSTRUCT ARCHAEOLOGY

FIGURE 1



NAVENBY: GEOPHYSICAL SURVEY RESULTS

The Cale

Craiglands

Manse

NAVENBY: GEOPHYSICAL SURVEY RESULTS

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SURVEY BY

GeoQuest ASSOCIATES

FOR

PRE-CONSTRUCT ARCHAEOLOGY

FIGURE 2


Kenilin
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A
B
C
D
NAVENBY: GEOPHYSICAL INTERPRETATION
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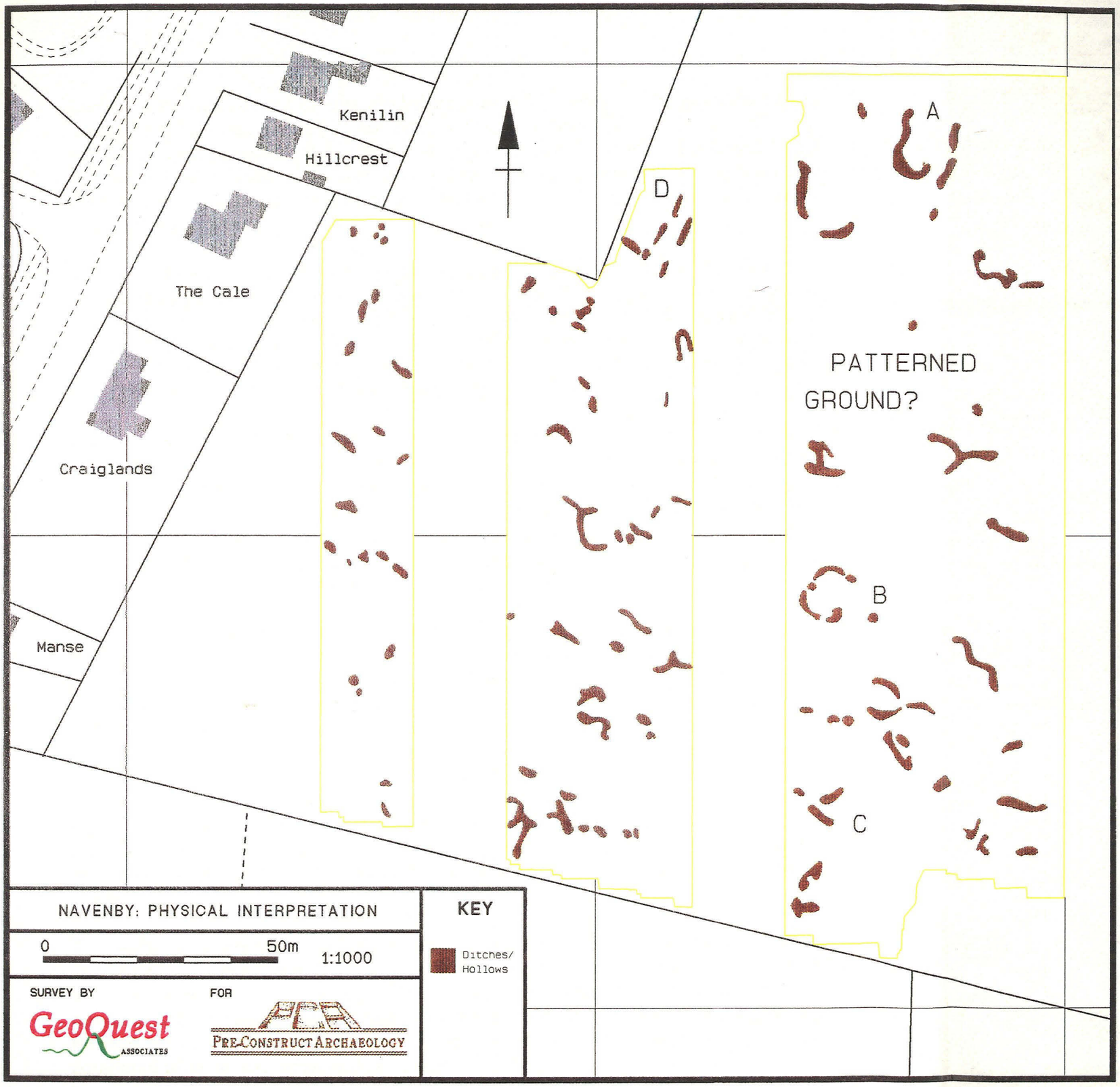
GeoQuest
ASSOCIATES
FOR
PRE-CONSTRUCT ARCHAEOLOGY

FIGURE 3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The Cale
Craiglands
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C
D
PATTERNED
GROUND?
NAVENBY: PHYSICAL INTERPRETATION
0
50m
1:1000
KEY
Ditches/
Hollows
SURVEY BY
GeoQuest
ASSOCIATES
FOR
PRE-CONSTRUCT ARCHAEOLOGY

FIGURE 4

APPENDIX A

Principles of Geomagnetic Surveying

Geomagnetic prospecting detects subsurface features in terms of the perturbations or 'anomalies' that they induce in the Earth's magnetic field. In contrast to resistivity, seismic or electromagnetic surveying, no energy is injected into the subsoil and hence this is one of a class of *passive* geophysical techniques that includes gravity and thermal surveying. In an archaeological setting two types of magnetic anomalies can be distinguished:

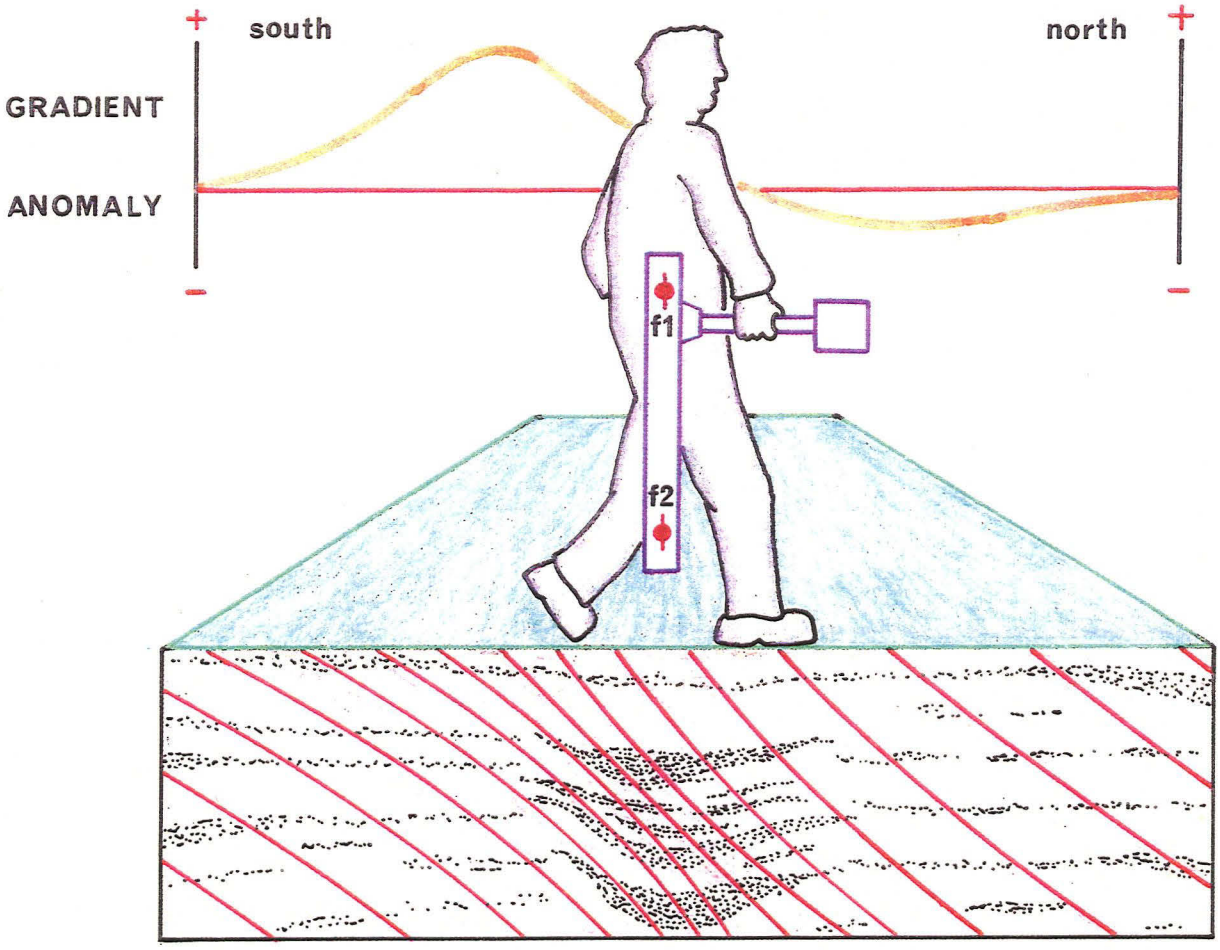
1 Anomalies arising from variations in *magnetic susceptibility* which will modulate the component of magnetisation *induced* in the subsurface by the Earth's magnetic field. For most archaeological sites, this is the dominant factor giving rise to geomagnetic anomalies. In general, susceptibility is relatively weak in sediments, such as sandstones and enhanced in ingeous rocks and soils, especially those which have been burnt or stratified with organic material.

2 Anomalies due to large, *permanently magnetised* structures. Such permanent magnetisation or 'remanence' arises when earth materials are heated to above ~600°C and cooled in the geomagnetic field. Thus kilns and hearths are often detected as strong permanent magnets causing highly localised anomalies that dominate effects due to background susceptibility variations. Remanence can result from other physical and chemical processes but these give rise to anomalies that are usually unimportant for geophysical prospecting.

There are several approaches towards the practical measurement of geomagnetic anomalies. In this study measurements were made using a Geoscan FM36 fluxgate gradiometer which records the change with height in the vertical component of the Earth's magnetic field, as shown overleaf. This method has the advantage of being insensitive to diurnal variations while the Geoscan instrument also benefits from an integrated data logger. Note that in mid northern latitudes the magnetic anomaly will be asymmetric with the main peak displaced to the south of the archaeological feature. Thus, a ditch filled with a soil of enhanced susceptibility, for example, will generate a positive anomaly to the south, mirrored by a weak negative anomaly north of the feature. When portrayed as an area map of grey tones this gives rise to a 'shadowing' or pseudo relief effect which must be borne in mind when making an archaeological interpretation.

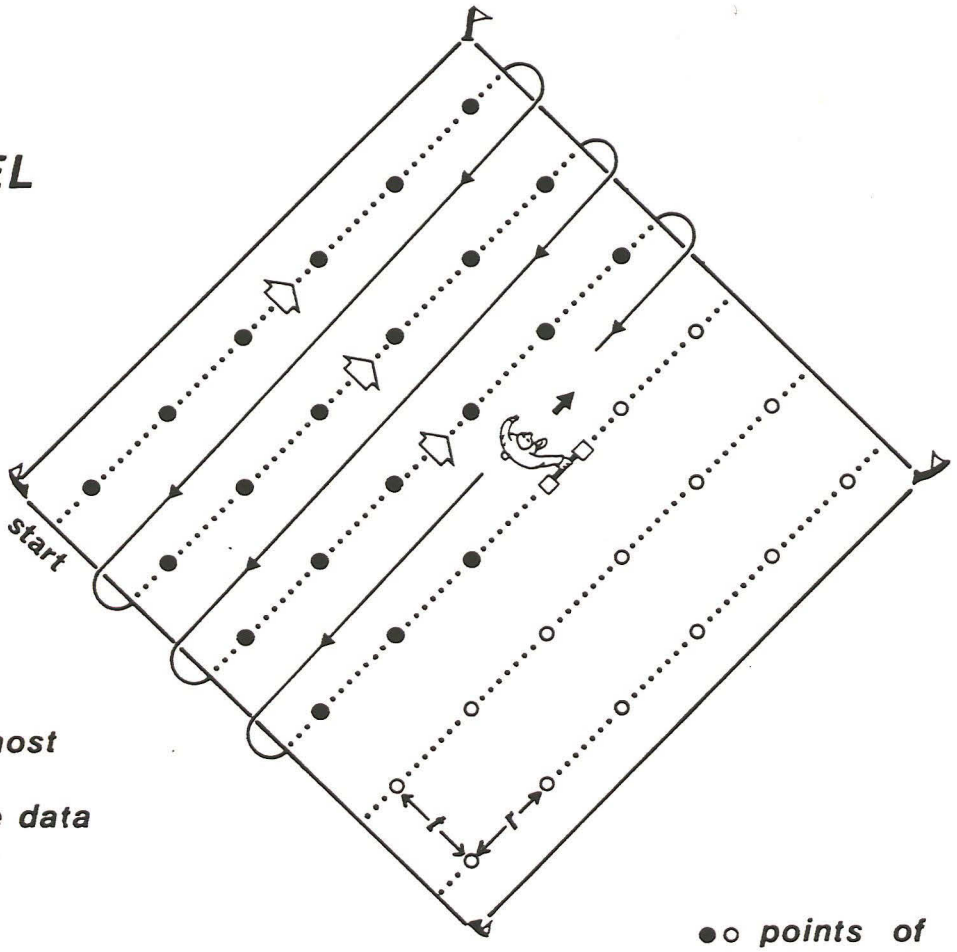
Two techniques can be used to survey gridded areas using the fluxgate magnetometer. In the parallel method the instrument is used to scan the area along traverses which are always in the same direction. This method minimises 'heading errors' due to operator and instrument magnetisation but is time consuming. The alternative zig-zag method is significantly faster and suitable for areas where anomalies are large compared to these and other sources of error.

MAGNETIC SURVEYING



SURVEY SCHEMES

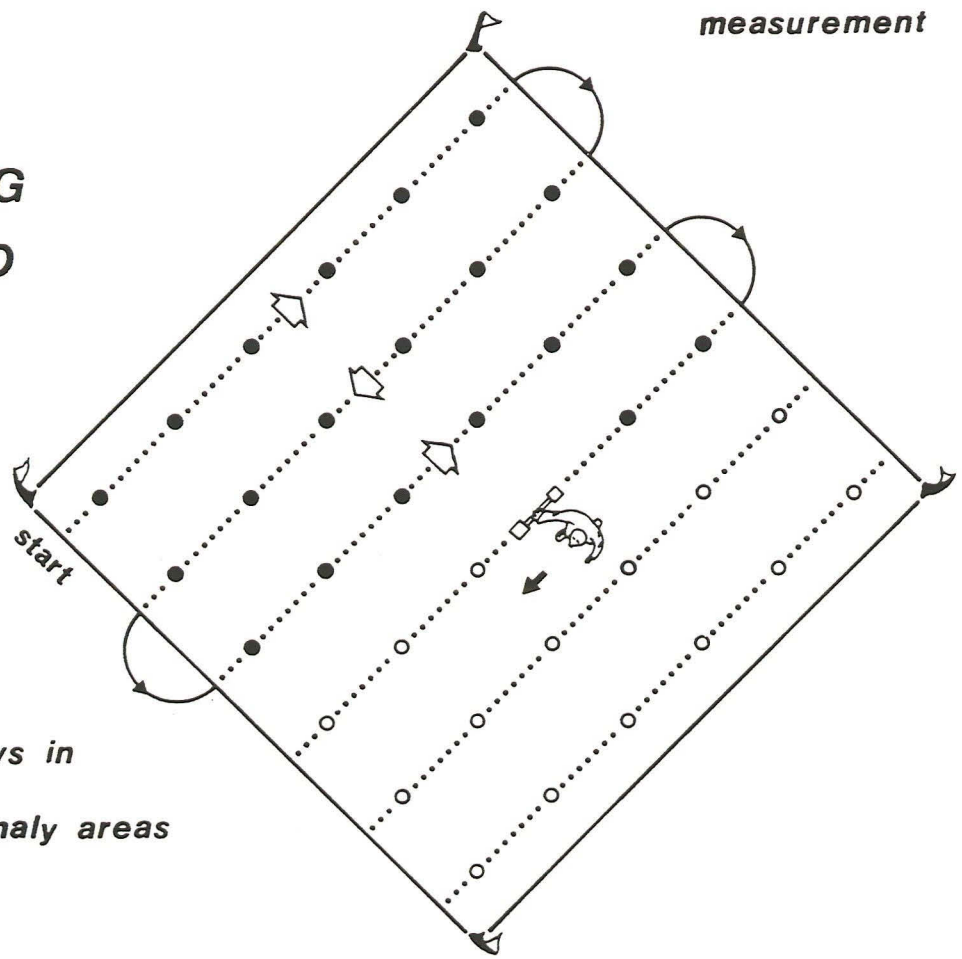
PARALLEL METHOD



slower but minimises most errors in the data

●○ *points of measurement*

ZIG-ZAG METHOD



suitable for rapid surveys in strong anomaly areas

NOTES

GeoQuest Associates
The Old Vicarage
Castleside
Co. Durham DH8 9AP

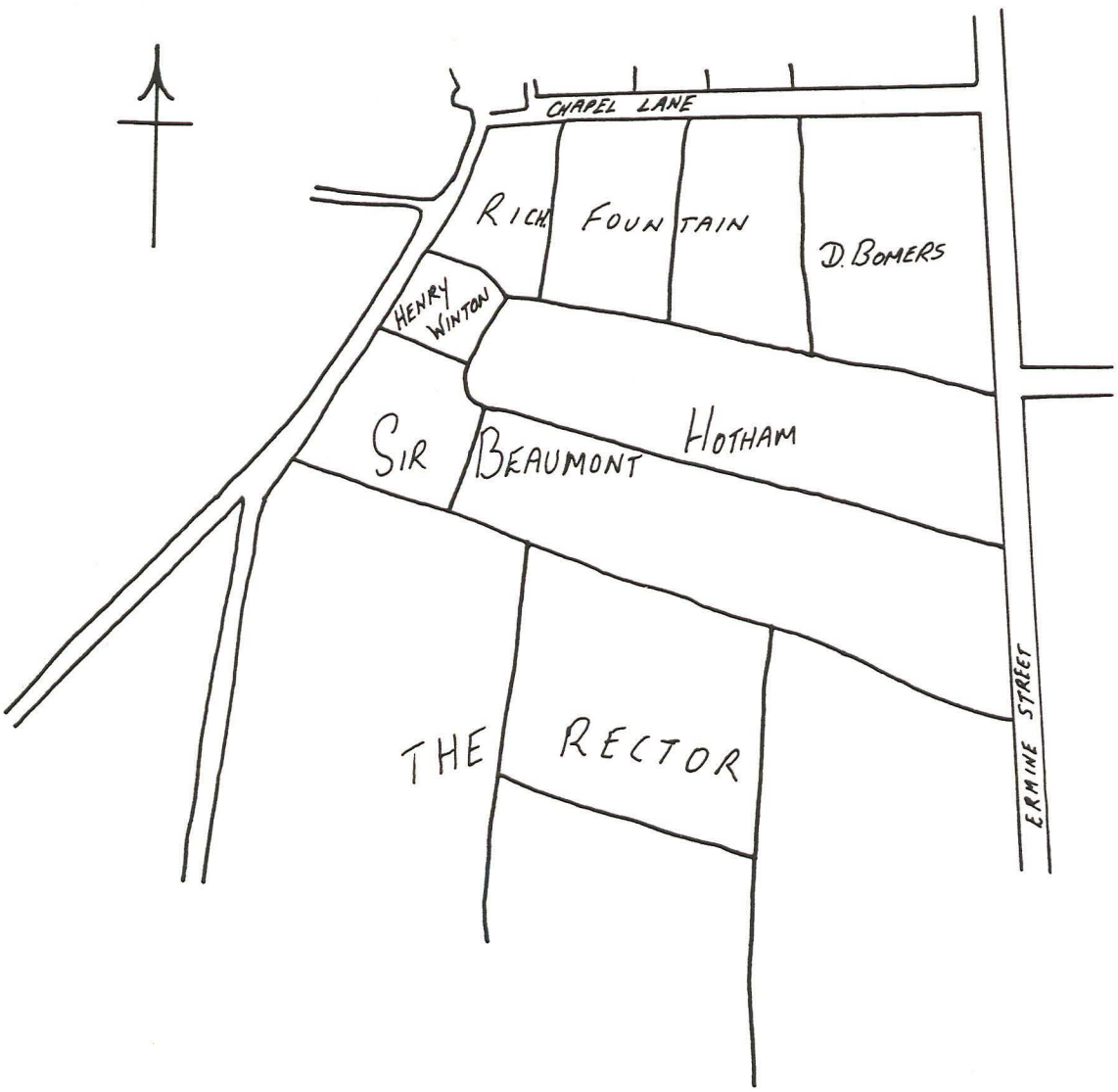
11.2 Information derived from the Sites and Monuments Record

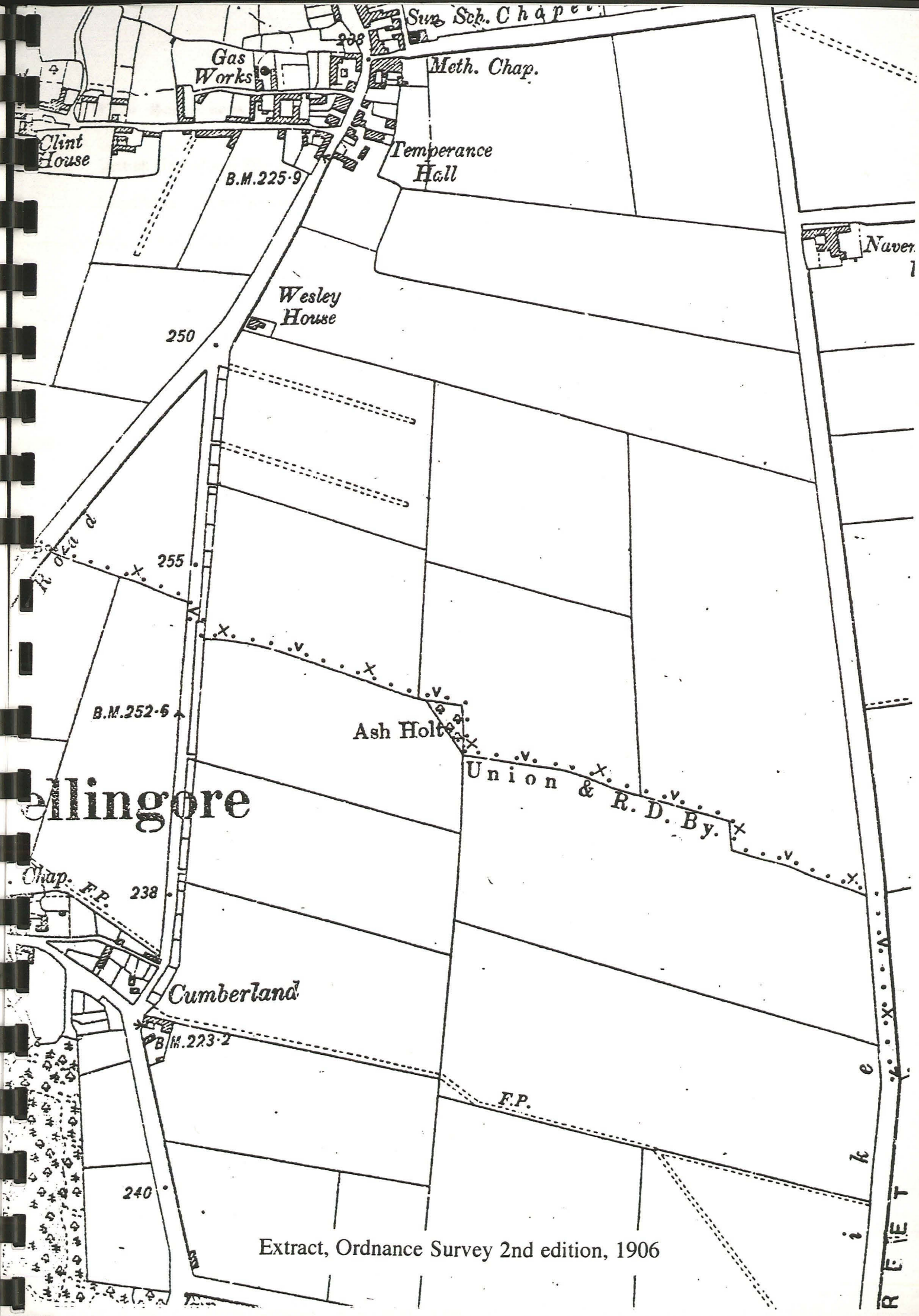
SMR/Map	NGR	Description
H	SK988579	Skeleton; below stone slabs - in garden at Dial House
N	SK995575	C3rd/C4th R-B pottery; found 1976 in association with stone slabs
Q	SK993575	Four mid - late C4th Roman coins
U	SK987577	Med. gritted pottery sherd; building site
V	SK993578	R-B pottery and stone footings
W	SK993577	Lead spindle whorl, C4th cons, pottery with reverse boss impressions, human remains, Stibbington pottery
X	SK 995575	X2 worked flints
Z	Unprovenanced	Coin, from 95NE
AA	SK 992577	Button (flint) scraper, x3 R-B bronze bracelets, human remains; found within stones; associated grey and fine ware pottery; coin of *Claudius Gothicus*
AB	Unprovenanced	Middle Bronze Age polished stone adze with perforation
AC	SK 992576	Coin; *Urbs Roma*
AH	SK 9982 5673	Coin; C4th
AI	SK 9929 5765	R-B pottery, commemorative coin, *Constantinian*, and coin of *Julia Domna*
AJ	SK 9923 5775	C14th/C15th bronze ring; inscribed *IHS HAZARENUS*
AL	SK 993 575	Roman remains (??)
AN	SK 9929 5777	C1st penannular brooch and coin of *Constantinus Caesar* (332)
AO	SK 9942 5711	Bronze key handle; ?Roman
AP	SK 95NE	Late Bronze Age pegged and socketed spearhead
AQ	SK 991 575	4 Roman coins, C18th token, 2 R-B bronze fittings
AR	SK 9940 5780	R-B metal finds, including C1st/C2nd fantail brooch with enamel inlay; 23 C4th coins
AQ	SK 991 575	X4 Roman coins, x2 Roman bronze belt fittings and lead ?goblet base; William III farthing
AS	SK 993 576	R-B to post-medieval pottery; recovered during field walking
AT	SK 990 575	X4 Roman coins + post-medieval pottery; recovered during field walking

AU	SK 990 575	X3 Roman coins, grey ware jug handle, x2 lead fragments
AV	SK 990 575	Coin of *Tetricus* (270 - 273)
AW	SK 95NE	Roman bronze looped attachment
AX	SK 95NE	Silvered *antonianus* of *Valerian I* (235 - 60)
AY	SK 993 578	Quantity of R-B grey ware
AZ	SK 95NE	"Roman site"; finds include medieval lead wool seal, x3 post-medieval buttons, 3 coins of *Constantine II* (354 - 61), 3 other C4th coins, rams head petra handle
BA	SK 95NE	Tudor bronze rosette, Roman finger ring frag., C4th coins, a gold half-Noble of Henry VI
BB	SK 95NE	X3 R-B pot sherds, bronze strap end, medieval penanular brooch
BC	SK 991 575	Coin of Constantinus II (324 - 37); 3 of the house of Constantine, R-B bronze bell, C17th/18th bronze buckle, post-med. knife blade
BE	SK 95NE	X6 C4th coins
BF	SK 95NE	C4th coins and $^1/_2$d toxen of 1793
BG	SK 95NE	C4th coin, 2 bronze strap ends, bronze handle
BH	SK 95NE	X5 Roman coins, 4 small finds and a Cu alloy ring buckle
BI	SK 993 578	Large Roman plate brooch, bronze cuirass buckle, post-med buckle and lead tag
BJ	SK 993 578	Field walking collection: includes Roman bronze plumb bob, bronze mirror, bronze pin, C16th buckle
BK	SK 993 578	Coin of Victorinus (268 - 70), 3 Cu alloy strap attachments, misc. post-med. finds
BL	SK 993 578	X2 Roman coins, 1 lead disc, 1 iron knife frag.
BN	SK 991 578	X2 Roman coins and bronze spoon bowl. Med. bronze pendant
BO	SK 991 575	X5 Roman coins, 1 bronze attachment, also Roman
BP	SK 995 575	X7 Roman coins + misc. items, including: lead spindle whorl, lead plumb bob, domed rivet head, dolphin brooch attachment, fragments of cast Cu alloy bowl, C17th/18th shoe buckle, pin head with ring and dot motif, cut short-cross $^1/_2$ d.
BZ	SK 993 578	Roman coins

Appendix 11.3 Historical maps

Extract from Enclosure Plan, 1771 (copy 1847)




Sun. Sch. Chapel
Gas Works
Meth. Chap.
Clint House
B.M.225·9
Temperance Hall
Wesley House
250
255
B.M.252·6
Ash Holt
Union & R. D. By.
ellingore
Chap.
F.P.
238
Cumberland
B.M.223·2
F.P.
240
Extract, Ordnance Survey 2nd edition, 1906

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