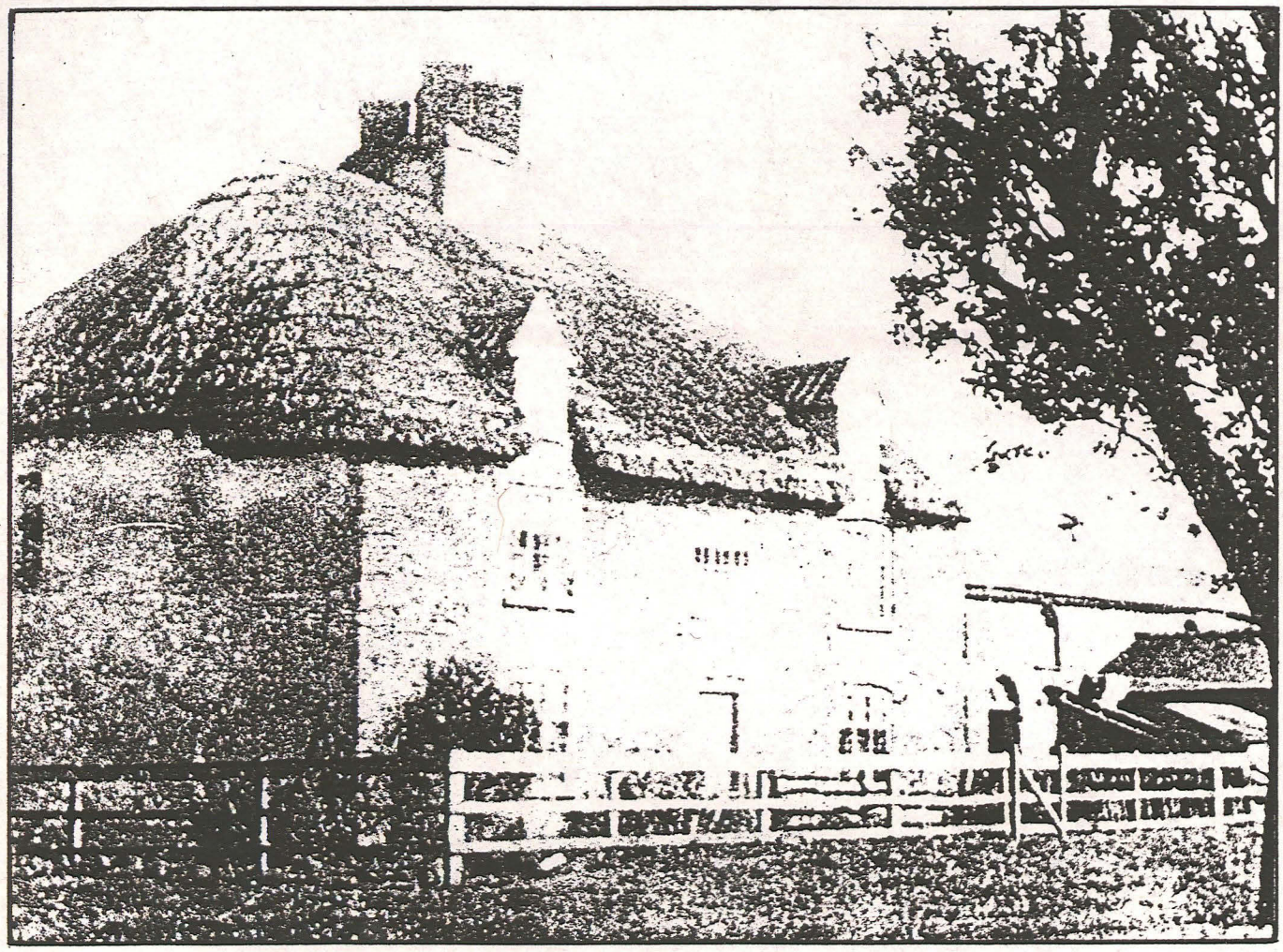
ARCHAEOLOGICAL DESK TOP AND PHASE I FIELD EVALUATION REPORT



WASH ROAD, KIRTON, BOSTON, LINCOLNSHIRE

Feb 1996

Pre-Construct Archaeology (Lincoln)

Site code: WRK96
LCCM Accession No. :

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23.2.96.

CONTENTS

I.0 Non-technical summary

David O'Conner & Associates propose to construct an office and steel-framed cold storage unit on c. 0.8 hectares of land north of Wash Road, Kirton, Boston, Lincolnshire. The development area lies immediately west of the site of Bozon Hall; part of a moated complex which was built c. 1377.

An archaeological assessment and non-intrusive evaluation has taken place to fulfil a planning requirement, which may be followed by limited intrusive investigation.

Data compiled during the present study suggests that the archaeological potential of the site is moderately high, though the data also suggests that most of the archaeological deposits will lie outside of the principal impact zones associated with the development.

This report incorporates the results of two geophysical surveys (magnetometry and resistivity) which were undertaken by the Landscape Research Centre Ltd.

The site central National Grid Reference is TF 3100 3817.

2.0. Introduction

This desk top/evaluation report was commissioned by David O'Conner & Associates in advance of a possible scheme of development on land north of Wash Road, Kirton, Boston (Fig. 1). The commission was requested to fulfil a planning requirement issued by Boston Borough Council (Application B14/0603/95).

The report was researched and written between January 23rd and February 21st, 1996, by Colin Palmer-Brown of Pre-Construct Archaeology (Lincoln). Research included a detailed inspection of the site; an examination of the Sites and Monuments Record (SMR) held at the City & County Museum, Lincoln; records held by the Boston Borough Archaeologist; 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 Sites and Monuments Record, Lincoln. Relevant published and unpublished records held by Pre-Construct Archaeology were also consulted as part of the assessment/evaluation.

In addition to the normal range of data consulted, the site has been the subject of a detailed geophysical survey, incorporating both magnetometry and resistivity (Appendix 1). While the magnetometry has proved moderately successful, the resistivity has not: the survey was conducted under poor conditions, and the results reflect this situation

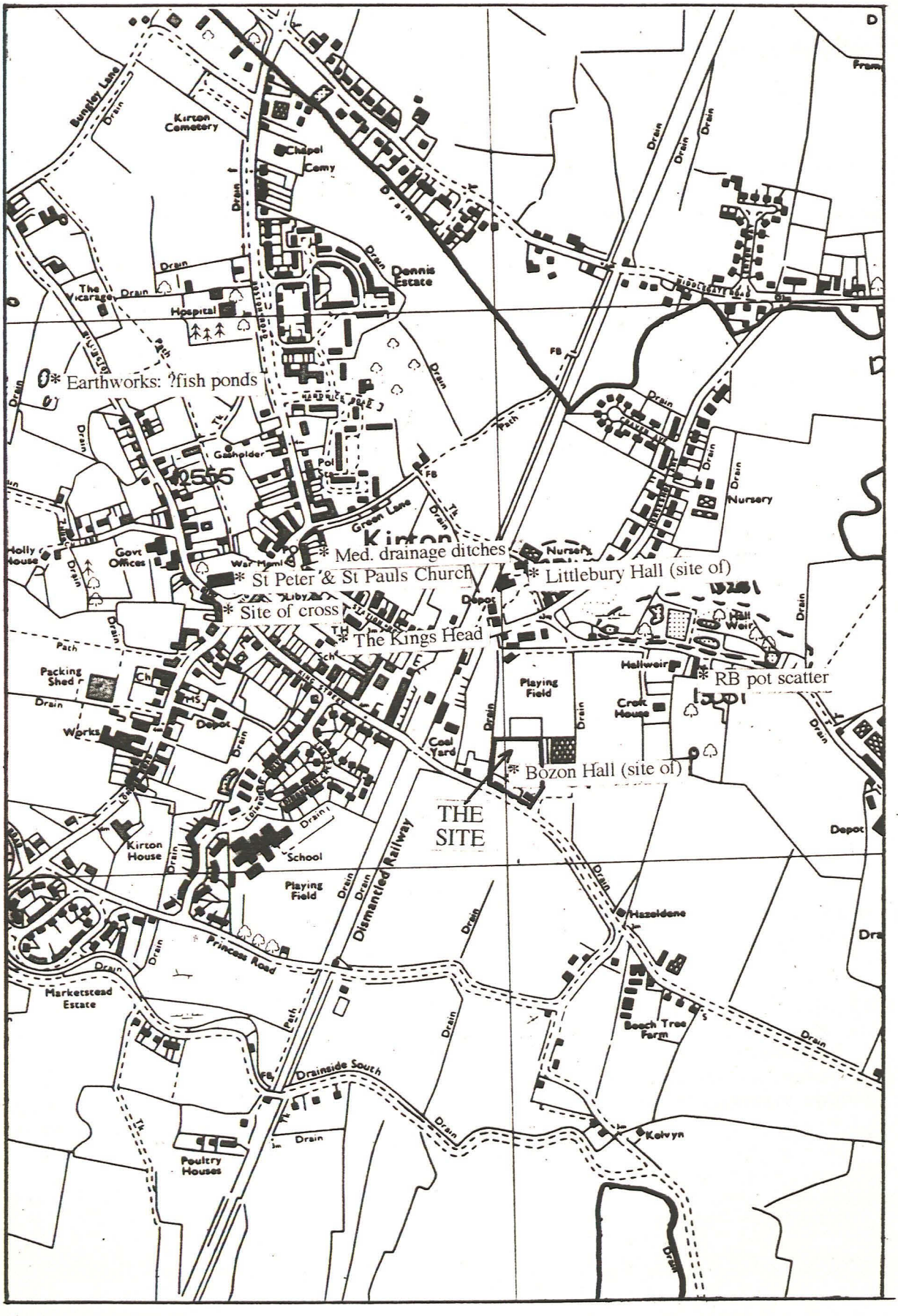
3.0 Location and description

Kirton lies in the administrative district of Boston Borough, approximately 3.5km south-west of Boston, 7.5km west of The Wash in the fens of South Lincolnshire. The modern settlement occupies an area of c. 2.0km^2 on land approximately 3.0m OD. Its main road link is the modern A16 trunk road, which connects Boston with Gosberton.

The geology which underlies Kirton is dominated by the Snargate Series: coarse silty gleyic brown alluvial soils (Robson 1990).

The proposed development lies on the east fringe of the village, immediately north of Wash road. It encompasses an area of approximately 0.8 hectares. Its east sides clear of obstruction, though the west side is occupied by large greenhouses and, to the south, a metal shed and water tank. The site is bisected north-south by a crude metalled surface, made largely from stone and brick rubble. The south side of the greenhouses carries a similar surface, which connects with the north-south alignment.

Fig. 1 1:10,000 site location, incorporating extracts from the Sites and Monuments Record and records held by the Boston Community Archaeologist



The site boundaries are defines as follows: Wash Road to south; linear drain to west; shallow ditch/tall hedges to north; a combination of fencing and hedges to east.

The ground surface is predominantly flat, though there is a slight rise towards the south-east corner of the plot.

East of the greenhouses, the soil surface is clear of vegetation, excluding isolated areas of nettles and dispersed (?bean) crop residue (now ploughed).

4.0 The Proposed Scheme

1: 50 ground plans were provided by the Client to assist with the production of this assessment report (Fig. 2). These indicate the sites of a new office building (south side of plot) and a steel-framed storage unit (north side). Both buildings will be served by a north-south access, extending from Wash Road.

5.0. Planning background

It is understood that planning permission has been granted in outline only, and that full consent will not be granted until the Client has commissioned a staged programme of archaeological investigation. This assessment/non-intrusive evaluation constitutes the first two elements of a tripartite scheme, and may be followed by a short programme of strategic trenching.

The planning reference number is B14/0603/95)

5.1 Archaeology in Boston and the Local Development Plan (LDP)

Boston Borough Council, in recognising the importance of buried archaeological remains, has included, as part of its LDP (Draft 1993), conditions relating to the protection of deposits, when associated with planning matters (Sections C 11-13): "One important factor to be taken into consideration in evaluating development proposals is the impact on archaeological deposits.....where a site contains archaeological deposits of particular importance it will normally be expected that those deposits should remain undisturbed by development." The document continues: "However where the development proposal is clearly of greater value to the community than the preservation of archaeological remains, or where the minor proposals will involve minimal damage, planning permission may be granted. When planning permission is granted it may be necessary to safeguard the archaeological interest."

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

This report forms is first two stages in a strategic process of elimination: based on the results of the assessment and evaluation, informed decisions may be made relating to the requirements (or otherwise) for further archaeological intervention. Where archaeology remains a requirement, beyond evaluation, further management strategies for safeguarding the archaeological resource may be developed, including; preservation *in situ* (usually the preferred, and least-expensive, option); excavation (preservation by record), or a recording brief.

5.2 Report Objectives

The report aims to identify and assess (without the use of intrusive techniques) archaeological deposits which may be threatened by development - in essence, to gather sufficient information to provide interested parties with a set of data from which a reasoned judgement may be made regarding future archaeological resource management. Desk-top assessment is the first stage in a common process of archaeological investigation and may be procedurally followed by further assessments, exploratory trial work or a watching brief. In the case of this study, non-intrusive evaluation has been integrated within the wider desk top report.

6.0 Methods

6.1 Desk-based assessment

The assessment is based partly on data extracted from the County Sites and Monuments Record (SMR) and records held by the Boston Community Archaeologist. Other data has been derived from records (principally cartographic) held at the Lincolnshire Archives Office, as well as publications and photographs kept at the Local Studies Library, Lincoln. Published and unpublished information held by Pre-Construct Archaeology (Lincoln) was also consulted.

Requests were made to the University of Cambridge Aerial Photographic Library for vertical and oblique cover searches.

The site was inspected on January 19th, 1996.

6.2 Geophysical surveys

In the project specification, it was proposed that two methods of geophysical survey be applied, in view of the potential range of archaeological features present: earth-cut remains which could respond well to magnetometry, and structural remains which could be more responsive to resistivity. The surveys were carried out by the Landscape Research Centre Ltd on February 8th and February 14th, and the full results can be examined in Appendix 1 (a summary of these findings in presented in Section 9.0 of this report).

7.0 General archaeological and historical background

The origins of this former market town may be sought in the Saxon period, though traces of much earlier activity have been recorded in surrounding areas. The earliest known find is that of an isolated Bronze Age axe head which was recovered by a schoolboy from a ploughed field between Kirton Holme and Kirton End in the 1950's. Ordnance Survey records (1st edition) which indicate the site of a "Tumulus" (ie Bronze Age or even Neolithic burial site) have not been authenticated archaeologically, though there is no reason why, as in other parts of the fens, discreet islands could not have been occupied or utilised by later prehistoric communities. It is known, for example, that salt working was a major industrial concern during the Iron Age and, in Lincolnshire, the origins of the industry can be traced as far back as the later Bronze Age.

In the Roman period, a time when sea levels may have receded, large areas of the fens were occupied by human communities. This occupation is expressed in the form of cropmarks seen from the air and find scatters seen on the ground, often over linear islands or roddons (extinct river channels). Several sites have been identified as surface scatters to the west of Kirton, and there is one scatter c. 300m north-east of the proposed development site. Unfortunately, there has not yet been a thorough archaeological investigation of any of these settlements and the basis on which they functioned has not been established. It has been suggested that the exploitation of coastal salt was a major stimulus behind settlement expansion during the Roman period.

Although recorded in the Domesday Book (and therefore of at least late Saxon origin), there is evidence that *Chirchetune* (the name of the settlement in 1086) had its origins firmly rooted in the Saxon period. On the one hand, there are the records left by the C18th historian, William Stukely, who suggested that the soke of Kirton (or Drayton) was the original estate and seat of the first Saxon kings and Earls of Mercia, and the origin of the potent kingdom of that name (Green c.1910). There is also the place-name evidence (Cherchetune = Church Town), and it has been suggested that there may have existed a church at Kirton in the pre-Viking era (Stocker 1993, 114).

Domesday book tells us that the lands making up the parish were in the hands of Count Alan Rufus and Guy de Craon. The former had received generous tracts from the king (William I) in return for services at the Battle of Hastings. The survey records that in Kirton Hundred (a jurisdiction of Drayton), Count Alan had 30 Freemen and 16 smallholders who had 10 ploughs. There was a church, a meadow and 2 salt houses (Morris 1986).

Although resembling a village today, in the medieval period, Kirton was a successful market town - the third largest settlement in the county. The greatest give-away to its former prosperity is its church: dedicated to St Peter and St Paul. This large and impressive structure has been described as 'a town church in a village (Pevsner and Harris, 1988, 419). It was largely restored in the C19th, though traces of Norman architecture are preserved within the tower.

The prosperity of Kirton, to a large extent, was based on its market, which was held every Saturday near Marketstead House, approximately one mile south of the village (White, 1842). A wide base of produce was derived from the diverse flora and fauna offered by the fen environment.

The number of large halls which were built within and around the modern settlement serve as a reminder of the former importance of Kirton. Orme Hall (otherwise known as Horam Hall) lay c. 1.7km north-west of the proposed development site, and was the seat of the Knightly family of Lockton. A description of the building was provided by the historian Marrat, prior to its demolition in 1818.

Littlebury Hall, which was the seat of the Littlebury's between the C14th and C16th, lay only 300m north of the proposed development site. It was partially destroyed by fire in 1867 and was subsequently rebuilt as a farm house.

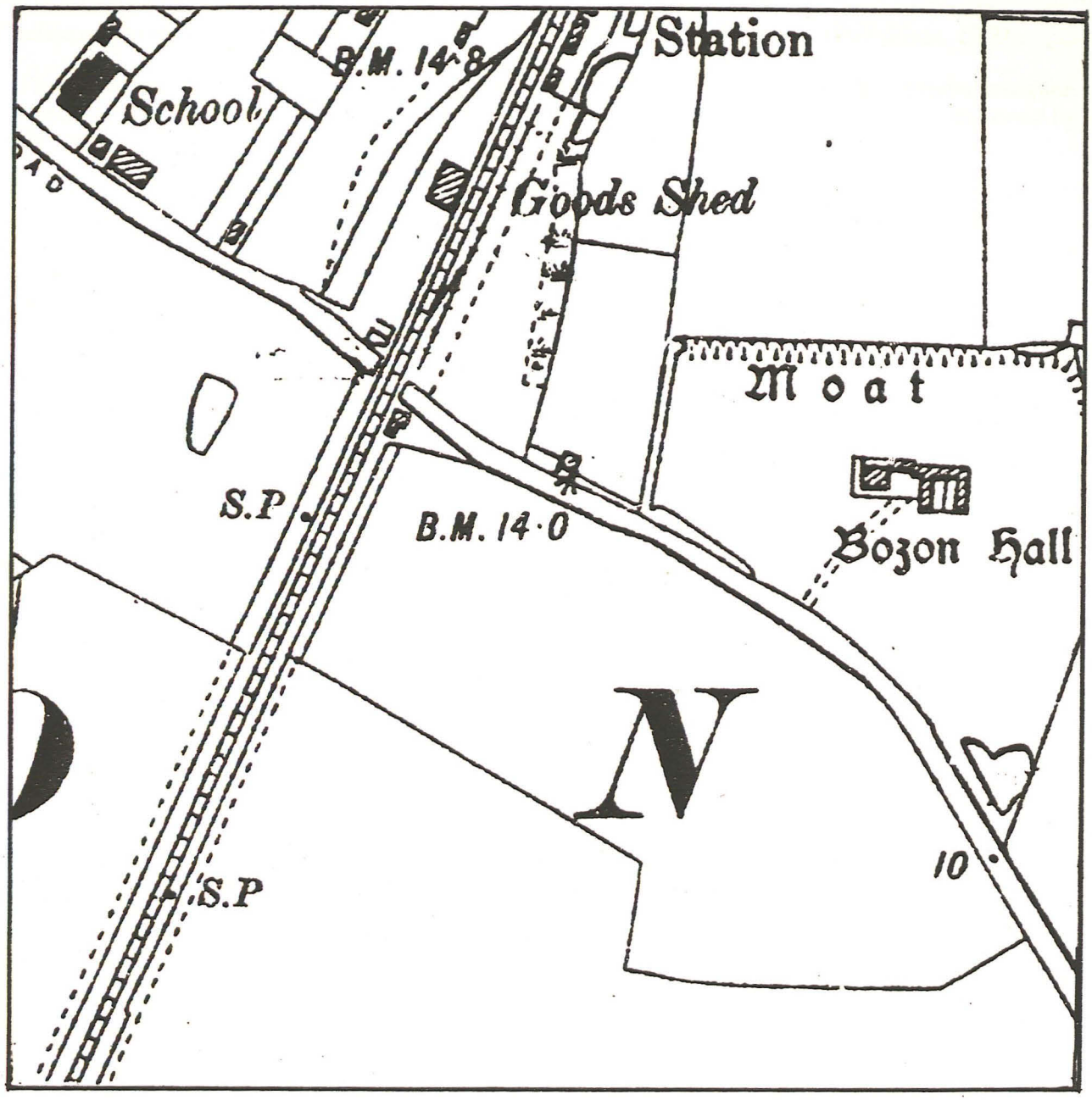
Blossom Hall lies approximately 2.0km south-east of the Wash Road site at Skeldyke. It is a grand brick house with Artisan Mannerist features, dated to 1617 (Pevsner and Harris 1988, 421).

A further manorial complex, Bozon Hall, lay partly within the proposed development site. This site is described in greater detail below (Section 8.0).

At the fore of Kirton's (best-documented) post-medieval history is the reaction of the masses to the enclosure of the land in the late C18th, and also the draining of the fens. To many, these changes threatened a traditional life of fishing and fowling in an environment which was unique to the fen basin. Holland Fen was enclosed in 1769, but the transition was not smooth. On June 6th, 1768, for example, a large group of opponents assembled at Hubbard's Bridge, and then proceeded to Boston in a riotous manner to demand papers relevant to the enclosure of the Fen. These papers were seized, torn into pieces and thrown into the streets. In acts of protest, animals were slaughtered, barns were burnt down and murder was even committed: those supporting enclosure were purged by farmers, and land holders were threatened with death for supporting the changes. Enclosure of the fens rendered the famous Goose Court (which had been held at the Sessions House, established by the Earl of Exeter) profitless, and it was discontinued c. 1802 (White, 1842).

8.0 Historical background to the proposed development site

The proposed development site lies within the moated enclosure associated with Bozon Hall. The site of the hall is clearly indicated on the Ordnance Survey 2nd Edition (surveyed 1887; revised 1903).



Extract, Ordnance Survey, 2nd Edition

The site indicated on the above map section can be easily cross-referenced to the modern Ordnance Survey 1:10,000 (Fig. 1), and it is clear that part of the hall complex extended into the east side of the proposed development site. However, the map referred to must relate to a building which was demolished in 1977, and not the original Bozon Hall, which was a C14th foundation.

The site demolished in 1977 is depicted on the front cover of this report (Lincoln Local Studies archive reference number C9030 LCL5278). As can be seen, this was a fine post-medieval building, or range of buildings, which post-dated the medieval manor, which is a principal concerns of this study.

Relatively little information of direct relevance to Bozon Hall has identified during the production of this report. The enclosure map for Kirton was inspected (Lincs. Archives Office ref. no.: Wigtoft

PAR 17/1) but was not informative; and Bozon Hall does not feature in Leach and Pacey's Lost Lincolnshire Country Houses (1990 - 1993), and it has not been possible to trace a primary reference to material published in Lincolnshire Life Magazine in February 1969 (Hunt, 1969).

The above account states that the present Bozon Hall stands on the site of an older moated mansion which, in 1377, was the property of Thomas de Branstaun. The medieval hall is also mentioned by Canon David Pink (Pink, 1990), though no primary reference is cited.

When the site was inspected on January 19th, 1996, the soil surface was scanned for surface remains: there is a good deal of later post-medieval pottery on the site, though one, fresh-looking, sherd of black shell-tempered pottery was recovered. This was examined by J Young (City of Lincoln Archaeology Unit) who placed the sherd in the C10th. Clearly, a single artefact is insufficient evidence from which to draw any firm conclusions, though it would suggest the possibility that the site was occupied in some form in the late Saxon period.

As part of the assessment, requests were made at the Sites and Monuments Record, Heritage Lincolnshire and the University of Cambridge to inspect all aerial photographs of relevance to the proposed development. Only the latter body was able to provide information, and this was of limited value: two vertical photographs, detailed as follows:-

Date	**Film ref.**	**Frame No.**	**Scale**
6/4/1974	RC8-AN	173, 174	1:15,000
30/5/84	RC8-GM	125, 126	1:10,000.

The small scale of these frames renders them unhelpful to the present study, and there are no oblique views taken at lower altitudes.

9.0 Geophysical survey (summary)

The Landscape Research Centre Ltd. were commissioned to undertake a magnetometer and resistivity survey on a c. 0.5 hectare area to the east of greenhouses which occupy the west side of the site. The purpose of these surveys was to identify the widest possible range of buried features which could be expected within the defined development zone (earth-cut features such as ditches and pits, as well as structural features such as walls and surfaces).

The full results of the survey can be examined in Appendix 1, though a summary may be presented thus:

a) Magnetometry

Eight magnetic anomalies (A - H) were recorded during the survey. Of these, most (A - E) can be explained in terms of modern ferrous litter, metal fencing and the proximity of greenhouses on the west side of the site. However, three anomalies on the south and south-east sides of the survey site are more problematic and may be of archaeological significance.

Anomaly F: a strong signal suggested that the anomaly lay just below the modern ground surface or was caused by a burning event

Anomaly G: a localised positive anomaly, possibly a pit

Anomaly H: a sub-rectangular anomaly extending c. 35m east-west, turning south for c. 14m, then east and slightly north again for c. 22m. This anomaly lies directly west of the area of the moated manor house which was demolished in the 1970's and which may have been a successor to the original medieval Bozon Hall.

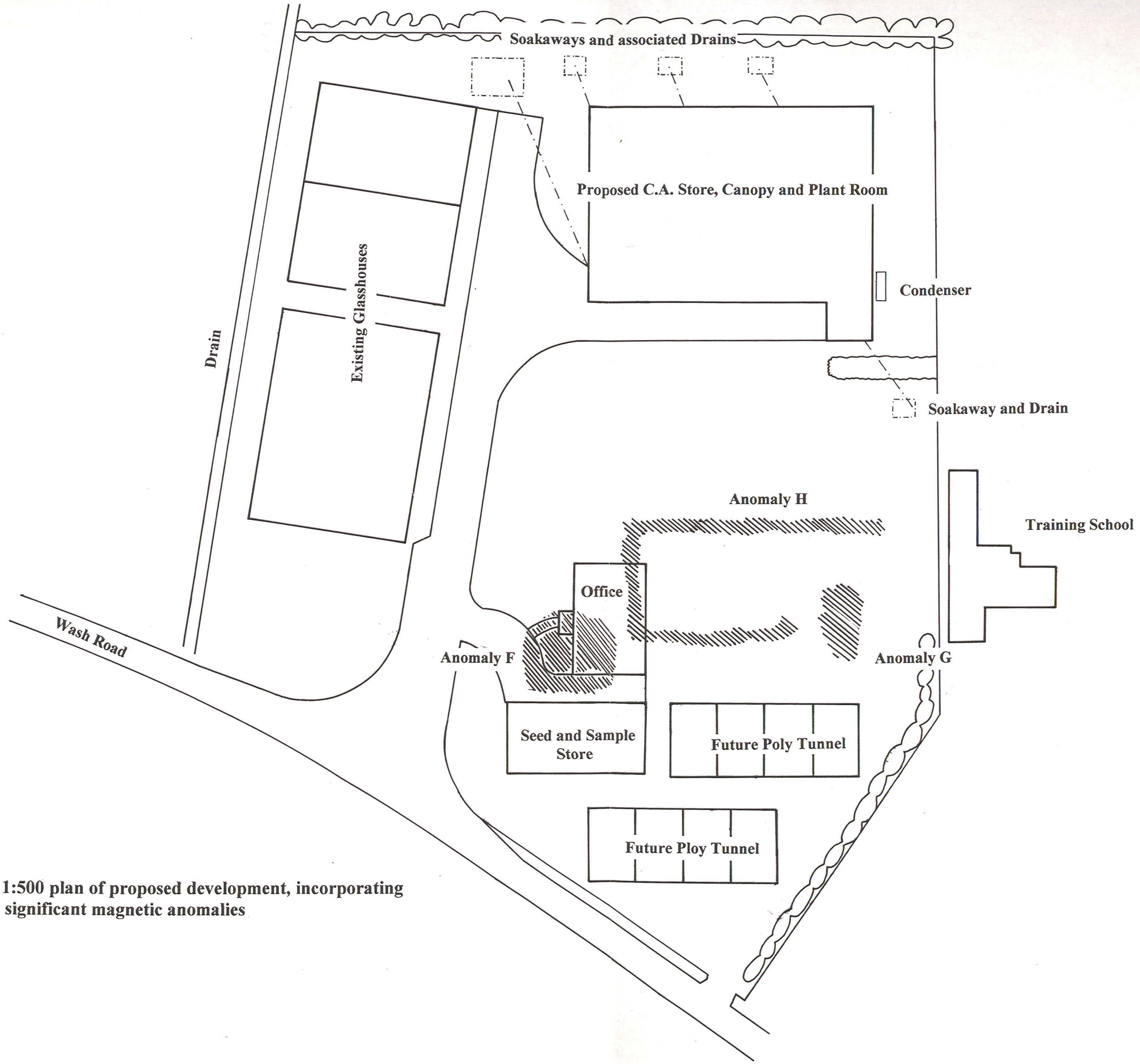


Fig.2 1:500 plan of proposed development, incorporating significant magnetic anomalies

b) Resistivity

The resistivity survey was undertaken in less than favourable conditions: frozen, snow-covered ground on February 8th and saturated ground on February 14th. The constraining factors were made apparent to the client who (understandably) was keen that the survey should take place at the earliest possible time. Against their better judgement, The Landscape Research Centre carried out the survey but, regrettably, the results were much as expected: ambiguous (Appendix 1)

10.0 Conclusions

It is concluded that areas within the site of proposed development are of potentially high archaeological significance. Indirect evidence for this derives from historical and cartographic reference material (relating to the proximity of Bozon Hall, the post-medieval successor of which lay directly east of the site), and direct evidence derives from the magnetometer survey.

Fig. 2 illustrates the proposed development scheme, and also the most significant magnetic anomalies revealed by the geophysical survey. Based on the magnetometry data alone, there is no perceived impact to archaeological resources from development associated with the storage unit which will occupy the north side of the site, or the access which extends eastwards off the main north-south access from Wash Road. However, it will be seen that anomaly F lies in the south-west corner of the proposed office and its associated access. Also, anomaly H appears to extend into the east side of the proposed office block.

Experience in other parts of the fens around Boston has shown that most archaeological features underlay c. 25cm - 30cm of topsoil (usually equated with the depth of modern plough penetration). It may be anticipated therefore that, if the magnetic anomalies revealed by the geophysical survey translate to positive archaeological features, then these will be affected by aspects of the development if this is to involve the excavation of trenches which exceed 25cm in depth. With this in mind, the Client may wish to consider some design modification/relocation.

The status of the magnetic anomalies revealed by the geophysics cannot be determined on present evidence, which would require a limited programme of strategic archaeological trenching. The requirement or non-requirement of this is a matter for discussion between the Client and the curatorial archaeologist.

11.0 Acknowledgements

Pre-Construct Archaeology (Lincoln) would like to thank Mr D O'Connor (David O'Connor & Associates) for commissioning this report. Thanks are expressed to Jim Bonner (Community Archaeologist for Boston Borough Council) and the staff at the City and County Museum, Lincoln, for allowing access to the Sites and Monuments Record. Thanks also to Ruby Desmond of Cambridge University Dept. of Aerial Photography, and also to The Landscape Research Centre Ltd. for undertaking the geophysics. Final thanks are expressed to the staff at the Local Studies Library, Lincoln, for their determined assistance during compilation of the historical background to this report.

12.0 References

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Fluxgate Gradiometer Survey

for

Pre-Construct Archaeology (Lincoln)

at

Wash Lane, Kirton, Lincolnshire

Survey by the

Landscape Research Centre Ltd
The Old Abbey
Yedingham
North Yorkshire
YO17 8SW

carried out on the

8th-14th February, 1996

Phone & Fax 01723 859759

Summary

A fluxgate gradiometer and resistivity survey were carried out by the Landscape Research Centre Ltd. for Pre-Construct Archaeology (Lincoln), as part of an archaeological assessment of a proposed development at Wash Lane, Kirton, Lincolnshire. The proposed development area was not receptive to resistivity survey due to factors discussed below, although the gradiometer survey did produce a number of magnetic anomalies which are discussed in detail below.

Report

The subject of this report is the interpretation and discussion of the results of a fluxgate gradiometer and resistivity survey carried out on behalf of Pre-Construct Archaeology (Lincoln). The site in question is a proposed development at Wash Lane, Kirton, Lincolnshire. The gradiometer survey was conducted using a *Geoscan Research* fluxgate gradiometer (model FM36). The zigzag traverse method of survey was used. The survey was conducted by taking readings every 25cm along the north/south axis and every metre along the east/west axis (thus 3600 readings for every 30m grid). The resistivity survey was conducted using a *Geoscan Research* resistivity meter (model RM15), with readings being taken every metre in both the east/west and the north/south axes (thus 900 readings for every 30m square grid). The data has been processed and presented using the programs GeoImage (a program dealing with the processing of geophysical data) and GSys (a program which can display, process and present digitised plans and images).

The survey was carried out on the 8th and the 14th February, 1996. The personnel involved were James Lyall and Heather Clemence. The proposed site was 0.75 hectares in area and consisted of one field, bounded on the north and east by fences and trees, in the west by greenhouses and a narrow track and in the south by Wash Lane. The survey area consisted of a ploughed field, the soil having a high clay content. The field had a number of deeper furrows, two of which were picked up by the surveys. An area of 0.54 hectares was surveyed using each method. The survey area for each method was a block of six 30 metre grids, using the eastern fence line as a base line.

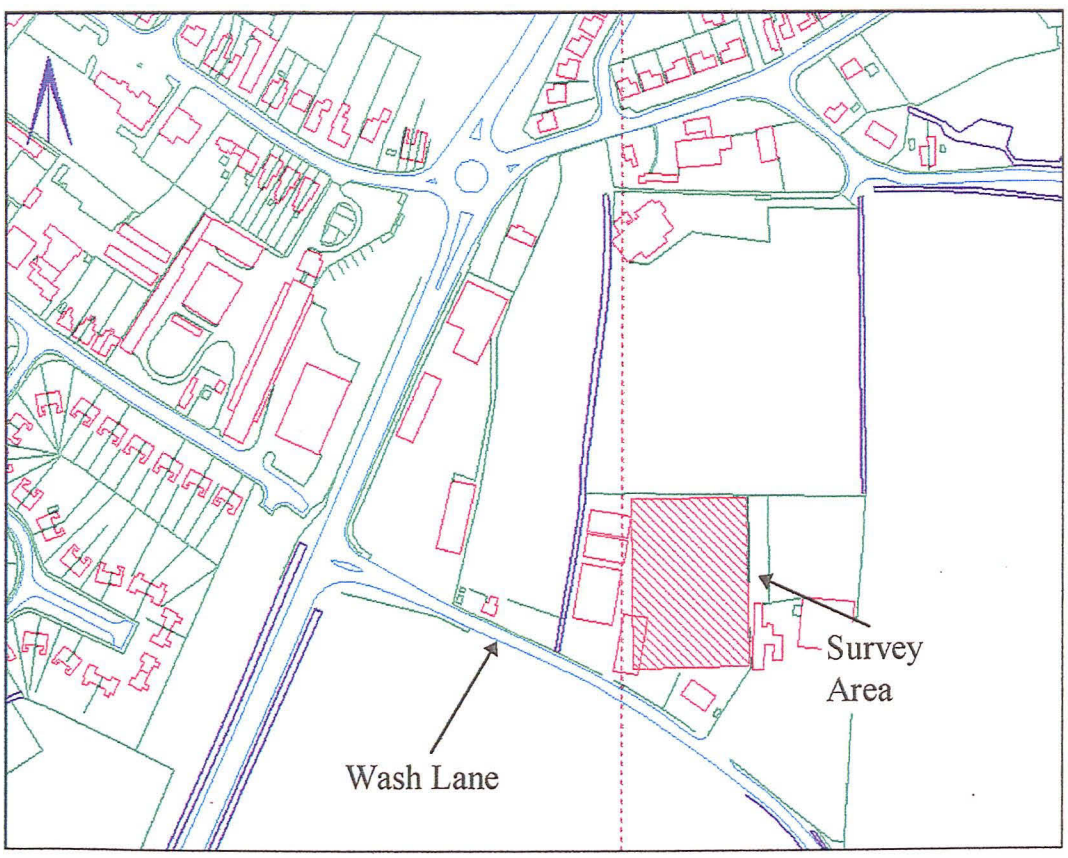

Figure One

This plan gives the location of the survey area, which measures 60m by 90m. Four plastic pegs have been left in the area, at the four corners of the shaded rectangle. The plan also shows the position of Wash Lane.

The Fluxgate Gradiometer Data

The fluxgate gradiometer data is displayed both as an image (Figure Two) and as a digitised interpretation (Figure Three). Figure Two is presented as a greyscale image. The anomalies are the areas of lighter and darker grey, which indicate areas of higher and lower magnetic susceptibility. The sampling strategy allowed for a 75% cover of the total area and thus it was felt that a solid block of data would allow for a more detailed interpretation of anomalies to be made than if gaps were left in the surveyed area. As half a hectare was the agreed sample area, the small triangle of land nearest to Wash Lane in the south was not surveyed.. The results from the survey are discussed in detail below. The survey was carried out when the underlying clay soil was wet, and this, combined with the condition of the area as a ploughed field with some deep furrows, made area survey of this type difficult. This being said, the experience of the surveying team meant that allowance could be made for these conditions, and the results from the gradiometer survey can be treated with a level of confidence far higher than that for the resistivity results (See **Resistivity Data** for details).

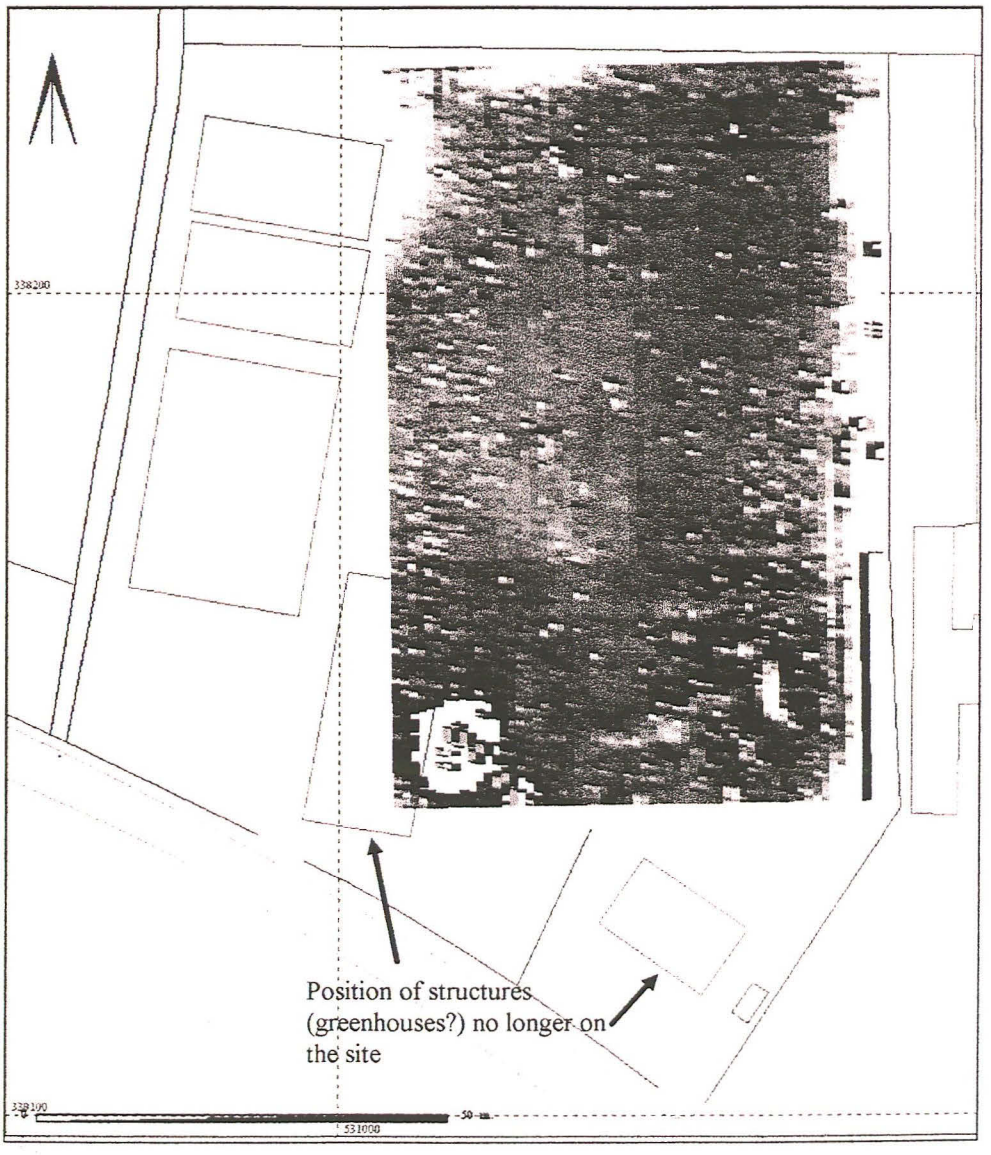

Figure Two
This plan shows the results of the gradiometer survey displayed as a greyscale image.

Note the level of high magnetic "spikes" throughout the survey area. A number of modern iron objects were removed from the survey area by the Landscape Research Centre Ltd team, but apparently a high number of ferrous objects remain buried. Considering the objects noticed by the survey team, these are likely to be modern, but this cannot be ascertained by gradiometer survey data alone. The Ordnance Survey map shows the position of two structures no longer on the site. Figure Two shows the position of these structures in relation to the survey area.

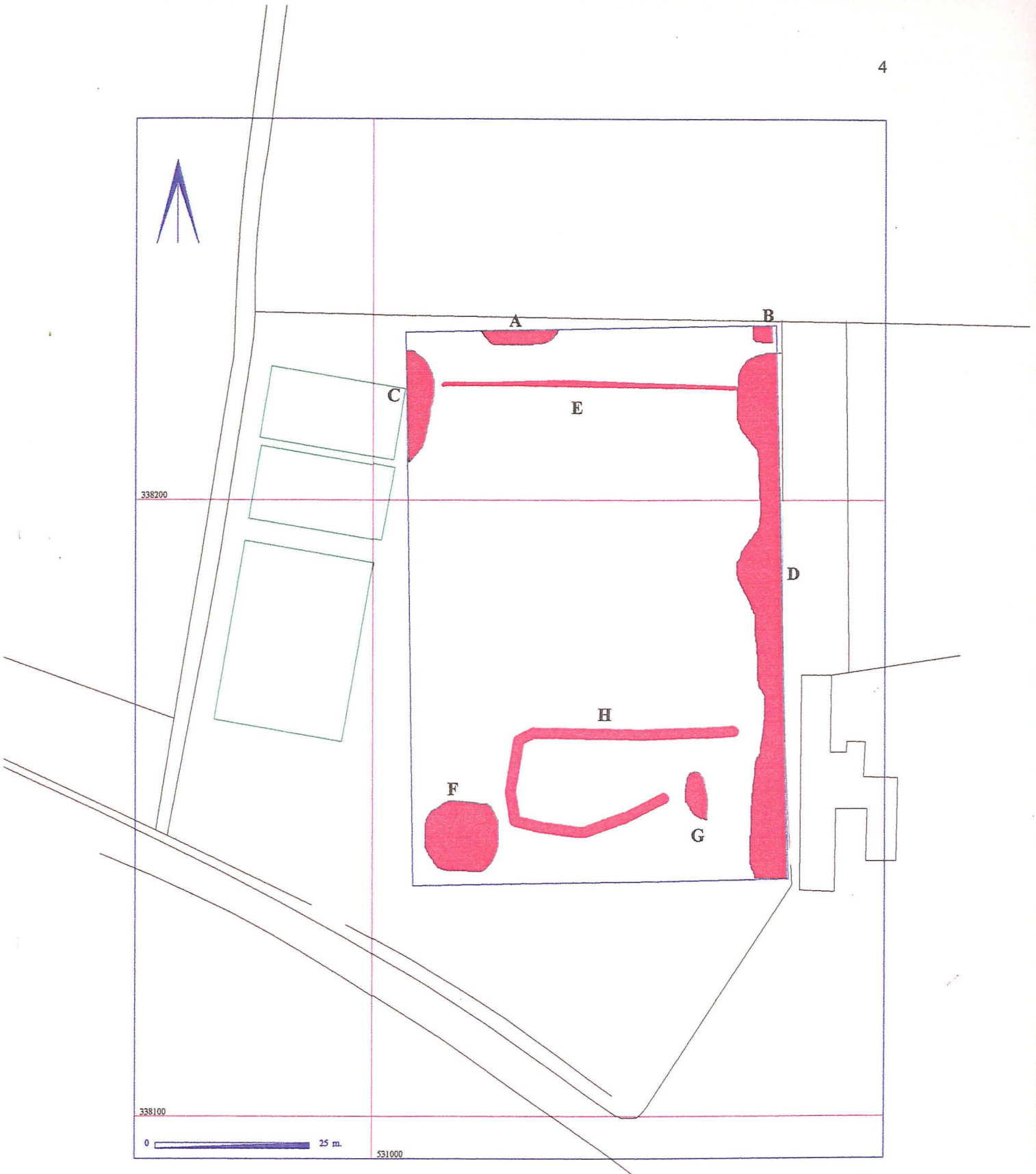

Figure Three

This plan shows the positions of the digitised interpretation of the magnetic anomalies with the letters and used in the text below. Note that these are the digitised outlines of magnetic signals and need not necessarily equate with the true size of the feature, which might be either larger or smaller than the extent of the magnetic signal.

Modern Anomalies

Five definitely modern anomalies occur on the gradiometer image (Figure Two), and were digitised (Figure Three), as anomalies A, B, C, D and E.

Anomaly A is caused by the proximity of the fence line to the north. Anomaly B is caused by modern rubbish (tin cans) in the north-east corner of the field. Anomaly C is caused by the proximity of the greenhouse and the narrow track running up the side of the greenhouses. Anomaly D is caused by the

proximity of the metal fence along the eastern boundary of the field. Anomaly E is caused by the presence of a furrow running east-west in the northern part of the survey area. Note that Anomaly E is a dark line on the image (Figure 2), indicating a negative anomaly, whereas all the anomalies caused by metal are white, indicating a strong positive signal.
Anomaly F is more problematic, in that there is no visible cause for this anomaly. The strength of the signal would indicate that this anomaly is just below the surface, or conversely is caused by some burning event, (as for instance with a kiln), but the anomaly does not give the high-low signal which is characteristic for this type of feature, thus the interpretation of this anomaly remains a question mark.

Potential Archaeological Anomalies
Anomaly G is a localised positive anomaly. It may be a pit, but its position in relation to Anomaly H may have some significance.
Anomaly H appears to be a rectilinear anomaly, running east-west for 35m before turning south for 14m and then east and slightly north again for 22m. It is possible that this anomaly is in fact 3 different features, but the image data suggests that they are related. While this anomaly could be part of a drainage system, the orientation makes this unlikely. It is pertinent to point out that the anomaly occurs immediately to the west of the area of the moated manor house dismantled in the 1970's.

The Resistivity Data
Due to pressure from the client, the resistivity survey was carried out in far from ideal conditions; namely, the ground was frozen and covered in the remains of snow on the 8th of February and was totally wet on the 14th of February. Resistivity surveying measures the difference in electrical resistance in the soil, and as water is a good conductor of electricity, the resistance in wet soils is conversely much lower than would otherwise have been the case. Note this difference in the greyscale image (Figure 4), where the southernmost 2 grids were surveyed on the 14th February, when the ground was wet from rain and snow the previous day. In addition, the four grids surveyed on the 8th February were also affected by water as the snow and frost thawed out during the duration of the survey, so that like cannot be compared to like across the four grids. All of these factors render the results of the resistivity survey somewhat invalid, and any conclusions drawn from the resistivity survey data should be treated with extreme caution. In effect, all that can be pointed out are areas of higher or lower resistance, and even these cannot be differentiated into potential archaeological features, as they may well have been caused by different levels of wetness or different stages of thawing underground.

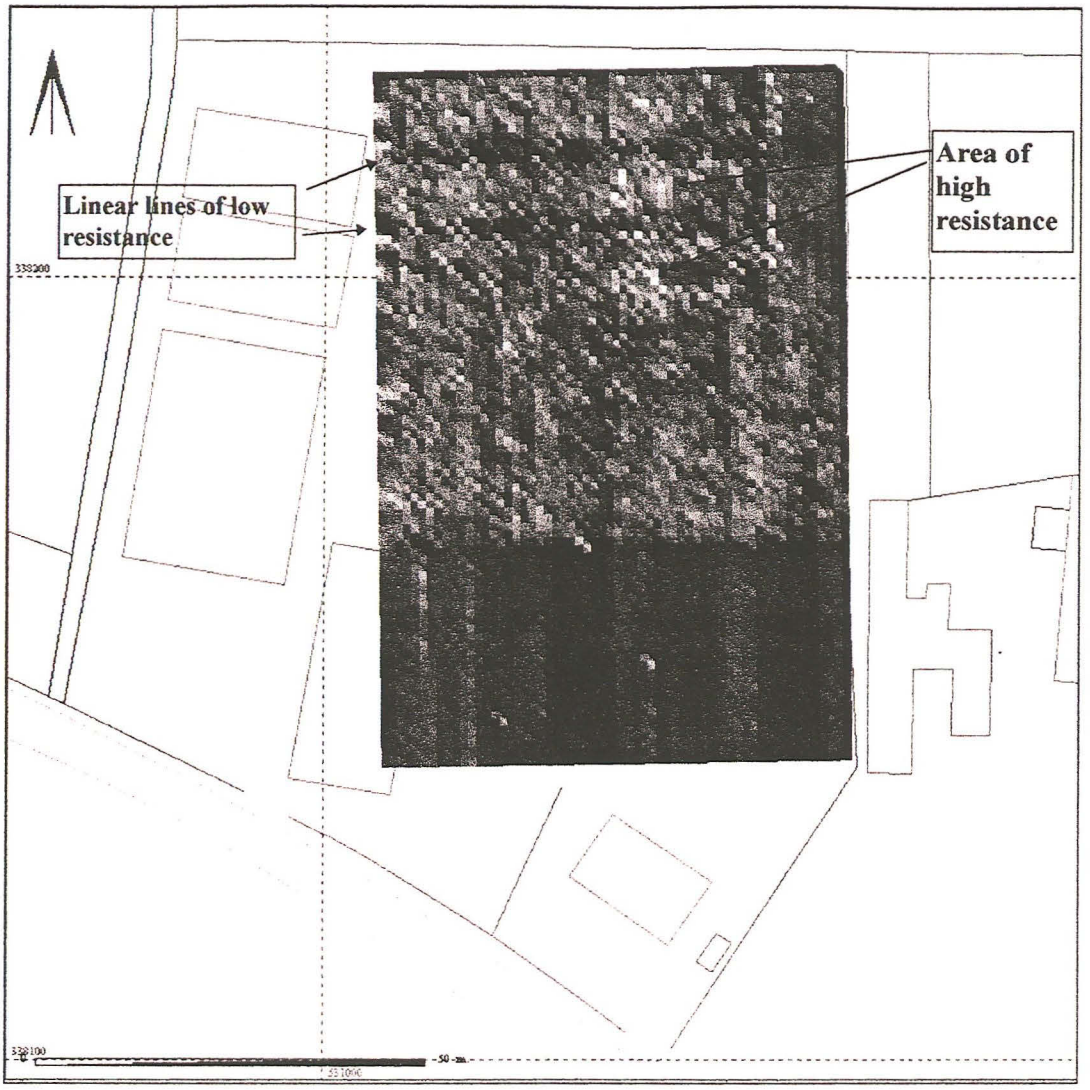

Figure Four
This plan shows the results of the resistivity survey displayed as a greyscale image.

In effect, only two anomalies (See Figure Four) can be identified with even a low level of confidence from the resistance data. The first are two low resistance linear anomalies running east-west across the northern part of the survey. These can be equated to furrow lines, the northernmost of which was particularly deep. The second is an area of high resistance in the north-west of the survey area. No interpretation can be offered for this anomaly, due to the factors described above.

Conclusion

In conclusion, the site at Kirton proved to be of a medium to low magnetic susceptibility, with the ploughed field making this form of survey difficult in places. A number of magnetic anomalies were found, most of which are modern in origin. However, two anomalies (H and G) may be archaeological in origin. The weather conditions made the resistivity survey data almost impossible to interpret, and only one area of high resistance could be identified. Any conclusions drawn from the resistance data should be treated with extreme caution.

The plans should allow any archaeological investigation (if such is deemed to be necessary) of the area to concentrate in the specific areas believed to be significant. The United Kingdom latitudes are such that there can be a distortion of up to half a metre in position between the magnetic anomalies shown and the position of the actual features themselves.

Report by James Lyall

Landscape Research Centre Ltd.

APPENDIX ONE

GRID NO	MINIMUM	MAXIMUM	RANGE	AVERAGE	STD. DEVIATION
1	-157	356	513	-2	11
2	-45	112	157	0	16
3	-371	396	767	4	12
4	-24	39	63	-1	8
5	-68	336	404	1	12
6	-99	189	288	1	19

TABLE ONE

The table gives the raw data and statistics in NanoTesla for each of the 6 grids of the gradiometer survey. Values shown are the minimum value, maximum value, range, average value and the standard deviation of each grid.

Fluxgate Gradiometer Survey

for

Pre-Construct Archaeology (Lincoln)

at

Wash Lane, Kirton, Lincolnshire

Survey by the

Landscape Research Centre Ltd
The Old Abbey
Yedingham
North Yorkshire
YO17 8SW

carried out on the

8th-14th February, 1996

Phone & Fax 01723 859759

Summary

A fluxgate gradiometer and resistivity survey were carried out by the Landscape Research Centre Ltd. for Pre-Construct Archaeology (Lincoln), as part of an archaeological assessment of a proposed development at Wash Lane, Kirton, Lincolnshire. The proposed development area was not receptive to resistivity survey due to factors discussed below, although the gradiometer survey did produce a number of magnetic anomalies which are discussed in detail below.

Report

The subject of this report is the interpretation and discussion of the results of a fluxgate gradiometer and resistivity survey carried out on behalf of Pre-Construct Archaeology (Lincoln). The site in question is a proposed development at Wash Lane, Kirton, Lincolnshire. The gradiometer survey was conducted using a *Geoscan Research* fluxgate gradiometer (model FM36). The zigzag traverse method of survey was used. The survey was conducted by taking readings every 25cm along the north/south axis and every metre along the east/west axis (thus 3600 readings for every 30m grid). The resistivity survey was conducted using a *Geoscan Research* resistivity meter (model RM15), with readings being taken every metre in both the east/west and the north/south axes (thus 900 readings for every 30m square grid). The data has been processed and presented using the programs GeoImage (a program dealing with the processing of geophysical data) and GSys (a program which can display, process and present digitised plans and images).

The survey was carried out on the 8th and the 14th February, 1996. The personnel involved were James Lyall and Heather Clemence. The proposed site was 0.75 hectares in area and consisted of one field, bounded on the north and east by fences and trees, in the west by greenhouses and a narrow track and in the south by Wash Lane. The survey area consisted of a ploughed field, the soil having a high clay content. The field had a number of deeper furrows, two of which were picked up by the surveys. An area of 0.54 hectares was surveyed using each method. The survey area for each method was a block of six 30 metre grids, using the eastern fence line as a base line.

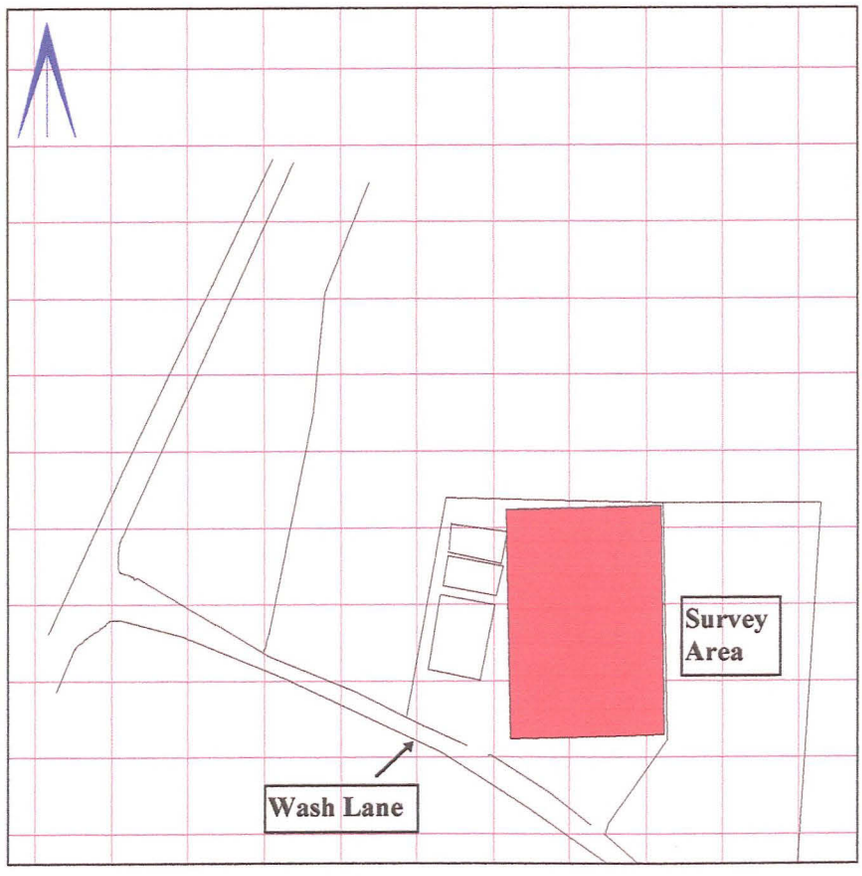

Figure One

This plan gives the location of the survey area, which measures 60m by 90m. Four plastic pegs have been left in the area, at the four corners of the shaded rectangle. The plan also shows the position of Wash Lane.

The Fluxgate Gradiometer Data

The fluxgate gradiometer data is displayed both as an image (Figure Two) and as a digitised interpretation (Figure Three). Figure Two is presented as a greyscale image. The anomalies are the areas of lighter and darker grey, which indicate areas of higher and lower magnetic susceptibility. The sampling strategy allowed for a 75% cover of the total area and thus it was felt that a solid block of data would allow for a more detailed interpretation of anomalies to be made than if gaps were left in the surveyed area. As half a hectare was the agreed sample area, the small triangle of land nearest to Wash Lane in the south was not surveyed.. The results from the survey are discussed in detail below. The survey was carried out when the underlying clay soil was wet, and this, combined with the condition of the area as a ploughed field with some deep furrows, made area survey of this type difficult. This being said, the experience of the surveying team meant that allowance could be made for these conditions, and the results from the gradiometer survey can be treated with a level of confidence far higher than that for the resistivity results (See **Resistivity Data** for details).

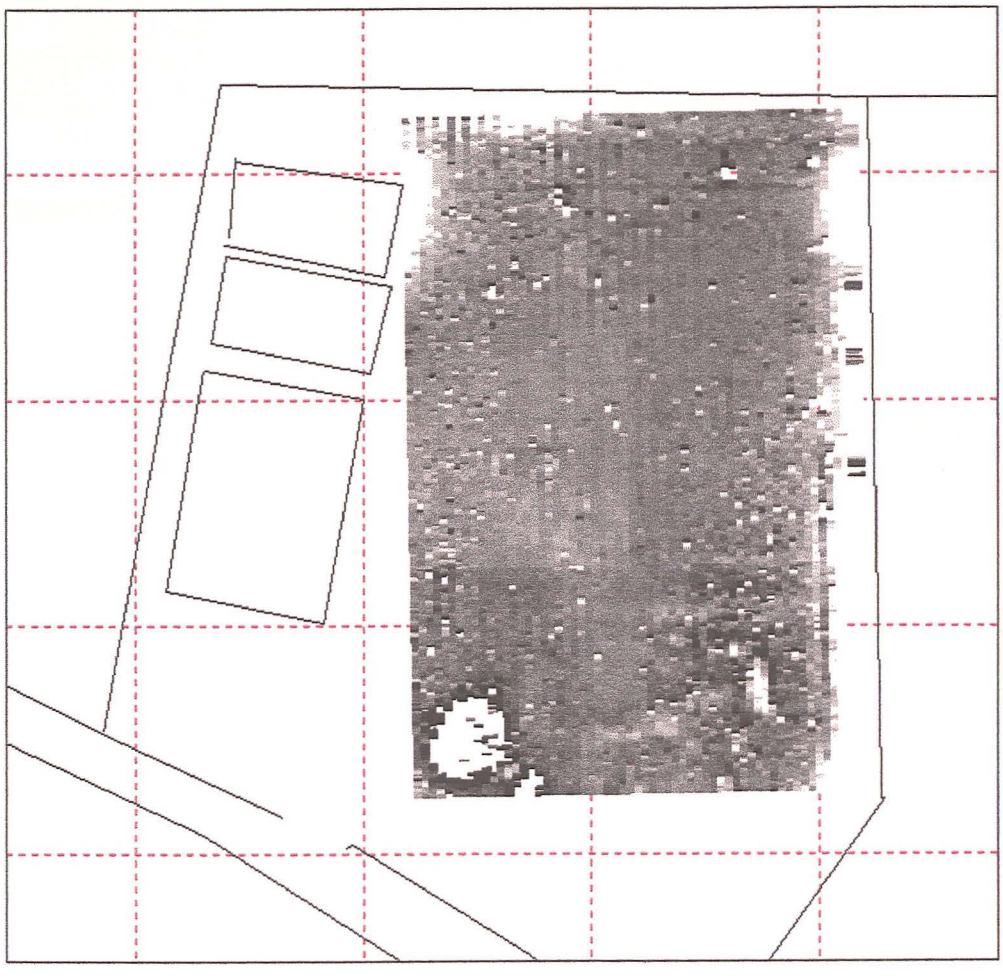

Figure Two
This plan shows the results of the gradiometer survey displayed as a greyscale image.

Note the level of high magnetic "spikes" throughout the survey area. A number of modern iron objects were removed from the survey area by the Landscape Research Centre Ltd team, but apparently a high number of ferrous objects remain buried. Considering the objects noticed by the survey team, these are likely to be modern, but this cannot be ascertained by gradiometer survey data alone. The Ordnance Survey map shows the position of two structures no longer on the site. Figure Two shows the position of these structures in relation to the survey area.

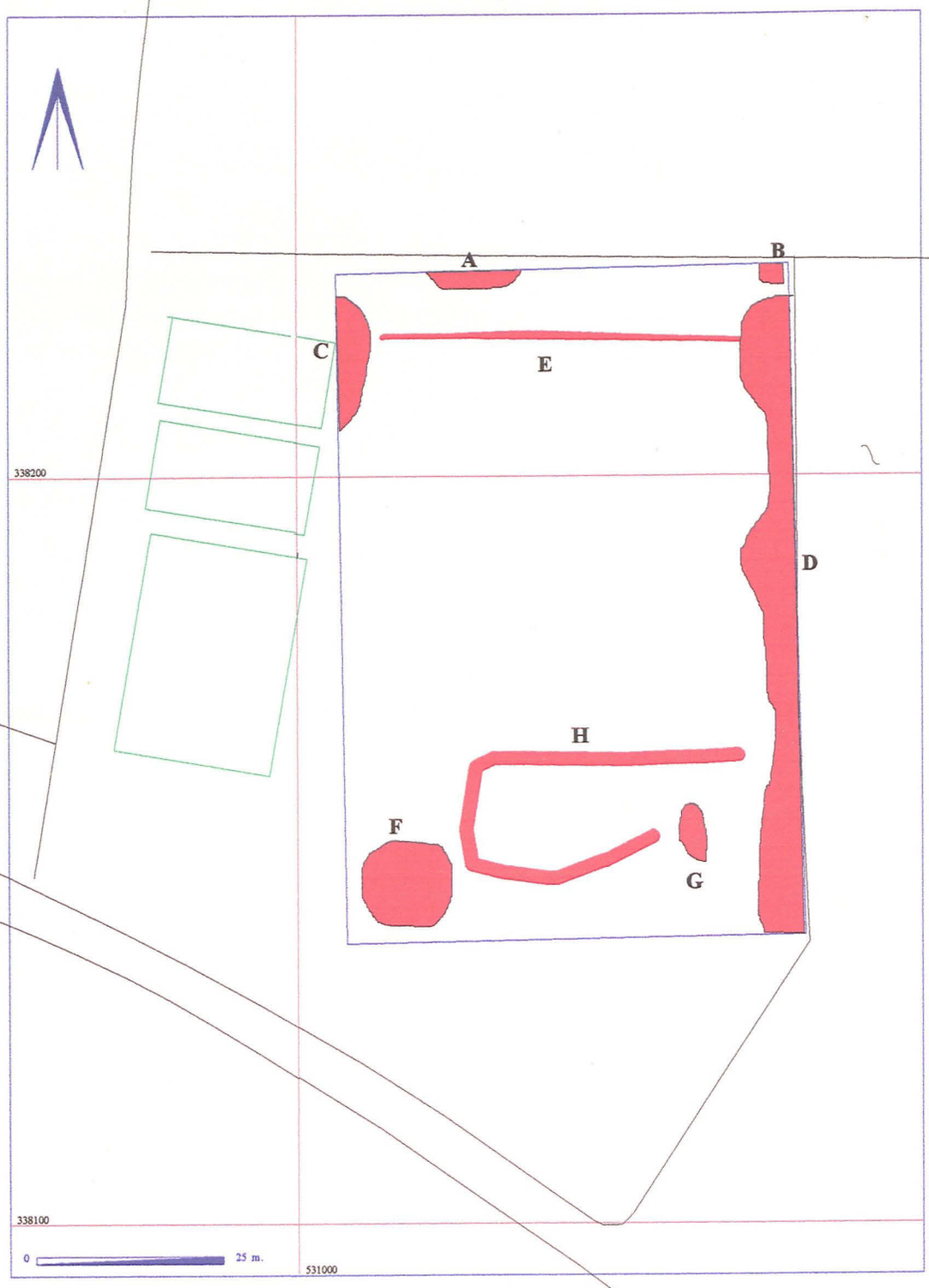

Figure Three

This plan shows the positions of the digitised interpretation of the magnetic anomalies with the letters and used in the text below. Note that these are the digitised outlines of magnetic signals and need not necessarily equate with the true size of the feature, which might be either larger or smaller than the extent of the magnetic signal.

Modern Anomalies

Five definitely modern anomalies occur on the gradiometer image (Figure Two), and were digitised (Figure Three), as anomalies A, B, C, D and E.

Anomaly A is caused by the proximity of the fence line to the north. Anomaly B is caused by modern rubbish (tin cans) in the north-east corner of the field. Anomaly C is caused by the proximity of the greenhouse and the narrow track running up the side of the greenhouses. Anomaly D is caused by the proximity of the metal fence along the eastern boundary of the field. Anomaly E is caused by the

presence of a furrow running east-west in the northern part of the survey area. Note that Anomaly E is a dark line on the image (Figure 2), indicating a negative anomaly, whereas all the anomalies caused by metal are white, indicating a strong positive signal.
Anomaly F is more problematic, in that there is no visible cause for this anomaly. The strength of the signal would indicate that this anomaly is just below the surface, or conversely is caused by some burning event, (as for instance with a kiln), but the anomaly does not give the high-low signal which is characteristic for this type of feature, thus the interpretation of this anomaly remains a question mark.

Potential Archaeological Anomalies
Anomaly G is a localised positive anomaly. It may be a pit, but its position in relation to Anomaly H may have some significance.
Anomaly H appears to be a rectilinear anomaly, running east-west for 35m before turning south for 14m and then east and slightly north again for 22m. It is possible that this anomaly is in fact 3 different features, but the image data suggests that they are related. While this anomaly could be part of a drainage system, the orientation makes this unlikely. It is pertinent to point out that the anomaly occurs immediately to the west of the area of the moated manor house dismantled in the 1970's.

The Resistivity Data
Due to pressure from the client, the resistivity survey was carried out in far from ideal conditions; namely, the ground was frozen and covered in the remains of snow on the 8th of February and was totally wet on the 14th of February. Resistivity surveying measures the difference in electrical resistance in the soil, and as water is a good conductor of electricity, the resistance in wet soils is conversely much lower than would otherwise have been the case. Note this difference in the greyscale image (Figure 4), where the southernmost 2 grids were surveyed on the 14th February, when the ground was wet from rain and snow the previous day. In addition, the four grids surveyed on the 8th February were also affected by water as the snow and frost thawed out during the duration of the survey, so that like cannot be compared to like across the four grids. All of these factors render the results of the resistivity survey somewhat invalid, and any conclusions drawn from the resistivity survey data should be treated with extreme caution. In effect, all that can be pointed out are areas of higher or lower resistance, and even these cannot be differentiated into potential archaeological features, as they may well have been caused by different levels of wetness or different stages of thawing underground.

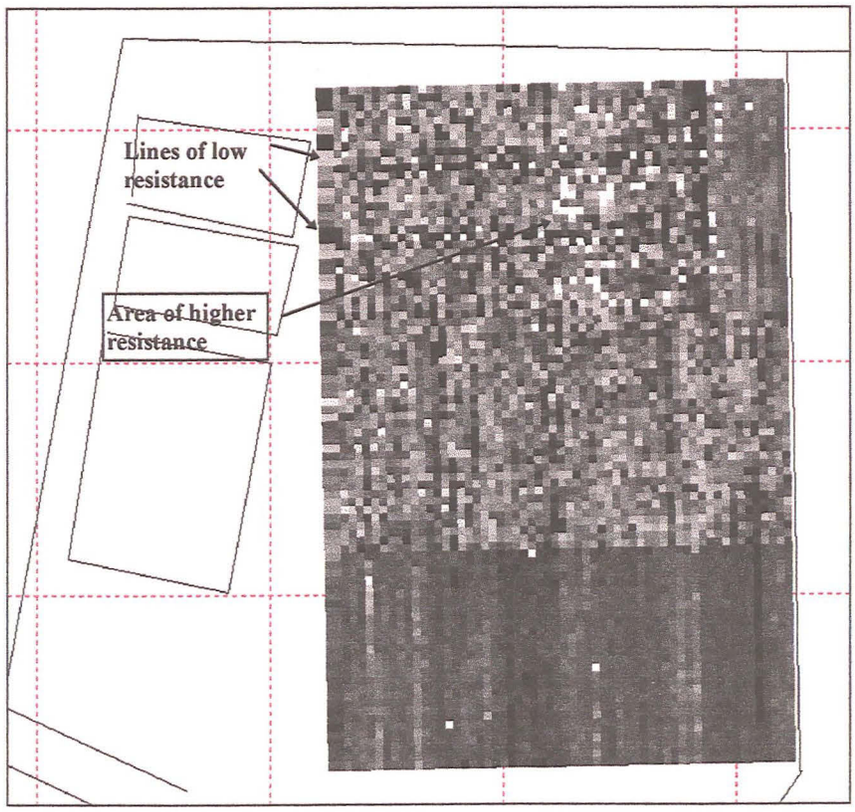

Figure Four
This plan shows the results of the resistivity survey displayed as a greyscale image.

In effect, only two anomalies (See Figure Four) can be identified with even a low level of confidence from the resistance data. The first are two low resistance linear anomalies running east-west across the northern part of the survey. These can be equated to furrow lines, the northernmost of which was particularly deep. The second is an area of high resistance in the north-west of the survey area. No interpretation can be offered for this anomaly, due to the factors described above.

Conclusion

In conclusion, the site at Kirton proved to be of a medium to low magnetic susceptibility, with the ploughed field making this form of survey difficult in places. A number of magnetic anomalies were found, most of which are modern in origin. However, two anomalies (H and G) may be archaeological in origin. The weather conditions made the resistivity survey data almost impossible to interpret, and only one area of high resistance could be identified. Any conclusions drawn from the resistance data should be treated with extreme caution.

The plans should allow any archaeological investigation (if such is deemed to be necessary) of the area to concentrate in the specific areas believed to be significant. The United Kingdom latitudes are such that there can be a distortion of up to half a metre in position between the magnetic anomalies shown and the position of the actual features themselves.

Report by James Lyall

Landscape Research Centre Ltd.

APPENDIX ONE

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